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Ambositrinae
(Insecta: Hymenoptera: Diapriidae)

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Front cover. The insects depicted are *Maoripria verticillata* n.sp., male (above) and
M. annettae n.sp., male (below)

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ABSTRACT

The genera and species of Ambositrinae occurring in New Zealand are described and illustrated, and the known distribution of all species is mapped. Keys to the subfamilies of Diapriidae and the genera of Ambositrinae occurring in New Zealand are given. The phylogeny of the world genera of Ambositrinae, modifications of the first post-petiolar tergite, wing reduction, biology, and host associations are discussed. An abnormally developed cyclopic male is described. The biogeographical relationships of New Zealand's Ambositrinae are reviewed in the context of continental drift theory. Speciation and present-day distributions of species within New Zealand are explained by reference to Tertiary changes in land area and glaciation. Four genera are redescribed: *Pantolytomyia* Dodd, 1915; *Diphoropria* Kieffer, 1905; *Parabetyla* Brues, 1922; *Betyla* Cameron, 1889 (= *Tanyzonus* Marshall, 1892). Three new genera – *Archaeopria*, *Maoripria*, *Zealaptera* – are erected. *Parabetyla spinosa* Brues, 1922 and *Betyla fulva* Cameron, 1889 (= *Tanyzonus bolitophilae* Marshall, 1892) are redescribed, and 33 new species are described: *Archaeopria eriodes*, *A. pelor*, *A. pristina*; *Pantolytomyia flocculosa*, *P. tungane*, *P. takere*, *P. polita*, *P. insularis*, *P. wairua*, *P. taurangi*; *Diphoropria sinuosa*, *D. kuscheli*; *Maoripria verticillata*, *M. annettae*, *M. earlyi*, *M. masneri*; *Parabetyla tika*, *P. pipira*, *P. ngarara*, *P. pokorua*, *P. nauhea*, *P. tahi*; *Zealaptera chambersi*; *Betyla prosedera*, *B. auriger*, *B. thegalea*, *B. rangatira*, *B. karamea*, *B. eupepla*, *B. tuatara*, *B. wahine*, *B. paparoa*, *B. midas*. Unassociated males representing 2 species of *Maoripria*, 2 species of *Parabetyla*, and 7 species of *Betyla* are diagnosed briefly.

CHECKLIST OF TAXA

<i>Archaeopria</i> new genus	Page 16	<i>pokorua</i> new species	Page 49
<i>eriodes</i> new species	17	<i>nauhea</i> new species	49
<i>pelor</i> new species	18	<i>tahi</i> new species	50
<i>pristina</i> new species	19	sp. P94	50
<i>Pantolytomyia</i> Dodd, 1915	20	sp. P95	50
<i>flocculosa</i> new species	23	<i>Zealaptera</i> new genus	51
<i>tungane</i> new species	25	<i>chambersi</i> new species	51
<i>takere</i> new species	26	<i>Betyla</i> Cameron, 1889	52
<i>polita</i> new species	26	= <i>Tanyzonus</i> Marshall, 1892	
<i>insularis</i> new species	27	<i>fulva</i> Cameron, 1889	56
<i>wairua</i> new species	28	= <i>bolitophilae</i> Marshall, 1892	
<i>taurangi</i> new species	29	<i>prosedera</i> new species	57
<i>Diphoropria</i> Kieffer, 1905	31	<i>auriger</i> new species	58
<i>sinuosa</i> new species	33	<i>thegalea</i> new species	59
<i>kuscheli</i> new species	36	<i>rangatira</i> new species	60
<i>Maoripria</i> new genus	37	<i>karamea</i> new species	60
<i>verticillata</i> new species	39	<i>eupepla</i> new species	61
<i>annettae</i> new species	41	<i>tuatara</i> new species	63
<i>earlyi</i> new species	42	<i>wahine</i> new species	64
<i>masneri</i> new species	43	<i>paparoa</i> new species	65
sp. P72	43	<i>midas</i> new species	65
sp. P73	44	sp. P75	66
<i>Parabetyla</i> Brues, 1922	44	sp. P76	66
<i>tika</i> new species	46	sp. P77	66
<i>spinosa</i> Brues, 1922	48	sp. P78	67
<i>pipira</i> new species	48	sp. P79	67
<i>ngarara</i> new species	48	sp. P80	67
		sp. P81	68

CONTENTS

Acknowledgments	Page 6
Introduction	6
Phylogeny	7
Biology	10
Wing reduction	10
Biogeography	10
Methods and conventions	13
Key to subfamilies of Diapriidae occurring in New Zealand	14
Key to genera of Ambositrinae occurring in New Zealand	15
Descriptions (see 'Checklist of Taxa')	16
References	69
Appendix 1: Abbreviations for collectors' names	70
Appendix 2: Glossary of morphological terms and symbols	71
Appendix tables 1-6	73
Illustrations: line figures	81
micrographs	106
distribution maps	142
Taxonomic index	164



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INTRODUCTION

The Ambositrinae are one of the major hymenopterous components of the New Zealand forest fauna. Probably all are parasites of the immature stages of nematocerous Diptera, which are also abundant in the litter and low vegetation of New Zealand forests. The present-day austral-disjunct distribution of the Ambositrinae (Naumann 1982) reflects a Gondwana radiation no later than the Cretaceous, and the morphological diversity within the subfamily evidences a long evolutionary history.

The New Zealand forest floor fauna as a whole has been regarded as a Tertiary fauna which survived the Pleistocene glaciations, often in relatively small refugia, and which has colonised in strength the expanding post-glacial forests (Dugdale *in* Wardle *et al.* 1983). Because of New Zealand's long isolation this colonisation has taken place largely in the absence of competition from more recently evolved hymenopterous taxa. It is not surprising, then, that New Zealand's Ambositrinae are of uncommon interest.

The bibliography of original work on the New Zealand Ambositrinae is meagre, and concerns predominantly two species. Cameron's (1889) description of the genus *Betyla* for *B. fulva*, represented then by a single female from Greymouth, is the first description of a diapriid now known to belong to the Ambositrinae. Marshall (1892a) erected *Tanyzonus* for a new species, *bolitophilae*, of which he had female and male specimens reared from the glow-worm *Arachnocampa luminosa* (Skuse) (Diptera: Keroplatidae) (see also Hudson 1892, 1893). However, only months later Marshall (1892b) synonymised his species with *B. fulva*. This synonymy was doubted by Brues (1922) and Gourlay (1927), but has generally been accepted - e.g., by Kieffer (1916), who rediagnosed *Betyla* and *B. fulva*, and included *Betyla* in his key to world genera of Belytinae. Brues (1922) erected *Parabetyla* for a new species, *P. spinosa*, based on a single female from Dun Mountain NN, and provided a key which included *Betyla* and *Parabetyla*. Masner (1961) proposed the subfamily Ambositrinae for a new genus, *Ambositra*, from Africa and Madagascar. Subsequently *Betyla*, *Parabetyla*, and a number of other principally Southern Hemisphere diapriid genera were included in the Ambositrinae, and the Gondwana associations of the subfamily were appreciated for the first time (Masner 1969). Naumann's (1982) revision of the Australian Ambositrinae included a synopsis of world genera, diagnoses of *Betyla*, *Parabetyla*, and an undescribed New Zealand genus, and a discussion of the phylogenetic and biogeographic relationships of the New Zealand taxa then known.

This contribution, the result of a study of more than 3500 specimens over a period of 7 years, describes and names New Zealand taxa as fully as the available material allows.

However, much remains to be done within New Zealand, especially as regards rearing and the association of sexes.

PHYLOGENY

Most of the characters listed in Table 1 and used to construct the phylogeny (Text-fig. 1) are discussed in Naumann (1982). In general the polarity of each character has been determined by comparison with genera of the subfamily Belytinae, which appears to include the most primitive Diapriidae. Many of the plesiomorphies (those for characters 1, 3–5, 7, 8, 10–15, 18–21, 23–25, 30, and 32) are plesiomorphies for the Hymenoptera as a whole. Only the modifications of T2, the parafrontal carina, the pronotal scrobe, and the cercus require further explanation.

Modifications of T2. Fig. 26–29 show the plesiomorphic arrangement of the anterior metasomal tergites in the Hymenoptera. Either the tergites do not overlap, or the posterior margin of each tergite slightly overlaps the anterior margin of the following one. This is the situation in primitive Diapriidae, and is seen widely in Belytinae (Fig. 30, 31). In all Diapriidae T2 is relatively large. The posterior margin of T1 (pmt) is clearly visible in dorsal view across its entire width. (In Diapriidae T1 is fused to S1, and together they form the petiole.) The joint between T1 and T2 allows considerable mobility, which is important for manoeuvres associated with oviposition and copulation. However, it is a point of weakness which may be susceptible to damage by dirt particles or predators. Therefore, within the Ambositrinae there is a trend towards the at least partial protection of this joint. Lateral extensions of T2 (al, Fig. 30) combine with similar outgrowths of S2 to protect the joint in all Ambositrinae.

In *Diphoropria* Kieffer and *Archaeopria* n.gen. carinae (ct) arise from each anterolateral corner of T2 and provide additional dorsolateral protection to the joint (Fig. 32, 33). The posterior margin of T1 is still broadly visible in dorsal view, and the anterior margin of T2 appears to be emarginate, with the emargination flanked by carinae.

In *Pantolytomyia* Dodd a flange (ft) arises from each anterolateral corner of T2 to partially cover the T1–T2 joint from above (Fig. 34, 36). Consequently, only a small portion of the posterior margin of T1 is visible in dorsal view and T2 has acquired a secondary, incised, anterior margin (am, Fig. 34, 36).

The most complete type of protection of the T1–T2 joint has been achieved independently within the *Dissoxylabis* Kieffer group of genera and in the *Betyla* group. The flange arising from T2 forms a complete cover over the joint, and T2 has acquired a secondary, 'entire' anterior margin (am, Fig. 35, 36). The posterior margin of T1 is not visible in

dorsal view, unless the gaster is very strongly jack-knifed on the petiole.

Ambositra protects the T1–T2 joint in an entirely different way. T1 and T2 are more or less as in *Diphoropria* except that the lateral outgrowths of T2 are very large. The T1–T2 joint is almost completely overgrown and protected by dense, stiffly coiffured pubescence.

The blunt, pubescent anteromedian process of T2 of *Maoripria* n.gen. appears to be a novel development in this genus, although it is lost in one apterous species. Possibly the low, bare longitudinal ridges seen in a similar position in some *Diphoropria* and *Scianomas* Naumann are homologous structures.

Parafrontal carina. This minute carina extends from the posterior wall of each antennal socket to the frons and encloses the postantennal excavation (Fig. M63, M64). It is known only in *Maoripria*, although processes from either the antennal socket or the frons or from both are present in many other genera.

Pronotal scrobe. A transverse groove is present on the pronotum in some Belytinae. This seems to be the forerunner of the discrete pit here termed the pronotal scrobe (Fig. M139, M140). The pronotal scrobe is the synapomorphy of the *Dissoxylabis* group of genera.

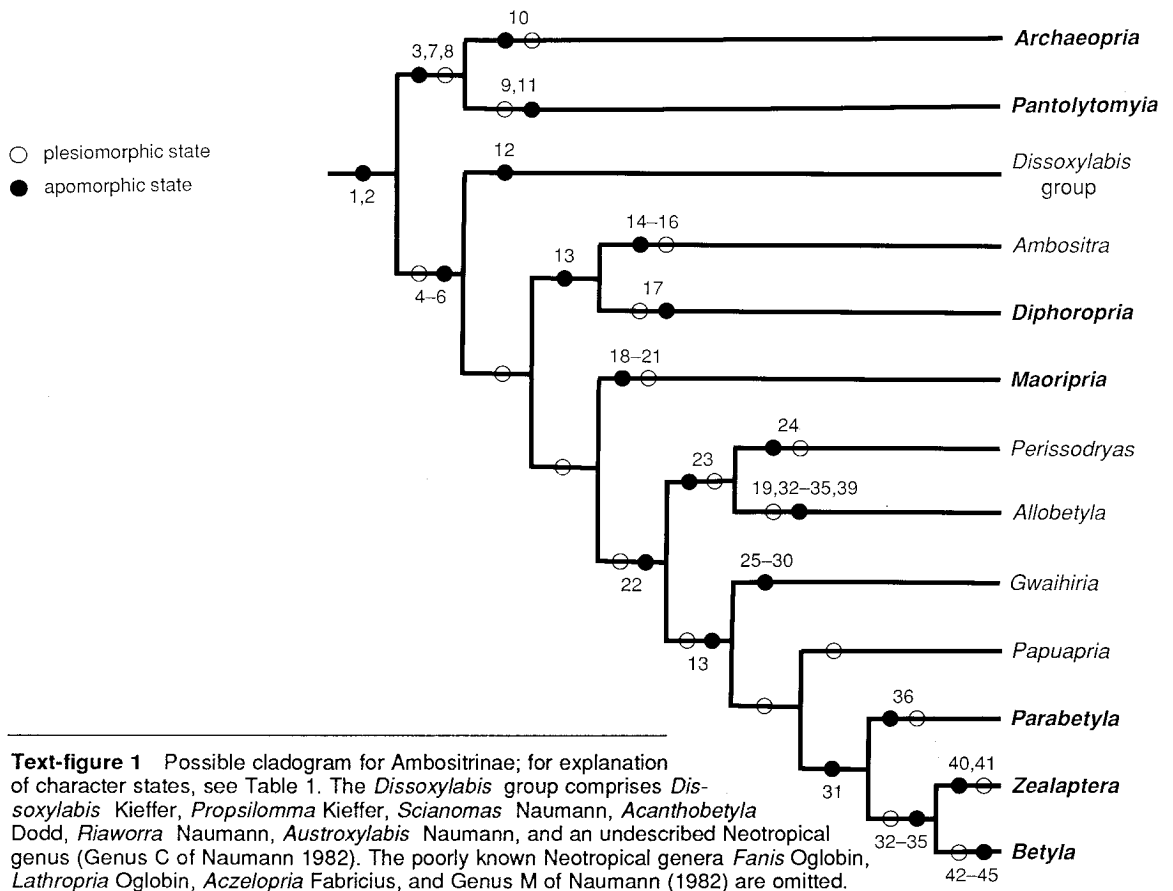
A pronotal scrobe is also present in macropterous males of two species of *Betyla*, but it is absent from most macropterous males, all wing-reduced males, and all females of the genus (all female *Betyla* are apterous). Two explanations are possible: (1) the pronotal scrobe has been acquired secondarily in *Betyla*, and *Betyla* is not closely related to the *Dissoxylabis* group (as depicted in Text-fig. 1); (2) the pronotal scrobe has been lost secondarily from most *Betyla*, and thus *Betyla* is a member of the *Dissoxylabis* group. The pronotal scrobe certainly has been lost in the flightless Australian genus *Riaworra* Naumann, so it is not unreasonable to imagine the loss of the pronotal scrobe in wing-reduced *Betyla*, where the mesosoma is otherwise considerably modified. However, it is less easy to accept the loss of the pronotal scrobe from macropterous *Betyla*.

Cercus. An articulated cercus occurs in most primitive Hymenoptera, and presumably is part of the diapriid ground-plan. Within the Ambositrinae the articulated cercus may be digitiform (i.e., length exceeds basal diameter) or lobiform (i.e., length and basal diameter similar). In *Archaeopria* and *Pantolytomyia* the cercus of the female (and sometimes also that of the male) is reduced to a convex plate bearing sensory setae. Such reduction has taken place independently within the Belytinae and the Diapriinae.

(continued on p. 10)

Table 1 Character states used in construction of cladogram (Text-fig. 1) for Ambositrinae

Char. no.	Character	Plesiomorphic state	Apomorphic state
1	Lateral margin of gaster	rounded, laterotergites not sharply defined	carinate, laterotergites sharply defined
2	1st post-petiolear sternite (S2)	not smaller than S3	smaller than S3
3	Forewing distal margin (macropters)	rounded	emarginate or incised
4	Forewing costal cell (macropters)	broad	narrow
5	Basalis and 1A (macropters)	tracheate	not tracheate
6	Free tergites on gaster	6	5 or fewer
7	Cercus of female	digitiform or lobiform, articulated	plate-like, not articulated
8	Cerci of female	widely separated	narrowly separated, or moderately so
9	T2 anteriorly	emarginate	incised
10	Notaulices of macropters	well defined	weak or absent
11	Pre-episternal furrow	absent	broad or narrow
12	Pronotal scrobe	absent	present
13	Hindwing <i>Sc+R</i> (macropters)	present	absent
14	F1	with no basal ring nor distinct constriction	with basal ring and distinct constriction
15	Pubescence of forewing (macropters)	not closely appressed, dense	closely appressed, sparse
16	Forewing <i>Sc+R</i> (macropters)	reaching costal margin; marginal vein present	not reaching costal margin; marginal vein absent
17	T2 anterior emargination	without longitudinal carinae either side	with a longitudinal carina on each side
18	Parafrenal carina	absent	present
19	Antennal socket inner wall	not produced dorsally	produced dorsally
20	Notaulices of macropters	weak	absent
21	T2 anteriorly	without a blunt median process	with a blunt median process
22	T2 anteriorly	emarginate	entire
23	S3 anteriorly	not bulging beneath S2	bulging beneath S2
24	Apical external spine of foretibia	absent	present
25	Occipital carina	smooth	punctate
26	Genal region around anterior tentorial pit	not strongly concave	strongly concave
27	Labrum, distal margin	convex or straight	emarginate
28	Body	elongate	short, stocky
29	Antennal prominence	strong	weak
30	Marginalis of macropters	long, L/W approx. 2.0	short, L/W 1.1–1.5
31	Wing development, females	macropterous	micropterous or apterous
32	Petiole, dorsal carinae	present	absent
33	Mesoscutellum	present, not strap-like	strap-like or absent



(Table 1: continued from previous page)

34	Mesoscutellar fovea	present	absent
35	Tegula and forewing	present	absent
36	Pronotum, transverse carina	absent	present
37	Neck	as long as collar	shorter than collar
38	Metanotum	defined	absent, or reduced to a smooth trough
39	Mesosoma and petiole	not extensively rugose-punctate	extensively rugose-punctate
40	Legs	slender	stout
41	Mandibular formula	2-3	2-2
42	Occipital carina	not a complete ring	a complete ring
43	Cercus-bearing tergite (female)	sclerotised, cerci present	desclerotised, cerci absent
44	Free tergites in gaster (female)	5	2
45	Gastral tergites, sinuate suture	absent	present

Sister-group relationships. Text-fig. 1 summarises the fairly clear-cut autapomorphies of the various ambositrine genera and proposes a tentative phylogeny for the subfamily. A resolution of the *Dissoxylabis* group has been proposed by Naumann (1982).

Many of the proposed sister-group relationships are very weakly established. Several are defined by single apomorphies, e.g., *Ambositra* + *Diphoropria*, *Perissodryas* + ... + *Betyla*, *Gwaihiria* + ... + *Betyla*, and *Parabetyla* + *Zealaptera* + *Betyla*; and two branches – *Ambositra* + ... + *Betyla* and *Maoripria* + ... + *Betyla* – lack synapomorphies entirely. Only the primary dichotomy separating *Archaeopria* and *Pantolytomyia* from the other genera is beyond suspicion. Further consideration of the phylogeny of the subfamily and of a tribal classification should be deferred until the poorly known Neotropical genera have been assessed.

The cladogram allows numerous convergences. The pre-episternal furrow has opened up in *Pantolytomyia* + *Archaeopria* and in *Perissodryas* Naumann. The inner wall of the antennal socket is dorsally produced in *Pantolytomyia* (although sometimes weakly so), *Archaeopria*, *Maoripria*, apterous *Perrissodryas*, *Allobetyla* Naumann, and *Lathropria* Ogloblin. The produced socket is often correlated with terricolous habits and wing reduction. Wing reduction and the associated modifications of the head and mesosoma have occurred at least nine times. Of eighteen ambositrine genera, only six do not include at least some wing-reduced forms. The distribution of modified flagellar segments remains a confused matter, and I have omitted the character from the phylogenetic analysis. However, it does seem likely that a carina has appeared on F3 independently within *Diphoropria*, *Maoripria*, *Perissodryas*, and *Gwaihiria* Naumann. S3 is anteriorly swollen to accommodate an enlarged ovipositor in females of *Maoripria*, some *Betyla*, *Perissodryas*, *Allobetyla*, *Scianomas*, and some *Dissoxylabis*.

BIOLOGY

Despite the abundance of adult Ambositrinae only two species have been reared to provide definite host associations. *Betyla fulva* is a solitary parasite of the glow-worm *Arachnocampa luminosa*, the adult wasp emerging from the pupa of the fly (Hudson 1892). *Diphoropria sinuosa* n.sp. has been reared from an unidentifiable mycetophilid pupa.

Adult ambositrines (and other diapiroids) are most commonly collected in moist, shaded habitats from litter, moss, and low vegetation. With very few exceptions, those diapiroids for which hosts are known are parasites of the

immature stages of Diptera. Given this, it is reasonable to assume that all ambositrines are also parasites of Diptera, most likely nematoceros flies, which usually are extremely abundant in typical ambositrine habitats.

Adult ambositrines have been collected in and at the margins of the following habitats and vegetation types:

Nothofagus (various species) forests;
Nothofagus / podocarp / broadleaf forest;
Agathis (kauri) forest;
Agathis / podocarp forest;
podocarp / broadleaf forest;
punga (*Alsophila*) / broadleaf forest;
rimu (*Dacrydium*) forest;
Dracophyllum forest;
podocarp / broadleaf / nikau palm (*Rhopalostylis*) forest;
Fuchsia / *Weinmannia* bush;
Podocarpus bogs;
subalpine grassland bogs;
Scirpus swamps;
paddocks;
domestic gardens.

They are known from altitudes up to 1615 m, and they avoid xeric, glacial, and exposed habitats.

WING REDUCTION

In New Zealand many insect families include a strikingly large number of species which are secondarily flightless (Holloway 1963, Watt 1975). The extent of wing atrophy or loss in the New Zealand Hymenoptera has not been documented precisely, but the phenomenon appears to be common in the Ceraphronoidea, Scelionidae, and Diapriidae and in some chalcidoid, platygastriid, proctotrupid, and bethylid groups, and, of course, in the Formicidae (Naumann & Early, unpublished; Dessart 1981; Valentine & Walker 1983). Wing reduction occurs in 89% of New Zealand ambositrine species. Other structural changes accompanying wing reduction and various biological aspects of wing polymorphism and wing reduction in Ambositrinae have been reviewed by Naumann (1982), and some biogeographical aspects are treated below.

BIOGEOGRAPHY

As is the case in many other groups of New Zealand insects (see Watt 1975), endemism is very high in the Ambositrinae. All New Zealand ambositrine species and five of the seven genera are endemic; only *Pantolytomyia* and *Diphoropria* are shared with other regions. *Pantolytomyia* is represented in New Zealand by seven species, and else-

where only by a single, taxonomically isolated species in eastern Australia. *Diphoropria* is represented in New Zealand by two species which form a species-group morphologically remote from all other species-groups. *Diphoropria* is the dominant ambositrine genus in Australia, New Guinea, and on the south-west Pacific islands: in all these areas there is a total of about 35 species, some of which are very common. One of the New Zealand species, *D. sinuosa*, is among the most common of New Zealand's microhymenopterans.

Ambositrinae are known from New Caledonia, Norfolk Island, and Lord Howe Island, but species from these islands are more closely related to Australian and New Guinea ambositrines than to New Zealand species (Naumann 1987 and unpublished).

There are no close affinities between the New Zealand and South American Ambositrinae. Masner (1969) suggested that several micropterous South American ambositrines could be referred to *Parabetyla*, which is represented by six species in New Zealand. However, these South American micropters are more closely related to *Dissoxylabis*, their resemblance to species of *Parabetyla* being the result of convergence (Naumann 1982; see also remarks following redescription of *Parabetyla*).

The austral disjunct distribution of the world's Ambositrinae and of the Mycetophilidae plus Keroplatidae, which include the only recorded hosts, has been discussed at some length by Naumann (1982). Since the New World ambositrine genera are still poorly understood, and the phylogeny depicted in Text-fig. 1 remains tentative, it is premature to speculate further on the historical biogeography of the subfamily. However, it does seem clear that *Pantolytomyia*, *Archaeopria*, *Diphoropria*, *Maoripria*, and the common ancestor of the *Parabetyla* + *Zealaptera* + *Betyla* group were isolated on the New Zealand land mass when this effectively lost contact with Cretaceous Gondwanaland. The *Dissoxylabis* group of genera (characterised by the presence of a pronotal scrobe) is well represented in both Australia and South America, and if the phylogeny depicted in Text-fig. 1 is correct, should have had the opportunity to enter New Zealand before the latter's biological isolation. It is possible that eventually *Betyla* will prove to be a New Zealand representative of the *Dissoxylabis* group (see discussion of pronotal scrobe under 'Phylogeny').

New Zealand is particularly rich in ambositrine species with primitive gastral segmentation and wing venation. The three species of *Archaeopria* and seven species of *Pantolytomyia* make up 29% of the New Zealand ambositrine fauna. In Australia, only *Pantolytomyia ferruginea* Dodd, which represents 2.2% of the ambositrine fauna, preserves the primitive ambositrine segmentation and venation.

New Zealand is also rich in wing-reduced forms: 89% of the species are either exclusively wing-reduced or have wing-reduced morphs. The corresponding figure for the Australian Ambositrinae is about 66%.

The New Zealand ambositrine fauna is large (36 species) considering the rather small land area. Australia, with a much larger land area, has 45 species. However, most of Australia is arid and inhospitable to ambositrines, which are restricted today to the small areas of moist forest in the east and south-west.

Naumann (1982) suggested that the driving force for speciation within the Australian Ambositrinae was the alternation between pluvial periods when ambositrines dispersed widely over the east and south, and arid periods when populations were isolated in forest tracts and small, moist refugia. How are we to account for the almost equally species-rich New Zealand ambositrine fauna?

It must be remembered that the outline of the New Zealand archipelago changed dramatically during the Tertiary (Fleming 1980). In the Cretaceous and Eocene the land was largely continuous, with a few isolated islands in the north. During this period primitive taxa would have been able to disperse widely. The present-day widespread distribution of all species of *Archaeopria* and of some species of *Pantolytomyia* may date from this period.

During the Oligocene, northern and southern land masses were widely separated, providing the opportunity for speciation on either side of the water barrier. Intermingling and wide dispersal throughout New Zealand was once again possible during the Miocene. In the Pliocene New Zealand was once again archipelagic. During the Pleistocene succession of glacial and interglacial periods sea levels fluctuated, at times allowing dispersal of land animals across the present-day Cook and Foveaux straits and at other times isolating land animals on islands. During the glacial periods much of the South Island was unsuitable for ambositrines because of widespread ice cover and the spread of tundra at the expense of forest areas. Some coastal areas (along with most of the North Island) escaped the worst effects of glaciation. Here scrubland and perhaps forest survived. Almost certainly there were several such isolated coastal refugia, and these have been used to explain Pleistocene speciation in alpine plants, cicadas, and other terrestrial animals (Fleming 1980). Possibly these also permitted speciation in Ambositrinae.

Reconstructions of the geological history of New Zealand since the Cretaceous provide, then, a picture of a changing archipelago of land areas hospitable to Ambositrinae and isolated from each other by water or glaciation. These hospitable areas periodically were interconnected by forested land. Since Ambositrinae in general favour moist forest habitats and eschew deforested areas or marine

barriers, and since many New Zealand ambositrines are flightless, with particularly limited dispersal powers, this changing scenario provides a reasonable explanation for the present-day species diversity.

Milder post-glacial conditions have permitted considerable recent dispersal of Ambositrinae, and earlier distribution patterns have been partially obscured.

Text-fig. 2 gives the number of species recorded in each of the areas defined by Crosby *et al.* (1976). The Ambositrinae are particularly diverse in the west and north of the South Island and in the Taranaki, Bay of Plenty, Auckland, and Northland areas. This reflects: (1) the greater number of suitable, moist forest habitats in these areas today (see fig. 3.9 in Wardle *et al.* 1983); (2) the geological history of New Zealand; and (3) considerable specialist collecting effort, particularly on the west coast of the South Island. Probably many ambositrine species originated in glacial refugia such as in the extreme north or the extreme southwest of the South Island. Presumably also there was some 'glacial concentration' of previously widespread species in these refugia. Both processes contribute to high species diversity in these areas and to the high species endemism evident in some terrestrial taxa (e.g., see Climo 1975).

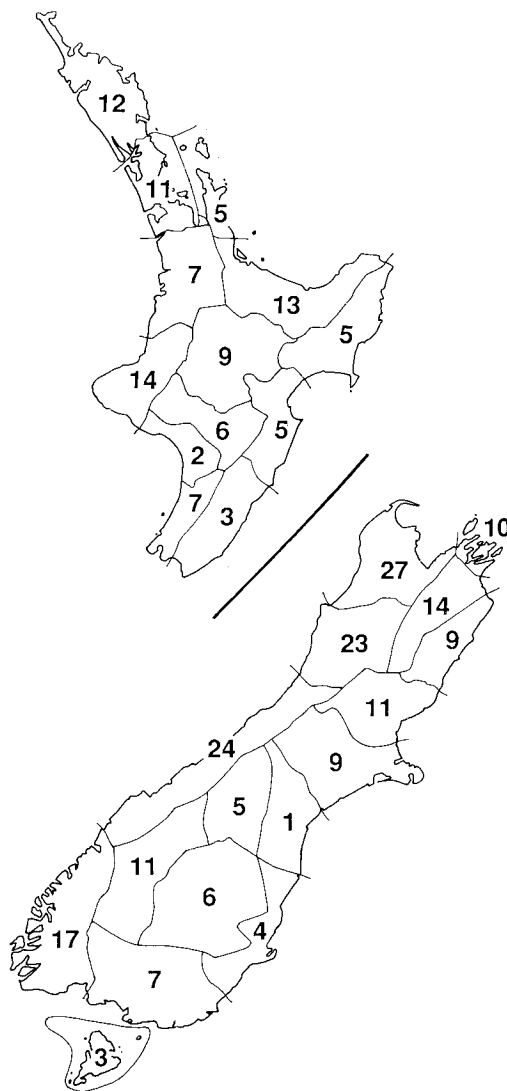
Archaeopria. All three species are widespread throughout New Zealand. The species are very distinct and retain many character states which are plesiomorphic for the Ambositrinae. It is reasonable to suggest that the species are very old, and that their widespread distribution may have been attained in the early Tertiary.

Pantolytomyia. Species such as *P. flocculosa* n.sp. and *P. taurangi* n.sp. retain striking plesiomorphic character states, and may have attained their present wide distributions very early in the Tertiary also. The *takere* species-group, comprising four species, all with wing-reduced females, is restricted to the South Island, and each species is more or less limited in its geographical range. It is likely that each survived (or perhaps originated) in an isolated coastal scrub refugium during Pleistocene glaciation, and because of the restricted dispersal powers of the females has since dispersed to only a limited extent. *P. insularis* n.sp., a member of the *takere* group, is the only ambositrine endemic to Stewart Island, and may have differentiated since Stewart Island was isolated by a rise in sea level 9500 years ago (Fleming 1975). There are examples of endemic Stewart Island taxa in other land animals, e.g., distinct races of birds (Bull & Whittaker 1975) and an endemic simuliid species (McLellan 1975).

Maoripria. The present-day restricted distributions of some wing-reduced *Maoripria* similarly may be the result

of origin in or confinement to glacial refugia, and subsequent limited dispersal. *M. annettae* n.sp. and *M. earyli* n.sp. are known from the South Island and the south of the North Island, which may reflect a previous distribution on the Pliocene southern island (see Fleming 1980), which included southern portions of the present-day North Island.

Diphoropria. *D. kuscheli* n.sp., which as far as is known is entirely macropterous, *D. sinuosa* macropters, and



Text-figure 2 Numbers of species of Ambositrinae collected from areas designated by Crosby *et al.* (1976); see also map on inside back cover.

moderately wing-reduced *D. sinuosa* brachypters (type A brachypters) are widespread through New Zealand. However, most records of the more strongly wing-reduced type B brachypters of *D. sinuosa* are from the South Island, and brachypterous males are known only from the south-west of the South Island. Probably the extremes of wing reduction are favoured by the extreme moist, cool conditions of the south-west (see Naumann 1982 for a discussion of factors influencing wing reduction in Ambositrinae).

Parabetyla. All females of *Parabetyla* are micropterous. One species from each of three species-groups has been recorded from both the North and South islands. Within the *spinosa* group, *P. pokorua* n.sp., *P. ngarara* n.sp., and *P. spinosa* Brues each has limited distribution, perhaps focusing on Pleistocene glacial refugia.

Zealaptera. The single, apterous species *Z. chambersi* n.sp. is widespread throughout New Zealand.

Betyla. All *Betyla* females are apterous. *B. fulva* is widespread throughout New Zealand. The closely related *B. prosera* n.sp. is absent from the southern half of the South Island, perhaps as a result of glaciation. *B. auriger* n.sp. is restricted to the north of the South Island, a distribution probably focusing on a glacial refugium. Presumably *B. thegalea* n.sp. attained its present distribution straddling Cook Strait before the last Pleistocene appearance of the strait. The distribution of the closely related *B. karamea* n.sp. and *B. rangatira* n.sp. appears to reflect unglaciated areas. *B. karamea* is known from the largely unglaciated North Island and an area focusing on the glacial refugia in the north of the South Island. The disjunct distribution of *B. rangatira* focuses on several South Island glacial refugia. Within the *eupepla* group, *B. eupepla* n.sp. and *B. tuatara* n.sp. are widespread. The restricted distribution of *B. wahine* n.sp. and *B. paparoa* n.sp. may be traceable to South Island glacial refugia. *B. midas* n.sp. is known from a single specimen from the Hunua Range, south-east of Auckland AK; it is perhaps premature to speculate that it originated on a Pliocene island in this region.

Males have been associated with females for very few species of *Betyla*. Among the unassociated males there are four wing-reduced species which are of biogeographical interest in that they are restricted to the South Island.

Wing-reduced forms are more numerous on the South Island. Of those species which include wing-reduced female morphs, only one (*B. midas*) is restricted to the North Island, 15 are known from both the North and South

islands, and an additional 14 are known only from the South Island. Males are less commonly wing-reduced, so for them the contrast between the islands is less striking. However, all the wing-reduced *Betyla* males (representing four species) and brachypterous male morphs of *D. sinuosa* are known only from the South Island.

There is one further interesting biogeographical observation to be made on wing-reduced forms. In Australia there are nine species of *Diphoropria* in which females are exclusively micropterous. In New Zealand there are no micropters, despite the abundance and widespread distribution of *Diphoropria* macropters and brachypters. Presumably, in New Zealand, the niches which could have been occupied by micropterous *Diphoropria* have been taken up by the many species of *Maoripria*, *Parabetyla*, *Zealaptera*, and *Betyla*, most or all of which have micropterous or apterous females, and all of which are absent from Australia.

METHODS AND CONVENTIONS

Collecting. New Zealand's ambositrines are most commonly collected in forest localities by diurnal, crepuscular, or nocturnal net-sweeping of low vegetation, by Malaise trapping, and by extraction of litter, moss, rotten wood, and lichens using a Berlese funnel. Pitfall, pan, and light traps are also productive. Occasional specimens can be obtained by manual sifting of leaf litter and moss.

Dissection. Specimens for this study were cleared in 10% (w/v) potassium hydroxide solution, washed in distilled water, and dissected in glycerine. Dissections were preserved temporarily on cavity slides, and finally were transferred either to glycerine in microvials attached to the specimen pin or via graded alcohols and Euparal essence to Euparal slide mounts.

Measurements were made from dried, pinned specimens.

Scanning electron microscopy. Most of the scanning electron micrographs were prepared at 15 kV accelerating voltages from dried specimens mounted on card and coated with gold/palladium. Fig. M8 and M13 were prepared at 5 kV using a specimen coated in a clear antistatic fluid, Duron®. This was applied by touching a fine brush on the surface of the fluid and then touching the tip of the brush on the specimen. Usually the fluid quickly spread to cover the surface of the specimen near to the point of contact with the brush. The process was repeated on the head, mesosoma, legs, and metasoma if complete coverage was required.

This process permitted examination of unique specimens which could not be coated with gold / palladium.

Association of sexes. Sexual dimorphism is pronounced in the Ambositrinae (Naumann 1982), and is even more exaggerated in those species in which females are short-winged or apterous and the males are macropterous. The New Zealand ambositrine fauna, with its many wing-reduced forms, presents particularly severe problems in this respect. It is often very difficult to associate females and males on purely morphological grounds. Further, it is common for closely related species to be collected together in the same locality and microhabitat, which makes it difficult to associate the sexes unequivocally on collecting records alone.

Only females have been selected as holotypes, and the males of many species have not been recognised. Males of the only species of *Zealaptera*, of most species of *Parabetyla*, and of some *Maoripria* and *Diphoropria* are unknown, and most males of *Betyla* cannot be associated with females. In this monograph unassociated males have been segregated to species and assigned 'provisional species numbers' (e.g., *Betyla* sp. P75). Species thus identified by number only are diagnosed briefly and included in the keys, and the material examined is detailed. Laboratory rearing over more than one generation will be required to associate definitely males and females of many species.

Descriptions. For economy of space, I have presented many descriptions of species or morphs as differential descriptions which indicate only how the species or morph differs from another which has been more fully described.

Data from specimen labels. The data for the holotype are given in full. For all other material examined I give only the number of specimens of each sex, the most specific locality information, the date of collection, the collector(s), and the repository. Abbreviations for collectors' names are defined in Appendix 1, and repository abbreviations (Watt 1979) under 'Institutions', below. Data on distribution, habitat, vegetation, altitude, and collecting method have been summarised. Imperial measure has been converted to its metric equivalent.

Institutions. The following abbreviations (after Watt 1979) are used for the names of institutions where material is held.

- AMNZ Auckland Institute and Museum, Auckland, New Zealand
ANIC Australian National Insect Collection, CSIRO Division of Entomology, Canberra, Australia
BMNH British Museum (Natural History), London, U.K.

- BPBM Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.
CMNZ Canterbury Museum, Christchurch, New Zealand
CNCI Canadian National Collection of Insects, Biosystematics Research Institute, Agriculture Canada, Ottawa, Canada
FCCO F. Chambers Collection, Opunake, New Zealand
HKTC Henry K. Townes Collection, Gainesville, Florida, U.S.A.
HNHM Hungarian Natural History Museum, Budapest, Hungary
LCNZ Department of Entomology, Lincoln College, Canterbury, New Zealand
NMNZ National Museum of New Zealand, Wellington, New Zealand
NZAC New Zealand Arthropod Collection, Entomology Division, DSIR, Auckland, New Zealand

Other conventions. (1) New Zealand localities are defined in terms of the two-letter codes of Crosby *et al.* (1976); see also map on inside back cover.

(2) Line figures, scanning electron micrographs, and distribution maps have been grouped separately. For ease of reference, micrographs are prefixed with the letter M (i.e., Fig. M1–M161).



KEY TO SUBFAMILIES OF DIAPRIIDAE OCCURRING IN NEW ZEALAND

The following key permits placement of all New Zealand species of Diapriidae but is not universally applicable — many Diapriinae and Belytinae occurring outside New Zealand do not agree with the antennal and wing character states given in couplet 2. Only the subfamily Ismarinae is not represented in New Zealand.

- 1 Gastral tergites with sharp lateral margins, abruptly reflexed (Fig. 20); 1st gastral sternite (S2) much shorter than 2nd (S3) (Fig. 15, 16, 18, 19) ... **AMBOSITRINAE**
 —Gastral tergites rounded laterally, not abruptly reflexed (Fig. 12, 13); 1st gastral sternite (S2) much longer than 2nd (S3) ... 2
- 2 Entire posterior margin of petiole clearly visible in dorsal view, not overlapped by anterior margin of T2 (Fig. 21, 22, M1, M3); antenna of female 15-segmented, with at most a very gradual club; antenna of male 14-segmented, with F1 carinate or emarginate; usually macropterous, but if brachypterous then gaster with an elongate, bead-like 'tail' (Fig. M5, cf. M6); radial cell of forewing and basal cell of hindwing both usually well defined ... **BELYTINAE**
 —Entire posterior margin of petiole not clearly visible in dorsal view, overlapped by anterior margin of T2 (Fig. 23–25, M2, M4) [if T2 strongly depressed, then posterior margin of petiole visible]; antenna of female 10–14-segmented, with a gradual or abrupt club; antenna of male 13- or 14-segmented; usually F2 carinate or emarginate, rarely F1 also carinate or no flagellar segments carinate; macropterous, brachypterous, micropterous, or apterous; gaster never with an elongate, bead-like 'tail'; neither radial cell of forewing nor basal cell of hindwing defined ... **DIAPRIINAE**
- Anterior margin of T2 emarginate, not overlapping posterior extremity of petiole; T2 with (Fig. M82, M85, M87) or without (Fig. M56, M84) a blunt anteromedian process ... 9
- 4(3) Male; antenna 14-segmented; F1 (and sometimes also F2) with a longitudinal carina, spine, or emargination (Fig. 248–257); gaster with 7 free sternites ... 5
 —Female; antenna 15-segmented; flagellar segments without carinae or emarginations (Fig. 239–247); gaster with 5 free sternites ... 7
- 5(4) Macropterous (Fig. 45) ... (p. 52) .. *Betyla* (part)
 —Micropterous (Fig. 259) or brachypterous (Fig. 260) ... 6
- 6(5) Gaster with 3 free tergites between petiole and spiracle-bearing tergite; all sutures between gastral tergites complete, reaching carinate margin of gaster ... (p. 44) .. *Parabetyla* (part)
 —Gaster with fewer than 3 free tergites between petiole and spiracle-bearing tergite (Fig. 271, 273–275); at least some sutures between gastral tergites laterally effaced, not reaching carinate margin of gaster ... (p. 52) .. *Betyla* (part)
- 7(4) Gaster with 3 free tergites between petiole and spiracle-bearing tergite (Fig. 43, 44); all sutures between gastral tergites complete, reaching carinate margin of gaster (Fig. 44) ... 8
 —Gaster with only 1 completely free tergite between petiole and spiracle-bearing tergite (Fig. 267, M147–150); at least some sutures between gastral tergites laterally effaced, not reaching carinate margin of gaster (Fig. 46) ... (p. 52) .. *Betyla* (part)



KEY TO GENERA OF AMBOSITRINAE OCCURRING IN NEW ZEALAND

- 1 Gaster with 4 free tergites between petiole and spiracle-bearing tergite (Fig. 15, 18) ... 2
 —Gaster with fewer than 4 free tergites between petiole and spiracle-bearing tergite (Fig. 16, 19, 267, 270–275, M159, M160) ... 3
- 2(1) Anterior margin of T2 emarginate (Fig. 72, 74, M12, M14); notaulices absent or weak and incomplete, never percurrent (Fig. M7–9); macropterous ... (p. 16) .. *Archaeopria*
 —Anterior margin of T2 incised (Fig. M20, M22, M24); notaulices present, sometimes weak but percurrent in all except micropters (Fig. M19, M21, M23, M28, M30, M32); macropterous, brachypterous, or micropterous ... (p. 20) .. *Pantolytomyia*
- 3(1) Anterior margin of T2 entire, overlapping posterior extremity of petiole; T2 without a blunt anteromedian process (Fig. M96, M97, M132, M134, M136) ... 4
 —Tegula and mesoscutal-mesoscutellar suture present (Fig. 192); pronotal collar about as long as neck, collar with a transverse carina (Fig. 192, 201–203); legs slender (Fig. 43) ... (p. 44) .. *Parabetyla* (part)
 —Tegula and mesoscutal-mesoscutellar suture absent (Fig. M93); pronotal collar much longer than neck, collar without a transverse carina (Fig. M92); legs stout (Fig. 44) ... (p. 51) .. *Zealaptera*
- 9(3) Inner wall of antennal sockets not dorsally produced; parafrenal carina absent (Fig. 159, M46); notaulices present (Fig. M49, M50) or absent; T2 anteriorly without (Fig. M56, M58) a blunt median process ... (p. 31) .. *Diphoropria*
 —Inner wall of antennal sockets dorsally produced (Fig. 176); parafrenal carina present (Fig. M63, M65); notaulices absent (Fig. M68, M70); T2 anteriorly with (Fig. M82, M85) or without (Fig. M67) a blunt median process ... (p. 37) .. *Maoripria*

DESCRIPTIONS

Archaeopria new genus

"Genus B". Masner, 1969: 105–107.

Type-species *Archaeopria eriodes* new species.

Diagnosis. Distinguished from all other Ambositrininae except *Pantolytomyia* by distal emargination or incision of forewing (Fig. 37, 66, 68, 69) and strongly sclerotised and tracheate basal and *IA* of forewing, and by 6 free gastral tergites of both sexes (Fig. 71, 73). Distinguished from *Pantolytomyia* by anteriorly emarginate T2 (Fig. 72, 74, M14).

Macropterous. Pronotal scrobe absent; median metanotal and propodeal carinae absent. F2 of male carinate.

Female. Macropterous.

Head hypognathous and globular or opisthognathous and somewhat elongate; temples of moderate length. Ocelli present. Vertex without spines or carina. Frontal prominence well developed; antennal socket with inner wall dorsally produced as a flange, outer wall not markedly expanded; parafrenal carina absent. Ventral margin of upper frons at most laterally defined. Compound eye of moderate size or small. Genal region not strongly concave about anterior tentorial pit. Occipital carina strong or weak, smooth, ventrally interrupted. Palpal formula 5-3. Mandibles sometimes forming a beak; mandibular formula 2-1 or 2-2. Distal margin of labrum convex. Genal bridge incomplete.

Antenna 0.5–0.6x BL, 15-segmented. F1 with or without a minute ring near base and basal constriction. Clava absent or 5- or 6-segmented and weak.

Mesosoma broad, widest at tegulae, not extensively rugose-punctate. Pronotum: neck much longer than collar or as long, posteriorly with or without a transverse row of small punctures; collar medially short or moderately long, without a transverse carina or spines. Pronotal scrobe, postspiracular excavation, and posterolateral spine all absent. Mesoscutum convex, without microsculpture; notaulices very weak and incomplete, or absent. Tegula large, without microsculpture. Mesoscutal-mesoscutellar suture present. Mesoscutellum: fovea well defined, undivided; axillar processes blunt or slightly acuminate, free or not free. Mesopleuron: pre-episternal furrow, sternaulus, and ventral sternopleural carina all absent. Metanotum large, 0.4–0.5x as long as mesoscutum; dorsellum defined, with lateral carinae but lacking median and transverse carinae; spines absent. Dorsal propodeum: lateral carinae straight, parallel or posteriorly diverging; median carina absent; anterior margin weakly defined; posterolateral

corners bluntly or subangularly produced; vertical spines absent; posterior margin defined, excavate; propodeum and nucha not smoothly continuous.

Forewing broad, flat, at rest reaching just beyond posterior tip of gaster, hyaline, tinged with yellow, not microdenticulate; distal margin emarginate or incised. Marginal vein not extending beyond proximal 0.4–0.5 of wing. *C*, *Sc+R*, marginalis, stigmalis, basalis, and *IA* strongly sclerotised, tracheate; *M+Cu1* and *Cu1* proximally both weakly indicated by coloration. Costal cell broad. Radial cell not defined; basal cell well defined, closed. Marginal vein broadly contiguous with costal margin; $M/W = 3.0-8.9$; $S/M = 1.1-1.8$.

Hindwing broad, 0.7–0.8x as long as forewing, hyaline, tinged with yellow, with 3 hamuli. *Sc+R* strongly sclerotised, tracheate, continuous from base to hamuli, with 2 pustules distally; basal cell not defined; *C* indistinguishable.

Legs slender. Foretibia without an apical, external spine.

Petiole. Longitudinal carinae parallel, diverging over midlength, or absent; $PL/PW = 1.2-2.8$.

Gaster with 6 free tergites and 5 free sternites, posteriorly acuminate. T2 anteriorly emarginate, with a pair of longitudinal carinae. T3, T4, and T5 transverse. T6 subtriangular to trapeziform, with a pair of spiracles. T7 minute, exposed, with a pair of cerci. Cerci plate-like, not articulated, externally visible, narrowly separated. All sutures between tergites complete, well defined, evenly curved. S2 of moderate size; anterolateral corner not visible from above; anterior and posterior margins emarginate. S3 anteriorly not bulged beneath S2. S6 triangular.

Pubescence. Body with numerous long, appressed or suberect setae; dense, short, appressed pubescence reduced. Woolly pit posterior to coxa I present or absent, pit posterior to coxa II present; pits without broad, flat setae. Truncate, golden setae absent. *Sc+R* of forewing with or without a macroseta near intersection with basalis. Surfaces and margins of wings densely pubescent. S6 without a dense brush of setae.

Male. Differing from female as follows.

Antenna 0.6–0.8x BL, 14-segmented. F1 elongate, cylindrical; $F1L/F1W = 3.1-5.5$. F2 carinate. F3–12 cylindrical, elongate, or only slightly longer than wide, not strongly pedunculate. Clava absent; distal flagellar segments at most very slightly wider than proximal segments.

Petiole. $PL/PW = 1.5-3.3$.

Gaster with 7 free sternites.

Remarks. The three species referred to *Archaeopria* are very different phenetically, though possibly *A. pelor* and *A. pristina* are more closely related. In contrast to *A.*

eriodes, both these species have the inner walls of the antennal sockets produced, the notaulices absent, coxal pit I not visible in lateral view, and the postmarginal row of setae absent. On the other hand the bizarre head of *A. pelor* is unlike that of any other ambositrine.

The three species share several character states plesiomorphic for the Ambositrinae: basalis and *IA* of forewing tracheate; costal cell of forewing broad; *Sc+R* of hindwing reaching hamuli as a tracheate vein; gaster with 6 free tergites; T2 anteriorly emarginate. Perhaps the slight sexual dimorphism could be added to this list. The weakening or loss of the notaulices in macropters (a very rare condition within the Ambositrinae) is the only autapomorphy.

In several respects *A. eriodes* is curiously similar to *Ambositra famosa* Masner of the Ethiopian region. In both species coxal pit I is not visible in lateral view, the neck is surrounded by rigid, regular, woolly pubescence, and the setae of the body tend to be sparse and appressed.

The name *Archaeopria* is derived from the Greek *archaios* ('primitive, old') and the ending *-pria*, commonly used for diaptiid genera; gender feminine.

KEY TO SPECIES OF *ARCHAEOPRIA* (FEMALES AND MALES)

- 1 Antennal socket anteriorly with an angulate process (Fig. 48, 51, 56, 57); opisthognathous, the mandibles longitudinally aligned ... (p. 18) .. *pelor*
—Antennal socket without an angulate process (Fig. 47, 49, 50, 52); hypognathous, the mandibles transversely aligned ... 2
- 2(1) Notaulices present (Fig. M7); inner wall of antennal socket very slightly produced dorsally (Fig. 53); coxal pit I not visible in lateral view (Fig. M15); petiole short, PL/PW less than 2.0; flagellar segments of male short, F12L/F12W less than 1.9 ... (p. 17) .. *eriodes*
—Notaulices absent (Fig. M9); inner wall of antennal socket strongly produced dorsally (Fig. 55); coxal pit I visible in lateral view (Fig. M16); petiole elongate, PL/PW more than 2.6; flagellar segments of male elongate, F12L/F12W more than 3.0 ... (p. 19) .. *pristina*

Archaeopria eriodes new species

Pantolytomyia sp. 1. Naumann 1982: 32, 34.

Female. Length and ratios of measurements as in Appendix Table 1.

Head in dorsal view not strongly emarginate posteriorly; occipital carina well defined, not projecting strongly beyond posterior of gena. Temple smoothly curving to

occipital carina (Fig. 47). Vertex convex, curving smoothly to occipital carina (Fig. 50). Ocelli of moderate size. Upper frons very weakly convex; ventral margin defined laterally by a process. Antennal sockets thin-walled, medially contiguous; inner wall very weakly produced dorsally (Fig. 53); anterior wall rounded, without an angulate process. Clypeus and labrum each wider than long; free margin of labrum convex. Hypognathous; mandibles transverse, their apices broadly overlapping.

Antenna. Scape, pedicel, and F1–5 smooth. Scape basally slender (Fig. 58). Clava moderately defined.

Mesosoma. Pronotum: anterior neck transversely striate, posterior neck with a row of foveae; mid-dorsal length of collar less than OD. Mesoscutum (Fig. M7): notaulices anteriorly weak, in cross-section broadly V-shaped, posteriorly indistinct; middle and lateral lobes weakly convex. Mesoscutellum: fovea well defined, slightly wider than long, its posterior margin strongly convex; septum between fovea and lateral excavation of moderate size; parafoveal area sloping posteriorly, its submarginal carina strong; free portion of each axillar process short. Postfoveal mesoscutellum distinctly broader than fovea, weakly convex; lateral margin not foveolate; posterior margin and rim smooth. Lateral excavation small. Mesopleuron (Fig. M10) anteriorly produced; coxal pit I not visible in lateral view. Metanotum: lateral carina not dorsally produced; lateral excavation smooth. Dorsal propodeum: lateral carinae strong, posteriorly diverging (Fig. M12); posterior margin weakly emarginate. Nucha smooth.

Forewing. Incision deep (Fig. 66). Venation as in Fig. 66; basalis straight.

Petiole. Median dorsal carina at most weakly indicated anteriorly only. Dorsolateral carinae anteriorly weak and diverging, or absent, posteriorly strong, subparallel.

Gaster. T2 anterolaterally broadly produced (Fig. M12); anterolateral longitudinal carina shorter than PL.

Pubescence. Occipital carina (except mid-dorsally) and pronotal collar each with a regular, rigid, woolly band (Fig. M15, M17). Postantennal excavation with dense, woolly setae matted by flocculent material. Propleuron, dorsellum, dorsolateral and ventral propodeum, lateral and ventral petiole, and S2 all densely woolly. Head, ventral mesosoma, and gaster all with moderately dense to scattered, appressed setae. Mesoscutum and mesoscutellum with scattered setae. Lateral pronotum, mesopleuron, longitudinal band on lateral propodeum, and T2 entirely or mostly bare. Forewing: macroseta at intersection of *Sc+R* and basalis approximately twice as long as surrounding setae; an irregular postparastigmal row of setae present (Fig. 67); apical marginal setae approximately twice as long as marginalis.

Colour. Head and mesosoma pale brown; metasoma, legs, and antenna pale brown to reddish orange to yellow; palpi yellow; pubescence silver to slightly golden.

Male. Differing from female as follows. Length and ratios of measurements as in Appendix Table 1.

Antenna. F2 carinate, as in Fig. 61. Flagellar segments as in Fig. 61, 62.

Type data. **Holotype:** female, WD-OL, Haast Pass, W of summit, 550 m, from sifted litter and rotten wood, 24 January 1978, G. Kuschel (NZAC).

Paratypes (5 females, 7 males). **NORTH ISLAND:** 1 male, Mount Ruapehu, 28 Jan 1976, VAM (NZAC); 1 female, same locality, 15 Nov 1979, FC (FCCO); 1 female, Tongariro National Park, 27 Feb 1949, RH (NZAC).

SOUTH ISLAND: 1 male, Lewis Pass, 26 Apr 1980, JWE (BMNH); 1 male, Pudding Hill Domain, 19 Sep 1981, JWE (LCNZ); 1 female, Governor's Bush, 29 Jan 1972, WJK & PSB (BMNH); 1 female, Makarora, 21 Jan 1978, GK (ANIC); 1 female, same locality, 21-24 Jan 1978, S&JP (CNCI); 4 males, Grebe Valley, 4 Feb 1982, JWE, CAM, & PTS (LCNZ, ANIC).

Material examined. Type series only.

TO / BR, MC, WD, MK, OL, FD (Map 1).

Collected by Berlese funnel extraction of litter and rotten wood and by sweeping low vegetation (especially ferns); in *Nothofagus* (various spp.) forests; at altitudes between 170 m and 865 m.

Remarks. The name *eriodes* (Greek, 'like wool') refers to the pubescence surrounding the neck.

Archaeopria pelor new species

Female. Length and ratios of measurements as in Appendix Table 1.

Head in dorsal view posteriorly strongly emarginate (Fig. 48); occipital carina well defined, not projecting strongly beyond posterior margin of gena. Temples long, swollen. Vertex flattened posterior to ocelli, then curving abruptly to occipital carina (Fig. 51). Ocelli small. Upper frons weakly convex; ventral margin not defined. Antennal sockets with walls thin, slightly funnel-shaped, medially contiguous; inner wall dorsally produced (Fig. 54); anterior wall with an angulate process. Clypeus and labrum each longer than wide; free margin of labrum strongly convex. Opisthognathous; mandibles longitudinal, their apices slightly overlapping.

Antenna. Scape reticulate, at least basally, with slight

annular basal thickening (Fig. 59). Pedicel with F1-5 smooth. Clava weak.

Mesosoma. Pronotum: anterior neck weakly transversely striate, posterior neck smooth; mid-dorsal length of collar 1.0-2.0x OD. Mesoscutum (Fig. M8): notaulices absent; middle and lateral lobes weakly convex. Mesoscutellum: fovea anteriorly and laterally well defined, wider than long; posterior margin weakly defined, strongly convex; septum between fovea and lateral excavation narrow; parafoveal area sloping posteriorly, with submarginal carina strong; free portion of each axillar process short. Post-foveal mesoscutellum slightly wider than fovea, weakly convex; lateral margin not foveolate; posterior margin and rim smooth. Lateral excavation of moderate size. Mesopleuron not produced anteroventrally; coxal pit I visible in lateral view. Metanotum with lateral carina not dorsally produced. Dorsal propodeum: lateral carinae strong, posteriorly diverging; posterior margin strongly emarginate. Nucha smooth.

Forewing. Emargination shallow (Fig. 68). Venation as in Fig. 68; basalis angulate.

Petiole. Dorsal and dorsolateral carinae absent (Fig. M13).

Gaster (Fig. 71). T2 anterolaterally broadly produced (Fig. 72); anterolateral longitudinal carina longer than PL.

Pubescence. Postantennal excavation, occipital carina laterally, posteroventral gena, pronotal collar, propleuron, parafoveal area, dorsellum, dorsolateral and lateral propodeum, lateral and ventral petiole, and S2 all densely woolly. Supraclypeal frons, ventral mesosoma, and gaster with dense, appressed setae. Vertex, upper frons, gena, lateral pronotum, mesoscutum, mesopleuron, and dorsal gaster all with sparse to very sparse, appressed setae. Forewing: no macroseta at intersection of Sc+R and basalis; postparastigmal row of setae absent; apical marginal setae longer than marginalis.

Colour. Head, mesosoma, and metasoma brown to reddish orange. Antennae and legs reddish orange to yellow. Palpi yellow. Pubescence silver.

Male. Differing from female as follows. Length and ratios of measurements as in Appendix Table 1.

Head. Occipital carina projecting strongly beyond posterior margin of gena. Temples shorter, not swollen (Fig. 56). Vertex curving more evenly to occipital carina (Fig. 57). Ocelli larger.

Antenna. F2 carinate, as in Fig. 63; F10-12 as in Fig. 64.

Petiole. Median dorsal carina very weakly indicated anteriorly only. Dorsolateral carinae strong, continuous, parallel.

Gaster. Anterolateral longitudinal carina approximately as long as PL.

Type data. **Holotype:** female, WD, Mount Hercules Scenic Reserve, 180 m, swept from ferns in forest, 17 January 1982, J.W. Early (NZAC).

Paratypes (5 females, 3 males). **NORTH ISLAND:** 1 female, Parahaki, 12 Oct 1967, KAJW (AMNZ); 1 female, Waitakere Range, Jan 1981, JSN (NZAC); 1 female, 1 male, Kohukohunui, 30 Mar 1974, GK (ANIC); 1 female, 1 male, west Mount Egmont, 10–11 Dec 1982, FC (FCCO).

SOUTH ISLAND: 1 female, Whangamoa Saddle, 22 Dec 1983, LM (CNCI); 1 male, Kelly's Creek, 28 Nov 1977, ES (ANIC).

Material examined. Type series only.

ND, AK, TK / NN, NC, WD (Map 2).

Collected by sweeping ferns and from litter in *Nothofagus fusca* forest.

Remarks. The head of *A. pelor* (Fig. 51, 57), with its anterodorsally directed spines and elongate, posteroventrally directed mandibles, is reminiscent of the heads of a variety of taxonomically unrelated microhymenoptera, e.g., Eubroncinae (Mymaridae; Yoshimoto *et al.* 1972), *Encyrtoscelio* Dodd (Scelionidae; Bin 1979), *Gnathoceraphron* Dessart & Bin (Ceraphronidae; Dessart & Bin 1980), *Psilus* Panzer (Diapriidae; Muesebeck 1980), and *Stentoriceps* Quinlan (Eucoilidae; Quinlan 1984). Perhaps the anterodorsal spines or processes assist adult wasps to burst the host puparium, pupal skin, or egg chorion, the long mandibles providing extra leverage (Quinlan 1984). Alternatively, or in addition, the processes and mandibles could help the adult wasps to force their way through loose soil and litter (Bin 1979). The hosts and habits of some of these microhymenoptera with unusual heads are known, and they suggest that the wasps spend much time in the soil or litter, where they parasitise the immature stages of Diptera or the eggs of Hemiptera buried in the soil. In one paratype male of *A. pelor* from Kelly's Creek the basalis is narrowly interrupted immediately posterior to *Sc+R*.

The name *pelor* (Greek, 'monster') refers to the large, grotesque head of this species.

Archaeopria pristina new species

Female (Fig. 37). Length and ratios of measurements as in Appendix Table 1.

Head in dorsal view not strongly emarginate posteriorly; occipital carina well defined, projecting strongly beyond posterior margin of gena (Fig. 49). Temple smoothly curving to occipital carina. Vertex convex, curving smoothly to occipital carina (Fig. 52). Ocelli of moderate

size. Upper frons very weakly convex; ventral margin not defined. Antennal sockets with walls thin, medially contiguous; inner wall dorsally produced (Fig. 55); anterior wall rounded, without an angulate process. Clypeus approximately as long as wide. Labrum wider than long, its free margin emarginate. Hypognathous; mandibles transverse, their apices broadly overlapping.

Antenna. Scape, pedicel, and F1–5 smooth. Scape basally slender (Fig. 60). F1 with a minute basal constriction. Clava scarcely differentiated.

Mesosoma. Pronotum: anterior neck transversely striate; posterior neck with a row of foveae; mid-dorsal length of collar 1.5–2.0x OD. Mesoscutum (Fig. M9) convex, lacking notaulices; middle and lateral lobes not differentiated. Mesoscutellum: fovea well defined, wider than long, its posterior margin convex; septum between fovea and lateral excavation of moderate size; parafoveal area sloping posteriorly, its submarginal carina strong; free portion of axillar processes long, curved. Postfoveal mesoscutellum distinctly wider than fovea, weakly convex; lateral margin foveolate; posterior margin and rim smooth. Lateral excavation of moderate size. Mesopleuron (Fig. M16) anteroventrally weakly produced; coxal pit I visible in lateral view. Metanotum: lateral carina not produced dorsally; lateral excavation smooth. Dorsal propodeum: lateral carinae strong, subparallel; posterior margin weakly emarginate. Nucha smooth.

Forewing. Emargination shallow (Fig. 69). Venation as in Fig. 70; basalis angulate.

Petiole. Median dorsal carina absent. Dorsolateral carinae strong, continuous, narrowly separated (Fig. M11, M14), subparallel.

Gaster (Fig. 73). T2 anterolaterally narrowly produced (Fig. 74); anterolateral longitudinal carina shorter than PL.

Pubescence. Postantennal excavation, occipital carina ventrally, pronotal collar (Fig. M18), propleuron, dorsolateral and ventral propodeum, lateral and ventral petiole, S2, and S3 anteriorly all densely woolly. Supraclypeal frons, ventral mesosoma, and ventral gaster with moderately dense, appressed setae. Upper frons, vertex, gena, lateral pronotum, mesoscutum, mesoscutellum, mesopleuron, longitudinal band on lateral propodeum, and dorsal gaster all with sparse, appressed setae or bare. Forewing: macroseta at intersection of *Sc+R* and basalis scarcely longer than surrounding setae; parafoveal row of setae absent; apical marginal setae shorter than marginalis.

Colour. Head, mesosoma, and metasoma reddish orange, with or without brown to dark brown markings; lateral pronotum, mesopleuron, and petiole sometimes entirely dark brown; gaster usually with 3 irregular, transverse brown bands. Antenna and legs reddish orange to yellow. Palpi yellow. Pubescence silver to slightly golden.

Male. Differing from female as follows. Length and ratios of measurements as in Appendix Table 1.

Antenna. F2 carinate, as in Fig. 65.

Type data. **Holotype:** female, MC, Summit Road, Akaroa, "S49: 335 290 [NZMS1 map reference], podocarp / broadleaf / ferns", 3 November 1970, P.M. Johns (NZAC).

Paratypes (4 females, 13 males). **NORTH ISLAND:** 1 male, Waitakere Range, Nov 1980, JSN (NZAC); 1 male, Lake Okataina, 18 May 1982, FC (FCCO); 1 male, east Mount Egmont, 5 Mar 1983, FC (FCCO).

SOUTH ISLAND: 1 male, Canaan, 22 Dec 1983, JWE (BMNH); 1 female, Dun Mountain, 18 Oct 1925, WH (NZAC); 1 male, St Arnaud Range, 3 Feb 1972, SAT (LCNZ); 1 male, Lake Rotoiti, 23 Mar 1977, AKW (NZAC); 1 male, Lake Daniells track, 26 Apr 1980, JWE (ANIC); 1 female, Punakaiki, 3 Jan 1984, LM (CNCI); 2 males, Lake Wombat track, 11 Jan 1982, JWE (LCNZ); 1 female, Howden track from Divide to Saddle, 8 Feb 1980, JWE & RME (ANIC); 1 female, Tutoko River, 13 Feb 1980, RRS (LCNZ); 1 male, Grono Bay, 28 Nov – 1 Dec 1981, CFB (NZAC); 1 male, Deep Cove, Jan 1970, ACE (NZAC); 2 males, Grebe Valley, 4 Feb 1982, JWE, CAM, & PTS (LCNZ).

Material examined. Type series only.

AK, BP, TK / NN, MB, BR, MC, WD, OL, FD (Map 3).

Collected by sweeping ferns, by Malaise trap, and from rotten wood; in podocarp / broadleaf forest and *Nothofagus* forest; at altitudes between 35 m and 900 m.

Remarks. The name *pristina* is Latin, meaning 'primitive'.

Genus *Pantolytomyia* Dodd

Pantolytomyia Dodd, 1915: 395–396. Tillyard, 1926: 281. Muesebeck & Walkley, 1956: 379. Masner, 1969: 105–107. Naumann, 1982: 5, 6, 8, 10–13, 15–16, 19, 23–24, 29–32.

Type-species *Pantolytomyia ferruginea* Dodd, 1915, by original designation and monotypy.

Diagnosis. Distinguished from all other Ambositrinae except *Archaeopria* by the 6 free gastral tergites, in both sexes (Fig. 38, 39). Distinguished from *Archaeopria* by the anteriorly incised T2 (Fig. M20). Macropterous (Fig. 38), brachypterous (Fig. 39), or micropterous. Forewing distally incised or emarginate in macropters and some brachypters; basalis and *IA* of forewing usually strongly

sclerotised and tracheate. Pronotal scrobe and median metanotal carina both absent. Median propodeal carina present or absent. F2 of male carinate.

Macropterous female. Head hypognathous, globular; temple of moderate length. Ocelli present. Vertex without spines or carina. Frontal prominence well developed; antennal sockets with inner wall dorsally produced, sometimes only weakly so, outer wall not markedly expanded; parafrenal carina absent. Upper frons with ventral margin not defined. Compound eye of moderate size. Genal region not strongly concave about anterior tentorial pit. Occipital carina ventrally interrupted, smooth. Palpal formula 5-3. Mandibles neither elongate nor projecting; mandibular formula 2-1 or 2-2. Distal margin of labrum strongly convex or weakly emarginate. Genal bridge incomplete.

Antenna 0.5–0.6x BL, 15-segmented. F1 with neither a minute ring nor a basal constriction. Clava either scarcely defined or 5–7-segmented and weak or strongly defined.

Mesosoma broad, widest at tegulae, not extensively rugose-punctate. Pronotum: neck longer than collar, posteriorly with or without a transverse carina or spine. Pronotal scrobe, postspiracular excavation, and posterolateral spine all absent. Mesoscutum strongly convex; notaulices well defined, percurrent. Tegula large, without microsculpture. Mesoscutal-mesoscutellar suture present. Mesoscutellum: fovea well defined, undivided; axillar processes free, acuminate or blunt. Mesopleuron: preepisternal furrow broad; sternaulus present or absent; ventral sternopleural carina absent. Metanotum large; dorsellum defined, with a lateral carina; median carina and spines absent. Dorsal propodeum: lateral carina present; median carina present or absent; vertical spines absent; posterior margin defined; propodeum and nucha not smoothly continuous.

Forewing broad, flat, at rest reaching to or beyond posterior tip of gaster, hyaline, not microdenticulate; distal margin incised. Marginalis not extending beyond proximal 0.4–0.5 of wing. *C*, *Sc+R*, marginalis, stigmalis, basalis, and *IA* (usually) all strongly sclerotised, tracheate; *IA* sometimes strongly indicated by coloration; *M+Cu1* and *Cu1* proximally sometimes weakly indicated by coloration. Costal cell broad. Radial cell not defined. Basal cell well defined, posteriorly closed or open. Marginalis broadly contiguous with costal margin; *M/W* = 1.5–6.9; *S/M* = 1.2–1.5.

Hindwing broad, 0.7–0.8x as long as forewing, hyaline, with 3 hamuli. *Sc+R* strongly sclerotised, tracheate, continuous from base to hamuli; basal cell defined or not defined.

Legs slender. Foretibia without an apical, external spine.

Petiole. Longitudinal carinae parallel. *PL/PW* = 1.8–2.3.

Gaster with 6 free tergites and 5 free sternites, posteriorly acuminate. T2 anteriorly incised. T3, T4, and T5 transverse. T6 subtriangular to trapeziform, with a pair of spiracles. T7 small, at least partially exposed, with a pair of cerci. Cerci plate-like, not articulated, externally visible, moderately widely or narrowly separated. All sutures between tergites complete, well defined, evenly curved. S2 of moderate size; anterolateral corner not visible from above; anterior and posterior margins entire. S3 anteriorly not bulged beneath S2. S6 triangular.

Pubescence. Body with numerous long, appressed or suberect setae and some dense, short, appressed setae. Woolly pits posterior to coxae I and II present, without broad, flat setae. Truncate, golden setae absent. Forewing *Sc+R* with or without a macroseta near intersection with basalis. Surfaces and margins of fore and hind wings densely setose. S6 without a dense brush of setae.

Brachypterous female differing from macropterous female as follows.

Head. Temple sometimes long. Compound eye sometimes of moderate size. Occipital carina sometimes forming a complete ring. Genal ring sometimes complete.

Mesosoma. Axillar processes not free. Pre-episternal furrow sometimes narrow. Sternaulus always absent.

Forewing usually narrow, at rest reaching to somewhere between mid-propodeum and slightly beyond posterior extremity of T2; distal margin incised, emarginate, or rounded. Marginalis sometimes terminating 0.9 of wing length from base. *C*, *Sc+R*, marginalis, stigmalis, basalis, and *IA* sometimes weakly indicated by coloration or absent. Where measurable, $M/W = 2.0-3.0$ and $S/M = 0.5-1.3$. Costal cell sometimes narrow or absent. Basal cell sometimes absent.

Hindwing. Basal cell never defined.

Petiole. Carinae sometimes absent.

Pubescence. Forewing *Sc+R* never with a macroseta.

Micropterous female differing from macropterous female as follows.

Head. Temple long. Antennal socket with inner wall always distinctly produced dorsally. Compound eye small.

Mesosoma. Pronotum: neck with a transverse row of punctures; collar without a carina or spine. Mesoscutum more flattened; notaulices weak, incomplete. Tegula small. Mesoscutellum: fovea weakly defined; axillar processes not free. Mesopleuron: pre-episternal furrow narrow; sternaulus always absent. Metanotum of moderate size; dorsellum scarcely defined. Dorsal propodeum with lateral and median carinae always present.

Forewing smaller than tegula, not extending beyond posterior margin of mesoscutellum; distal margin nar-

rowly rounded. Venation absent.

Hindwing absent.

Petiole. Carinae absent.

Pubescence. Forewing bare.

Macropterous male differing from macropterous female as follows.

Head. Occipital carina sometimes forming a complete ring. Mandibular formula 2-3 or 2-2. Genal bridge sometimes complete.

Antenna $0.7-0.9 \times BL$, 14-segmented. F1 cylindrical; $F1L/F1W = 1.1-5.3$. F2 carinate. F3-12 cylindrical, elongate, or only slightly longer than wide, not strongly pedunculate. Clava absent; distal flagellar segments at most very slightly wider than proximal segments.

Forewing at rest often greatly exceeding posterior tip of gaster. $M/W = 1.4-6.7$; $S/M = 1.2-2.7$.

Petiole. $PL/PW = 2.0-3.0$.

Gaster with 7 free sternites. Cerci either plate-like and not articulated or lobiform and articulated or digitiform and articulated, but always widely separated.

Brachypterous male differing from macropterous male as follows.

Head. Temple elongate. Compound eye small.

Antenna. $F1L/W = 1.6-2.4$. Clava always absent.

Mesosoma. Mesoscutum more flattened. Tegula smaller. Axillar process not free. Sternaulus never present. Metanotum of moderate size; dorsellum sometimes scarcely defined. Dorsal propodeum: lateral carina always absent; median carina present or absent.

Forewing more narrowed, at rest reaching somewhere between posterior margin of propodeum and posterior margin of T3; distal margin rounded, sometimes very narrowly. Marginalis, when present, not extending beyond proximal 0.4-0.5 of wing. *C*, *Sc+R*, marginalis, stigmalis, basalis, and *IA* all sometimes weakly indicated by coloration, or entirely absent. Costal cell broad, narrow, or absent. Basal cell never posteriorly closed, sometimes absent. Where measurable, $M/W = 2.6-2.7$ and $S/M = 1.4$.

Hindwing either narrow, about $0.6 \times$ as long as forewing and without a basal cell, or absent.

Petiole. Carinae absent. $PL/PW = 1.3-1.8$.

Pubescence. *Sc+R* of forewing without a macroseta. Surfaces and margins of fore and hind wings sometimes not densely setose.

Remarks. The seven New Zealand species of *Pantolytomyia* fall into three species-groups (see below). *P. ferruginea* from Australia, the only other known species of *Pantolytomyia*, seems to form a fourth group, which can be diagnosed as follows: antennal sockets with inner wall

strongly produced dorsally; F1L exceeding F2L in male; pronotal collar with a transverse carina; axillar hook long, curved; macropterous or brachypterous, without pronounced mesosomatic modifications; forewing 1A tracheate.

I am unable to resolve the phylogeny within *Pantolytomyia* with any confidence. The *flocculosa* species-group retains several character states plesiomorphic within *Pantolytomyia* (inner wall of antennal socket very weakly produced, pronotal collar rounded, axillar hook short). It is defined by a single apomorphy (the loss of the tracheate 1A from macropters), and may be the sister-group to all other *Pantolytomyia* species. The assemblage comprising *takere* group + *P. taurangi* + *P. ferruginea* is defined by one synapomorphy (the produced inner wall of the antennal socket). The elongate, curved axillar process of *P. ferruginea* is a striking autapomorphy, but the sister-group of this species is uncertain.

Of the four, the *takere* species-group includes the most strikingly modified species of *Pantolytomyia*. In *P. polita* n.sp., *P. insularis* n.sp., and *P. wairua* n.sp. wing reduction is accompanied by the most pronounced modifications of the head, mesosoma, and petiole encountered in the genus. These species variously show reduction in size of the compound eye, elongation of the temple, flattening of the mesoscutum, loss of the free portion of the axillar process, and loss of the carinae of the propodeum and petiole.

KEY TO SPECIES OF *PANTOLYTOMYIA* KNOWN FROM NEW ZEALAND

Females

- 1 Antennal sockets with inner walls not produced (Fig. 89); either frons with a tuft of setae which is usually matted with flocculent material (Fig. 82) or sternaulus present (Fig. M26) ... 2
 —Antennal sockets with inner wall strongly produced (Fig. 90); frons without a tuft of matted setae (Fig. 100); sternaulus absent (Fig. M43) or represented by a very short, very weak carina near coxal pit I ... 3
- 2(1) Frons with a tuft of setae which is usually matted with flocculent material (Fig. 82); sternaulus absent (Fig. M25); P/M less than 5.2 ... (p. 23) .. *flocculosa*
 —Frons without a tuft of matted setae (Fig. 83); sternaulus present (Fig. M26); P/M more than 5.7 ... (p. 25) .. *tungane*
- 3(1) Pronotal collar with a transverse carina or spine, although these sometimes weak (Fig. 132–134); propodeum with a weak or strong median dorsal carina (Fig. M35); forewing, at rest, reaching beyond mid-point of petiole ... (p. 29) .. *taurangi*

—Pronotal collar usually without a carina or spine (Fig. 128–131), but if carina present then forewing at rest not extending beyond mid-point of petiole; propodeum usually without a median dorsal carina (Fig. M29)... 4

- 4(3) Temples long, in part parallel (Fig. 80); HW/HL 0.78 or less; forewing at rest extending beyond posterior margin of propodeum; antennal socket without a distinct anterolateral process (Fig. 87)... (p. 28) .. *wairua*
 —Temples short, not parallel, curving to occipital carina (Fig. 77–79); HW/HL 0.78 or more; forewing at rest extending at most to posterior margin of propodeum; antennal socket usually with a distinct anterolateral process (Fig. 84, 86) ... 5
- 5(4) Propodeum with distinct lateral and median carinae (Fig. 135) ... (p. 26) .. *takere*
 —Propodeum without distinct lateral or median carinae (Fig. M29, M31) ... 6
- 6(5) Antennal clava weakly defined (Fig. 110), with F12L/F12W exceeding 0.82; NND/NW 5.00 or less, or notaulices absent posteriorly; PL/PW less than 1.50; GL/GW 1.95 or more; GW/HW 1.44 or less ... (p. 26) .. *polita*
 —Antennal clava strongly defined (Fig. 111), with F12L/F12W less than 0.81; NND/NW 5.00 or more, and notaulices always present; PL/PW more than 1.50; GL/GW 1.95 or less; GW/HW 1.44 or more ... (p. 27) .. *insularis*
- ##### Males
- 1 Antennal sockets with inner wall not produced (Fig. 89); either frons with a tuft of matted setae (Fig. 99) or sternaulus present (Fig. M26); F1L/F2L 1.00 or more ... 2
 —Antennal sockets with inner wall strongly produced (Fig. 90); frons without a tuft of matted setae (Fig. 101); sternaulus absent; F1L/F2L 1.00 or less ... 3
- 2(1) Frons with a tuft of matted setae (Fig. 99); sternaulus absent (Fig. M25); F2 as in Fig. 115; P/M less than 7.00 ... (p. 23) .. *flocculosa*
 —Frons usually without a tuft of matted setae (Fig. 100); sternaulus present (Fig. M26); F2 as in Fig. 116; P/M more than 8.00 ... (p. 25) .. *tungane*
- 3(1) Macropterous – forewing at rest extending beyond posterior tip of gaster; F1L/F2L = 0.37–0.77; propodeum with a median dorsal carina (Fig. M35) ... 4
 —Brachypterous – forewing at rest not extending beyond posterior tip of gaster; F1L/F2L 0.69–1.00; propodeum usually without a median carina (Fig. M29) ... 5

- 4(3) Antennal sockets each with an anterolateral process (Fig. 101); pronotal collar rounded (Fig. M27); M/W 5.45 or more ... (p. 26) .. *takere*
 —Antennal sockets without an anterolateral process (Fig. 105); pronotal collar with a transverse carina or spine (Fig. 132–134); M/W 5.45 or less ... (p. 29) .. *taurangi*
- 5(3) Forewing at rest extending to or beyond posterior margin of T2; POL/OOL more than 0.70; F11L/F11W more than 1.55; propodeum with a median carina ... (p. 28) .. *wairua*
 —Forewing at rest not extending beyond posterior margin of propodeum; POL/OOL less than 0.65; F11L/F11W less than 1.55; propodeum without a median carina ... 6
- 6(5) NND/NW less than 4.70; pronotal collar anteriorly rounded (Fig. 130, M38) ... (p. 26) .. *polita*
 —NND/NW more than 5.90; pronotal collar anteriorly defined by a blunt, transverse carina or angulation (Fig. M39, M40) ... (p. 27) .. *insularis*

flocculosa species-group

Diagnosis. Antennal sockets with inner wall very weakly produced. F1L exceeding F2L in male. Pronotal collar rounded. Axillar process short. Macropterous, submacropterous, or brachypterous; wing-reduced forms without pronounced modifications to mesosoma. Forewing *IA* not tracheate.

Included species. *P. flocculosa* n.sp., *P. tungane* n.sp.

Pantolytomyia flocculosa new species

Female. Length and ratios of measurements as in Appendix Table 2. Macropterous, submacropterous, or brachypterous.

Head. Temple smoothly, gradually curving to smooth occipital carina (Fig. 75). Vertex convex. Ocelli of moderate size. Upper frons flat (Fig. 82), with a slight median dimple (usually obscured by matted pubescence); ventral margin not defined. Antennal sockets thin-walled, medially narrowly separated or contiguous; inner wall very weakly produced (Fig. 89); outer wall without an anterolateral process.

Antenna. Scape, pedicel, and F1–5 smooth. Clava weak (Fig. 106).

Mesosoma. Pronotum: anterior neck transversely striate; posterior neck with a row of elongate foveae; collar dorsally smooth, rounded (Fig. 128), mid-dorsal length slightly greater than OD. Mesoscutum (Fig. M19): notaulices distinct, narrow, posteriorly slightly expanded; middle and lateral lobes convex, smooth. Mesoscutellum: fovea well defined, almost as long as wide, with posterior margin strongly convex; septum between fovea and each lateral excavation of moderate size; submarginal carina more or less straight; axillar process short, more or less straight. Postfoveal mesoscutellum distinctly broader than fovea, weakly convex; lateral margin not foveolate; posterior margin and rim smooth. Mesopleuron (Fig. M25) not produced anteroventrally; sternaulus absent. Metanotum: lateral carinae produced; lateral excavation smooth. Dorsal propodeum: median carina absent; lateral carinae strong, straight, parallel (Fig. M20); posterior margin emarginate. Nucha smooth.

Forewing (Fig. 137, 138). Variation continuous between (a) macropterous condition (forewing at rest exceeding posterior tip of gaster, shape and venation as in Fig. 137, 138) and (b) extreme brachypterous condition (forewing at rest extending to middle of T2, slightly narrower and reduced distal to marginalis, compared to wing of macropter). Vein *IA* not tracheate.

Petiole. Carinae strong, continuous. Median dorsal carina straight (Fig. M20); dorsolateral carina straight or diverging slightly in anterior half; intervening carinae absent.

Gaster. T2 incised, as in Fig. M20, sometimes with weak punctures lateral to incision.

Pubescence. Frons with a dense tuft of long setae usually matted by flocculent material (Fig. 82). Postantennal excavation, occipital carina ventrally, pronotal collar, propleuron, metanotum, lateral propodeum, petiole laterally and ventrally, and S2 all densely woolly. Head, mesoscutum, mesoscutellum, mesosternal area, metanotum, legs, T2 (excluding central area), T3–6, and S3–6 all with rather dense, long, erect or appressed setae. Intersection of basalis and *Sc+R* with a macroseta.

Colour. Head, lateral lobe of mesoscutum, mesopleuron, propodeum, and petiole all usually dark brown to black; F8–13 rarely dark brown. Mesosoma and gaster mostly reddish brown to reddish orange; occasionally entire body almost uniformly reddish brown. Antenna and legs reddish orange to yellow. Palpi pale yellow. Pubescence silver.

Male. Differing from female as follows. Length and ratios of measurements as in Appendix Table 2.

Head in dorsal and lateral view as in Fig. 92, 99.

Antenna. Flagellar segments as in Fig. 114; F2 carinate, as in Fig. 115.

Colour. Flagellum reddish orange to yellow.

Type data. **Holotype:** female, BR, Mawhera State Forest, "71/143", 10 November 1971, J.S. Dugdale (NZAC).

Paratypes (162 females, 95 males). **NORTH ISLAND:** 1 female, Omahuta State Forest, 15 Jul 1974, JSD (NZAC); 1 male, Waipoua State Forest, 19 Sep 1977, LLD (NZAC); 4 females, 2 males, same locality, 16–21 Mar 1978, S&JP (CNCI, ANIC); 2 males, same locality, 13–14 Apr 1980, AN & MT (CNCI); 1 male, Trounson Park area, 14 Jan 1974, FC (FCCO); 1 male, Mount Te Aroha, 17 Mar 1983, FC (FCCO); 1 female, Mamaku Range, 18 Jan 1972, GWR (NZAC); 1 male, same locality, 27 Dec 1982, FC (FCCO); 1 female, Tikitiki Stream, 24 Jul 1976, JSD (NZAC); 1 female, Tarawera Bush, Feb 1969, HAO (NZAC); 1 female, 4 males, Okataina, 18 May 1982, 17 Mar 1983, FC (FCCO); 2 females, Moerangi, 4–9 Apr 1980, AN & MT (CNCI, ANIC); 4 females, 6 males, Opepe Reserve, 5–8 April 1980, AN & MT (CNCI, ANIC, NZAC); 1 male, Okoeko Stream, 3–8 Apr 1980, AN & MT (CNCI); 1 female, Kaimanawa State Forest, 31 Jan 1971, HAO (NZAC); 1 male, Te Ponanga Saddle, 4–9 Apr 1980, AN & MT (CNCI); 1 female, 1 male, same locality, 25 Apr 1983, FC (FCCO); 1 male, Lake Rotopounamu, 4–9 Apr 1980, AN & MT (CNCI); 1 male, Pihanga Scenic Reserve, 13 Jan 1972, GWR (NZAC); 1 female, Blyth track, 17 Feb 1965, LPM (NZAC); 1 female, same locality, 19 Nov 1965, JIT (NZAC); 2 females, Mount Ruapehu, 15 Nov 1974, FC (FCCO); 1 female, Ruahine Range, 23 Feb 1970, GWR (NZAC); 1 male, Ihaia, 1 Jan 1977, FC (FCCO); 3 females, 1 male, Mount Egmont, 15 Oct 1982, 14–23 Jul 1983, FC (FCCO).

SOUTH ISLAND: 1 female, Tennyson Inlet, 27 May 1982, S&JP (CNCI); 1 female, Pakawau, 28 May 1971, JSD (NZAC); 1 male, Onekaka, 20 May 1967, FDA (NZAC); 2 females, Harwood's track, 13 Feb 1981, JWE (LCNZ, ANIC); 2 males, Castle Rock – Torrent Bay track, 4 Feb 1981, JWE (LCNZ); 1 male, Castle Rock Hut, 3 Feb 1981, JWE (LCNZ); 2 females, Canaan, 22–28 May 1982, S&JP (CNCI); 2 males, Mytton Hut, 13 Dec 1967, SE (NZAC); 1 female, Gordon's Knob, 16 May 1963, JIT (NZAC); 1 female, Leslie Valley, 24 Jan 1948, JTS (NMNZ); 2 females, Kaka – Glenhope Road, 28 Aug 1964, JIT (NZAC); 2 females, Whangamoa, 13 Oct 1966 (NZAC); 1 female, Cable Bay, 23 Jul 1964, JIT (NZAC); 3 females, Whangamoa Saddle, 12 Aug 1965, AKW (NZAC, ANIC); 3 males, Nelson, 8 Jun 1927, 12 May 1928, ESG (NZAC); 1 female, Dun Mountain, 12 Jul 1966, JIT (NZAC); 1 female, Roding Valley, 27 July 1967, JSD (NZAC); 1 female, 1 male, Pelorus Bridge, 21 Oct 1967, JSD (NZAC); 1 female, Pelorus Reserve, 2 Oct 1963, JIT (NZAC); 1 female, Maungatapu Saddle, JIT (NZAC); 2 females,

Fabian's Valley, 23 Oct 1963, JIT (NZAC); 1 female, Lake Tennyson, 11 Nov 1978, JWE (LCNZ); 2 females, Lake Rotoiti, 27 Jul 1965, JIT (NZAC); 1 female, 1 male, same locality, 3 Feb 1978, Dec 1980, AKW (NZAC); 3 females, same locality, 24–26 Mar 1980, AN & MT (CNCI, ANIC); 49 females, 25 males, Mount Robert, 23–26 Mar 1980, AN & MT (CNCI, ANIC, NZAC); 1 female, road to Mount Robert, 7 Oct 1968, JIT (NZAC); 2 females, Lake Rotoroa, 25–27 Mar 1980, AN & MT (CNCI); 1 male, same locality, 18–29 May 1982, S&JP (CNCI); 1 male, Mount Misery, 25 Jan 1977, JSD (NZAC); 1 female, Shenandoah Saddle, 12 Feb 1981, JWE (LCNZ); 1 female, 2 males, Riordan's Creek, 26 Apr 1980, JWE (LCNZ); 1 female, Fletcher's Creek, 9 Oct 1971, JSD (NZAC); 3 females, same locality, Nov 1971, JM (NZAC, ANIC); 1 female, Okuku Scenic Reserve, 2 Aug 1981, RME (LCNZ); 5 females, 1 male, Porarari River, 2 Apr 1983, JWE (LCNZ, ANIC); 1 female, Waipuna, 21 May 1971, JSD (NZAC); 1 female, 7 males, Lake Daniells track, 26 Apr 1980, JWE (LCNZ); 7 females, 11 males, Lewis Pass, 2 Jan 1979, 26 Apr 1980, 12 Feb 1981, 5 Apr 1983, JWE (LCNZ, ANIC); 2 females, Springs Junction, 4 May 1979, RME (LCNZ); 1 female, Lake Christabel, 19 Dec 1981, CAM (LCNZ); 1 female, Capleston, 8 Mar 1971, JCW (NZAC); 1 female, Turiwate, 12 May 1965, JIT (NZAC); 1 female, George's River, 29 Jan 1978, S&JP (CNCI); 1 female, Lake Mahinapua, 28 Jan 1978, S&JP (CNCI); 5 females, same locality, 16–22 Mar 1980, AN & MT (CNCI); 9 females, 5 males, same locality, 9–17 Jan 1982, JWE (LCNZ, ANIC); 1 female, Lower Hurunui, 11 May 1952, JSD (CMNZ); 1 female, Devil's Punch Bowl track, 16 Nov 1966, AKW (NZAC); 2 females, Arthur's Pass, 20 Nov 1978, SPW (LCNZ); 1 female, Halpin Creek, 8 Jan 1982, JWE (CNCI); 2 males, Klondyke Corner, 21 Jan 1981, JWE (LCNZ); 1 male, 8 km S of Arthur's Pass, 19–21 Mar 1980, AN & MT (CNCI); 1 female, Bealey Spur, 1 Jun 1981, CAM (LCNZ); 1 female, "Mount B" [Mt B'limit], 13 May 1965 (NZAC); 1 male, Pylon Gully, 11 May 1979, PH (LCNZ); 1 female, Mount Murchison, 26 Mar 1975, KWW (NZAC); 2 females, McLennan's Bush, 11 Dec 1973, GK (NZAC); 1 female, Scott's Saddle, 27 Nov 1981, JWE (LCNZ); 1 male, Hooker Valley, 31 Mar–2 Apr 1977, JSD (NZAC); 1 male, Mount Hercules, 17 Jan 1982, JWE (LCNZ); 1 female, Kohuamarua Bluff, 15 Jan 1982, JWE (LCNZ); 1 female, Lake Matheson, 16 Jan 1982, JWE (LCNZ); 2 males, Makarora Valley, 12 Apr 1982, JWE (LCNZ).

Material examined. Type series, plus 2 non-type males from Whangamoa (NN), 17 Nov 1966 (NZAC) and Dun Mountain (NN), 14 Sep 1971, GWR (NZAC).

ND, BP, TO, TK, RI, HB / SD, NN, MB, BR, NC, MC,

MK, WD, OL (Map 4).

Collected by Berlese funnel extraction of moss, litter, and lichens, diurnal or nocturnal sweeping of ferns, moss, and ground-cover, and Malaise, pan, carrion, or light trap (blended light); in *Agathis*, *Agathis* / podocarp / broadleaf, *Nothofagus* (various species), punga / broadleaf, and podocarp / broadleaf forests; between 20 m and 1400 m.

Remarks. Usually the frontal tuft of setae is matted with flocculent material, which suggests a secretory organ at the base of the tuft. The area beneath the pubescence is sometimes slightly depressed, but no pores are visible, either in dry specimens or in preparations cleared in KOH. In some ceraphronoids there is a facial pit in more or less the position occupied by the setal tuft in *P. flocculosa* (Bin & Dessart 1983). The ceraphronoid facial pit is associated with a small apodeme and sometimes also a cuticular chamber, and may have a sensory or glandular function. Two males (excluded from the type series; see above) generally agree with the description of *P. flocculosa* but have very stout flagellar segments (e.g., F11L/F11W = 1.16). The left antenna of one paratype female is deformed: F8/9 and F12/13 are incompletely separated (Fig. 107).

The name *flocculosa* (Latin *floccus*, 'a tuft of wool') refers to the matted tuft of setae on the frons.

Pantolytomylia tungane new species

Female. Differing from *P. flocculosa* female as follows. Length and ratios of measurements as in Appendix Table 2. Macropterous.

Head in dorsal and lateral view as in Fig. 76, 83.

Antenna. Clava as in Fig. 108.

Mesosoma. Mid-dorsal length of pronotal collar (Fig. 129) less than OD. Axillar process slightly longer, more curved (Fig. M21). Mesopleuron: sternaulus present (Fig. M26), sometimes weak. Propodeum as in Fig. M22.

Forewing. Shape and venation as in Fig. 139, 140; apical incision weaker.

Petiole. Median dorsal and lateral carinae often indistinct posteriorly.

Gaster. T2 incised, as in Fig. M22.

Pubescence. Frons without a dense tuft of matted setae. Long, erect or appressed setae generally sparser.

Colour. Mesosoma, petiole, and gaster usually more extensively and sometimes entirely dark brown. F7–11 usually dark brown; F12 and F13 reddish orange to pale yellow, always contrasting with F7–11.

Male. Differing from *P. flocculosa* male as follows. Length and ratios of measurements: Appendix Table 2.

Head in dorsal and lateral view as in Fig. 93, 100.

Antenna. F2 carinate, as in Fig. 116; F10–12 as in Fig. 117.

Mesosoma, forewing, petiole. As in *P. tungane* female.

Pubescence, colour. As in *P. tungane* female, but occasionally with a very small tuft of frontal setae.

Type data. **Holotype:** female, WD, Lake Mahinapua, 20 m, swept from ferns, ground cover in punga / broadleaf forest, 17 January 1982, J.W. Early (NZAC).

Paratypes (11 females, 6 males). **NORTH ISLAND:** 1 female, Waipoua State Forest, 4 Feb 1975 (NZAC); 1 female, same locality, 16–21 Mar 1978, S&JP (CNCI); 2 females, Birkenhead, Jan 1981, JFL (NZAC).

SOUTH ISLAND: 1 female, Mount Arthur, 20 Mar 1964, JIT (NZAC); 2 females, Lewis Pass Scenic Reserve, 5 Apr 1983, JWE (LCNZ, ANIC); 1 male, Lake Rotoiti, 30 Jun 1965, LPM (NZAC); 2 females, 3 males, same data as holotype (LCNZ, ANIC); 2 females, same data as holotype except 9 Jan 1982 (LCNZ); 1 female, 5 miles [8 km] N of Franz Josef township, 8 Feb 1965, NAW (NZAC); 1 male, Sunny Flat, 25 Jan 1978, GK (NZAC); 1 female, Gunn's Camp, 5 Feb 1980, JWE (ANIC); 1 male, Tutoko River, 13 Feb 1980, RRS (LCNZ); 1 female, Moraine Creek, 12 Feb 1980, JWE (LCNZ).

Material examined. Type series, plus 5 non-type examples as follows: 1 female, Waipoua State Forest, 19 Sep 1977, LLD (NZAC); 1 female, same locality, 11–14 Apr 1980, AN & MT (CNCI); 1 female, Huia, May 1981, BM (NZAC); 3 males, Lake Rotoiti, 4–9 Feb 1978, S&JP (CNCI, ANIC).

ND, AK / NN, BR, WD, FD (Map 5).

Collected by Berlese funnel extraction of sifted litter, by sweeping of low vegetation (especially ferns), and by Malaise trapping, in boggy areas, punga / broadleaf forest, *Agathis* forest, *Dracophyllum* forest, and *Nothofagus menziesii* forest; at altitudes between 20 m and 1066 m.

Remarks. Six specimens (excluded from the type series; see above) generally agree with the description of *tungane*, but the sternaulus is almost indistinguishable and the distal flagellar segments are almost concolorous.

The name *tungane* (Maori, 'brother') refers to the close relationship of this species to *P. flocculosa*.

takere species-group

Diagnosis. Antennal sockets with inner wall strongly produced. F1L less than F2L in male. Pronotal collar

rounded or with a transverse carina. Axillar processes short. Females brachypterous or micropterous; males macropterous, brachypterous, or micropterous; wing-reduced forms often with pronounced mesosomatic modifications. Forewing *IA* of macropters and some brachypters tracheate.

Included species. *P. takere* n.sp., *P. polita* n.sp., *P. insularis* n.sp., *P. wairua* n.sp.

***Pantolytomyia takere* new species**

Female. Differing from *P. flocculosa* female as follows. Length and ratios of measurements as in Appendix Table 2. Brachypterous.

Head in dorsal and lateral view as in Fig. 77, 84. Antennal sockets with inner wall strongly produced (Fig. 90), outer wall with an anterolateral process.

Antenna. Clava as in Fig. 109.

Mesosoma. Mid-dorsal length of pronotal collar more than 3.0x OD. Mesoscutum flattened (Fig. M27). Mesoscutellum: fovea wider than long (Fig. M23); submarginal carina weak; axillar process very short, blunt. Postfoveal mesoscutellum with lateral excavation small. Metanotum with lateral carina weakly produced. Dorsal propodeum (Fig. 135): median carina present, sometimes weak; lateral carinae posteriorly diverging; posterior margin very weakly emarginate. Nucha punctate.

Forewing at rest extending to posterior margin of propodeum; shape and venation as in Fig. 142; *IA* absent.

Petiole. Median dorsal carina at most weakly developed anteriorly, absent posteriorly; dorsolateral carina absent.

Gaster. T2 incised, as in Fig. M24.

Pubescence. Frons without a dense tuft of matted setae. Forewing *Sc+R* without a macroseta.

Colour. Body predominantly reddish brown to reddish orange. Antenna and legs reddish orange to yellow.

Male (Fig. 38). Differing from *P. flocculosa* male as follows. Length and ratios of measurements as in Appendix Table 2.

Head in dorsal and lateral view as in Fig. 94, 101; otherwise as in *P. takere* female.

Antenna. F2 carinate, as in Fig. 118; F10–12 as in Fig. 119.

Mesosoma. Mid-dorsal length of pronotal collar 2.0–3.0x OD. Mesoscutellum: fovea wider than long, its posterior margin weakly convex; axillar processes long, weakly curved. Dorsal propodeum: median carina present; lateral carinae strong, straight, parallel; posterior margin weakly emarginate. Nucha punctate.

Forewing shape and venation as in Fig. 38, 141; *IA* tracheate.

Pubescence. Frons without a dense tuft of matted setae.

Colour. Parts of mesopleuron, metapleuron, propodeum, petiole, and gaster reddish brown to brown. Head, most of mesosoma, and legs reddish orange to yellow.

Type data. **Holotype:** female, WD, Westland National Park, Lake Wombat track, 180–240 m, [swept from] ferns in podocarp/broadleaf forest, 11 January 1982, J.W. Early (NZAC).

Paratypes (29 females, 14 males). **SOUTH ISLAND:** 1 female, Okarito, 3 Oct 1977, RME (LCNZ); 19 females, 10 males, same data as holotype (LCNZ, ANIC, CNCI); 1 female, 3 males, Canavan's Knob, 10 Jan 1982, JWE (LCNZ, ANIC); 1 male, Franz Josef, 10 Apr 1982, JWE (LCNZ); 1 female, Lake Matheson, 16 Jan 1982, JWE (LCNZ); 2 females, Tempest Spur, 28 Jan 1975, JSD (NZAC); 2 females, Gertrude Valley, 24 Oct 1966, FDA (NZAC, ANIC); 1 female, Parakaunui Falls, 16 Jan 1978, GK (NZAC); 1 female, Waikawa, 9 Oct 1966, FDA (NZAC); 1 female, Owaka, 26 Jan 1978, S&JP (CNCI).

Material examined. Type series only.

— / WD, FD, SL (Map 6).

Collected by Berlese funnel extraction of sifted litter, moss, and wood and by sweeping low vegetation; from podocarp / broadleaf forest, rimu forest, and snowgrass swards; at altitudes between 120 m and 1463 m.

Remarks. The name *takere* is Maori, meaning 'chief man'.

***Pantolytomyia polita* new species**

Female. Differing from *P. flocculosa* female as follows. Length and ratios of measurements as in Appendix Table 2. Micropterous.

Head in dorsal and lateral view as in Fig. 78, 85. Ocelli small. Antennal sockets with inner wall strongly produced, outer wall with or without an anterolateral process.

Antenna. Clava as in Fig. 110.

Mesosoma. Pronotal collar (Fig. 130) approximately 5.0x OD. Mesoscutum: notaulices narrow, not posteriorly expanded, anteriorly distinct, posteriorly distinct or absent; middle and lateral lobes flattened. Mesoscutellum: fovea wider than long, its posterior margin indistinct; axillar processes short, posterolaterally directed. Postfoveal mesoscutellum very broad, flattened; lateral excavation small. Metanotum with lateral carinae and lateral excavation indistinct. Dorsal propodeum: median and lat-

eral carinae absent; posterior margin very weakly emarginate.

Forewing ribbon-like, at most slightly longer than tegula; venation absent.

Petiole strongly expanded over midlength; median dorsal and dorsolateral carinae absent.

Pubescence. Frons without a dense tuft of matted setae. Mesoscutum and mesoscutellum more sparsely setose. T2 uniformly setose. Forewing *Sc+R* without a macroseta.

Colour. Body uniformly reddish orange or yellow.

Male. Differing from *P. flocculosa* male as follows. Length and ratios of measurements as in Appendix Table 2. Micropterous.

Head in dorsal and lateral view as in Fig. 95, 102; otherwise as in *P. polita* female.

Antenna. F2 carinate, as in Fig. 120; F10–12 as in Fig. 121.

Mesosoma (Fig. M28, M29, M38). Notaulices distinct; otherwise as in *P. polita* female.

Forewing, petiole, pubescence, colour. As in *P. polita* female.

Type data. **Holotype:** female, MC, Akaroa, Summit Road, swept from ferns in podocarp / broadleaf forest, 3 November 1970, P.M. Johns (NZAC).

Paratypes (2 females, 5 males). **SOUTH ISLAND:** 1 female, Port Underwood Saddle, Sep 1969, GK (ANIC); 2 males, Rarangi, 2 Sep 1969, GK (NZAC); 3 males, same data as holotype (NZAC, ANIC); 1 female, Rock and Pillar Range, Nov 1969, JM (NZAC).

Material examined. Type series, plus a non-type female from Rock Peak, 2 km E of Crown Range Saddle, 27 Nov 1974, JCW (NZAC).

— / SD, MC, OL, CO (Map 7).

Collected by Berlese funnel extraction of litter and by sweeping ferns; in podocarp / broadleaf forest.

Remarks. One female (excluded from the type series; see above) agrees with the description of *P. polita* except that the nucha is weakly punctate and the forewing has a barely distinguishable longitudinal vein. Females of *P. polita* and *P. takere* are very similar, but can be distinguished as follows: *polita* – micropterous, lacking propodeal carinae; *takere* – brachypterous, with propodeal carinae. Males are distinguished more readily, differing in wing length (*polita* micropterous, *takere* macropterous) and several ratios (POL/OOL, NND/NW, PL/PW).

The name *polita* (Latin, 'made smooth') refers to the polished appearance of the propodeum and petiole.

Pantolytomyia insularis new species

Female (Fig. 39). Differing from *P. flocculosa* female as follows. Length and ratios of measurements as in Appendix Table 2. Brachypterous.

Head in dorsal and lateral view as in Fig. 79, 86. Ocelli small. Antennal sockets with inner wall strongly produced, outer wall with an anterolateral process.

Antenna. Clava strong (Fig. 111).

Mesosoma. Pronotal collar defined anteriorly by a blunt, transverse carina (Fig. M39, M40); mid-dorsal length approximately 3.0x OD. Mesoscutum (Fig. M30): notaulices not expanded posteriorly; middle and lateral lobes weakly convex. Mesoscutellum: fovea wider than long, its posterior margin weakly convex; axillar processes very short, not free. Postfoveal mesoscutellum more flattened; lateral excavation small. Metanotum: lateral carina weakly produced. Dorsal propodeum short, broad; carinae absent; posterior margin weakly emarginate. Nucha punctate.

Forewing at rest not extending beyond posterior margin of propodeum; shape as in Fig. 39. *Sc+R* tracheate; marginalis, stigmal, costal, and *1A* veins absent.

Petiole not strongly expanded. Median dorsal and dorso-lateral carinae absent (Fig. M31).

Gaster. T2 incised, as in Fig. M31.

Pubescence. Frons without a tuft of matted setae. Body more sparsely setose. Setae of T2 grouped into 2 poorly defined, narrowly separated transverse bands. Forewing *Sc+R* without a macroseta.

Colour. Body uniformly reddish orange. Antennae and legs yellow.

Male. Differing from *P. flocculosa* male as follows. Length and ratios of measurements as in Appendix Table 2.

Head in dorsal and lateral view as in Fig. 96, 103; otherwise as in *P. insularis* female.

Antenna. F2 carinate, as in Fig. 122; F10–12 as in Fig. 123.

Mesosoma. Pronotal collar defined anteriorly by a blunt, transverse carina or angulation (Fig. M41), sometimes with a weak median carina; mid-dorsal length approximately 3.0x OD. Mesoscutum, mesoscutellum, metanotum, and dorsal propodeum as in *P. insularis* female.

Forewing more thread-like (Fig. 149).

Petiole, pubescence, colour. As in *P. insularis* female.

Type data. **Holotype:** female, SI, Big South Cape Island, litter sample, 7 November 1969, J. McBurney (NZAC).

Paratypes (7 females, 20 males). **SI:** 1 male, Pegasus Creek, Feb 1968 (NZAC); 1 female, Codfish Island, near summit, 14 Dec 1966, JIT (NZAC); 1 male, Ulva Island,

NW side, 14 Oct 1970, FDA (NZAC); 6 males, same data as holotype (NZAC, ANIC, CNCI); 6 females, 12 males, same locality as holotype, 8 Nov 1968, 18 Nov 1968, 22 Feb 1969, JM, GK, & JIT (NZAC, ANIC, BMNH).

Material examined. Type series only.

— / SI (Map 8).

Collected from litter.

Remarks. Similar in both sexes to *P. polita*, but differing as detailed in the key.

The name *insularis* stems from the Latin *insula* ('an island'), in reference to the type locality.

Pantolytomyia wairua new species

Female. Differing from *P. flocculosa* female as follows. Length and ratios of measurements as in Appendix Table 2. Brachypterous.

Head. Temples elongate, in part parallel (Fig. 80, 87). Antennal sockets with inner wall strongly produced, outer wall with at most a very weak anterolateral process.

Antenna. Clava as in Fig. 112.

Mesosoma. Mid-dorsal length of pronotal collar (Fig. 131) 2.0–3.0x OD. Mesoscutum (Fig. M32) not expanded posteriorly; middle and lateral lobes weakly convex. Mesoscutellum: fovea wider than long, its posterior margin weakly defined and weakly convex; axillar processes very short, straight. Postfoveal mesoscutellum with lateral excavation small. Metanotum with lateral carina weakly produced. Dorsal propodeum: median carina weak; lateral carinae strong, posteriorly diverging. Nucha punctate.

Forewing at rest not extending beyond mid-point of petiole; shape and venation as in Fig. 143; *IA* tracheate.

Petiole. Median dorsal and dorsolateral carinae absent (Fig. M33).

Gaster. T2 carinate, as in Fig. M33.

Pubescence. Frons without a dense tuft of matted setae. Body generally more sparsely setose. Forewing *Sc+R* without a macroseta.

Colour. Head and gaster predominantly brown. Mesosoma and petiole reddish orange. Antenna reddish orange to yellow. Legs reddish orange, suffused with pale brown.

Male. Differing from *P. flocculosa* male as follows. Length and ratios of measurements as in Appendix Table 2. Brachypterous.

Head in dorsal and lateral view as in Fig. 97, 104. Antennal sockets with inner wall strongly produced.

Antenna. F2 carinate (Fig. 124); F10–12 as in Fig. 125.

Mesosoma. Mesoscutum: notaulices not expanded posteriorly. Mesoscutellum: axillar processes short, not free. Metanotum with lateral carina scarcely produced. Dorsal propodeum: median carina present; lateral carinae strong, parallel over most of their length (Fig. 136); posterior margin emarginate. Nucha punctate.

Forewing at rest extending to posterior margin of T2; shape and venation as in Fig. 150; basalis and *IA* not tracheate.

Hindwing with 2 hamuli (Fig. 151).

Petiole. Median dorsal and dorsolateral carinae strong, continuous, subparallel; intervening carinae absent.

Pubescence as in *P. wairua* female.

Colour. Body predominantly brown. Most sclerites peripherally reddish orange. Antenna reddish orange to yellow.

Type data. **Holotype:** female, FD, Tutoko River, 60 m, swept from *Blechnum* in *Nothofagus menziesii* forest, 13 February 1980, J.W. Early (NZAC).

Paratypes (5 females, 2 males). **SOUTH ISLAND:** 3 females, Howden track from Divide to Saddle, 8 Feb 1980, JWE & RME (LCNZ, ANIC); 2 females, 2 males, same data as holotype (LCNZ, ANIC).

Material examined. Type series, plus 16 non-type examples (11 females, 5 males) from near summit, Arthur's Pass, 31 Dec 1983, JWE (LCNZ, ANIC).

— / NC–WD, OL, FD (Map 9).

Swept from ferns in *Nothofagus* forest at altitudes between 60 m and 900 m.

Remarks. Females of *P. wairua* are distinguished from those of all other *Pantolytomyia* species by their slender habitus and elongate temples (Fig. 80, 87).

The material from Arthur's Pass (excluded from the type series; see above) presents some difficulties. Females and males have the gracile appearance, pubescence, antenna, and temple of typical *P. wairua*. However, in males and in some females the pronotum has a distinct transverse carina, whereas in other females the carina appears to be absent. The forewing of the male is slightly longer than described above, extending slightly beyond the posterior margin of T2, but not beyond the apex of the gaster.

The name *wairua* is Maori, meaning 'spirit'.

taurangi species-group

Diagnosis. Antennal sockets with inner wall strongly produced. F1L exceeding F2L in male. Pronotal collar with a transverse carina, or spinose. Axillar processes short.

Females macropterous or brachypterous; males macropterous; brachypters without pronounced modifications to mesosoma. Forewing *IA* tracheate.

Included species. *P. taurangi* n.sp.

***Pantolytomyia taurangi* new species**

Macropterous female. Differing from *P. flocculosa* female as follows. Length and ratios of measurements as in Appendix Table 2.

Head in dorsal, posterior, and lateral view as in Fig. 81, 88, 91. Antennal sockets with inner wall strongly produced.

Antenna. Clava as in Fig. 113.

Mesosoma (Fig. M43). Pronotal collar anteriorly defined by a transverse carina (Fig. 132), the carina sometimes produced (Fig. 133) or spinose (Fig. 134), sometimes very weak; a very weak median dorsal carina sometimes present; mid-dorsal length 2.0–3.0x OD. Mesoscutellum (Fig. M34) with axillar processes usually stout, free, rarely not free. Dorsal propodeum: median carina present; lateral carinae diverging slightly posteriorly. Nucha punctate.

Forewing shape and venation as in Fig. 144; *IA* tracheate.

Petiole. Median dorsal and dorsolateral carinae sometimes weak posteriorly; a very weak intervening carina sometimes present (Fig. M35).

Gaster. T2 incised, as in Fig. M35, with or without weak punctures lateral to incision.

Pubescence. Frons without a dense tuft of matted setae. Body generally more sparsely setose; T2 often with only a few lateral and posterior setae.

Colour. Head and mesopleuron (rarely), metapleuron, propodeum, and petiole (often) brown. Body predominantly reddish orange to yellow. F12–13 sometimes pale yellow, contrasting with darker F1–11.

Brachypterous female. Differing from *P. taurangi* macropterous female as follows. Length and ratios of measurements as in Appendix Table 2.

Mesosoma (Fig. M36, M44). Mesoscutum and mesoscutellum more flattened. Axillar process more slender.

Forewing. Variation continuous between: (a) at rest extending to posterior margin of T2, with shape and venation as in Fig. 146; (b) intermediate condition (Fig. 147); and (c) at rest extending slightly beyond mid-point of petiole, with shape and venation as in Fig. 148; *IA* tracheate.

Petiole. Median dorsal and dorsolateral carinae very weak or absent (Fig. M37).

Pubescence. T2 more uniformly setose.

Colour. Brown markings absent.

Male. Differing from *P. flocculosa* male as follows. Length and ratios of measurements as in Appendix Table 2.

Head in dorsal and lateral view as in Fig. 98, 105. Antennal sockets with inner wall strongly produced.

Antenna. F2 carinate, as in Fig. 126; F10–12 as in Fig. 127.

Mesosoma. Pronotal collar: mid-dorsal length slightly greater than OD; otherwise as in *P. taurangi* macropterous female.

Forewing, petiole, pubescence. As in *P. taurangi* macropterous female.

Colour. Variation continuous between: (a) melanistic form – head, lateral lobe of mesoscutum, mesopleuron, metapleuron, propodeum, petiole, gaster, most of flagellum, and parts of femora and tibiae all brown; pronotum, middle lobe of mesoscutum, mesoscutellum, metanotum, antenna, and legs predominantly reddish orange to yellow; (b) rufinistic form – body entirely reddish orange to yellow. Palps yellow. Pubescence silver.

Type data. **Holotype:** female, WD, Lake Mahinapua, 20 m, swept from ferns in mixed punga / broadleaf forest, 9 January 1982, J.W. Early (NZAC).

Paratypes (241 females, 177 males). **NORTH ISLAND:** 1 female, Pandora, 11 Nov 1967, JM (NZAC); 1 female, Omahuta State Forest, 18 Mar 1978, S&JP (CNCI); 1 female, Kerikeri, Jan 1979 (NZAC); 2 males, Waipoua State Forest, 5 Feb 1975, AKW (NZAC); 1 female, same locality, 16–21 Mar 1978, S&JP (ANIC); 5 females, 1 male, same locality, 11–15 Apr 1980, AN & MT (CNCI); 1 female, Waimatenui, 12 Jun 1966, JIT (ANIC); 2 females, Dome State Forest, 15 Mar 1978, S&JP (CNCI, ANIC); 5 females, Waitakere Range, Nov 1980–Jan 1981, JSN (NZAC, BMNH, ANIC); 1 female, 2 males, Kohukohuni, 30 Mar 1974, GK (NZAC); 1 female, Katherine Bay, 20 Apr 1965, RGO (NMNZ); 2 females, Tapu Road, summit, 25 Mar 1977, GK (NZAC, ANIC); 1 female, Mount Pirongia, 16 Jan 1977, AKW (NZAC); 1 female, 1 male, same locality, 9 Jun 1977, BMM & BAH (NZAC, ANIC); 1 female, Waikino, Jun 1912, OHS (BPBM); 3 males, Mount Te Aroha, 17 Mar 1983, FC (FCCO); 1 female, Ponga Bush, 4 Jan 1973, BMM (NZAC); 1 female, Mamaku Range, 18 Jan 1972, GWR (NZAC); 1 female, Hongi's Track, 5 Oct 1966, KAJW (AMNZ); 5 males, Lake Okataina, 18 May 1982, 17 Mar 1983, FC (FCCO); 2 females, Moerangi, 4–9 Apr 1980, AN & MT (CNCI); 1 female, Opepe Reserve, 14 Jan 1972, GWR (NZAC); 4 females, same locality, 3 Feb–27 Mar 1978, S&JP (CNCI,

ANIC); 3 females, 3 males, same locality, 5–8 Apr 1980, AN & MT (CNCI); 2 females, 2 males, Okoek Stream, 3–8 Apr 1980, AN & MT (CNCI); 1 female, 2 males, Kaimanawa Forest Park, 11–26 Mar 1978, S&JP (CNCI); 1 female, 1 male, same locality, 3–8 Apr 1980, AN & MT (CNCI, ANIC); 1 female, Te Ponanga Bush, 27 Jan 1976, BMM (NZAC); 1 female, Pihanga Scenic Reserve, GWR (NZAC); 1 male, same locality, 13 Jan 1972 (NZAC); 2 females, 1 male, Rangipo Intake, 6 Apr 1980, AN & MT (CNCI); 2 females, Blyth track, 17 Feb 1965, JIT (NZAC); 1 female, Lake Waikaremoana, 17 Jan 1972, GWR (NZAC); 2 females, Ahimanawa Range, 14 Jan 1972, GWR (NZAC); 1 female, Makahu Spur, 24 Feb 1971, ACE (ANIC); 1 female, Poporangi Stream, 30 Jan 1954 (CMNZ); 1 female, same locality, 31 Jan 1954, JSD (CMNZ); 1 female, Taihape, 2 Dec 1965, LPM (CNCI); 1 female, Pouakai Hut, 3 Dec 1975, AKW (NZAC); 13 females, 6 males, Mount Egmont, Jan–Dec 1979–1983, FC (FCCO); 2 females, Mangatarere Stream, 13 Jan 1972, GWR (NZAC); 2 females, Lake Wairarapa, 1 Sep 1965, JIT (NZAC); 1 female, Aorangi Mountains, 2 Sep 1965, JIT (NZAC); 1 female, Ballance Bridge Reserve, 3 Jan 1975, JCW (NZAC); 3 males, Tararua State Forest, 8 Mar 1978, S&JP (CNCI); 1 female, Akatarawa Divide, 3 Jan 1947, JTS (NMNZ); 2 females, same locality, 27 Mar 1978, S&JP (CNCI).

SOUTH ISLAND: 1 female, Cable Bay, 23 Jul 1964, JIT (NZAC); 1 female, Whangamoia Saddle, 1 Sep 1966, JCW (NZAC); 1 male, Upper Maitai, 3 May 1950, ESG (NZAC); 3 females, Nelson, 18 Oct 1923, 8 Sep 1926, 12 May 1928, ESG (NZAC); 1 female, Dun Mountain track, 14 Sep 1971, GWR (NZAC); 1 female, Roding Valley, 19 Oct 1965, JIT (NZAC); 1 male, same locality, 27 Jul 1967, JSD (NZAC); 1 male, Cleopatra's Pool, 5 Feb 1981, JWE (LCNZ); 4 males, Castle Rock – Torrent Bay track, 4 Feb 1981, JWE (LCNZ, ANIC); 1 male, Bark Bay, 5 Feb 1981, JWE (LCNZ); 1 female, Canaan area, 3 Mar 1964, JIT (NZAC); 1 female, 1 male, same locality, 17 Sep 1964, LPM (NZAC); 1 female, same locality, 8 Dec 1964, JIT (NZAC); 3 females, Mytton Hut, 13 Dec 1967, SE (NZAC); 1 female, Takaka Hill, 1 Feb 1978, S&JP (CNCI); 1 female, Pigeon Saddle, 21 May 1982, S&JP (CNCI); 1 male, Motueka, 19–28 May 1982, S&JP (CNCI); 1 female, Clark River, 28 Aug 1964, JIT (NZAC); 1 female, Mount Arthur, Sep 1969, JIT (NZAC); 1 female, same locality, 21 Nov 1969, JNJ (ANIC); 1 female, same locality, 21 Jan 1948, RRF (NMNZ); 1 female, Mount Domett, 1 Jul 1971, JSD (ANIC); 1 male, Oparara, 11 Mar 1971, JIT (NZAC); 2 females, Kawatiri, 25 Aug 1964, JIT (NZAC); 3 males, Mount Burnett, 8 Feb 1981, JWE (LCNZ); 1 female, Mangarakau, 20 May 1982, S&JP (CNCI); 1 female, Tennyson Inlet, 27 May 1982, S&JP

(CNCI); 2 females, 1 male, Ship Cove, 27–30 Nov 1972, JM (NZAC, BMNH); 2 females, Mistletoe Bay, 26 May 1982, S&JP (CNCI); 1 female, Shakespeare Bay, 11 Aug 1969, JM (NZAC); 1 female, Reservoir Reserve, 22 Sep 1965, LPM (NZAC); 1 female, same locality, 30 Nov 1972, JSD (NZAC); 1 male, Pelorus Valley, 29 Apr 1964, JIT (NZAC); 1 female, upper Wairau Valley, JIT (NZAC); 1 female, 1 male, St Ronan's Well, 7 Sep 1966, JIT (NZAC); 2 females, Lake Rotoiti, 27 Jul 1965, JIT & AKW (NZAC); 1 male, same locality, 7 Feb 1978, AKW (NZAC); 1 male, 1 female, same locality, 4–10 Feb 1978, S&JP (CNCI); 1 female, 3 males, same locality, 24–26 Mar 1980, AN & MT (CNCI); 1 female, same locality, Jan–Apr 1981, FD (NZAC); 5 males, Mount Robert, 23–26 Mar 1980, AN & MT (CNCI, ANIC); 1 female, 2 males, same locality, 10 Dec 1980, JSN & EV (BMNH): 1 male, Lake Rotorua, 18–29 May 1982, S&JP (CNCI); 1 male, Shenandoah Saddle, 12 Feb 1981, JWE (LCNZ); 1 female, Fleicher's Creek, Nov 1971, JM (NZAC); 1 female, lower Buller Gorge, 16 Dec 1970, HAO (ANIC); 1 female, 3 males, Riordan's Creek, 26 Apr 1980, JWE (LCNZ); 1 male, West Inangahua State Forest, 18 Apr 1972, JSD (NZAC); 1 female, same locality, 19 Sep 1972, JSD (NZAC); 1 female, Boatman's Creek, Nov 1971, JM (NZAC); 1 female, Pahautane Bay, 23 Aug 1977, RME (LCNZ); 1 female, Mount Dewar, 10 Dec 1969, JIT (NZAC); 3 females, E of Mount Dewar, 2 Dec 1969, JIT (NZAC); 2 females, 6 males, Croesus Track, 18–21 Jan 1982, JWE (LCNZ); 5 females, 8 males, Porarari River, 2 Apr 1983, MLB & JWE (LCNZ, ANIC); 1 male, Bullock Creek, 23 Mar 1980, AN & MT (CNCI); 1 female, Springs Junction, 4 May 1979, RME (LCNZ); 7 females, 7 males, Lewis Pass Scenic Reserve, 2 Jan 1979, 5 Apr 1983, JWE (LCNZ, ANIC); 1 male, 8 km W of Lewis Pass, 17–30 May 1982, S&JP (CNCI); 2 males, summit of Ada Pass, 25 Apr 1966, GWR (NZAC); 2 females, Waiheke State Forest, 20 Dec 1981, CAM (LCNZ); 1 female, Lady Lake, 2 Feb 1979, RME (LCNZ); 5 females, Oaro, 18 March 1978, JWE (LCNZ); 3 females, Lower Hurunui, 11 May 1952, JSD (CMNZ, ANIC); 1 female, Mount Algidus, 17 Mar 1965, GWR (NZAC); 1 female, Pudding Hill Domain, 19 Sep 1981, JWE (LCNZ); 1 female, Klondyke Corner, 26 Oct 1981, JWE (LCNZ); 1 female, Bealey, 13 May 1965 (NZAC); 1 male, 8 km S of Arthur's Pass, 19–21 Mar 1980, AN & MT (CNCI); 6 males, Kelly's Creek, 9 Jan 1982, JWE (LCNZ, ANIC); 1 male, Jacksons–Taramakau, 26 Jan 1978, GK (NZAC); 2 males, 7.7 km SSE of Kumara, 18–22 Mar 1980, AN & MT (CNCI); 1 female, 1 male, Okuku State Forest, 10 Jul 1979, RME (LCNZ); 5 females, 10 males, same locality, 9 Jan 1982, 14 Jan 1983, JWE (LCNZ, ANIC); 1 female, 1 male, same locality, 18–22 Mar 1980, AN & MT (CNCI); 1 female, Hokitika, 28 Jan

1978, S&JP (CNCI); 1 female, 1 male, Hokitika River gorge, 17 Mar 1980, AN & MT (CNCI, ANIC); 3 males, Lake Mahinapua, 30 Jan 1978, S&JP (CNCI); 1 female, same locality, 16–22 Mar 1980, AN & MT (CNCI); 26 females, 20 males, same locality, 9 and 17 Jan 1982, JWE (LCNZ, BMNH, CNCI, ANIC, NZAC); 1 female, Mount Hercules, 4 Nov 1965, JIT & ACE (NZAC); 1 female, same locality, 17 Jan 1982, JWE (LCNZ); 1 female, Lake Kaniere, 23 Oct 1978, JWE (ANIC); 2 females, Poerua State Forest, 10 Feb 1976, KB & RRS (LCNZ); 7 females, 2 males, Lake Wombat track, 11 Jan 1982, JWE (LCNZ); 1 male, Peter's Pool, 11 Jan 1982, JWE (LCNZ); 1 female, 7 males, Canavan's Knob, 10 Jan 1982, JWE (LCNZ, BMNH); 1 female, 1 male, Lake Matheson, 16 Jan 1982, JWE (LCNZ); 1 female, Sunny Flat, 25 Jan 1978, GK (NZAC); 1 male, Ahuriri Valley, 23 Jan 1966, JIT (NZAC); 1 male, Omarama, 23 Jan 1966, JIT (NZAC); 2 females, Ellery River, 11 Apr 1982, JWE (LCNZ, ANIC); 12 females, 6 males, Moraine Creek, 12 Feb 1980, JWE (LCNZ, ANIC); 1 female, 1 male, Tutoko River, 13 Feb 1980, JWE (LCNZ); 1 male, near Grono Bay, 23 Nov 1981, CFB (NZAC); 7 females, 10 males, Deep Cove, 2–3 Feb 1983, JWE & CAM (LCNZ, ANIC, NZAC); 2 females, same locality, 17 Jan 1970, ACE (NZAC, ANIC); 3 males, Wilmot Pass, 21–23 Jan 1970, JIT & ACE (NZAC); 6 males, Lake Manapouri, South Arm, 4 Feb 1982, JWE, CAM, PTS, & RME (LCNZ); 1 male, Lake Monk, 5 Apr 1957, TR (NMNZ); 1 male, Gunn's Camp, 5 Feb 1980, JWE (LCNZ); 1 female, Makarora, 23–25 Jan 1978, S&JP (CNCI); 1 female, Davis Flat, 12 Apr 1982, JWE (LCNZ); 2 females, Howden track from Divide to Saddle, 8 Feb 1980, JWE & RME (ANIC); 1 female, Lake Howden, 8 Feb 1980, JWE (LCNZ); 1 female, Ben Nevis, 28 Mar 1970, JCW (NZAC); 1 female, Mount Maungatua, 14 Jan 1965, GK (NZAC); 1 female, Waipori Valley, 8 Nov 1968, JCW (NZAC); 1 male, Catlins, Tautuku Lodge, 6–9 Feb 1982, JWE (LCNZ); 1 female, Table Hill Reserve, 17 Jan 1978, S&JP (CNCI).

Material examined. Type series only.

Taken in all areas except WI, SC, and SI (Map 10).

Collected by sweeping ferns, moss, and ground cover; by pan, Malaise, pitfall, and black-light traps; and by Berlese funnel extraction of litter; in *Agathis*, *Agathis* / podocarp / broadleaf, podocarp / broadleaf, podocarp / *Nothofagus* (various species), podocarp / broadleaf / nikau palm, and punga / broadleaf forests, in *Podocarpus* bogs, and in *Fuchsia* / *Weinmannia* bush; at altitudes between 20 m and 1524 m.

Remarks. The spinose pronotal collar (Fig. 134) of some *P. taurangi* individuals is a striking variation on the

usual carinate condition. However, individuals with character states intermediate between the spinose and carinate extremes are known (e.g., Fig. 133), and spinose and carinate individuals have been collected together on several occasions. The spinose state occurs in macropterous and brachypterous females and in males.

The name *taurangi* (Maori, 'wanderer'), refers to the wide distribution of this species.

Genus *Diphoropria* Kieffer

Diphoropria Kieffer, 1905: 103. (For full synonymy see Naumann 1982.)

Type-species *Diphoropria rufipes* Kieffer, 1905, by monotypy.

Diagnosis (New Zealand species only). Forewing: distal margin rounded (Fig. 40); basalis and *IA* never tracheate. Hindwing *Sc+R* not continuous from base to hamuli as a tracheate vein. Gaster with 5 free tergites in both sexes. Antennal sockets with inner wall not produced dorsally. Parafrontal carina absent. Pronotal scrobe absent (Fig. M46). Notaulices and median carinae of metanotum and propodeum present. Macropterous or brachypterous (Fig. 152, 153). Anterior margin of T2 emarginate (Fig. M56), with a pair of longitudinal carinae, but without an anteromedian process. Male with carinae on F2 only, or on F1 and F2, or on F1, F2, and F3.

In New Zealand most similar to *Maoripria*, which differs in having a dorsal process and a parafrontal carina on the antennal socket and in lacking notaulices.

Redescription (all species)

Macropterous female. Head hypognathous, globular; temple of moderate length or short; ocelli present; vertex without spines or carinae. Frontal prominence moderately or strongly developed; antennal sockets with inner wall not produced dorsally, outer wall not expanded; parafrontal carina absent. Frons with ventral margin defined, weakly defined, or not defined. Compound eye of moderate size or large. Genal region not strongly concave about anterior tentorial pit. Occipital carina moderately developed, with at most 1 or 2 mid-dorsal punctures. Palpal formula 5-3. Mandibles neither elongate nor projecting; mandibular formula 3-2. Distal margin of labrum convex. Genal bridge incomplete.

Antenna 0.5–1.0x BL, 15-segmented. F1 with neither a minute ring nor a basal constriction. Clava 6–8-segmented and gradual, or absent.

Mesosoma broad, widest at tegulae, not extensively rugose-punctate. Pronotum: neck longer than collar, posteriorly with a transverse row of small foveae or punctures; collar without a carina or spines; pronotal scrobe and postspiracular excavation absent. Mesoscutum convex; notaulices well defined. Tegula large, without microsculpture. Mesoscutal-mesoscutellar suture present. Mesoscutellum: fovea well defined, undivided; lateral excavation well defined; axillar processes usually moderately long, free, curved, acuminate. Mesopleuron: pre-episternal furrow absent; sternaulus continuous, broadly interrupted, or absent; ventral sternopleural carina absent. Metanotum of moderate size, with median, lateral, and transverse carinae; dorsellum well defined; spines absent. Dorsal propodeum: median carina long; posterior margin defined, but dorsal propodeum and nucha not smoothly continuous; posterolateral corners sometimes angularly produced; vertical spines absent.

Forewing broad, flat, at rest extending beyond posterior tip of gaster, hyaline or weakly brown, not microdenticulate; distal margin rounded. Marginalis not extending beyond proximal half of wing; *Sc+R*, marginalis, and stigmalis strongly sclerotised, tracheate. *C* proximally, basalis, *M+Cu1*, basal portion of *Cu1*, and poststigmalis usually indicated by coloration. Costal cell narrow; radial and basal cells scarcely defined, posteriorly open. Marginalis broadly contiguous with costal margin; *M/W* and *S/M* variable, usually exceeding 1.0.

Hindwing broad, approximately 0.7x as long as forewing, hyaline, with 3 hamuli. *Sc+R* not continuous from base to hamuli as a tracheate vein. Basal cell absent.

Legs slender. Foretibia without an apical, external spine.

Petiole. Longitudinal carinae diverging over mid-length and/or anteriorly. *PL/PW* = 1.0–3.0.

Gaster with 5 free tergites and 5 free sternites, posteriorly acuminate or rather blunt. T2 anteriorly emarginate, sometimes very weakly so, with a short longitudinal carina on each side of emargination and often with a median fold or carina, but without a blunt anteromedian process. T3 and T4 transverse. T5 trapeziform to subtriangular, with a pair of spiracles. T6 minute, exposed, with a pair of cerci. Cerci lobiform or digitiform, articulated, widely separated. All sutures between tergites complete, well defined, evenly curved. S2 small, anteriorly and posteriorly emarginate. S3 not anteriorly bulged. S6 triangular, longer than S4+5.

Pubescence. Body with both long, appressed or suberect setae and dense, short, appressed setae. Woolly pits situated posterior to coxae I and II; broad, flattened setae absent. Truncate, golden setae absent. Forewing *Sc+R* without a macroseta. Surfaces and margins of wings densely setose. Apical sternite without a dense brush of short, stiff setae.

Brachypterous female. Differing from macropterous female as follows.

Head sometimes more elongate, with longer temple and small compound eye.

Mesosoma more slender. Mesoscutum weakly convex or nearly flat; notaulices weaker or absent. Sternaulus always present.

Forewing at rest extending to somewhere between mid petiole and posterior margin of T2.

Hindwing narrow.

Petiole. Carinae sometimes weaker.

Micropterous female. Not known from New Zealand; where it occurs (Australia, Lord Howe Island), differing from macropterous female as follows.

Mesosoma. Mesoscutum flat or very weakly convex; notaulices sometimes weakly defined or reduced to an elongate puncture near posterior margin of mesoscutum. Tegula small. Mesoscutellum: fovea sometimes weakly septate; axillar processes short, neither free nor recurved. Mesopleuron: sternaulus defined, continuous; ventral sternopleural carina defined, especially near coxae. Dorsal propodeum: median carina sometimes very short, sometimes with vertical spines.

Forewing at rest not extending beyond posterior margin of metanotum, without venation or pubescence.

Hindwing absent.

Macropterous male. Differing from macropterous female as follows.

Antenna 0.7–1.1x as long as body, 14-segmented. *F1L/F1W* = 2.3–5.0. Carinae present on F2 only, or on F1 and F2, or on F1, F2, and F3. Flagellar segments filiform, not strongly pedunculate.

Petiole. *PL/PW* = 1.5–2.7.

Gaster with 7 free sternites. Cerci always digitiform.

Brachypterous male. Differing from macropterous male as follows.

Mesosoma, forewing, hindwing. As in brachypterous female.

Micropterous male. Not known from New Zealand; where it occurs (Australia), differing from macropterous male as follows.

Mesosoma as in micropterous female.

Forewing at rest reaching beyond posterior margin of metanotum, not reaching posterior margin of propodeum; otherwise as in micropterous female.

Hindwing minute, translucent without venation, pubescence, or hamuli.

Remarks. The generic diagnosis and redescription above are modified after Naumann (1982). The diagnosis emphasises character states useful for distinguishing New Zealand *Diphoropria* from other New Zealand ambositrines, and does not apply generally. For example, wing venation and notaular character states are different in Australian micropters, and T2 is unusually modified anteriorly in some macropterous species from New Guinea. The generic redescription applies to all known species of *Diphoropria*.

Only two species of *Diphoropria* have been recorded from New Zealand (*D. sinuosa* n.sp. and *D. kuscheli* n.sp.), in contrast to the 35 species (several undescribed) known from outside New Zealand. *D. kuscheli* and *D. sinuosa* are closely related to each other (synapomorphy: elongate, strongly sinuate axillar process) and remote from all other *Diphoropria*. Some small females of *D. kuscheli* with stouter gasters can be difficult to separate from macropterous females of *D. sinuosa*. Males of *D. kuscheli* have not been recognised. Some of the males here assigned to *D. sinuosa* may, in fact, belong to *D. kuscheli*. *D. kuscheli* is known only from macropterous females. Both sexes of *D. sinuosa* can be either macropterous or brachypterous. However, micropterous *Diphoropria* are absent from New Zealand, which is in striking contrast to Australia, where the females of nine species are micropterous.

KEY TO SPECIES OF *DIPHOROPRIA* KNOWN FROM NEW ZEALAND (FEMALES)

- Gaster broad (Fig. 156), 1.6–2.2x longer than wide; T5 0.7–1.3x longer than wide; flagellum unicolorous, or rarely apical segments slightly darker; macropterous (Fig. 40) or brachypterous (Fig. 152, 153); petiolar carinae either distinct and narrowly separated (Fig. M56) or absent (Fig. M50, M57) ... (p. 33) .. *sinuosa*
—Gaster elongate (Fig. 157), 2.3–2.7x longer than wide; T5 1.2–1.6x longer than wide; apical flagellar segments often distinctly darker; macropterous (Fig. 40); petiolar carinae distinct, usually rather widely separated (Fig. M58) ... (p. 36) .. *kuscheli*

Diphoropria sinuosa new species

Macropterous female. Length and ratios of measurements as in Appendix Table 3.

Head. Temple smoothly, very gradually curving to smooth occipital carina (Fig. M45). Vertex convex. Ocelli of moderate size. Frons flat (Fig. M46); ventral margin defined by lateral processes or undefined. Antennal sock-

ets with walls thin, medially narrowly separated or contiguous, anteriorly with setigerous punctures and 1 or 2 rugae.

Antenna. Scape, pedicel, and F1–5 reticulate (Fig. M47). Clava moderately well developed.

Mesosoma. Pronotum: anterior neck transversely striate; posterior neck with a transverse row of foveae; collar smooth, its mid-dorsal length less than OD. Mesoscutum: notaulices distinct, narrow, rarely posteriorly expanded (Fig. M49); middle lobe convex, smooth; lateral lobe with at least a weak depression. Mesoscutellum: fovea well defined, wider than long, its posterior margin strongly convex; septum between fovea and lateral excavation of moderate size; parafoveal area sloping posteriorly; submarginal carina more or less straight; axillar process long, acuminate, sinuate (Fig. M49). Postfoveal mesoscutellum slightly broader than fovea, nearly flat; lateral margin not foveolate; posterior margin with a crenulate furrow (sometimes weakly defined), its rim smooth. Mesopleuron (Fig. M52) narrowly produced anteroventrally; sternaulus strong, continuous. Metanotum: lateral carina produced posterodorsally (Fig. M54); lateral excavation smooth. Dorsal propodeum: median carina well defined, unarmed; lateral carinae more or less straight, parallel or converging slightly anteriorly; posterior margin straight or very weakly emarginate. Nucha smooth or with a few weak rugae laterally.

Forewing at rest extending slightly beyond posterior extremity of gaster.

Petiole. Median dorsal carina strong, continuous, usually reaching posterior extremity of petiole (Fig. M56); dorsolateral carina strong, continuous, diverging at least slightly in anterior half; intervening carinae absent or weak and irregular.

Gaster broad (Fig. 156); T2 weakly arched; anterior excavation strong, flanked by short, low carinae; intercarinal area broad, smooth or with a very weak median carina.

Pubescence. Postantennal excavation, pronotal collar, propleuron, metapleuron, propodeum (laterally), petiole (laterally and ventrally), and S2 all densely woolly. Head, mesoscutum, mesoscutellum, metanotum, T2 (anteriorly, laterally, and posteriorly only), T3–5, and S3–6 all with sparse to moderately dense, long setae. Frons, clypeus, mesosternal area, legs, and gastral sternites all with at least some short, more or less depressed setae.

Colour. Variability continuous between: (a) pale form – body reddish orange to yellow; appendages yellow; some carinae and margins of sclerites dark brown; (b) intermediate form – body and appendages predominantly reddish orange; head, mesoscutal lobes, mesopleuron, propodeum, petiole, and T2 all with brown to black markings; (c) melanistic form – body and hind coxa uniformly dark

brown to black; antenna, frontal prominence, tegula, axillar process, legs, and margins of gastral tergites all yellow, reddish orange, or pale brown. In all forms palpi yellow, pubescence silver, and apical flagellar segments scarcely darker than basal segments.

Brachypterous female, type A (Fig. 152). Differing from macropterous female as follows. Length and ratios of measurements as in Appendix Table 3.

Head. Ocelli smaller.

Mesosoma. Mesoscutum: middle lobe flat (Fig. 152); lateral lobe with or without a depression. Mesoscutellum: submarginal carina absent; axillar process shorter, less sinuate.

Forewing at rest extending beyond posterior of petiole but not beyond T2; shape and venation as in Fig. 154.

Pubescence. Dorsal propodeum and dorsal petiole with dense, more or less depressed, moderately long setae. T2 with such setae at midlength as either a pair of lateral patches or a transverse band.

Colour. Usually of pale form, or body uniformly reddish brown; dark markings absent.

Brachypterous female, Type B (Fig. 153). Differing from macropterous female as follows. Length and ratios of measurements as in Appendix Table 3.

Head. Vertex more flattened. Ocelli minute.

Mesosoma. Mesoscutum: notaules distinct but weaker (anteriorly more evanescent, posteriorly often more widely separated from mesoscutal-mesoscutellar suture) or indistinct; middle lobe flat (Fig. M50); lateral lobe without a depression. Mesoscutellum: submarginal carina absent; axillar process either free and spine-like or free portion absent. Postfoveal mesoscutellum slightly or distinctly wider than fovea, flat or convex; posterior margin smooth. Metanotum with carinae indistinct, not produced. Dorsal propodeum: median carina indistinguishable; lateral carinae always at least slightly converging anteriorly, never parallel.

Forewing at rest not reaching beyond posterior of petiole; shape and venation as in Fig. 155.

Petiole. Carinae weak or absent (Fig. M57).

Gaster. Anterior excavation of T2 weaker; flanking carinae shorter, weaker, more oblique.

Pubescence. Dorsal propodeum with dense, more or less depressed, moderately long setae. T2 with 3 narrowly separated transverse bands of such setae (Fig. M61, M62).

Colour. Pale form only; dark markings absent.

Macropterous male. Differing from macropterous female as follows. Length and ratios of measurements as in Appendix Table 3.

Head. Dorsal and lateral view as in Fig. 158, 159

Antenna. F1 usually carinate (Fig. 164, 165); carina sometimes reduced to a small apical tooth (Fig. 166) or absent (Fig. 167). F2 carinate.

Mesosoma. Mesoscutum: middle lobe near posterior margin rarely with 1 or 2 minute punctures lacking setae. Nucha rarely with a few weak dorsal rugae.

Petiole. Median carina rarely almost completely effaced over posterior 0.7.

Brachypterous male. Differing from macropterous female as follows. Length and ratios of measurements as in Appendix Table 3.

Head. Vertex flattened. Ocelli small to minute. Frons with ventral margin produced medially or undefined.

Antenna. F1 at most with a short, tooth-like, apical carina.

Mesosoma. Mesoscutum: notaules weaker; middle lobe weakly convex or flat. Mesoscutellum: axillar process short, slightly curved. Postfoveal scutellum: marginal furrow not crenulate, interrupted only by a weak sagittal septum, or furrow absent. Metanotum: carinae very weak; lateral carina at most very slightly produced.

Forewing at rest reaching beyond posterior of petiole. Shape and venation as in type A female.

Pubescence. Dorsal propodeum and dorsal petiole sometimes with dense, more or less depressed, moderately long setae. T2 either with a few suberect setae anteriorly, laterally, and posteriorly or with 3 bands of more or less depressed setae (bands either widely separated and sparse or narrowly separated and dense).

Colour. Pale or intermediate form only.

Type data. Holotype: macropterous female, AK, Lynfield, Tropicana Drive, litter 75/155, 17 October 1975, G. Kuschel (NZAC).

Paratypes: 102 macropterous females, 8 macropterous males, same data as holotype, various dates between 27 Jul 1974 and 27 Jan 1977 (NZAC, ANIC, BMNH, CNCI); 2 brachypterous females (type A), Dovedale, 11 Oct 1963, JIT (NZAC); 3 brachypterous females (type B), 1 brachypterous male, Howden track from Divide to Saddle, 8 Feb 1980, JWE & RME (LCNZ, ANIC).

Material examined. Type series, plus 1637 non-type examples* (675 macropterous females, 155 brachypterous females (67 type A, 88 type B), 775 macropterous males, 32 brachypterous males; AMNZ, ANIC, BMNH, BPBM, CMNZ, CNCI, HKTC, LCNZ, NMNZ, NZAC).

*Because it would be impractical to list individual collection data for so many specimens, most have been excluded from the paratype series.

Taken from all areas except WA; offshore island records include Poor Knights, Little Barrier, Cuvier, Ruamahuanui, Big South Cape, and Long Island (Maps 11–14).

Collected by Berlese funnel extraction of litter, moss, and rotten wood; by pyrethrum knock-down techniques from dead tree-fern stems; by diurnal or nocturnal sweeping of low vegetation (especially ferns and moss); and by yellow-pan, Malaise, and light trapping; in and at the margins of *Nothofagus* (various spp.) forests; *Agathis* forest; podocarp / broadleaf forest; punga / broadleaf forest; rimu forest; *Fuchsia* / *Weinmannia* bush; coastal bush; subalpine grassland bog; *Scirpus* swamp; paddocks; and domestic gardens.

Recorded at altitudes from sea level to 1463 m, and in all months of the year.

One male was reared from the pupal case of a mycetophilid fly.

Wing polymorphism. In females there is almost continuous variation in wing length and several correlated characters between extremes of macroptery and brachyptery. The distinctions made above between macropters, type A brachypters, and type B brachypters is somewhat arbitrary, but useful for descriptive purposes.

The morphological variation described above in detail can be summarised. With the shortening and narrowing of the wings there is a narrowing of the mesosoma, accompanied by a flattening of its dorsal surface and an increase in the pubescence of the posterodorsal surfaces of the body (surfaces which in macropters, with the wings at rest,

Table 2 Percentages of macropterous and brachypterous morphs in *Diphoropria sinuosa* n.sp. and *D. nigricans* (Dodd) (data for *nigricans* from Naumann 1982)

		<i>sinuosa</i>	<i>nigricans</i>
Females:	macropters	85.1	99.3
	brachypters:		
	type A	8.9	0.7
	type B	6.0	nil
Males:	macropters	97.6	100
	brachypters	2.4	nil

would be covered by the wings). The distinction between macropterous and brachypterous males is sharper in material available at present. Brachypterous morphs of both sexes are of more frequent occurrence in *D. sinuosa* than in *D. nigricans* (Dodd), the most common and widespread Australian ambositrine (Table 2).

Teratological specimen. A single cyclopic, macropterous male (from Klondyke Corner, Arthur's Pass National Park; in LCNZ) differs from normal macropterous *D. sinuosa* males as detailed in Table 3. Fully cyclopic individuals (i.e., individuals in which the two compound eyes have fused completely) are extremely rare among the Hymenoptera, and have previously been recorded for only six families (Fergusson 1978). The only record of a one-eyed member of the Diapriidae is that by Bin (1976), who described a teratological specimen of *Trichopria* Ashmead in which the single compound eye was large and frontally placed. However, in this specimen the condition had been achieved through asymmetry of the head, with the right side more strongly developed. The single compound eye of the *Trichopria* was more or less normally shaped and clearly not a fusion product. The abnormal *D. sinuosa* male described above is the first recorded instance of the true cyclopic condition in the Diapriidae.

The cyclopic *D. sinuosa* male is similar to the other cyclopic Hymenoptera in that the abnormal features are confined to the head. Modifications of the vertex and frons, including loss of ocelli, are usual in cyclopic individuals. It is less common for the antennae also to be abnormal as they are in the *D. sinuosa* male, although this has been described by Paetzold & Vater (1968) in *Pachyneuron aphidius* (Bouché) (Pteromalidae).

Fergusson (1978) reviews morphological, histological, and biological studies of cyclopic Hymenoptera. Cyclopic honey bees, although able to run, are incapable of normal flight. The cyclopic *D. sinuosa* was swept from seedlings of *Nothofagus* sp. on the forest floor, along with several normal *D. sinuosa* males.

Remarks. The name *sinuosa* (Latin, 'curved') refers to the strongly curved axillar process.

Table 3 Comparison of normal macropterous and cyclopic males of *Diphoropria sinuosa* n.sp.

Character	Normal	Cyclopic
compound eyes	separate, contours convex (Fig. 158, 159)	fused (Fig. 160, 161), slightly reniform
ocelli	3 present	absent
frons	flat	with a median process
head	globular	elongate
antennae	flagellar segments relatively slender (Fig. 162), F12L 3.5–4.6x F12W	flagellar segments swollen, F12L 3.0x F12W; left F3 deformed basally (Fig. 163)

Diphoropria kuscheli new species

Female (Fig. 40). Differing from *D. sinuosa* macropterous female as follows. Length and ratios of measurements as in Appendix Table 3.

Antenna. F12 and F13 as in Fig. M48.

Mesosoma. Postfoveal mesoscutellum (Fig. M51) distinctly broader than fovea; lateral margin sometimes indistinctly foveolate. Axillar process as in Fig. M53. Metanotum with lateral carina weakly produced posterodorsally, or not produced (Fig. M55). Dorsal propodeum: median carina well defined, weak, or absent; lateral carinae usually more distinctly converging anteriorly.

Petiole. Median dorsal carina usually not reaching posterior extremity of petiole (Fig. M58). Area between median and lateral carinae usually flat and smooth.

Gaster elongate (Fig. 157).

Colour. Pale form rare, usually with at least head or petiole brown. F6–13 often distinctly darker than F1–5.

Male. Unknown.

Type data. **Holotype:** female, WD, Haast Pass, W of summit, 550 m, ex sifted litter and rotten wood 78/52, 24 January 1978, G. Kuschel (NZAC).

Paratypes (91 females). **NORTH ISLAND:** 1, Waipoua State Forest, 4 Feb 1975, AKW (NZAC); 1, Maungaturoto area, Wilson Causer Road, 9 Jul 1967, KAJW (AMNZ); 2, Lynfield, 13 Dec 1975, 5 Sep 1976, GK (NZAC); 1, Kirikiri Saddle, 12 Feb 1979, JSD (NZAC); 1, Waikino, Jun 1912, OHS (BPBM); 1, Okataina, 18 May 1982, FC (FCCO); 1, Whakamaru, 25 Sep 1969, RP (CNCI); 1, Okoeke Stream, 3–8 Apr 1980, AN & MT (CNCI); 1, Kaimanawa Forest Park, 11–26 Mar 1978, S&JP (CNCI); 1, same locality, 3–8 Apr 1980, AN & MT (CNCI); 2, Desert Road S of Turangi, 13 Jan 1972, GWR (NZAC); 1, Mount Ruapehu, 15 Nov 1979, FC (FCCO); 1, Dawson Falls road, 21 Oct 1968, JSD (NZAC); 2, Mount Egmont, 29 May 1982, 24 Feb 1984, FC (FCCO).

SOUTH ISLAND: 1, Nelson, 6 Feb 1923, AT (NZAC); 3, Roding Valley, 2nd ford, 27 Jul 1967, JSD (NZAC, ANIC, BMNH); 1, 30 km SW of Collingwood, 23 May 1982, S&JP (CNCI); 1, Karamea, 22 Jan 1980, JWE (LCNZ); 2, Connor's Creek, 21 Dec 1981, JWE (LCNZ); 2, Lake Rotoiti, 5 Feb 1978, Dec 1980, AKW (NZAC); 1, same locality, 6 Feb 1978, S&JP (ANIC); 1, Croesus track, 18 Jan 1982, JWE (LCNZ); 2, Blue-Grey River, 20 Dec 1981, CAM (LCNZ); 1, Taylorville, 8 Jan 1985, AJH (ANIC); 1, Mawhera State Forest, 10 Nov 1971, JSD (NZAC); 1, Lewis Pass, 20 Jan 1976, AKW (NZAC); 1, same locality, 8–12 Dec 1957, ESG (NZAC); 1, near Marble Hill, 5 May 1983, JWE (LCNZ); 1, Riordan's Creek, 26 Apr 1980, JWE (LCNZ); 4, Puhi Puhi Valley, 2 Jan 1982, JWE

(LCNZ, ANIC); 1, Kelly's Creek, 28 Nov 1977, ES (NZAC); 1, Halpin Creek, 8 Jan 1982, JWE (LCNZ); 1, Lower Hurunui, 11 May 1952, JSD (CMNZ); 1, Cass, 1 Dec 1924, AT (CMNZ); 1, Peel Forest, 5 Nov 1979, JCW (NZAC); 1, Kaituna, 22 Aug 1964, GK (NZAC); 2, Price's Valley, 5–24 Mar 1981, JWE (LCNZ); 2, same locality, Mar–Apr 1981, RPM (NZAC); 1, Pudding Hill Domain, 19 Sep 1981, JWE (LCNZ); 1, Sharplin Falls Scenic Reserve, 21 Oct 1981, JWE & RAM (LCNZ); 1, Governor's Bush, 1 Mar 1976, WJS (LCNZ); 2, Hooker Valley, 30 Mar – 2 Apr 1977, JSD (NZAC, ANIC); 1, Okuku Creek, 18–22 Mar 1980, AN & MT (CNCI); 1, Mount Hercules, 1 Mar 1966, GK (NZAC); 3, Hokitika, 28 Jan 1978, S&JP (CNCI, ANIC); 1, Hokitika River gorge, 17 Mar 1980, AN & MT (CNCI); 1, Lake Mahinapua, 26–30 Jan 1978, S&JP (CNCI); 5, Lake Wombat track, 11 Jan 1982, JWE (LCNZ); 1, near Canavan's Knob, 26 Apr – 5 May 1982, ABM (LCNZ); 1, same locality, 10 Jan 1982, JWE (LCNZ); 1, Franz Josef, 10 Apr 1982, JWE (ANIC); 2, same data as holotype (NZAC, ANIC); 2, same locality as holotype, 22–24 Jan 1978, S&JP (CNCI, ANIC); 2, Sunny Flat, 25 Jan 1978, GK (NZAC); 1, Howden track from Divide to Saddle, 8 Feb 1980, JWE & RME (LCNZ); 1, Hollyford River, 5–8 Feb 1980, JWE (LCNZ); 1, Simonin Creek, 23 Jan – 1 Feb 1975, JSD (NZAC); 1, Wilmot, 11 Feb 1967, AKW (NZAC); 1, Grebe Valley, 4 Feb 1982, JWE, CAM, & PTS (LCNZ); 1, Lake Manapouri, South Arm, 4 Feb 1982, SPW (LCNZ); 1, Dashwood Stream, 19 Jan 1970, ACE (NZAC); 2, South Borland Valley bivouac, 2 Feb 1982, JWE (LCNZ, ANIC); 1, Moraine Creek, 12 Feb 1980, JWE (LCNZ); 1, Tutoko River, 13 Feb 1980, JWE (LCNZ); 2 females, Deep Cove, 2–3 Feb 1983, JWE & CAM (LCNZ, ANIC); 1, Owaka, 13–20 Jan 1978, S&JP (CNCI).

Material examined. Type series only.

ND, AK, CL, BP, TO, TK/NN, MB, BR, KA, NC, MC, WD, OL, FD, SL (Map 15).

Collected by Berlese funnel extraction of litter, moss, fleshy fungi, and rotten wood; by diurnal and nocturnal sweeping of low vegetation (especially ferns); and by pitfall, Malaise, and light trapping; in and at the margin of *Agathis* forest, podocarp / broadleaf forest, *Nothofagus* (various species) forests, coastal bush, and bogs; at altitudes between 60 m and 910 m.

Remarks. Small females of *D. kuscheli* are sometimes difficult to distinguish from macropterous females of *D. sinuosa*. Males of *D. kuscheli* have not been recognised.

Named after Dr G. Kuschel, collector of many of the Ambositrinae examined in this study.

Maoripria new genus

"Genus B". Naumann, 1982: 6, 8, 13, 22, 146, 153–154, 161, 238 (fig. 526), 239 (fig. 533).

Type-species *Maoripria verticillata* new species.

Diagnosis. Antennal sockets with inner wall produced dorsally (Fig. 176); parafrenal carina present (Fig. M63); notaulices absent (Fig. M68, M70, M75); foretibia without an apical, external spine; gaster with 5 free tergites; T2 anteriorly emarginate, without longitudinal carinae, usually with a blunt median process (Fig. M82, M85); S2 usually very small. Macropterous (Fig. 41), brachypterous, micropterous, or apterous (Fig. 42). Forewing venation of macropters and brachypters unique within the Ambositriinae (Fig. 41).

Macropterous female. Head hypognathous, globular; temple of moderate length. Frontal prominence well developed; antennal sockets with inner wall produced dorsally, fused, outer wall not markedly expanded; parafrenal carina present. Upper frons with ventral margin not defined. Ocelli present. Compound eye of moderate size. Genal region not strongly concave about anterior tentorial pit. Occipital carina interrupted ventrally. Palpal formula 5-3. Mandibles neither elongate nor projecting; mandibular formula 2-3. Labrum with distal margin convex. Genal bridge incomplete.

Antenna 0.6–0.7x BL, 15-segmented. F1 with neither a ring nor a basal constriction. Clava weak, 4- or 5-segmented.

Mesosoma broad, widest at tegulae, not extensively rugose-punctate. Pronotum: neck much longer than collar, posteriorly with a transverse row of small punctures; collar medially short, without a carina or spines. Pronotal scrobe and postspiracular excavation absent. Mesoscutum convex; notaulices absent. Tegula large, without microsculpture. Mesoscutal-mesoscutellar suture present. Mesoscutellum: fovea moderately defined, undivided; axillar processes very short, blunt, at most minutely free. Mesopleuron: pre-episternal furrow absent; sternaulus and ventral sternopleural carina absent. Metanotum large; dorsellum differentiated, with a lateral carina; spines absent. Dorsal propodeum: lateral carina straight, posteriorly diverging; median carina present; anterior margin weakly defined; posterolateral corner subangularly produced; vertical spines absent; posterior margin defined, emarginate; propodeum and nucha not smoothly continuous.

Forewing broad, flat, at rest extending beyond posterior tip of gaster, hyaline, tinged with yellow, not microdentate; distal margin rounded. Venation not extending beyond proximal 0.3–0.4 of wing. *Sc+R*, *marginalis*, and *stigmalis* strongly sclerotised, tracheate; *marginalis*

curved, scarcely touching costal margin. Basalis indicated by coloration. Costal cell narrow; radial cell not defined; basal cell poorly defined, open posteriorly.

Hindwing broad, 0.6–0.7x as long as forewing, hyaline, tinged with yellow, with 3 hamuli. *Sc+R* strongly sclerotised, tracheate, continuous from base to hamuli, more or less contiguous with costal margin. Costal cell present basally only; basal cell not defined.

Legs slender. Foretibia without an apical, external spine.

Petiole. Longitudinal carinae parallel, diverging over midlength. PL/PW = 1.4–1.9.

Gaster with 5 free tergites and 5 free sternites, posteriorly acuminate. T2 emarginate anteriorly, with a blunt median process; longitudinal carinae absent. T5 trapeziform, with a pair of spiracles. T6 minute, exposed, with a pair of cerci; cerci digitiform, basally narrowed, articulated, widely separated. All sutures between tergites complete, well defined, evenly curved. S2 very small, broadly overlapped by S3; anterolateral corner not visible from above; anterior and posterior margins emarginate. S3 slightly bulging beneath S2. S6 triangular.

Pubescence. Body with moderate cover of long, appressed or suberect setae; dense, short, appressed pubescence reduced. Woolly pits posterior to coxae I and II, without broad, flat setae. Truncate, golden setae absent. Forewing *Sc+R* without a macroseta. Surfaces and margins of forewing densely setose. S6 without a dense brush of setae.

Submacropterous, brachypterous females. Differing from macropterous female as follows.

Mesosoma. Mesoscutellar fovea more weakly defined, sometimes indistinct. Metanotal carinae less distinct.

Forewing at rest reaching to posterior tip of gaster or only slightly exceeding posterior extremity of petiole.

Micropterous female. Differing from macropterous female as follows.

Head globular or more elongate. Temple of moderate length or elongate. Compound eye smaller. Ocelli present or absent.

Mesosoma slender, more or less parallel-sided, widest at tegulae. Pronotal collar moderately long, longer or shorter than neck. Mesoscutal-mesoscutellar suture present or absent. Tegula present or absent. Mesoscutum or mesonotum flattened. Mesoscutellum with fovea very weakly defined or absent. Mesopleuron: ventral sternopleural carina developed at least anteriorly. Metanotum very reduced, at most represented by vestigial carinae. Dorsal propodeum: longitudinal carinae absent; posterior margin more weakly defined.

Forewing minute, scale-like, at rest not exceeding posterior margin of mesoscutellum. Venation absent.

Hindwing absent.
Petiole. PL/PW = 0.8–1.4. Longitudinal carinae absent.
Pubescence. Forewing without setae.

Apterous female. Differing from macropterous female as follows.

Head elongate. Temple long. Ocelli absent. Compound eye small. Occipital carina forming a complete ring. Palpal formula 5-2. Genal bridge complete.

Antenna. Clava scarcely defined, 3- or 4-segmented.

Mesosoma slender, widest at coxa I. Pronotum: collar elongate, much longer than neck; punctures of neck weak. Mesoscutal-mesoscutellar suture absent. Mesonotum small, flattened. Notaulices and tegula absent. Axillar process, mesoscutellar fovea, and lateral excavation absent. Mesopleuron with sternaulus and ventral sternopleural carina present. Metanotum not defined, without carinae or tubercles. Dorsal propodeum: longitudinal carinae absent; posterior margin very weakly defined.

Petiole. PL/PW = 1.3–2.7.

Gaster. T2 without a blunt median process.

Pubescence. Woolly pit posterior to coxa II only.

Macropterous male. Differing from macropterous female as follows.

Antenna approximately as long as body, 14-segmented, not clavate. Flagellar segments elongate, pedunculate. F1 carinate; F1L/F1W = 2.0–3.8.

Forewing at rest extending well beyond posterior tip of gaster.

Petiole. Longitudinal carinae weak. PL/PW = 1.3–2.7.

Gaster with 7 free sternites.

Pubescence. Flagellar segments verticillate.

Brachypterous male. Differing from macropterous male as follows.

Head. Ocelli slightly smaller.

Mesosoma. Mesoscutellar fovea, metanotal carinae, and propodeal carinae very weakly defined.

Forewing at rest reaching slightly beyond posterior extremity of petiole.

Micropterous male. Differing from macropterous male as follows.

Antenna. Flagellar segments not strongly pedunculate. Either F1 alone, or F1 and F2, or F1, F2, and F3 carinate.

Mesosoma, forewing, hindwing. As in micropterous female.

Pubescence. Flagellar segments not verticillate.

Apterous male. Differing from macropterous male as follows.

Antenna. Flagellar segments not strongly pedunculate. F2 carinate.

Mesosoma as in apterous female.

Gaster. T2 without a blunt median process. T6 sometimes concealed.

Pubescence. Flagellar segments not verticillate.

Remarks. In addition to the species of *Maoripria* described and named below, two species are each represented in the material available to me by apterous males from the South Island. In the absence of females I prefer not to name these species formally. However, they have been assigned provisional species numbers (P72, P73), are included in the key to males, and are briefly described.

Apart from the striking autapomorphy of the pedunculate, verticillate flagellum of the male, *M. verticillata* exhibits mostly character states plesiomorphic within *Maoripria* (macropterous or brachypterous, with relatively slight associated modification of head and mesosoma; petiole weakly carinate; F1 alone carinate in male; T2 with an anteromedial, blunt process), and may be the sister-group to all other species of *Maoripria*.

The wing-reduced species of *Maoripria* (*M. annettae* n.sp., *M. masneri* n.sp., *M. earlyi* n.sp., *M. sp. P72*, *M. sp. P73*) make up a rather loose aggregate for which I cannot propose a phylogeny with any confidence. *M. annettae* is the most strikingly modified *Maoripria* – both females and males are apterous, with a profoundly modified head and mesosoma, F2 alone is carinate in the male, and T2 has lost the anteromedial process in both sexes. *M. sp. P72* and *M. sp. P73* may form a species pair (synapomorphy: more than one flagellar segment carinate in male).

An undescribed Australian ambositrine known only from minute, apterous males collected in Tasmania is superficially very similar to apterous and micropterous *Maoripria* males. In the Tasmanian males the temple is long, the compound eye is small, the inner wall of the antennal socket is dorsally produced, the ocelli are absent, the proximal three flagellar segments are carinate, the flagellar segments are weakly pedunculate and not verticillate, the pronotal collar is long, the lateral pronotum is very large, the mesoscutal-mesoscutellar suture is absent, the mesonotum is small and flat, the tegula is absent, the mesopleuron is large and lacks a sternaulus, the metanotum is obliterated, and the dorsal propodeum and petiole lack carinae. However, these close similarities to wing-reduced *Maoripria* are convergences. In the Tasmanian species the anterior margin of T2 is entire (not emarginate as in all *Maoripria*) and has weak longitudinal carinae (rather than a blunt median process as in most *Maoripria*). Further, the foretibia of the Tasmanian species bears a minute, apical, external spine, which is a synapomorphy and a diagnostic

character state for *Perissodryas* Naumann. The entire anterior margin of T2 and the longitudinal carinae near this margin seen in the Tasmanian males are also character states shared with described species of *Perissodryas*. Therefore I regard the undescribed Tasmanian species as an extremely modified *Perissodryas*. A tendency in *Perissodryas* towards wing reduction has already been documented in the descriptions of occasional brachypters in *P. daedalma* Naumann and the entirely brachypterous *P. apotoma* Naumann (Naumann 1982).

The name is derived from *Maori*, the indigenous people of New Zealand, and the ending *-pria*, commonly applied to diapriid genera; gender feminine.

KEY TO SPECIES OF MAORIPRIA

Females

- 1 Macropterous, submacropterous, or brachypterous; forewing at rest exceeding posterior extremity of petiole; pronotal collar short (Fig. M68); dorsal propodeum and petiole usually with longitudinal carinae (Fig. M82) ... (p. 39) .. *verticillata*
 —Micropterous or apterous (Fig. 42); forewing at rest not exceeding posterior extremity of petiole; pronotal collar moderately or very long (Fig. M70, M78, M79); dorsal propodeum and petiole without longitudinal carinae (Fig. M79, M84, M87, M88) ... 2
- 2(1) Mesoscutal-mesoscutellar suture present (Fig. M78); ocelli present; tegula present... (p. 420) .. *earlyi*
 —Mesoscutal-mesoscutellar suture absent (Fig. M70, M79); ocelli absent; tegula absent ... 3
- 3(2) Sternaulus present (Fig. M76); pronotal collar long (Fig. M70); mesonotum small, shorter than pronotal collar ... (p. 41) .. *annettae*
 —Sternaulus absent (Fig. M81); pronotal collar moderately long (Fig. M79); mesonotum large, longer than pronotal collar ... (p. 43) .. *masneri*

Males

- 1 Macropterous (Fig. 41) or brachypterous — forewing at rest exceeding posterior tip of petiole; flagellar segments strongly pedunculate, verticillate (Fig. 41) ... (p. 39) .. *verticillata*
 —Micropterous — forewing at rest not exceeding posterior extremity of propodeum — or apterous (Fig. 42); flagellar segments not strongly pedunculate, not verticillate (Fig. 42, 183) ... 2
- 2(1) Flagellum with 3 carinate segments (F1, F2, F3) ... (p. 44) .. sp. P73

—Flagellum with 1 or 2 carinate segments (F1 and/or F2) (Fig. 184, 185, 187) ... 3

3(2) F1 and F2 carinate ... (p. 43) .. sp. P72
 —F1 or F2 carinate ... 4

4(3) Pronotal collar long, as in Fig. M73, M75; F2 carinate; sternaulus present (Fig. M74); apterous ... (p. 41) .. *annettae*

—Pronotal collar short, as in Fig. M78, M79; F1 carinate; sternaulus absent, as in Fig. M80, M81; micropterous ... 5

5(4) Mesoscutal-mesoscutellar suture present, as in Fig. M78; median and lateral ocelli present ... (p. 42) .. *earlyi*

—Mesoscutal-mesoscutellar suture absent, as in Fig. M79; median ocellus absent; lateral ocelli present or absent ... (p. 43) .. *masneri*

Maoripria verticillata new species

Macropterous female. Length and ratios of measurements as in Appendix Table 4.

Head. Temple moderately long, gradually curving to occipital carina (Fig. 168). Compound eye of moderate size, with more than 10 facets. Vertex convex; ocelli present. Antennal sockets with outer wall rugose (Fig. M63).

Antenna. Scape, pedicel, and F1 reticulate (Fig. M63, M64). Clava as in Fig. 179.

Mesosoma. Pronotum: anterior neck transversely striate; posterior neck laterally with elongate foveae; collar dorsally very short, its mid-dorsal length less than OD; lateral pronotum ventrally smooth. Mesoscutum convex, smooth; notaulices absent. Mesoscutal-mesoscutellar suture present. Mesoscutellum: fovea distinct, almost as long as wide, its posterior margin strongly convex; parafoveal area without a submarginal carina or free axillar process. Postfoveal mesoscutellum distinctly broader than fovea, weakly convex; lateral margin sharp, not foveolate; posterior margin smooth; rim poorly defined, smooth; lateral excavation present. Tegula present. Mesopleuron large, trapeziform; sternaulus and ventral sternopleural carina absent. Coxal pit I large, well defined (in lateral view). Metanotum: dorsellum defined, with a weak, lateral longitudinal carina; lateral excavation smooth. Dorsal propodeum: longitudinal carinae present; posterior margin carinate, emarginate. Nucha indistinctly punctate or smooth.

Forewing at rest exceeding apex of gaster; shape and venation as in Fig. 41.

Hindwing present.

Petiole. Longitudinal carinae as in Fig. M82.

Gaster. T2 anteriorly with a median process, as in Fig. M85.

Pubescence. Occipital carina ventrally, pronotal collar, coxal pits I and II, propleuron, metanotum, propodeum, petiole (especially laterally and ventrally), T2 anteriorly, and S2 all densely woolly. Mesosternal area with dense, short, appressed or suberect setae. Head, mesoscutum, mesoscutellum, mesopleuron ventrally, T3–6, and S3–6 with sparse, erect or appressed setae. Lateral pronotum, mesopleuron, and T2 bare.

Colour. Head, mandible, and mesosoma yellowish brown to pale reddish orange. Antenna and metasoma pale yellowish brown to pale yellow; distal flagellar segments sometimes distinctly darker than proximal segments. Palpi yellow. Pubescence silver.

Submacropterous, brachypterous females. Differing from macropterous female as follows. Length and ratios of measurements as in Appendix Table 4.

Head (Fig. 172). Ocelli smaller.

Mesosoma. Mesoscutum flat (Fig. M71). Mesoscutellar fovea more weakly defined, sometimes indistinct (Fig. M68). Metanotal carinae weaker.

Forewing. Variation continuous between (a) submacropterous condition (forewing at rest reaching to apex of metasoma) and (b) extreme brachypterous condition (forewing slightly exceeding posterior of petiole). Shape and venation as in Fig. 189, 190.

Macropterous male (Fig. 41). Differing from macropterous female as follows. Length and ratios of measurements as in Appendix Table 4.

Head. Parafrontal carina as in Fig. M65.

Antenna. Flagellar segments strongly pedunculate. F1 carinate (Fig. M66, M67).

Mesosoma. Mesoscutum and mesoscutellum as in Fig. M69. Mesopleuron as in Fig. M72. Dorsal propodeum as in Fig. M83.

Petiole. Dorsal carinae sometimes absent.

Forewing. Shape and venation as in Fig. 41.

Pubescence. Flagellar segments verticillate (Fig. 41).

Brachypterous male. Differing from macropterous male as follows. Length and ratios of measurements as in Appendix Table 4.

Head. Ocelli smaller.

Mesosoma as in brachypterous female.

Forewing narrow, at rest reaching slightly beyond posterior extremity of petiole. *Sc+R* apically knobbed.

Type data. **Holotype:** macropterous female, AK, Kohukohunui, Hunua Range, 600 m, litter 74/20, 30 March 1974, G. Kuschel (NZAC).

Paratypes (4 macropterous females, 115 submacropterous or brachypterous females, 30 males). **NORTH ISLAND:** 1 female, Puketi State Forest, 21 Jan 1972, GWR (NZAC); 1 female, Omahuta, 4 Jan 1975, GK (NZAC); 1 female, Waipoua State Forest, 19 Jan 1972, GWR (ANIC); 2 females, 1 male, same locality, 16–21 Mar 1978, S&JP (CNCI); 2 females, same locality, 11–15 Apr 1980, AN & MT (CNCI); 3 males, same locality, 11–12 Dec 1983, JWE (LCNZ, ANIC); 1 female, Little Barrier Island, 10 Mar 1974, JCW (NZAC); 3 females, Waitakere Range, 1 Jan 1981, JSN (NZAC, ANIC); 13 females, 7 males, same data as holotype (NZAC, ANIC, BMNH, CNCI); 1 female, Mount Pirongia, 24 Sep 1964, GK (NZAC); 1 female, same locality, 9 Jun 1972, BAH (NZAC); 1 female, Awakino Gorge, 23 Jan 1972, GWR (NZAC); 1 female, Holly Hut, Nov 1975, AKW (NZAC); 1 female, Dawson Falls area, 21 Feb 1977, BM (NZAC); 2 females, west Mount Egmont, 31 Dec 1980, 18 Oct 1983, FC (FCCO); 1 female, south Mount Egmont, 13 June 1982, FC (FCCO); 1 male, Mamaku Plateau, 18 Jan 1972, GWR (NZAC); 3 females, Mount Ngongotaha, 13 May 1971, RGO (NMNZ); 3 females, Horohoro State Forest, 24–27 Jul 1976, JSD (NZAC); 1 female, Moerangi, 4–9 Apr 1980, AN & MT (CNCI); 1 female, Mount Maungapohatu, 3 Mar 1971, JIT (NZAC); 3 females, Huiarau Range, 17 Jan 1972, GWR (NZAC); 1 female, Lake Waikareiti, 14 Dec 1946, RRF (NMNZ); 1 female, same locality, 17 Jan 1972, GWR (NZAC); 16 females, 1 male, Lake Waikaremoana, 17 Jan 1972, GWR (NZAC); 2 females, Opepe Reserve, 14 Jan 1972, GWR (NZAC); 13 females, 3 males, same locality, 27 Mar 1978, S&JP (CNCI, ANIC, NZAC); 11 females, 3 males, same locality, 5–8 Apr 1980, AN & MT (CNCI, ANIC, NZAC); 3 females, 1 male, Kaimanawa Forest Park, 29 Feb 1975, BM (NZAC, ANIC); 3 females, 1 male, same locality, 11–26 Mar 1978, S&JP (CNCI, NZAC); 1 male, same locality, 3–8 Apr 1980, AN & MT (CNCI); 3 females, Pihanga Scenic Reserve, 13 Jan 1972, GWR (NZAC, ANIC); 2 females, Lake Rotopounamu, 4–9 Apr 1980, AN & MT (CNCI); 1 female, Mount Ruapehu, SW slopes, 2 Mar 1963, RGO (NMNZ); 2 females, Ohakune Mountain Road, 13 Oct 1961, DRM (NMNZ); 1 female, same locality, 1 Dec 1965, JIT & LPM (NZAC); 1 female, Ballance Bridge Reserve, 3 Jan 1975, JCW (NZAC); 1 female, Akatarawa, 9 Feb 1983, FC (FCCO).

SOUTH ISLAND: 3 males, Oparara, 11 Mar 1971, JIT (NZAC, ANIC); 2 females, Glasseye Creek, 29 Apr 1965,

JIT (NZAC); 1 female, Moor Park, 24 Nov 1965, GWR (NZAC); 2 females, Lake Sylvester, 30 Apr 1969, JSD (NZAC); 1 female, 2 miles [3.2 km] below Lake Cobb, 18 Feb 1967, FD (NZAC); 1 female, Dun track saddle, 14 Sep 1971, GWR (NZAC); 1 male, Nelson, 8 Jun 1927, ESG (NZAC); 1 male, Pelorus Bridge, 7 Jun 1964, JIT (NZAC); 1 male, Croesus track, 21 Jan 1982, JWE (LCNZ); 1 female, Porarari River, 2 Apr 1983, MLB & JWE (LCNZ); 1 female, Taramakau No. 4 hut, 6 Apr 1953, JSD (CMNZ); 1 female, Kahutara Gorge, 27 Apr 1961, RAC (NZAC); 2 females, Devil's Punch Bowl track, 16 Nov 1966, AKW (NZAC); 1 female, 2 males, Kelly's Creek, 18 May 1970, DSH (CNCI); 2 females, Okuku Creek, 18–22 Mar 1980, AN & MT (CNCI).

LOC. INDET.: 1 male, 8 Feb 1981, FC (LCNZ); 1 male, FC (FCCO).

Material examined. Type series only.

ND, AK, CL (Little Barrier I.), WO, TK, BP, GB, TO, WA, WN / NN, MB, BR, WD, KA (Map 16).

Collected by Berlese funnel extraction of litter, rotten wood, moss, and grass tussocks, and by sweeping low vegetation (especially ferns); in podocarp / broadleaf forest, *Agathis* / podocarp / broadleaf forest, and *Nothofagus* forest; at altitudes between 60 m and 1220 m.

Remarks. The pedunculate, verticillate flagellar segments of the male are unique within the Ambositriinae, and similar to flagellar segments in some *Trichopria* Ashmead (Diapriidae: Diapriinae).

The name *verticillata* (Latin) refers to the whorls of setae on the male's flagellar segments.

Maoripria annettae new species

Female. Length and ratios of measurements as in Appendix Table 4. Apterous.

Head. Temple long (Fig. 169), very gradually curving to occipital carina. Compound eye small, with fewer than 10 facets. Vertex in profile as in Fig. 173; ocelli absent. Antennal sockets with outer wall rugose.

Antenna. Scape, pedicel, and F1 reticulate. Clava as in Fig. 180.

Mesosoma. Pronotum: microsculpture of neck as in Fig. M70; collar dorsally very long; lateral pronotum very large (Fig. M76), ventrally with a few longitudinal striae. Mesoscutal-mesoscutellar suture absent. Mesonotum small. Tegula absent. Mesopleuron small, subtriangular; sternaulus and ventral sternopleural carina present; coxal pit I scarcely visible in lateral view. Metanotum not differ-

entiated. Dorsal propodeum: longitudinal carinae absent; posterior margin not carinate. Nucha rather short, indistinctly punctate.

Petiole. Longitudinal carinae absent (Fig. M84).

Gaster. T2 anteriorly without a median process. Apical tergites as in Fig. M90.

Pubescence. Occipital carina ventrally, anterior margin of lateral pronotum, propleuron, coxal pit II, mesosternal area, propodeum, petiole, T2 anteriorly, and S2 all densely woolly. Head, pronotal collar dorsally, T2, and S3 with sparse, erect or appressed setae; T3–5 and S4–6 more densely setose. Mesonotum predominantly bare, with at most a few setae adjacent to anterior and lateral margins (Fig. M70). Lateral pronotum and mesopleuron bare.

Colour reddish orange to yellow. Antennae, palpi, and legs usually more pale than head, mesosoma, and metasoma. Pubescence silver.

Male (Fig. 42). Differing from female as follows. Length and ratios of measurements as in Appendix Table 4.

Head. Temple as in Fig. 177. Vertex in profile as in Fig. 178.

Antenna. Flagellar segments not strongly pedunculate (Fig. 183). F2 carinate, as in Fig. 184.

Mesosoma. Mesoscutum flat (Fig. M77). Mesoscutal-mesoscutellar suture usually distinct (Fig. M75, M86), rarely indicated only by a pigmented line and a slight inflection of mesonotum (Fig. M73, M74). Lateral excavation of mesoscutellum weakly indicated. Tegula present. Metanotum differentiated, but without dorsellum or carinae. Mesopleuron trapeziform; coxal pit I not visible in lateral view. Nucha more distinctly punctate.

Pubescence. Flagellar segments not verticillate.

Type data. Holotype: female, NN, Dun Mountain, 2000 feet [610 m], ex beech litter 66/274, 31 August 1966, J.I. Townsend & A.K. Walker (NZAC).

Paratypes (54 females, 35 males). **NORTH ISLAND:** 1 male, Makahu Spur, 24 Feb 1971, ACE (NZAC); 2 males, 10 km S of Levin, 8 Mar 1978, S&JP (CNCI); 1 female, Tararua Range, 4 Dec 1952, BAH (NMNZ); 1 male, Akatarawa Saddle, 7–10 Mar 1978, SP (CNCI); 8 females, 8 males, Orongorongo [Rimutaka] State Forest, 21 May 1969, 19 Sep 1969, 23 Sep 1969, Feb 1976, JSD, JCW, & AM (NZAC, ANIC); 3 males, Taita, 1958–1961, KL & JS (NZAC); 2 males, Days Bay, 30 Nov 1947, RRF (NMNZ); 5 males, Haurangi Mountains, 2 Sep 1965, JIT (NZAC, CNCI).

SOUTH ISLAND: 1 female, 2 males, Canaan, 27 Feb 1967, JIT (NZAC, BMNH); 1 male, Iron Hill Ridge, 16 Mar 1968, JSD (NZAC); 3 females, Mytton Hut, 13 Dec 1967, SE (NZAC); 12 females, Lake Sylvester, 29 Oct 1969, JSD

(NZAC, ANIC, BMNH); 1 male, Leslie Valley track, 23 Jan 1948, RRF (NMNZ); 3 females, 1 male, Cable Bay, Maori Pa, 23 Jul 1964, JIT (NZAC); 1 female, Nelson, 12 May 1928, ESG (NZAC); 8 females, 3 males, same data as holotype (NZAC, ANIC, CNCI); 12 females, 5 males, same locality as holotype, 14 Oct 1969, 6 Nov 1969, 6 Dec 1969, and 14 Sep 1971, JIT, JCW, & GWR (NZAC); 1 female, Wairoa Gorge, 20 Oct 1971, GWR (NZAC); 1 female, Richmond Range, 13 Mar 1969, ACE (NZAC); 1 female, Port Underwood Saddle, Sep 1969, GK (NZAC); 1 male, Rarangi, 2 Sep 1969, GK (NZAC); 2 females, Mount Robert, 23–26 Mar 1980, AN & MT (CNCI).

Material examined. Type series only.

HB, WN, WA / NN, SD, MB, BR (Map 17).

Collected by Berlese funnel extraction of litter and moss and by pitfall trapping; particularly in *Nothofagus* sp. forest; at altitudes between 20 m and 1400 m.

Remarks. By virtue of its complete loss of wings, greatly enlarged pronotum, and very reduced meso- and metanota *M. annettae* is the most profoundly modified species of *Maoripria*. The left antenna of one male (Dun Mountain; NZAC) is deformed: flagellar segments 5 and 6 are imperfectly separated.

Named after Annette K. Walker, in recognition of her many contributions to this study.

Maoripria earlyi new species

Female. Length and ratios of measurements as in Appendix Table 4. Micropterous.

Head. Temple long, gradually curving to occipital carina (Fig. 170). Compound eye of moderate size, with more than 10 facets. Vertex in frontal view as in Fig. 176, in profile as in Fig. 174; ocelli present. Antennal sockets with outer wall minutely granulate or with a few rugae.

Antenna. Scape, pedicel, and F1 reticulate. Clava as in Fig. 181.

Mesosoma. Pronotum: microsculpture of neck as in Fig. M78, M80; collar dorsally moderately long, its mid-dorsal length greater than OD; lateral pronotum of moderate size, ventrally smooth. Mesoscutum flat. Mesoscutal-mesoscutellar suture present. Mesoscutellum: fovea and lateral excavation forming a continuous, weakly defined, crescentic, transverse furrow; posterior margin smooth. Tegula moderately large. Mesopleuron small, trapeziform; sternaulus absent; ventral sternopleural carina present anteriorly only; coxal pit I well defined in lateral view. Metanotum represented by a transverse carina or flange; longitudinal

carinae absent. Dorsal propodeum: longitudinal carinae absent; posterior margin very weakly emarginate, almost straight, carinate. Nucha punctate.

Forewing without venation.

Hindwing minute.

Petiole. Longitudinal carinae absent (Fig. M87).

Gaster. T2 anteriorly with a median process (Fig. M89).

Pubescence. Occipital carina ventrally, anterior margin of lateral pronotum, propleuron, coxal pits I and II, mesosternal area, metanotum, propodeum, petiole, T2 anteriorly, and S2 all densely woolly. Head, pronotal collar dorsally, T2, S3, mesoscutum anteriorly and laterally, and mesoscutellum laterally (Fig. M78) with sparse, erect or appressed setae; T3–5 and S4–6 more densely setose. Lateral pronotum, mesoscutellum, and mesopleuron predominantly bare.

Colour reddish orange to yellow. Antennae, palpi, and legs usually paler than head, mesosoma, and metasoma. Pubescence silver.

Male. Differing from female as follows. Length and ratios of measurements as in Appendix Table 4.

Head. Compound eye slightly larger.

Antenna. Flagellar segments not strongly pedunculate (Fig. 186). F1 carinate (Fig. 185).

Mesosoma. Mesoscutum flat. Mesoscutellum: fovea present, weakly defined; lateral excavation small; post-foveal mesoscutellum wider than fovea, its lateral margin sharp; posterior margin smooth. Tegula larger than in female. Mesopleuron slightly smaller than in female; ventral sternopleural carina absent. Metanotum: dorsellum represented by 2 submedian tubercles; longitudinal carina absent.

Pubescence. Flagellar segments not verticillate.

Type data. **Holotype:** female, OL, Howden track from Divide to Saddle, 750–900 m, swept from ferns, 8 February 1980, J.W. Early & R.M. Emberson (NZAC).

Paratypes (8 females, 5 males). **NORTH ISLAND:** 1 female, 2 males, 10 km S of Levin, 8 Mar 1978, SP (CNCI, NZAC); 1 female, Tararua Range, 4 Dec 1952, BAH (NMNZ); 1 female, 3 males, Mount Holdsworth track, 3 Sep 1965, JIT (NZAC, ANIC).

SOUTH ISLAND: 1 female, Boulder Lake, 27 Oct 1965, AKW (NZAC); 1 female, Lake Wombat track, 11 Jan 1982, JWE (LCNZ); 1 female, Moraine Creek, 12 Feb 1980, JWE (LCNZ); 1 female, Tutoko Bench, 13 Jan 1977, JSD (NZAC); 1 female, same data as holotype (ANIC).

Material examined. Type series, plus a non-type female from Tutoko Bench, 13 Jan 1977, JSD (NZAC).

WN / NN, WD, FD (Map 18).

Collected by sweeping ferns and moss, and by Berlese funnel extraction of moss and litter; in podocarp/broadleaf forest and *Nothofagus* spp. forest; at altitudes between 150 m and 900 m.

Remarks. One female (excluded from the type series; see above) generally agrees with the description of *M. earlyi* but has a slightly more elongate apical flagellar segment and pronotal collar.

Named after Mr J.W. Early, who has collected many of the specimens examined during this study.

Maoripria masneri new species

Female. Length and ratios of measurements as in Appendix Table 4. Micropterous.

Head. Temple moderately long, gradually curving to occipital carina (Fig. 171). Compound eye small, with fewer than 10 facets. Vertex in profile as in Fig. 175; ocelli absent. Antennal sockets with outer wall rugose.

Antenna. Scape, pedicel, and F1 reticulate. Clava as in Fig. 182.

Mesosoma. Pronotum: microsculpture of neck as in Fig. 175, M79; collar dorsally moderately long; lateral pronotum ventrally with a few longitudinal striae. Mesoscutal-mesoscutellar suture absent. Mesonotum large. Tegula absent. Mesopleuron small, trapeziform (Fig. M81); sternaulus absent; ventral sternopleural carina developed anteriorly and posteriorly only; coxal pit I well defined in lateral view. Metanotum represented by a pair of dorsolateral, transverse lobes; dorsellum and carinae absent. Dorsal propodeum: longitudinal carinae absent; posterior margin straight, weakly carinate. Nucha weakly punctate.

Forewing without venation.

Hindwing absent.

Petiole. Longitudinal carinae absent (Fig. M88).

Gaster (Fig. 191). T2 anteriorly with a median process.

Pubescence. Occipital carina ventrally, anterior margin of lateral pronotum, propleuron, coxal pits I and II, mesosternal area, propodeum, petiole, T2 anteriorly, and S2 all densely woolly. Head, pronotal collar dorsally, T2, and S3 with sparse, erect or appressed setae; T3–5 and S4–6 more densely setose. Mesonotum predominantly bare, with a few setae anteriorly (Fig. M79). Lateral pronotum bare. Mesopleuron bare or with 2 or 3 setae ventrally.

Colour very pale orange-brown, reddish brown, or yellow. Antennae, palpi, and legs usually paler than head, mesosoma, and metasoma. Pubescence silver.

Male. Differing from female as follows. Length and

ratios of measurements as in Appendix Table 4.

Head. Lateral ocelli present or absent; median ocellus always absent.

Antenna. Flagellar segments not strongly pedunculate (Fig. 188). F1 carinate (Fig. 187).

Petiole posteriorly with a few weak, short, longitudinal striae.

Pubescence. Flagellar segments not verticillate.

Type data. **Holotype:** female, MB, Black Birch Experimental Station, 4600 feet [1400 m], ex litter 70/130, 20 February 1970, G. Kuschel (NZAC).

Paratypes (10 females, 7 males). **SOUTH ISLAND:** 1 female, 4 males, same data as holotype (NZAC, ANIC); 1 female, 1 male, Mount Dewar, 10–11 Dec 1969, JIT (NZAC, ANIC); 1 female, Mount Hutt State Forest, 19 Sep 1981, JWE (LCNZ); 1 male, Simonin Pass, 27 Jan 1975, GWR (NZAC); 2 females, 1 male, Tempest Spur, 29–31 Jan 1975, JSD (NZAC); 1 female, Takahe Valley, 11 Dec 1972, ACE (CNCI); 1 female, east McKenzie Burn, 7 Dec 1980, RME & CAM (LCNZ); 1 female, Wilmot Pass, 22 Jan 1970, JSD (NZAC); 1 female, Rock Peak, 27 Nov 1974, JCW (NZAC); 1 female, Old Woman Range, 20 Nov 1974, JCW (NZAC).

Material examined. Type series only.

— / MB, BR, MC, WD, FD, CO (Map 19).

Collected by Berlese funnel extraction of litter, moss, and grass tussocks; at altitudes between 750 m and 1463 m.

Remarks. Named after Dr Lubomir Masner, who first recognised that species here referred to *Maoripria* represented a distinct new genus of Ambositrinae.

Maoripria sp. P72

Female. Unknown.

Male. Micropterous.

Head. Temple moderately long. Compound eye moderately small, with more than 10 facets. Ocelli present.

Antenna. Flagellar segments not strongly pedunculate. F1 and F2 carinate.

Mesosoma. Pronotal collar moderately long. Mesoscutum flat. Mesoscutal-mesoscutellar suture present. Mesoscutellum: fovea present; lateral excavation small. Tegula present. Mesopleuron large, trapeziform; sternaulus and ventral sternopleural suture absent; coxal pit I well defined in lateral view. Dorsellum very weakly differentiated. Dorsal propodeum: longitudinal carinae absent; posterior margin carinate.

Gaster. T2 anteriorly with a blunt median process.

Pubescence. Flagellar segments not verticillate. Coxal pits I and II woolly. Mesoscutum with a few scattered, erect setae anteriorly. T2 with conspicuous, rather long and moderately densely scattered setae.

Material examined. 1 male, Mount Arthur (NN), 3500 feet [1065 m], 20 Mar 1964, JIT (NZAC) (Map 20).

Remarks. Most similar to males of *M. earlyi* and *M. sp. P73*. Immediately distinguishable from all other *Maoripria* males by having two flagellar segments carinate.

Maoripria sp. P73

Female. Unknown.

Male. Micropterous.

Head. Temple moderately long. Compound eye small, with more than 10 facets. Ocelli present.

Antenna. Flagellar segments not strongly pedunculate. F1, F2, and F3 carinate.

Mesosoma. Pronotal collar moderately long. Mesoscutum flat. Mesoscutal-mesoscutellar suture present. Mesoscutellum: fovea and lateral excavations forming a continuous, weakly defined, transverse, crescentic furrow. Tegula present. Mesopleuron large, trapeziform; sternaulus and ventral sternopleural suture absent; coxal pit I well defined in lateral view. Dorsellum weakly differentiated. Dorsal propodeum: longitudinal carinae absent; posterior margin carinate.

Gaster. T2 anteriorly with a blunt median process.

Pubescence. Flagellar segments not verticillate. Coxal pits I and II woolly. Mesoscutum with a few erect setae anteriorly, near margin.

Material examined. Two males: 1, Moraine Creek (FD), 825 m, swept from ferns and moss in *Nothofagus menziesii* forest, 12 Feb 1980, JWE (LCNZ); 1, Doubtful Sound (FD), swept from ferns, 2-3 Feb 1983, JWE & CAM (ANIC) (Map 20).

Remarks. Most similar to *M. earlyi* and *M. sp. P72*. Immediately distinguishable from all other New Zealand *Maoripria* by having three flagellar segments carinate.

—⑤—

Genus *Parabetyla* Brues

Parabetyla Brues, 1922: 222, 224. Muesebeck & Walkley, 1956: 379. Masner, 1969: 106-107. Naumann, 1982: 19, 22, 25, 146, 152-153, 161, 171.

Type-species *Parabetyla spinosa* Brues, 1922, by original designation and monotypy.

Diagnosis. Antennal sockets with inner wall not dorsally produced; parafrontal carina absent (Fig. 195, 197, 198); pronotal collar with a transverse carina (Fig. 192, 201-204); mesoscutal-mesoscutellar suture and tegula present; legs slender (Fig. 43); dorsal propodeum often with vertical spines; female micropterous; male micropterous or brachypterous; anterior margin of T2 entire; gaster with 5 free tergites in both sexes; F2 alone carinate in male.

Close to *Zealaptera* and *Betyla*. Females of *Zealaptera* distinguished from those of *Parabetyla* by lacking tegula, mesoscutal-mesoscutellar suture, and metanotum and by having stouter legs; males of *Zealaptera* unknown. Females of *Betyla* distinguished by having incomplete sutures between at least some gastral tergites; males of *Betyla* macropterous, or with incomplete sutures between some gastral tergites.

Female. Micropterous.

Head hypognathous, globular; temple long. Ocelli present or absent. Vertex without spines or carinae. Frontal prominence well developed; antennal sockets with inner wall not produced dorsally, outer wall not markedly expanded; parafrontal carina absent; upper frons with ventral margin defined or not defined. Compound eye small. Genal region not strongly concave about anterior tentorial pit. Occipital carina moderately developed, smooth, not ventrally interrupted. Palpal formula 5-3. Mandibles neither elongate nor projecting; mandibular formula 2-3. Distal margin of labrum convex. Genal bridge complete.

Antenna 0.5-0.8x BL, 15-segmented. F1 with neither a minute ring nor a basal constriction. Clava strong or weak, 4-6-segmented.

Mesosoma 2.0-2.3x longer than wide, widest at tegulae, not extensively rugose-punctate. Pronotum: neck usually as long as collar, posteriorly with a transverse row of small punctures; collar with a transverse carina, but without a posterolateral spine; pronotal scrobe, suprspiracular carina, and postspiracular excavation absent. Mesoscutum very weakly convex; notaulices each weakly indicated by an elongate puncture, or absent; tegula minute, translucent, without microsculpture; mesoscutal-mesoscutellar suture present. Mesoscutellum: fovea absent or indicated by a very weak depression; axillar processes absent; lateral excavation present or absent. Mesopleuron: pre-episternal furrow absent; sternaulus and ventral sternopleural carina

continuous. Metanotum small or absent, without spines. Dorsal propodeum with or without 3 vertical spines, these sometimes reduced to tubercles; carinae not defined; posterior margin weakly defined or not defined, straight.

Forewing at rest not reaching posterior margin of mesoscutellum, translucent, without venation.

Legs slender. Foretibia without an apical, external spine.

Petiole with fine, parallel, longitudinal carinae, or carinae absent. PL/PW = 1.2–1.7.

Gaster with 5 free tergites and 5 free sternites. T2: anterior margin entire; carinae absent. T4 transverse, larger than T3. T5 small, semi-circular, with a pair of spiracles. T6 minute, exposed or concealed, with a pair of cerci; cerci digitiform, basally narrowed and articulated, sometimes concealed, widely separated. All sutures between tergites complete, well defined, evenly curved. S2 small, with at least lateral carinae; anterior and posterior margins emarginate. S3 not anteriorly produced. S6 longer than S4+5, triangular.

Pubescence. Head, prothorax, and mesothorax moderately setose. Metathorax, propodeum, petiole, and gaster densely setose. Woolly pits posterior to coxae I and II; broad, flattened setae absent. Truncate, golden setae absent. Forewing bare. Apical sternite without a dense brush of short setae.

Brachypterous male. Differing from micropterous female as follows.

Head. Temple short. Ocelli present.

Antenna 0.9–1.0x BL, 14-segmented. F1 elongate, cylindrical, carinate; F1L/F1W = 2.2–3.2. Flagellar segments filiform, not strongly pedunculate. Clava absent.

Mesosoma broad, widest at tegulae. Pronotum: neck longer than collar; collar without a carina. Mesoscutum more convex; notaulices very weak. Tegula large. Mesoscutellum: fovea well defined; axillar processes free, blunt. Sternaulus and ventral sternopleural carina absent. Metanotum large. Dorsellum well defined. Dorsal propodeum: lateral carinae present; vertical spines absent.

Forewing narrow, flat, at rest slightly overlapping anterior margin of T2, hyaline, not microdenticulate; distal margin narrowly rounded. Sc+R and marginalis indistinctly indicated by coloration. Costal cell narrow, incompletely defined. Radial and basal cells not defined.

Hindwing narrow, approximately 0.7x as long as forewing, with 1 hamulus. Sc+R not continuous from base to hamulus. Basal cell not defined.

Petiole. Longitudinal carinae fine, more distinct, parallel.

Gaster with 7 free sternites.

Pubescence. Forewing Sc+R without a macroseta. Surfaces and margins of forewing densely setose.

Micropterous male. Differing from micropterous female as follows.

Head. Temple of moderate length. Ocelli absent.

Antenna as in brachypterous male.

Mesosoma. Tegula minute. Mesoscutellum well defined or weak. Metanotum sometimes large, with a well defined dorsellum. Dorsal propodeum: lateral carinae present; posterior margin defined; vertical spines never present.

Forewing narrow, minute, not extending beyond posterior margin of mesoscutellum, hyaline, not microdenticulate; distal margin narrowly rounded. Marginalis not extending beyond proximal 0.6–0.7 of wing. Sc+R and marginalis tracheate or absent; all other venation absent. Costal cell very narrow. Radial and basal cells absent. Marginalis very broadly contiguous with costal margin.

Hindwing minute, scale-like, at most 0.3–0.5x as long as forewing, without hamuli. Sc+R and basal cell absent.

Petiole. PL/PW = 1.4–2.0.

Gaster with 7 free sternites.

Remarks. The discovery of a species of *Parabetyla* in which the propodeal spines are represented by minute tubercles means that the genus can no longer be recognised by the presence of a trispinose propodeum.

Masner (1969) recorded *Parabetyla* from the Neotropical region. I have now examined three undescribed species of micropterous Ambositrinae from South America which Masner would place provisionally in *Parabetyla*. I prefer to exclude all three from *Parabetyla*, since all lack a transverse carina on the pronotal collar. All three appear to be more closely related to the morphologically diverse *Dissoxylabis* Kieffer, which is represented by numerous species in the Neotropical region. In one of the three micropterous species S3 is anteriorly produced, as in many *Dissoxylabis*, and in another the mesoscutellum is bifoveate, also as in many *Dissoxylabis*. Neither an anteriorly produced S3 nor a bifoveate scutellum occurs in *Parabetyla* as defined above.

The males of *Parabetyla* are rarely collected. Only a few males of *P. tika* n.sp. and unassociated singletons representing two other species are known. The two unassociated males have been designated by provisional species numbers (P94 and P95). Since *P. tika* is the only species for which both the female and male are known, this species is described first, in full, and differential descriptions of all other species (including the type-species *P. spinosa*) follow.

Parabetyla can be subdivided into four species-groups which are diagnosed below using characters of the female, but I am unable to propose a phylogeny for the species. By virtue of the female's retaining the lateral excavation of the mesoscutellum and a relatively well differentiated

dorsellum, *P. ngarara* n.sp. appears to be a relatively plesiomorphic species.

KEY TO SPECIES OF *PARABETYLA* (FEMALES)

- 1 Propodeum with a single, distinct, posterodorsal tubercle ... (p. 50) .. *tahi*
—Propodeum with 2 or 3 tubercles or spines, or all tubercles reduced and concealed by setae ... 2
- 2(1) Propodeal spines all reduced to minute tubercles, mostly concealed by setae of propodeum; F2L/F2W = 0.6–1.0 ... (p. 49) .. *nauheha*
—At least lateral propodeal spines strong (Fig. 201–204), sharp, and usually projecting conspicuously beyond setae of propodeum; F2L/F2W = 1.0–1.7 ... 3
- 3(2) Lateral excavation of mesoscutellum, median carina of metanotum, and lateral rim of metanotum clearly differentiated; mesoscutum densely pubescent (Fig. 203); MSL/MSW exceeding 1.2 ... (p. 48) .. *ngarara*
—Lateral excavation of mesoscutellum, median carina of metanotum, and lateral rim of metanotum not clearly differentiated; mesoscutum not densely pubescent; MSL/MSW less than 1.2 ... 4
- 4(3) Propodeum with a median spine well anterior to lateral spines (Fig. 43); mesopleural fovea present (Fig. 43); SCL/SCW = 5.4–6.5 ... (p. 46) .. *tika*
—Propodeum with a median spine near lateral spines (Fig. 201, 202, 204); mesopleural fovea absent; SCL/SCW = 6.5–7.9 ... 5
- 5(4) Pronotal collar with a median longitudinal carina over anterior half (Fig. 192); HW/HL less than 0.8; S6L/S4L = 6.0–7.5 ... (p.48) .. *spinosa*
—Pronotal collar without a median longitudinal carina; HW/HL exceeding 0.8; S6L/S4L = 2.8–4.0 ... 6
- 6(5) Median propodeal spine weaker than lateral spines (Fig. 202); upper frons with lower margin defined; lateral ocelli minute ... (p. 48) .. *pipira*
—Median propodeal spine as strong as lateral spines (Fig. 204); upper frons with lower margin not defined; lateral ocelli absent ... (p. 49) .. *pokorua*

tika species-group

Diagnosis. Mesopleural fovea present. Median propodeal spine situated well anterior to lateral propodeal spine; all propodeal spines usually strong.

Included species. *P. tika* n.sp.

Parabetyla tika new species

Parabetyla sp. Naumann, 1982: 239, fig. 532.

Female (Fig. 43). Length and ratios of measurements as in Appendix Table 5.

Head. Temple smoothly, very gradually curving to occipital carina. Vertex convex. Ocelli absent. Frons flat, its ventral margin not defined. Antennal sockets with walls thin, medially contiguous, anteriorly transversely rugose.

Antenna. Scape reticulate.

Mesosoma. Pronotum: anterior neck transversely striate; posterior neck with a transverse row of foveae; collar smooth or very faintly reticulate, dorsally broadly convex, laterally almost flat, without a supraspiracular process. Mesoscutum rarely slightly convex; notaulices weak, without sharp margins, almost half as long as mesoscutum; posterior margin sinuate. Mesoscutellum weakly convex or flat; lateral excavation absent. Mesopleuron smooth; mesopleural fovea present. Metanotum: median carina, lateral carina, and lateral rim not clearly differentiated. Propodeum dorsally irregularly rugose-punctate; median spine far anterior to lateral spine (Fig. 43); spines all sharp, approximately equal in length, usually strong and never reduced to minute tubercles; nucha with a transverse band of elongate punctures.

Petiole in dorsal view more or less parallel-sided; anterior margin straight, not upturned. Longitudinal carinae fine, parallel, continuous.

Gaster. T2 anteriorly with a transverse row of elongate, irregular punctures or longitudinal striae.

Pubescence. Lower gena, propleuron, posteroventral mesopleuron, mesosternal area, metanotum, metapleuron, propodeum, petiole, and S2 all densely woolly. Head, dorsal pronotum, mesoscutum, mesoscutellum, T2–5, S3–6, and legs with sparser, long setae; mesoscutellum with about 6 such setae; setae of T2 sometimes grouped into 2 or 3 poorly defined bands.

Colour. Body reddish brown, reddish orange, or orange; gaster sometimes mottled. Antennae and legs orange to yellow, usually distinctly paler than body. Palpi yellow. Pubescence silver.

Male. Differing from female as follows. Length and ratios of measurements as in Appendix Table 5.

Head. Temple curving more abruptly to occipital carina (Fig. 196). Median and lateral ocelli minute, 0.7x and 0.3x as large as an ocular facet respectively. Compound eye larger (Fig. 197).

Antenna. F1 carinate, as in Fig. 199.

Mesosoma. Pronotal collar medially much shorter than neck. Mesoscutum faintly reticulate or smooth between setigerous punctures; notaulices distinct, more or less percurrent, without sharp margins. Mesoscutellum with posterior margin smooth. Mesopleural fovea absent. Metanotum with median carina, lateral carina, and lateral rim distinct.

Petiole. Anterior margin slightly upturned.

Type data. **Holotype:** female, BR, Inangahua State Forest, Stoney Creek [=Stony River], litter 72/144, 18 April 1972, J.S. Dugdale (NZAC).

Paratypes (152 females, 5 males). **NORTH ISLAND:** 1 female, Mount Pirongia, Apr 1980, RME (LCNZ); 2 females, Mahoenui, 26 Jun 1977, GWR (NZAC); 2 females, Mount Te Aroha, 14 Mar 1983, FC (FCCO); 2 females, Kaimai Range, 4–5 Feb 1982, FC (FCCO); 2 females, Mamaku Plateau, 24 Dec 1982, 17 Mar 1983, FC (FCCO); 2 females, Okataina, 18 May 1982, 14 Mar 1983, FC (FCCO); 1 female, Mangatawai Stream, 13 Jan 1972, GWR (NZAC); 2 females, Te Ponanga Saddle, 25 Apr 1983, FC (FCCO); 2 females, Ohakune Mountain Road, 1 Dec 1965, JIT & LPM (NZAC); 1 female, Erua, near National Park, 24 Nov 1965, LPM (NZAC); 2 females, Mount Egmont, 29 Apr 1983, 23 Jul 1983, FC (FCCO); 2 females, Haurangi, JIT (NZAC).

SOUTH ISLAND: 1 female, 12 miles [19 km] from Mangarakau sawmill, 22 Aug 1967, FDA (NZAC); 1 female, Harwood's track, 3 Feb 1981, JWE (LCNZ); 1 female, Upper Maitai, 13 Feb 1957, ESG (NZAC); 1 female, Takaka Hill, 7 May 1957, ESG (NZAC); 1 female, Flora Camp, 21 Jan 1948, RRF (NMNZ); 1 female, Cobb-Sylvester track, 8 Jan 1965, JIT (NZAC); 2 females, Leslie Valley track, 23 Jan 1948, RRF (NMNZ); 1 female, 1 male, Mount Arthur, 19 Nov 1969, JIT (NZAC, ANIC); 1 male, same locality, 20 Mar 1964, JIT (NZAC); 1 male, same locality, 6 Mar 1935, ESG (NZAC); 1 male, same locality, 22 Jan 1948, RRF (NMNZ); 1 female, Salisbury's Opening, 23 Jan 1940, RRF (NMNZ); 2 females, Dun Mountain, 30 Jul 1922, 28 Oct 1924, AP (NZAC); 1 female, 1 male, Fletcher's Creek, 9 Sep 1971, JSD (NZAC); 1 female, Puihi Puihi Valley, 2 Jan 1982, JWE (LCNZ); 2 females, St Arnaud track, 24–26 Mar 1980, AN & MT (CNCI); 1 female, Mount Robert carpark, 28 Sep 1973, RME (LCNZ); 1 female, Mouty Priestly, 10 Dec 1969, JM (NZAC); 2 females, Riordan's Bridge, 27 Oct 1970 (LCNZ); 1 female, Lewis Pass Scenic Reserve, 2 Jan 1979, JWE (LCNZ); 2 females, Lake Christabel, 19 Dec 1981, CAM (LCNZ); 1 female, 3 km S of Reefton, 28 Jan 1972, JM (ANIC); 1 female, Tawhai State Forest, 12 Apr 1972, JM (NZAC); 5 females, Porarari River, 2 Apr 1983, JWE (LCNZ, ANIC); 2 females, Lower Hurunui, 11 May 1952,

JSD (CMNZ); 3 females, Dobson's track, 11 Nov 1966, AKW (NZAC, ANIC); 1 female, Halpin's Creek, 12 Oct 1970, CJH (CNCI); 4 females, Kelly's Creek, 9 Jan 1981, JWE (LCNZ); 33 females, Lake Mahinapua, 9 and 17 Jan 1982, JWE (LCNZ, ANIC, BMNH, CNCI); 1 female, same locality, 9 Mar 1972, JM (NZAC); 1 female, same locality, 16–22 Mar 1980, AN & MT (CNCI); 1 female, Okuku Scenic Reserve, 8 Jan 1982, JWE (LCNZ); 2 females, Lake Matheson, 16 Jan 1982, JWE (LCNZ); 13 females, Lake Wombat track, 11 Jan 1982, JWE (LCNZ, ANIC); 1 female, Canavan's Knob, 10 Jan 1982, JWE (LCNZ); 1 female, Bruce Bay, 10 Jan 1954, WC (CMNZ); 1 female, Arawata River valley, 11 Apr 1982, JWE (LCNZ); 1 female, Ellery River, 11 Apr 1982, JWE (LCNZ); 5 females, Howden track from Divide to Saddle, 8 Feb 1980, JWE & RME (LCNZ); 2 females, Davis Flat, 12 Apr 1982, JWE (LCNZ); 1 female, Gertrude Valley, 24 Oct 1966, FDA (NZAC); 1 female, Murchison Mountains, 7 Dec 1980, RME & CAM (LCNZ); 1 female, Lake Te Ana-Au, 12–24 Jan 1953, RRF (CMNZ); 5 females, Grebe Valley, 4 Feb 1982, JWE, CAM, & PTS (LCNZ); 5 females, Deep Cove, 2–3 Feb 1983, JWE, CAM (LCNZ); 1 female, same locality (NZAC); 1 female, Wolfe Flat, 23 Jan 1970, JM (NZAC); 7 females, Moraine Creek, 12 Feb 1980, JWE (LCNZ, ANIC); 5 females, South Borland Valley bivouac, 2 Feb 1982, JWE (LCNZ, ANIC); 1 female, Tutoko River, 13 Feb 1980, JWE (LCNZ).

Material examined. Type series only.

WO, BP, TO, TK, WA / NN, MB, BR, KA, NC, WD, OL, FD (Map 21).

Collected from litter, moss, and low vegetation; in and at margins of *Dracophyllum*, *Nothofagus*, podocarp / broadleaf, and punga / broadleaf forests, *Fuchsia* / *Weinmannia* bush, and from coastal forest; at altitudes between 20 m and 1180 m.

Remarks. The series from South Borland Valley includes individuals in which the propodeal spines are unusually weak for *P. tika*; the mesoscutum of one of these individuals is unusually convex.

The name *tika* is Maori, meaning 'correct, perfect'.

***spinosa* species-group**

Diagnosis. Mesopleural fovea absent. Median propodeal spine situated near lateral propodeal spines; median spine strong or weak, lateral spines strong.

Included species. *P. spinosa* Brues, *P. pipira* n.sp., *P. pokorua* n.sp., *P. ngarara* n.sp.

Parabetyla spinosa Brues

Brues, 1922: 224–225. Tillyard, 1926: 282. Muesebeck & Walkley, 1956: 379. Early, 1978: 207. Naumann, 1982: 153.

Female. Differing from female of *P. tika* as follows. Length and ratios of measurements as in Appendix Table 5.

Head. Vertex slightly flattened (Fig. 201); median ocellus minute. Frons with ventral margin defined, straight.

Antenna. Scape smooth except for reticulate basal 0.2–0.3.

Mesosoma. Pronotum (Fig. 192): collar longer than neck, with a distinct median dorsal carina over anterior half. Mesoscutum: notaulices each represented by a weak posterolateral depression. Mesopleural fovea absent. Propodeum with median spine situated posteriorly.

Pubescence. Petiole more sparsely setose. Setae of T2 not grouped into bands.

Male. Unknown.

Type data. **Holotype:** female, NN, Dun Mountain, 2000 feet [610 m], 16 March 1921, A. Philpott (NZAC).

Material examined. Holotype, plus 3 non-type females (NZAC, LCNZ, ANIC).

— / NN, BR, WD (Map 22).

Collected from understorey in *Nothofagus fusca* forest and from litter, in January, March, and December, on one occasion at night.

Parabetyla pipira new species

Female. Differing from female of *P. tika* as follows. Length and ratios of measurements as in Appendix Table 5.

Head. Median and lateral ocelli minute. Frons with ventral margin defined, straight (Fig. 193) or very slightly emarginate. Vertex in profile as in Fig. 195.

Mesosoma. Mesoscutum lacking notaulices. Mesoscutellum weakly convex; lateral excavation absent. Mesopleural fovea absent. Propodeum: lateral spine strong, sharp; median spine short, broader, situated posteriorly (Fig. 202).

Pubescence. Postantennal excavation with dense setae matted with white flocculence.

Male. Unknown.

Type data. **Holotype:** female, BR–WD, West Inanga-

hua State Forest, “127 BFUP”, moss 72/184, 19 September 1972, J.S. Dugdale (ex alcohol collection; NZAC).

Paratypes (6 females). **SOUTH ISLAND:** 1, Canaan, 27 Feb 1967, JIT (NZAC); 1, Mount Domett, 1 Dec 1971, GK (NZAC); 1, Mount Dewar, 11 Dec 1969, JIT (NZAC); 1, Big River Road, 28 Jan 1972, JM (ANIC); 1, Puhi Puhi Valley, 12 Oct 1966, AKW (NZAC); 1, Okarahia, 5 Feb 1925, AT (CMNZ).

Material examined. Type series only.

— / NN, BR, KA (Map 23).

Collected from moss and litter; at altitudes between 427 m and 1250 m.

Remarks. The name derives from *pipiri* (Maori, ‘to cling together’), referring to the mutual proximity of the propodeal spines.

Parabetyla ngarara new species

Female. Differing from female of *P. tika* as follows. Length and ratios of measurements as in Appendix Table 5.

Head. Frons with ventral margin defined, concave (Fig. 194). Antennal sockets with posterior wall bearing a conspicuous process.

Mesosoma. Pronotal collar more narrowly convex dorsally. Mesoscutum without notaulices, but these suggested by a vague posterior depression. Mesoscutellum: middle lobe anteriorly weakly concave; lateral excavation large, well defined; posterior margin sinuate. Metanotum: median carina differentiated, small; lateral rim clearly differentiated. Propodeum: lateral spine strong, sharp; median spine slightly shorter, broader, arising posteriorly (Fig. 203).

Petiole flattened anterodorsally, with longitudinal carinae diverging; mid-dorsal carina conspicuous.

Gaster. Punctures anteriorly on T2 broad, weakly defined.

Pubescence. Postantennal excavation with a few setae matted with white flocculence. Lateral excavation of mesoscutellum and metanotum densely woolly. Pronotal collar densely setose dorsally. Mesoscutum with 30–40 long setae. Setae of T2 not distinctly grouped into bands.

Colour. Body reddish brown. Legs, antennae, and parts of gaster reddish orange to yellow.

Male. Unknown.

Type data. **Holotype:** female, NN, Canaan, litter 66/

137, 18 April 1966, J.I. Townsend (ex alcohol collection; NZAC).

Material examined. Holotype only (Map 24).

Remarks. The name *ngarara* is Maori, meaning 'monster'.

Parabetyla pokorua new species

Female. Differing from female of *P. tika* as follows. Length and ratios of measurements as in Appendix Table 5.

Head. Median ocellus minute, or indicated by a slight puncture. Frons with ventral margin not defined.

Mesosoma. Mesoscutum: notaulices each represented by a short depression near mesoscutal-mesoscutellar suture; length of depression 0.2–0.3x MSL. Mesopleural fovea represented by a weak depression. Propodeum with median spine arising posteriorly (Fig. 204).

Gaster. T2 smooth anteriorly.

Pubescence. Setae of T2 not grouped into bands.

Male. Unknown.

Type data. **Holotype:** female, BR, Buller District, Rahu Saddle, 2200 feet [670 m], moss 65/330, 1 June 1965, J.I. Townsend (ex alcohol collection; NZAC).

Paratype: 1 female, same data as holotype (NZAC).

Material examined. Type specimens, plus 3 non-type females as follows: 2, Jackson River, 12 Apr 1982, JWE (LCNZ, ANIC); 1, Gilbert Island, May 1982, CFB (NZAC).

— / BR, WD, FD (Map 25).

Collected by Berlese funnel extraction of litter and moss, and by sweeping ferns and moss; in podocarp/*Nothofagus menziesii* forest; at altitudes between 30 m and 670 m.

Remarks. Three females excluded from the type series (see above) differ in being smaller (body length 1.74–2.55 mm) and in having weak propodeal spines.

The name *pokorua* (Maori, 'ant') refers to the ant-like appearance of the female.

nauhea species-group

Diagnosis. Mesopleural fovea absent. Propodeal spines reduced to minute tubercles situated posteriorly.

Included species. *P. nauhea* n.sp.

Parabetyla nauhea new species

Female. Differing from female of *P. tika* as follows. Length and ratios of measurements as in Appendix Table 5.

Mesosoma. Mesoscutum lacking notaulices. Mesopleural fovea absent. Propodeal spines represented by minute tubercles, usually concealed by pubescence, in a transverse line near nucha.

Petiole very slightly swollen over midlength. Longitudinal carinae weak.

Gaster. T2 smooth anteriorly or with longitudinal striae.

Pubescence. Setae of T2 not grouped into bands.

Colour. Body almost uniformly reddish-orange to orange; antennae and legs orange to yellow.

Male. Unknown.

Type data. **Holotype:** female, FD, 12 miles [19 km] east of Milford Hotel, 20 February 1965, N.A. Walker (NZAC).

Paratypes (41 females). **NORTH ISLAND:** 2, Mount Egmont, 23 Jul 1983, FC (FCCO).

SOUTH ISLAND: 1, Mount Domett, GK (NZAC); 1, Nelson Lakes National Park, 6 Feb 1978, S&JP (CNCI); 1, Porarari River, 2 Apr 1983, JWE (LCNZ); 3, Lake Mahi-napua, 17 Jan 1982, JWE (LCNZ, ANIC); 2, Lake Wombat track, 11 Jan 1982, JWE (LCNZ); 1, "Westland" (loc. indet.), CEC (AMNZ); 4, Tutoko River, 13 Feb 1980, JWE (LCNZ, ANIC); 4, Moraine Creek, 12 Feb 1980, JWE (LCNZ); 1, Mackay's Stream, 31 Oct 1966, JIT (NZAC); 20, Deep Cove, 2–3 Feb 1983, JWE & CAM (LCNZ, ANIC, BMNH); 1, Wilmot Pass, 22 Jan 1970, JSD (NZAC).

Material examined. Type series only.

TK / NN, BR, WD, FD, OL (Map 26).

Collected from moss and ferns in *Nothofagus menziesii*, punga / broadleaf, and podocarp / broadleaf forests; at altitudes between 20 m and 1250 m.

Remarks. The name *nauhea* is Maori, meaning 'rascal'.

tahi species-group

Diagnosis. Mesopleural fovea present. Median propodeal spine represented by a sharp, posteriorly situated tubercle; lateral spines absent.

Included species. *P. tahi* n.sp.

Parabetyla tahi new species

Female. Differing from female of *P. tika* as follows. Length and ratios of measurements as in Appendix Table 5.

Head. Antennal sockets with walls irregularly rugose anteriorly. Frons with ventral margin defined, convex.

Mesosoma. Pronotal collar weakly rugose or smooth anteromedially. Mesoscutum weakly convex, with slight posterior depressions representing notaulices. Mesoscutellum flat. Propodeum irregularly rugose-punctate dorsally; median tubercle sharp, low, not projecting beyond setae, situated near rather rounded posterior margin; dorsolateral spines absent.

Pubescence. Setae of gastral tergites sparse, not forming bands.

Male. Unknown.

Type data. **Holotype:** female, TK, Mount Messenger, south side, 15 December 1983, J.W. Early (NZAC).

Paratypes (4 females). **NORTH ISLAND:** 2, same data as holotype (LCNZ, ANIC); 1, 21 km N of Ohura, 14 Dec 1983, JWE (LCNZ).

SOUTH ISLAND: 1, Lake Kaniere, 14 Apr 1984, JWE (LCNZ).

Material examined. Type series only.

TK / WD (Map 27).

Swept from grass, sedge, and ferns in *Nothofagus fusca* and podocarp forests; at altitudes between 90 m and 140 m.

Remarks. The name *tahi* (Maori, 'one') refers to the single propodeal tubercle.

Parabetyla sp. P94

Female. Unknown.

Male. Differing from male of *P. tika* (principally) as follows.

Head. Vertex flattened (Fig. 198); ocelli absent or very minute – less than 0.3x diameter of an ocular facet.

Antenna. F1 carinate, as in Fig. 200.

Mesosoma. Pronotal collar minutely rugulose, about as long as neck. Median metanotal carina indistinct.

Gaster. In one specimen, suture between T2 and T3 very indistinct.

Material examined. Three males, as follows: 1, Motueka, 19–28 May 1982, S&JP (CNCI); 1, Shakespeare Bay, 11 Aug 1969, JM (NZAC); 1, Pelorus Bridge, 10 Oct 1964, GK (ANIC).

— / NN, SD, MB (Map 28).

Collected from litter and by Malaise trap in *Nothofagus* sp. forest.

Remarks. These three males cannot be associated with females. They may represent the male sex of one of the species of *Parabetyla* described above.

Parabetyla sp. P95

Female. Unknown.

Male. Differing from male of *P. tika* principally as follows. Brachypterous.

Head. Vertex more convex. Ocelli larger, each larger than an ocular facet.

Antenna. F1 slightly less swollen.

Mesosoma. Notaulices almost indistinguishable. Axillar process free, blunt.

Forewing slender, at rest reaching slightly beyond posterior extremity of petiole. *Sc+R* tracheate; marginal vein not clearly delimited (Fig. 205).

Hindwing very slender, at rest reaching slightly beyond posterior extremity of petiole. *Sc+R* not reaching hamulus.

Material examined. Three males, as follows: 1, Simonin Pass, 23 Jan 1975, GWR (NZAC); 1, Moraine Creek, 11 Feb 1980, JWE (ANIC); 1, Lake Marian track, 10 Feb 1980, JWE (LCNZ).

— / FD (Map 28).

Collected by Berlese funnel extraction of litter and by sweeping low vegetation; in *Nothofagus menziesii* forest; at altitudes between 550 m and 1065 m.

Remarks. These males cannot yet be associated with females. They may represent the male sex of one of the species of *Parabetyla* described above.

—⑤—

Zealaptera new genus

Type-species *Zealaptera chambersi* new species

Diagnosis (females only; males unknown). Antennal sockets with inner wall not produced dorsally. Parafrontal carina absent (Fig. M91). Pronotal collar long, without a carina or spines (Fig. M92). Mesoscutal-mesoscutellar suture (Fig. M93) and tegula absent. Legs stout (Fig. 44). Dorsal propodeum without vertical spines. Apterous. Petiole curved in lateral view (Fig. M96). T2 with anterior margin entire (Fig. M97). Gaster with 5 free tergites.

Similar to *Parabetyla* and *Betyla*. *Zealaptera* females distinguished from those of *Parabetyla* by lacking pronotal carina, tegula, mesoscutal-mesoscutellar suture, and metanotum and by having stouter legs; and from those of *Betyla* by having complete sutures between all gastral tergites.

Female. Apterous.

Head hypognathous, elongate; temple long. Ocelli absent. Vertex without spines or carina. Frontal prominence well developed; antennal sockets with inner wall not produced dorsally; outer wall not markedly expanded; parafrontal carina absent. Upper frons with ventral margin defined on each side by a small process. Compound eye small. Genal region not strongly concave about anterior tentorial pit. Occipital carina moderately strong, smooth, not interrupted ventrally. Palpal formula 5-3. Mandibles neither elongate nor projecting; mandibular formula 2-2. Labrum with distal margin very weakly convex. Genal bridge complete.

Antenna 0.4x BL, 15-segmented. F1 with neither a minute ring near base nor a basal constriction. Clava weak, 4- or 5-segmented.

Mesosoma slender, widest at coxa I, not extensively rugose-punctate. Pronotum: neck much shorter than collar, posteriorly with an irregular row of very small, setigerous punctures; collar very long, without a carina or spines. Pronotal scrobe and postspiracular excavation absent. Mesoscutal-mesoscutellar suture absent. Mesonotum flat, smooth; notaulices, mesoscutellar fovea, and axillar processes absent. Mesopleuron: pre-episternal furrow absent; sternaulus and ventral sternopleural carina present. Metanotum absent. Dorsal propodeum: longitudinal carinae and vertical spines absent; posterior margin defined; dorsal propodeum and nucha not smoothly continuous. Suture between mesonotum and mesopleuron with a minute vestige (?forewing, ? tegula).

Legs stout. Foretibia without an apical, external spine.

Petiole curved in lateral view. Carinae absent. PL/PW = 1.5–2.0.

Gaster with 5 free tergites and 5 free sternites, posteriorly acuminate. T2 entire anteriorly, sometimes with very

weak punctures, without carinae or processes. T5 trapeziform, with a pair of spiracles. T6 minute, exposed, with a pair of cerci (Fig. M98, M99); cerci digitiform, articulated, externally visible, widely separated. All sutures between tergites complete, well defined, evenly curved. S2 of moderate size; anterior and posterior margins emarginate. S3 not bulged beneath S2 anteriorly. S6 triangular.

Pubescence. Body with numerous long, appressed or suberect setae; dense, short, appressed pubescence reduced. Woolly pits posterior to coxae I and II; without broad, flat setae. Truncate, golden setae absent. S6 without a dense brush of setae.

Male. Unknown.

Remarks. The name *Zealaptera* is derived from the stem-syllable for New Zealand and the Greek *apteron* ('wingless'); gender feminine.

Zealaptera chambersi new species

Female. Length and ratios of measurements as in Table 4.

Head. Temple very long, smoothly curving to occipital carina (Fig. 206). Vertex very weakly convex (Fig. 207). Upper frons flat (Fig. 44) or very slightly concave (Fig. 207), with a ventrolateral process adjacent to each antennal socket. Antennal sockets with inner walls fused; anterior and lateral walls at most very weakly rugose-punctate (Fig. M91); posterior walls each with a small process immediately below rim.

Antenna. Proximal segments stout (Fig. 208). Scape microreticulate basally, otherwise predominantly smooth; pedicel and F1–5 predominantly smooth. Clava as in Fig. 208.

Mesosoma. Pronotum: neck smooth; collar predominantly smooth, dorsally flat, laterally very weakly convex,

Table 4 Range of body length and ratios of measurements for *Zealaptera chambersi* females.

BL (mm)	2.08–3.09	HW/HL	0.55–0.65
FW/MAE	1.23–1.43	SCL/SCW	3.46–4.11
SCL/HW	1.07–1.22	F1L/F1W	0.73–1.09
F1L/F2L	1.20–1.50	F2L/F2W	0.56–0.83
F12L/F12W	0.77–0.95	F13L/F13W	1.34–1.60
ML/MW	2.19–2.62	ML/MH	2.26–2.74
MNL/MNW	0.91–1.05	PL/PW	1.59–2.00
PL/PH	1.78–2.07	GL/GW	1.76–2.20
GL/HW	2.93–3.53	T4L/T3L	0.50–0.73
T5L/T5W	0.43–0.67	S6L/S4L	2.50–3.57

ventrolaterally with a longitudinal groove; spiracular process absent; shape as in Fig. M92. Mesonotum flat or very weakly convex; shape as in Fig. M93; posterolateral corners slightly depressed (Fig. M94). Mesopleuron trapeziform (Fig. M92), smooth, dorsally weakly depressed; sternaulus continuous. Propodeum anteriorly contiguous with mesonotum, dorsally convex, with conspicuous setigerous punctures (Fig. M95); interspaces smooth; posterolateral margin straight or weakly convex (Fig. M93), without spines or tubercles; posterolateral margin straight (Fig. M92), with a very weak supracoxal tubercle. Nucha weakly punctate.

Petiole arched (Fig. M96), mid-dorsally smooth (Fig. M97), otherwise weakly rugose.

Metasoma. T2 anteriorly very weakly rugose, posteriorly as in Fig. M98, M99.

Pubescence. All setae acuminate. Occipital carina ventrally, propleuron, mesosternal area, propodeum ventrally, and petiole ventrally densely woolly. Pronotum between neck and collar, propodeum (especially dorsolaterally and ventrolaterally), petiole (especially laterally), and S2 with long, dense, suberect setae; head, pronotal collar dorso-laterally, mesonotum, propodeum dorsally, petiole dorsally, and metasoma with similar setae but sparser. Setae of proximal antennal segments inclined at about 45° to surface; apart from a few long setae near base of scape (Fig. M91), length of these setae less than width of segment of origin. Pronotal collar dorsally and laterally, mesopleuron, and petiole mid-dorsally bare.

Colour predominantly reddish brown to reddish orange. Flagellum, palpi, and legs reddish orange to yellow. Setae silver to very slightly golden.

Male. Unknown.

Type material. **Holotype:** female, ND, Omahuta State Forest, swept at night, 15 July 1974, J.S. Dugdale (NZAC).

Paratypes (29 females). **NORTH ISLAND:** 3, Waipoua State Forest, 4 Feb 1975, AKW (NZAC, ANIC); 3, Waikohatu Bridge, 14 Apr 1980, AN & MT (CNCI, ANIC); 1, Yaka's Tree track, 11–14 Apr 1980, AN & MT (CNCI); 3, Waitakere Range, Dec 1980, JSN (NZAC, BMNH); 1, Mount Te Aroha, 17 Mar 1983, FC (FCCO); 2, Kaimai, 4–5 Feb 1982, FC (FCCO); 1, Mamaku Plateau, 27 Dec 1982, FC (FCCO); 1, Okataina, 18 May 1982, FC (FCCO); 2, Lake Okataina, 17 Mar 1983, FC (FCCO, ANIC); 1, Mount Maungapohatu, 3 Mar 1971, JIT (NZAC); 1, Mount Egmont, 12 May 1975, FC (LCNZ); 3, same locality, 18 Jan – 29 May 1983, FC (FCCO, ANIC).

SOUTH ISLAND: 2, Harwood's track, 3 Feb 1981, CAM & JWE (LCNZ); 1, Porarari River, 2 Apr 1983, JWE (LCNZ); 2, Okuku Scenic Reserve, 9 Jan 1982, JWE

(LCNZ); 2, Howden track from Divide to Saddle, 8 Feb 1980, JWE & RME (LCNZ, ANIC).

Material examined. Type series only.

ND, AK, BP, TK / NN, BR, WD, OL (Map 29).

Collected by sweeping (by day and night) undergrowth, especially ferns and moss, and by Berlese funnel extraction of litter; in *Agathis*, *Nothofagus* sp., and podocarp / broad-leaf forests; at altitudes between 35 m and 900 m.

Remarks. Named after Mr F.D. Chambers, collector of many specimens examined in this study.

Genus *Betyla* Cameron

Betyla Cameron, 1889: 12. Marshall, 1892b: 308. Cameron, 1903: 296. Hutton, 1904: 98. Kieffer, 1910: 8; 1916: 351, 358, 622. Brues, 1922: 221–222. Gourlay, 1927: 310. Muesebeck & Walkley, 1956: 336. Masner, 1965: 55; 1969: 105–109. Naumann, 1982: 10–11, 16–17, 19, 22, 151–152. Type-species *Betyla fulva* Cameron, 1889, by original designation and monotypy.

Tanyzonus Marshall, 1892a: 275–277. Brues, 1922: 221. Gourlay, 1927: 310. Muesebeck & Walkley, 1956: 402. Type-species *Tanyzonus bolitophilae* Marshall, 1892, by monotypy. Synonymised by Marshall (1892b).

See Remarks following redescription of *B. fulva* for discussion of synonymy.

Diagnosis. Female (Fig. 46). Antennal sockets with inner wall not produced dorsally. Parafrontal carina absent. Pronotal collar long, without a carina or spines. Mesoscutal-mesoscutellar suture present or absent. Tegula absent. Legs slender. Dorsal propodeum without vertical spines. Apterous. Petiole stout, in lateral view not curved. T2 with anterior margin entire (Fig. M115). Gaster with 2 free tergites; some sutures between gastral tergites laterally effaced (Fig. 268, 269).

Females similar to females of *Parabetyla*, *Zealaptera*, and the Australian *Riaworra* Naumann; *Parabetyla* and *Zealaptera* distinguished from *Betyla* by having complete sutures between all gastral tergites, *Riaworra* by its spinose pronotum and emarginate T2.

Macropterous male (Fig. 45). Pronotal scrobe present (Fig. M140) or absent (Fig. M138). Forewing with distal margin rounded; basalis not tracheate. Hindwing Sc+R not continuous from base to hamuli. Gaster with 5 free tergites; T2 with anterior margin entire (Fig. M146).

Most similar to macropterous males of Neotropical *Dissoxylabis* Kieffer and Australian *Scianomas* Naumann. Males of both these genera differ in having Sc+R tracheate

and continuous between base of hindwing and hamuli.

Wing-reduced males (Fig. 259, 260). Distinguished from wing-reduced males of all other ambositrine genera (except *Riaworra*) by having incomplete sutures between gastral tergites, and from *Riaworra* by lacking pronotal spines and having T2 anteriorly entire.

Female. Apterous.

Head hypognathous, globular, or slightly elongate; temple of moderate length or elongate. Ocelli absent. Vertex without spines or carina. Frontal prominence well developed; antennal sockets with inner wall not dorsally produced, outer wall not markedly expanded; parafrenal carina absent. Upper frons with ventral margin not defined. Compound eye of moderate size or small. Genal region not strongly concave about anterior tentorial pit. Occipital carina smooth, ventrally very narrowly interrupted. Palpal formula 5-3. Mandibles neither elongate nor projecting; mandibular formula 2-3. Distal margin of labrum straight or very slightly convex. Genal bridge ventrally very narrowly incomplete.

Antenna 0.6–0.8x BL, 15-segmented. F1 with neither a minute ring nor a basal constriction. Clava weak or strong, 4–7-segmented.

Mesosoma slender, widest at coxa I, not extensively rugose-punctate. Pronotum: neck shorter than collar, posteriorly with a transverse row of small, irregular punctures; collar medially moderately long, without a carina or spines, its posterolateral corner sometimes bluntly produced. Pronotal scrobe and postspiracular excavation absent. Mesoscutal-mesoscutellar suture usually absent. Mesoscutum (or mesonotum) flat, without notaulices. Tegula absent. Mesoscutellum (when defined) strap-like, without fovea, lateral excavations, or axillar processes. Mesopleuron: pre-episternal furrow absent; sternaulus present or absent; ventral sternopleural carina present. Metanotum represented by a transverse trough in which lobes or very weak carinae are sometimes weakly defined; spines absent. Dorsal propodeum: lateral and median carinae present or absent; posterior margin defined; dorsal propodeum and nucha not smoothly continuous. A minute, shrivelled vestige (?forewing, ?tegula) sometimes visible in suture between mesonotum and mesopleuron.

Legs slender. Foretibia without an apical, external spine.

Petiole. Longitudinal carinae absent or very weak and irregular.

Gaster with 2 free tergites and 5 free sternites, posteriorly acuminate. T2 anteriorly entire. Spiracle-bearing tergite well defined, free. Following tergite desclerotised, without cerci (cercus-bearing in other genera). Sutures between at least some tergites incomplete, laterally effaced, sinuate. S2 of moderate size; anterolateral corners

not visible from above; anterior and posterior margins emarginate. S3 rarely bulged anteriorly beneath S2. S6 triangular.

Pubescence. Body with numerous long, appressed or suberect setae as well as dense, shorter, appressed setae. Woolly pits posterior to coxae I and II without broad, flat setae. Truncate, golden setae absent. S6 without a dense brush of setae.

Macropterous male. Differing from female as follows.

Head globular to slightly transverse. Temple short. Ocelli present. Compound eye never small.

Antenna 0.8–1.2x BL, 14-segmented. F1 carinate, toothed or emarginate; F1L/F1W = 3.3–4.6. F2 sometimes carinate. F2–12 filiform; clava absent.

Mesosoma broad, widest at tegulae. Pronotum: neck longer than collar, with punctures more distinct; collar medially short; pronotal scrobe present or absent; postspiracular excavation absent. Mesoscutum strongly convex; notaulices weak or strong, percurrent. Mesoscutal-mesoscutellar suture always present. Tegula large, without microsculpture. Mesoscutellum: fovea well defined, undivided; lateral excavations well defined; axillar processes free, blunt or slightly acuminate. Mesopleuron: pre-episternal furrow very narrow; sternaulus and ventral sternopleural carina absent. Metanotum large; dorsellum well defined; spines absent. Dorsal propodeum: lateral and median carinae present or absent; posterior margin sometimes scarcely defined.

Forewing broad, flat, at rest extending beyond posterior tip of gaster, hyaline, tinged with yellow, not microdentate; distal margin rounded. Marginalis not extending beyond proximal 0.4–0.5 of wing. *C*, *Sc+R*, marginalis, postmarginalis, and stigmalis strongly sclerotised, tracheate; poststigmalis, *Rs*, basalis, *M+Cul*, free portion of *Cul*, free portion of *M*, and *1A* indicated at least weakly by coloration. Costal cell narrow. Radial cell defined or not defined. Basal cell weakly defined. Marginalis broadly contiguous with costal margin; *M/W* approximately 2.0; *S/M* approximately 1.0.

Hindwing broad, 0.5–0.6x as long as forewing, hyaline, with 3 hamuli; *Sc+R* not continuous from base to hamuli; basalis indicated by coloration; basal cell defined.

Petiole. Longitudinal carinae parallel or absent.

Gaster with 5 free tergites and 7 free sternites. T3 and T4 transverse. T5 transverse, with a pair of spiracles. T6 large, strongly sclerotised, with a pair of cerci; cerci digitiform, basally narrowed, articulated, externally visible, widely separated. All sutures between tergites complete, well defined, evenly curved.

Pubescence. Forewing *Sc+R* without a macroseta. Surfaces and margins of wings densely setose.

Brachypterous male. Differing from female as follows.

Antenna as in macropterous male, except: F1 alone modified, strongly emarginate; $F1L/F1W = 2.2-3.0$; F2-12 more or less moniliform, without a clava.

Mesosoma. Neck as long as collar. Pronotal scrobe never present. Notaulices and mesoscutal-mesoscutellar suture always present. Tegula small, without microsculpture. Mesoscutellum: fovea weakly defined, undivided; axillar processes free, acuminate. Sternaulus always present. Metanotum large; dorsellum defined. Dorsal propodeum with longitudinal carinae always absent.

Forewing spoon-shaped, at rest reaching anterior extremity of petiole, mostly hyaline, apically opaque, cream-coloured, not microdenticulate. *Sc+R* tracheate, not reaching margin; all other venation absent.

Hindwing narrow, approximately 0.3x as long as forewing, without hamuli or venation.

Petiole. Longitudinal carinae parallel.

Gaster with 3 free tergites and 7 free sternites. Spiracle-bearing tergite well defined, free, semicircular. Cercus-bearing tergite and cercus as in macropterous male. Sutures between at least some tergites laterally effaced, sinuate.

Micropterous male. Differing from female as follows.

Antenna as in brachypterous male, but $F1L/F1W = 2.2-3.0$, and distal flagellar segments very slightly wider than proximal segments.

Mesosoma. Neck sometimes as long as collar. Mesoscutal-mesoscutellar suture always present. Mesoscutum sometimes convex, with weak notaulices. Tegula small, without microsculpture. Mesoscutellum: fovea strongly or weakly defined, undivided; axillar processes not free. Metanotum small; dorsellum not defined. Dorsal propodeum never with longitudinal carinae.

Forewing minute, at rest not extending beyond posterior margin of mesoscutellum, flat, not microdenticulate; distal margin narrowly rounded, hyaline. Venation absent.

Hindwing absent.

Petiole. Longitudinal carinae parallel.

Gaster as in brachypterous male.

Remarks. The males and females of *Betyla* species are morphologically so different that it has been possible to associate the sexes of only two species. Apterous females and macropterous males have been associated by rearing in *B. fulva*, and by many coincident collections in *B. eupepla* n.sp., which is the most commonly taken *Betyla*. However, I have examined males representing a further seven species, three of them macropterous, one brachypterous, and three micropterous. These males cannot be associated with confidence with the females of described species, and have been identified below by provisional numbers

(species P75 to P81). Abbreviated descriptions are given below, and these males are included in the key.

The eleven species of *Betyla* known from females fall into five species-groups. Of these the rather slender species of the *fulva* and *thegalea* groups and the stocky *auriger*, with its curious girdle of lanceolate, golden setae, are the most highly modified. Otherwise little can be said of the phylogeny of these groups until males can be associated for more species.

KEY TO SPECIES OF *BETYLA*

Females

- 1 S3 anteriorly swollen (Fig. 267); gaster posteriorly narrowly acuminate (Fig. 269); $T4L/T4W = 0.86-1.05$
... (p. 59) .. *thegalea*
—S3 not anteriorly swollen (Fig. M147); gaster posteriorly broadly acuminate (Fig. 268); $T4L/T4W = 0.48-0.89$... 2
- 2(1) T2 anteriorly with a distinct band of lanceolate, golden setae (Fig. 151-153); posterodorsal margin of propodeum with a pair of submedian tubercles (Fig. M116, M117) ... (p. 58) .. *auriger*
—T2 anteriorly without a distinct band of lanceolate, golden setae (Fig. M113, M115, M121); posterodorsal margin of propodeum with at most 1 median tubercle or spine (Fig. M112, M114) ... 3
- 3(2) Propodeum dorsally predominantly bare (Fig. M119-121, M124-126) ... 4
—Propodeum dorsally predominantly or entirely setose (Fig. M112, M114, M131, M133) ... 5
- 4(3) Mesoscutal-mesoscutellar suture absent (Fig. M119, M120); metanotum without submedian lobes
... (p. 60) .. *rangatira*
—Mesoscutal-mesoscutellar suture present (Fig. M124, M125); metanotum with a pair of submedian lobes
... (p. 60) .. *karamea*
- 5(3) Spiracular process present (Fig. M107); mesonotum widest anterior to midlength (Fig. M112, M114) ... 6
—Spiracular process absent, as in Fig. M108; mesonotum widest posterior to midlength (Fig. M131, M133, M135) ... 7
- 6(5) T2 anteriorly with at least a few lanceolate, golden setae (Fig. M113, M147); setae of scape, F1, F2, and F3

- predominantly decumbent; F3L/F3W = 0.82–1.08
 ... (p. 56) .. *fulva*
- T2 anteriorly without lanceolate, golden setae (Fig. M114, M148); setae of scape, F1, F2, and F3 predominantly erect or suberect; F3L/F3W = 0.97–1.56
 ... (p. 57) .. *prosedera*
- 7(5) T2 with lanceolate, golden setae ... 8
 —T2 without lanceolate, golden setae ... 9
- 8(7) Posterodorsal margin of propodeum with a distinct median spine; mesonotum 1.33x longer than wide, anteriorly densely setose ... (p. 65) .. *paparoa*
 —Posterodorsal margin of propodeum without a median spine; mesonotum 1.06x longer than wide, anteriorly sparsely setose ... (p. 65) .. *midas*
- 9(7) Posterodorsal margin of propodeum with a distinct median tubercle or spine (Fig. M133, M134)
 ... (p. 63) .. *tuatara*
 —Posterodorsal margin of propodeum with at most a minute median tubercle (Fig. M131, M135) ... 10
- 10(9) Decumbent setae of T2 gathered into distinct bands (Fig. M150); clava strong (Fig. 245); T2 anteriorly smooth (Fig. M132) or weakly punctate; mesonotum widest posterior to midlength (Fig. M131)
 ... (p. 61) .. *eupepla*
 —Decumbent setae of T2 not gathered into bands (Fig. M158); clava weak (Fig. 247); T2 anteriorly strongly punctate (Fig. M136); mesonotum widest at midlength (Fig. M135) ... (p. 64) .. *wahine*
- Males**
- 1 Macropterous – forewing at rest far exceeding posterior extremity of gaster (Fig. 45); ocelli large ... 2
 —Brachypterous or micropterous - forewing at rest not reaching posterior extremity of petiole (Fig. 259, 260); ocelli absent ... 6
- 2(1) F2 carinate (Fig. M105); subocular suture present (Fig. M101) ... 3
 —F2 not carinate (Fig. M104); subocular suture absent (Fig. M100) ... 5
- 3(2) Frons without a process near each antennal socket (Fig. 232, 236) .. (p. 61) ... *eupepla*
 —Frons with a small process near each antennal socket (Fig. 234, 238) ... 4
- 4(3) Pronotal scrobe present, as in Fig. M140; carina on F2 reaching only to midpoint (Fig. 255); petiole dorsally with at least a few longitudinal striae or carinae
 ... (p. 67) .. **sp. P79**
 —Pronotal scrobe absent, as in Fig. M138; carina on F2 reaching almost to apex (Fig. 256); petiole dorsally smooth
 ... (p. 67) .. **sp. P80**
- 5(2) F1 emarginate, without a carina (Fig. M104); length of setae on F1 and F2 generally less than or equal to width of these segments; vertex with at least some dense, decumbent setae ... (p. 56) .. *fulva*
 —F1 carinate (Fig. M106); length of setae on F1 and F2 generally greater than width of these segments; vertex without dense, decumbent setae ... (p. 68) .. **sp. P81**
- 6(1) Pedicel transversely expanded (Fig. 252); axillar process free; forewing spoon-shaped, reaching almost to anterior extremity of petiole (Fig. 260)
 ... (p. 66) .. **sp. P77**
 —Pedicel not transversely expanded (Fig. 250, 251, 254); axillar process not free; forewing scale-like, smaller than tegula (Fig. 259) ... 7
- 7(6) Posterolateral corner of propodeum not tuberculate (Fig. 264); propodeum laterally with large smooth areas
 ... (p. 66) .. **sp. P76**
 —Posterodorsal corner of propodeum tuberculate (Fig. 263, 266); propodeum laterally entirely rugose-punctate
 ... 8
- 8(7) F1 carinate as in Fig. 250; sternaulus present
 ... (p. 66) .. **sp. P75**
 —F1 carinate as in Fig. 254; sternaulus absent
 ... (p. 67) .. **sp. P78**
- fulva* species-group**
- Diagnosis.** Spiracular process present. Posterodorsal margin of propodeum without tubercles or spines. S3 not anteriorly swollen. T2 anteriorly without a distinct band of lanceolate, golden setae. Propodeum dorsally densely setose.
- Included species.** *B. fulva* Cameron, *B. prosedera* n.sp.

Betyla fulva Cameron

fulva Cameron, 1889: 13; 1898: 41–42; 1903: 296. Marshall, 1892b: 308. Hutton, 1904: 98. Kieffer, 1910: 8, pl. 1 (fig. 18, 19); 1916: 358–359, 622, fig. 88–91. Brues, 1922: 222. Tillyard, 1926: 282. Gourlay, 1927: 310. Muesebeck & Walkley, 1956: 336. Miller, 1956: 54, 474. Richards, 1960: 571. Masner, 1965: 55. Valentine, 1967: 1143. Early, 1978: 207. Naumann, 1982: 151–152, fig. 527–529.

bolitophilae Marshall, 1892a: 275–277, fig. 1, 2 (*Tanyzonus*). Hudson, 1892: 277–278; 1893: 164, pl. 9. Brues, 1922: 222. Gourlay, 1927: 310; 1930: 7. Muesebeck & Walkley, 1956: 402. Synonymised by Marshall (1892b).

Female. Length and ratios of measurements as in Appendix Table 6.

Head. Temple as in Fig. 209. Vertex as in Fig. 220. Antennal sockets contiguous, in profile rounded.

Antenna. Scape predominantly reticulate. Clava strong (Fig. 239).

Mesosoma. Pronotum: neck and collar smooth; spiracular process strong (Fig. M107). Mesoscutal-mesoscutellar suture present or absent, sometimes replaced by a transverse fold. Mesonotum (or mesoscutum, if defined) strongly inclined to long axis of body (Fig. M109) large, widest anterior to midlength; shape as in Fig. M112. Mesoscutellum (if defined) small, strap-like. Mesopleuron usually smooth, occasionally weakly striate; shape as in Fig. M109; dorsal margin strongly inclined to long axis of body; sternaulus sometimes very weak; posterodorsal notch present. Metanotum with a pair of continuous submedian processes, each continuous with mesonotum; processes weak or absent in small specimens. Propodeum: posterodorsal margin without median or submedian tubercles or spines; posterolateral margin with a supracoxal tubercle (Fig. 258). Nucha smooth or very weakly rugose.

Gaster posteriorly broadly acuminate. T2 anteriorly usually smooth (Fig. M113), rarely punctate-striate. Suture between T2 and T3 strongly sinuate. T3 medially short (Fig. 269). S3 not anteriorly swollen (Fig. M147).

Pubescence. T2 anteriorly without a distinct band of lanceolate setae, but with a few scattered, weakly lanceolate setae (Fig. M159); all other setae acuminate. Postantennal excavation, occipital carina ventrally, propleuron, mesosternal area, parts of lateral propodeum and petiole, and S2 all densely woolly. Head (excluding apex of vertex), dorsal and lateral propodeum and petiole, and gastral tergites and sternites with dense, decumbent setae; setae of T2 diffuse (Fig. M147) or gathered into very indistinct bands. Head, pronotal collar, mesonotum, propodeum, petiole, and gastral tergites with rather sparse, long, erect and suberect setae; on propodeum these setae often

scarcely differentiated from slightly shorter, decumbent setae. Scape, F1, F2, and F3 with predominantly decumbent setae, suberect setae rather sparse. Length of scape setae usually 1.5x SCW, length of long setae on F1, F2, and F3 predominantly 1.2–1.3x (rarely 1.5x) width of segment of origin. Apex of vertex, pronotum, mesonotum, and mesopleuron predominantly or entirely bare.

Colour predominantly reddish brown to reddish orange. Flagellum, legs, and palpi reddish orange to yellow. Lanceolate setae golden; all other setae silver.

Male (Fig. 45). Length and ratios of measurements as in Appendix Table 6. Macropterous.

Head. Temple as in Fig. 231. Vertex as in Fig. 235; ocelli present. Frons without a small process adjacent to each antennal socket. Antennal sockets separated. Subocular suture absent (Fig. M100).

Antenna. Scape anteriorly and posterobasally microreticulate, posteriorly predominantly smooth. Pedicel not enlarged (Fig. M104). F1 emarginate.

Mesosoma. Pronotum: neck anteriorly rugose; collar smooth; scrobe absent (Fig. M137, M138). Mesoscutum: notaulix well defined (Fig. M141) over posterior 0.6–0.8. Mesoscutellum: axillar process free, very long (Fig. M142); fovea and lateral excavation well defined; posterior margin medially strongly punctate. Mesopleuron lacking sternaulus. Metanotum with dorsellum well differentiated from lateral excavation. Propodeum (Fig. M143) dorsally strongly or weakly rugose, with or without smooth areas, laterally almost entirely rugose-punctate; posterodorsal margin straight or irregular, sometimes weakly defined; posterodorsal tubercle usually weak; posterolateral margin without a supracoxal tubercle. Nucha punctate.

Petiole dorsally with longitudinal carinae (Fig. M143).

Gaster. T2 anteriorly moderately (Fig. M143) or strongly punctate. Suture between T2 and T3 complete (Fig. 270).

Pubescence. Postantennal excavation minutely, occipital carina ventrally, propleuron, mesosternal areas, propodeum, and petiole in part densely woolly. Head, pronotum and mesopleuron ventrolaterally, forewing, petiole in part, and gastral sternites with dense, more or less decumbent setae. Head, mesoscutum, mesoscutellum, dorsellum, propodeum, and petiole (especially laterally) with long, often dense, erect or suberect setae. Pronotum laterally, mesopleuron, and T2 medially predominantly bare. F1 and F2 with both decumbent and erect setae; length of setae at most equal to width of segment of origin.

Colour either predominantly black to dark brown, with antenna, pronotum dorsally, mesoscutum, mesoscutellum, and legs reddish orange to yellow, or predominantly reddish orange to yellow.

Type data. Holotype *fulva* Cameron: female, BR, Grey-mouth, R. Helms (BMNH).

Lectotype female and **paralectotype** male *bolitophilae* Marshall: no data (HNHM).

Material examined. Holotype *fulva*, plus 165 non-type examples (88 females, 77 males; NZAC, BMNH, ANIC, NMNZ, CNCI, FCCO, LCNZ).

ND, AK, CL (including Cuvier I., Little Barrier I.), WO, BP, TO, TK, RI, HB, WI, WN / NN, SD (including Stephens I.), MB, BR, KA, NC, WD, CO, DN, FD, SL / SI (including Big South Cape I.) (Map 30).

Collected by Berlese funnel extraction of litter and moss; by pitfall, pan, and carrion traps; by sweeping low vegetation (ferns, *Gahnia*, *Tradescantia*, young *Macropiper*); and by Malaise and light trapping (males only).

Taken in *Nothofagus* spp., *Agathis*, podocarp / broadleaf, and punga / broadleaf forests, and in *Fuchsia* / *Weinmannia* and coastal bush.

Recorded in all months; at altitudes between 20 m and 1050 m.

Reared from pupae of *Arachnocampa luminosa* Skuse (Keroplastidae).

Remarks. Marshall's description of *Tanyzonus bolitophilae* appeared in November 1892 (Marshall 1892a). Cameron immediately drew Marshall's attention to his own (Cameron's) earlier description of *Betyla fulva* (Cameron 1889), and in December 1892 Marshall promptly synonymised *T. bolitophilae* with *B. fulva* (Marshall 1892b). Cameron (1898) confirmed the synonymy. Brues (1922) and Gourlay (1927) questioned the synonymy; both believed that the petiole of *B. fulva* had a ventral tooth which they suspected to be absent from *T. bolitophilae*. I have examined the holotype of *B. fulva*, and find that the 'tooth' visible on the petiole is, in fact, an artifact produced by matted pubescence and glue.

Marshall's collection was acquired by the HNHM. There are now four specimens of *B. fulva* in this collection. A female labelled "*fulva* Cam. Coll. Marshall" and a male labelled "*fulva* Cam. Coll. Marshall", "*fulva* Cameron (N. Zealand)", "BETULA", "*Betyla fulva* [male, female]", "*Betyla* del. L. Masner 1976" both agree with Marshall's description of *T. bolitophilae*. Furthermore, the arrangement of antennae and legs of these specimens corresponds exactly with that depicted in Marshall's illustration. I am in no doubt that these specimens are the syntypes of *T. bolitophilae*. Either Marshall did not label these as *T. bolitophilae* or he removed his own identification labels on being advised that *T. bolitophilae* was a synonym of *B. fulva*. I have selected the female as lectotype and the male as paralectotype of *T. bolitophilae*. The other two speci-

mens of *B. fulva* in the HNHM (both females) bear Cameron labels and appear to have been received by Marshall from Cameron. Both differ slightly from Marshall's description of *T. bolitophilae*, indicating that neither can be considered a syntype of this nominal species. Neither has label data sufficiently similar to that of the holotype of *B. fulva* to suggest that it could be considered a syntype of that species.

Females of *B. fulva* are distinguishable from all other *Betyla* females (except those of *B. prosedera* n.sp.) by the prominent pronotal spiracular process. Males of *B. fulva* are distinguishable from all other *Betyla* males by the emarginate F1.

Two males (in NZAC) have partially deformed antennal segments. On one specimen (from Palmerston North, WI-WN) F1 of the left antenna has a posteromedial process (Fig. 248) as well as the normal, external emargination; F1 of the right antenna is normally formed. On the other specimen (from Orongorongo Field Station, WN) the pedicel of the right antenna is incomplete posteriorly (Fig. 249); on the left antenna it is normal.

Betyla prosedera new species

Female. Differing from *B. fulva* female as follows. Length and ratios of measurements as in Appendix Table 6.

Head. Temple as in Fig. 210. Vertex as in Fig. 221.

Antenna. Scape sometimes posteromedially smooth. Clava weaker (Fig. 240).

Mesosoma (Fig. M114). Pronotum: spiracular process sometimes slightly weaker. Neither mesonotum (or mesoscutum, if defined) nor dorsal margin of mesopleuron as strongly inclined (Fig. M110). Mesopleuron sometimes with 1 or 2 weak striae; sternaulus always defined. Metanotum sometimes with a very indistinct, lateral, longitudinal ridge. Propodeum: posterodorsal margin usually slightly less distinct; posterolateral margin sometimes with a supracoxal tubercle.

Pubescence. Lanceolate setae absent. Suberect setae of dorsal propodeum more distinct. Setae of T2 usually longer (Fig. M115, M148). Setae of scape, pedicel, F1, F2, and F3 predominantly suberect. Length of long setae of scape usually 1.8x SCW, of F1, F2, and F3 1.7x width of segment of origin.

Male. Unknown.

Type data. Holotype: female, BR, Shenandoah Saddle, litter around *Blechnum* clumps, *Nothofagus fusca* and *N. menziesii* forest, 12 February 1981, J.W. Early (NZAC).

Paratypes (29 females). **NORTH ISLAND:** 1, Omahuta, 16 Jul 1974 (NZAC); 1, Tapapa, 25–29 Mar 1978, S&JP (CNCI).

SOUTH ISLAND: 1, Pakawau, 28 May 1971, JSD (NZAC); 3, Kaihoka Lakes, 20 May 1982, 28 Oct 1965, LPM, S&JP (NZAC, CNCI, ANIC); 1, Pigeon Saddle, 20 km NE of Takaka, 21 May 1982, S&JP (CNCI); 1, Takaka Valley, 26 Feb 1963 (NZAC); 1, Karamea, 22 Jan 1980, JWE (LCNZ); 1, Orr Hill, 25 Apr 1963, GK (NZAC); 1, Pelorus Bridge, 25–28 May 1982, S&JP (CNCI); 1, Mount Robert, 3 Mar 1964, JIT (NZAC); 1, same locality as holotype, 10 Jun 1982, RME (LCNZ); 1, Tawhai State Forest, 12 Apr 1972, JM (NZAC); 2, Porarari River, 2 Apr 1983, MLB & JWE (LCNZ, ANIC); 1, Ahaura, Callaghan's Ridge, 21 Apr 1971, JSD (NZAC); 2, Greymouth, 23 Jun 1935, 19–21 Jun 1957, ESG (NZAC); 2, Lake Mahinapua, 9 Mar 1972, 17 Jan 1982, JWE & JM (LCNZ, ANIC); 1, Mawhera State Forest, 10 Nov 1971, JM (NZAC); 2, Fletcher's Creek, Nov 1971, JM (NZAC); 1, Puhī Puhī Reserve, 13 Oct 1966, AKW (ANIC); 1, Oaro, 17 Mar 1979, JWE (LCNZ); 2, Arthur's Pass, 23 Oct 1970, DSH (CNCI, LCNZ); 1, 8 km S of Arthur's Pass, 19–21 Mar 1980, AN & MT (CNCI).

Material examined. Type series only.

ND, BP / NN, SD, MB, BR, KA, WD, NC (Map 31).

Collected by Berlese funnel extraction of litter, moss, and cryptogams; and swept from ferns and ground cover; in *Agathis*, punga / broadleaf, *Nothofagus* spp., and nikau palm forests, and in coastal bush; at altitudes between 5 m and 700 m.

Remarks. *B. prosera* is very close to *B. fulva*. The female is distinguished from other *Betyla* females by its large spiracular process, slender clava, and lack of lanceolate setae.

The name derives from the Greek *prosedros* ('closely akin'), with reference to this species' close resemblance to *B. fulva*.

auriger species-group

Diagnosis. Spiracular process absent. Posterodorsal margin of propodeum with a pair of submedian tubercles. S3 not anteriorly swollen. T2 anteriorly with a distinct band of lanceolate, golden setae. Propodeum dorsally densely setose.

Included species. *B. auriger* n.sp.

Betyla auriger new species

Female (Fig. 46). Length and ratios of measurements as in Appendix Table 6.

Head. Temple as in Fig. 211. Vertex as in Fig. 222. Antennal sockets contiguous, in profile anteriorly rounded.

Antenna. Scape predominantly microreticulate. Clava strong (Fig. 241).

Mesosoma. Pronotum: neck and collar smooth; spiracular process absent (Fig. M108). Mesoscutal-mesoscutellar suture absent. Mesonotum weakly or not inclined to long axis of body, widest posterior to midlength; shape as in Fig. M116. Mesopleuron with at most a few weak posterodorsal punctures; shape as in Fig. M111; dorsal margin parallel to long axis of body; posterodorsal notch present. Metanotum with weak median and lateral ridges (Fig. M116). Propodeum: posterodorsal margin with a pair of weak, submedian tubercles (Fig. M116, M117); posterolateral margin with or without a supracoxal tubercle. Nucha rugose-punctate.

Petiole. Dorsal rugosity weak, irregular (Fig. M117).

Gaster posteriorly broadly acuminate. T2 anteriorly smooth. Suture between T2 and T3 strongly sinuate (Fig. M154). T3 medially short (Fig. M155). S3 not anteriorly swollen (Fig. M149).

Pubescence. T2 anteriorly with a distinct band of lanceolate setae (Fig. M151–153); all other setae acuminate. Postantennal excavation, occipital carina ventrally, propleuron, mesosternal area, propodeum and petiole laterally and ventrally, and S2 densely woolly. Head, anterior 0.5–0.7 of mesonotum, propodeum and petiole dorsally, and gaster with dense, decumbent setae; setae of T2 gathered into distinct bands (Fig. M151). Head, pronotal collar, mesonotum, propodeum, petiole, and gastral tergites with long, erect or suberect setae. Scape, F1, F2, and F3 with both decumbent and suberect, long setae. Length of long setae on F1, F2, and F3 less than 1.4x width of corresponding segment. Lateral pronotum, posterior 0.3–0.5 of mesonotum, and mesopleuron predominantly or entirely bare.

Colour predominantly reddish brown to reddish orange. Flagellum and tarsi reddish orange to yellow. Palpi yellow. Lanceolate setae golden; all other setae silver.

Male. Unknown.

Type data. **Holotype:** female, SD, Port Underwood Saddle, litter 69/152, September 1969, G. Kuschel (NZAC).

Paratypes (33 females). **SOUTH ISLAND:** 1, Aore Valley, 18 Apr 1963, JIT (NZAC); 1, Takaka Hills, 1 Feb 1978, S&JP (CNCI); 2, Leslie Valley track, 23–24 Jan 1948, RRF & JTS (NMNZ); 3, Karamea, 3 May 1963, 11 Mar 1971, GK & JIT (NZAC, ANIC); 1, Dovedale, 11 Oct

1963, JIT (NZAC); 1, Whangamoia Saddle, 12 Aug 1965, AKW (NZAC); 3, Upper Maitai, 3 May 1950, ESG (NZAC); 2, Dun Mountain, 3 Feb 1962, 14 Sep 1971, ESG & GWR (NZAC); 1, Brook Reserve, 23 Jul 1964, JIT (NZAC); 1, Picton, 22 Sep 1965, LPM (NZAC); 1, Tennyson Inlet, 27 May 1982, S&JP (CNCI); 2, same data as holotype (NZAC, ANIC); 1, Kawatiri, 25 Aug 1964, JIT (NZAC); 4, St Arnaud track, Lake Rotoiti, 24–26 Mar 1980, AN & MT (CNCI, ANIC); 1, Mount Robert, 3 Aug 1964, JIT (NZAC); 1, Lewis Pass Scenic Reserve, 5 May 1983, JWE (LCNZ); 1, Croesus track, Paparoa Range, 21 Jan 1982, JWE (ANIC); 1, Boatman's Creek, 4 Oct 1971, GK (NZAC); 1, Moana, 10 Mar 1950, RRF (CMNZ); 2, Okuku Scenic Reserve, 14 Jan 1982, 18–22 Mar 1980, JWE, AN & MT (LCNZ, CNCI); 2, Lake Mahinapua, 17 Jan 1982, 16–22 Mar 1980, JWE, AN & MT (LCNZ, CNCI).

Material examined. Type series only.

— / NN, SD, BR, WD (Map 32).

Collected by Berlese funnel extraction of litter, moss, and lichens and by sweeping low vegetation (especially ferns); in *Nothofagus* / podocarp, podocarp / mixed broadleaf, and punga / broadleaf forests; at altitudes between 20 m and 900 m.

Remarks. By virtue of the discrete band of lanceolate, golden setae on T2, *B. auriger* is the most distinctive of *Betyla* females.

The name *auriger* (Latin, 'gold-bearing') refers to these setae.

thegalea species-group

Diagnosis. Pronotum without a spiracular process. Posterodorsal margin of propodeum with a pair of submedian tubercles. S3 anteriorly swollen. T2 without a distinct band of lanceolate, golden setae. Propodeum dorsally densely setose.

Included species. *B. thegalea* n.sp.

Betyla thegalea new species

Female. Length and ratios of measurements as in Appendix Table 6.

Head. Temple as in Fig. 212. Vertex as in Fig. 223. Antennal sockets contiguous, in profile anterodorsally acute.

Antenna. Scape basally and apically microreticulate. Clava strong (Fig. 242).

Mesosoma. Pronotum: neck and collar smooth; spiracular process absent. Mesoscutal-mesoscutellar suture absent. Mesonotum weakly or not inclined to long axis of body, widest posterior to midlength. Mesopleuron smooth; dorsal margin parallel to long axis of body; posterodorsal notch present. Metanotum with 2 widely separated processes each contiguous with mesonotum. Propodeum: posterodorsal margin with a pair of weak, submedian tubercles; posterolateral margin without a supracoxal tubercle. Nucha smooth.

Petiole. Dorsal rugosity weak, irregular.

Gaster posteriorly narrowly acuminate. T2 anteriorly smooth. Suture between T2 and T3 weakly sinuate (Fig. 268). T3 medially long. S3 anteriorly swollen (Fig. 267).

Pubescence. All setae acuminate. Postantennal excavation, occipital carina ventrally, propleuron, mesosternal area, propodeum laterally and ventrally, petiole ventrally, and S2 densely woolly. Head, propodeum dorsally, petiole dorsally and laterally, and gaster with dense, decumbent setae; setae of T2 gathered into distinct bands. Head, pronotal collar, propodeum, petiole, and gaster dorsally with long, erect and suberect setae. Scape, F1, F2, and F3 with both decumbent and suberect, long setae. Long setae of scape predominantly longer than SCW. Longest setae of F1, F2, and F3 shorter than 1.8x width of segment of origin. Pronotum, mesonotum, and mesopleuron predominantly or entirely bare.

Colour predominantly reddish brown to reddish orange. Flagellum and legs reddish orange to yellow. Palpi yellow. Setae silver.

Male. Unknown.

Type data. Holotype: female, NN, Mount Domett, summit, moss 71/175, December 1971, G.W. Ramsay (NZAC).

Paratypes (2 females). **NORTH ISLAND:** 1, Mount Holdsworth, 19 Nov 1958, SE (NZAC).

SOUTH ISLAND: 1, Lake Sylvester, 31 Mar 1969, JCW (ANIC).

Material examined. Type series only.

WN / NN (Map 33).

Collected by Berlese funnel extraction of litter and moss, at altitudes between 1320 m and 1615 m (the Mount Holdsworth paratype is from litter collected at an unspecified altitude "above" 600 m).

Remarks. The female of *B. thegalea* is easily distinguished from those of all other *Betyla* by the profile of the

antennal socket, the elongate gaster, and the anteriorly swollen S3.

The name *thegalea* (Greek, 'pointed') refers to the shape of the gaster.

rangatira species-group

Diagnosis. Spiracular process absent. Posterodorsal margin of propodeum without median or submedian tubercles or spines. S3 not anteriorly swollen. T2 without a distinct band of lanceolate, golden setae. Propodeum dorsally predominantly bare.

Included species. *B. rangatira* n.sp., *B. karamea* n.sp.

Betyla rangatira new species

Female. Length and ratios of measurements as in Appendix Table 6.

Head. Temple as in Fig. 213. Vertex as in Fig. 224. Antennal sockets contiguous, in profile anteriorly rounded.

Antenna. Scape predominantly smooth, anteriorly and posterobasally microreticulate. Clava strong (Fig. 243).

Mesosoma. Pronotum: neck anteriorly striate or rugose; collar usually smooth, sometimes anteriorly weakly rugose; spiracular process absent. Mesocutal-mesoscutellar suture absent. Mesonotum weakly or not inclined to long axis of body, widest at midlength; shape as in Fig. M118. Mesopleuron smooth; shape as in Fig. M119; dorsal margin parallel to long axis of body; posterodorsal notch very indistinct. Metanotum either with a weak median ridge only (Fig. M120), or with weak median and lateral ridges, or without ridges. Propodeum: posterodorsal margin without a median tubercle or spine (Fig. M121); posterolateral margin with or without a supracoxal tubercle. Nucha usually smooth, rarely weakly rugose-punctate.

Petiole. Dorsal rugosity weak, irregular (Fig. M121).

Gaster posteriorly broadly acuminate. T2 anteriorly punctate-striate, usually strongly so. Suture between T2 and T3 strongly sinuate. T3 medially short. S3 not anteriorly swollen.

Pubescence. All setae acuminate. Postantennal excavation, occipital carina ventrally, propleuron, mesosternal area, propodeum and petiole laterally and ventrally, and S2 all densely woolly. Gena, frons ventrally, propodeum and petiole laterally, and gaster with dense, decumbent setae; setae of T2 not gathered into distinct bands. Head, pronotal collar, mesonotum, propodeum, petiole, and gaster dorsally with long, erect and suberect setae. Scape, F1, F2, and

F3 with both decumbent and suberect, long setae. Length of long setae of scape usually 1.5x SCW, occasionally 2.2x SCW. Longest setae of F1, F2, and F3 shorter than 2.0x width of segment of origin. Lateral pronotum and mesopleuron predominantly bare.

Colour predominantly reddish brown to reddish orange to yellow. Flagellum and legs reddish orange to yellow. Palpi yellow. Setae silver.

Male. Unknown.

Type data. **Holotype:** female, BR, Tawhai State Forest, ex litter 72/121, 6 March 1972, J.S. Dugdale (NZAC).

Paratypes (26 females). **SOUTH ISLAND:** 1, Oparara, 13–19 Nov 1957, ESG (NZAC); 1, Canaan, 18 Apr 1966, JIT (NZAC); 1, Takaka Hills, 1 Feb 1978, S&JP (CNCI); 1, Cobb Reservoir, 18 Sep 1964, TGW (NZAC); 1, Lake Sylvester, 29 Oct 1969, JSD (NZAC); 1, Leslie Valley track, 24 Jan 1948, JTS (NMNZ); 2, Roding River, 19 Oct 1965, JIT (NZAC); 1, Aniseed Valley, 1–4 Dec 1923, AT (NZAC); 1, Mount Malita, 1 Apr 1966, JIT (NZAC); 3, Whangamoia Saddle, 12 Aug 1965, AKW (NZAC, ANIC); 1, Cable Bay, 23 Jul 1964, JIT (NZAC); 1, Upper Maitai, 3 May 1950, ESG (NZAC); 2, Mount Arthur, 19 Nov 1969, 22 Mar 1971, JIT & ACE (NZAC); 1, Fabian's Valley, 23 Oct 1963, JIT (NZAC); 1, Boatman's Creek, Sep 1971, JM (NZAC); 1, Caplestone, 28 Jan 1972, JCW (NZAC); 1, Springs Junction, 4 May 1979, RME (LCNZ); 1, Arthur's Pass, 18–21 Mar 1980, AN & MT (ANIC); 1, Rocklands, 19 Dec 1978–2 Jan 1979, BIPB (NZAC); 2, Lake Te Anau, 1 Feb 1950, 12–24 Jan 1953, BD & RRF (CMNZ); 1, Hump Ridge, 8 Feb 1968, JIT (NZAC).

Material examined. Type series only.

— / NN, MB, BR, NC, CO, FD (Map 34).

Collected by Berlese funnel extraction of litter, moss, and lichens, and by pitfall trap; in *Nothofagus* spp. forests; at altitudes between 150 m and 1300 m.

Remarks. Females of *B. rangatira* are distinguished from all other *Betyla* females except *karamea* by the dorsally bare propodeum.

The name *rangatira* is Maori, meaning 'chief'.

Betyla karamea new species

Female. Length and ratios of measurements as in Appendix Table 6.

Head. Temple as in Fig. 214. Vertex as in Fig. 225. Antennal sockets contiguous, in profile anteriorly rounded.

Antenna. Scape predominantly smooth posteriorly, microreticulate posterobasally and anteriorly. Clava strong (Fig. 244).

Mesosoma. Pronotum: neck with or without striae; collar anteriorly with a few rugae; spiracular process absent. Mesoscutal-mesoscutellar suture present. Mesoscutum weakly inclined to long axis of body, large, widest at midlength; shape as in Fig. M124; mesoscutellum small, strap-like (Fig. M124, M125). Mesopleuron longitudinally striate (Fig. M123); shape as in Fig. M122; dorsal margin parallel to long axis of body; posterodorsal notch very indistinct. Metanotum with a pair of contiguous, submedian lobes (Fig. M125). Propodeum: posterodorsal margin without median or submedian tubercles or spines; posterolateral margin with a supracoxal tubercle. Nucha smooth or very weakly rugose.

Petiole. Dorsal rugosity weak, irregular (Fig. M126).

Gaster posteriorly broadly acuminate. T2 anteriorly strongly or weakly punctate. Suture between T2 and T3 strongly sinuate. T3 medially short. S3 not anteriorly swollen.

Pubescence. All setae acuminate. Postantennal excavation, occipital carina ventrally, propleuron, mesosternal area, propodeum and petiole ventrally, and S2 (sometimes weakly) all densely woolly. Head (not all specimens), propodeum laterally, petiole dorsally (in part) and laterally, and gaster with dense, decumbent setae; setae of T2 at most gathered into diffuse bands. Head, pronotal collar, mesoscutum, propodeum (sparsely), petiole, and gastral tergites with long, erect and suberect setae. Long setae of scape predominantly decumbent; F1, F2, and F3 with both decumbent and suberect, long setae. Length of long setae of scape usually 1.7x ScW, of F1, F2, and F3 less than 2.2x width of segment of origin. Pronotum, mesoscutum, mesoscutellum, mesopleuron, metanotum, and propodeum dorsally predominantly or entirely bare.

Colour predominantly reddish brown to reddish orange. Flagellum and tarsi reddish orange to yellow. Palpi yellow. Some setae anteriorly on T2 golden; all other setae silver.

Male. Unknown.

Type data. **Holotype:** female, TO, Ahimanawa Range, 609 m, litter 72/10, 14 January 1972, G.W. Ramsay (NZAC).

Paratypes (9 females). **NORTH ISLAND:** 2, Omahuta State Forest, 18 Mar 1978, S&JP (CNCI); 1, Waipoua State Forest, 16–21 Mar 1978, S&JP (CNCI); 1, Lake Waikareiti, 10 Dec 1946, RRF (NMNZ); 1, Lake Rotopounamu, 4–9 Apr 1980, AN & MT (CNCI); 1, Ohingaiti, 30 Feb 1943, JR (NMNZ).

SOUTH ISLAND: 1, Takaka Hills, 1 Feb 1978, S&JP

(CNCI); 1, Mount Domett, 1 Dec 1971, GK (NZAC); 1, Boatman's Creek, 4 Oct 1971, JM (ANIC).

Material examined. Type series only.

ND, GB, TO, RI / NN, BR (Map 35).

Collected by Berlese funnel extraction of litter and moss; in *Agathis* forest and mixed broadleaf / podocarp forest; at altitudes between 70 m and 1250 m.

Remarks. Females of *B. karamea* are most similar to those of *B. rangatira*, differing as detailed in the key. They are generally larger and more red-coloured, and the decumbent setae of T2 tend to form more distinct bands.

The name *karamea* is Maori, meaning 'red ochre'.

eupepla species-group

Diagnosis. Spiracular process absent. Posterolateral margin of propodeum with or without a median tubercle or spine. S3 anteriorly not swollen. T2 anteriorly without a distinct band of lanceolate, golden setae. Propodeum dorsally densely setose.

Included species. *B. eupepla* n.sp., *B. tuatara* n.sp., *B. wahine* n.sp., *B. paparoa* n.sp., *B. midas* n.sp.

Betyla eupepla new species

Female. Length and ratios of measurements as in Appendix Table 6.

Head. Temple as in Fig. 215. Vertex as in Fig. 226. Antennal sockets contiguous or very slightly separated, in profile anteriorly rounded.

Antenna. Scape predominantly microreticulate. Clava strong (Fig. 245).

Mesosoma. Pronotum: neck usually with at least a few rugae; collar rugose or smooth; spiracular process absent. Mesoscutal-mesoscutellar suture absent. Mesonotum weakly or not at all inclined to long axis of body, widest posterior to midlength; shape as in Fig. M131. Mesopleuron usually smooth, rarely with a few weak striae or posterodorsal punctures; shape as in Fig. M127; dorsal margin parallel to long axis of body; posterodorsal notch present. Metanotum: lateral longitudinal carinae distinct; median carina very rarely distinguishable. Propodeum: anterior margin usually moderately well defined; posterolateral margin usually without spines or tubercles, rarely with a very minute median or submedian tubercle; posterolateral margin with at most a weak supracoxal tubercle. Nucha smooth or rugose-punctate.

Petiole. Rugosity very weak or absent (Fig. M132).

Gaster posteriorly broadly acuminate. T2 anteriorly smooth, rarely punctate. Suture between T2 and T3 strongly sinuate. T3 medially short. S3 not swollen anteriorly (Fig. M150).

Pubescence. Lanceolate setae absent; all setae acuminate. Postantennal excavation, occipital carina ventrally, propleuron, mesosternal area, and propodeum and petiole ventrally densely woolly. Head, mesonotum, propodeum and petiole dorsally and laterally, and gastral tergites and sternites usually with dense, decumbent setae, but these sometimes absent from vertex and from anterior or entire mesonotum; setae of T2 gathered into distinct bands (Fig. M150). Head, pronotal collar, mesonotum, propodeum, petiole, and gastral tergites with long, erect and suberect setae. Setae of scape, F1, F2, and F3 predominantly decumbent, a few of them erect and suberect. Length of setae of scape and of F1, F2, and F3 respectively 1.0x and 1.3–1.4x width of segment of origin. Lateral pronotum and mesopleuron predominantly or entirely bare.

Colour largely reddish brown to reddish orange. Flagellum reddish orange to yellow. Palpi yellow. Setae silver.

Male. Differing from male of *B. fulva* as follows. Length and ratios of measurements as in Appendix Table 6.

Head. Temple as in Fig. 232. Vertex as in Fig. 236. Subocular suture present (Fig. M101–103).

Antenna. Scape weakly microreticulate. F1 and F2 carinate (Fig. M105), the carina of F2 not reaching apex.

Mesosoma. Pronotal scrobe present (Fig. M139, M140). Mesoscutellum (Fig. M144) with axillar process moderately long (Fig. M145). Propodeum as in Fig. M146, M156.

Gaster (Fig. M160). T2 anteriorly smooth, with at most a few weak anterolateral punctures.

Pubescence. Vertex without dense, decumbent setae. Setae of F1 and F2 decumbent.

Colour. Sometimes darker-coloured, with antenna, mesoscutum, and mesoscutellum predominantly brown.

Type data. **Holotype:** female, WD, Westland National Park, Lake Wombat track, 180–240 m, swept from ferns in podocarp / broadleaf forest, 11 January 1982, J.W. Early (NZAC).

Paratypes (151 females, 162 males). **NORTH ISLAND:** 1 female, Waipoua State Forest, 16–21 Mar 1978, S&JP (CNCI); 1 male, Waitakere Range, Nov 1980, JSN (NZAC); 2 females, Lynfield, 9 Aug 1975, GK (NZAC, ANIC); 1 male, Nihotupu, 2 Jan 1950, RH (NZAC); 2 females, 1 male, Mahoenui, 26 Jun 1977, GWR & LLD (NZAC); 1 female, Awakino Valley, 24 Mar 1945, JTS (NMNZ); 1 female, Okataina, 18 May 1982, FC (FCCO); 1 female, Tikitiki Stream, 24 Jul 1976, JSD (NZAC); 1

female, Opepe Reserve, 5–8 Apr 1980, AN & MT (ANIC); 1 female, Te Ponanga Bush, 27 Jan 1976, BM (NZAC); 1 male, Ponanga Saddle, 25 May 1983, FC (FCCO); 1 female, 16 km N of Waiouru, 17 Feb 1973, RME (LCNZ); 1 female, Okoeke Stream, 3–8 Apr 1980, AN & MT (CNCI); 1 male, west Mount Egmont, 20 Oct 1981, FC (FCCO); 5 females, south Mount Egmont, 23 Jul 1983, 3 Jun 1984, FC (FCCO); 1 male, Dawson Falls, 8 Feb 1981, FC (FCCO); 1 female, Totara Reserve, 4 Jan 1975, JCW (ANIC); 1 female, Ballance Bridge Reserve, 3 Jan 1975, JCW (NZAC); 2 females, Tararua State Forest, 8 Mar 1978, SP (CNCI); 1 female, 6 km SSE of Otaki, 7–10 Mar 1978, SP (CNCI).

SOUTH ISLAND: 1 female, Harwood's track, 4 Feb 1965, LPM (NZAC); 2 males, same locality, 3 Feb 1981, JWE (LCNZ); 8 males, Castle Rock – Torrent Bay track, 4 Feb 1981, JWE (LCNZ); 1 male, Falls River near mouth, 5 Feb 1981, JWE (LCNZ); 1 female, Takaka Valley, 26 Feb 1963 (NZAC); 1 male, 30 km NW of Motueka, 19–28 May 1982, S&JP (ANIC); 1 female, Canaan, 17 Nov 1964, LPM (NZAC); 2 females, Mount Domett, 1 Dec 1971, CWR & JSD (NZAC); 6 females, Leslie Valley track, 23 Jan 1948, RRF (NMNZ); 2 females, Flora Camp, 21 Jan 1948, RRF (NMNZ); 4 females, Mount Arthur, 14–19 Nov 1969, JIT & BM (NZAC, ANIC); 1 female, Wangapeka Valley, 14 Mar 1982, RME (LCNZ); 1 female, Whangamoia Saddle, 28 Aug 1965, JIT & AKW (NZAC); 2 females, Cable Bay, 23 Jul 1964, JIT (NZAC); 4 females, Dun Mountain, 18 Nov 1964, 12 Jul 1966, 14 Sep 1971, JIT & GWR (NZAC); 1 female, Fell Peak, 13 Mar 1969, JCW (NZAC); 1 female, Palmer's Bush, 20 Oct 1971, GWR (NZAC); 8 females, Wakefield, 19 Aug 1964, 27 May 1965, JIT (NZAC, ANIC); 4 females, Balloon Hut, 26 Jan 1948, RRF (NMNZ); 2 females, Kawatiri, 25 Jul 1964, JIT (NZAC, ANIC); 1 male, Opouri, 15 Jan 1969, JSD (NZAC); 4 females, Shakespeare Bay, 11 Aug 1969, JM (NZAC, ANIC); 1 female, Port Underwood Saddle, Sep 1969, GK (NZAC); 1 female, Tunakino Valley, 28 Apr 1964, JIT (NZAC); 1 female, Pelorus Valley, 29 Apr 1964, JIT (NZAC); 1 female, Pelorus Bridge, 25–28 May 1982, S&JP (CNCI); 1 female, Onamalutu Domain, 22 Sep 1965, LPM (NZAC); 2 females, Wairau Valley, 7 Sep 1966, JIT (NZAC); 2 females, Puhi Puhi Valley, 13 Oct 1966, AKW (NZAC, ANIC); 2 females, same locality, 2 Jan 1982, JWE (LCNZ); 1 female, Hundalee, 25 Mar 1965, NAW (NZAC); 2 females, 1 male, Mount Robert, 23–26 Mar 1980, AN & MT (CNCI, ANIC); 3 females, 3 males, Lake Rotoiti, 27 Jul 1965, 18 Jan 1976, 8 Feb 1978, 24–26 Mar 1980, AKW, JIT, ARF, AN, MT, & FD (NZAC, CNCI); 1 female, Lake Christabel, 19 Dec 1981, CAM (LCNZ); 2 females, Fletcher's Creek, 7 Mar 1972, JM & JSD (NZAC); 7 females, Tawhai State Forest, 9 Sep 1971, 28

Jan – 17 Apr 1972, JSD & JM (NZAC, ANIC); 1 male, 14 km SE of Reefton, 18–29 May 1982, S&JP (CNCI); 4 females, 4 males, Porarari River, 2 Apr 1983, JWE (LCNZ, ANIC); 1 female, Rapahoe, 29 May 1963, GK (NZAC); 10 males, Riordan's Creek, 26 Apr 1980, JWE (LCNZ, ANIC); 1 female, 9 males, Lewis Pass Scenic Reserve, 26 Apr 1980, 5 Apr 1980, 5 Apr 1983, JWE (LCNZ); 1 female, Kiwi Valley, 1 Nov 1949, RRF (CMNZ); 1 male, Waiheke State Forest, 20 Dec 1981, CAM (LCNZ); 3 females, Arthur's Pass, 10 Nov 1966, AKW (NZAC); 1 male, Klondyke Corner, 7 Dec 1982, CAM (LCNZ); 1 male, Bealey Valley track, 18–21 Mar 1980, AN & MT (CNCI); 2 females, 1 male, Halpin Creek, 12 Dec 1970, 8 Jan 1982, JWE & DSH (LCNZ); 1 female, 4 males, Kelly's Creek, 9 Jan 1982, JWE (LCNZ); 1 female, Sharplin Falls, 21 Oct 1981, JWE & RAM (LCNZ); 5 males, Okuku Scenic Reserve, 9 Jan 1982, JWE (LCNZ); 1 female, Otira, 12 May 1965, JIT (NZAC); 1 female, Otira River, 18–21 Mar 1980, AN & MT (CNCI); 1 female, Mahinapua State Forest, 9 Mar 1972, JM (NZAC); 1 female, Lake Mahinapua, 28 Jan 1978, S&JP (CNCI); 2 females, same locality, 16–22 Mar 1980, AN & MT (CNCI, ANIC); 18 males, same locality, 17 Jan 1982, JWE (LCNZ, ANIC); 1 female, Hokitika River, 17 Mar 1980, AN & MT (CNCI); 5 males, Mount Hercules Scenic Reserve, 17 Jan 1982, JWE (LCNZ); 1 male, Okarito, 15 Jan 1982, JWE (LCNZ); 1 female, 17 males, same data as holotype, 11 Jan 1981, JWE (LCNZ, ANIC); 1 female, 13 males, Canavan's Knob, 10 Jan 1982, JWE (LCNZ, ANIC); 2 males, near Canavan's Knob, 6 Jul – 11 Aug 1982, ABM (LCNZ); 1 female, 3 males, Lake Matheson, 16 Jan 1982, JWE (LCNZ); 1 female, 1 male, Arawata River, 11 Apr 1982, JWE (LCNZ); 1 female, 5 males, Cascade State Forest, 12 Apr 1982, JWE (LCNZ); 1 female, Simonin Pass, 23 Jan 1975, GWR (NZAC); 3 males, Simonin Creek, 23 Jan – 1 Feb 1975, JSD (NZAC, ANIC); 1 female, McKerrow Range, 23 Jan 1978, GK (NZAC); 1 female, Makarora, 21–24 Jan 1978, S&JP (CNCI); 1 male, track above Gunn's Camp, 5 Feb 1980, LAM (LCNZ); 1 female, 2 males, Gunn's Camp, 15 Feb 1980, JWE (LCNZ); 1 male, Routeburn track above Divide, 8 Feb 1980, JWE (LCNZ); 3 females, 1 male, Lake Howden, 8 Feb 1980, JWE (LCNZ, ANIC); 3 females, 3 males, Howden track from Divide to Saddle, 8 Feb 1980, JWE & RME (LCNZ, ANIC); 6 males, Hollyford River, 5–8 Feb 1980, JWE (LCNZ, ANIC); 1 male, Hollyford Valley, 5 Feb 1980, JWE (LCNZ); 4 females, 6 males, Moraine Creek, 12 Feb 1980, JWE (LCNZ, ANIC); 6 males, Tutoko River, 13 Feb 1980, JWE (LCNZ, ANIC); 1 female, Homer Tunnel, 24 Apr 1949, RRF (CMNZ); 1 female, Lake Gunn, 30 Oct 1966, JIT (NZAC); 1 female, 1 male, Plateau Creek, 3 Dec 1980, CAM & RME (LCNZ); 3 females, Lake Te Anau, 12–24 Jan 1953, RRF (CMNZ);

1 male, Grono Bay, 26 Nov 1981, CFB (NZAC); 2 males, Deep Cove, 17 Jan 1970, ACE (NZAC); 1 female, 7 males, same locality, 2–3 Feb 1983, JWE & CAM (LCNZ, ANIC); 1 male, West Arm, Lake Manapouri, 22 Jan 1970, ACE (NZAC); 8 females, 4 males, Grebe Valley, 4 Feb 1982, JWE, CAM, & PTS (LCNZ, ANIC); 1 female, South Borland Valley bivouac, 2 Feb 1982, JWE (ANIC).

Loc. INDET.: 1 female, "A.E. Brookes Collection" (NZAC).

Material examined. Type series only.

ND, AK, WO, BP, TO, TK, RI, WA, WN/NN, SD, MB, BR, KA, NC, MC, WD, OL, FD (Map 36).

Collected by Berlese funnel extraction of litter, moss, rotten wood, and bracket fungus; by sweeping low vegetation (especially ferns and moss), by pyrethrum spraying, and by Malaise and light traps (males only).

Taken in podocarp / broadleaf forest, punga / broadleaf forest, *Nothofagus* spp. forests, coastal scrub, and *Fuchsia* / *Weinmannia* bush, at altitudes between 20 m and 1000 m.

Recorded in all months, although not from southern parts of the South Island during June–September.

Remarks. *B. eupepla* is the most commonly collected species of *Betyla*. Females are distinguished from all other *Betyla* females by the strongly banded, silver setae of T2. Males are distinguishable from all other macropterous *Betyla* males by having a pronotal scrobe but lacking a frontal process adjacent to the antennal socket.

The name *eupepla* derives from Greek, meaning 'well clothed', and alludes to the pubescence of T2 in the female.

***Betyla tuatara* new species**

Female. Length and ratios of measurements as in Appendix Table 6.

Head. Temple as in Fig. 216. Vertex as in Fig. 227. Antennal sockets contiguous, in profile anteriorly rounded.

Antenna. Scape predominantly microreticulate, sometimes posteromedially smooth. Clava strong (Fig. 246).

Mesosoma. Pronotum: neck and collar smooth; punctures of constriction between neck and collar strong, elongate; spiracular process absent. Mesoscutal-mesoscutellar suture absent. Mesonotum not strongly inclined to long axis of body, widest at or behind midlength; shape as in Fig. M133. Mesopleuron with posteroventral striae; shape as in Fig. M128; dorsal margin parallel to long axis of body; posterodorsal notch very indistinct. Metanotum a broad, transverse trough with 2 very indistinct submedian processes and weak, widely separated, lateral, longitudinal ridges. Propodeum: posterodorsal margin with a median

spine or tubercle (Fig. M129); posterolateral margin with a distinct or weak supracoxal tubercle. Nucha rugose-punctate.

Petiole. Rugosity weak, irregular (Fig. M134).

Gaster posteriorly broadly acuminate. T2 anteriorly usually strongly punctate, rarely smooth. Suture between T2 and T3 strongly sinuate. T3 medially short. S3 not anteriorly swollen (Fig. M157).

Pubescence. All setae acuminate. Postantennal excavation, occipital carina ventrally, propleuron, mesosternal area, propodeum and petiole ventrally, and S2 (some specimens) all densely woolly. Frons, propodeum and petiole dorsally and laterally, and S2 (some specimens) with dense, decumbent setae; gastral tergites and sternites with a few such setae, but these not forming distinct bands (Fig. M157). Setae of scape, F1, F2, and F3 predominantly decumbent; suberect setae sparse. Length of long setae of scape 1.4–1.5x SCW; of F1, F2, and F3 predominantly 1.8–1.9x (rarely 2.6x) width of segment of origin. Head, pronotum, mesonotum, and mesopleuron largely bare.

Colour predominantly reddish brown to reddish orange. Flagellum and legs reddish orange to yellow. Palpi yellow. Setae silver.

Male. Unknown.

Type data. **Holotype:** female, BR, Tawhai State Forest, litter 72/134, 12 April 1972, J. McBurney (NZAC).

Paratypes (24 females). **NORTH ISLAND:** 1, Omahuta State Forest, 18 Mar 1978, S&JP (CNCI); 2, Waipoua State Forest, 4 Feb 1975, 16–21 Mar 1978, S&JP, AKW (NZAC, CNCI).

SOUTH ISLAND: 3, Kaihoka Lakes, 28 Oct 1965, LPM (NZAC, ANIC); 2, Puramahoi, 26 Oct 1965, LPM (NZAC); 1, Riwaka River Reserve, 28 May 1982, S&JP (CNCI); 2, Dun Mountain, 14 Feb 1957, 18 Nov 1964, ESG & JIT (NZAC); 1, Kawatiri, 25 Aug 1964, JIT (ANIC); 1, Boatman's Creek, 4 Oct 1971, GK (NZAC); 1, Porarari River, 2 Apr 1983, JWE (LCNZ); 1, 14 km SE of Reefton, 18–29 May 1982, S&JP (ANIC); 1, Lewis Pass, 10 Feb 1965, NAW (NZAC); 1, Mawhera State Forest, 10 Nov 1971, JM (NZAC); 2, Fletcher's Creek, Nov 1971, JM (NZAC); 3, Lake Mahinapua, 17 Jan 1982, JWE (LCNZ, ANIC); 1, Roaring Meg Power Station, 26 Nov 1974, JSD (NZAC); 1, Pounaweia, 18 Jan 1978, GK (NZAC).

Material examined. Type series, plus 5 non-type females as follows: 1, Rarangi, 2 Sep 1969, GK (NZAC); 1, Port Chalmers, 13 Jan 1978, GK (NZAC); 2, Leith Valley, 12 Jan 1978, GK (NZAC, ANIC); 1, Table Hill, 17 Jan 1978, GK (NZAC).

ND / NN, SD, BR, WD, CO, DN, SL (Map 37).

Collected by Berlese funnel extraction of litter and wood, by sweeping ferns and undergrowth, and by Malaise trapping; in mixed *Nothofagus*, *Agathis*, podocarp, and punga / broadleaf forests; at altitudes between 5 m and 900 m. One specimen sifted from beach wrack.

Remarks. Females of *B. tuatara* are distinguishable from all other *Betyla* females by the posteromedial spine or tubercle on the propodeum. Five females (excluded from the type series; see above) agree with the description of *B. tuatara* except that they are mostly larger (body length 2.81–3.38 mm), have a predominantly smooth pronotum, and are more distinctly red in colour. However, several paratype females are intermediate in at least one character between these large, red forms and typical *B. tuatara*. For the present the large, red forms should be regarded as rather striking extremes of variation within *B. tuatara*.

The name *tuatara* (Maori, 'spine') refers to the propodeal spine or tubercle.

Betyla wahine new species

Female. Length and ratios of measurements as in Appendix Table 6.

Head. Temple as in Fig. 217. Vertex as in Fig. 228. Antennal sockets contiguous, in profile anteriorly rounded.

Antenna. Scape anteriorly predominantly reticulate, posteriorly predominantly smooth. Clava weak (Fig. 247).

Mesosoma. Pronotum: neck and collar smooth; spiracular process absent. Mesoscutal-mesoscutellar suture absent. Mesonotum weakly or not inclined to long axis of body, widest at about midlength; shape as in Fig. M135. Mesopleuron smooth; shape as in Fig. M130; dorsal margin parallel to long axis of body; posterodorsal notch scarcely indicated. Metanotum smooth, trough-like, without carinae or processes. Propodeum: posterodorsal margin with a minute, submedian tubercle; posterolateral margin with at most a very weak supracoxal tubercle. Nucha rugose-punctate.

Petiole dorsally almost smooth (Fig. M136).

Gaster posteriorly broadly acuminate. T2 anteriorly strongly punctate. Suture between T2 and T3 strongly sinuate. T3 medially short (Fig. M135). S3 not anteriorly swollen (Fig. M158).

Pubescence. Lanceolate setae absent; all setae acuminate. Postantennal excavation, occipital carina ventrally, propleuron, mesosternal area, propodeum and petiole ventrally, and S2 all densely woolly. Propodeum and petiole dorsally and laterally and gastral tergites and sternites with decumbent setae; setae of T2 more sparse and not

gathered into bands (Fig. M158). Length of decumbent and suberect setae of F1, F2, and F3 respectively 1.0x and 2.0–2.5x width of segment of origin. Apex of vertex, lateral pronotum, and mesopleuron predominantly or entirely bare.

Colour predominantly reddish brown to reddish orange. Antennae and legs reddish orange to yellow. Palpi yellow. Setae silver.

Male. Unknown.

Type data. **Holotype:** female, SD, Ship Cove, litter 72/267, 27–30 September 1972, J. McBurney (NZAC).

Paratypes (10 females). **SOUTH ISLAND:** 1, same locality as holotype, 30 Sep 1972, JSD (ANIC); 2, Mistletoe Bay Reserve, 26 May 1982, S&JP (CNCL); 4, Shakespeare Bay, 11 Aug 1969, JM (NZAC, ANIC); 1, Pelorus Valley, 28 Apr 1964, JIT (NZAC); 1, Rarangi, 21 Jan 1978, GK (NZAC); 1, Makarora, 21 Jan 1978, GK (NZAC).

Material examined. Type series only.

— / SD, MB, OL (Map 38).

Collected by Berlese funnel extraction of litter and rotten wood; in *Nothofagus* forest.

Remarks. *B. wahine* is close to *B. eupepla* and *B. tuatara*. Females are distinguishable from *eupepla* females by their more gracile body, slender clava and mesonotum, and more strongly punctate T2; and from *tuatara* females by their more weakly punctate pronotum (cf. Fig. M133, M135) and the minute posterodorsal spine on the propodeum. One female (Shakespeare Bay; in NZAC) has an abnormal S5: the sternite is represented only by a triangular sclerite on the left-hand side of the body; S4 and S6 are developed normally.

The name *wahine* is Maori, meaning 'female'.

***Betyla paparoa* new species**

Female. Length and ratios of measurements as in Appendix Table 6.

Head. Temple as in Fig. 218. Vertex as in Fig. 229. Antennal sockets contiguous, in profile anteriorly rounded.

Antenna. Scape predominantly reticulate. Clava strong (as for *B. tuatara*, Fig. 246).

Mesosoma. Pronotum: neck and collar smooth; spiracular process absent. Mesoscutal-mesoscutellar suture absent. Mesonotum not inclined to long axis of body, widest posterior to midlength. Mesopleuron smooth, lacking a sternaulus; dorsal margin parallel to long axis of

body; posterodorsal notch very weak. Metanotum with strong, median and lateral longitudinal ridges. Propodeum: posterodorsal margin with a distinct median spine; posterolateral margin with a supracoxal tubercle. Nucha smooth.

Petiole. Dorsal surface almost smooth.

Gaster posteriorly broadly acuminate. T2 anteriorly punctate. Suture between T2 and T3 strongly sinuate. T3 medially long. S3 not anteriorly swollen.

Pubescence. T2 anteriorly with a few scattered lanceolate setae; all other setae acuminate. Postantennal excavation, occipital carina ventrally, propleuron, mesosternal area, propodeum and petiole ventrally, and S2 all densely woolly. Head, anterior half of mesoscutum, propodeum and petiole dorsally and laterally, and gastral tergites and sternites with dense, decumbent setae; setae of T2 gathered into more or less distinct bands. Head, pronotal collar, mesonotum, propodeum and petiole dorsally, and gastral tergites with long, suberect and erect setae. Setae of scape, F1, F2, and F3 predominantly decumbent, about as long as width of segment of origin. Lateral pronotum and mesopleuron predominantly bare.

Colour predominantly reddish brown to reddish orange. Antennae and legs reddish orange to yellow. Palpi yellow. Lanceolate setae golden; all other setae silver.

Male. Unknown.

Type data. **Holotype:** female, BR, Fletcher's Creek, litter 72/138, 18 April 1972, J.S. Dugdale (NZAC).

Material examined. Holotype only (Map 39).

Remarks. *B. paparoa* is close to *B. eupepla* and *B. tuatara*, but females are distinguishable by the dense, decumbent pubescence on the vertex and mesonotum, and the rather short pubescence on the basal antennal segments.

The name *paparoa* is Maori, meaning 'scarce'.

***Betyla midas* new species**

Female. Length and ratios of measurements as in Appendix Table 6.

Head. Temple as in Fig. 219. Vertex as in Fig. 230. Antennal sockets contiguous, in profile anteriorly rounded.

Antenna. Scape predominantly weakly reticulate. Clava strong (as for *B. rangatira*, Fig. 243).

Mesosoma. Pronotum: neck and collar smooth; spiracular process absent. Mesoscutal-mesoscutellar suture absent. Mesonotum weakly inclined to long axis of body,

widest at about midlength. Mesopleuron smooth, without a sternaulus; dorsal margin parallel to long axis of body; posterodorsal notch absent. Metanotum with weak median and lateral longitudinal ridges. Propodeum: posterodorsal margin without median spines or tubercles; posterolateral margin with a small supracoxal tubercle. Nucha rugose-punctate.

Petiole. Dorsal rugosity weak, irregular.

Gaster posteriorly broadly acuminate. T2 anteriorly punctate. Suture between T2 and T3 strongly sinuate. T3 medially short. S3 not anteriorly swollen.

Pubescence. T2 anteriorly and posteromedially with a distinct area of lanceolate setae; all other setae acuminate. Postantennal excavation, occipital carina ventrally, propleuron, mesosternal area, and propodeum and petiole ventrally all densely woolly. Head, propodeum and petiole dorsally and laterally, and gastral tergites and sternites with dense, decumbent setae; setae of T2 not gathered into distinct bands. Setae of scape decumbent, as long as SCW; setae of F1, F2, and F3 predominantly decumbent, their length 1.2x width of segment of origin. Lateral pronotum and mesopleuron bare.

Colour predominantly orange-yellow. Clava, palpi, and legs yellow to pale yellow. Lanceolate setae golden; all other setae silver.

Type data. Holotype: female, AK, Hunua Range, Kohukokunui, sifted litter 74/20, 30 March 1974, G. Kuschel (NZAC).

Material examined. Holotype only (Map 40).

Remarks. Females of *B. midas* are immediately distinguishable from all other *Betyla* females by the extensive, distinct area of lanceolate, golden setae on T2. This species is possibly closest to *B. auriger*, in which females have the lanceolate, golden setae of T2 gathered into a discrete anterior band.

The name alludes to the mythical king Midas, with reference to the golden pubescence of T2.

Betyla sp. P75

Female. Unknown.

Male. Micropterous.

Head. Temple as in Fig. 233; ocelli absent. Frons without a small process adjacent to each antennal socket (Fig. 237). Antennal sockets contiguous. Subocular suture absent.

Antenna. Scape predominantly smooth. Pedicel not enlarged (Fig. 250). F1 alone carinate.

Mesosoma (Fig. 259). Pronotum: collar smooth; scrobe absent. Mesoscutum with notaulices weak anteriorly, absent posteriorly. Mesoscutellum: axillar process not free; fovea weakly defined; lateral excavation small; posteromedial margin weakly punctate. Mesopleuron with sternaulus weakly developed. Metanotum with dorsellum not differentiated. Propodeum dorsally smooth, laterally rugose-punctate; posterodorsal margin well defined, emarginate (Fig. 263); posterolateral margin with a supra-coxal tubercle. Nucha smooth.

Forewing flap-like, smaller than tegula.

Petiole dorsally with longitudinal striae.

Gaster. T2 anteriorly strongly punctate. Suture between T2 and T3 very weak, indicated medially only (Fig. 271, 272).

Pubescence. Vertex without dense, decumbent setae. F1 and F2 with both decumbent and erect setae, their length at most equal to width of segment of origin. Forewing bare. T2 more or less uniformly setose, gathered into very indistinct bands.

Material examined. One male, Lake Mahinapua (WD), 30 m, podocarp/mixed broadleaf forest, 16–22 Mar 1980, AN & MT (CNCI) (Map 41).

Betyla sp. P76

Female. Unknown.

Male. Differing from male of P75 as follows.

Antenna. F1 emarginate (Fig. 251).

Mesosoma. Mesoscutum with notaulices each indicated posteriorly by a very weak depression. Mesopleuron without a sternaulus. Mesoscutellum with posterior margin smooth. Propodeum dorsally more convex, laterally with a large, smooth area; posterior margin as in Fig. 264.

Gaster. Suture between T2 and T3 very weakly indicated medially only (Fig. 273).

Pubescence. Forewing with 2 setae. Setae of T2 not gathered into bands.

Material examined. One male, Rocklands (CO), pit trap in tussock, 14–28 Dec 1979, BIPB (NZAC) (Map 41).

Betyla sp. P77

Female. Unknown.

Male. Differing from male of P75 as follows. Brachypterous (Fig. 260).

Antenna. Pedicel enlarged (Fig. 252).

Mesosoma (Fig. 260). Pronotum with collar weakly rugose. Mesoscutum with notaulices broad, deep, but not sharply defined. Mesoscutellum: axillar process free, moderately long; fovea deep but not sharply defined; lateral excavation about as large as postfoveal mesoscutellum. Mesopleuron with a sternaulus. Metanotum with dorsellum weakly differentiated. Propodeum dorsally convex, with a very weak rugosity, laterally with a large smooth area; posterodorsal margin sharp, as in Fig. 265. Nucha punctate.

Forewing at rest reaching anterior extremity of petiole. Outline apically spoon-like, as in Fig. 260; venation weakly indicated.

Gaster. Suture between T2 and T3 as in Fig. 274.

Pubescence. Setae of F1 and F2 erect, their length less than width of segment of origin. Forewing with 5 setae. Setae of T2 not grouped into bands.

Material examined. Two males: 1, Lake Sylvester (NN), 1064 m, litter 69/180, 29 Aug 1969, JSD (ANIC); 1, Mount Dewar (BR), 1697 m, mat plants 69/238, 2 Dec 1969, JIT (NZAC) (Map 41).

***Betyla* sp. P78**

Female. Unknown.

Male. Differing from male of P75 as follows.

Antenna (Fig. 253). Scape predominantly weakly microreticulate. F1 carinate, as in Fig. 254.

Mesosoma. Pronotal collar with a few rugae. Mesoscutum: notaulices each indicated by a weak depression. Mesoscutellum: fovea well defined; posterior margin smooth. Mesopleuron without a sternaulus. Propodeum dorsally flattened; posterodorsal margin well defined (Fig. 266); posterolateral margin with a weak supracoxal tubercle (Fig. 261).

Gaster. Suture between T2 and T3 as in Fig. 275.

Pubescence. Forewing with a single seta. Setae of T2 not gathered into bands.

Material examined. One male, Murchison Mountains (FD), Plateau Creek, litter, 3 Dec 1980, CAM & RME (LCNZ) (Map 41).

***Betyla* sp. P79**

Female. Unknown.

Male. Differing from *B. fulva* male as follows.

Head. Frons with a small process adjacent to each antennal socket.

Antenna. F1 and F2 carinate, as in Fig. 255.

Mesosoma. Mesoscutellum with axillar process very long. Propodeum with posterodorsal margin not defined.

Material examined (10 males). **SOUTH ISLAND:** 1, Harwood's track, 3 Feb 1981, JWE (LCNZ); 1, Cleopatra's Pool, 5 Feb 1981, JWE (LCNZ); 3, Castle Rock – Torrent Bay track, 4 Feb 1981, JWE (LCNZ, ANIC); 1, lower Buller Gorge, 16 Dec 1970, HAO (NZAC); 1, Lake Rotoiti, 7 Feb 1978, AKW (NZAC); 2, Croesus track, 18–21 Jan 1982, JWE (LCNZ, ANIC); 1, Lake Mahinapua, 17 Jan 1982, JWE (LCNZ).

— / NN, BR, WD (Map 42).

Collected by sweeping ferns, ground cover, and moss, and by Malaise and light trap; in *Nothofagus* and punga / broadleaf forest.

***Betyla* sp. P80**

Female. Unknown.

Male. Differing from male of *B. fulva* as follows.

Head. Frons with a small process adjacent to each antennal socket (Fig. 234, 238).

Antenna. Carina of F2 reaching apex of segment (Fig. 256).

Mesosoma. Pronotum without a scrobe. Mesoscutum with notaulices usually very weak. Mesoscutellum posteromedially weakly punctate; axillar process very long. Propodeum dorsally predominantly smooth, laterally with a large, smooth area. Nucha smooth.

Petiole dorsally smooth.

Gaster. T2 anteriorly smooth.

Material examined (22 males). **NORTH ISLAND:** 1, Waipoua State Forest, 19 Sep 1977, LLD (NZAC); 1, Puketi Forest, 12 Oct 1968, KAJW (AMNZ); 1, Waitakere, 24 Mar 1968, KAJW (AMNZ); 1, Mount Egmont, 24 Feb 1976, FC (FCCO); 1, Dawson Falls, 8 Feb 1981, FC (FCCO).

SOUTH ISLAND: 4, Castle Rock – Torrent Bay track, 4 Feb 1981, JWE (LCNZ, ANIC); 2, Harwood's track, 3 Feb 1981, 19–28 May 1982, JWE, S&JP (LCNZ, CNCI); 1, Falls River, 5 Feb 1981, JWE (LCNZ); 4, Croesus track, 20–21 Jan 1982, JWE (LCNZ, ANIC); 2, Okuku Scenic Reserve, 9 Jan 1982, JWE (LCNZ); 2, Lake Mahinapua, 17 Jan 1981, JWE (LCNZ, ANIC); 1, Howden track from Divide to Saddle, 8 Feb 1980, JWE & RME (LCNZ).

LOC. INDET.: 1 male, 1 Feb 1982, FC (FCCO).

ND, AK, TK / NN, BR, WD, OL (Map 43).

Collected by sweeping ferns, ground cover, and moss, and by Malaise trap; in *Nothofagus*, podocarp / broadleaf, punga / broadleaf, and *Agathis* forests; at altitudes between 20 m and 1370 m.

***Betyla* sp. P81**

Female. Unknown.

Male. Differing from male of *B. fulva* as follows.

Head. Subocular suture absent.

Antenna. F1 only carinate (Fig. 257, M106).

Mesosoma. Pronotum without a scrobe. Mesoscutellum with posteromedial margin sometimes very weakly punctate. Propodeum (Fig. 262) sometimes with a very short, submedian carina over posterior 0.2–0.3.

Gaster. T2 anteriorly strongly punctate.

Pubescence. Setae of F1 and F2 erect, their length usually greater than width of segment of origin.

Material examined (103 males). **NORTH ISLAND:** 1, Waipoua State Forest, 11–14 Apr 1980, AN & MT (CNCI); 2, Omahuta State Forest, 4 Feb 1975, GK (NZAC); 1, Matheson's Bay, 5 Dec 1968, KAJW (AMNZ); 1, Huia, Feb 1981, BMM (NZAC); 1, Kohukohunui, 3 Mar 1974, GK (NZAC); 1, Grafton Gully, 28 Feb 1978, S&JP (CNCI); 2, Walker Bush track, 5 Nov 1976, AKW (NZAC, ANIC); 1, Mount Te Aroha, 14 Mar 1983, FC (FCCO); 1, Dawson Falls, 24 Feb 1984, FC (FCCO); 1, Lucy's Gully, 14 Jul 1983, FC (FCCO); 1, Akatarawa Saddle, 7–10 Mar 1978, S&JP (CNCI).

SOUTH ISLAND: 1, Falls River, 5 Feb 1981, JWE (LCNZ); 2, Harwood's track, 3 Feb 1981, 19–28 May 1982, JWE, S&JP (CNCI); 1, Awaroa – Goat Bay track, 6 Feb 1981, SPW (LCNZ); 1, Mount Arthur, 22 Mar 1971, ACE (NZAC); 1, Whangamoia Saddle, 1–3 Feb 1978, S&JP (CNCI); 2, Dun Mountain, 29 Mar 1966, 14 Sep 1971, JIT, GWR (NZAC); 1, Nelson, 15 Feb 1921, AP (NZAC); 1, Wakefield, 19 Aug 1964, JIT (NZAC); 1, Pelorus Bridge, 24 Dec 1981, JWE (LCNZ); 5, Lake Rotoiti, 3–8 Feb 1978, AKW (NZAC); 1, Lake Rotoroa, 18–29 May 1982, S&JP (CNCI); 1, Shenandoah Saddle, 12 Feb 1981, JWE (LCNZ); 10, Porarari River, 2 Apr 1983, JWE & MLB (LCNZ, ANIC); 4, 14 km SE of Reefton, 18–29 May 1982, S&JP (CNCI, ANIC); 1, Rahu Scenic Reserve, 26 Apr 1980, JWE (LCNZ); 17, Lewis Pass Scenic Reserve, 2 Jan 1979, 26 Apr 1980, 17 May 1982, 5 Apr 1983, JWE, S&JP (LCNZ, ANIC, CNCI); 1, Jackson's Creek, 27 Oct 1970 (LCNZ); 1, Grey River valley, 21 Apr 1971, JSD (NZAC); 1, Jacksons, 26 Jan 1978, GK (NZAC); 1, Okuku Creek, 18–22 Mar 1980, AN & MT (CNCI); 1, 7.7 km SSE of

Kumara, 18–22 Mar 1980, AN & MT (CNCI); 1, Hokitika, 29 Jan 1978, S&JP (CNCI); 16, Lake Mahinapua, 9–17 Jan 1982, JWE (LCNZ, ANIC); 1, Poerua State Forest, 10 Feb 1976 (LCNZ); 2, Lake Wombat track, 11 Jan 1981, JWE (LCNZ); 1, Canavan's Knob, 10 Jan 1982, JWE (LCNZ); 1, Arawata River, 11 Apr 1982, JWE (LCNZ); 8, Arthur's Pass, 5 Apr 1975, 9 Jan 1981, 25 Oct 1982, 8 Feb 1982, JWE (LCNZ, ANIC); 1, Makarora, 21 Jan 1978, GK (NZAC); 1, Howden track from Divide to Saddle, 8 Feb 1980, JWE & RME (LCNZ); 1, Moraine Creek, 12 Feb 1980, JWE (LCNZ); 1, Deep Cove, 2–3 Feb 1983, JWE (LCNZ); 1, Grebe Valley, 4 Feb 1982, JWE, CAM, & PS (LCNZ); 1, Pounaweia, 18 Jan 1978, GK (ANIC).

ND, AK, CL, BP, TK, WN / NN, MB, BR, WD, NC, OL, FD, SL (Map 44).

Collected by sweeping ferns, ground cover, and moss, by Berlese funnel extraction of litter, rotting wood, and moss, and by Malaise and light traps.

Taken in podocarp / *Nothofagus menziesii*, *Nothofagus* spp., podocarp / broadleaf, *Agathis* / podocarp / broadleaf, punga / broadleaf, and coastal forests, and in *Fuchsia* / *Weinmannia* bush.

Recorded at altitudes between 20 m and 760 m.

Remarks. The petiole of one specimen (Omahuta State Forest; in NZAC) is incompletely sclerotised ventrally. The carina on F1 is variable in shape, and 0.3–0.8x as long as F1. The shape of the head and of the axillar process is also unusually variable. One specimen (Mount Te Aroha; in FCCO) differs from typical *Betyla* sp. P81 in having a vestigial median carina in the floor of the mesoscutellar fovea. This is the only New Zealand ambositrine specimen in which such a structure occurs. Because the specimen is in all other respects similar to typical *Betyla* sp. P81 I regard it as abnormally developed.

— 5 —

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APPENDIX 1: ABBREVIATIONS FOR COLLECTORS' NAMES

ABMiller	ACEyles	AKWalker
AMoeed	ANewton	APhilpott
ARichardson	ATonnoir	BAHolloway
BDuff	BIPBarratt	BMMay
CAMuir	CEClarke	CFButcher
CJHorning	DRMcQueen	ESchlinger
ESGourlay	EValentine	FChambers
FDodge	FDAlack	GKuschel
GWRamsay	HAOliver	JCWatt
JFLongworth	JITownsend	JMcBurney
JNJolly	JRamsay	JStart
JSDugdale	JSNoyes	JTSalmon
JWEarly	KAJWise	KBlank
KLee	KWWalker	LLDeitz
LMasner	LPMarchant	MLBarrell
MThayer	NAWalker	OHSweezey
PHorn	PMJohns	PSBroomfield
PTSyrett	RACumber	RAMcAnulty
RGOrdish	RHarrison	RMEmberson
RPetty	RPMcFarlane	RRForster
RRScott	SATimms	SEdridge
SPEck	SPWorner	TGWood
TRiney	VAMay	WClark
WHeighway	WJKnight	WJSweney

Also: AJH – A. & J. Hastings; S&JP – S. & J. Peck

APPENDIX 2: GLOSSARY OF MORPHOLOGICAL
TERMS AND SYMBOLS

al	anterolateral extensions of T2	It	laterotergite
am	secondary anterior margin of T2	lo	lateral ocellus
ap	axillar process	M	length of marginalis
apterous	forewing and tegula absent, or both represented by a single minute vestige	ma	marginalis
as	antennal socket	macropterous	fully winged, forewing at rest reaching or exceeding posterior tip of gaster; tegula present
at	anterior tentorial pit	MAE	max. diameter of compound eye
ba	basalis	mc	median carina of dorsal propodeum
bc	basal cell	M+Cu1	medial vein
BL	body length, excluding antenna and extruded genitalia	md	mandible
brachypterous	forewing at rest exceeding posterior margin of mesoscutellum but not that of T2, or only very slightly so; tegula present	me	metanotum
C	costa	metasoma	abdominal segments II–IX
c	cercus	mf	mesopleural fovea: a weak pit in mesopleuron
cc	costal cell	MH	max. height of mesosoma
ce	compound eye	micropterous	forewing at rest not extending beyond posterior margin of mesoscutellum, usually reduced to a minute scale; tegula present
cl	clypeus	ML	length of mesosoma, including neck and nucha
ct	carina of T2	ml	middle lobe of mesoscutum
cxI, II, III	coxae I, II, III	mn	mesonotum
cxpl, II	coxal pits I, II	mo	median ocellus
do	dorsellum	mp	mesopleuron
fd	fold	ms	mesoscutum
fo	fovea	msc	mesoscutellum
fp	frontal prominence	MSCL	length of mesoscutellum
free	completely delimited by suture	MSCW	width of mesoscutellum
ft	flange of T2	MSL	length of mesoscutum
FW	min. distance between compound eyes, measured across frons	MSW	width of mesoscutum
fw	forewing	mtp	metapleuron
F1 ... I3	flagellar segments 1 ... 13	MW	max. width of mesosoma, incl. reflexed tegulae
F1L, F2L, ...	length of F1, F2, ...	mx	maxilla
F1W, F2W, ...	width of F1, F2, ...	m xp	maxillary palp
gaster	abdominal segments III–IX	n	notaulix
gb	genal bridge	NND	min. distance between inner margins of notaulices
ge	gena	nu	nucha
GL	length of gaster	NW	max. width of a notaulix
GW	max. width of gaster	o	occiput
ha	hamuli	oc	occipital carina
HL	head length	OD	max. diameter of lateral ocellus
HW	head width	OOL	min. distance between lateral ocellus and compound eye
hw	hindwing	ov	ovipositor
lb	labrum	P	length of parastigma
lc	lateral carina of dorsal propodeum	p	petiole (= abdominal segment II = fused tergite and sternite of 1st metasomal segment)
le	lateral excavation	pa	parafoveal area of mesoscutellum
ll	lateral lobe of mesoscutum	pc	pronotal collar
lm	labium	pd	pedicel
lmp	labial palp	pe	postantennal excavation
ls	laterosternite	pfc	parafrontal carina
		pfm	postfoveal mesoscutellum
		PL	length of petiole

pm posterior margin of dorsal propodeum
pmt posterior margin of T1
pn pronotal neck
POL min. distance between lateral ocelli
po postocciput
poc postoccipital carina
pp propleuron
pr propodeum
ps pronotal scrobe
pt posterior tentorial pit
PW median width of petiole
px postspiracular excavation
rc radial cell
rd radicle
ri rim of metanotum
Rs radialis
S length of stigmalis
sc sternopleural carina
sca scape
SCL length of scape (excluding radicle)
Sc+R submarginal vein
SCW max. width of scape
sf supraclypeal frons
sg stigmalis
sp spiracle
spp spiracular process: a blunt process in posterodorsal corner of pronotum, above pronotal spiracle
ss subocular suture
st sternaulus
submacropterous forewing at rest extending well beyond posterior margin of T2 but not quite reaching posterior tip of gaster; tegula present
synsternite, syntergite compound sclerite formed by fusion of one or more sternites or tergites; fusion may be complete (sutures obliterated) or partial (sutures distinct laterally)
S2; S3; ... first free (q.v.) post-petiolar sternite; second such sternite; ...
S4L, ... max. length of S4, ...
te temple
tg tegula
T1 first post-propodeal tergite; fused to first post-propodeal sternite to form petiole in all Diapriidae
T2; T3; ... first free (q.v.) post-petiolar tergite; etc.; ...
T5L, ... length of T5 ...
T5W, ... max. width of T5 ...
uf upper frons
ve vertex
vs vertical spine
W width of marginalis
I...IX abdominal segments I...IX
IA anal vein

Appendix Table 1 Range of body lengths and ratios of measurements: female and male *Archaeopria* species. See Appendix 2 for explanation of abbreviations.

	<i>eriodes</i>		<i>pelor</i>		<i>pristina</i>	
	female	male	female	male	female	male
BL (mm)	2.47-2.63	2.21-2.50	2.44-2.94	2.00-2.81	3.51-3.77	3.07-3.72
HW/HL	0.84-0.88	0.86-0.90	0.75-0.85	0.73-0.78	0.72-0.83	0.75-0.82
OD/POL	0.53-0.54	0.58-0.75	0.91-1.40	0.86-1.27	1.00-1.86	1.22-1.71
POL/OOL	0.60-0.65	0.59-0.75	0.21-0.29	0.30-0.39	0.23-0.39	0.27-0.36
FW/MAE	1.17	1.17-1.22	1.37-1.53	1.09-1.13	1.04-1.22	0.89-1.08
SCL/SCW	5.50-5.69	5.17-5.83	5.43-6.17	7.08	8.12-9.50	7.86-9.00
SCL/HW	0.89	0.84-0.95	0.82-0.86	1.12	1.27-1.37	1.26-1.33
F1L/F1W	2.25	3.19-3.75	2.50-2.80	5.40	2.17-2.36	4.00-5.46
F2L/F2W	1.25-1.32	1.58-1.67	1.75-1.98	2.27	1.64-2.00	2.63-3.13
F1L/F2L	1.50	1.50-1.88	1.43-1.57	1.59	1.30-1.44	1.14-1.38
F11L/F11W	—	1.23-1.43	—	1.50	—	2.00-2.50
F12L/F12W	1.14-1.34	1.50-1.82	1.00-1.23	2.27	1.25-1.43	3.08-3.64
F13L/F13W	1.38-1.62	—	1.50-1.58	—	2.00-2.29	—
ML/MW	1.63-1.75	1.56-1.63	1.47-1.60	1.63	1.81-1.96	1.79-1.84
ML/MH	1.95-2.00	1.90-1.97	1.80-1.90	1.78	1.89-1.94	1.72-1.79
MSL/MSW	0.73-0.75	0.71-0.74	0.60-0.62	0.73	0.71-0.82	0.80-0.89
NND/NW	—	—	—	—	—	—
MSCL/MSCW	0.52-0.54	0.51-0.53	0.41-0.45	0.45	0.50-0.51	0.48-0.53
MSCL/MSL	0.67-0.70	0.66-0.71	0.71-0.74	0.64	0.62-0.74	0.59-0.66
S/M	1.20-1.25	1.23-1.43	1.50-1.75	1.64-1.70	1.13-1.43	1.23-1.30
M/W	3.20-3.75	3.00-4.00	3.75-5.33	4.67-4.76	6.00-8.89	7.17-8.33
P/M	4.13-4.53	4.13-5.00	3.13-4.00	3.70-3.86	2.69-3.14	3.00-3.21
PL/PW	1.69	1.85-1.92	1.22-1.23	1.53	2.65-2.80	3.00-3.29
PL/PH	—	—	—	—	2.65-3.00	3.01-3.42
GL/GW	1.96-2.04	—	2.10-2.25	—	2.19-2.39	—
GW/HW	1.57-1.60	—	1.36-1.39	—	1.36-1.67	—
T5L/T4L	1.1	—	1.17-1.33	—	1.00-1.13	—
T6L/T6W	0.46-0.57	—	0.53-0.58	—	0.67-0.74	—
S6L/S4L	4.18-4.55	—	4.00-5.20	—	2.46-3.20	—

Appendix Table 2 Range of body lengths and ratios of measurements: female and male *Pantolytomyia* species from New Zealand. See Appendix 2 for explanation of abbreviations.

	<i>flocculosa</i>		<i>tungane</i>		<i>takere</i>		<i>polita</i>	
	female	male	female	male	female	male	female	male
BL (mm)	1.82-2.65	1.74-2.39	2.21-2.89	2.08-2.55	1.79-2.73	1.67-2.52	2.13-2.57	1.92-2.37
HW/HL	0.88-0.99	0.91-1.18	0.96-1.08	1.08-1.15	0.82-0.85	0.82-0.91	0.85-0.96	0.81-0.85
OD/POL	0.30-0.42	0.50-0.70	0.42-0.70	0.70-1.00	0.12-0.29	0.39-0.50	0.22-0.30	0.40-0.50
POL/OOL	0.42-0.50	0.38-0.59	0.40-0.50	0.44-0.55	0.44-0.55	0.64-0.70	0.35-0.42	0.40-0.61
FW/MAE	1.21-1.69	1.07-1.33	1.10-1.49	1.05-1.13	1.52-2.00	1.21-1.35	1.63-2.08	1.31-1.50
SCL/SCW	5.50-6.00	4.67-5.60	5.08-6.17	4.50-5.33	5.67-6.67	6.25-7.20	5.00-7.00	5.17-6.60
SCL/HW	0.77-0.89	0.65-0.81	0.78-0.90	0.69-0.74	1.00-1.11	1.03-1.10	0.88-0.99	0.88-0.97
F1L/F1W	1.50-1.83	2.25-5.25	1.38-1.80	3.56-4.20	1.00-1.25	1.80-2.08	1.00-1.25	1.64-2.36
F2L/F2W	0.75-1.13	1.39-3.00	0.89-1.50	1.85-2.31	0.72-0.92	2.06-2.50	0.67-0.89	1.47-1.92
F1L/F2L	1.50-2.00	1.00-1.25	1.38-1.75	1.23-1.38	1.25-1.57	0.60-0.67	1.18-1.67	0.72-1.00
F11L/F11W	—	1.60-2.60	—	1.55-1.92	—	1.50-1.83	—	1.00-1.50
F12L/F12W	0.94-1.29	1.80-4.07	1.00-1.19	2.70-3.50	0.75-1.11	2.27-2.90	0.83-0.89	1.67-2.50
F13L/F13W	1.38-1.57	—	1.47-1.75	—	1.00-1.31	—	1.06-1.38	—
ML/MW	1.30-1.52	1.43-1.56	1.45-1.72	1.46-1.89	1.61-1.91	1.53-1.63	1.63-1.90	1.81-2.03
ML/MH	1.70-1.88	1.57-1.80	1.65-2.12	1.75-2.00	1.82-1.97	1.56-1.86	1.88-1.94	1.87-2.15
MSL/MSW	0.62-0.73	0.61-0.73	0.63-0.68	0.65-0.73	0.59-0.66	0.57-0.65	0.58-0.64	0.56-0.64
NND/NW	3.20-5.30	3.60-4.75	2.50-5.94	2.33-4.67	4.67-6.67	5.83-8.75	4.67-5.00	4.00-4.67
MSCL/MSCW	0.53-0.64	0.55-0.63	0.50-0.55	0.54-0.60	0.44-0.51	0.54-0.58	0.42-0.53	0.48-0.55
MSCL/MSL	0.80-0.88	0.80-0.95	0.74-0.88	0.80-0.84	0.68-0.82	0.82-0.96	0.72-0.79	0.78-0.86
S/M	1.50-1.92	2.10-2.20	2.20-2.22	2.67	—	1.20-1.28	—	—
M/W	3.25-4.00	1.42	1.50-1.67	1.71	—	5.45-6.89	—	—
P/M	4.31-5.15	6.10	5.78-6.80	8.33	—	3.29-3.43	—	—
PL/PW	1.83-2.09	2.30-2.82	1.92-2.00	2.17-2.91	1.35-1.59	2.07-2.40	1.36-1.47	1.38-1.67
PL/PH	1.83-2.15	1.82-2.82	2.00-2.21	2.36- 3.20	—	—	1.50-1.77	1.56-1.81
GL/GW	1.72-1.96	—	1.64-2.12	—	1.70-1.93	—	1.96-2.13	—
GW/HW	1.25-1.47	—	1.32-1.40	—	2.84-3.25	—	1.38-1.44	—
T5L/T4L	0.73-1.00	—	0.67-0.90	—	0.86-1.25	—	0.72-1.17	—
T6L/T6W	0.44-0.62	—	0.31-0.50	—	0.43-0.59	—	0.46-0.63	—
S6L/S4L	3.11-6.30	—	2.00-3.38	—	2.14-3.20	—	2.11-3.23	—

(Appendix Table 2, continued from preceding page)

	<i>insularis</i>		<i>wairua</i>		macropt.	<i>taurangi</i>	
	female	male	female	male	female	brachypt. female	male
BL (mm)	2.03-2.52	2.03-2.50	1.74-2.00	1.61-1.69	2.16-3.51	1.95-3.07	1.66-3.04
HW/HL	0.79-0.86	0.80-0.86	0.71-0.77	0.75	0.82-1.00	0.78-0.88	0.86-1.00
OD/POL	0.22-0.30	0.27-0.50	0.20-0.27	0.46-0.48	0.40-0.63	0.33-0.56	0.42-0.77
POL/OOL	0.40-0.46	0.44-0.56	0.60-0.73	0.74-0.79	0.46-0.63	0.36-0.55	0.52-0.64
FW/MAE	1.77-1.92	1.39-1.60	1.48-1.57	1.13-1.14	1.17-1.53	1.23-1.47	1.09-1.46
SCL/SCW	5.43-6.33	5.67-6.00	6.20-6.90	5.60-6.20	6.33-7.00	5.71-6.67	5.54-6.50
SCL/HW	0.94-1.03	0.92-1.00	1.00-1.09	1.04-1.15	1.00-1.11	1.00-1.14	0.88-1.00
F1L/F1W	1.00-1.44	1.83-2.00	1.13-1.56	2.43-2.71	1.18-1.50	1.09-1.31	1.17-2.50
F2L/F2W	0.60-0.78	1.20-1.56	0.75-0.94	1.67-2.17	0.91-1.13	0.80-1.13	1.70-3.23
F1L/F2L	1.67-1.86	0.82-1.00	1.33-1.67	0.69-0.83	1.11-1.50	1.22-1.50	0.37-0.77
F11L/F11W	—	0.94-1.13	—	1.60-1.80	—	—	1.31-1.80
F12L/F12W	0.73-0.80	1.30-1.85	0.86-1.00	2.33	0.80-1.10	0.80-1.00	1.86-2.93
F13L/F13W	1.10-1.19	—	1.07-1.33	—	1.25-1.43	1.05-1.28	—
ML/MW	1.73-1.97	1.66-1.83	1.75-1.84	1.75-1.78	1.49-1.62	1.54-1.67	1.42-1.73
ML/MH	1.90-2.09	1.91-2.08	2.04-2.15	2.04-2.07	1.75-2.04	1.85-2.03	1.70-1.94
MSL/MSW	0.55-0.63	0.53-0.60	0.56-0.61	0.58-0.62	0.55-0.63	0.53-0.64	0.59-0.66
NND/NW	5.00-5.83	5.00-6.15	4.58-7.50	6.00-7.00	7.95-10.0	7.69-9.00	4.83-8.23
MSCL/MSCW	0.44-0.52	0.45-0.50	0.55-0.57	0.58-0.63	0.50-0.56	0.51-0.54	0.51-0.57
MSCL/MSL	0.72-0.83	0.75-0.82	0.86-0.87	0.91-0.93	0.75-0.91	0.81-0.95	0.77-0.92
S/M	—	—	1.80	1.54	1.23-1.52	1.00-1.53	1.24-1.52
M/W	—	—	1.25	2.89	5.75-6.89	3.33-4.41	3.23-5.45
P/M	—	—	—	3.15	3.29-4.09	2.93-3.20	3.63-4.86
PL/PW	1.56-1.71	1.53-1.61	1.50-1.58	1.71	1.86-2.24	1.67-2.21	2.21-2.67
PL/PH	—	—	—	—	2.00-2.28	2.00-2.58	2.21-2.86
GL/GW	1.80-1.94	—	2.08-2.29	—	1.70-2.23	1.76-2.20	—
GW/HW	1.44-1.60	—	1.31-1.64	—	1.22-1.54	1.33-1.50	—
T5L/T4L	0.91-1.13	—	0.88-1.18	—	1.00-1.60	1.00-1.25	—
T6L/T6W	0.41-0.61	—	0.50-0.56	—	0.48-0.71	0.48-0.69	—
S6L/S4L	2.00-4.22	—	3.20-3.56	—	2.33-4.00	2.60-3.29	—

Appendix Table 3 Range of body lengths and ratios of measurements: female and male
Diphoropria species. See Appendix 2 for explanation of abbreviations.

	macropt. female	brachypt. female, A	<i>sinuosa</i> brachypt. female, B	macropt. male	brachypt. male	<i>kuscheli</i> female
BL (mm)	1.98-3.77	1.77-3.51	2.16-3.22	1.90-3.17	2.11-2.86	2.65-4.34
HW/HL	0.78-0.95	0.77-1.02	0.72-0.82	0.91-1.06	0.75-0.89	0.83-0.96
OD/POL	0.57-1.22	0.39-0.55	0.14-0.20	0.80-1.40	0.34-0.50	0.80-1.00
POL/OOL	0.29-0.50	0.39-0.46	0.36-0.50	0.39-0.75	0.42-0.50	0.39-0.53
FW/MAE	1.04-1.44	1.45-1.69	1.67-1.93	0.89-1.22	1.13-1.40	0.94-1.19
SCL/SCW	4.60-6.60	4.83-5.70	4.89-6.00	4.33-5.40	4.24-5.00	5.44-6.20
SCL/HW	0.90-1.17	0.88-1.14	0.95-1.15	0.73-0.83	0.88-1.02	0.98-1.13
F1L/F1W	2.00-2.55	1.50-2.31	1.50-1.83	2.40-5.00	3.14-3.60	2.17-2.83
F2L/F2W	1.43-1.85	1.25-1.85	1.27-1.57	2.25-3.43	2.13-2.83	1.57-2.17
F1L/F2L	1.07-1.40	1.22-1.40	1.09-1.29	0.92-1.12	1.05-1.18	1.23-1.45
F11L/F11W	—	—	—	2.40-3.85	1.85-2.50	—
F12L/F12W	0.74-1.05	0.75-1.05	0.73-0.83	3.50-4.60	2.43-4.00	0.75-0.91
F13L/F13W	1.44-1.90	1.40-1.67	1.44-1.73	—	—	1.50-1.73
ML/MW	1.46-2.04	1.62-1.78	2.00-2.22	1.50-1.74	1.57-2.09	1.41-1.65
ML/MH	1.55-2.02	1.88-2.08	2.00-2.29	1.68-1.98	1.91-2.05	1.85-2.04
MSL/MSW	0.79-0.90	0.77-0.88	0.87-1.08	0.80-1.00	0.85-0.89	0.83-1.02
NND/NW	1.00-2.75	1.00-1.86	—	1.00-2.76	1.00-1.71	1.83-2.22
MSCL/MSCW	0.49-0.58	0.54-0.58	0.57-0.77	0.51-0.60	0.60-0.67	0.50-0.56
MSCL/MSL	0.59-0.69	0.67-0.71	0.53-0.77	0.60-0.69	0.65-0.71	0.50-0.64
PL/PW	1.24-1.88	1.33	1.11-1.56	1.50-2.77	1.24-2.00	1.27-1.57
PL/PH	1.40-2.07	1.46-1.54	1.25-1.47	1.20-2.86	1.59-2.31	1.41-1.77
GL/GW	1.63-2.14	1.79-2.07	1.82-2.04	—	—	2.33-2.71
GW/HW	1.25-1.85	1.27-1.68	1.57-1.65	—	—	1.33-1.49
T4L/T3L	1.55-2.00	1.40-1.86	1.22-1.83	—	—	1.85-2.63
T5L/T5W	0.77-1.23	0.91-1.14	0.86-1.00	—	—	1.20-1.56
S6L/S4L	2.67-4.00	3.40-4.40	2.78-4.00	—	—	3.56-5.00

Appendix Table 4 Range of body lengths and ratios of measurements: female and male *Maoripria* species. See Appendix 2 for explanation of abbreviations (in addition: bpt., brchpt. – brachypterous; mcrpt. – macropterous; smpt. – submacropterous).

	<i>verticillata</i>				<i>annettae</i>		<i>earlyi</i>		<i>masneri</i>	
	mcrpt. female	smpt./bpt. female	mcrpt. male	brchpt. male	female	male	female	male	female	male
BL(mm)	1.64-1.85	1.14-2.00	1.14-1.59	1.69-1.90	1.33-1.95	1.12-1.77	1.61-2.86	1.46-1.72	1.46-2.34	1.51-2.00
HW/HL	0.73-0.81	0.72-0.82	0.76-0.90	0.75-0.77	0.62-0.67	0.56-0.63	0.71-0.79	0.72-0.77	0.72-0.80	0.74-0.81
OD/POL	0.42-0.75	0.29-0.67	0.50-0.70	0.25-0.38	—	—	0.09-0.18	0.32-0.34	—	0.09-0.10*
POL/OOL	0.29-0.44	0.26-0.51	0.32-0.53	0.36-0.40	—	—	0.50-0.77	0.45-0.48	—	0.78-0.89*
FW/MAE	1.20-1.36	1.31-1.89	1.00-1.18	1.25-1.27	0.90-1.43	0.63-1.00	1.40-2.09	1.60-1.65	2.08-2.55	1.50-1.92
SCL/SCW	5.42-6.89	5.20-6.22	6.00-6.88	5.50-6.20	4.17-4.75	4.80-6.22	4.20-5.46	5.27-5.60	4.60-5.56	5.17-5.75
SCL/HW	1.07-1.16	0.96-1.14	0.85-1.00	1.00-1.03	0.89-0.97	1.04-1.27	0.78-1.00	0.90-0.94	0.82-1.00	0.91-0.94
F1L/F1W	2.59-3.60	2.17-2.61	2.00-3.75	3.00-3.50	0.97-1.33	1.73-2.69	1.50-1.80	1.83-2.00	1.36-2.29	1.75-2.60
F2L/F2W	1.60-1.80	1.17-1.80	2.60-4.07	0.28-0.33	0.67-1.33	1.17-2.03	1.00-1.40	1.33-1.50	0.86-1.17	1.23-2.67
F1L/F2L	1.56-2.00	1.44-1.86	0.86-1.00	0.92-1.00	1.17-1.53	0.66-1.23	1.20-1.67	1.67-1.85	1.50-2.25	1.30-1.86
F11L/F11W	—	—	2.00-3.00	1.82-2.07	—	1.17-1.50	—	1.17-1.30	—	1.03-2.00
F12L/F12W	1.00-1.25	1.07-1.33	3.00-4.00	2.60-2.91	0.83-1.09	1.90-2.25	1.00-1.17	2.17-2.41	0.94-1.29	2.00-3.44
F13L/F13W	1.97-2.13	1.71-2.25	—	—	1.76-2.36	—	1.86-2.14	—	1.80-2.57	—
ML/MW	1.57-1.63	1.80-2.04	1.67-1.85	2.08-2.11	1.96-2.15	2.15-2.72	1.96-2.18	2.17-2.30	1.73-2.30	1.92-2.19
MLM/H	1.57-1.68	1.69-2.04	1.55-1.69	1.80-1.84	1.68-2.09	1.82-2.25	1.78-2.00	1.86-1.93	1.71-2.12	1.85-2.19
MSL/MSW	0.76-0.93	0.82-1.00	0.82-0.96	1.00	—	0.57-0.83	0.82-0.94	0.81-0.88	—	—
MSCL/MSCW	0.59-0.68	0.65-0.74	0.70-0.80	0.78-0.82	—	0.45-0.67	0.54-0.67	0.59-0.68	—	—
MSCL/MSL	0.62-0.68	0.64-0.72	0.69-0.83	0.64-0.70	—	0.53-0.83	0.54-0.64	0.63-0.73	—	—
MNL/MNW	—	—	—	—	0.62-0.95	—	—	—	1.09-1.25	1.14-1.33
PL/PW	1.40-1.88	1.25-1.56	1.33-2.70	1.21-1.36	1.10-1.39	1.21-1.52	1.09-1.30	1.07-1.31	0.84-1.36	1.13-1.25
PL/PH	1.50-1.88	1.18-1.67	2.11-2.50	1.36	1.16-1.55	1.16-1.81	—	1.36	—	—
GL/GW	1.54-1.95	1.28-1.79	—	—	1.77-2.17	—	1.72-2.78	—	1.72-2.11	—
GW/HW	2.31-2.79	2.27-2.86	—	—	2.95-4.13	—	2.89-3.78	—	2.75-3.43	—

*ocelli absent in some *M. masneri* males

Appendix Table 5 Range of body lengths and ratios of measurements: female and male *Parabetyla* species.
See Appendix 2 for explanation of abbreviations.

	<i>tika</i>		<i>spinosa</i>	<i>pipira</i>	<i>ngarara</i>	<i>pokorua</i>	<i>nauheha</i>	<i>tahi</i>
	female	male	female	female	female	female	female	female
BL (mm)	2.10-2.94	2.44-2.65	3.07-3.56	3.09-3.17	4.21	3.22-3.33	1.85-2.73	2.24-2.50
HW/HL	0.68-0.80	0.82-0.88	0.75	0.83-0.86	0.81	0.87-0.89	0.83-0.88	0.80-0.81
OD/POL	—	0.11-0.22	—	0.07-0.10	—	—	—	—
POL/OOL	—	0.75-1.00	—	0.60-0.64	—	—	—	—
FW/MAE	1.47-2.16	1.30-1.53	1.30-1.40	1.29-1.60	1.52	1.32-1.43	1.53-1.92	1.64-1.70
SCL/SCW	5.44-6.50	4.75-5.71	7.11-7.88	6.50-7.40	6.00	7.11-7.33	5.85-6.71	0.72-0.73
SCL/HW	1.08-1.24	0.84-0.95	1.36-1.37	1.21-1.30	1.13	1.22-1.23	1.03-1.27	1.20-1.22
F1L/F1W	1.17-1.40	2.22-3.17	1.33-1.50	1.29-1.60	1.56	1.39	0.80-1.40	1.60
F2L/F2W	1.00-1.20	1.70-3.00	1.23-1.67	1.14-1.39	1.15	1.14-1.23	0.60-1.00	1.20
F1L/F2L	1.17-1.33	1.06-1.12	1.11-1.33	1.11-1.20	1.27	1.13	1.27-1.33	1.33-1.34
F11L/F11W	—	1.71-2.00	—	—	—	—	—	—
F12L/F12W	0.67-0.92	2.86-3.67	0.75-0.80	0.71-0.76	0.82	0.76-0.79	0.67-0.83	0.91-0.92
F13L/F13W	1.06-1.54	—	1.44-1.56	1.35-1.47	1.35	1.27-1.38	1.36-1.65	1.65-1.66
MSL/MSW	1.00-1.15	0.89-0.92	0.95-1.05	0.91-1.00	1.23	0.96-1.00	0.81-1.07	1.00
MSCL/MSCW	0.57-0.73	0.54-0.62	0.68-0.71	0.52-0.60	0.58	0.52-0.59	0.63-0.75	0.74-0.77
MSCL/MSL	0.52-0.63	0.60-0.67	0.72-0.75	0.57-0.65	0.47	0.52-0.62	0.64-0.80	0.65-0.66
PL/PW	1.28-1.69	1.41-1.94	1.67-1.90	1.29-1.59	1.61	1.46-1.64	1.28-1.63	1.62-1.63
PL/PH	1.27-1.77	1.60-2.38	1.80-1.84	1.46-1.83	1.85	1.52-1.71	1.28-1.67	0.72-0.74
GL/GW	1.44-1.76	—	1.73-1.84	1.61-1.72	1.76	1.50-1.58	1.69-1.95	1.50-1.60
GW/HW	1.50-1.81	1.44-1.47	1.64-1.80	1.50-1.81	1.71	1.80-1.83	1.41-1.85	1.59-1.60
T4L/T3L	1.40-2.00	—	1.67-2.20	1.11-1.43	1.42	1.33-1.38	1.14-1.60	1.60
S6L/S4L	2.20-4.00	—	6.00-7.50	3.00-4.00	4.38	2.88-3.67	2.00-3.10	2.18

Appendix Table 6 Range of body lengths and ratios of measurements: female and male *Betyla* species. See Appendix 2 for explanation of abbreviations.

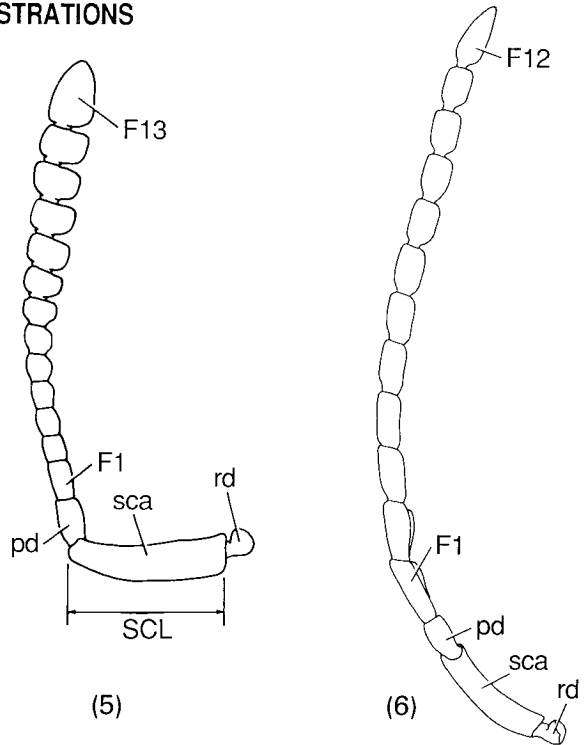
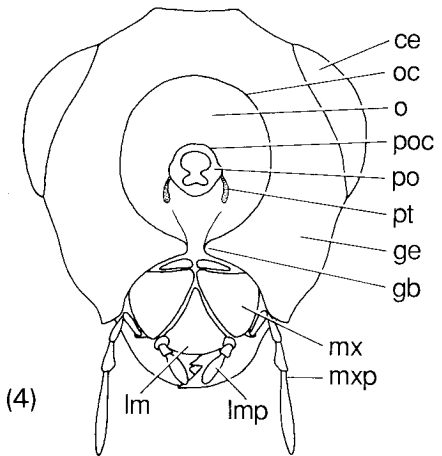
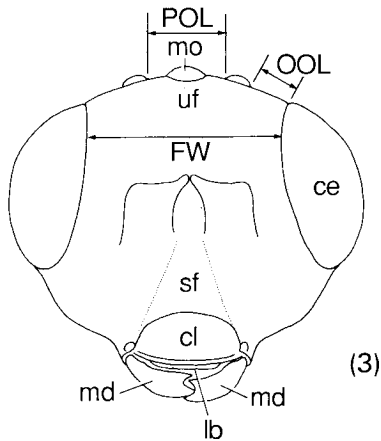
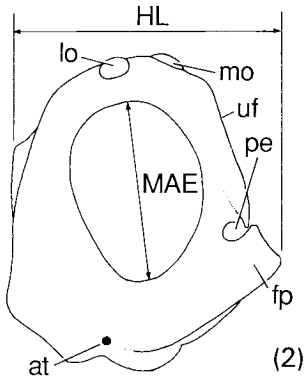
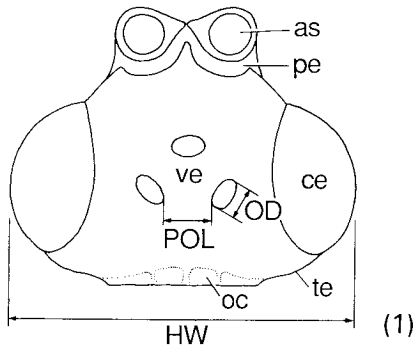
	<i>fulva</i>		<i>prosedera</i>	<i>auriger</i>	<i>thegalea</i>	<i>rangatira</i>
	female	male	female	female	female	female
BL (mm)	1.82-4.16	2.26-4.26	2.24-3.61	2.24-3.67	3.33-3.64	2.18-3.46
HW/HL	0.77-0.88	0.92-1.02	0.73-0.84	0.78-0.82	0.81-0.88	0.79-0.88
OD/POL	—	0.48-1.06	—	—	—	—
POL/OOL	—	0.82-1.22	—	—	—	—
FW/MAE	1.30-1.75	0.84-1.06	1.28-1.88	1.58-2.23	1.50-1.84	1.30-1.87
SCL/SCW	4.75-6.70	5.13-6.67	5.75-7.15	4.91-5.71	6.11-6.89	5.46-7.00
SCL/HW	1.00-1.20	0.85-0.95	1.03-1.32	0.95-1.02	1.04-1.19	1.03-1.14
F1L/F1W	0.91-1.54	3.36-4.13	1.07-1.86	1.00-1.20	1.33-1.69	1.17-1.64
F2L/F2W	0.91-1.14	3.06-4.80	1.00-1.67	0.83-1.08	1.25-1.62	1.00-1.19
F3L/F3W	0.82-1.08	3.16-4.53	0.97-1.56	0.83-1.08	1.25-1.57	1.00-1.33
F1L/F2L	1.00-1.43	1.07-1.36	1.00-1.29	1.00-1.20	1.00-1.05	1.05-1.39
F11L/F11W	—	2.15-3.00	—	—	—	—
F12L/F12W	0.64-0.85	3.33-4.50	0.69-1.00	0.68-0.83	0.86-0.92	0.76-0.92
F13L/F13W	1.31-1.54	—	1.33-1.76	1.36-1.70	1.62-1.77	1.43-1.68
ML/MW	2.00-2.54	1.52-1.89	2.11-2.28	1.79-2.14	2.08-2.80	2.05-2.50
ML/MH	1.85-2.33	1.61-1.74	1.91-2.35	1.74-2.03	2.13-2.73	1.98-2.59
MSL/MSW	— (or) 1.27-1.44	0.61-0.94	— (or) 1.44	—	—	—
MSCL/MSCW	— (or) 0.20-0.29	0.53-0.61	— (or) 2.92	—	—	—
MSCL/MSL	— (or) 0.08-0.15	0.57-0.70	— (or) 1.14	—	—	—
MNL/MNW	1.26-1.63	—	1.39-1.66	1.10-1.38	1.36-1.48	1.18-1.67
PL/PW	1.17-1.70	2.19-3.13	1.22-1.59	1.23-1.44	1.41-1.62	1.25-1.65
PL/PH	1.13-1.77	2.17-3.00	1.17-1.80	1.32-1.53	1.46-1.79	1.25-1.88
GL/GW	1.50-1.74	—	1.57-1.91	1.64-2.03	2.00-2.05	1.50-1.66
GW/HW	1.46-1.78	—	1.39-1.70	1.40-1.73	1.52-1.81	1.49-1.66
T4L/T4W	0.48-0.74	—	0.50-0.73	0.69-0.80	0.86-1.05	0.47-0.55
S6L/S4L	2.13-3.93	—	2.00-3.00	1.64-2.71	3.64-5.38	2.71-3.50

(continued overleaf)

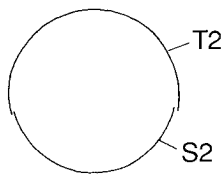
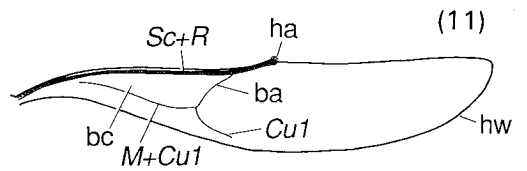
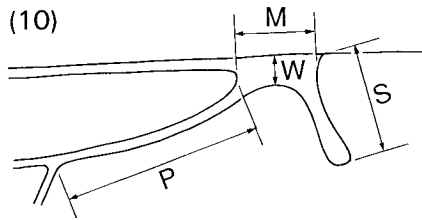
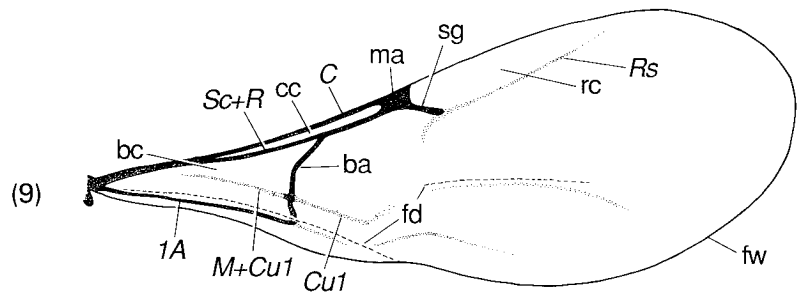
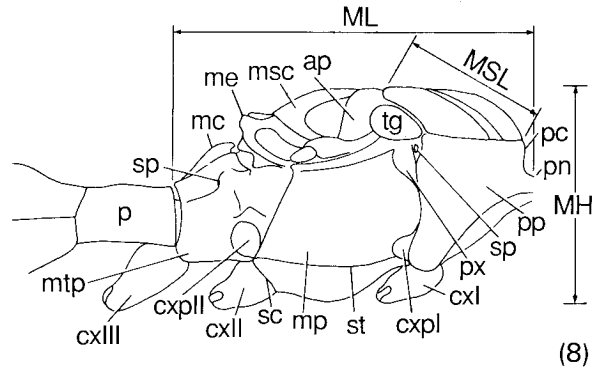
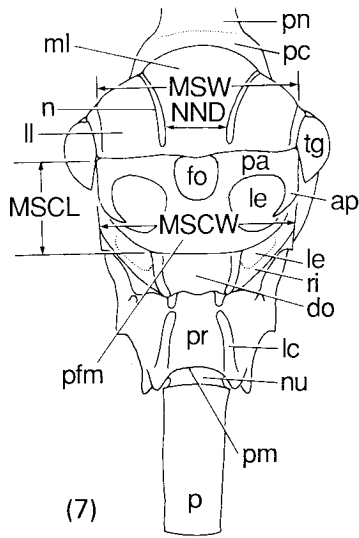
(Appendix Table 6; continued)

	<i>karamea</i> female	<i>eupepla</i> female male		<i>tuatara</i> female	<i>wahine</i> female	<i>paparoa midas</i> female female	
BL (mm)	2.65-3.80	1.74-3.07	1.90-3.38	1.90-2.89	2.47-3.46	3.15	1.95
HW/HL	0.80-0.98	0.72-0.82	1.06-1.18	0.71-0.78	0.72-0.75	0.82	0.87
OD/POL	—	—	0.50-0.69	—	—	—	—
POL/OOL	—	—	0.84-1.06	—	—	—	—
FW/MAE	1.04-1.52	1.52-2.09	0.96-1.19	1.65-2.09	1.55-1.81	1.46	1.80
SCL/SCW	5.62-6.28	4.89-5.88	5.29-6.55	5.34-7.03	5.17-6.63	5.89	5.29
SCL/HW	1.02-1.19	0.95-1.09	0.81-0.90	1.00-1.18	1.13-1.21	1.06	0.90
F1L/F1W	1.14-1.29	1.00-1.40	3.37-4.57	1.00-1.39	1.14-1.67	0.92	1.00
F2L/F2W	0.86-1.25	0.82-1.15	2.60-3.83	0.86-1.27	1.00-1.33	0.92	0.80
F3L/F3W	0.93-1.07	0.89-1.15	2.88-4.67	0.83-1.27	0.93-1.25	0.86	0.80
F1L/F2L	1.00-1.25	1.00-1.33	0.91-1.27	1.00-1.25	1.14-1.43	1.00	1.25
F11L/F11W	—	—	2.27-3.56	—	—	—	—
F12L/F12W	0.80-0.97	0.71-0.90	3.29-4.73	0.82-0.91	0.81-0.95	0.72	0.71
F13L/F13W	1.50-1.68	1.38-1.53	—	1.42-1.67	1.54-1.78	1.35	1.30
ML/MW	2.02-2.28	1.79-2.18	1.53-1.80	2.17-2.48	2.14-2.44	2.08	1.96
ML/MH	2.00-2.23	1.67-2.00	1.40-1.85	1.97-2.29	2.03-2.59	1.98	1.77
MSL/MSW	1.30-1.53	—	0.82-1.00	—	—	—	—
MSCL/MSCW	0.12-0.30	—	0.53-0.66	—	—	—	—
MSCL/MSL	0.06-0.14	—	0.57-0.70	—	—	—	—
MNL/MNW	1.40-1.74	1.00-1.29	—	1.23-1.57	1.29-1.58	1.33	1.06
PL/PW	1.48-1.72	1.08-1.33	2.08-3.89	1.25-1.50	1.23-1.64	1.43	1.20
PL/PH	1.48-1.65	1.14-1.43	2.19-4.00	1.33-1.59	1.05-1.69	1.43	1.29
GL/GW	1.54-1.68	1.61-2.00	—	1.53-1.68	1.51-1.67	1.74	1.61
GW/HW	1.53-1.75	1.45-1.87	—	1.45-1.74	1.59-1.77	1.74	1.39
T4L/T4W	0.48-0.65	0.55-0.89	—	0.54-0.75	0.50-0.72	0.58	0.60
S6L/S4L	2.71-3.33	3.17-4.00	—	2.60-3.60	1.89-3.10	2.57	3.71

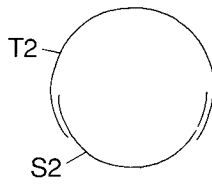
ILLUSTRATIONS



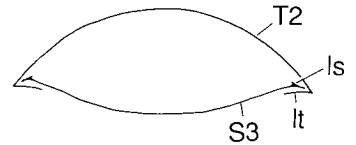
Figures 1–20 Morphological terms and measurements used in descriptions of Ambositrinae, modified after Naumann (1982); for explanation of abbreviations, see Appendix 2. **Figures 21–36** Modifications of anterior metasomal sclerites. **1–4**, head in dorsal, lateral, frontal, and posterior view respectively. **5, 6**, antenna, female and male.



(12)

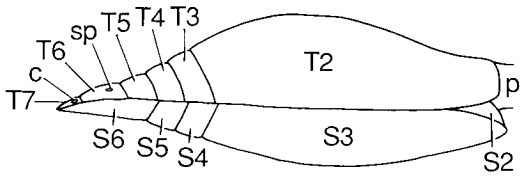


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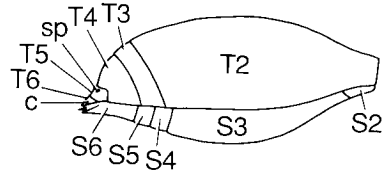


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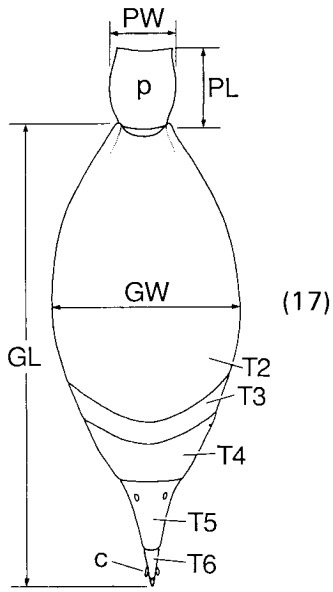
7, 8, mesosoma, dorsal and lateral. 9–11, wings: (9) forewing, with (10) detail of venation; (11) hindwing. 12–14, gaster, sectional outline of (12) primitive belytine, (13) diapiirine, and (14) ambositrine. 15–20, metasoma: (15,16) female, lateral; (17) female, dorsal; (18, 19) male, lateral; (20) male, dorsal. 21, 22, generalised belytine, dorsal and lateral views. 23–25, generalised diapiirines, lateral and dorsal views.



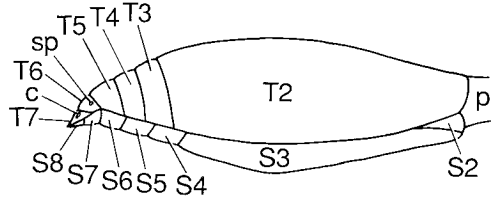
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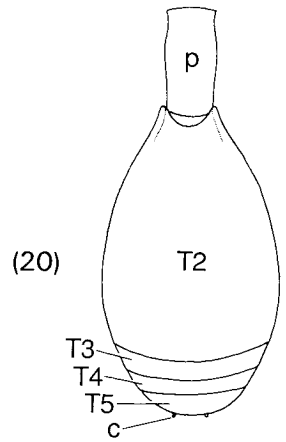
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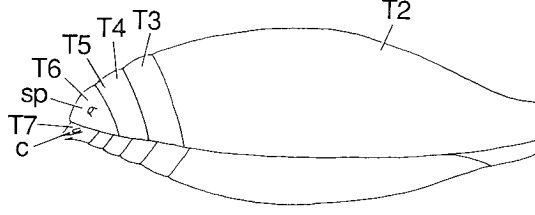
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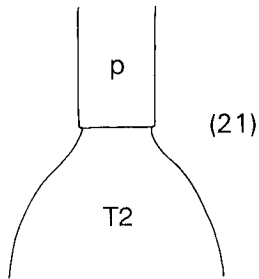
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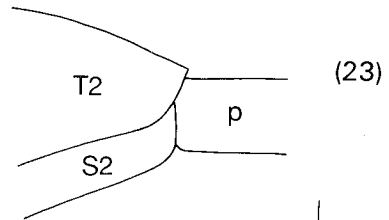
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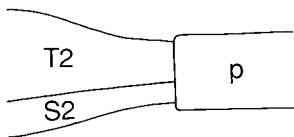
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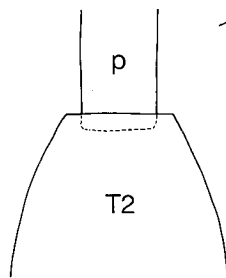
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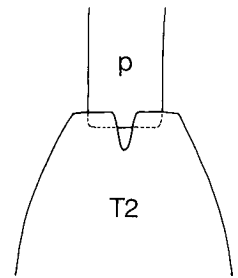
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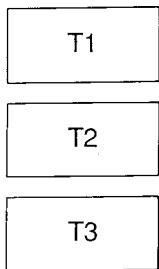
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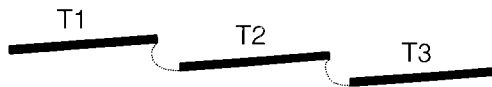
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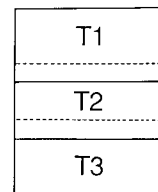
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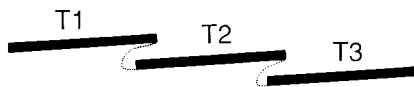
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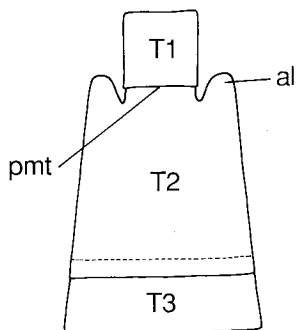
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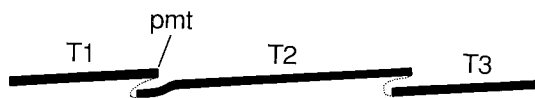
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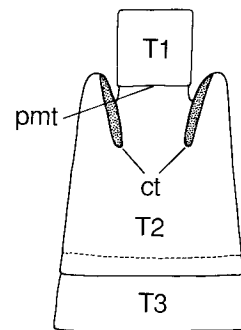
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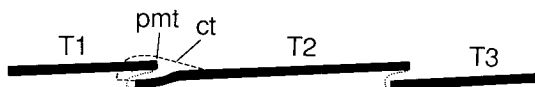
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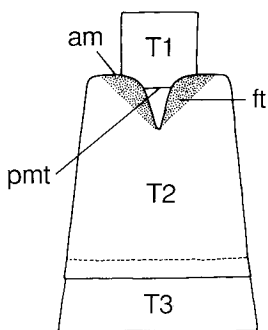
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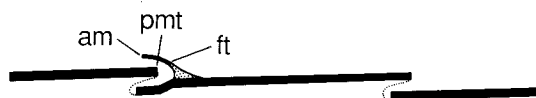
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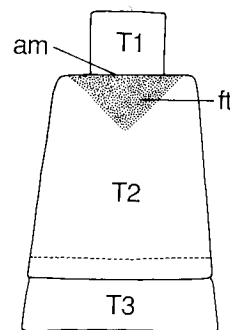
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(34)

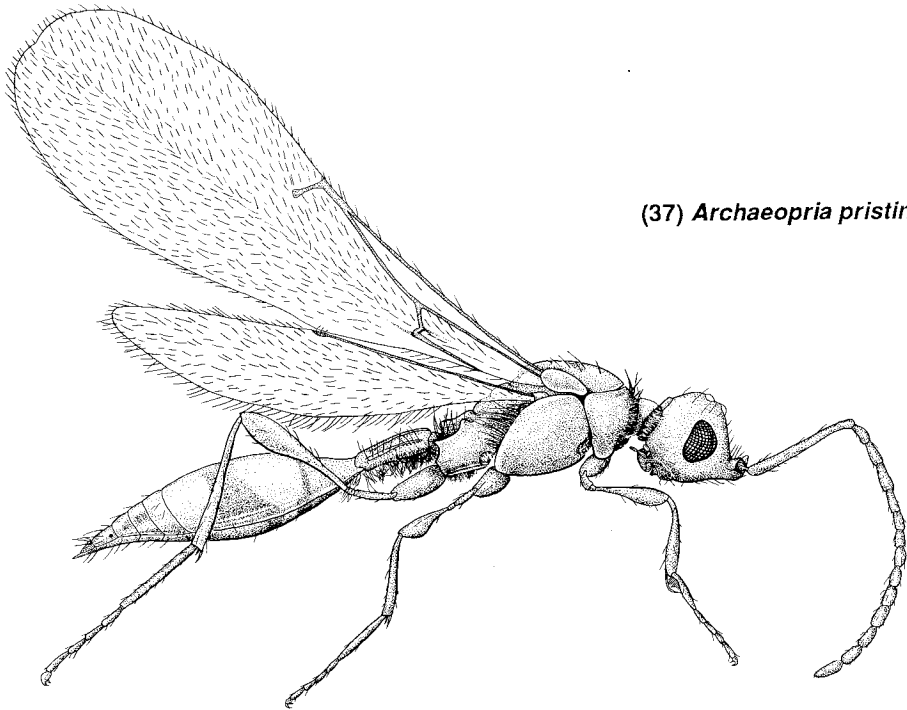


(36)



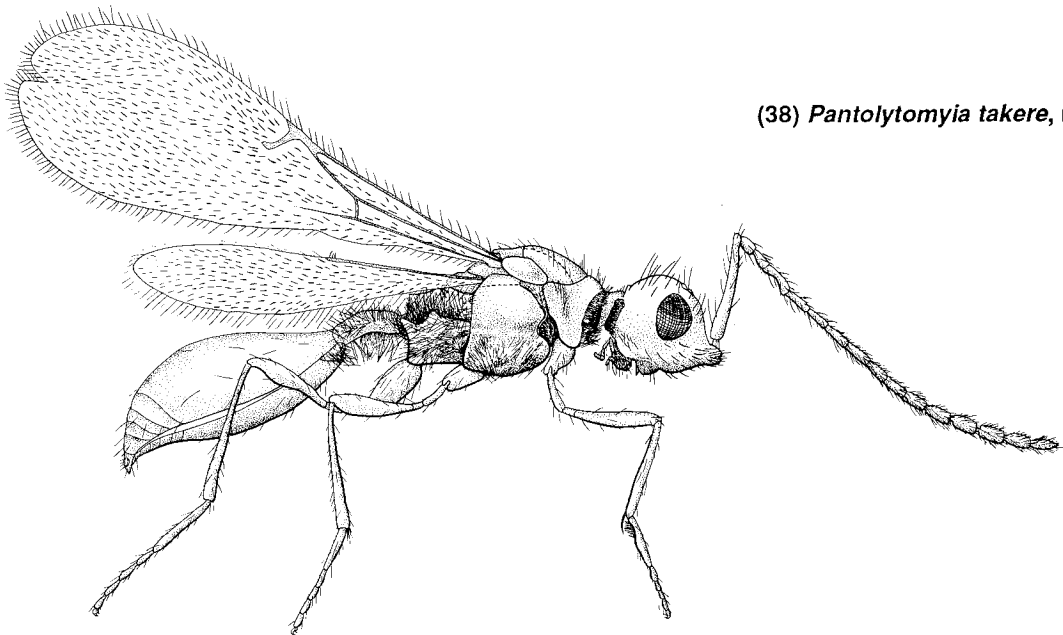
(35)

26–29, plesiomorphic state in Hymenoptera. 30, 31, plesiomorphic state in Diapriidae. 32, 33, T2 carinate, e.g., as in *Diphoropria*. 34–36, T2 flanged, with secondary anterior margin – (34) incised, (35) entire.

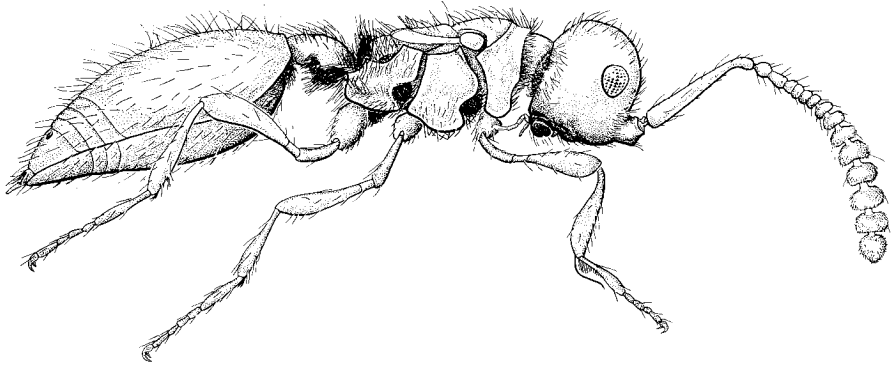


(37) *Archaeopria pristina*, female

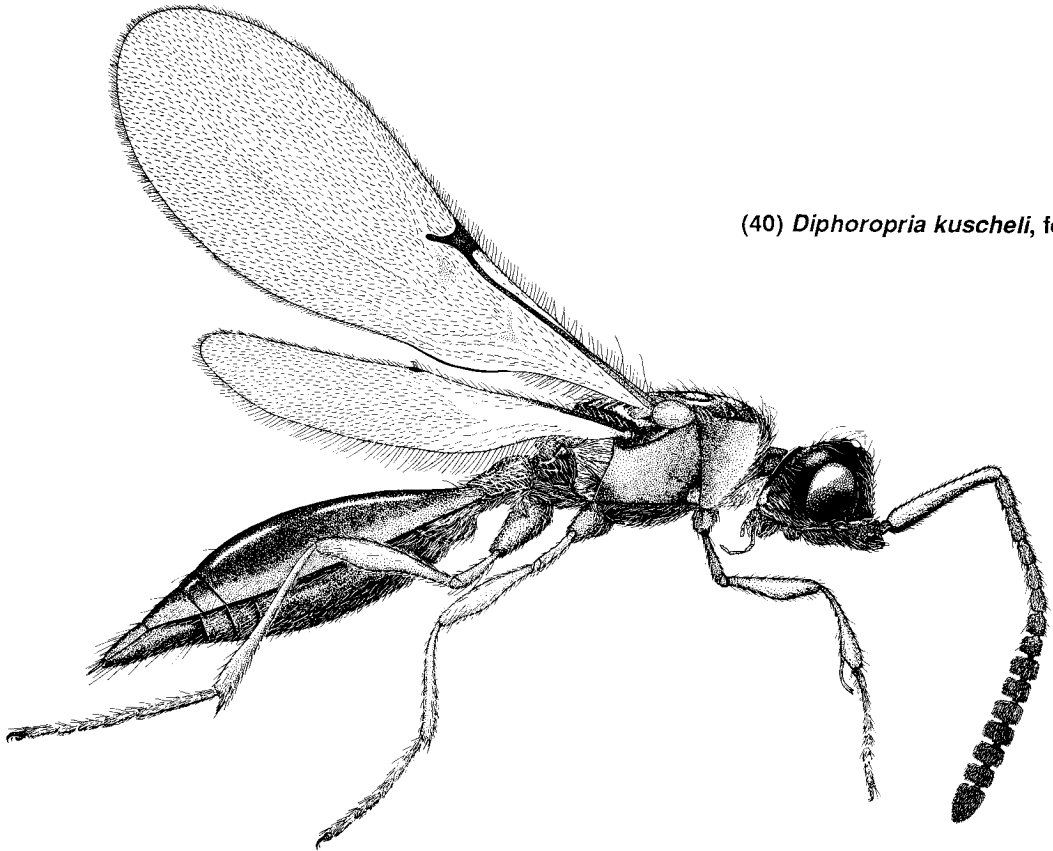
Figures 37–46 Habitus drawings of Ambositrinae representative of their genera.
Artists as credited under Acknowledgments.



(38) *Pantolytomyia takere*, male

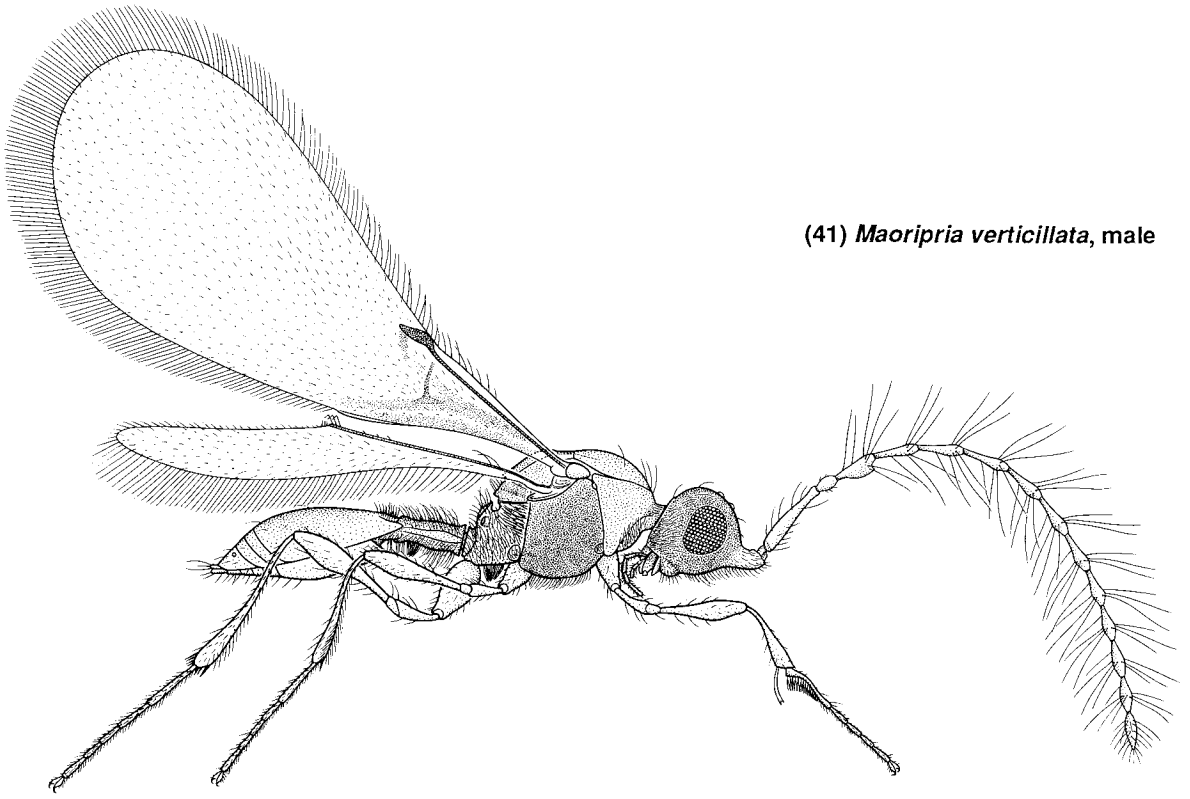


(39) *Pantolytomyia insularis*, female

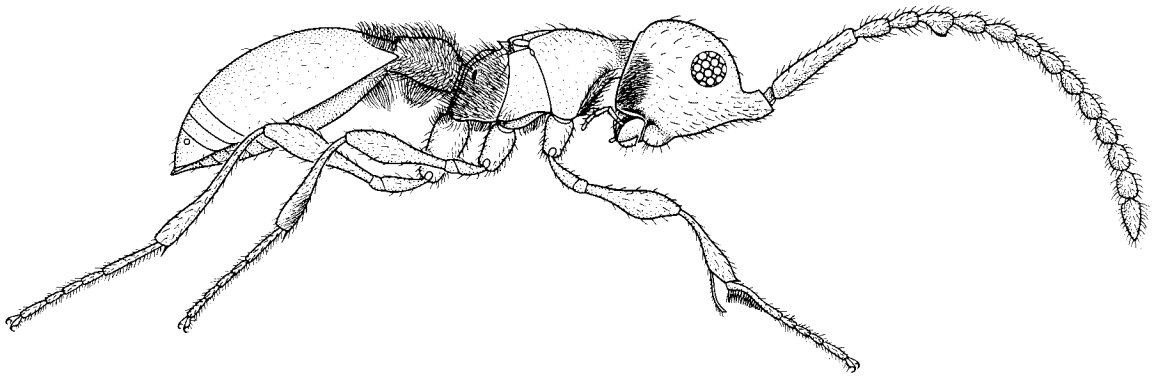


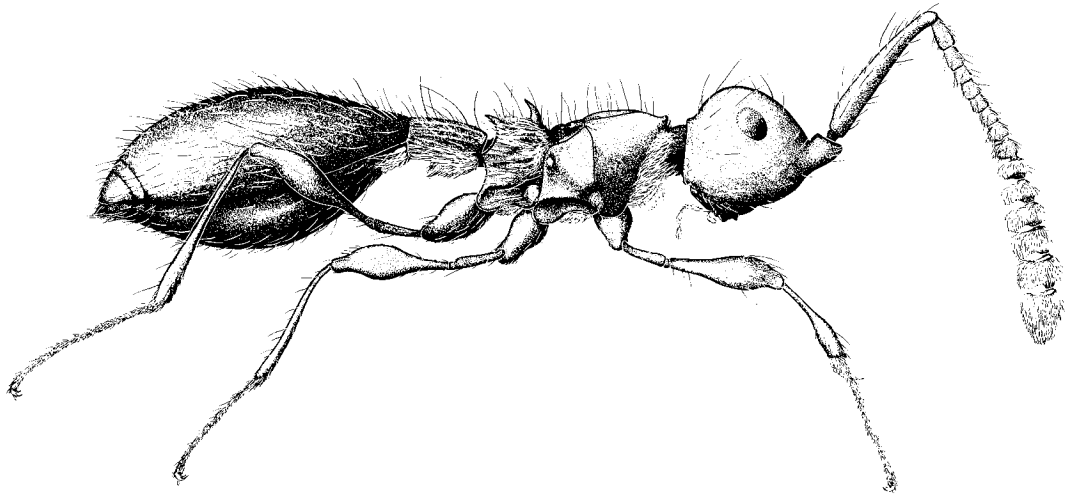
(40) *Diphoropria kuscheli*, female

(41) *Maoripria verticillata*, male

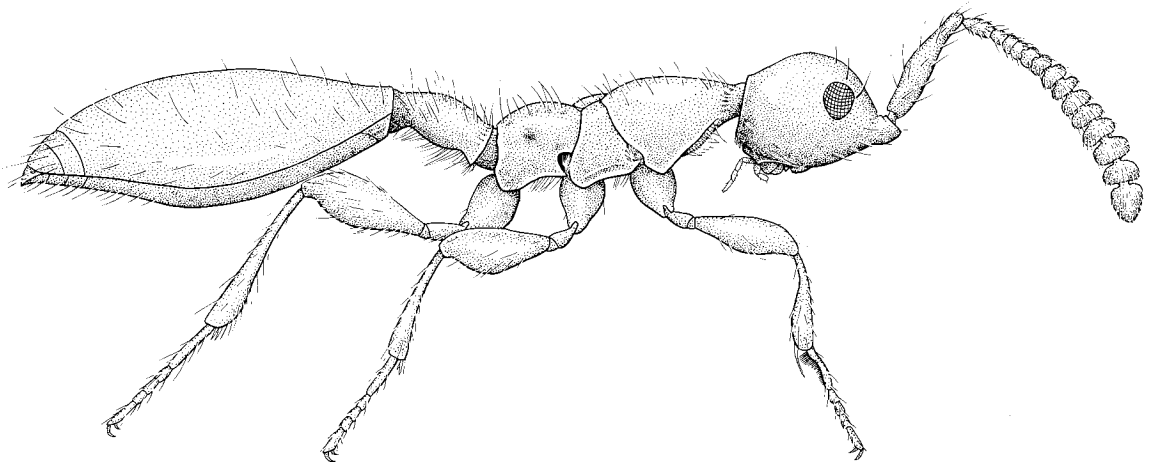


(42) *Maoripria annettae*, male



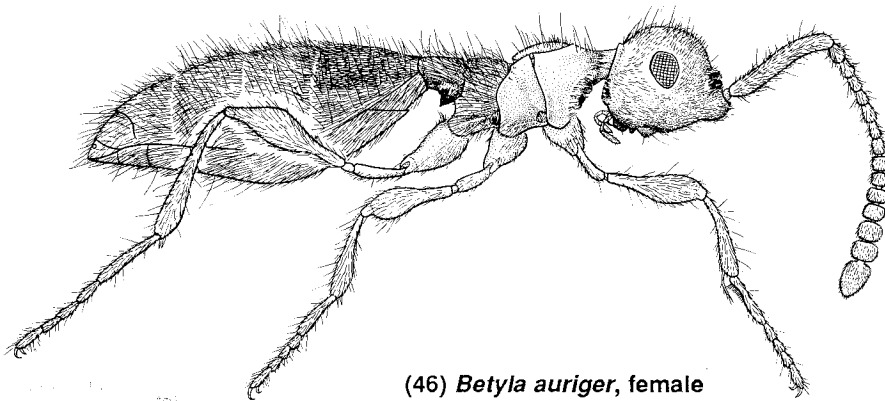
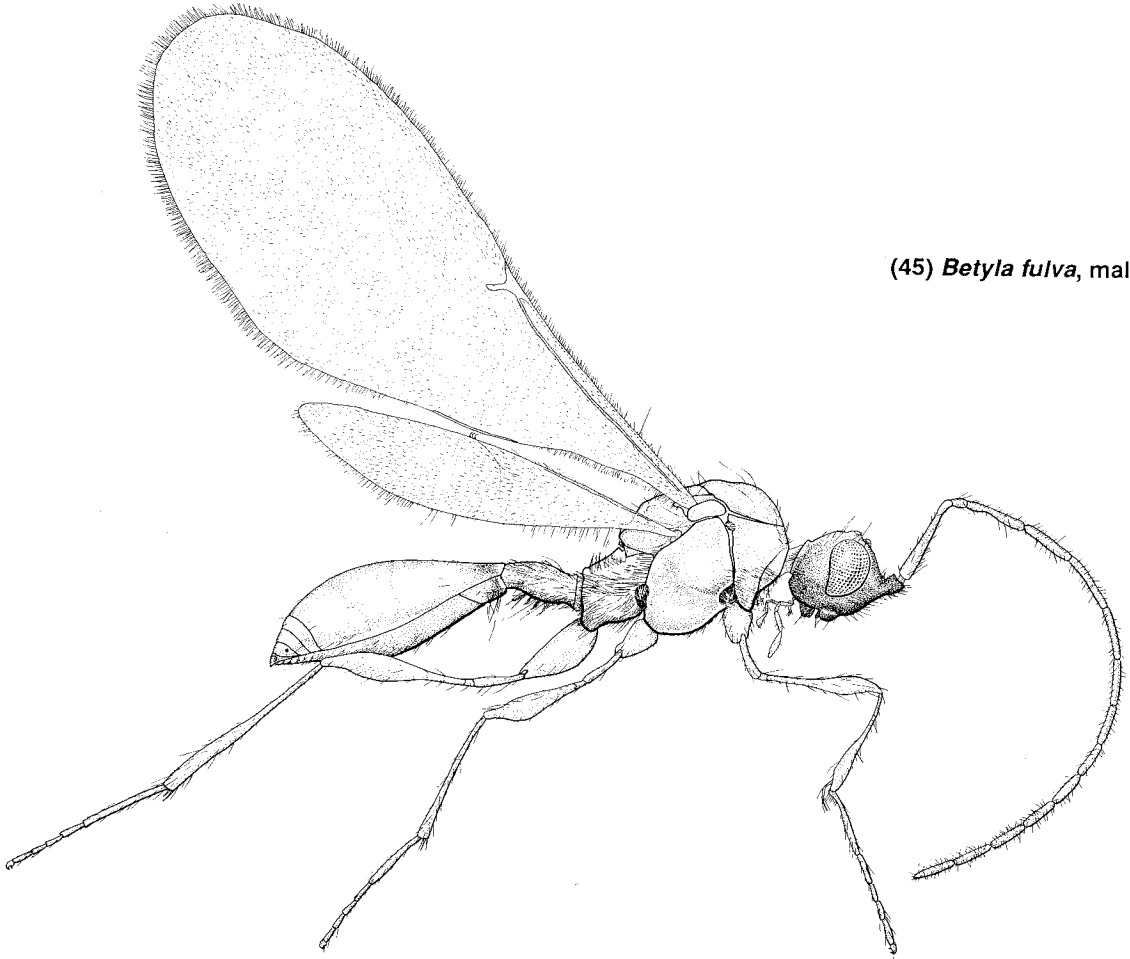


(43) *Parabetyla tika*, female

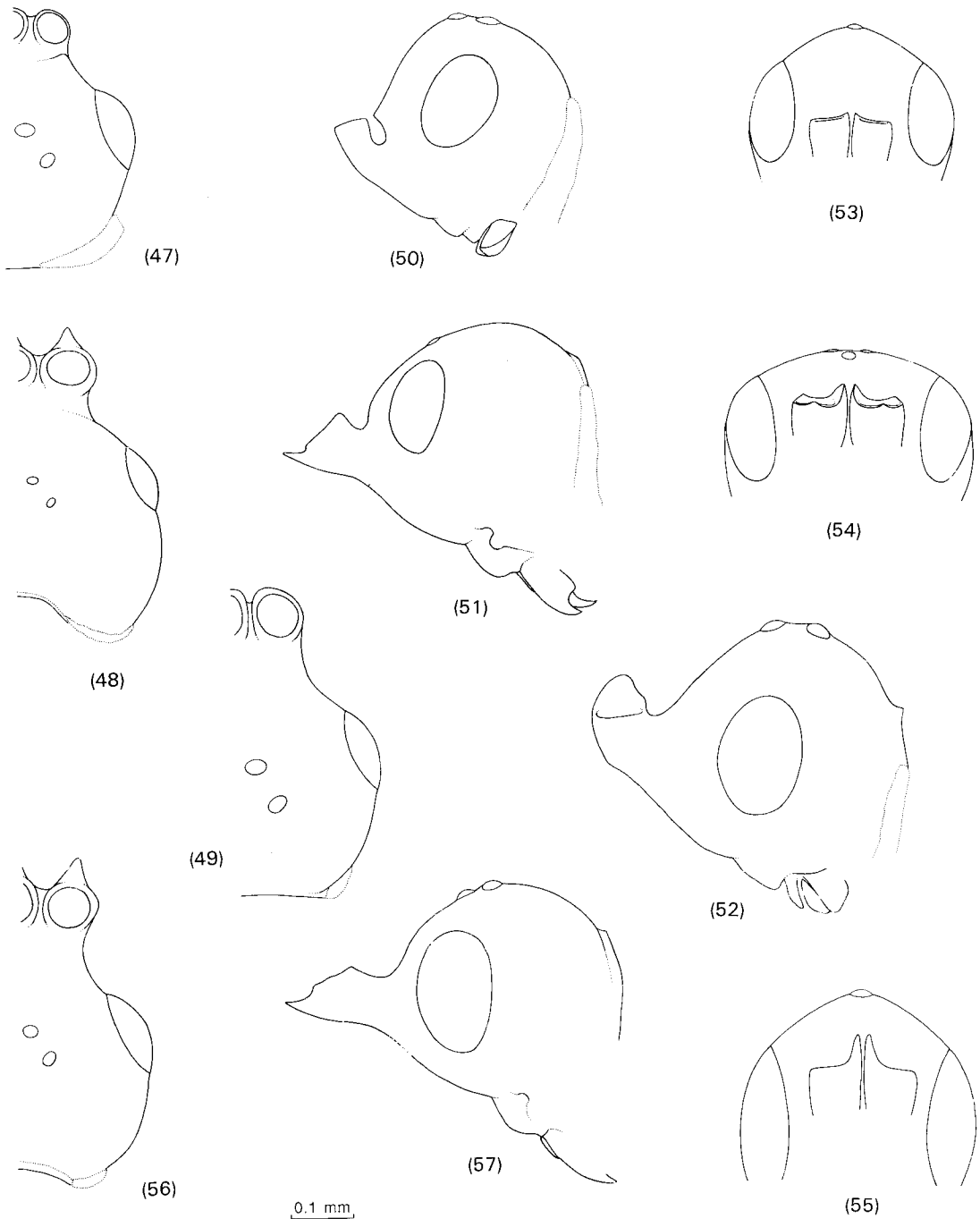


(44) *Zealaptera chambersi*, female

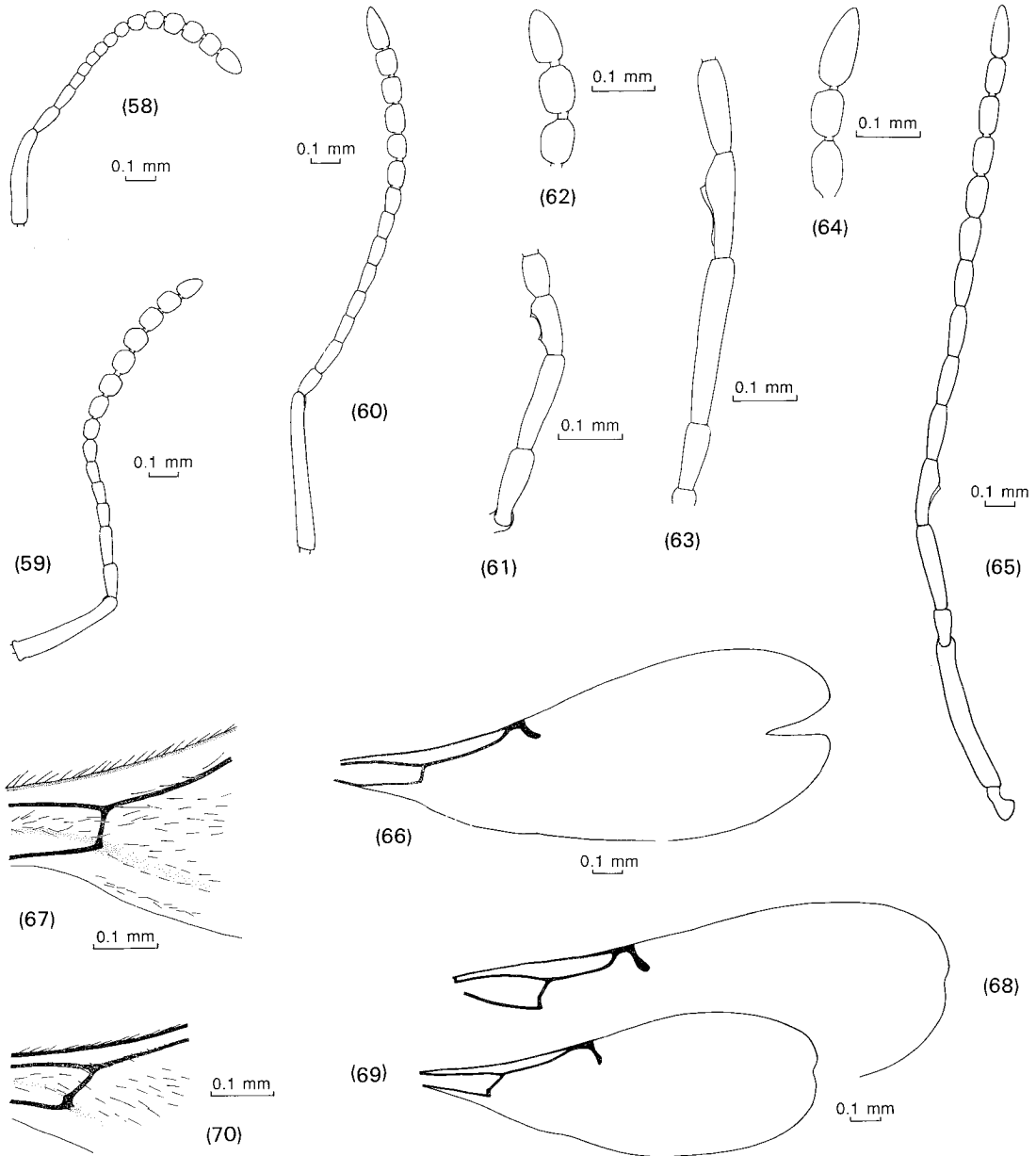
(45) *Betyla fulva*, male



(46) *Betyla auriger*, female

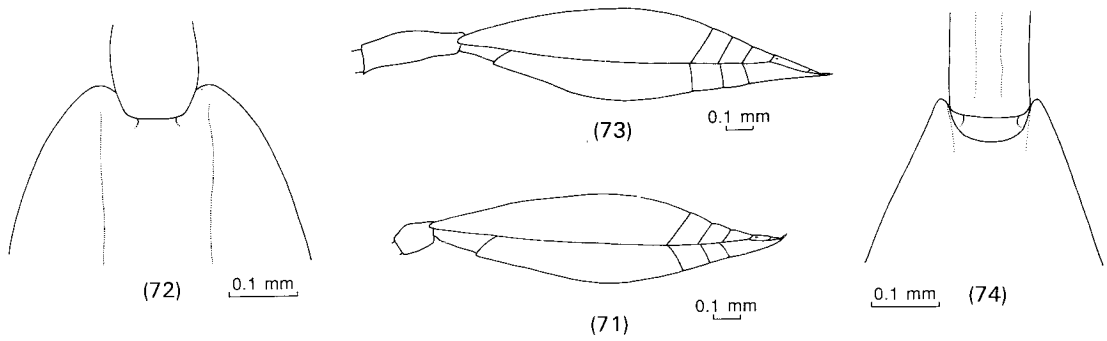


Figures 47-57 *Archaeopria* species, heads: (47) *eriodes*, female, dorsal; (48) *pelor*, female, dorsal; (49) *pristina*, female, dorsal; (50) *eriodes*, female, lateral; (51) *pelor*, female, lateral; (52) *pristina*, female, lateral; (53) *eriodes*, female, frontal; (54) *pelor*, female, frontal; (55) *pristina*, female, frontal; (56) *pelor*, male, dorsal; (57) *pelor*, male, lateral.

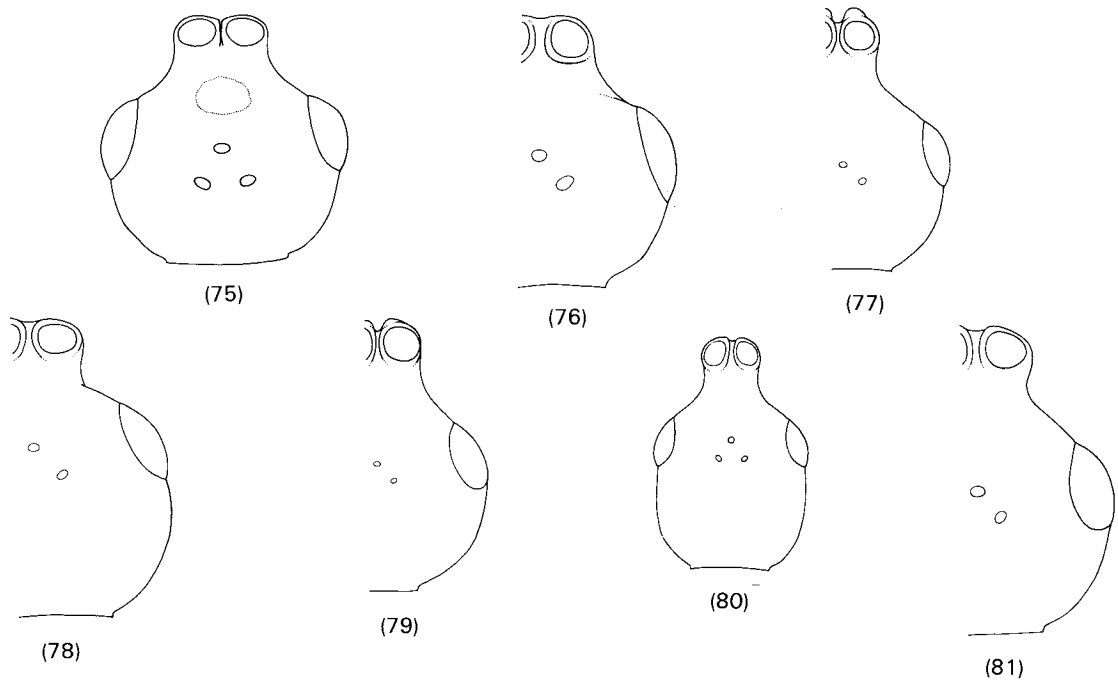


Figures 58–65 *Archaeopria* species, antennae: (58) *eriodes*, female; (59) *pelor*, female; (60) *pristina*, female; (61) *eriodes*, male, pedicel and F1–3; (62) *eriodes*, male, F10–12; (63) *pelor*, male, pedicel and F1–3; (64) *pelor*, male, F10–12; (65) *pristina*, male.

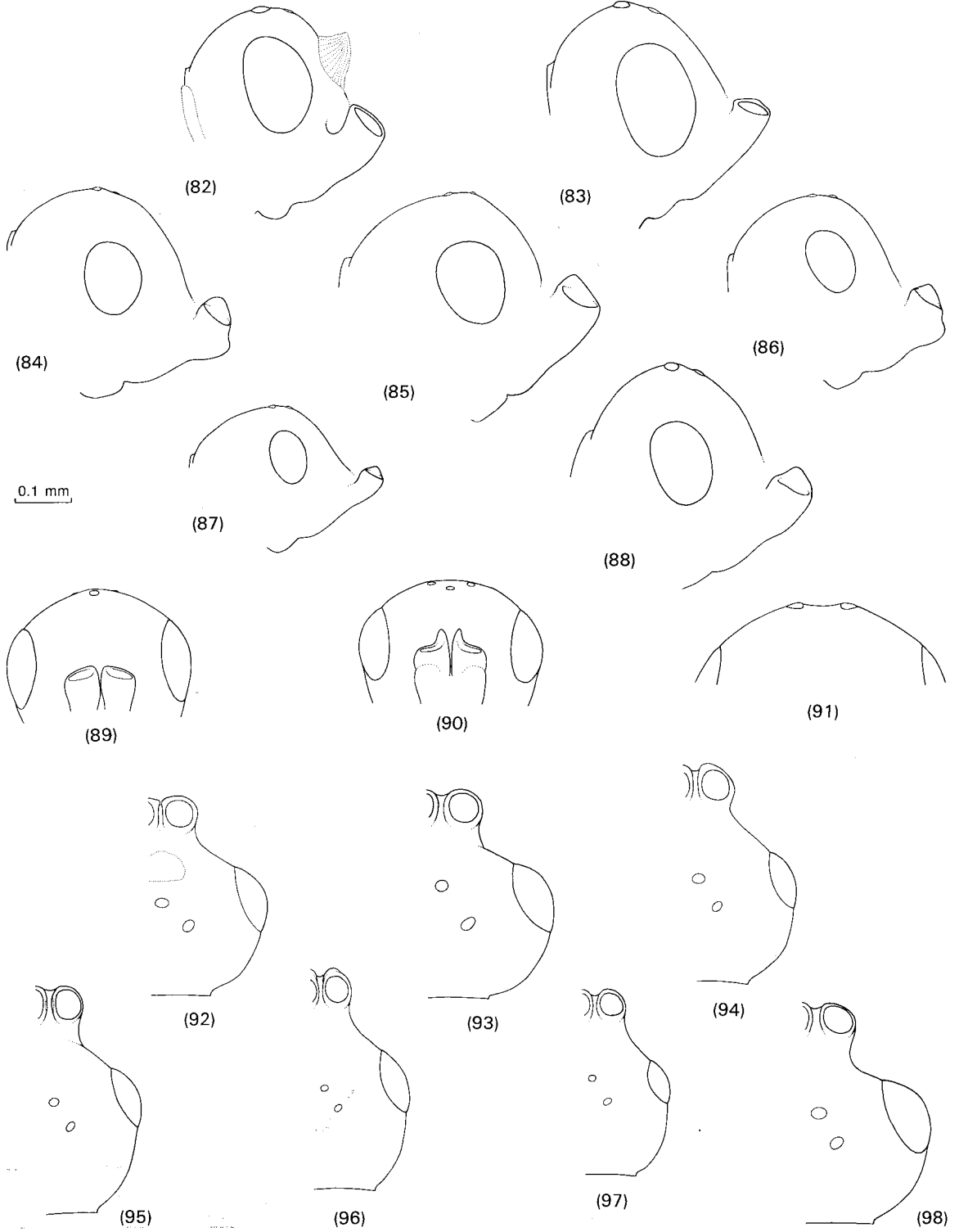
Figures 66–70 *Archaeopria* species, forewings and detail of venation: (66, 67) *eriodes*, male; (68) *pelor*, female; (69) *pristina*, male.

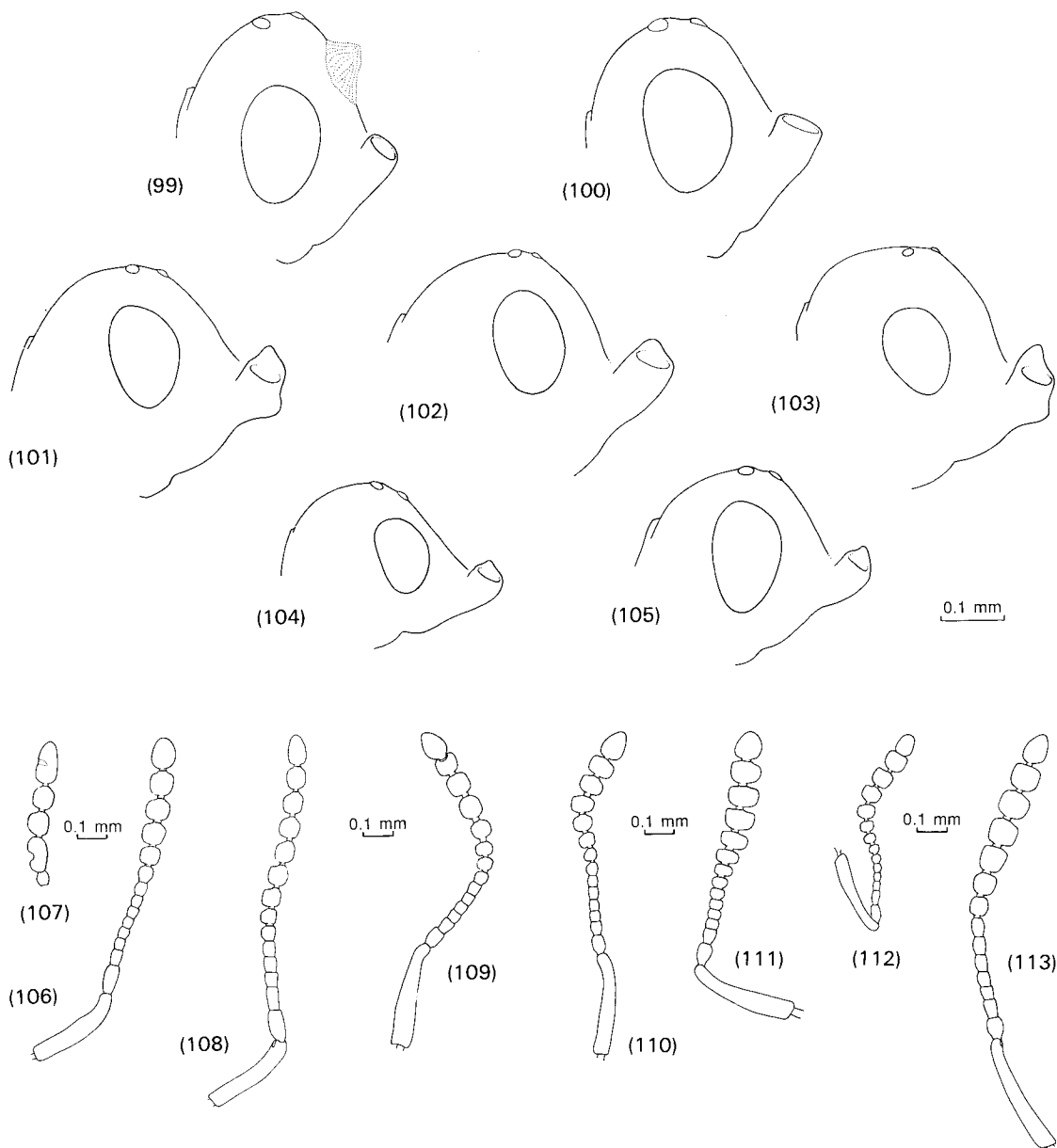


Figures 71, 72 *Archaeopria pelor*, female, lateral view of metasoma and dorsal view of petiole/T2 junction. **73, 74**, *A. pristina*, same.

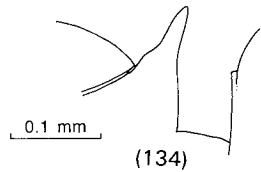
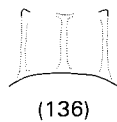
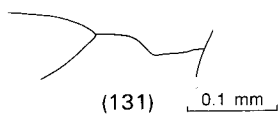
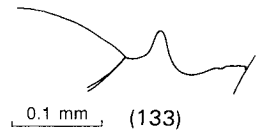
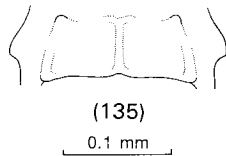
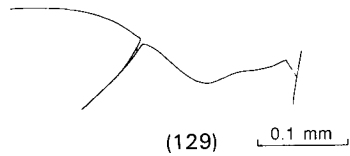
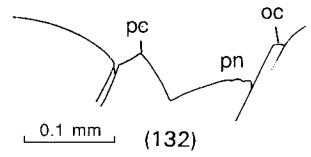
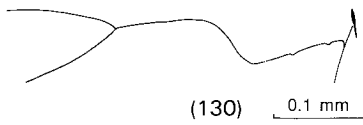
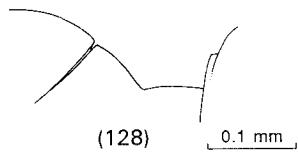
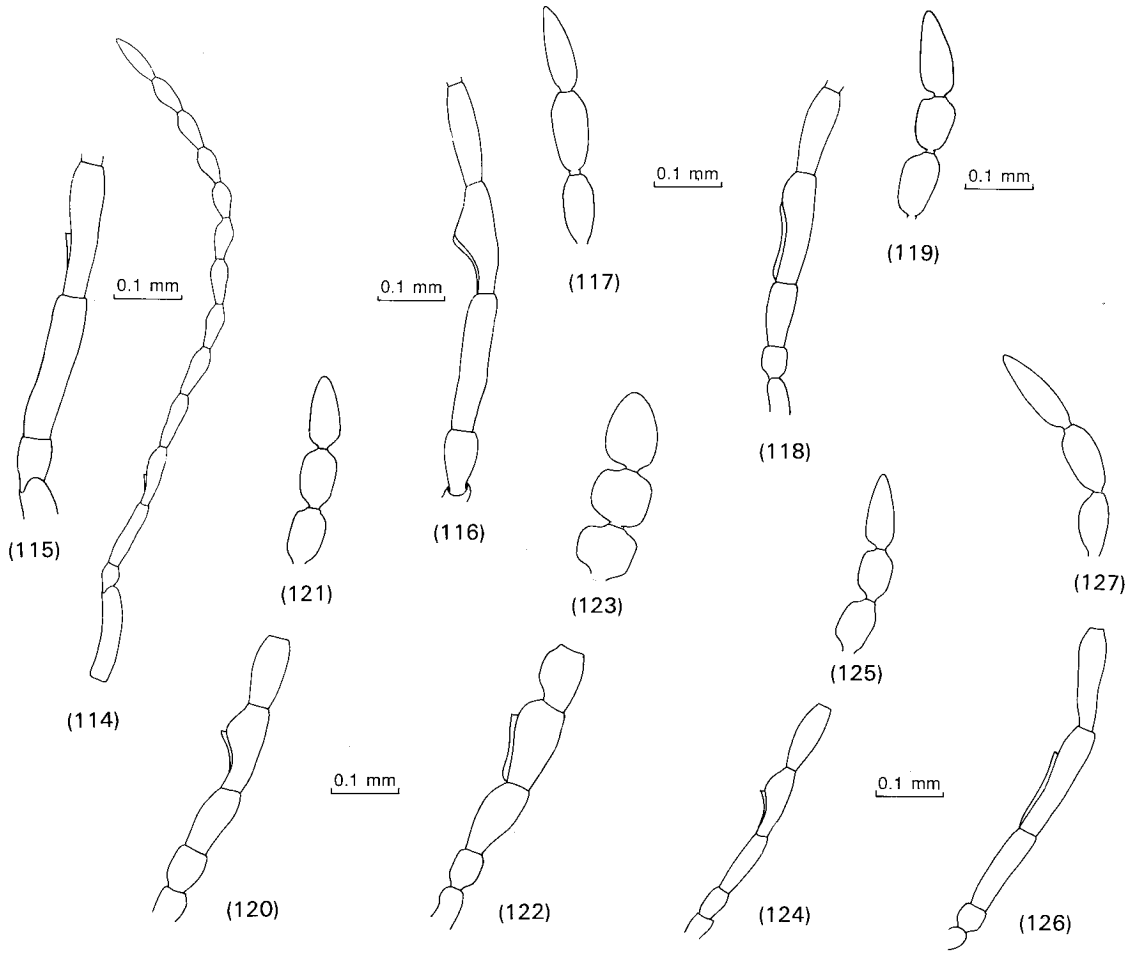


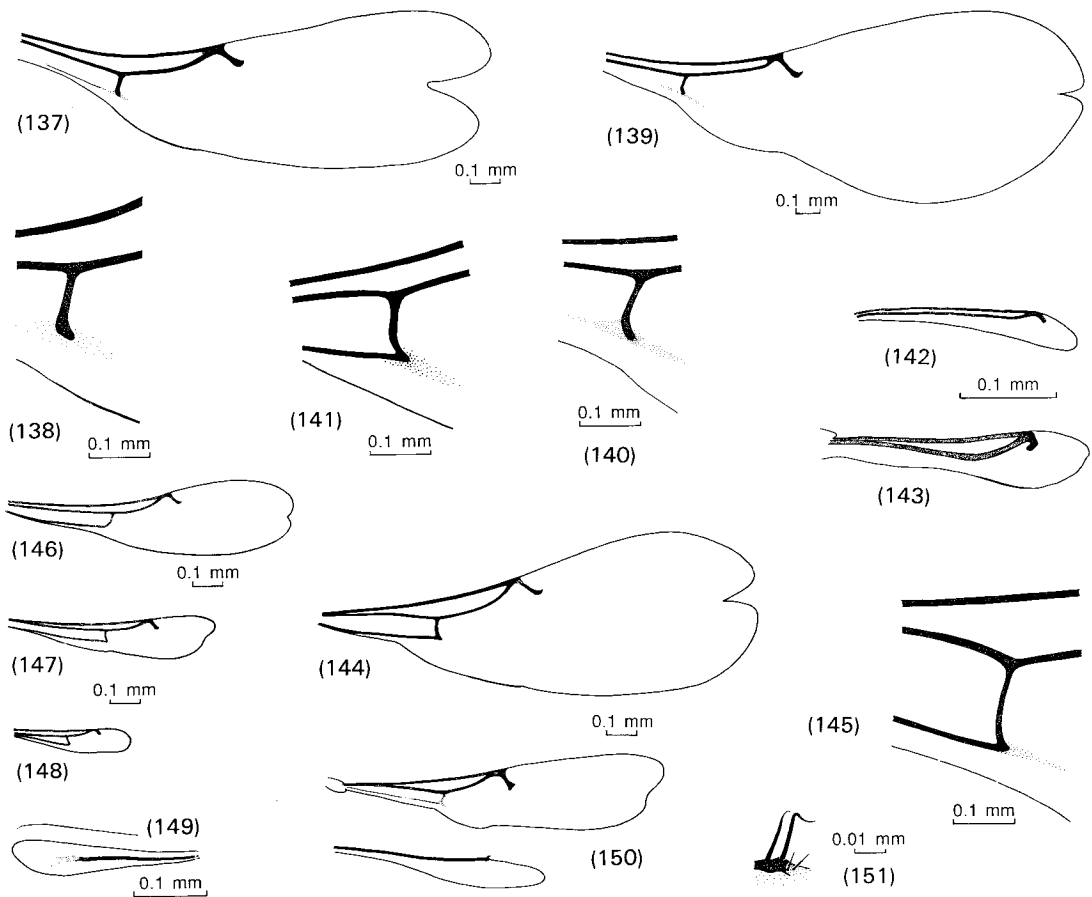
Figures 75–98 *Pantolytomyia* species, heads: (75) *flocculosa*, female, dorsal; (76) *tungane*, female, dorsal; (77) *takere*, female, dorsal; (78) *polita*, female, dorsal; (79) *insularis*, female, dorsal; (80) *wairua*, female, dorsal; (81) *taurangi*, female, dorsal; (82) *flocculosa*, female, lateral; (83) *tungane*, female, lateral; (84) *takere*, female, lateral; (85) *polita*, female, lateral; (86) *insularis*, female, lateral; (87) *wairua*, female, lateral; (88) *taurangi*, female, lateral; (89) *flocculosa*, female, frontal; (90) *takere*, female, frontal; (91) *taurangi*, vertex, posterior; (92) *flocculosa*, male, dorsal; (93) *tungane*, male, dorsal; (94) *takere*, male, dorsal; (95) *polita*, male, dorsal; (96) *insularis*, male, dorsal; (97) *wairua*, male, dorsal; (98) *taurangi*, male, dorsal.



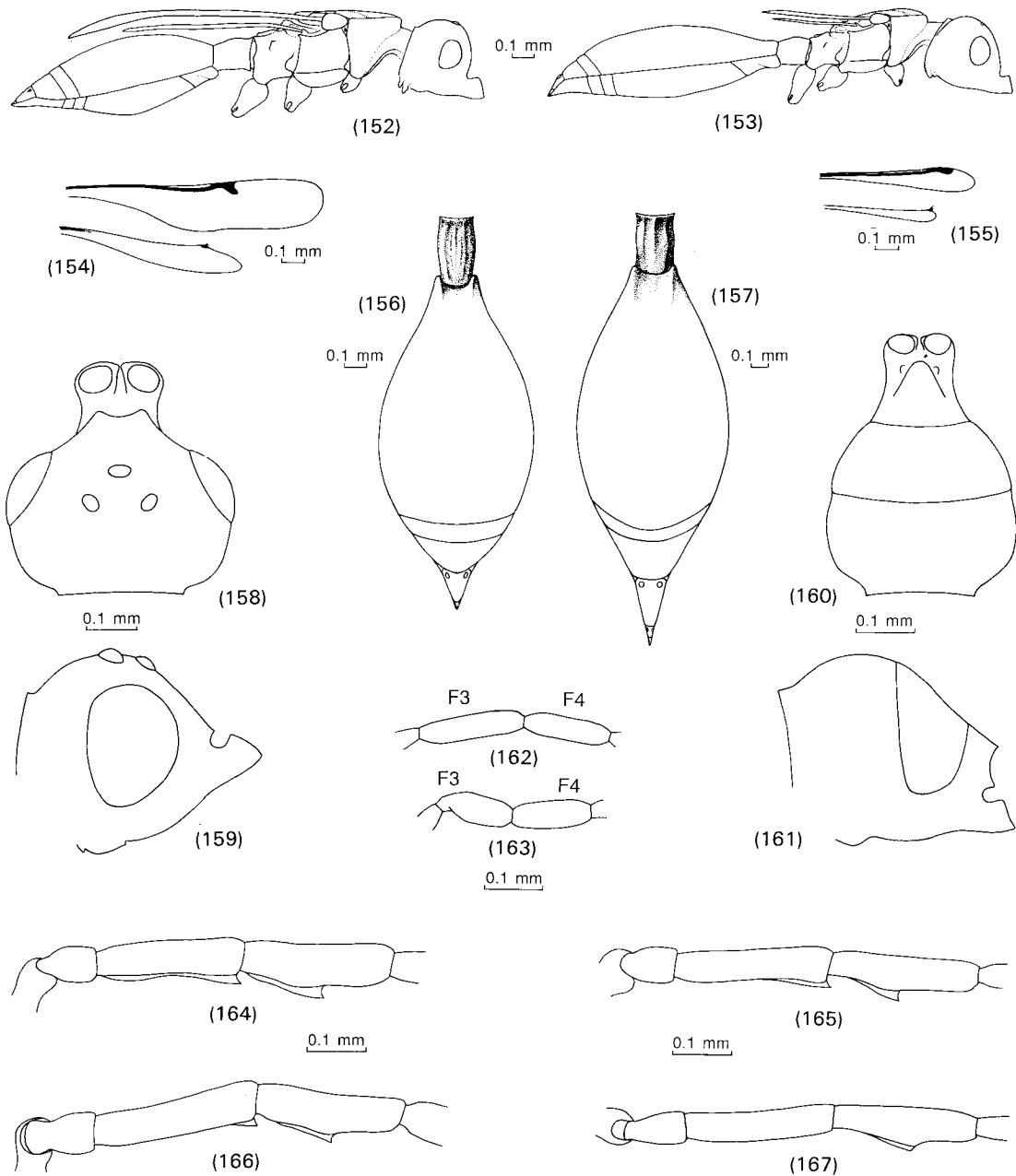


Figures 99–105 *Pantolytomyia* species, heads: (99) *flocculosa*, male, lateral; (100) *tungane*, male, lateral; (101) *takere*, male, lateral; (102) *polita*, male, lateral; (103) *insularis*, male, lateral; (104) *wairua*, male, lateral; (105) *taurangi*, male, lateral.
Figures 106–127 *Pantolytomyia* species, antennae – females (106–113) entire, males (114–127) from apex of scape to F3 and F10 to F12, except as indicated: (106) *flocculosa*, brachypter; (107) *flocculosa*, apical segments, deformed; (108) *tungane*; (109) *takere*; (110) *polita*; (111) *insularis*; (112) *wairua*; (113) *taurangi*, macropter; (114) *flocculosa*, entire; (115) *flocculosa*, apex of scape to F2; (116, 117) *tungane*; (118, 119) *takere*; (120, 121) *polita*; (122, 123) *insularis*; (124, 125) *wairua*; (126, 127) *taurangi*.
Figures 128–134 *Pantolytomyia* species, females, lateral profile of pronotum and anterior mesoscutum: (128) *flocculosa*; (129) *tungane*; (130) *polita*; (131) *wairua*; (132–134) *taurangi* – holotype, L. Mahinapua, and Mt Arthur specimens.
Figures 135, 136 Propodeum, dorsal, *Pantolytomyia takere* female and *P. wairua* male respectively.

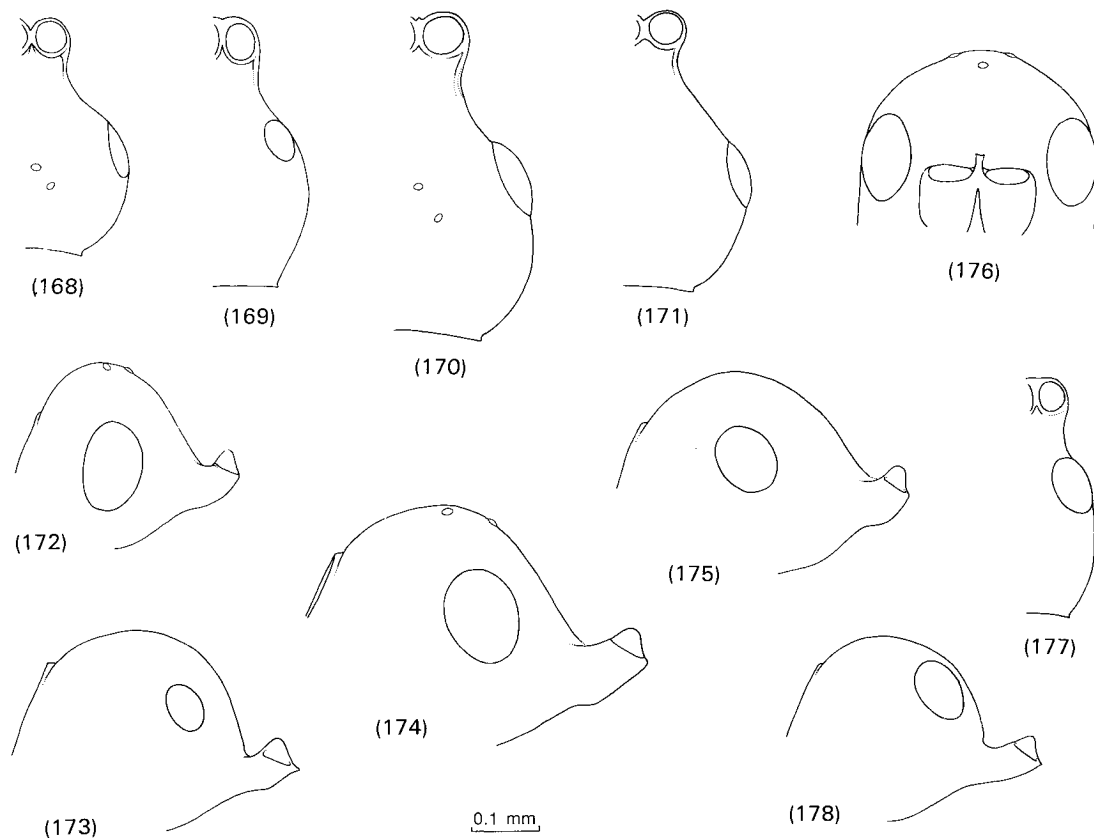




Figures 137–151 *Pantolytomyia* species, female forewings and detail of venation, except as indicated: (137, 138) *flocculosa*, macropter; (139, 140) *tungane*, macropter; (141) *takere*, male macropter; (142) *takere*, female brachypter; (143) *wairua*; (144, 145) *taurangi*, macropter; (146–148) *taurangi*, brachypters from L. Hurunui, L. Mahinapua, and Howden track; (149) *insularis*, male; (150, 151) *wairua*, male, with hindwing and detail of hamuli.



Figures 152–167 *Diphoropria* species – *sinuosa* except as marked: (152, 153) body, female, lateral, Type A and Type B brachypters; (154, 155) wings, female, Type A and Type B; (156, 157) metasoma, female, dorsal, *sinuosa* macropter and *kuscheli*; (158, 159) head, dorsal and lateral, normal macropterous male; (160, 161) same, cyclopic male; (162, 163) F3 and F4 of right and left antenna, cyclopic male; (164–167) apex of scape to F2, males from Waipoua State Forest, Arthur's Pass, Westland National Park, and Tropicana Drive, Lynfield, showing variation in carinae.

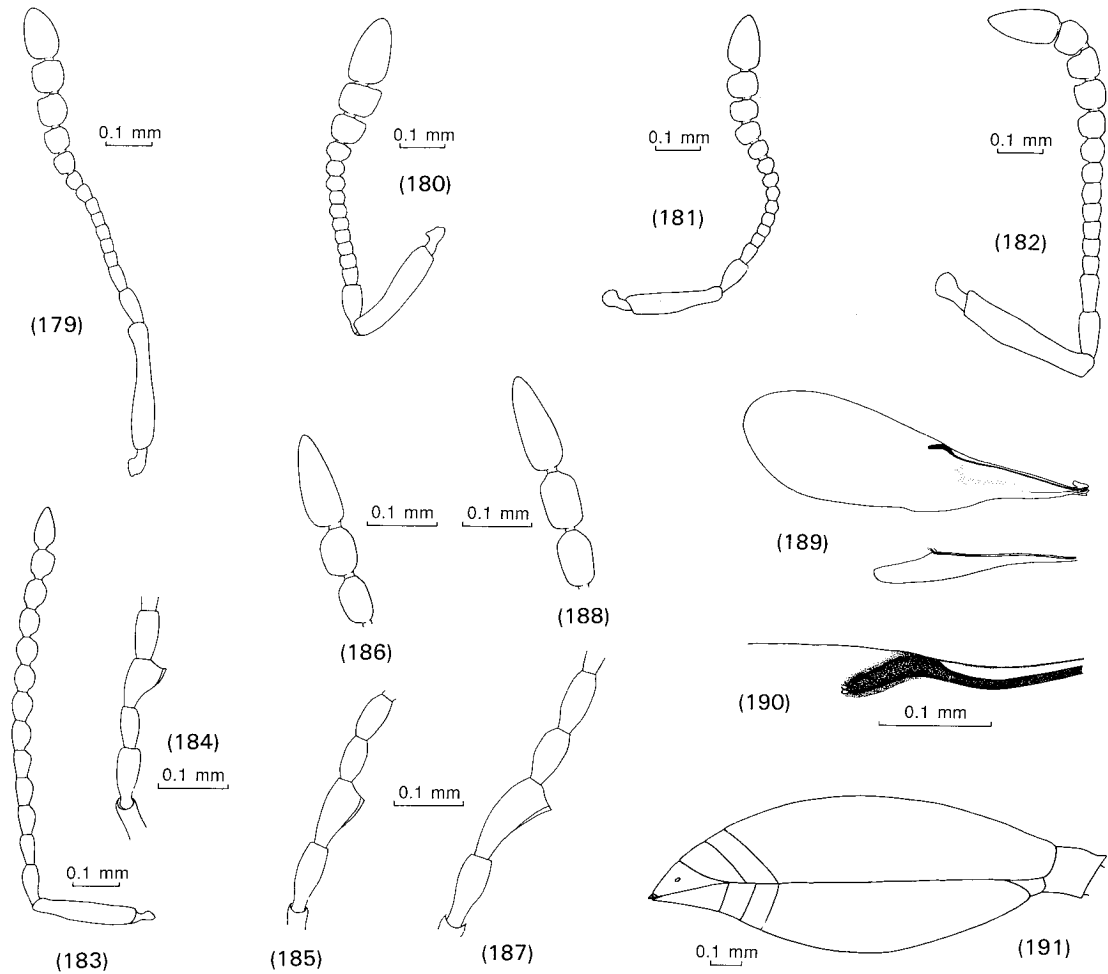


Figures 168–178 *Maipripria* species, heads, female except as marked: (168) *verticillata* macropter, dorsal; (169) *annettae*, dorsal; (170) *earlyi*, dorsal; (171) *masneri*, dorsal; (172) *verticillata*, brachypter, lateral; (173) *annettae*, lateral; (174) *earlyi*, lateral; (175) *masneri*, lateral; (176) *earlyi*, frontal; (177, 178) *annettae*, male, dorsal and lateral.

Figures 179–188 *Maipripria* species, antennae: (179) *verticillata*, female, entire; (180) *annettae*, same; (181) *earlyi*, same; (182) *masneri*, same; (183, 184) *annettae*, male, entire and apex of scape to F3; (185, 186) *earlyi*, male, apex of scape to F3 and F10–12; (187, 188) *masneri*, same.

Figures 189, 190 *Maipripria verticillata*, brachypterous female, wings and detail of forewing venation.

Figure 191 *Maipripria masneri*, female metasoma, lateral.



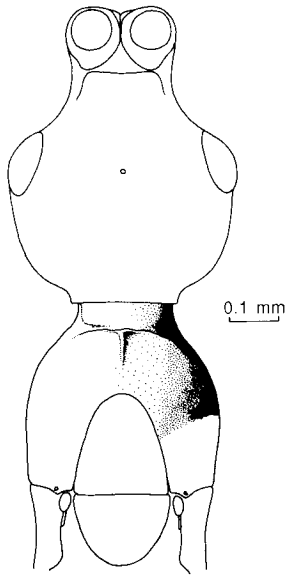
(overleaf)

Figures 192–198 *Parabetyla* species, heads: (192) *spinosa*, female, dorsal, with anterior mesosoma; (193) *pipira*, female, dorsal; (194) *ngarara*, same; (195) *pipira*, female, lateral; (196, 197) *tika*, male, dorsal and lateral; (198) P94, male, lateral.

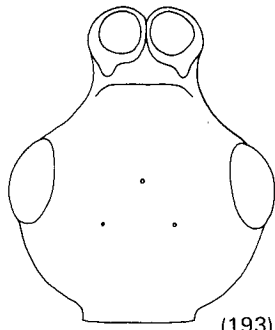
Figures 199, 200 Apex of scape to F2, male, *Parabetyla tika* and species P94.

Figures 201–204 *Parabetyla* species, females, profile of dorsal mesosoma and petiole: (201) *spinosa*, with head; (202) *pipira*; (203) *ngarara*, with head; (204) *pokorua*.

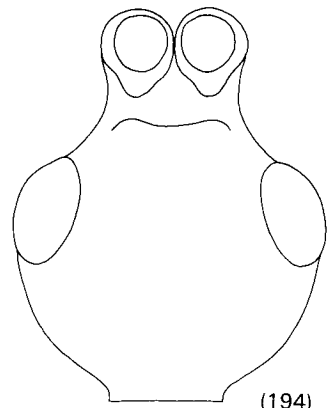
Figure 205 Forewing, male, *Parabetyla* species P95.



(192)

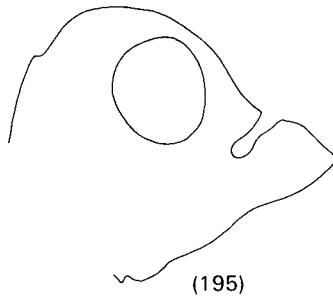


(193)

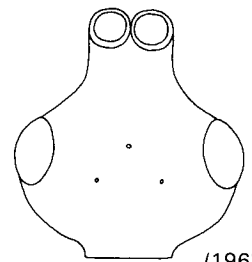


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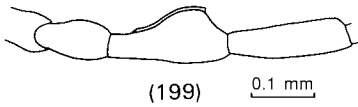
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(195)

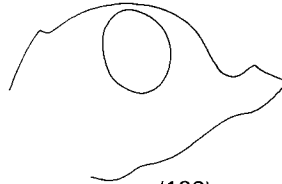


(196)



(199)

0.1 mm



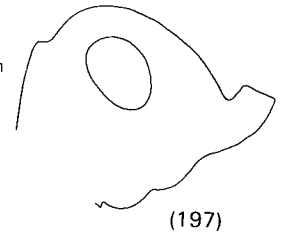
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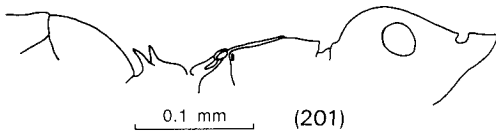


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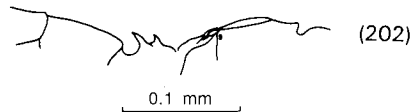


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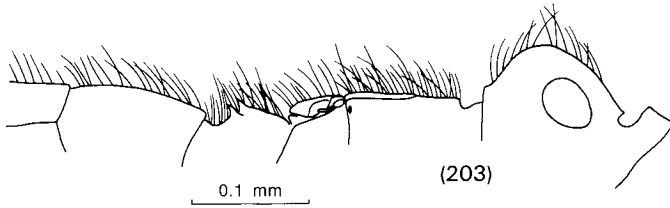
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(201)



(202)

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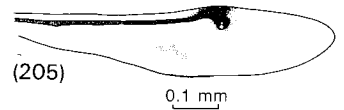


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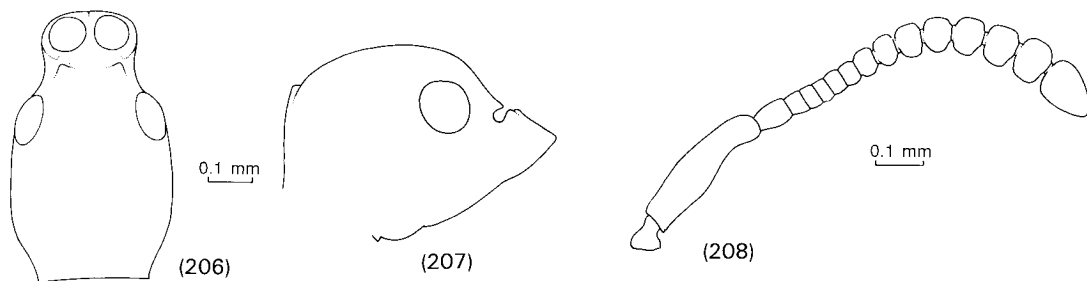


(204)

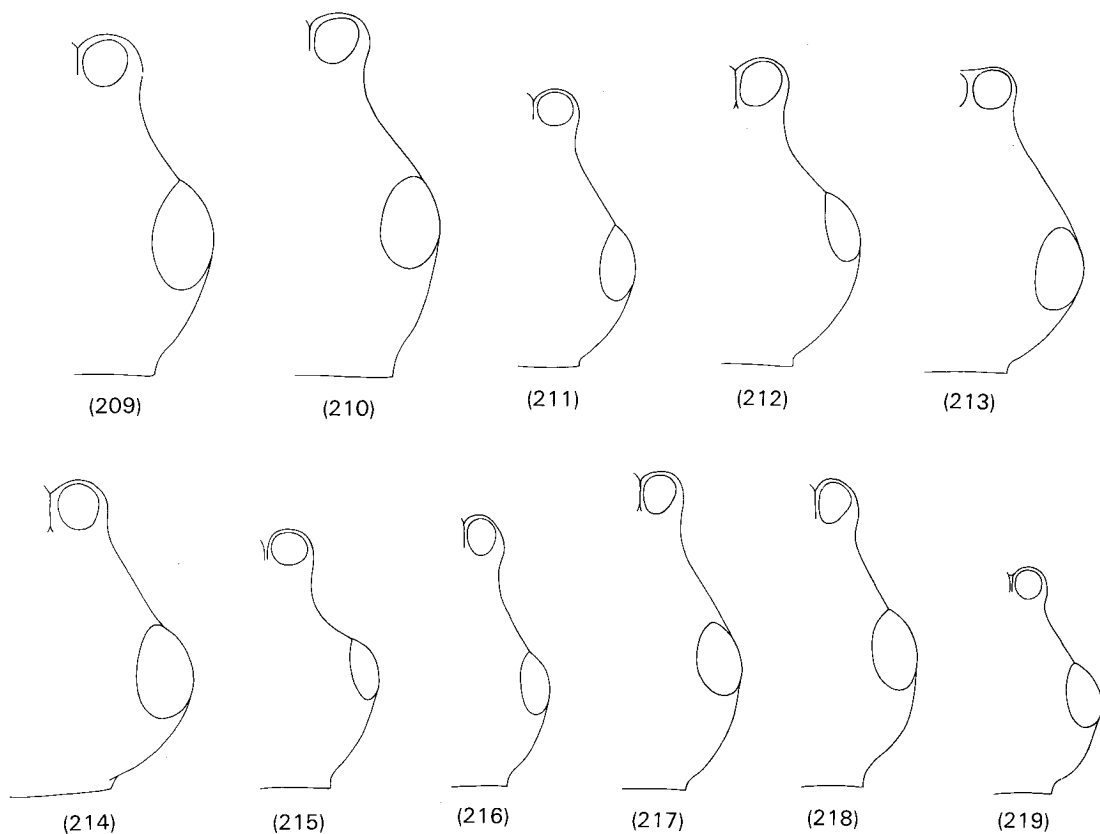


(205)

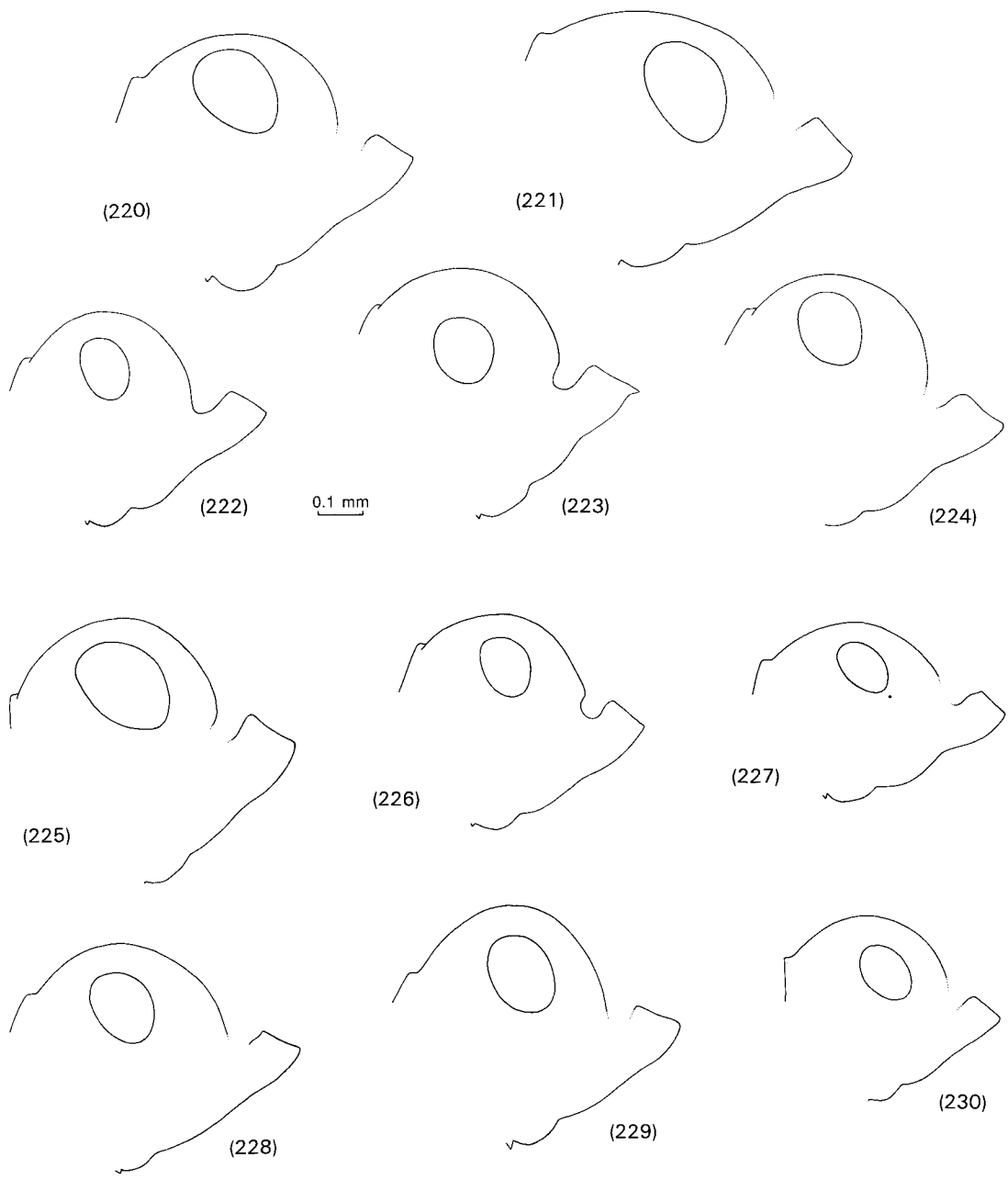
0.1 mm



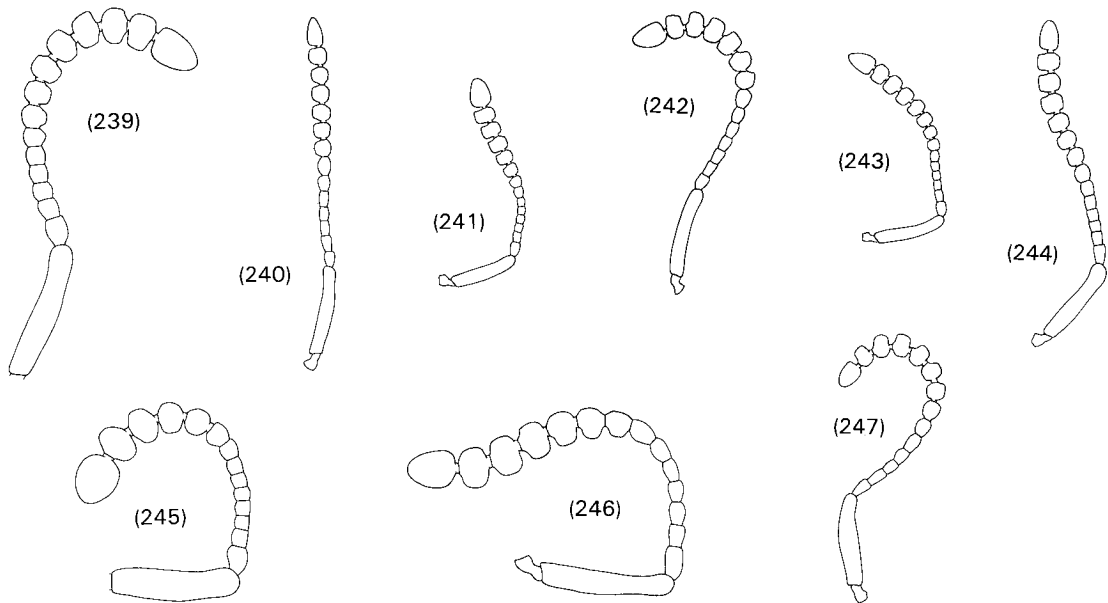
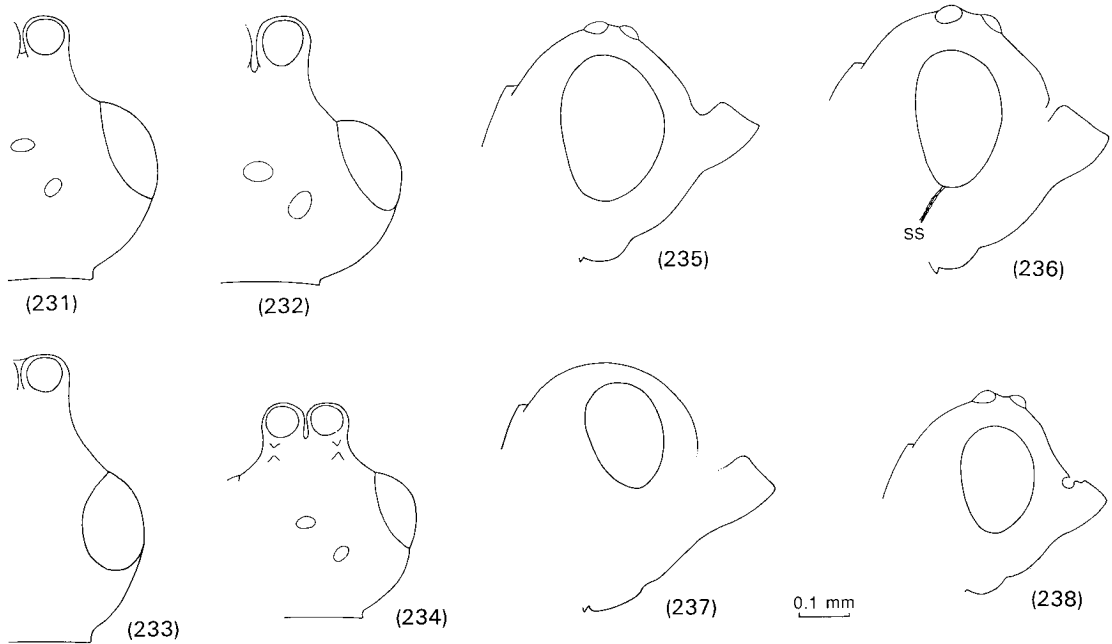
Figures 206–208 *Zealaptera chambersi*, female, head in dorsal and lateral view and antenna.



Figures 209–219 *Betyla* species, heads, female, dorsal: (209) *fulva*; (210) *prosedera*; (211) *auriger*; (212) *thegalea*; (213) *rangatira*; (214) *karamea*; (215) *eupepla*; (216) *tuatara*; (217) *wahine*; (218) *paparoa*; (219) *midas*.

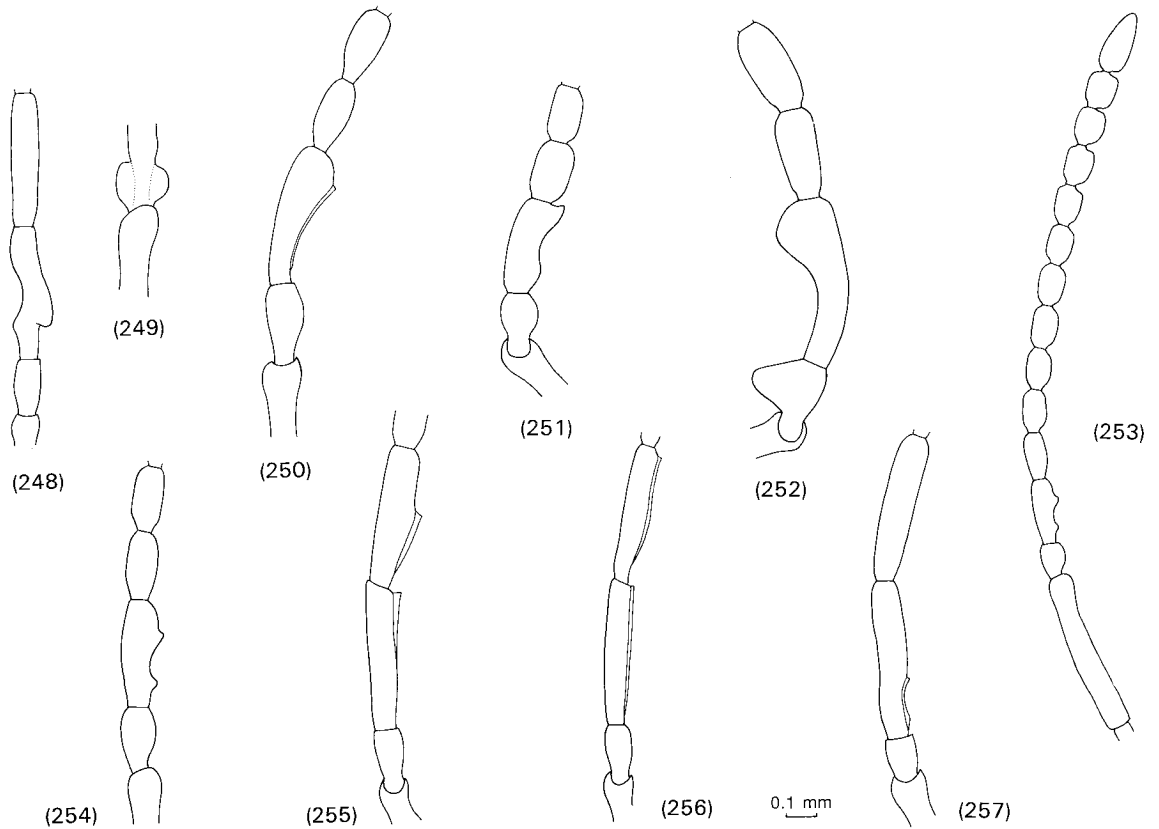


Figures 220–230 *Betyla* species, heads, female, lateral: (220) *fulva*; (221) *prosedera*; (222) *auriger*; (223) *thegalea*; (224) *rangatira*; (225) *kamea*; (226) *eupepla*; (227) *tuatara*; (228) *wahine*; (229) *paparoa*; (230) *midas*.



Figures 231–234 *Betyla* species, heads, male, dorsal: (231) *fulva*; (232) *eupepla*; (233) species P75; (234) species P80. **235–238**, male, lateral: (235) *fulva*; (236) *eupepla*; (237) species P75; (238) species P80.

Figures 239–247 *Betyla* species, antennae, female, entire: (239) *fulva*; (240) *prosedera*; (241) *auriger*; (242) *thegalea*; (243) *rangatira*; (244) *karamea*; (245) *eupepla*; (246) *tuatara*; (247) *wahine*.



Figures 248-257 *Betyla* species, antennae, male: (248, 249) *fulva*, F1 and pedicel respectively deformed; (250) species P75, apex of scape to F3; (251) species P76, same; (252) species P77, same; (253) species P78, entire; (254) species P78, apex of scape to F2; (255) species P79, same; (256) species P80, same; (257) species P81, same.

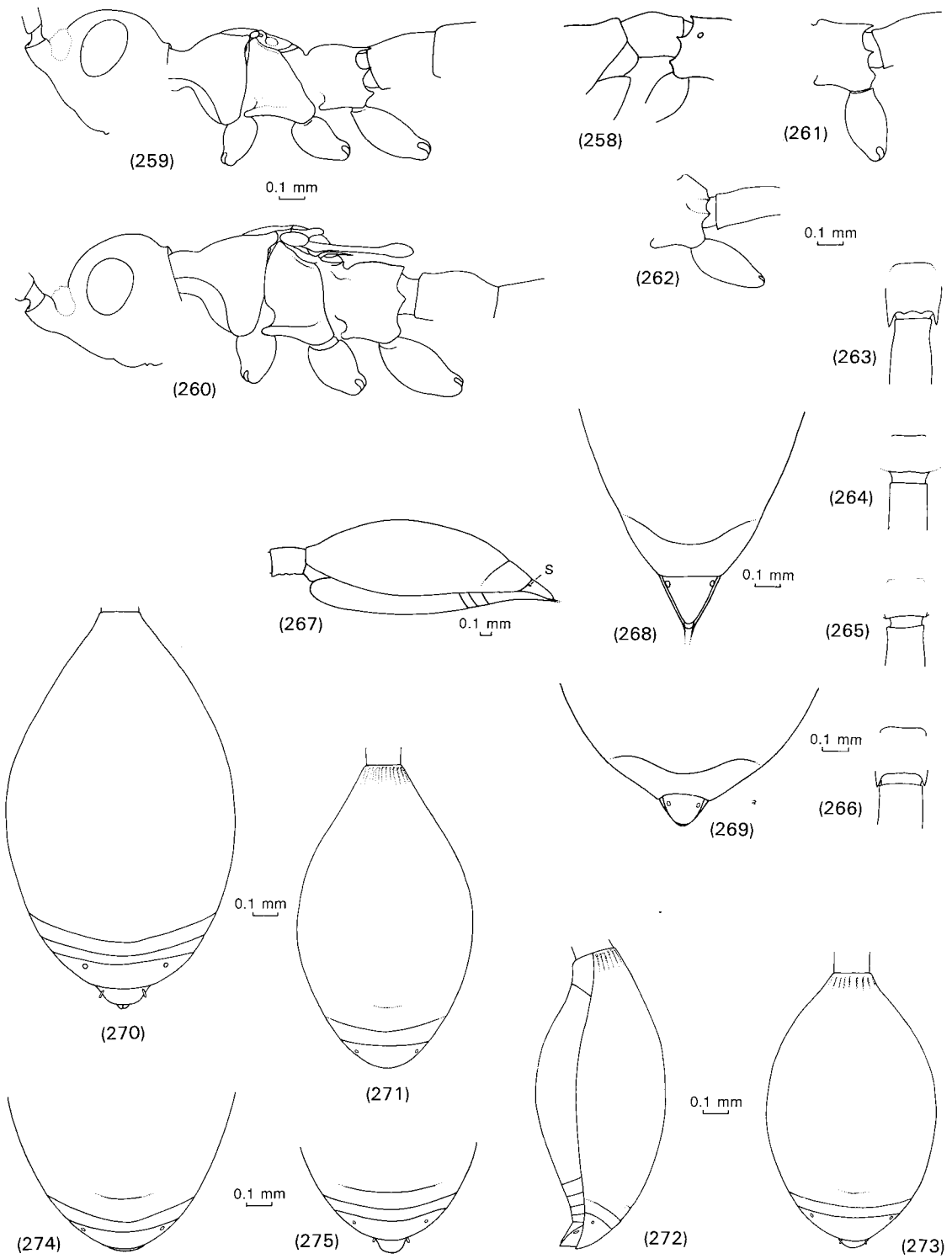
Figure 258 *Betyla fulva*, female, propodeum to anterior gaster, lateral.

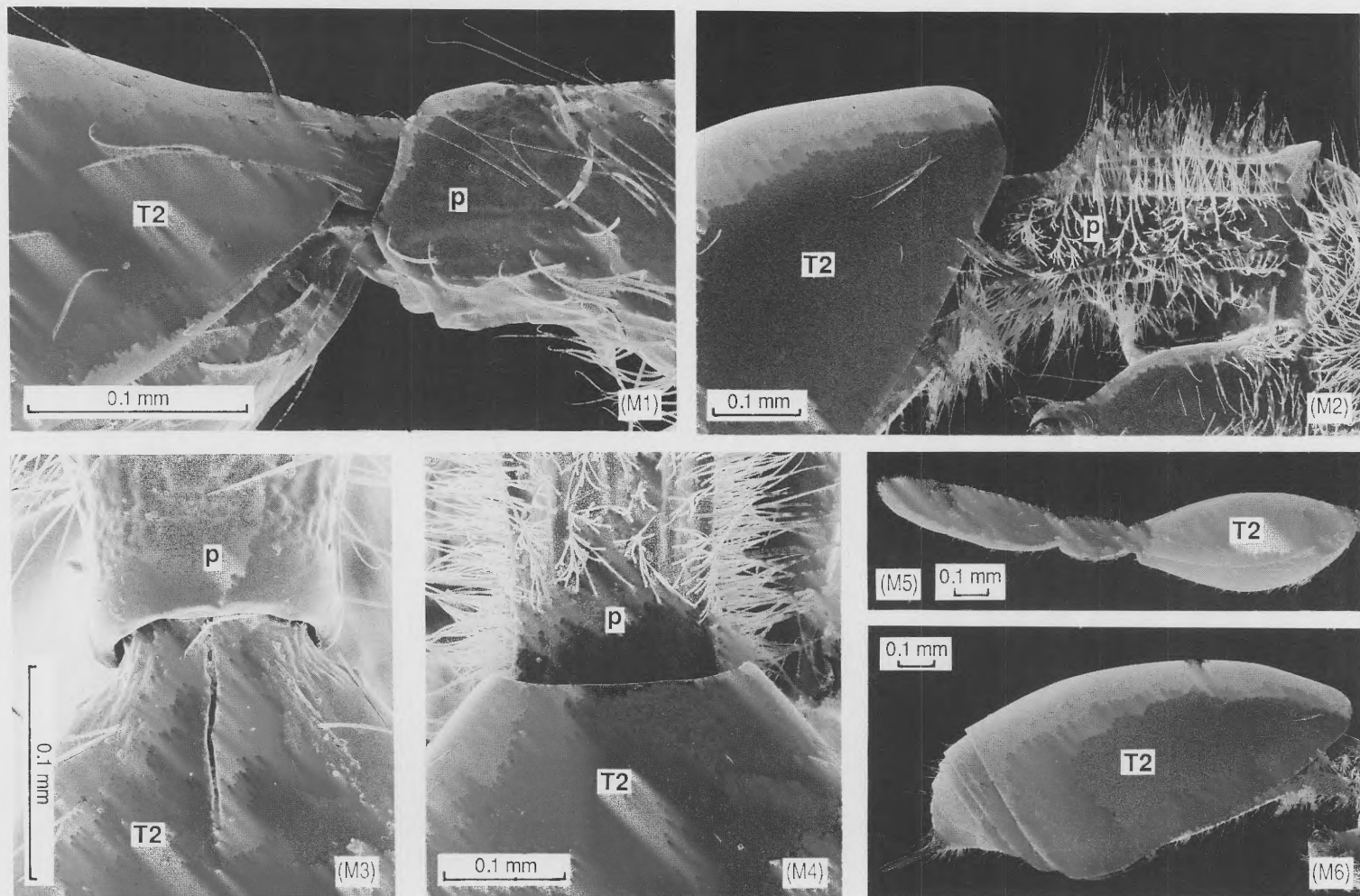
Figures 259, 260 Head to anterior gaster, lateral, *Betyla* species P75 and P77 males.

Figures 261, 262 Propodeum and petiole, lateral, *Betyla* species P78 and P81 males.

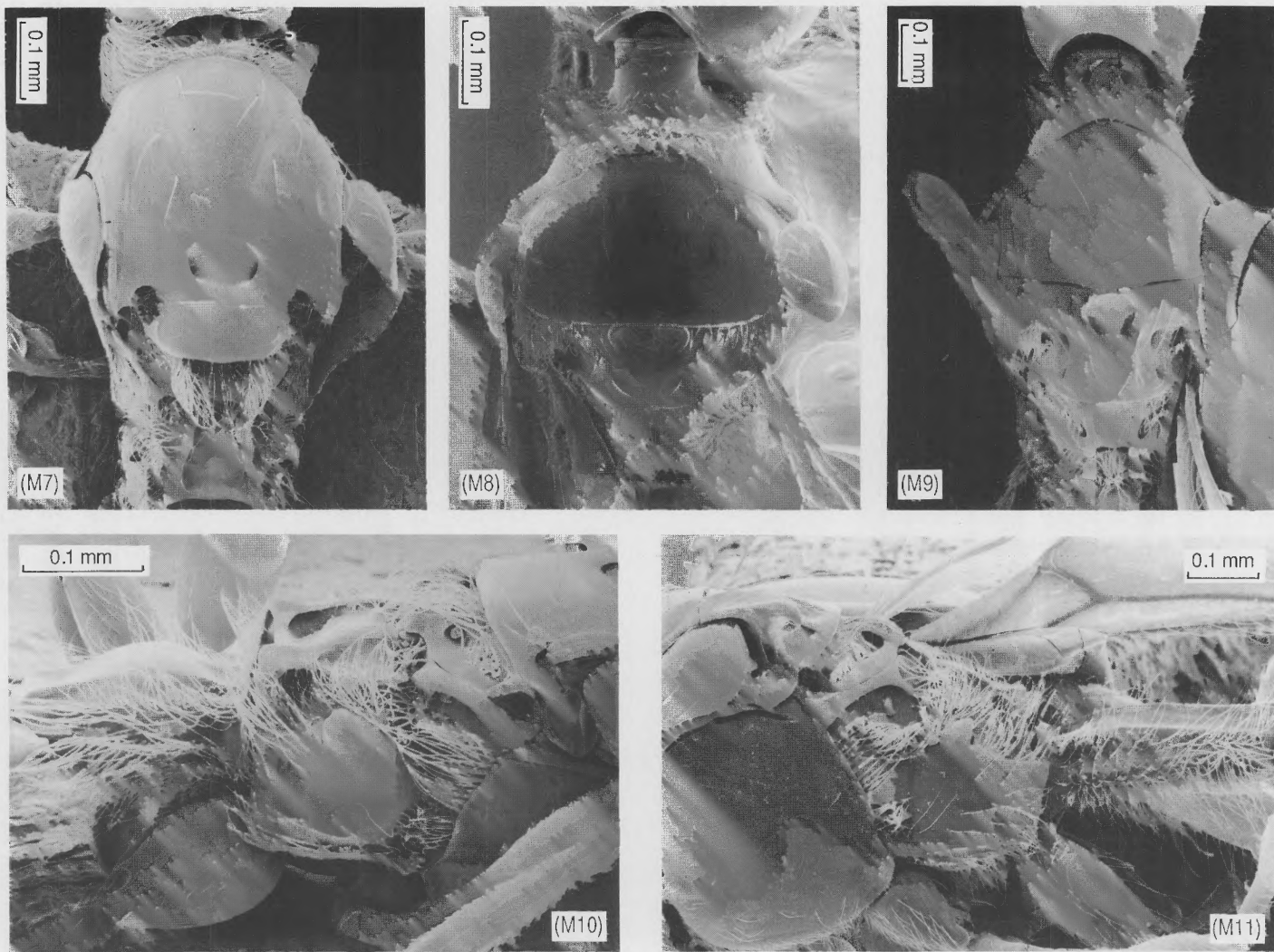
Figures 263-266 Propodeum and petiole, dorsal, *Betyla* species P75, P76, P77, and P78 males.

Figures 267-275 *Betyla* species, pedicel plus gaster or gastral apex alone: (267, 268) *thegalea*, female, lateral and dorsal; (269, 270) *fulva*, dorsal, female and male; (271, 272) species P75, male, dorsal and lateral; (273) species P76, male, dorsal; (274) species P77, same; (275) species P78, same.

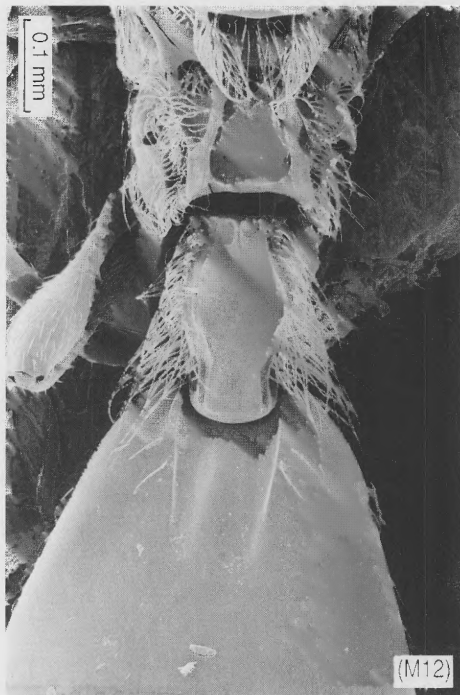




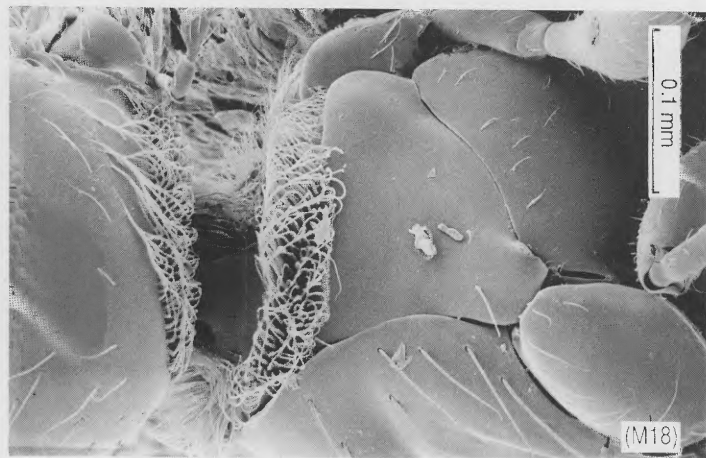
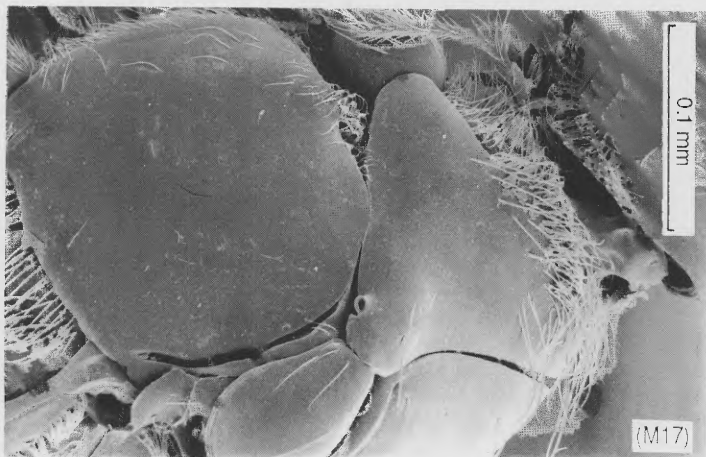
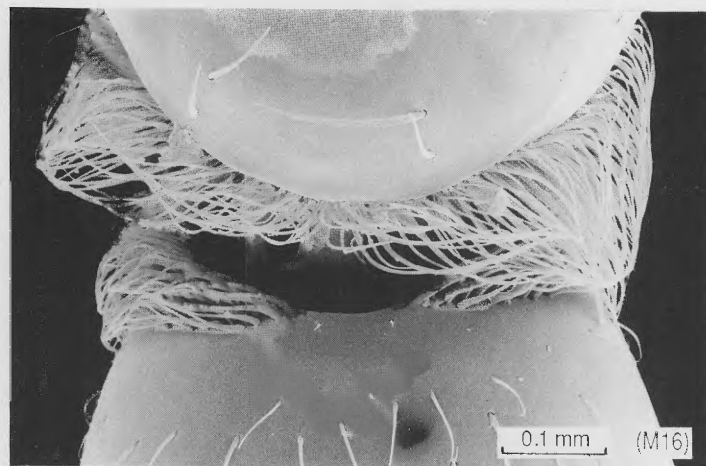
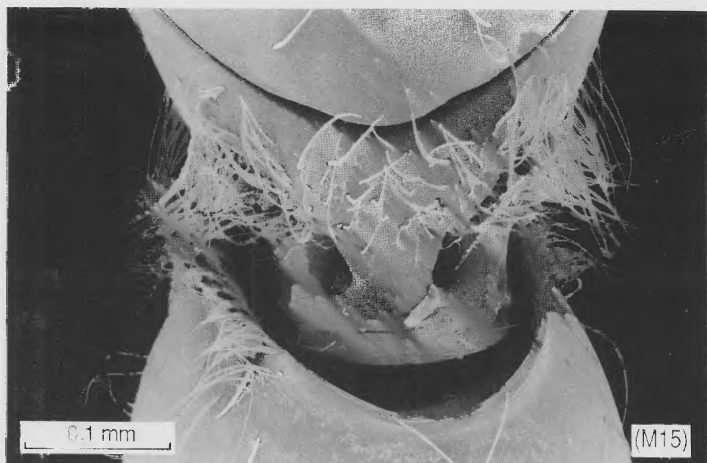
Figures M1-6 Metasoma of female belytine (*Stylaclista* sp. - M1, 3, 5) and diapiirine (*Spilomicrus* sp. - M2, 4, 6): (M1, 2) petiole and T2, lateral; (M3, 4) same, dorsal; (M5, 6) gaster, lateral.



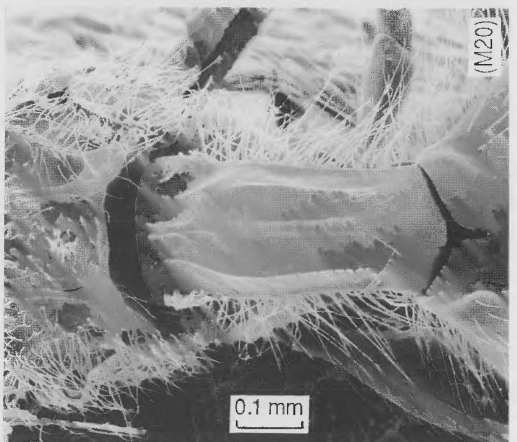
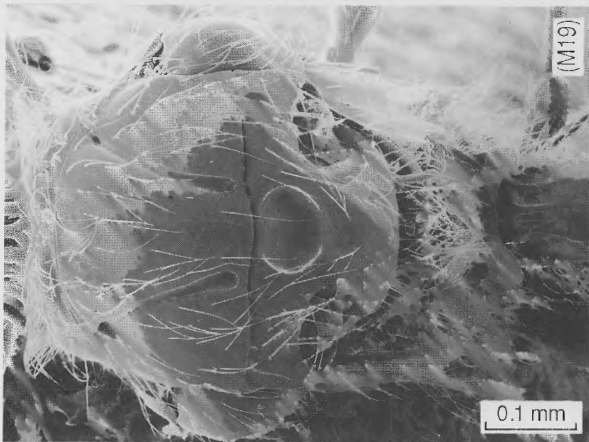
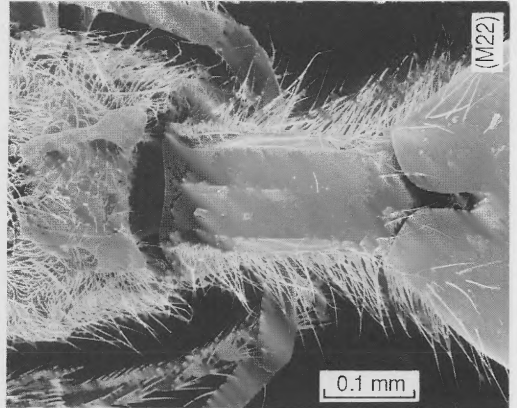
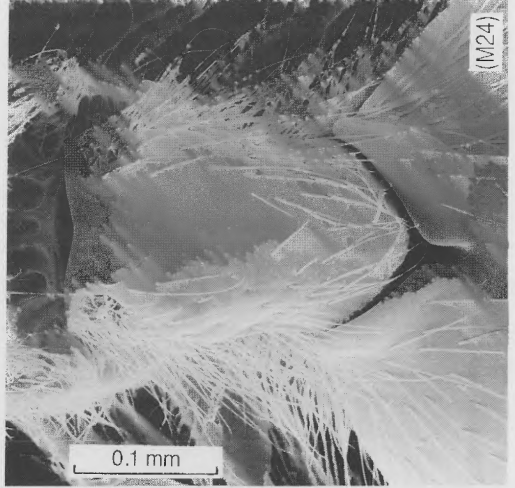
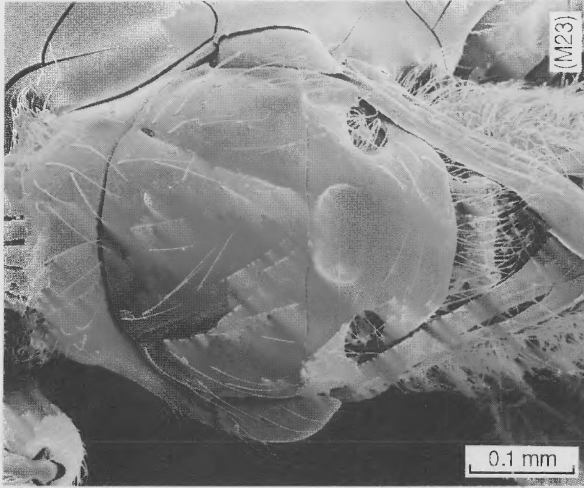
Figures M7-11 *Archaeopria* species, mesosoma, dorsal (M7-9) and lateral (M10, 11): (M7) *eriodes*, male; (M8) *pelor*, female; (M9) *pristina*, male; (M10) *eriodes*, male; (M11) *pristina*, male.

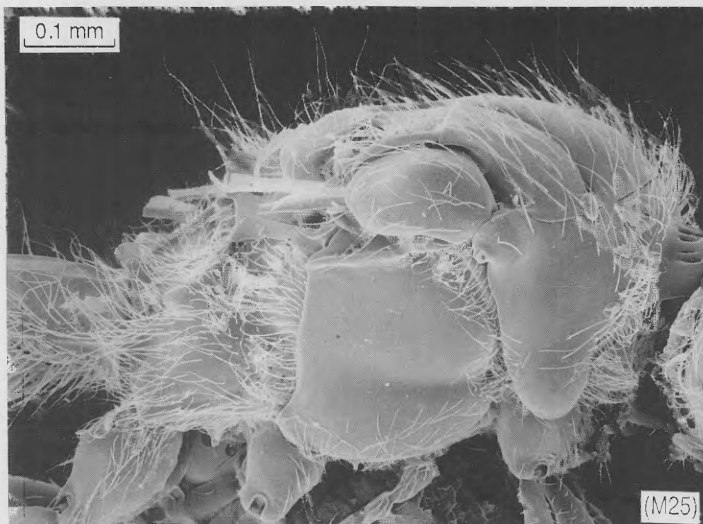


Figures M12–14 *Archaeopria* species, propodeum to anterior T2, dorsal: (M12) *eriodes*, male; (M13) *pelor*, female; (M14) *pristina*, male.



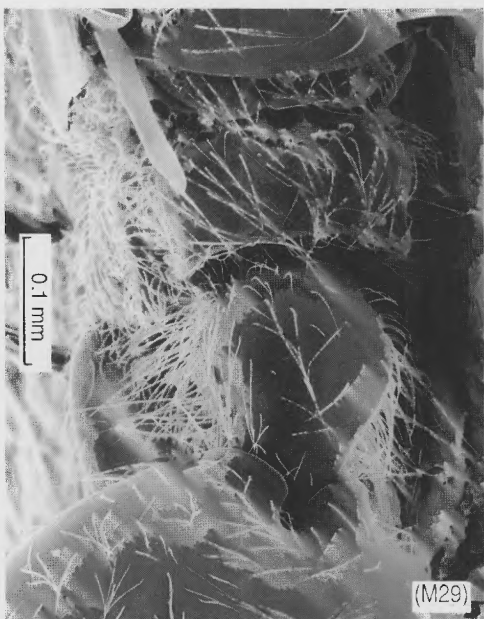
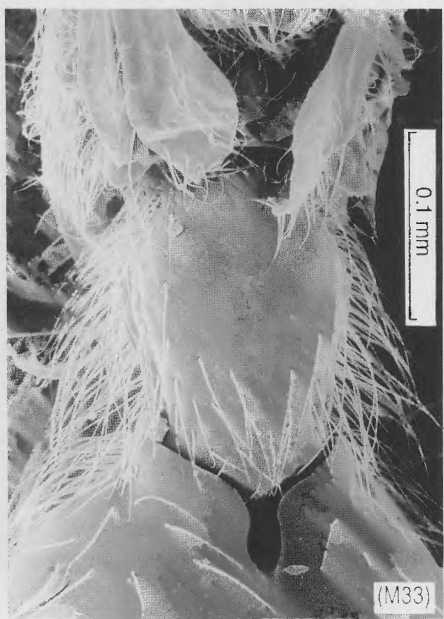
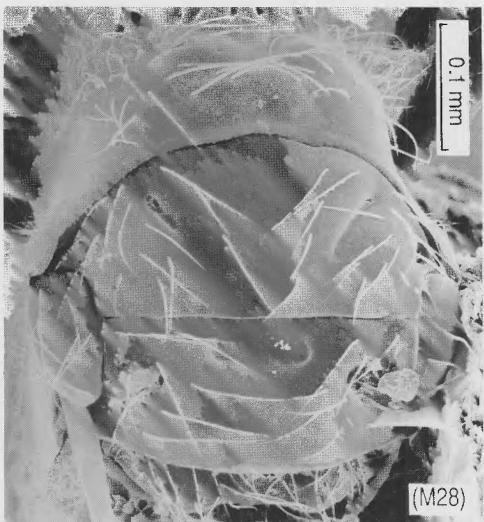
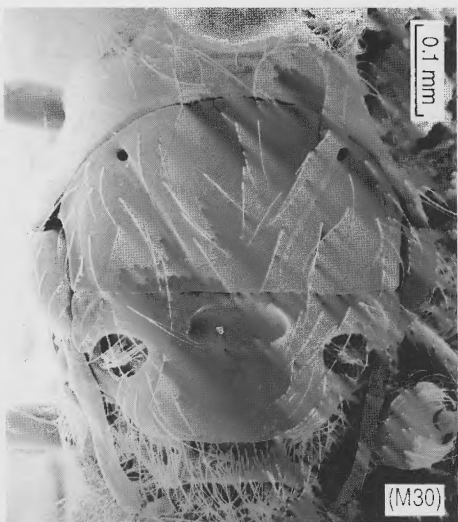
Figures M15–18 *Archaeopria* species, males, mesosoma and neck region, showing pubescence: (M15) *eriodes*, lateral; (M16) *pristina*, lateral; (M17) *eriodes*, dorsal; (M18) *pristina*, dorsal.

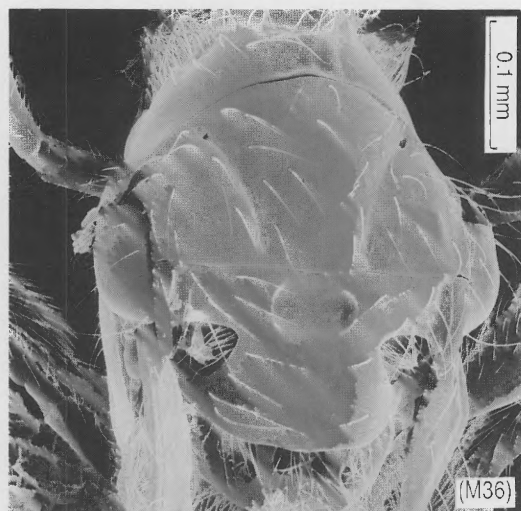
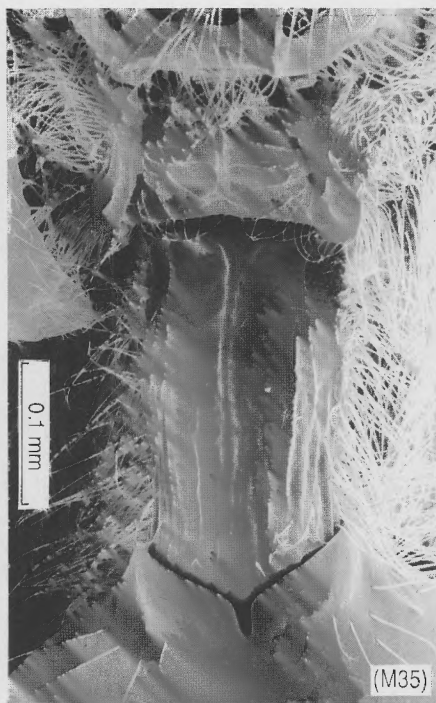
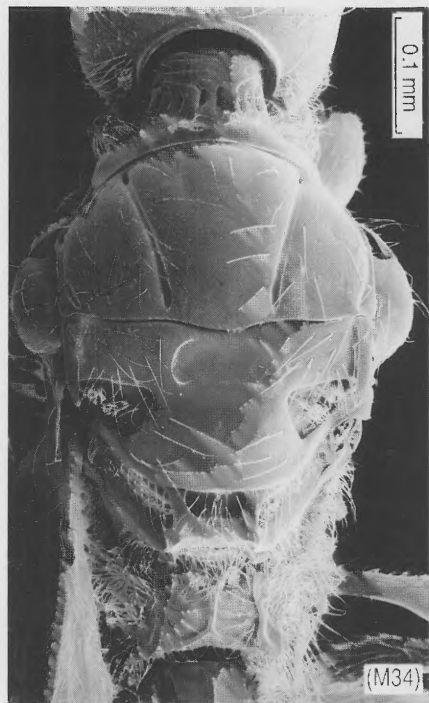




Figures M19–24 *Pantolytomyia* species, females, dorsal: (M19, 20) *flocculosa*, pronotum to metanotum and metanotum to anterior T2; (M21, 22) *tungane*, same; (M23, 24) *takere*, pronotum to propodeum and petiole to anterior T2.

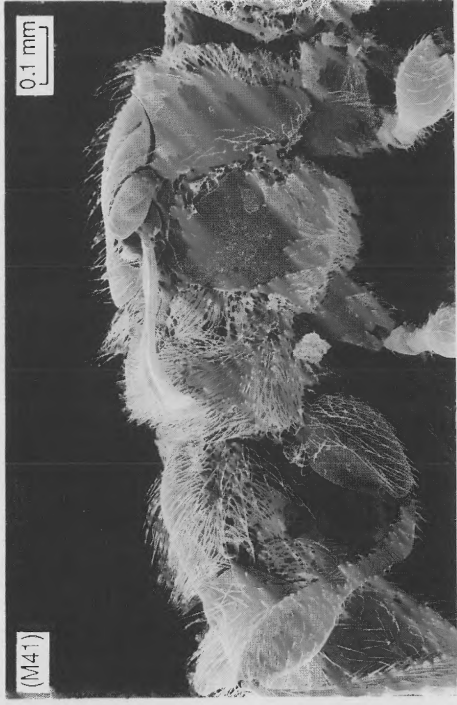
Figures M25–27 *Pantolytomyia* species, females, mesosoma, lateral: (M25) *flocculosa*; (M26) *tungane*; (M27) *takere*.

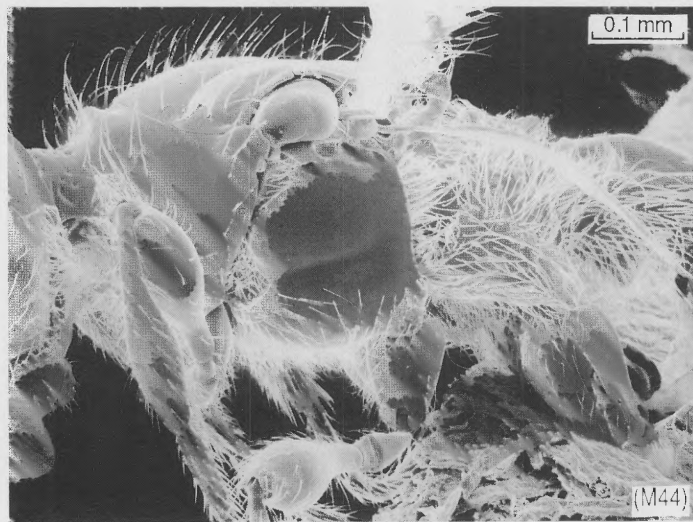
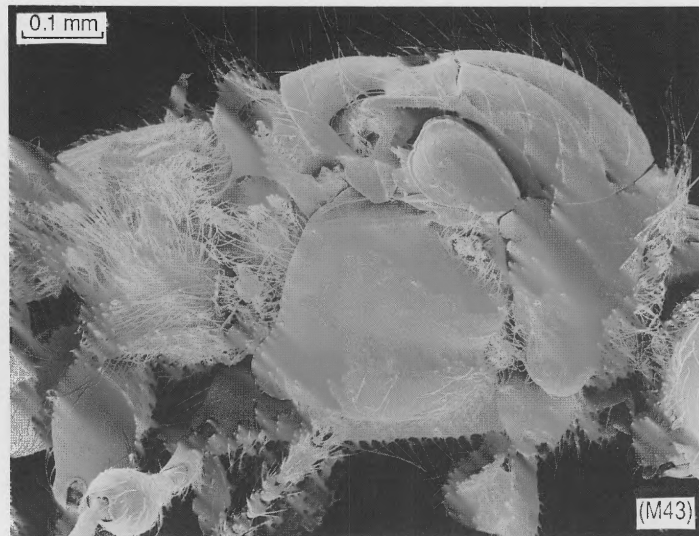




Figures M28–33 *Pantolytomyia* species, dorsal: (M28, 29) *polita*, male, pronotum to mesoscutellum and metanotum to anterior T2; (M30, 31) *insularis*, female, same; (M32, 33) *wairua*, female, mesosoma and petiole to anterior T2.

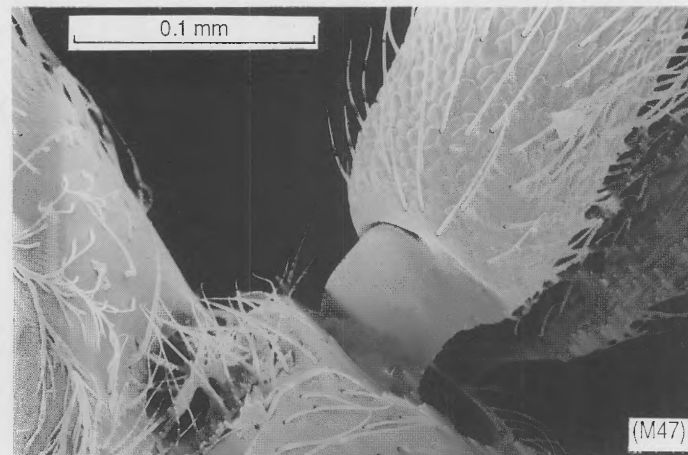
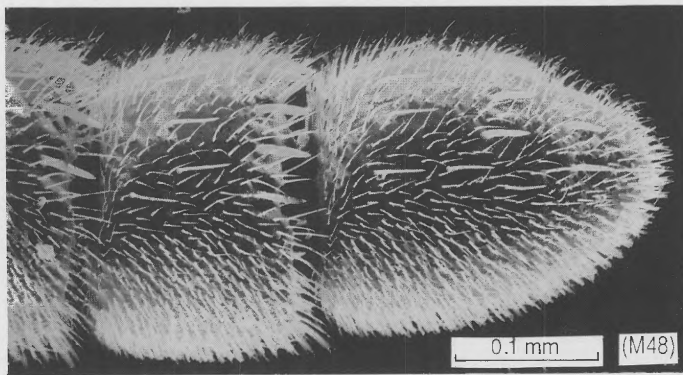
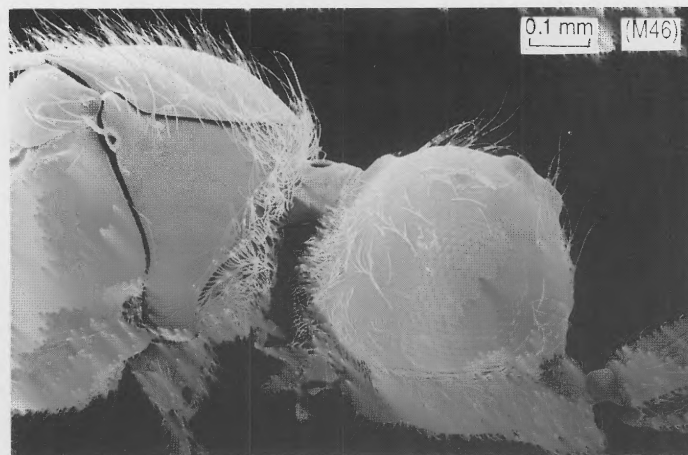
Figures M34–37 *Pantolytomyia taurangi*, females, pronotum to mesoscutellum and metanotum to anterior T2, dorsal: (M34, 35) macropter; (M36, 37) brachypter.





Figures M38–41 *Pantolytomyia* species, mesosoma, lateral: (M38) *polita*, male; (M39, 40) *insularis*, female, with detail of pronotum; (M41) *insularis*, male.

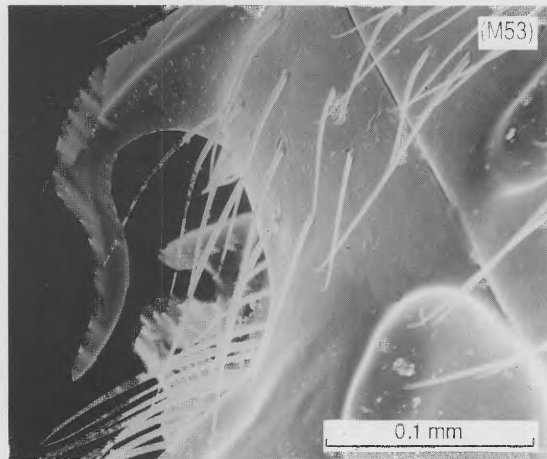
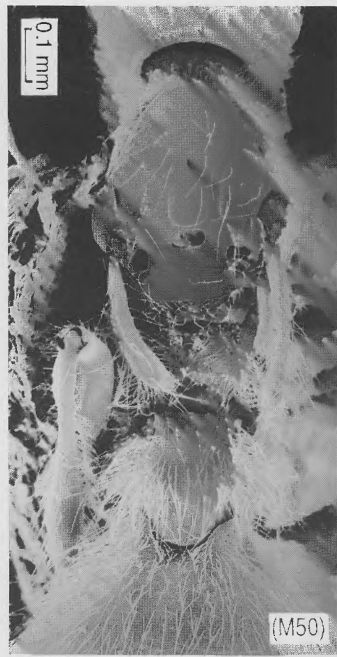
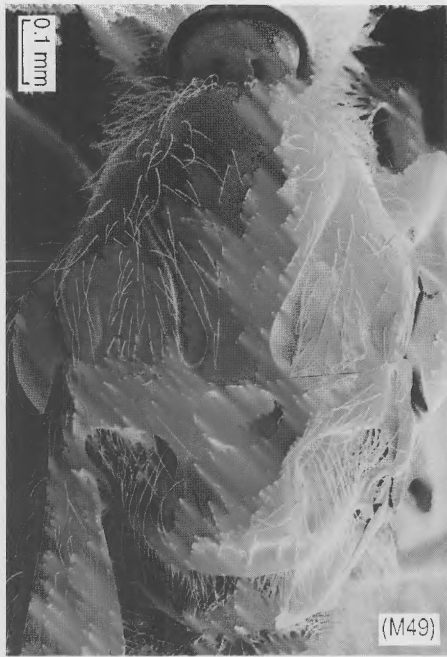
Figures M42–44 *Pantolytomyia* species, females, mesosoma, lateral: (M42) *wairua*; (M43, 44) *taurangi*, macropter and brachypter.

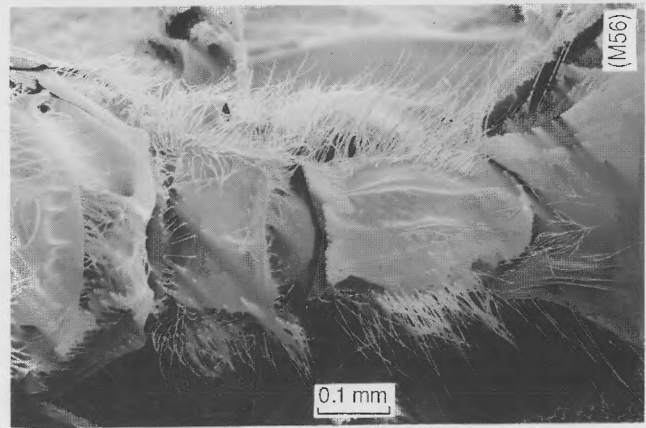
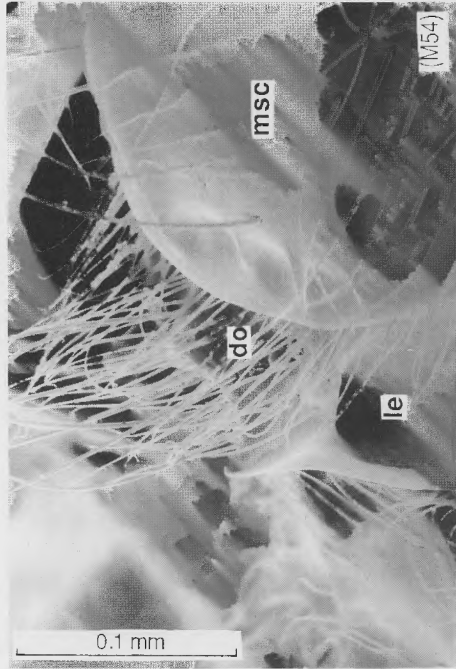
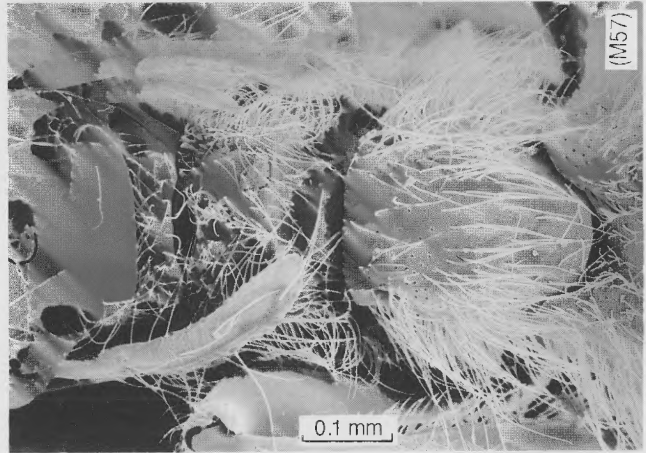
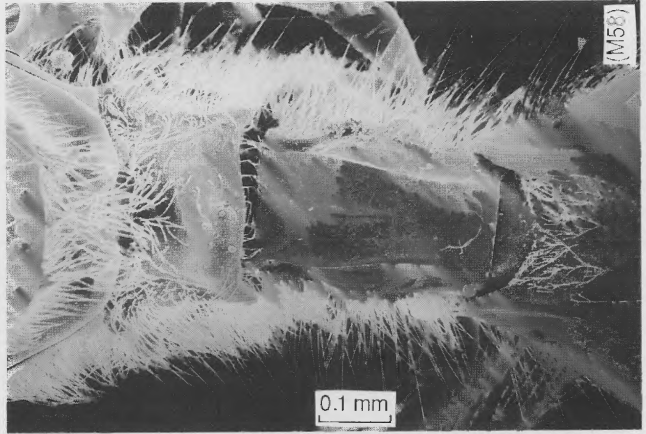
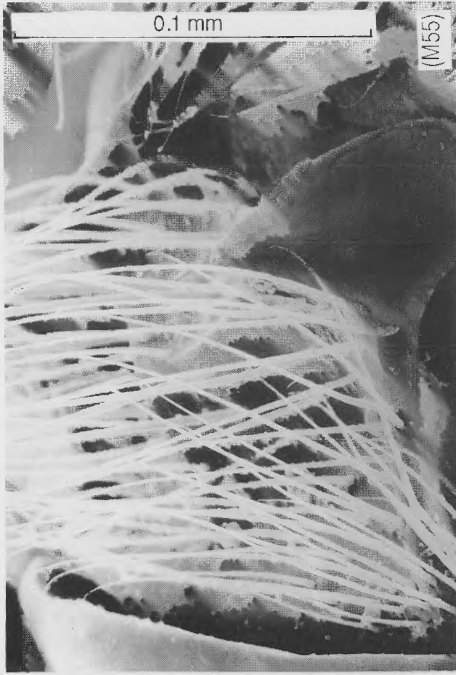


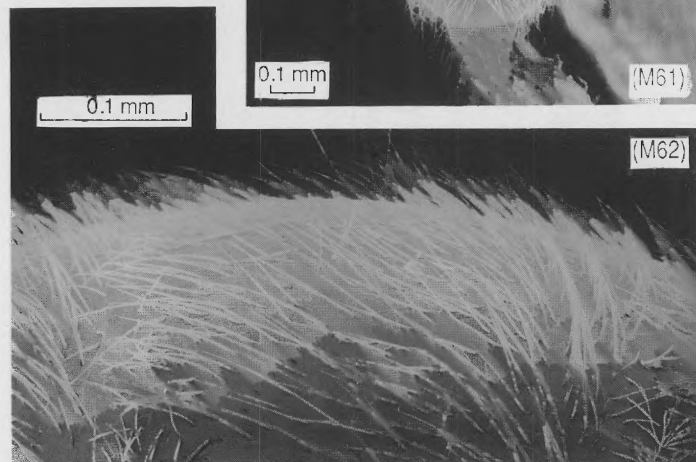
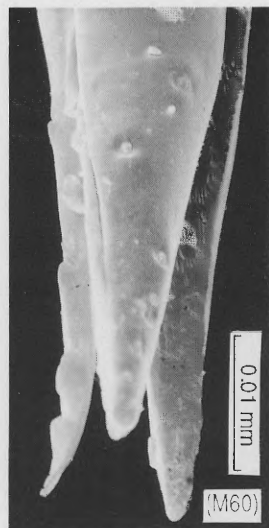
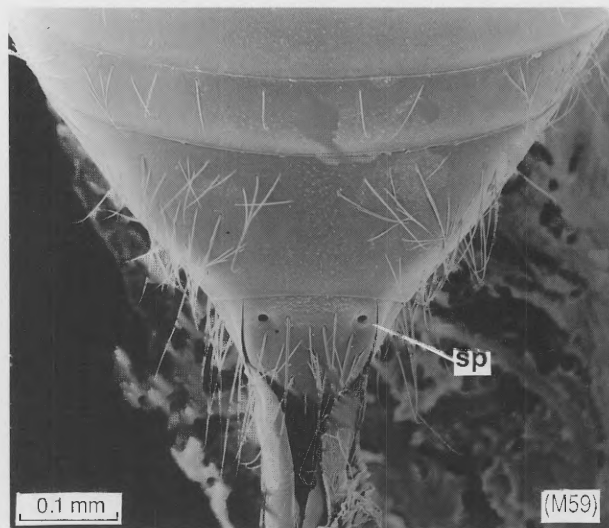
Figures M45-47 *Diphoropria sinuosa*, macropterous female: (M45) head, dorsal; (M46) head and pronotum, lateral; (M47) base of scape, lateral.

Figure M48 *Diphoropria kuscheli*, female, antennal segments F12, 13.

Figures M49-53 *Diphoropria* species, females: (M49) *sinuosa*, macropter, mesosoma, dorsal; (M50) *sinuosa*, Type B brachypter, mesosoma to anterior T2, dorsal; (M51) *kuscheli*, mesosoma, dorsal; (M52) *sinuosa*, macropter, mesosoma, lateral; (M53) *kuscheli*, axillar process, inner surface, dorsolateral.

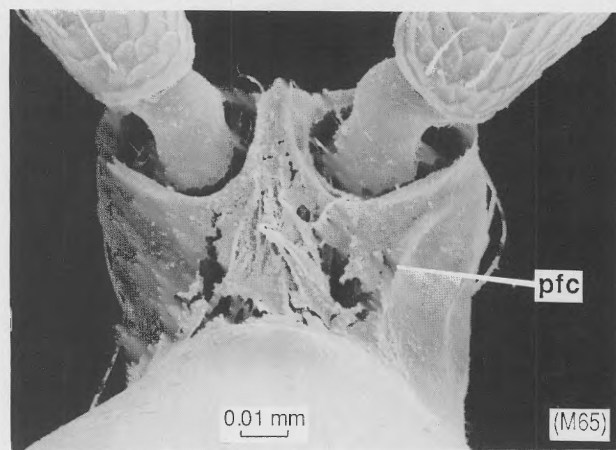
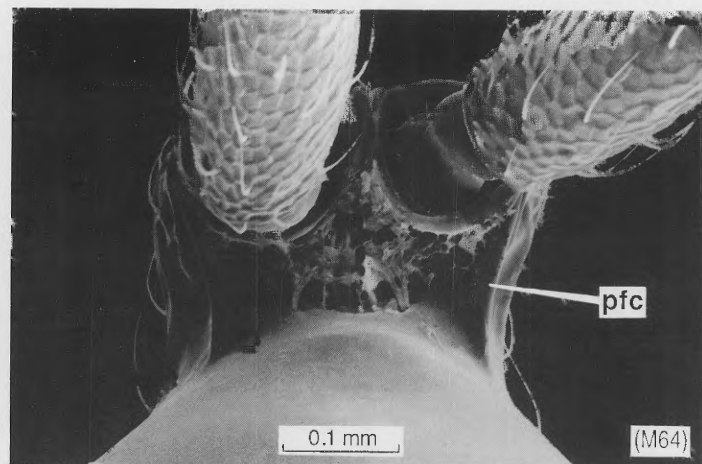
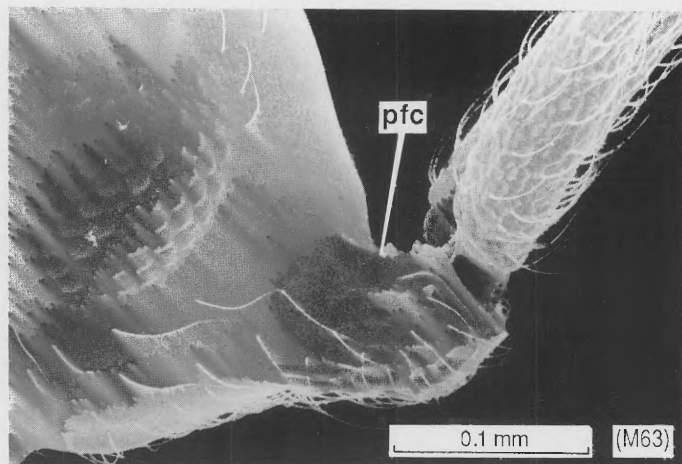




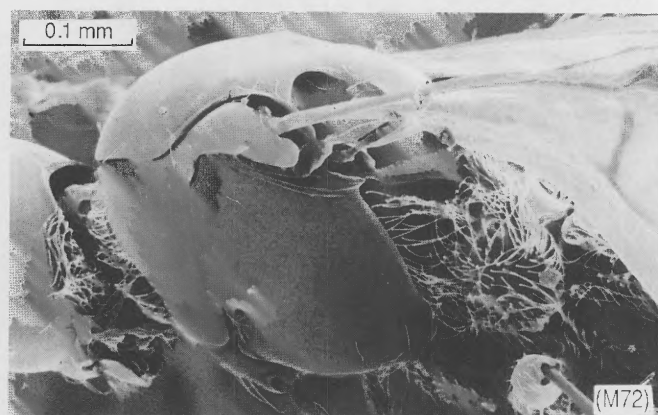
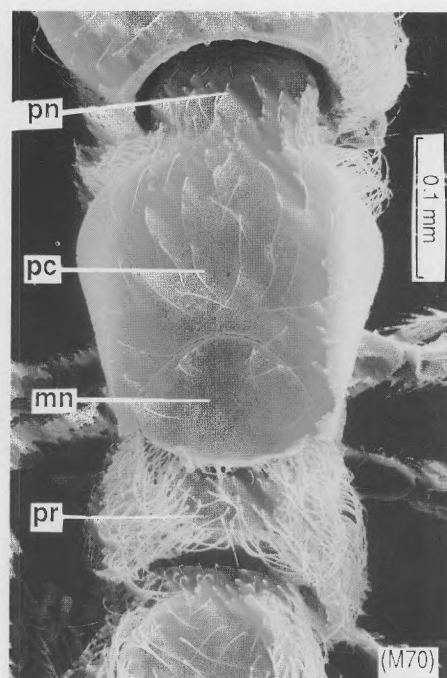
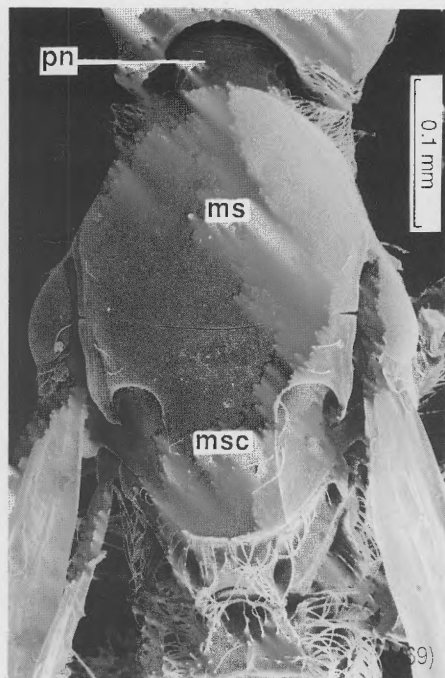


Figures M54–58 *Diphoropria* species, females: (M54) *sinuosa*, macropter, dorsellum, dorsolateral; (M55) *kuscheli*, dorsellum, dorsolateral; (M56) *sinuosa*, macropter, metanotum to anterior T2, dorsal; (M57) *sinuosa*, Type B brachypter, mesoscutellum to petiole, dorsal; (M58) *kuscheli*, metanotum to anterior T2, dorsal.

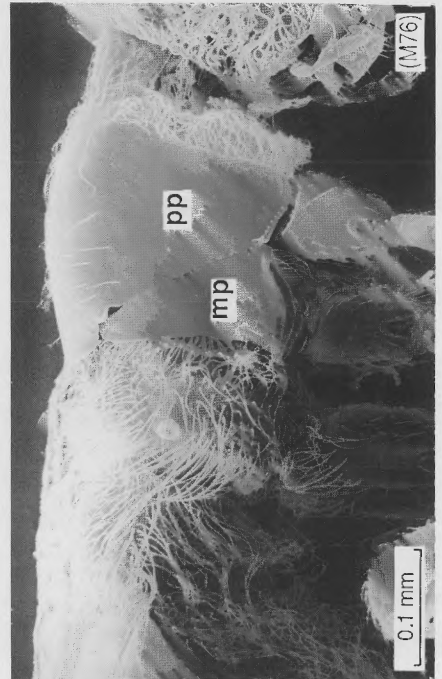
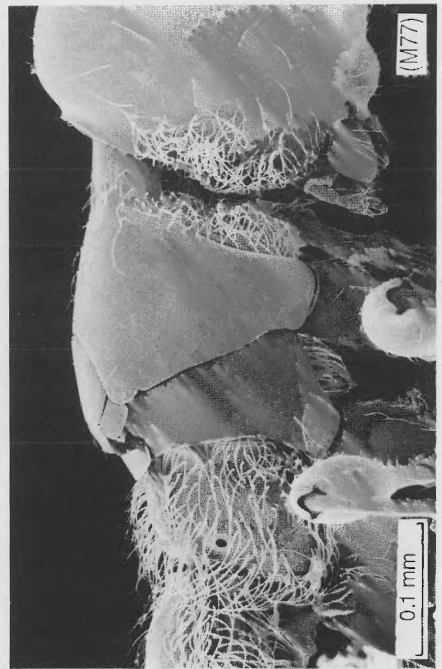
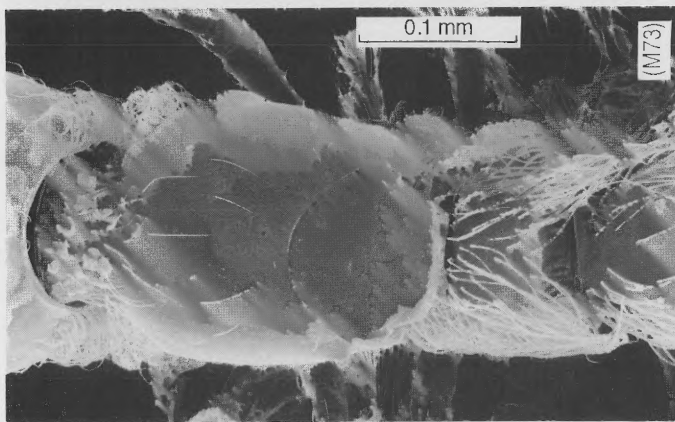
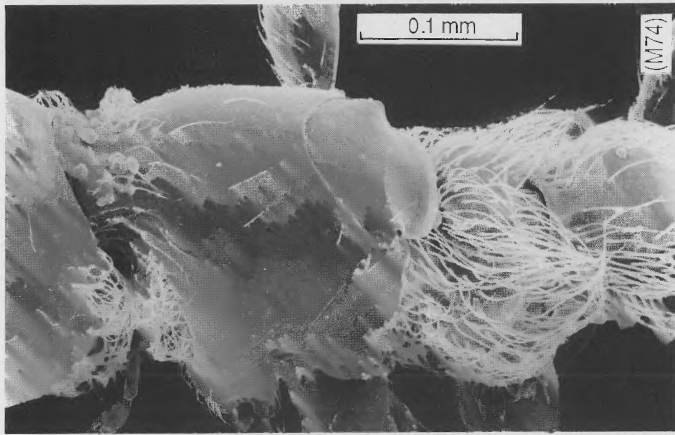
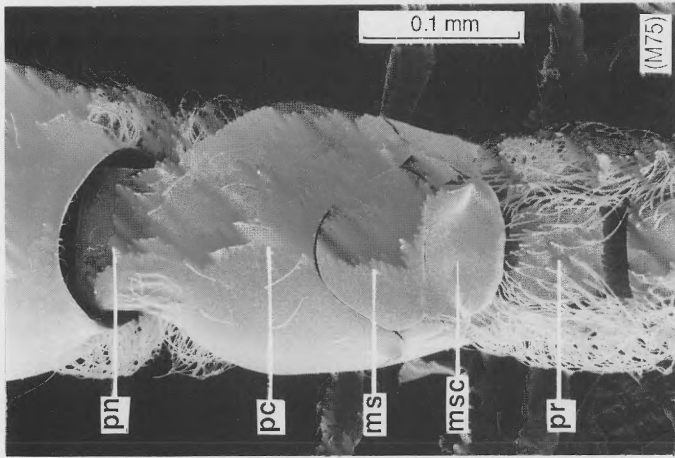
Figures M59–62 *Diphoropria sinuosa*, female: (M59, 60) macropter, apical tergites of gaster and tip of ovipositor; (M61, 62) Type B brachypter, metasoma and pubescence of T2, dorsal.



Figures M63–67 *Maoripria verticillata*: (M63, 64) brachypterous female, antennal sockets, lateral and dorsal; (M65) macropterous male, antennal sockets, dorsal; (M66, 67) male, apex of scape to base of F2, with enlargement of F1.

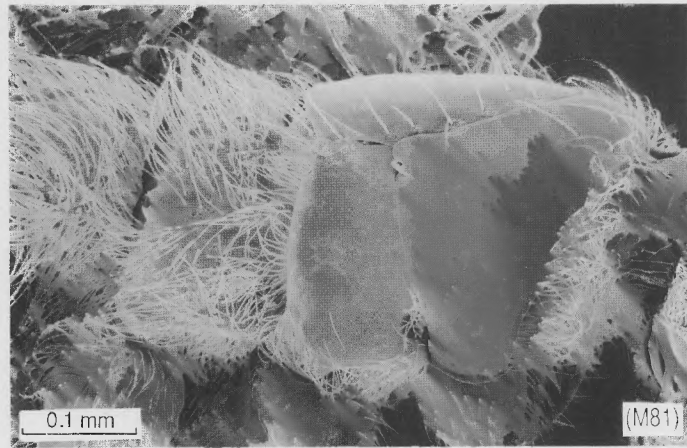
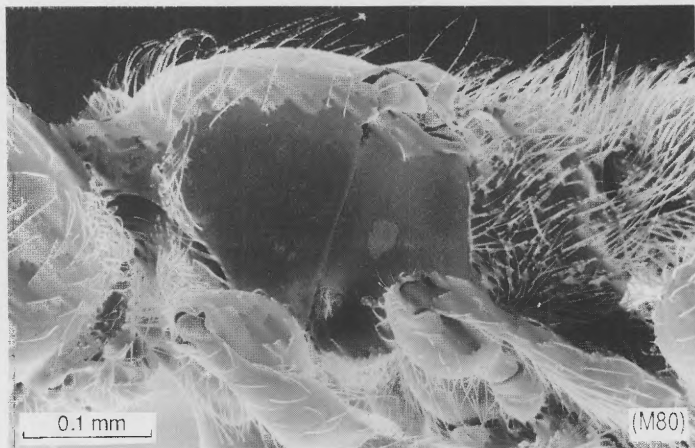
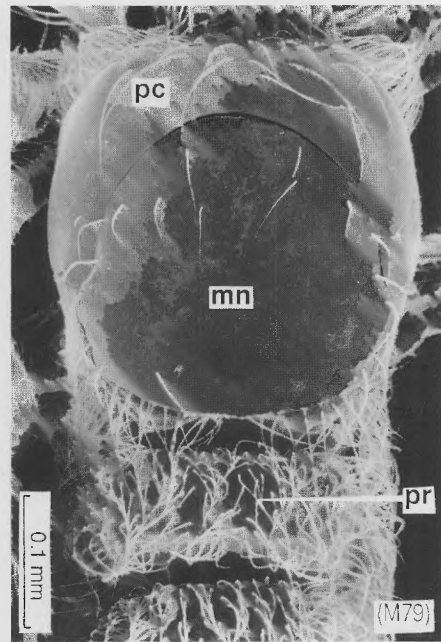
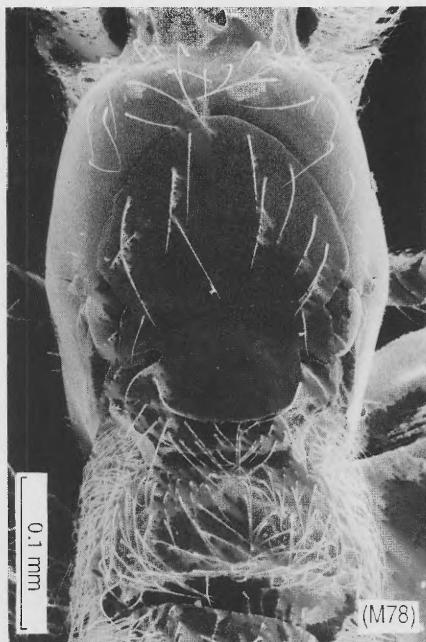


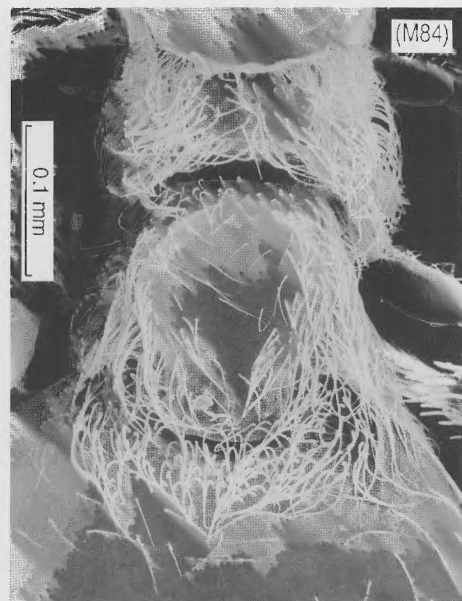
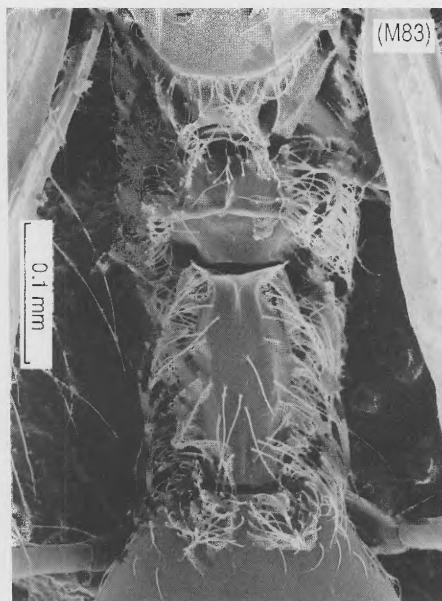
Figures M68–72 *Maoripria* species, mesosoma: (M68) *verticillata*, brachypterous female, dorsal; (M69) *verticillata*, macropterous male, dorsal; (M70) *annettae*, female; (M71) *verticillata*, brachypterous female; (M72) *verticillata*, macropterous male.



Figures M73–77 *Maqipria annettae*, mesosoma:
(M73, 74) male with no mesoscutal / mesoscutellar
suture, dorsal and dorsolateral; (M75) male with
suture, dorsal; (M76) female, lateral; (M77) male,
lateral.

Figures M78–81 *Maqipria* species, females,
mesosoma: (M78) *earlyi*, dorsal; (M79) *masneri*,
dorsal; (M80) *earlyi*, lateral; (M81) *masneri*, lateral.

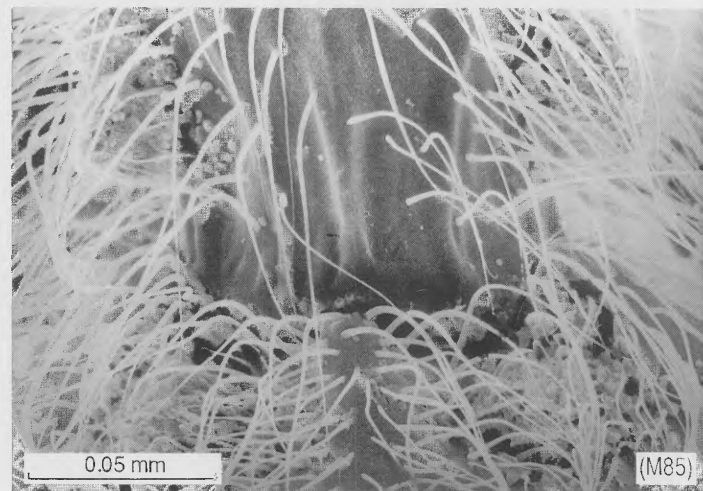


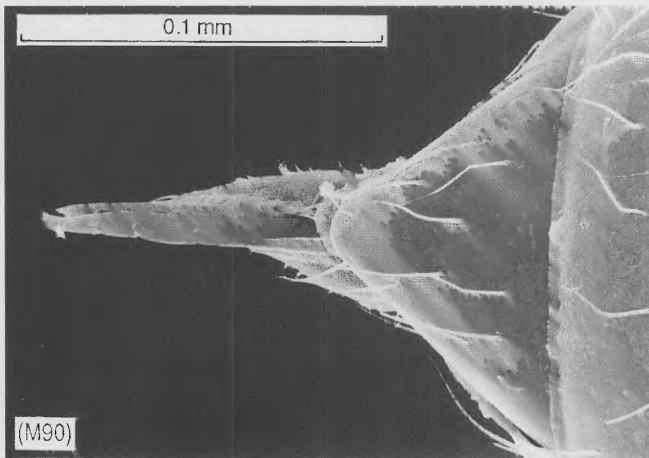
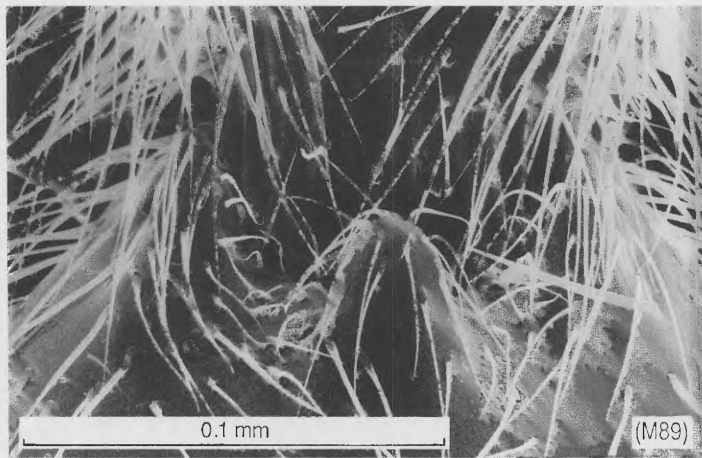
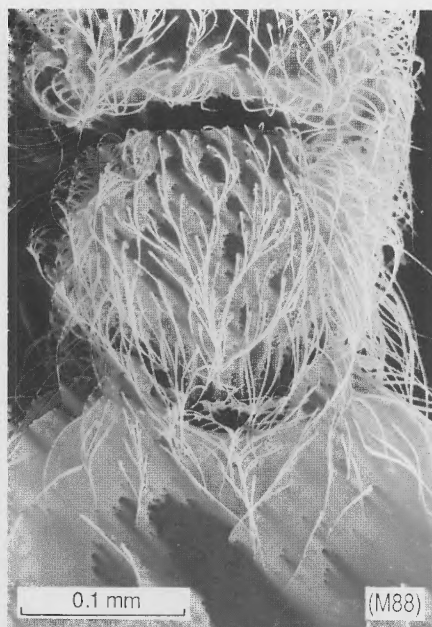
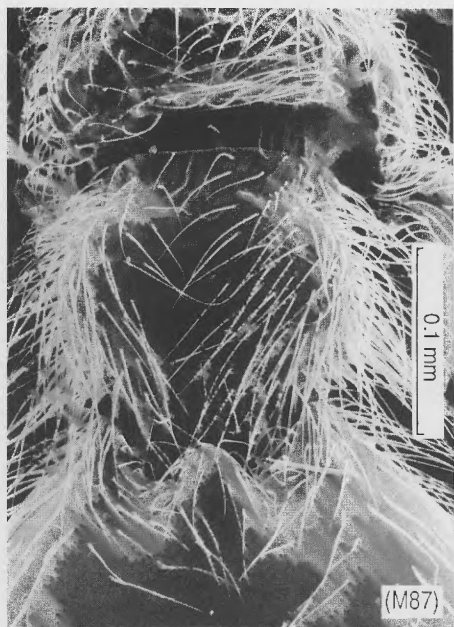
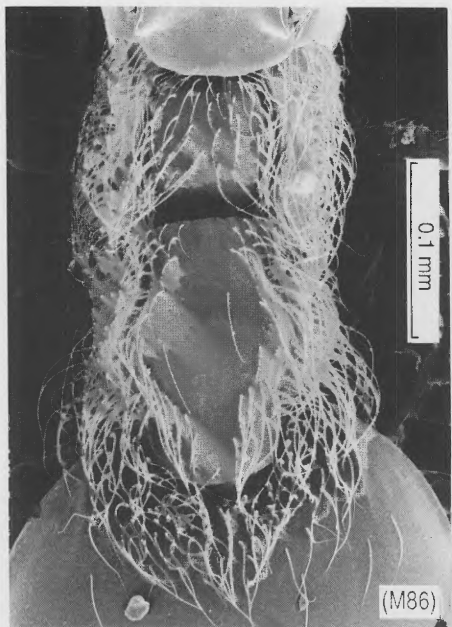


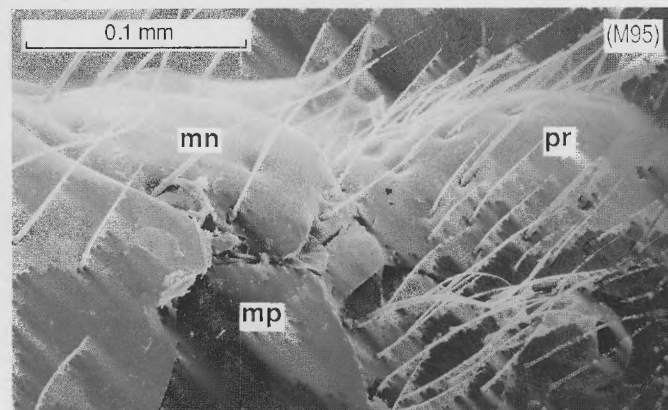
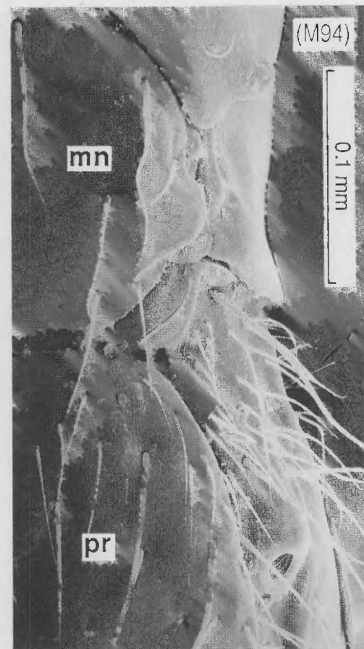
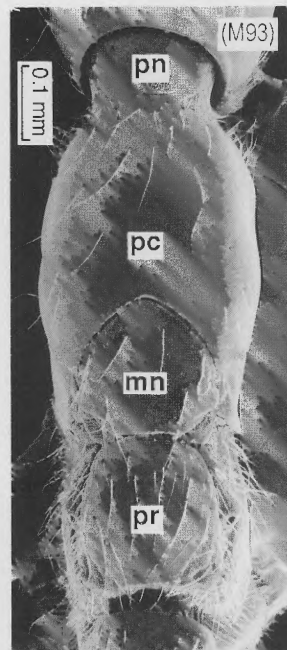
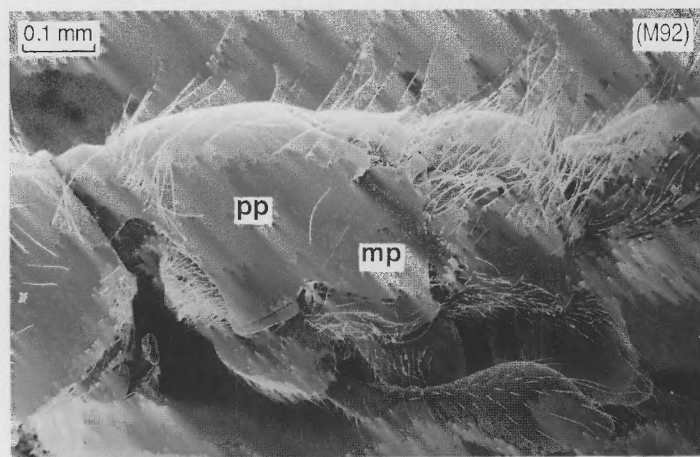
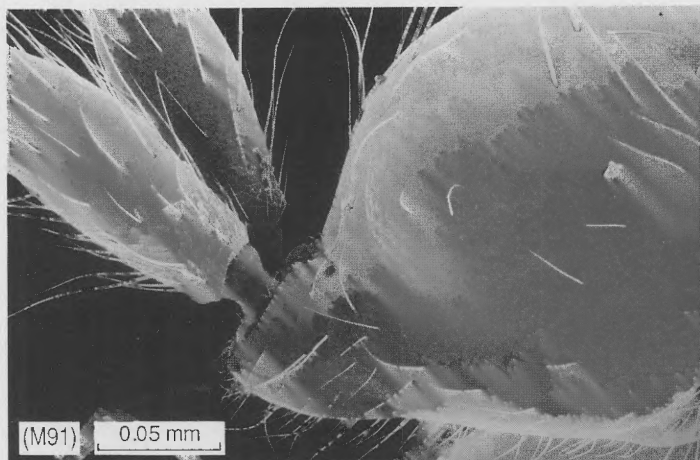
Figures M82–85 *Maipria* species, propodeum to anterior T2, dorsal: (M82) *verticillata*, brachypterous female; (M83) *verticillata*, macropterous male; (M84) *annettae*, female; (M85) petiole/T2, enlarged from M82.

Figures M86–89 *Maipria* species, propodeum to anterior T2, dorsal: (M86) *annettae*, male; (M87) *earlyi*, female; (M88) *masneri*, female; (M89) petiole/T2, enlarged from M87.

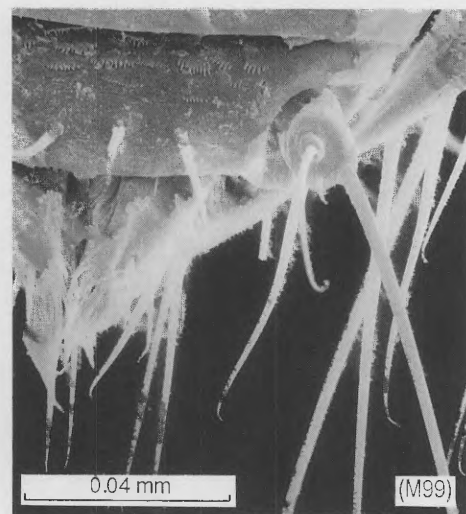
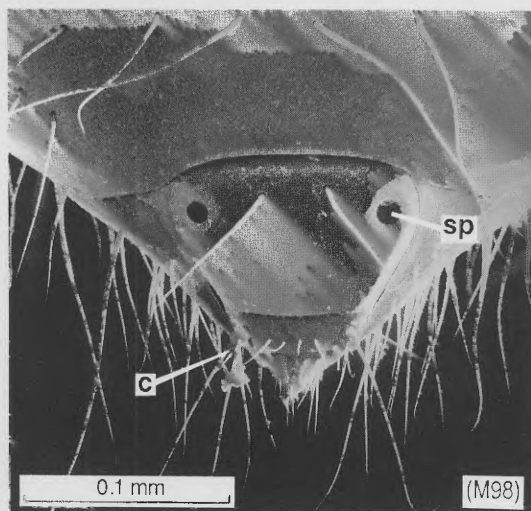
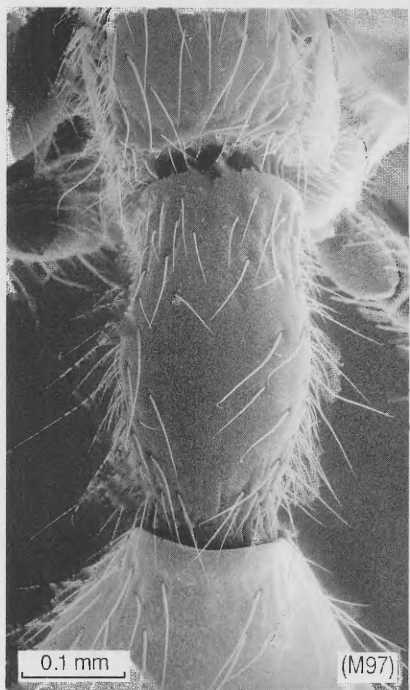
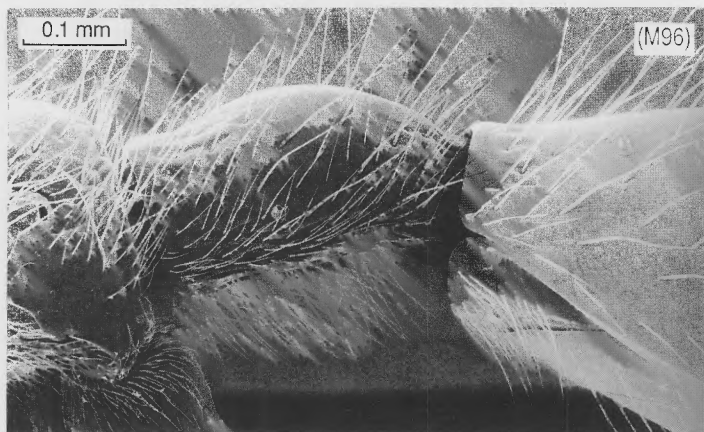
Figure M90 *Maipria annettae*, female, apical tergites of gaster and ovipositor.



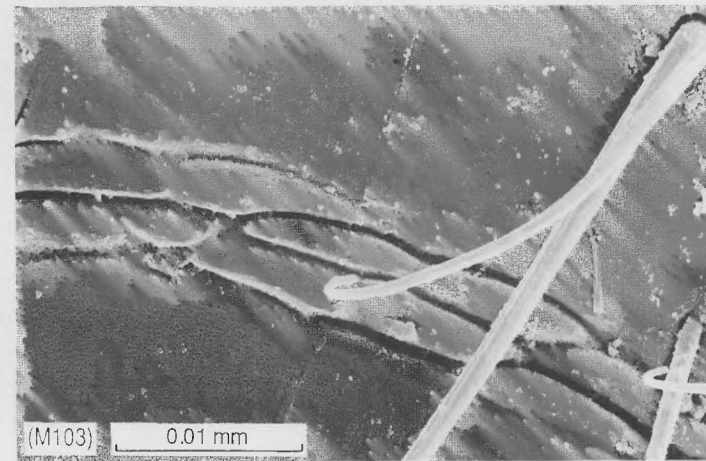
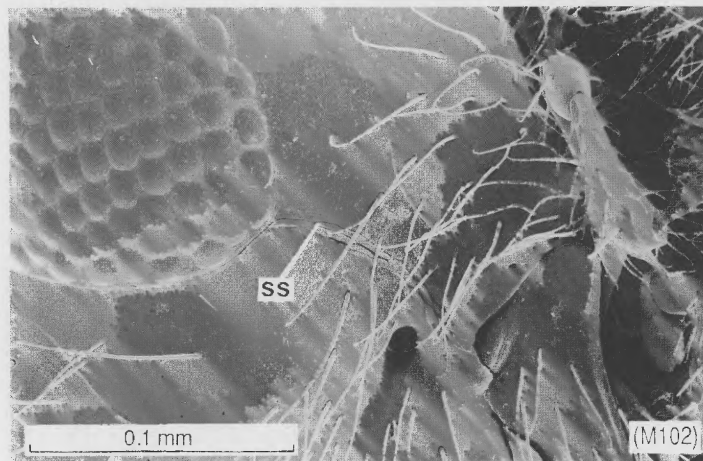
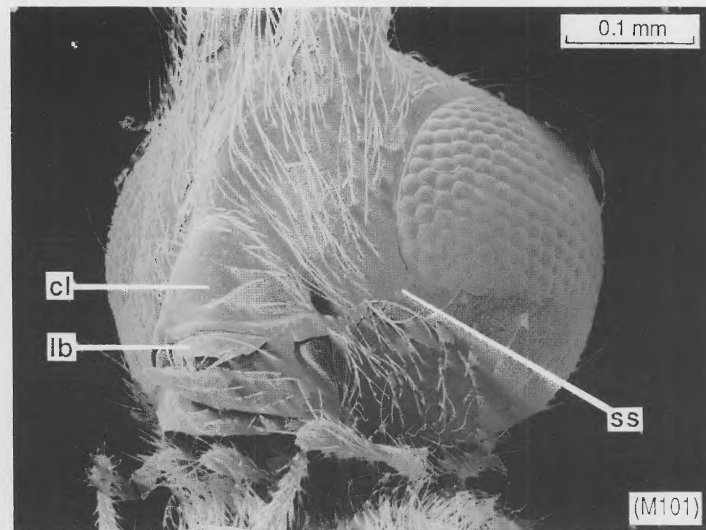
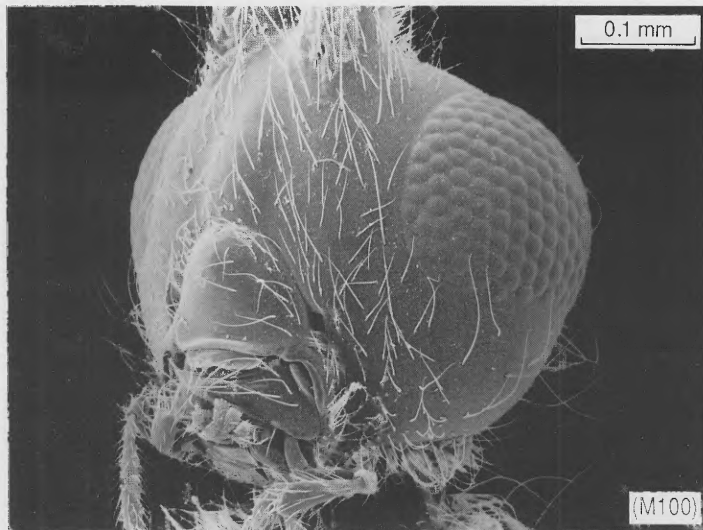




Figures M91–95 *Zealaptera chambersi*, female: (M91) head, lateral; (M92, 93) mesosoma, lateral and dorsal; (M94) mesonotum and propodeum, dorsal (detail from M93); (M95) same, lateral (detail from M92).



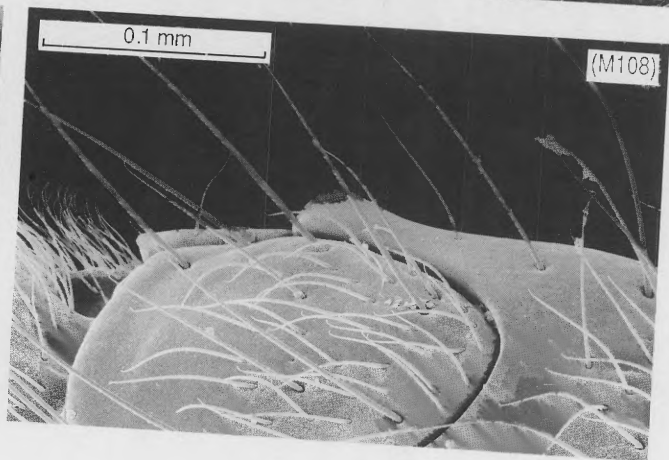
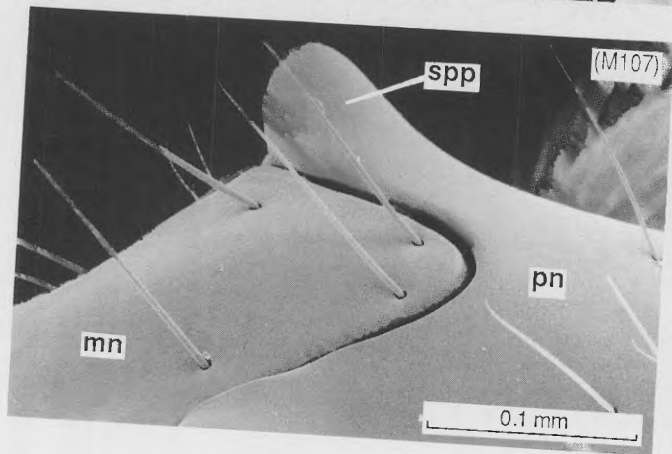
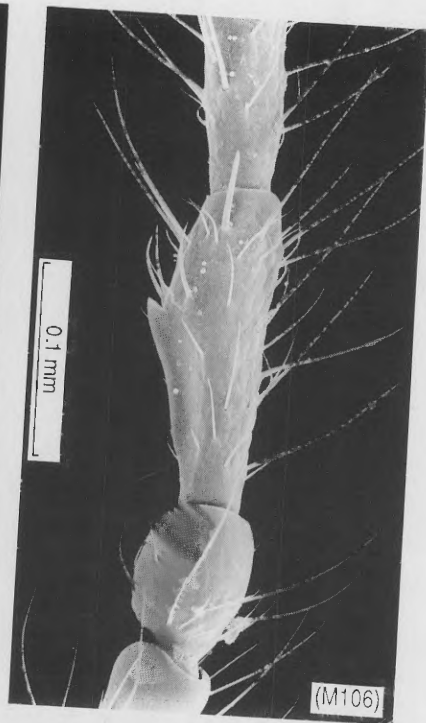
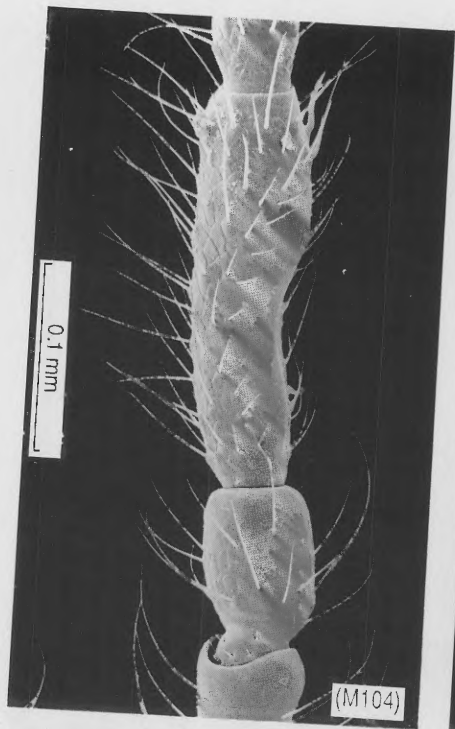
Figures M96–99 *Zealaptera chambersi*, female: (M96, 97) propodeum to anterior T2, lateral and dorsal; (M98, 99) posterior gastral tergites and enlargement of cercus.

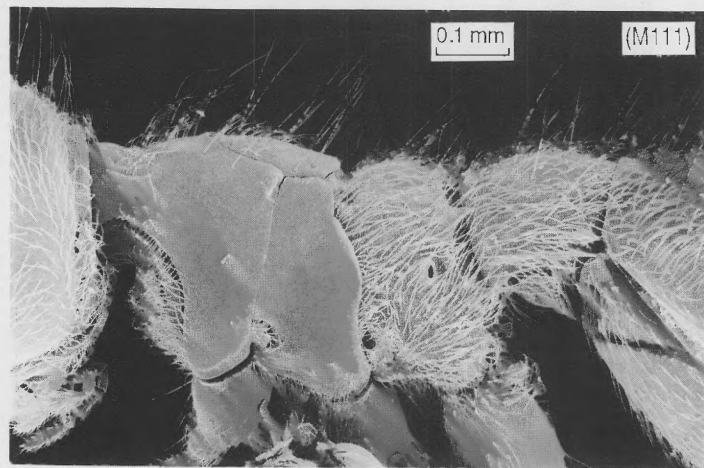
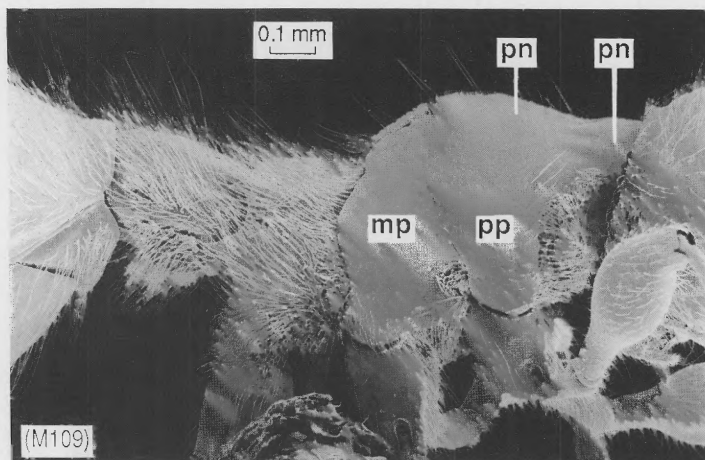


Figures M100–103 *Betyla* species, males, head, oblique ventral: (M100) *fulva*; (M101–103) *eupepla*, progressively enlarged to show subocular suture.

Figures M104–106 *Betyla* species, males, apex of scape, pedicel, and proximal flagellar segments: (M104) *fulva*; (M105) *eupepla*; (M106) species P81.

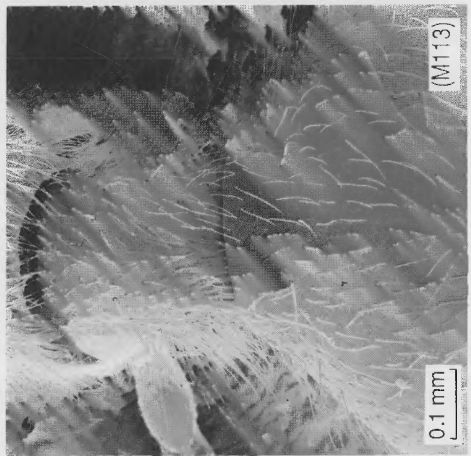
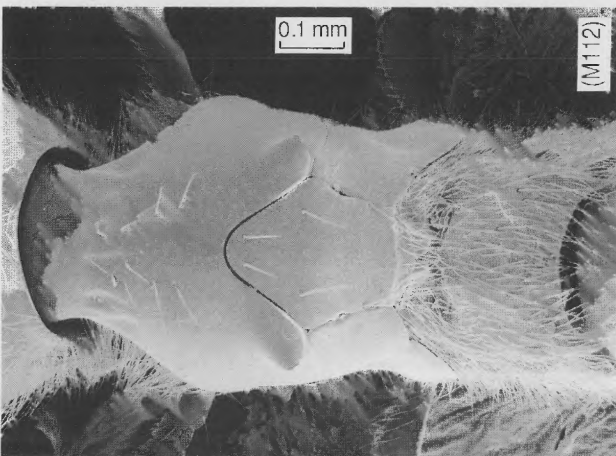
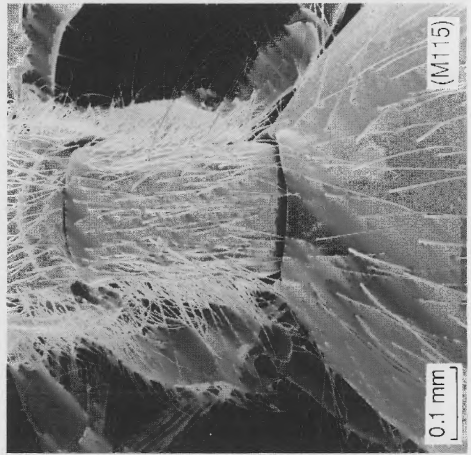
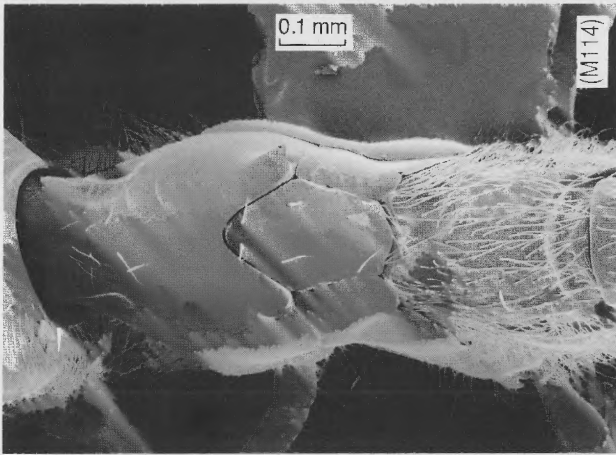
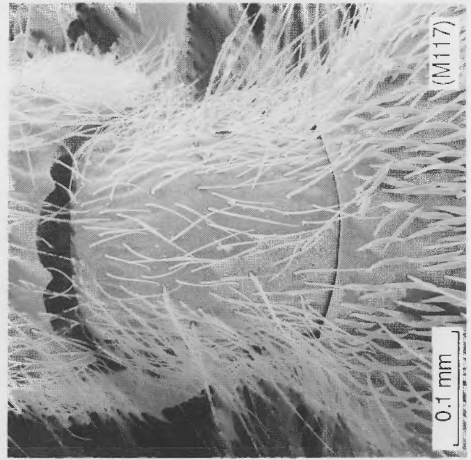
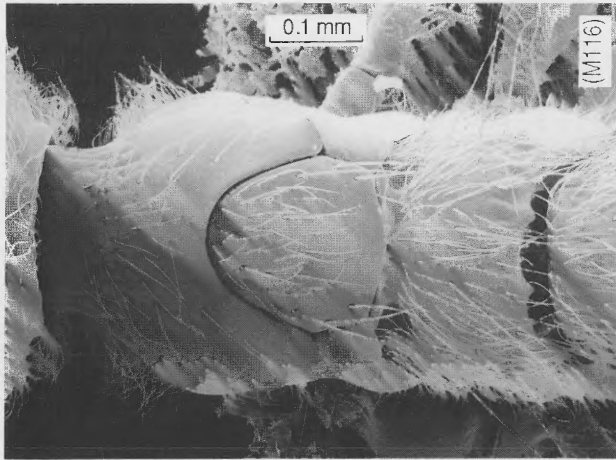
Figures M107, 108 Mesonotum and spiracular process, dorsolateral, female *Betyla fulva* and *B. auriger*.

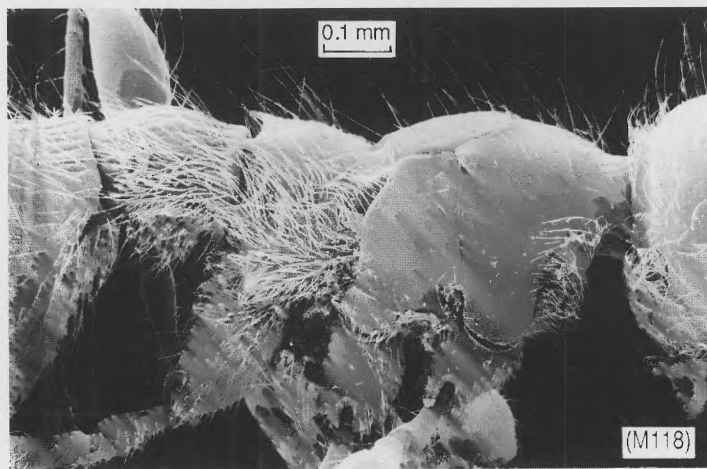
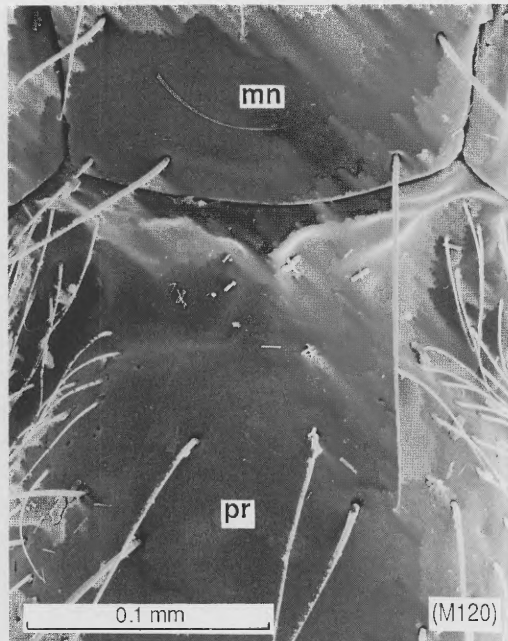
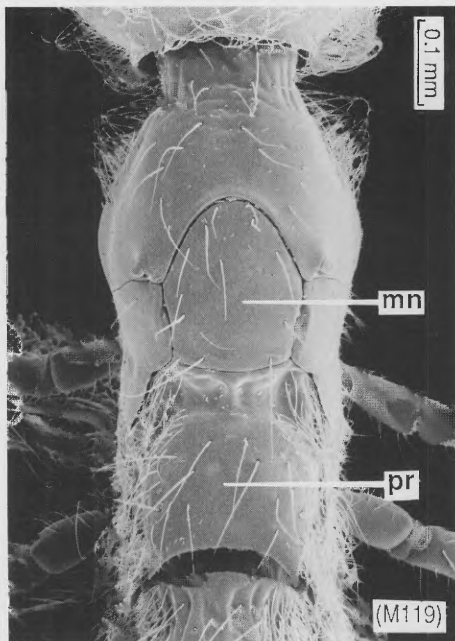




Figures M109–111 *Betyla* species, females, mesosoma, lateral: (M109) *fulva*; (M110) *prosera*; (M111) *auriger*.

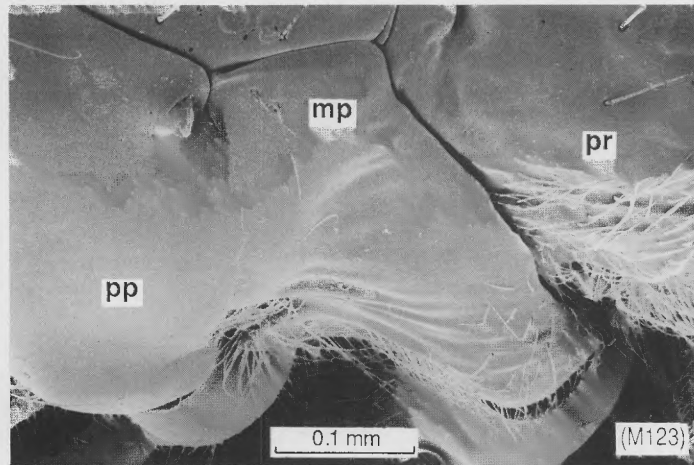
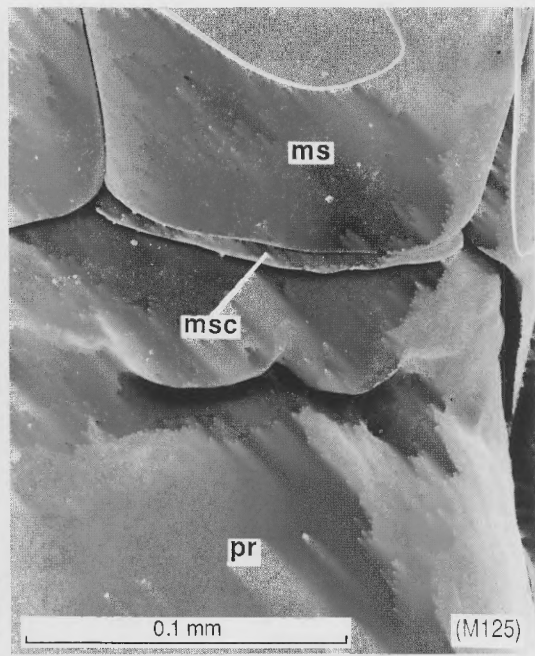
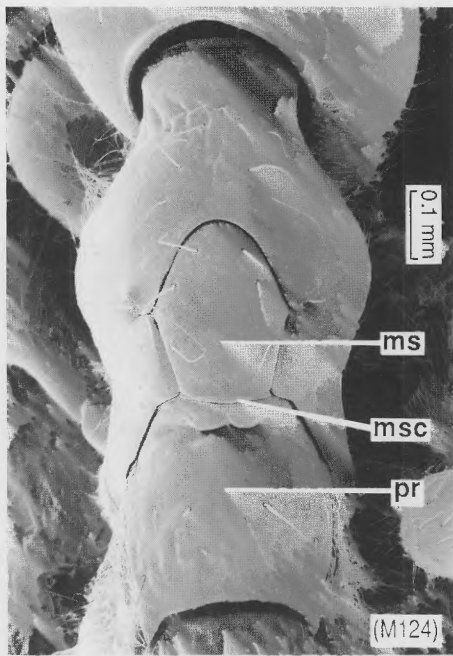
Figures M112–117 *Betyla* species, females, dorsal: (M112, 113) *fulva*, mesosoma and petiole to anterior T2; (M114, 115) *prosera*, same; (M116, 117) *auriger*, same.

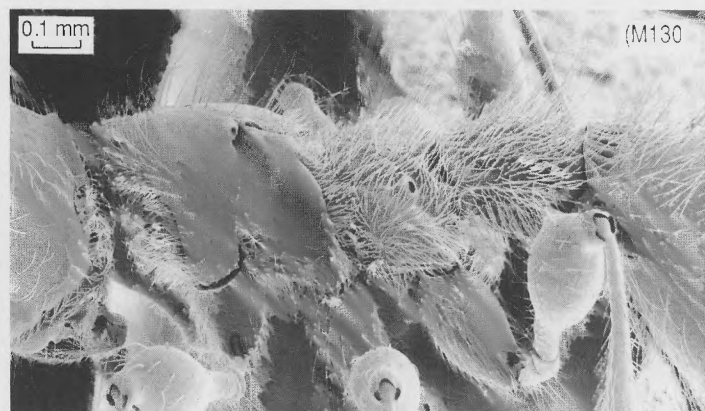
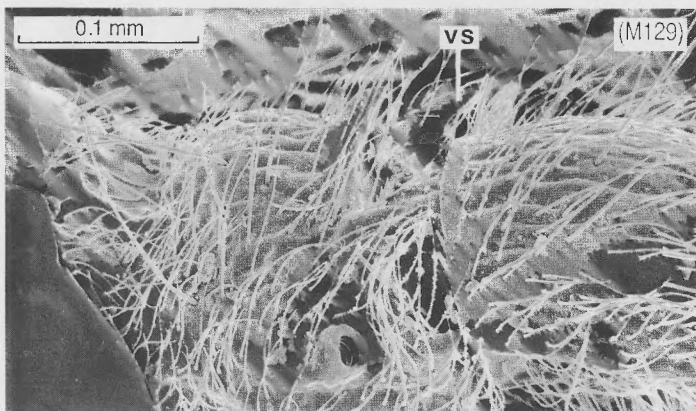
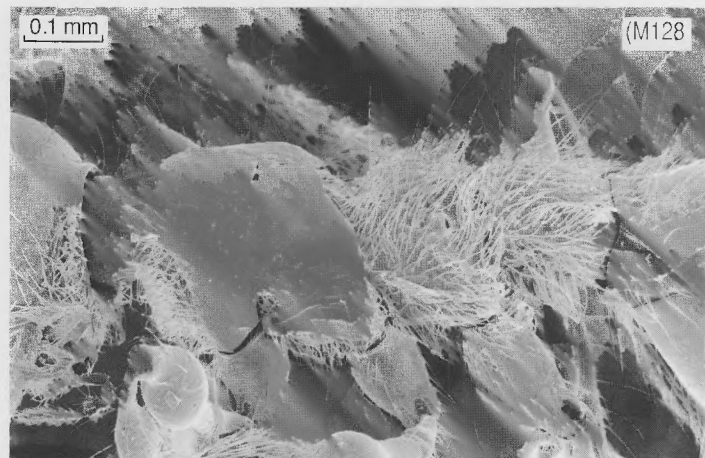
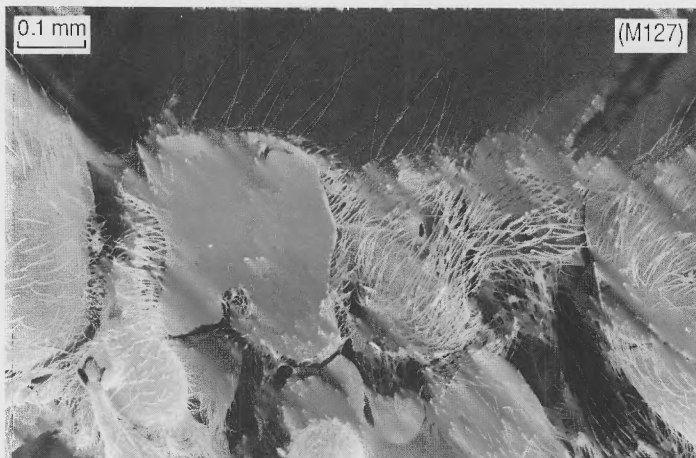




Figures M118–121 *Betyla rangatira*, female: (M118, 119) mesosoma, lateral and dorsal; (M120) posterior mesonotum to propodeum, dorsal; (M121) propodeum to anterior T2, dorsal.

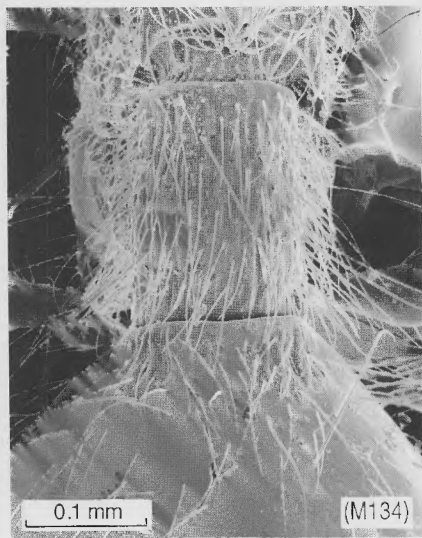
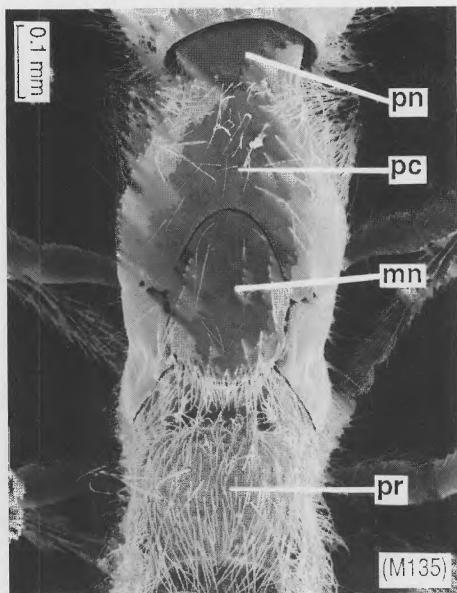
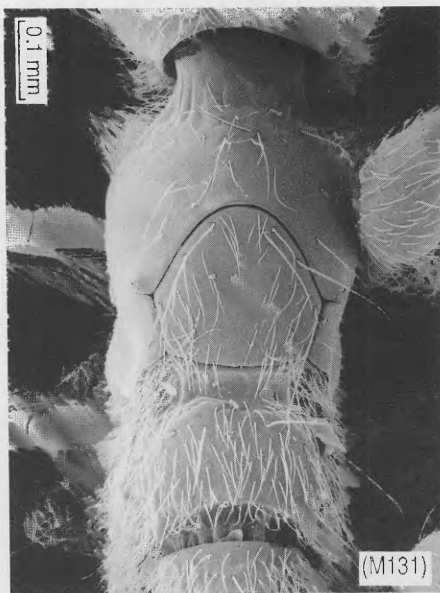
Figures M122–126 *Betyla karamaea*, female: (M122) mesosoma, lateral; (M123) pronotum and mesopleuron, dorsolateral; (M124) mesosoma, dorsal; (M125) posterior mesonotum to propodeum, oblique dorsal; (M126) propodeum to anterior T2, dorsal.

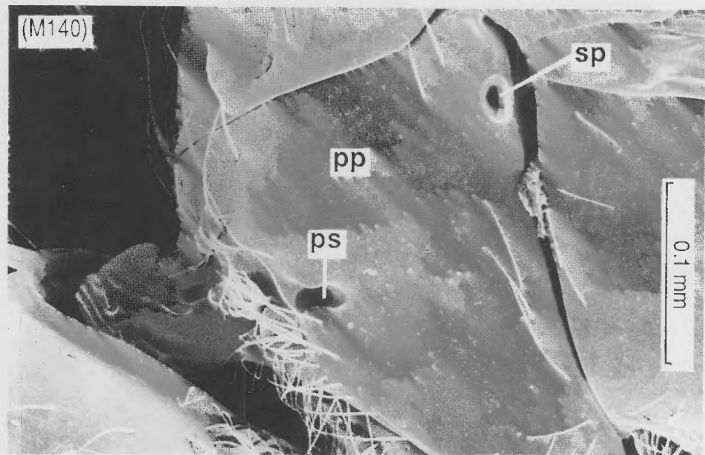
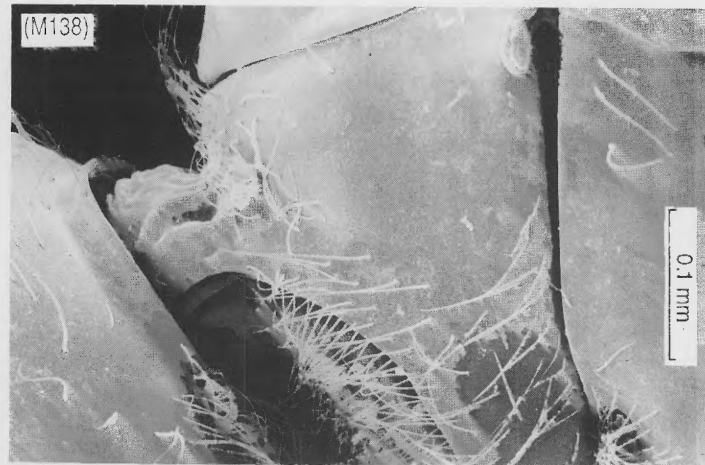




Figures M127–130 *Betyla* species, females, mesosoma, lateral: (M127) *eupepla*; (M128, 129) *tuatara*, with enlargement of propodeum; (M130) *wahine*.

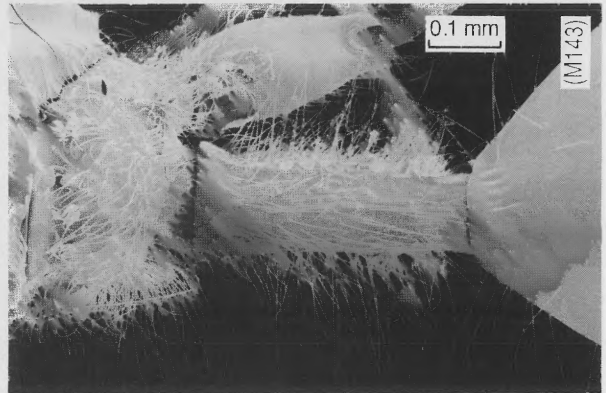
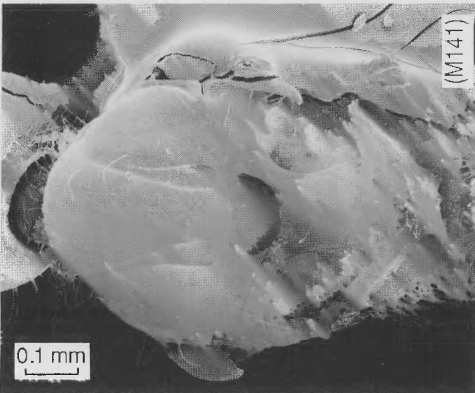
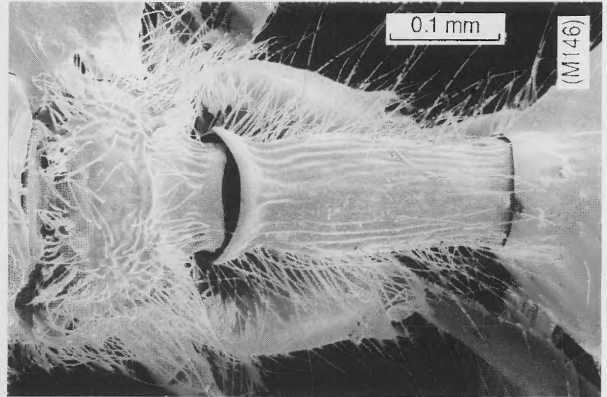
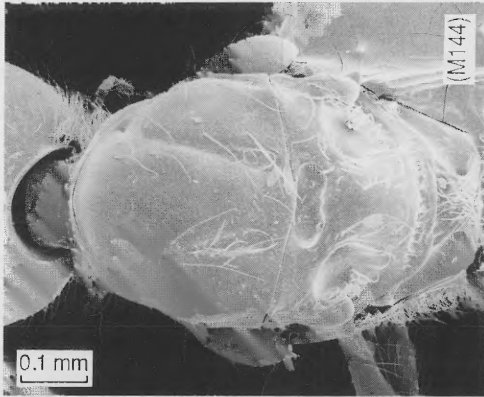
Figures M131–136 *Betyla* species, females, dorsal: (M131, 132) *eupepla*, mesosoma and petiole to anterior T2; (M133, 134) *tuatara*, same; (M135, 136) *wahine*, same.

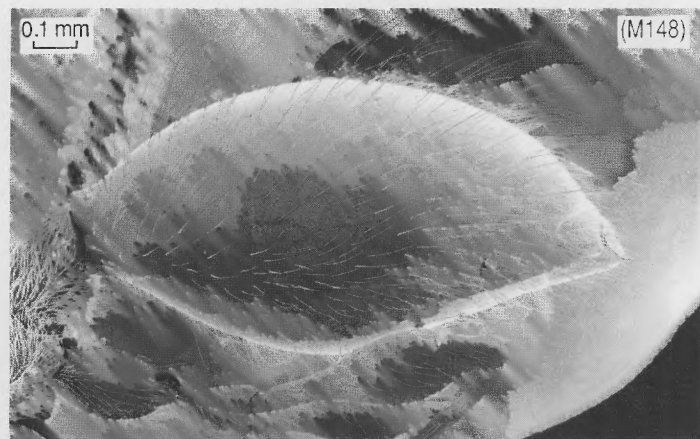




Figures M137–140 *Betyla* species, males, mesosoma and petiole with enlargement of pronotum, lateral: (M137, 138) *fulva*; (M139, 140) *eupepla*.

Figures M141–143 *Betyla fulva*, male: (M141) mesosoma, dorsal; (M142) axillar process, dorsolateral; (M143) propodeum to anterior T2, dorsal. M144–146 *B. eupepla*, male: sequence as for *fulva*.





Figures M147–150 *Betyla* species, female metasoma, lateral: (M147) *fulva*; (M148) *prosedera*; (M149) *auriger*; (M150) *eupepla*.

Figures M151–155 *Betyla auriger*, female metasoma, dorsal: (M151) entire; (M152, 153) pubescence on T2; (M154, 155) posterior gastral tergites.

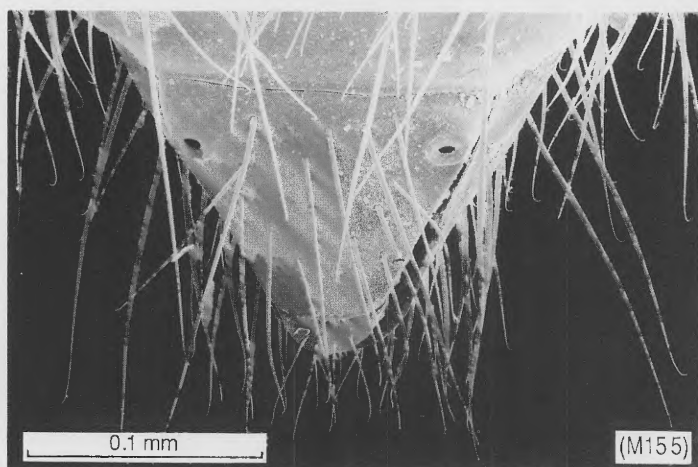
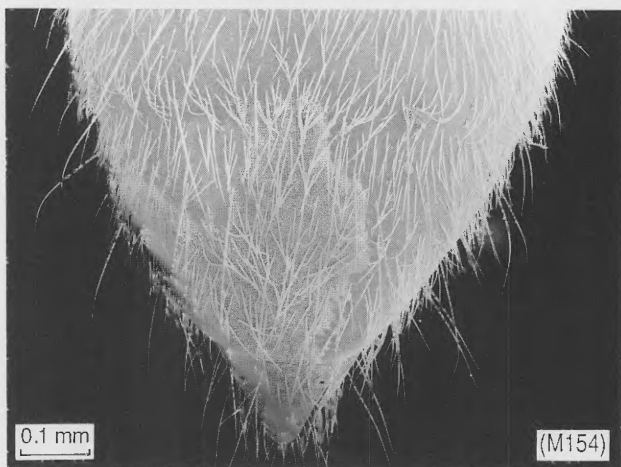
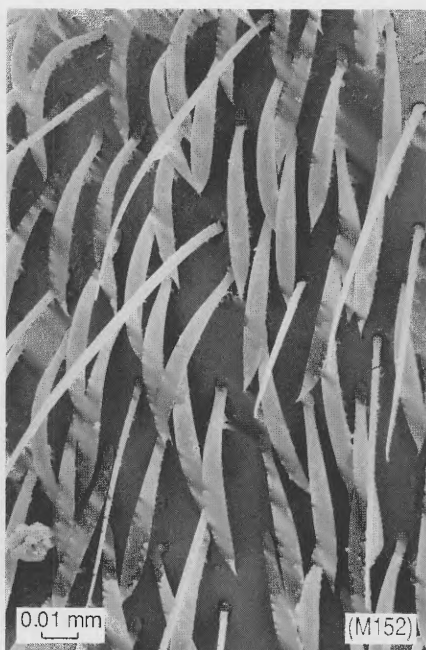
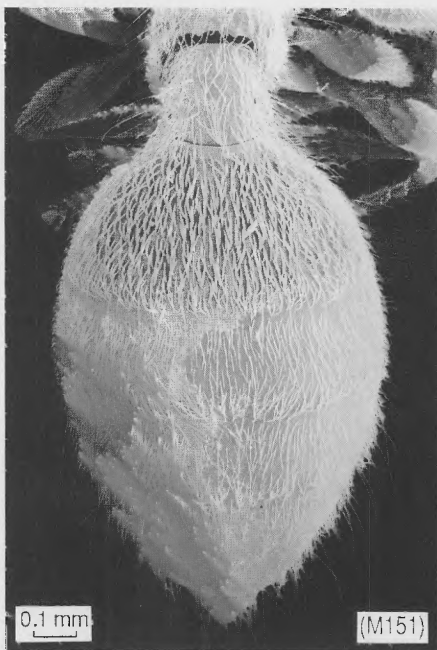
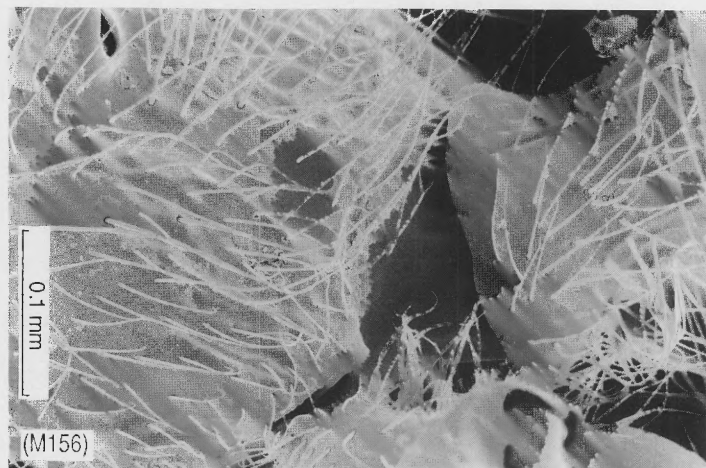


Figure M156 *Betyla eupepla*, male, propodeum, lateral.
Figures M157, 158 Metasoma, lateral, *Betyla tuatara* and *B. wahine*.



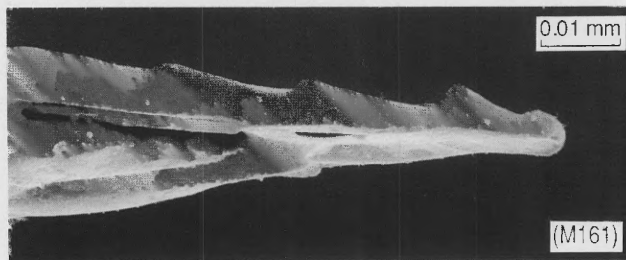
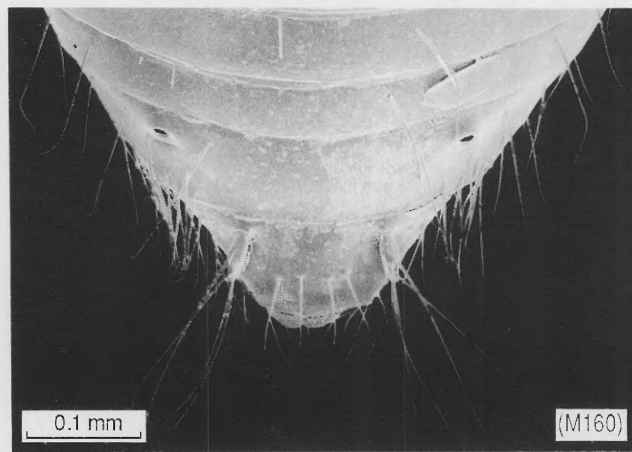
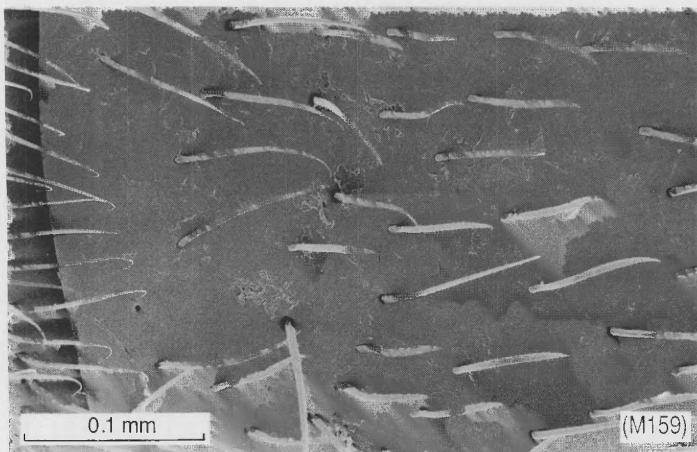
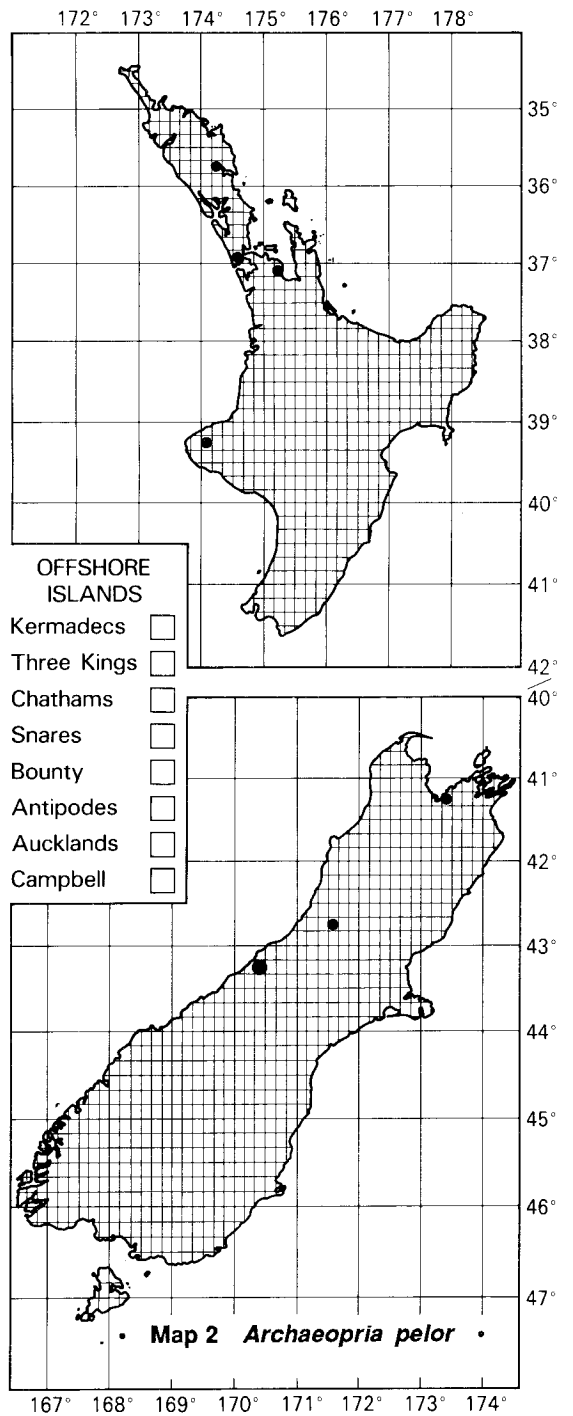
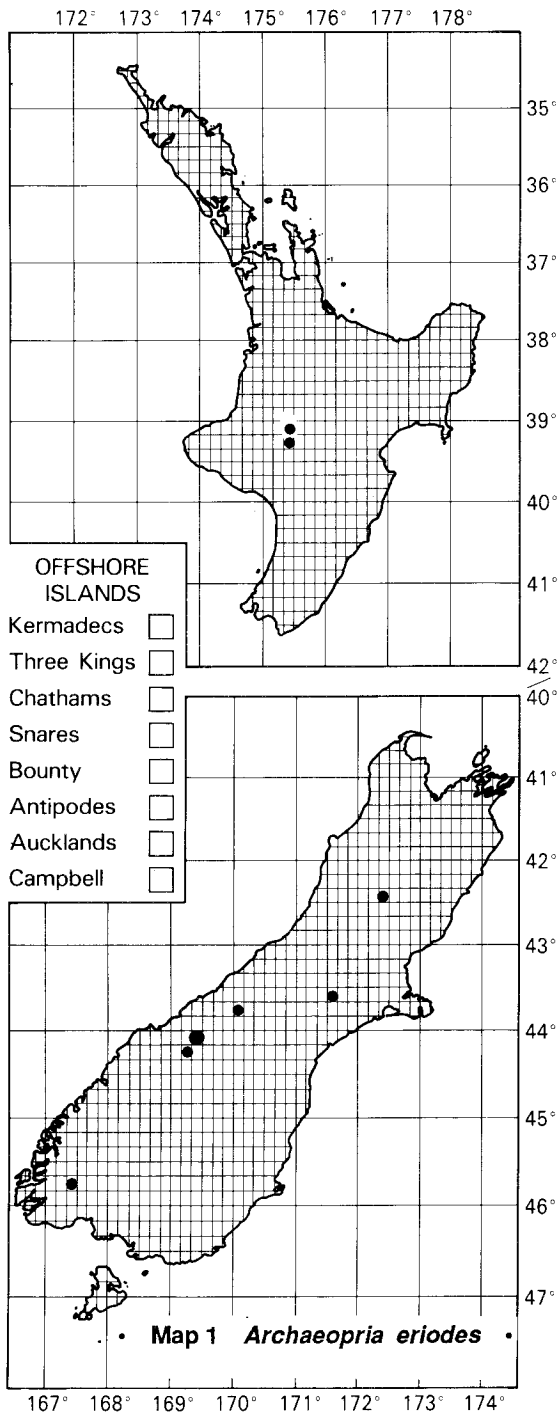
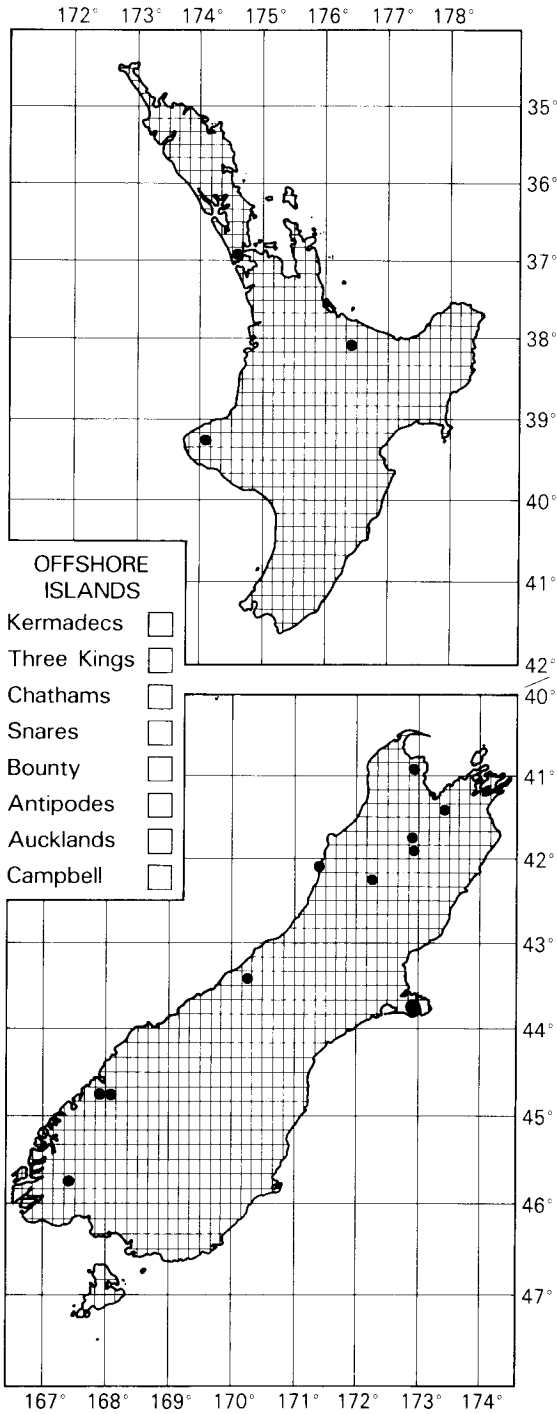


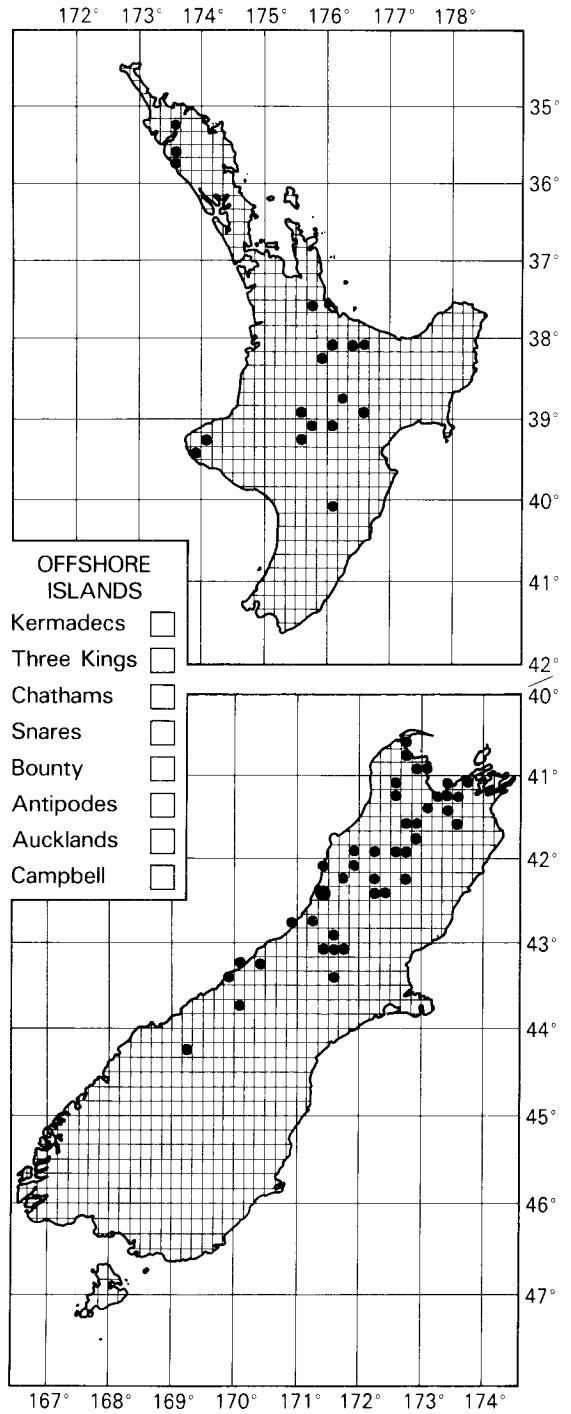
Figure M159 *Betyla fulva*, female, pubescence on T2, lateral.
Figures M160, 161 *Betyla eupepla*: (M160) male, apex of gaster, dorsal; (M161) female, apex of ovipositor, lateral.



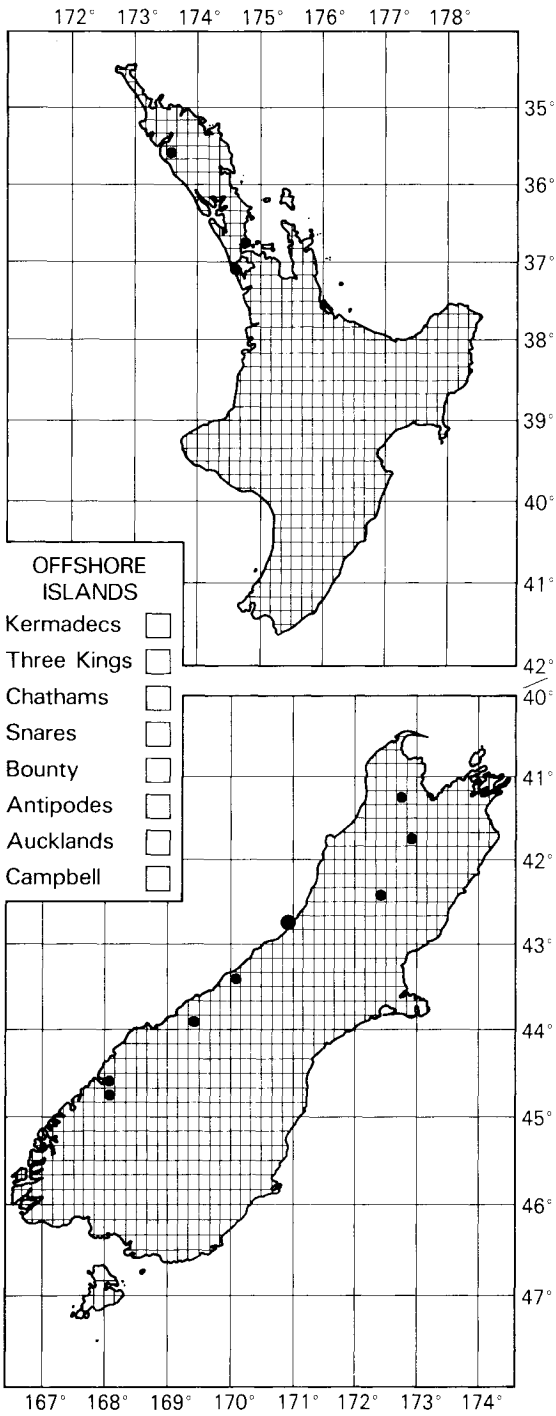
Maps 1-44 Distribution of collection localities for Ambositrinae examined in this study. Solid dots indicate occurrence within the marked grid sector. See also key maps on inside back cover and opposing page.



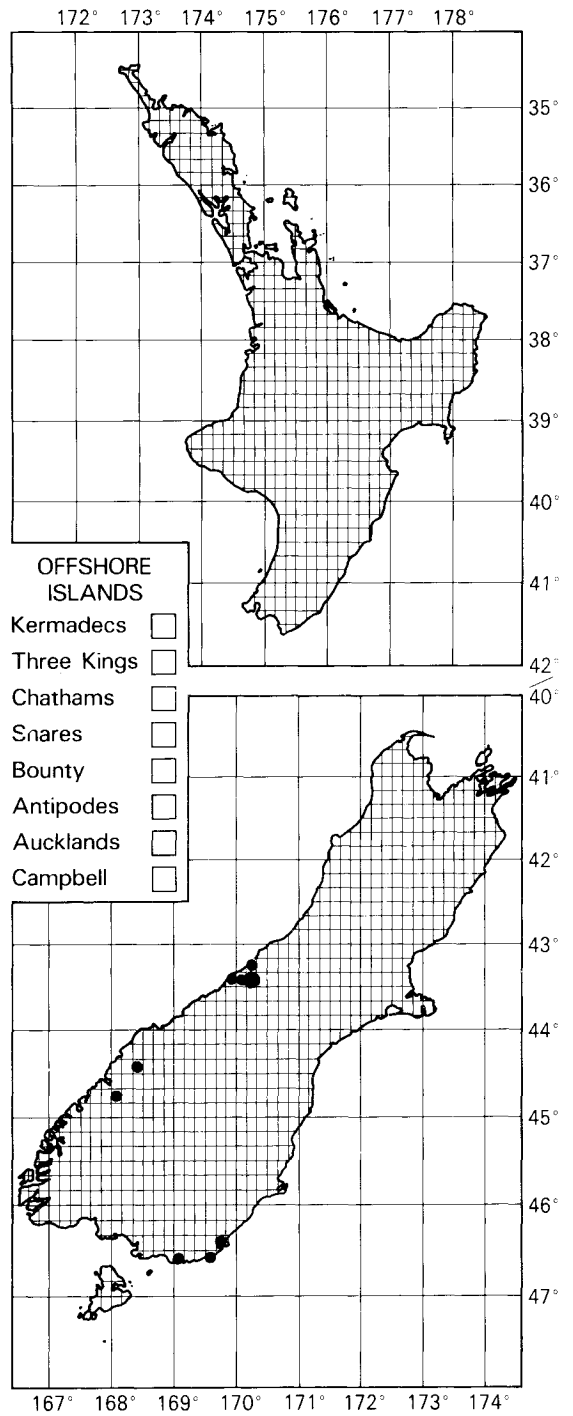
• Map 3 *Archaeopria pristina* •



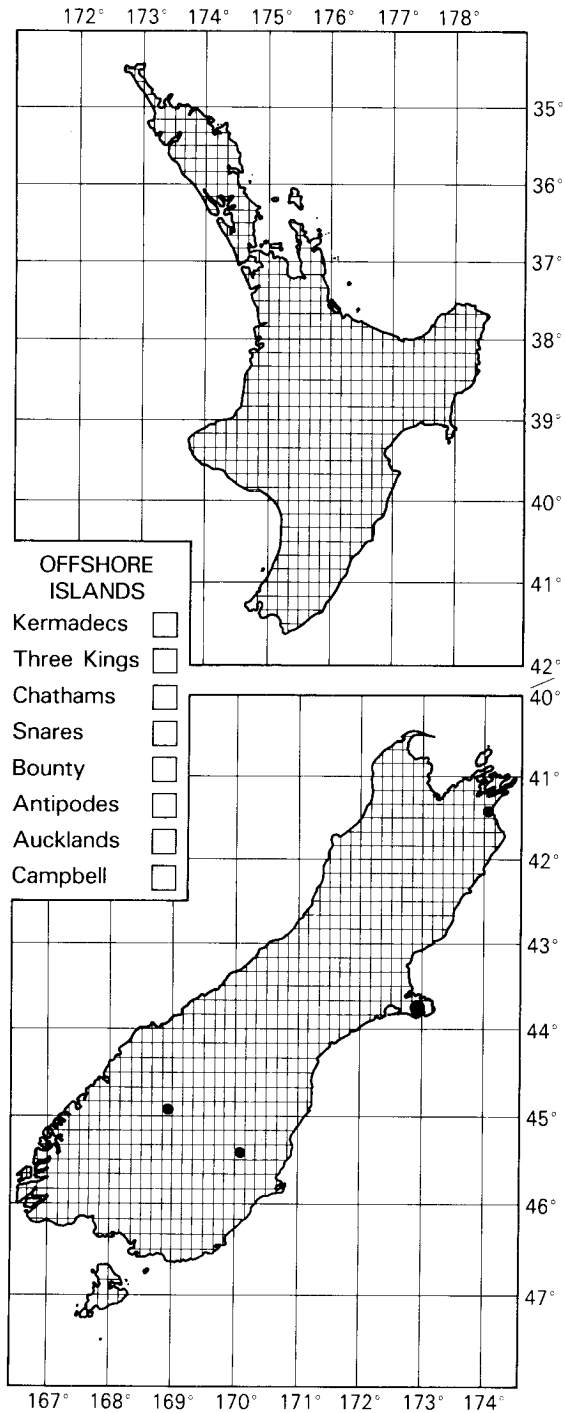
• Map 4 *Pantolytomyia flocculosa* •



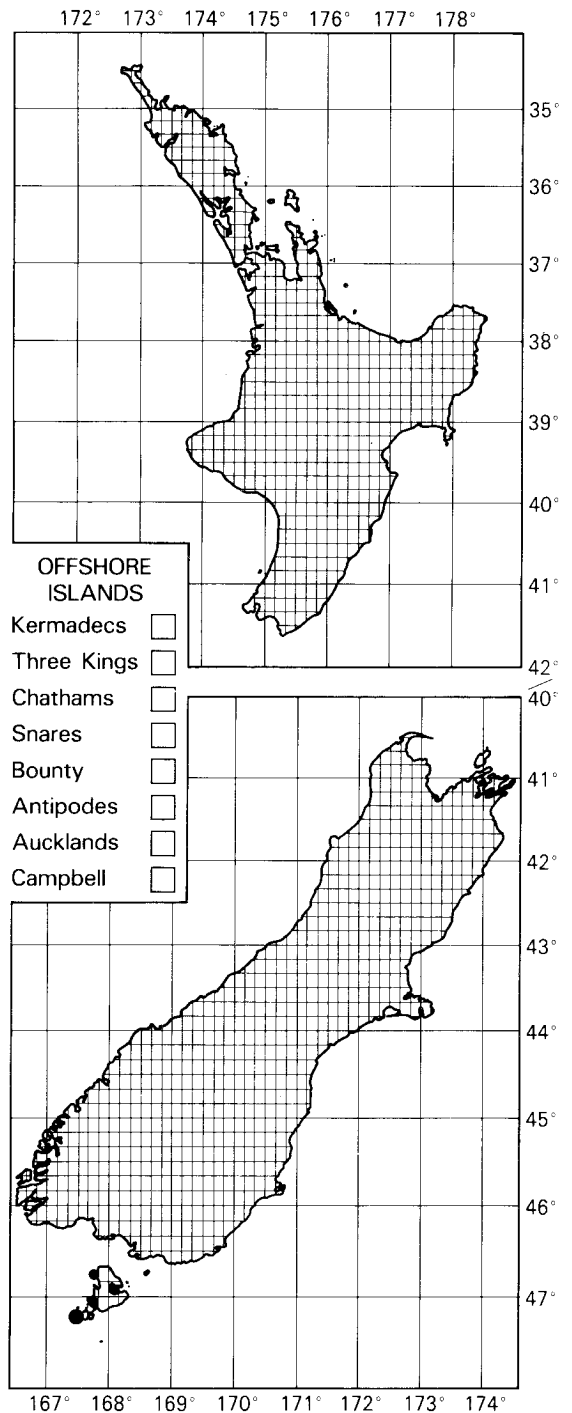
• Map 5 *Pantolytomyia tungane* •



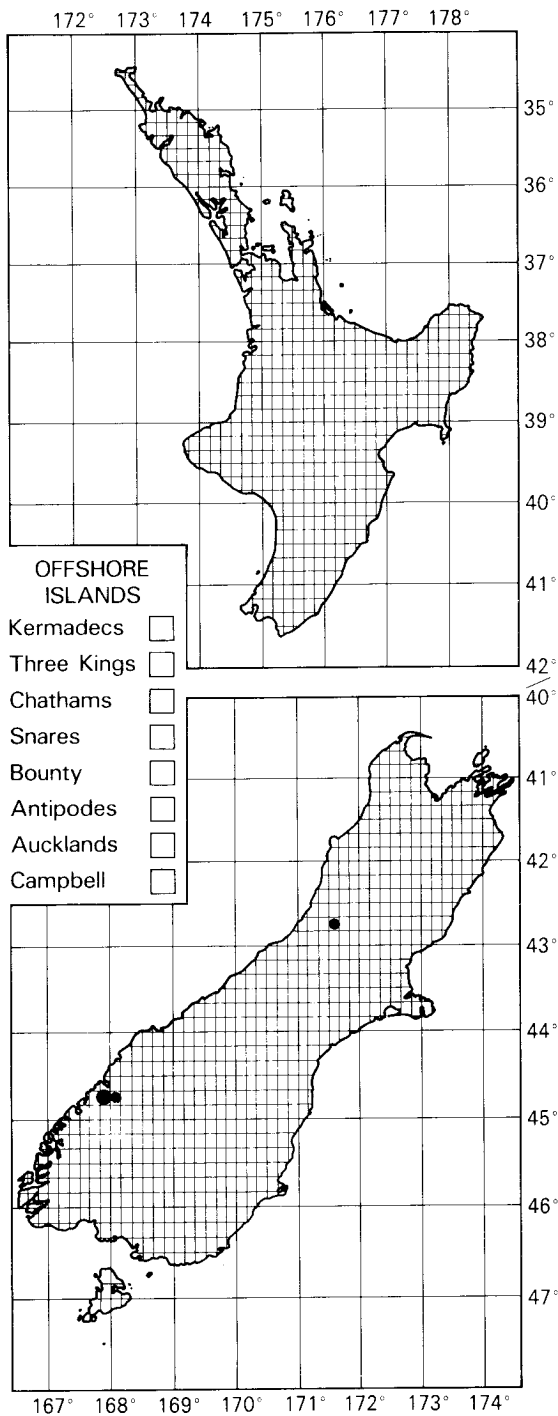
• Map 6 *Pantolytomyia takere* •



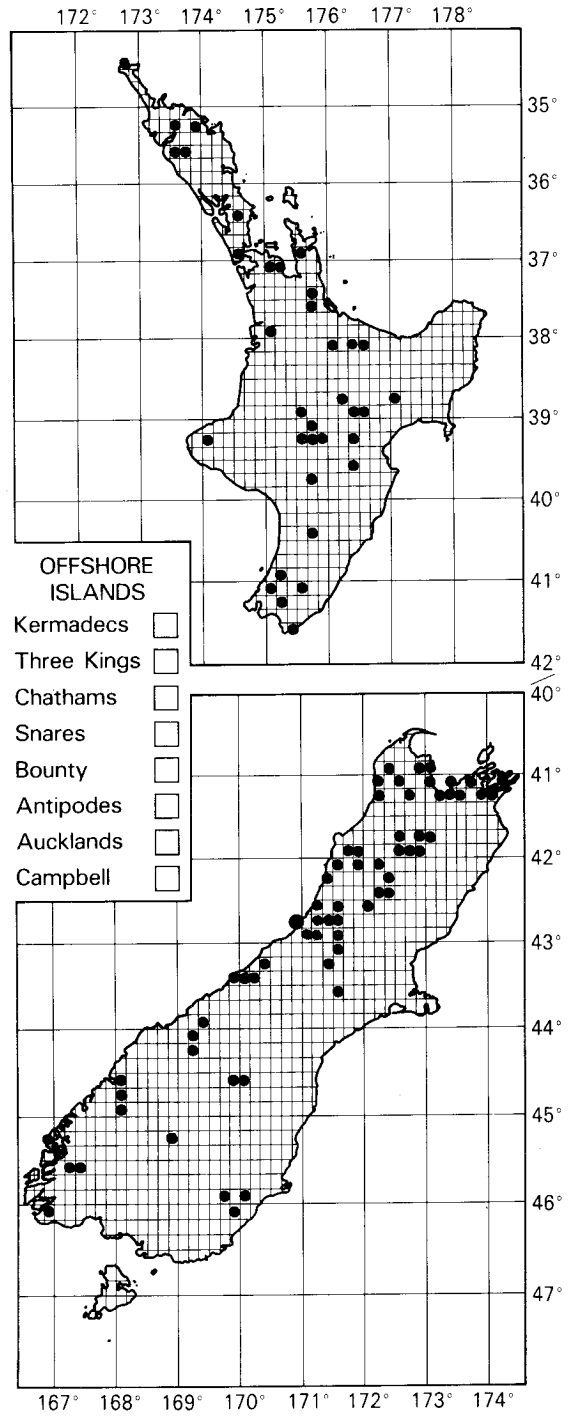
• Map 7 *Pantolytomyia polita* •



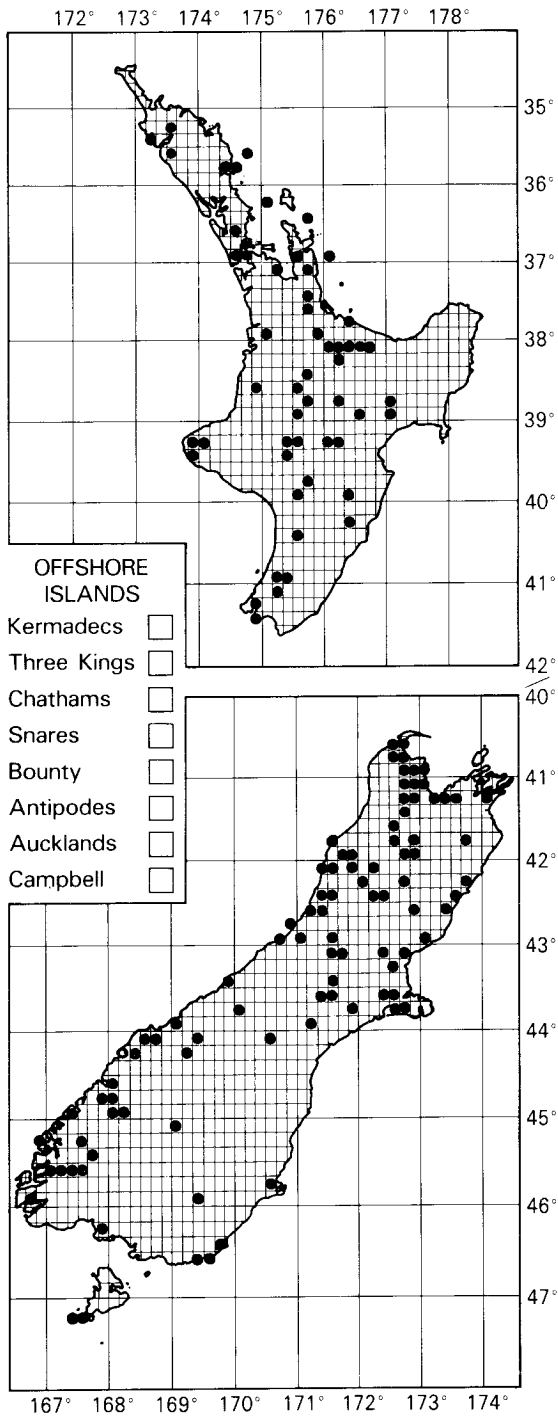
• Map 8 *Pantolytomyia insularis* •



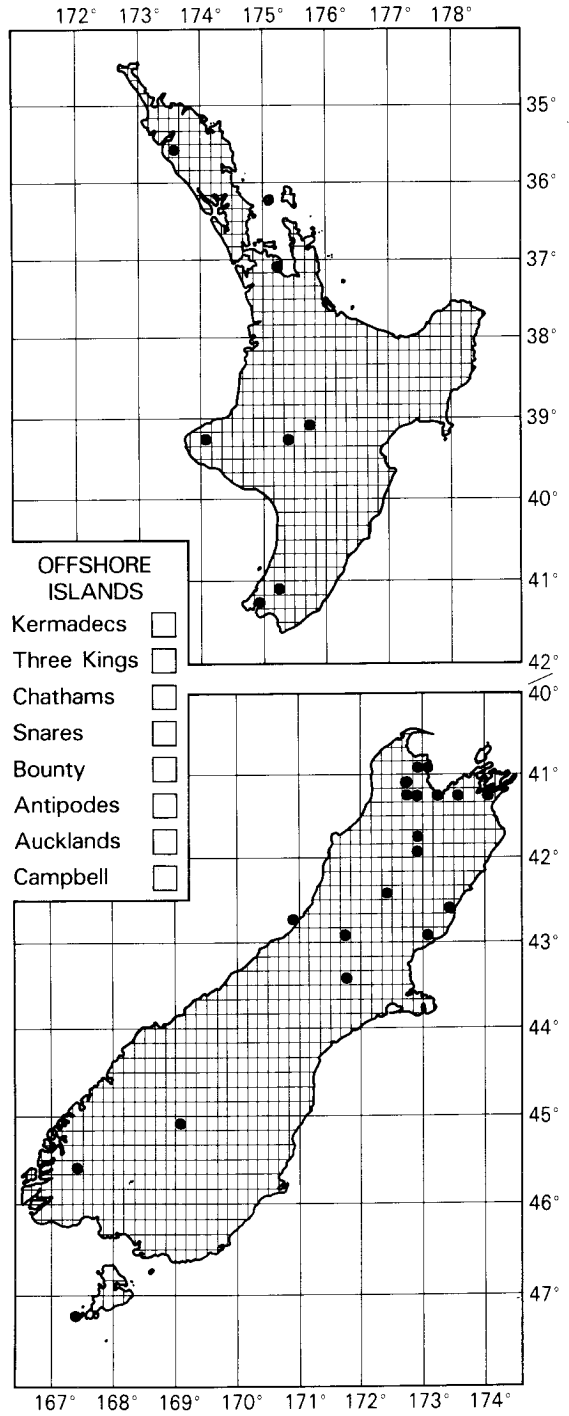
• Map 9 *Pantolytomyia wairua* •



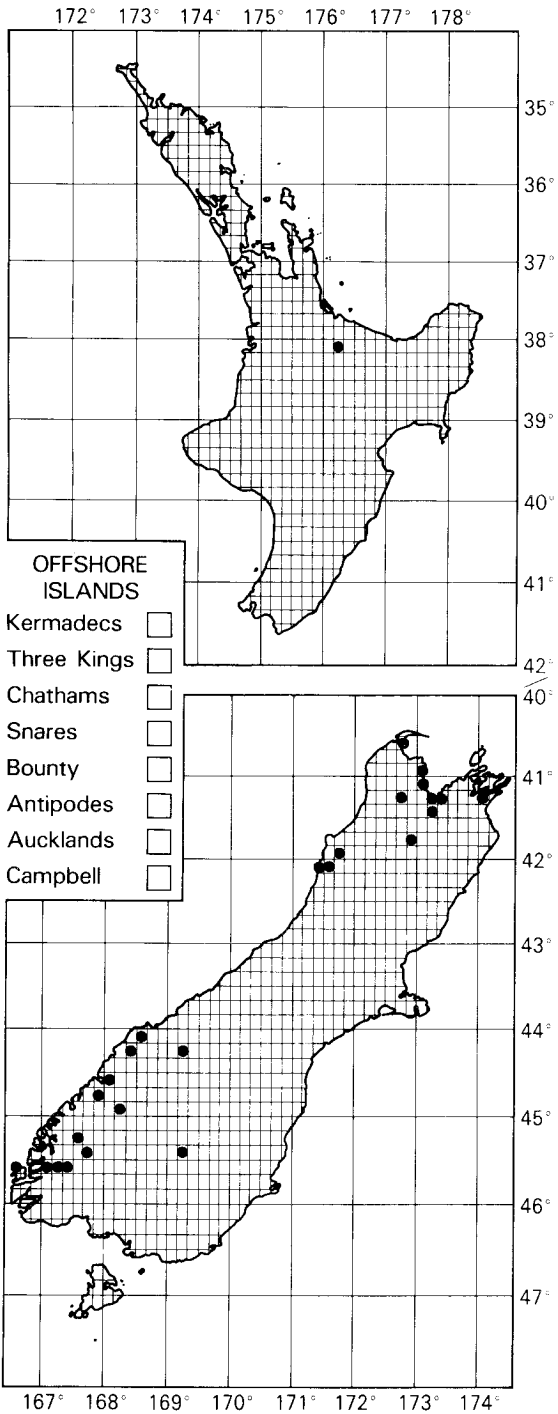
• Map 10 *Pantolytomyia taurangi* •



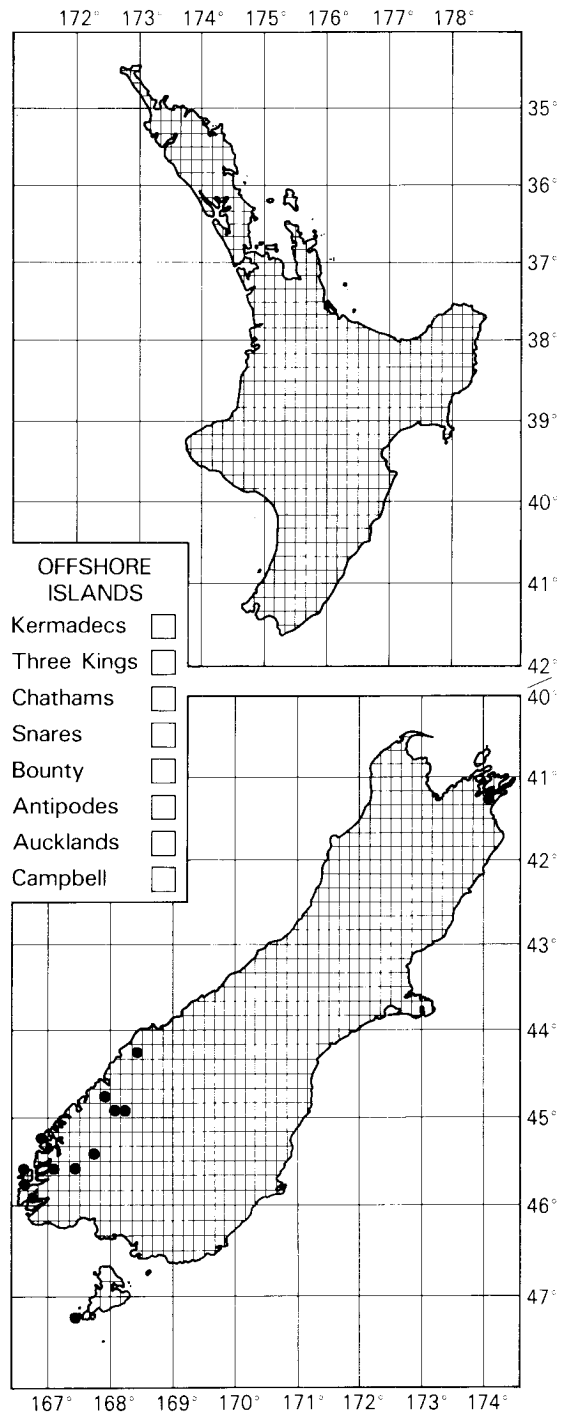
• Map 11 *Diphoropria sinuosa* •
macropters



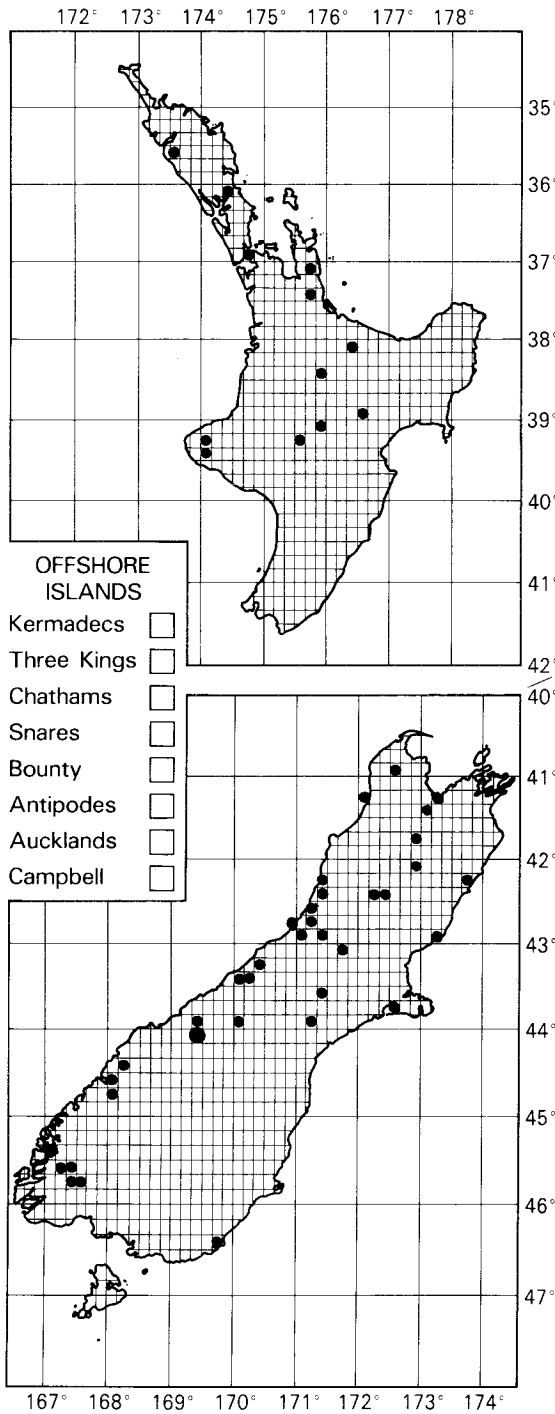
• Map 12 *Diphoropria sinuosa* •
brachypterous females, type A



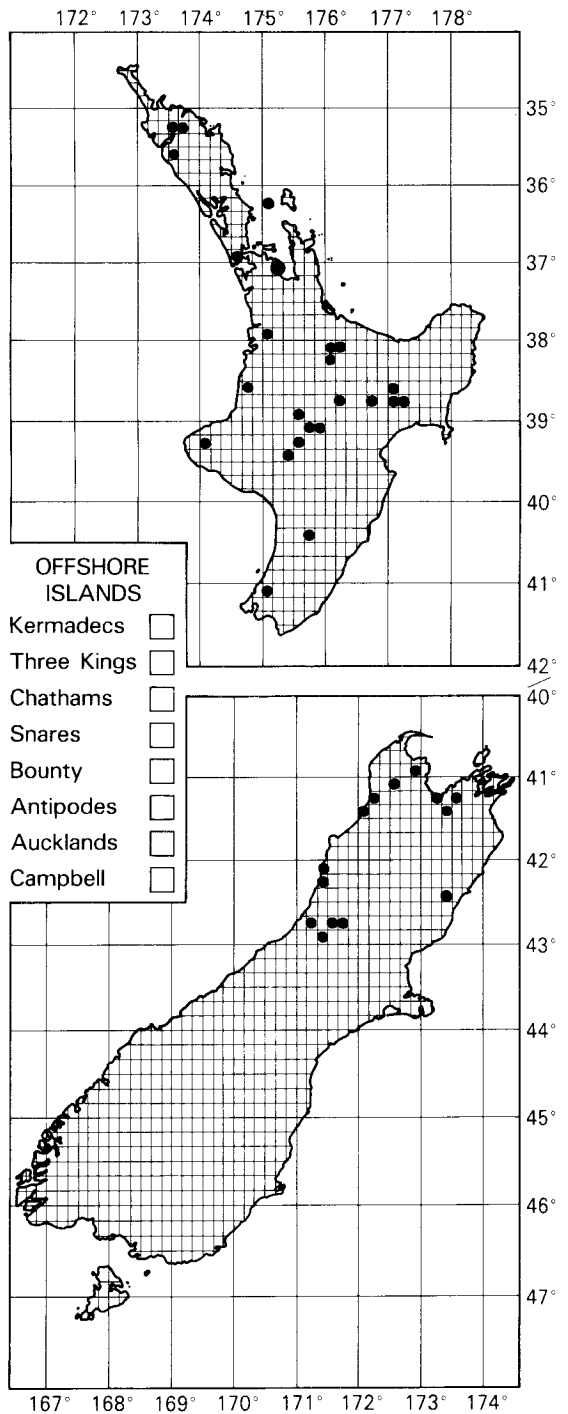
• Map 13 *Diphoropria sinuosa* •
brachypterous females, type B



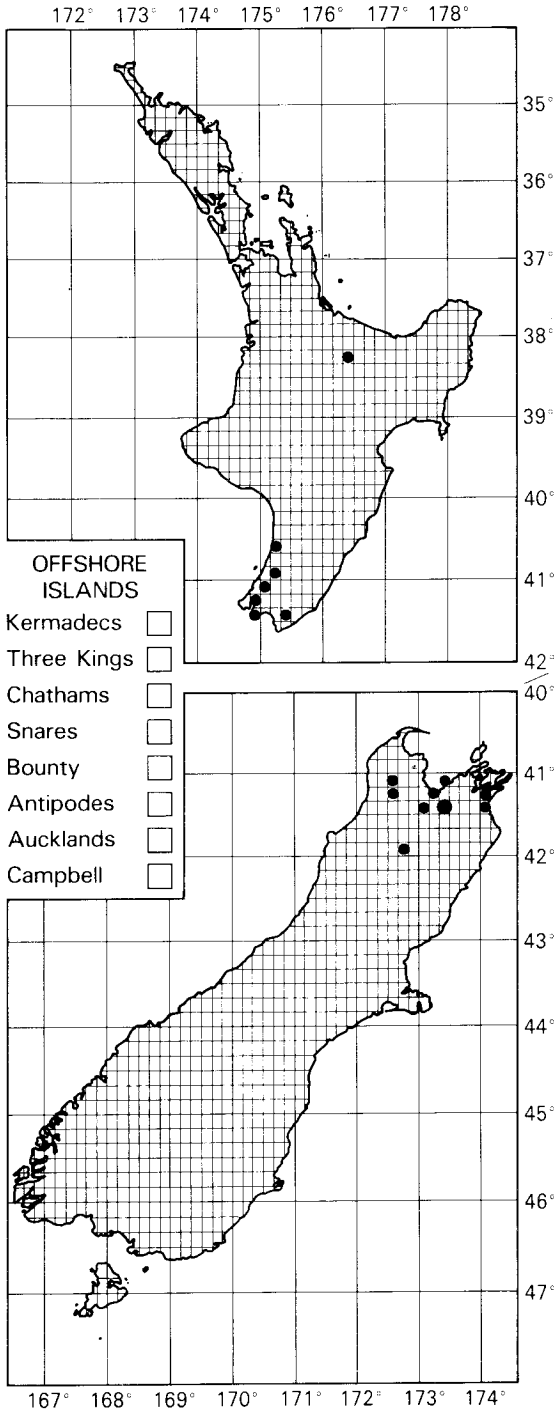
• Map 14 *Diphoropria sinuosa* •
brachypterous males



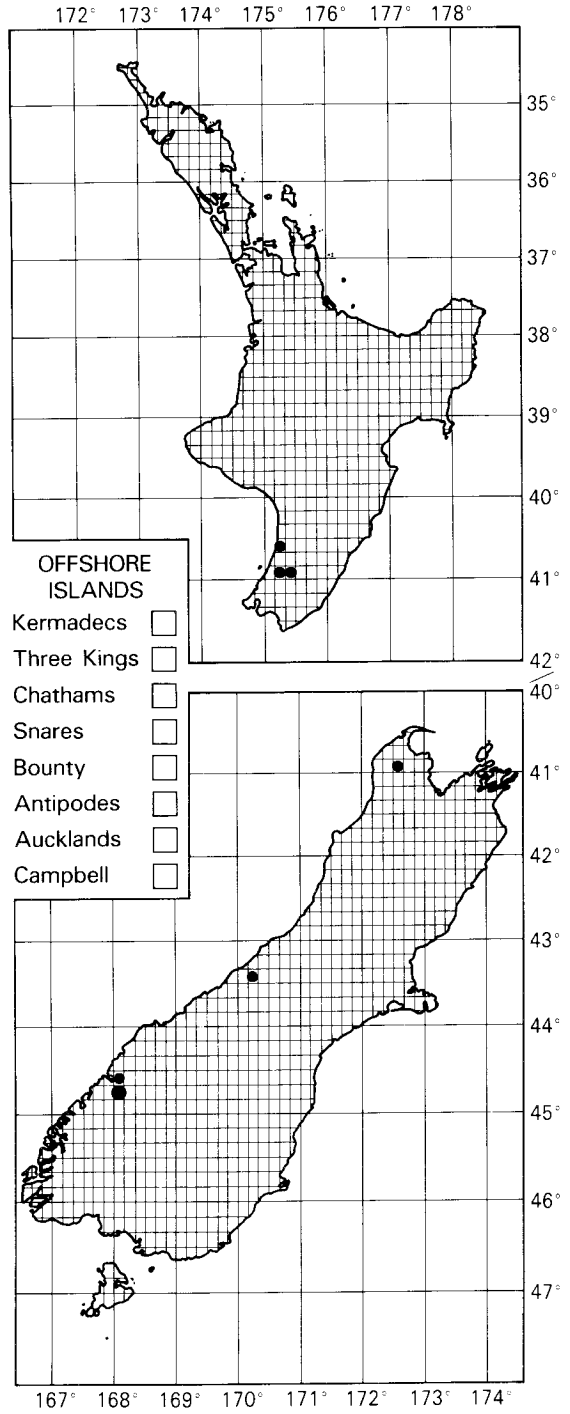
• Map 15 *Diphoropria kuscheli* •



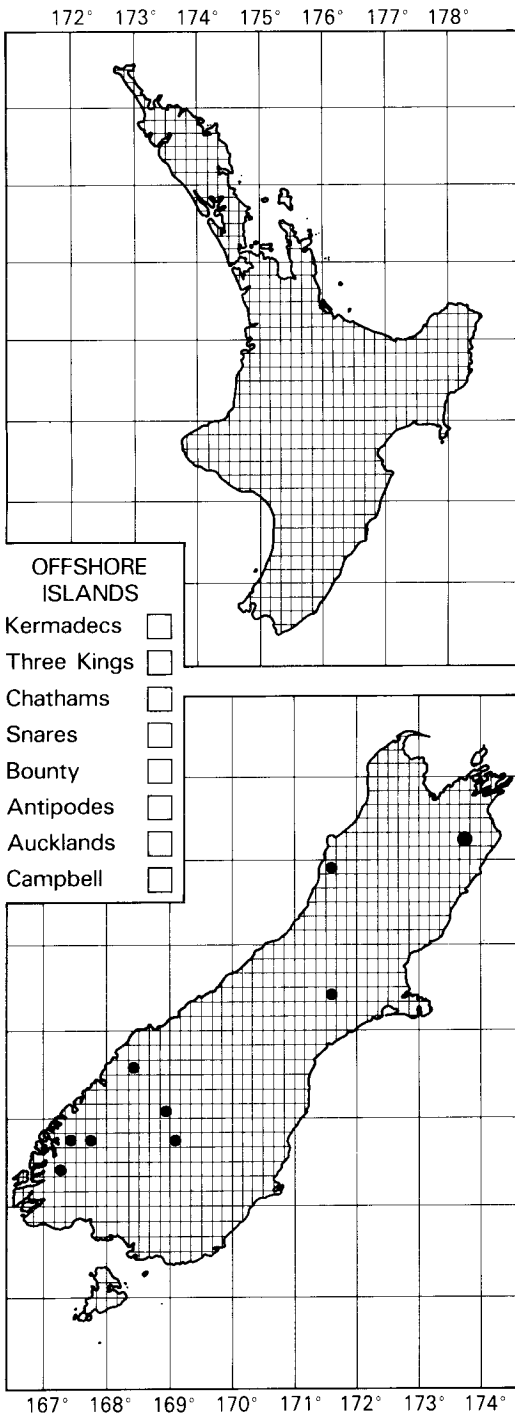
• Map 16 *Maoripria verticillata* •



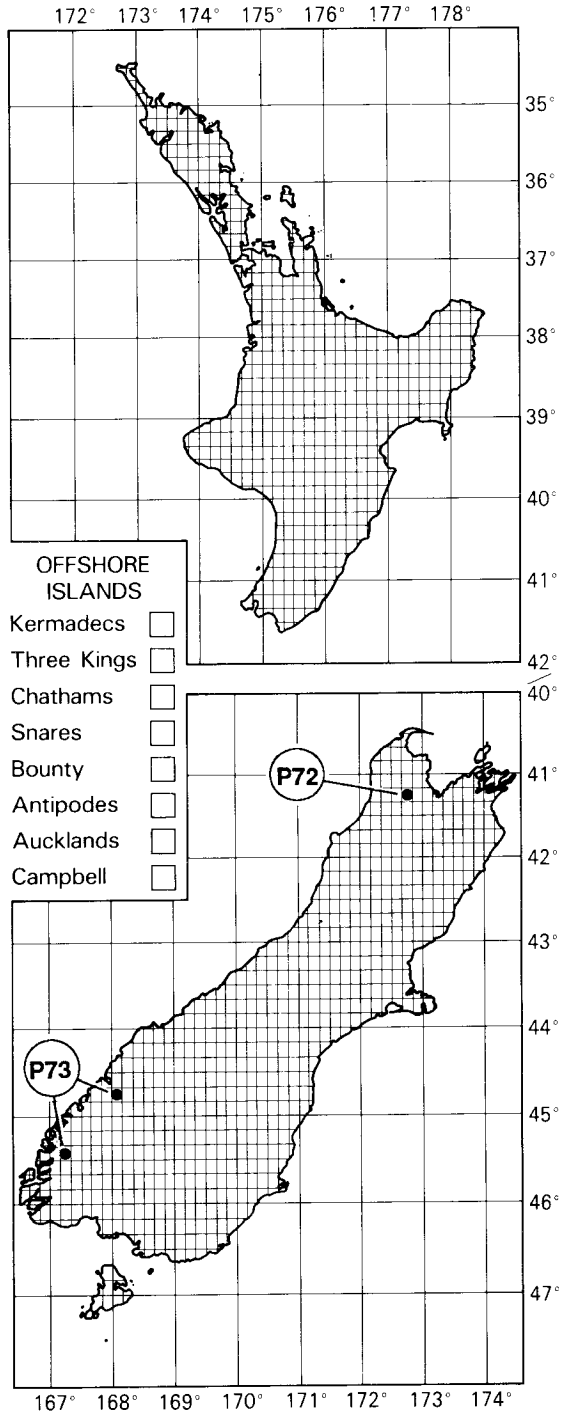
• Map 17 *Maoripria annettae* •



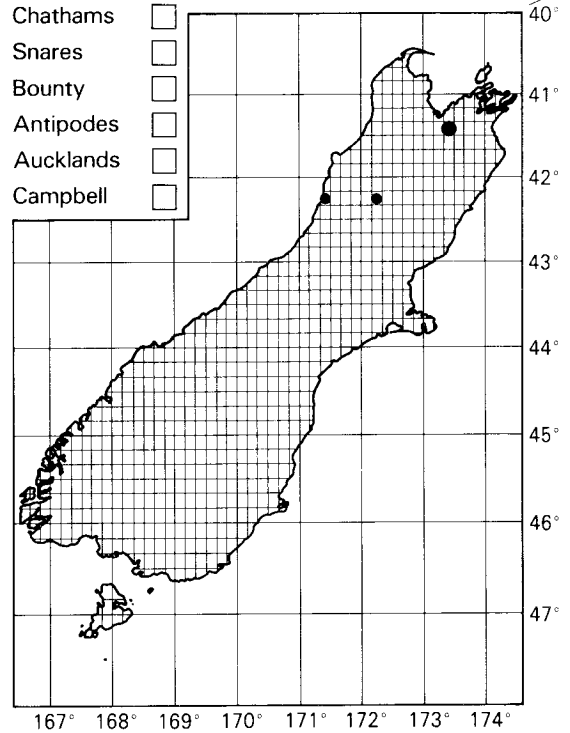
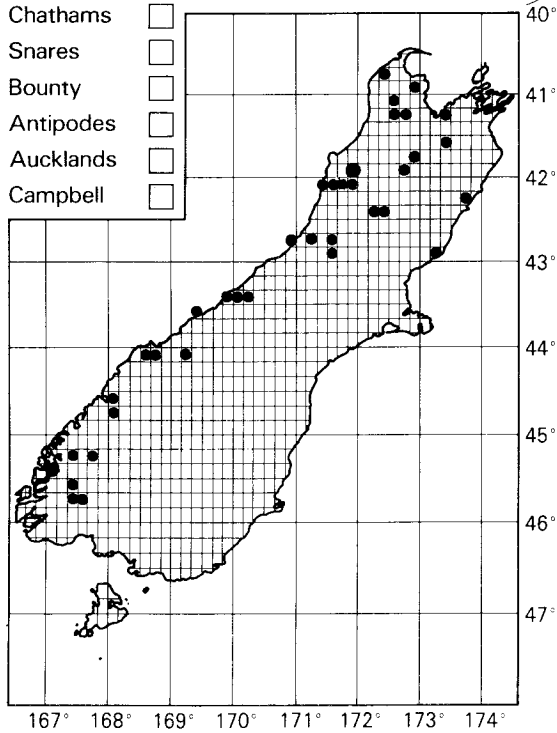
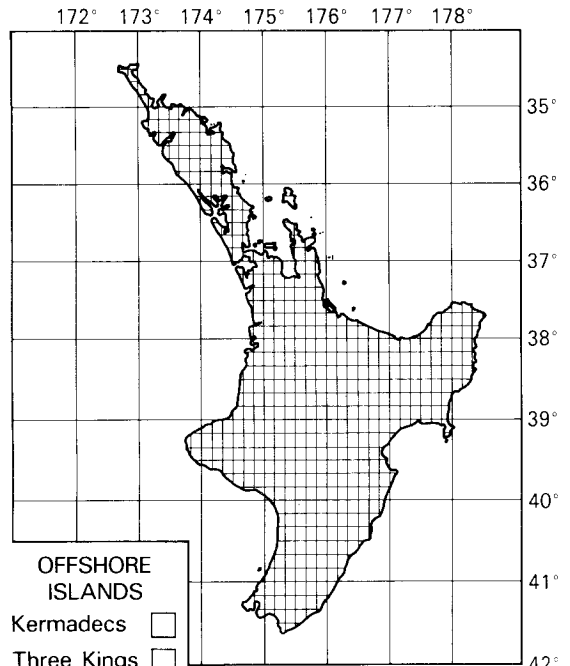
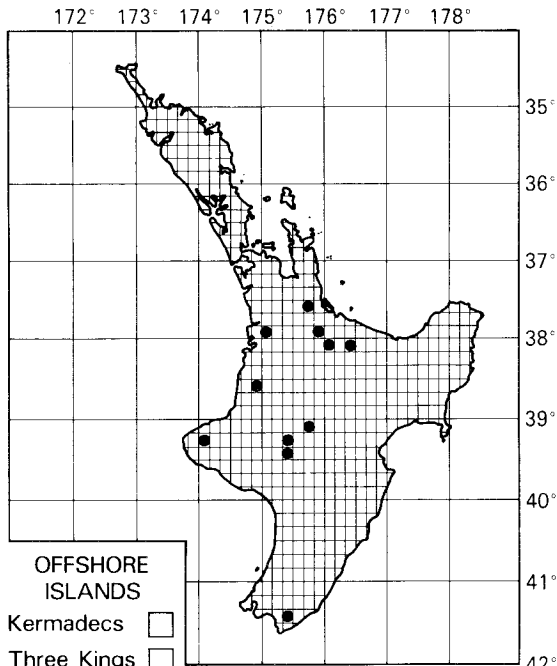
• Map 18 *Maoripria earlyi* •



• Map 19 *Maoripria masneri* •

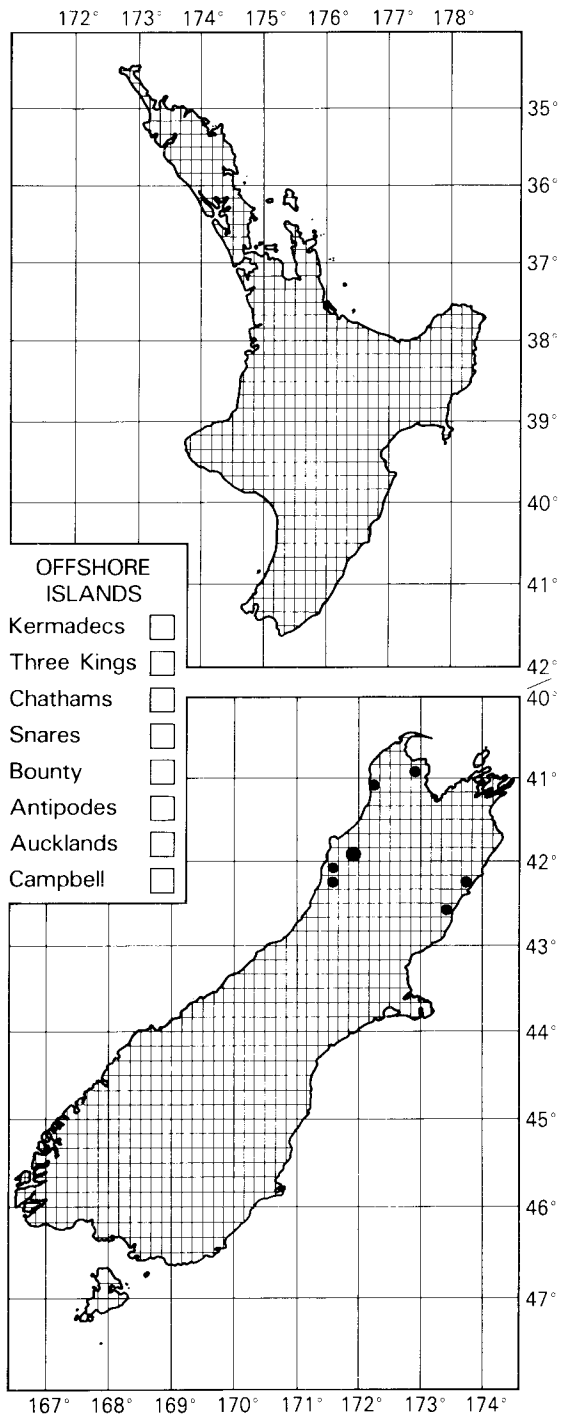


• Map 20 *Maoripria* spp. P72 & P73 •

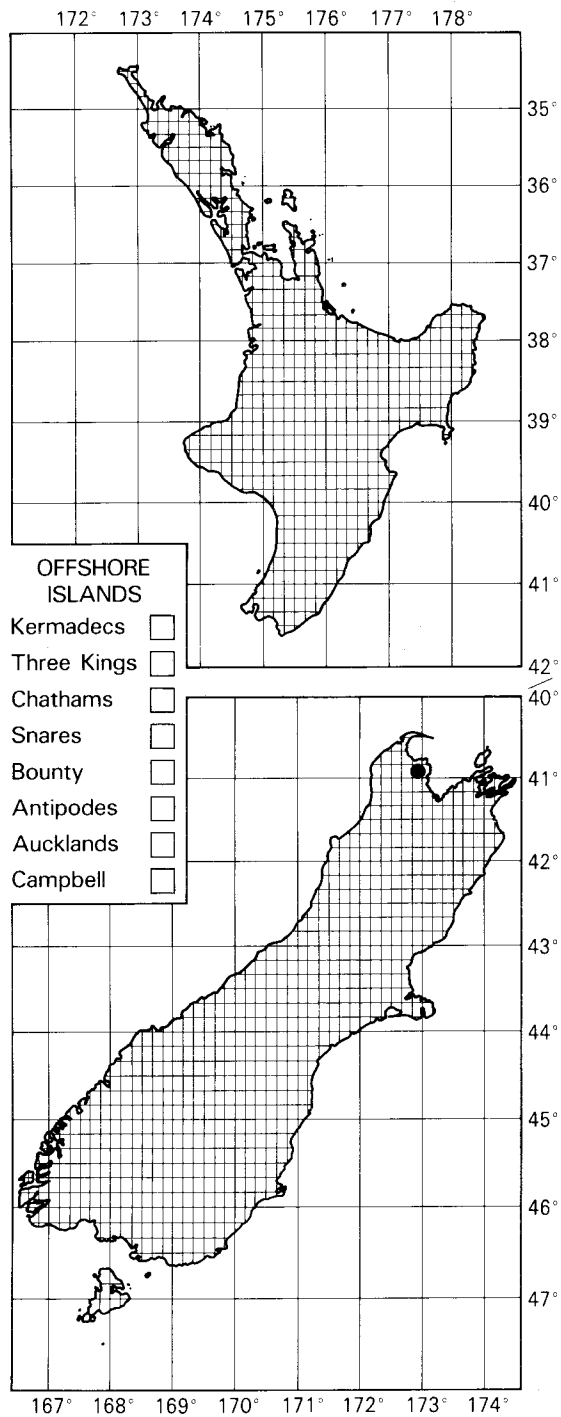


• Map 21 *Parabetyla tika* •

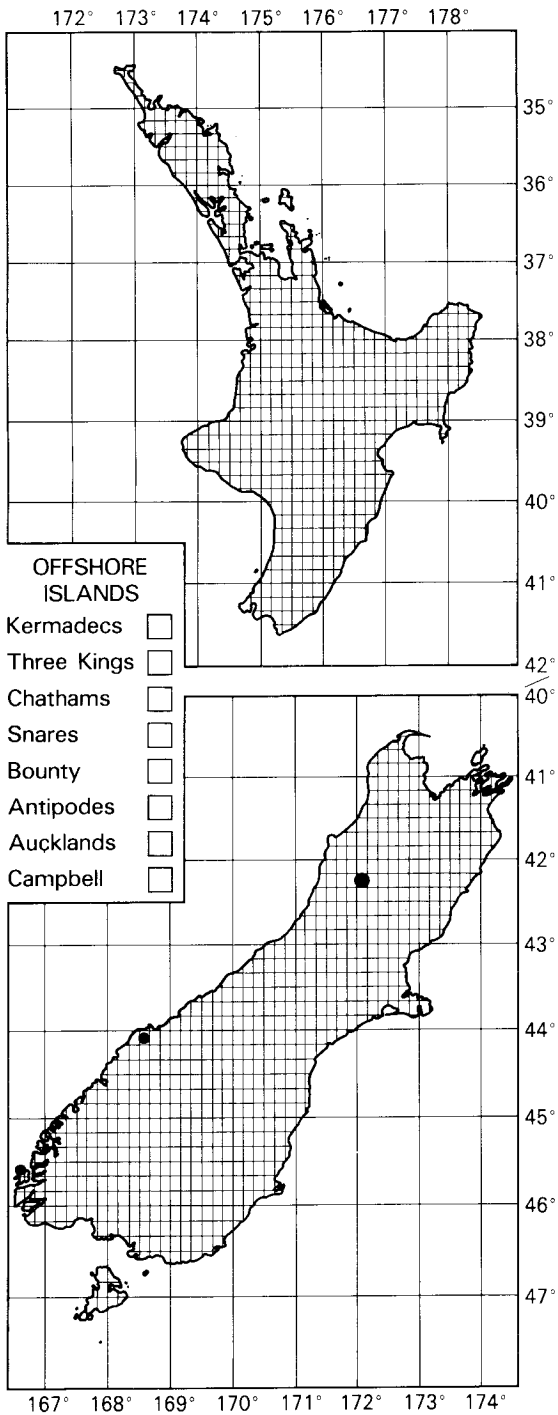
• Map 22 *Parabetyla spinosa* •



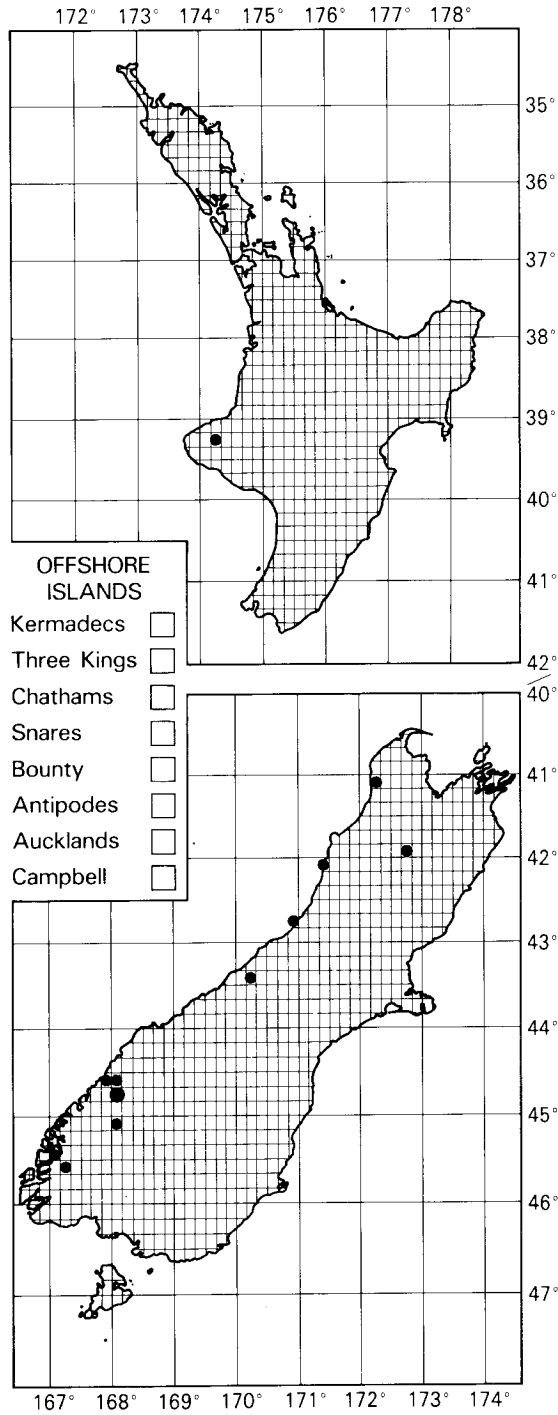
• Map 23 *Parabetyla pipira* •



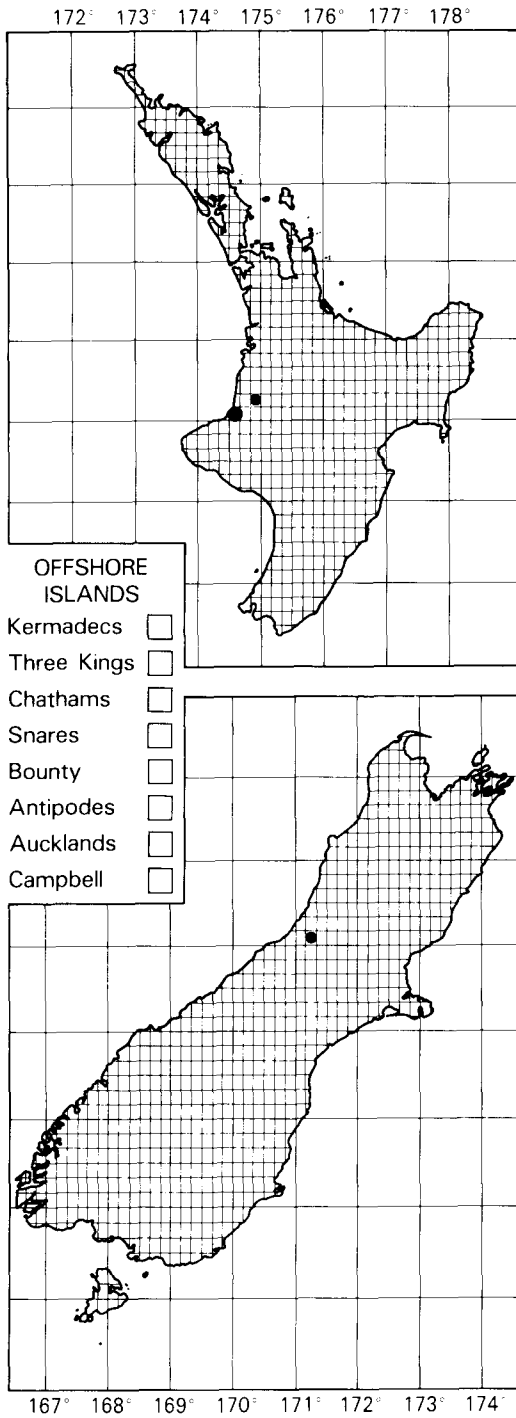
• Map 24 *Parabetyla ngarara* •



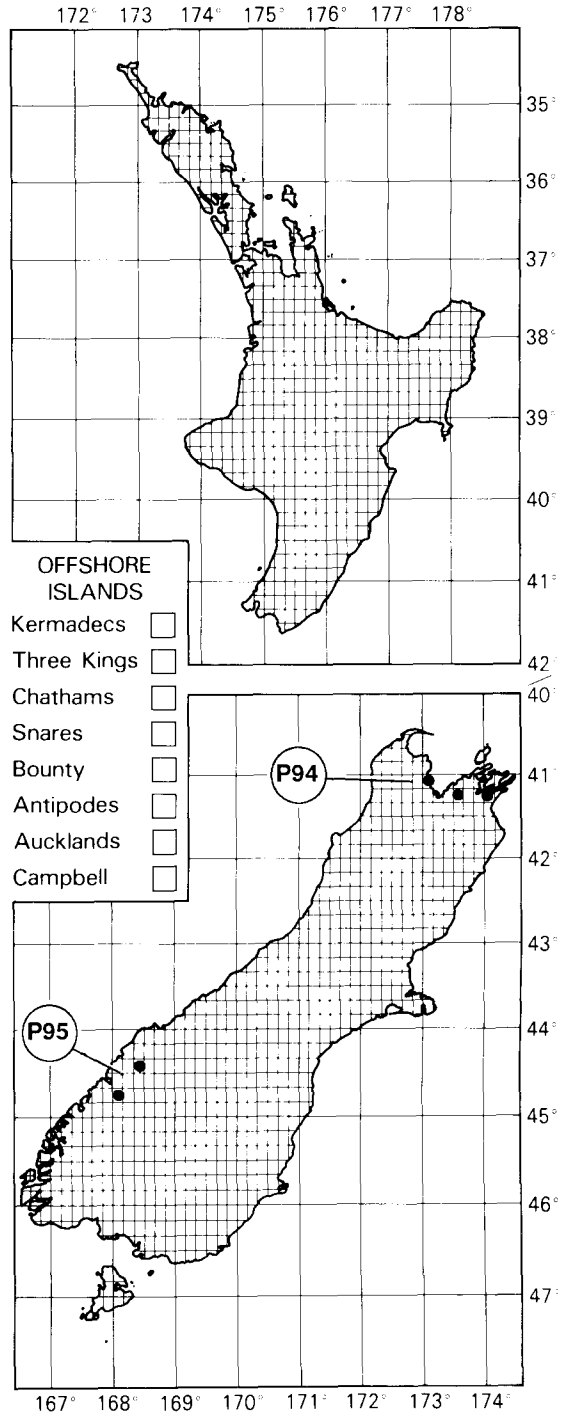
• Map 25 *Parabetyla pokorua* •



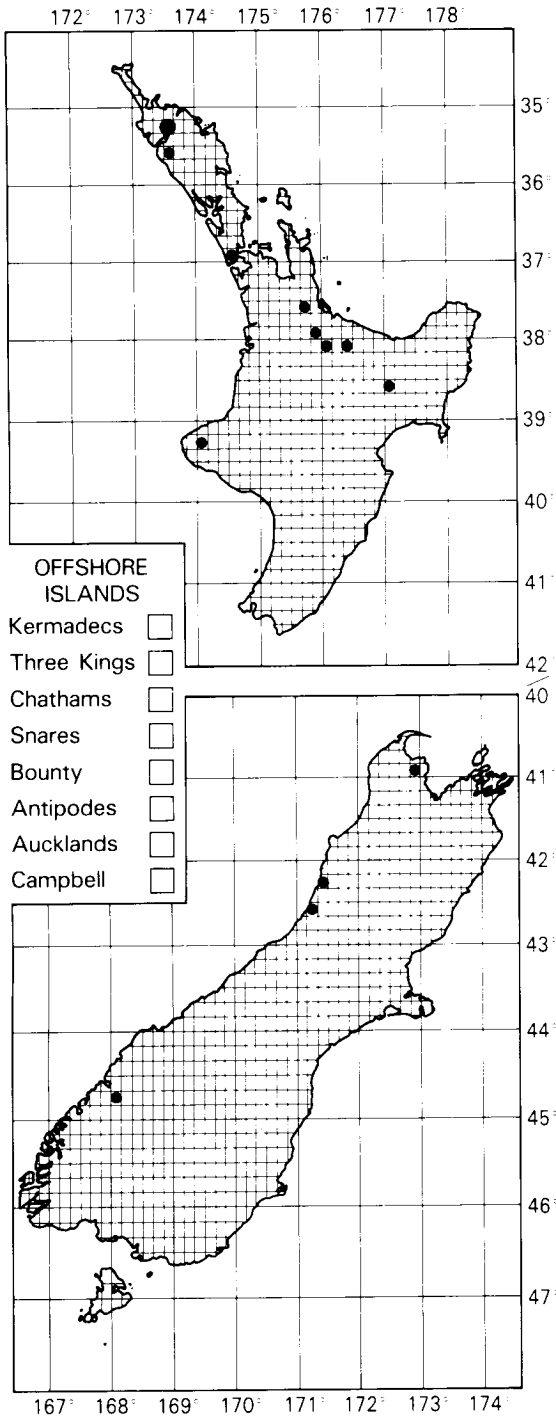
• Map 26 *Parabetyla nauhea* •



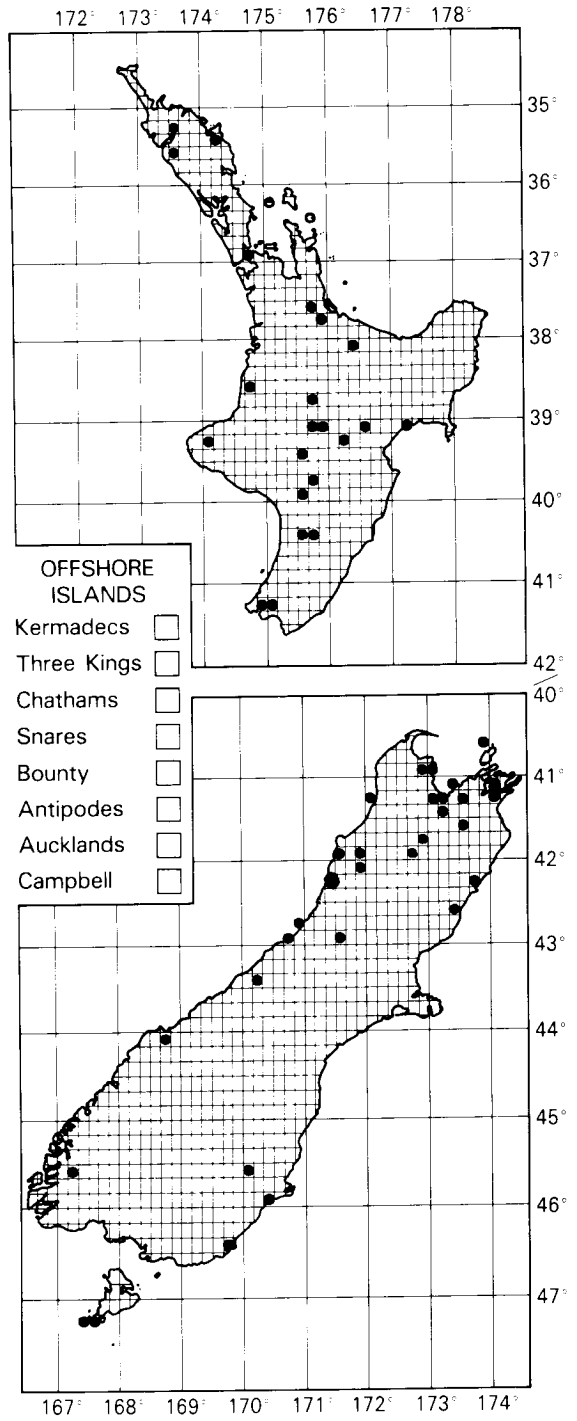
• Map 27 *Parabetyla tahi* •



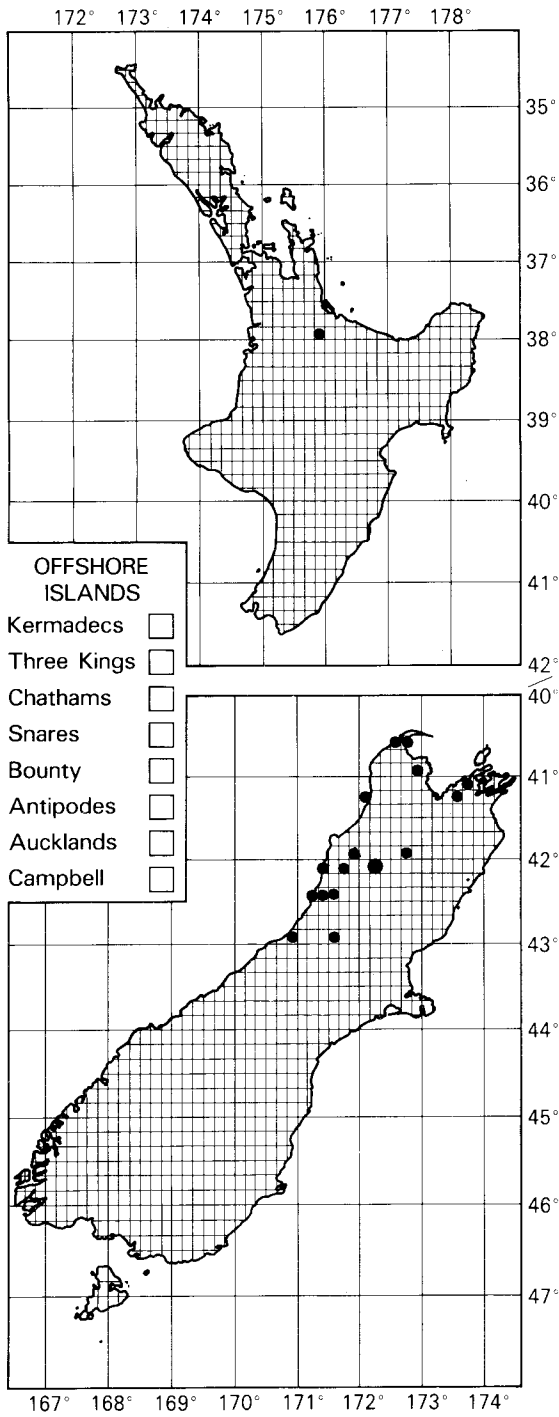
• Map 28 *Parabetyla* spp. P94 & P95 •



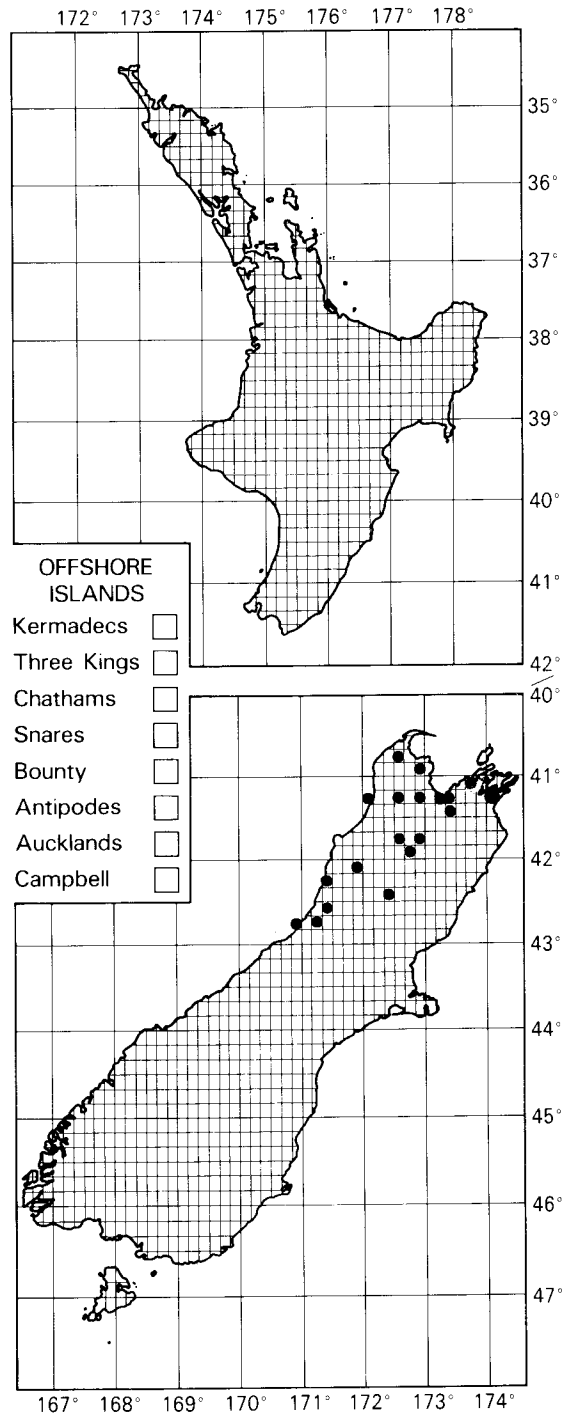
• Map 29 *Zealaptera chambersi* •



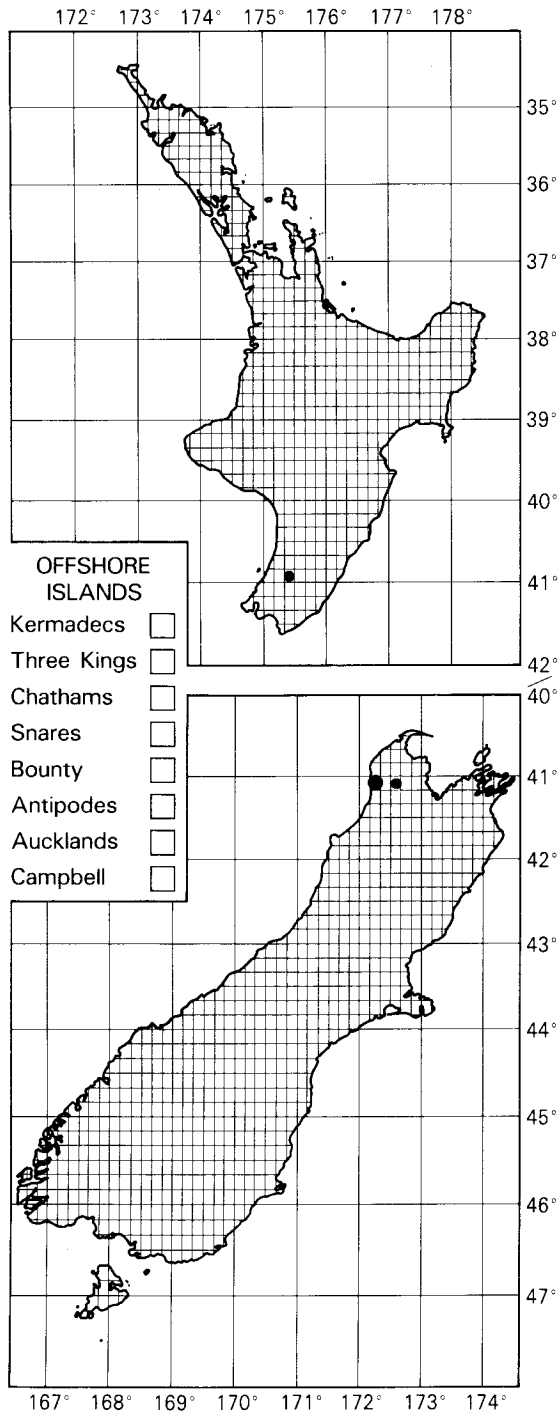
• Map 30 *Betyla fulva* •



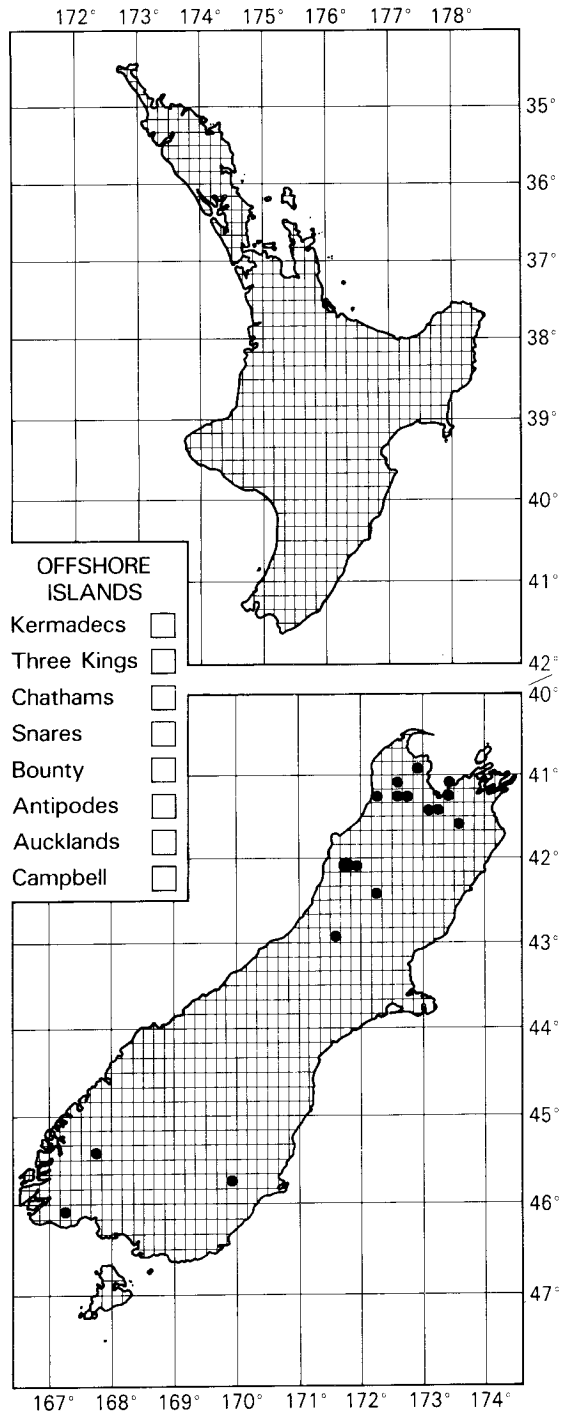
• Map 31 *Betyla prosedera* •



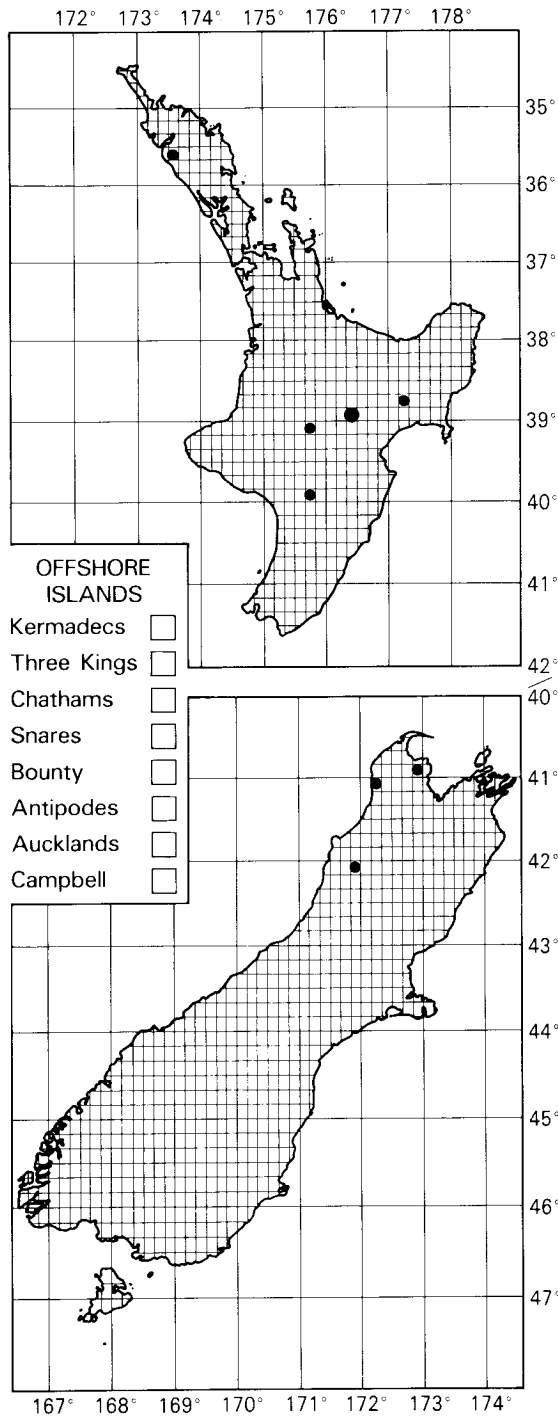
• Map 32 *Betyla auriger* •



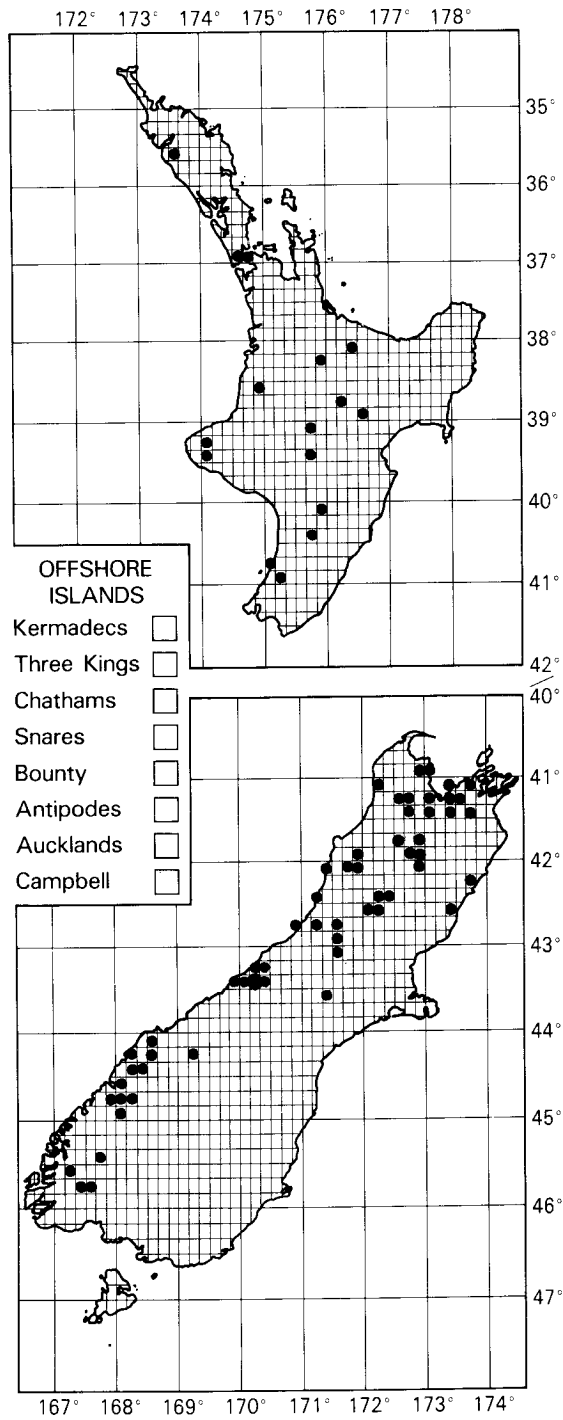
• Map 33 *Betyla thegalea* •



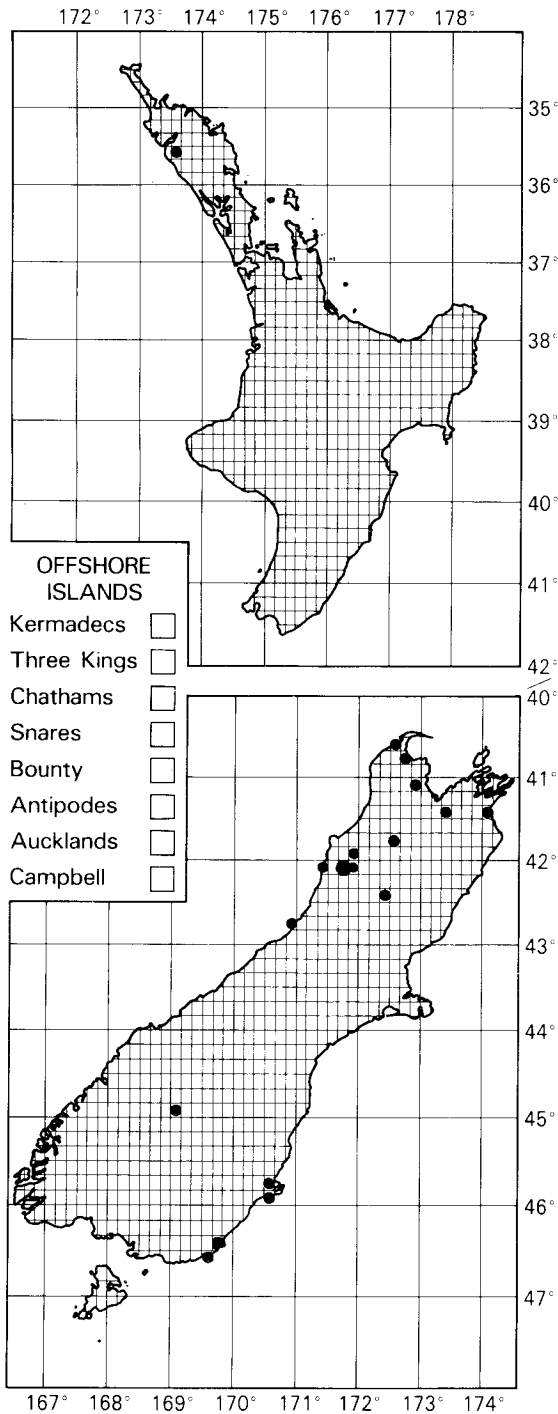
• Map 34 *Betyla rangatira* •



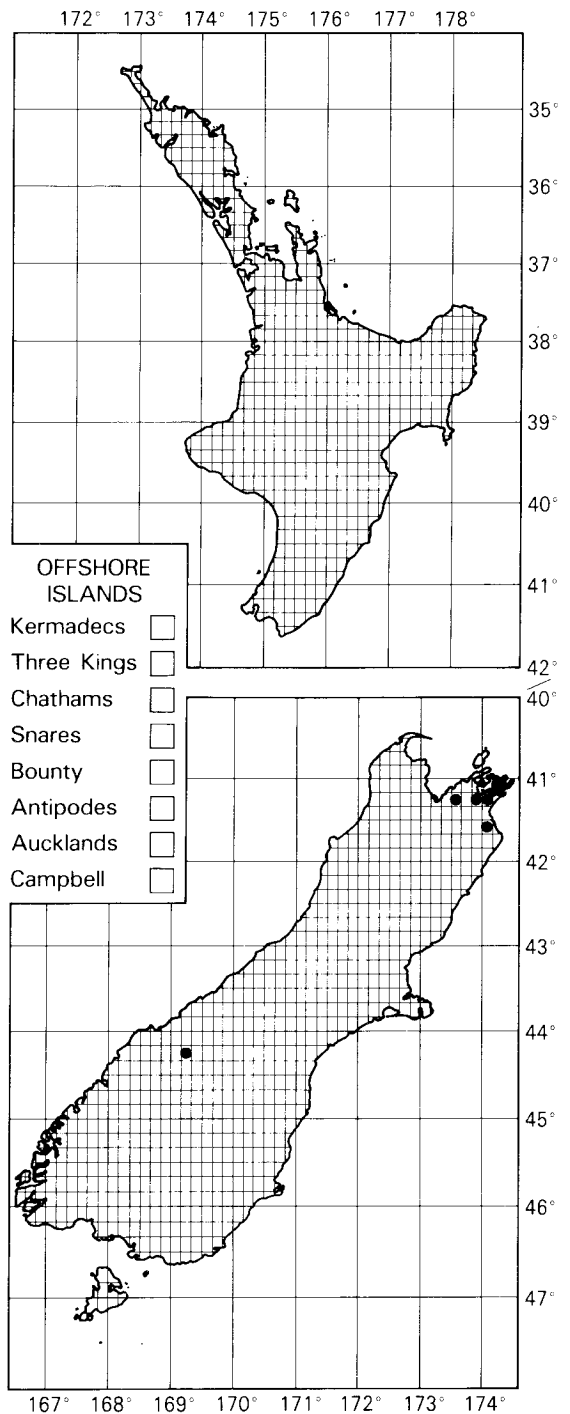
• Map 35 *Betyla karamea* •



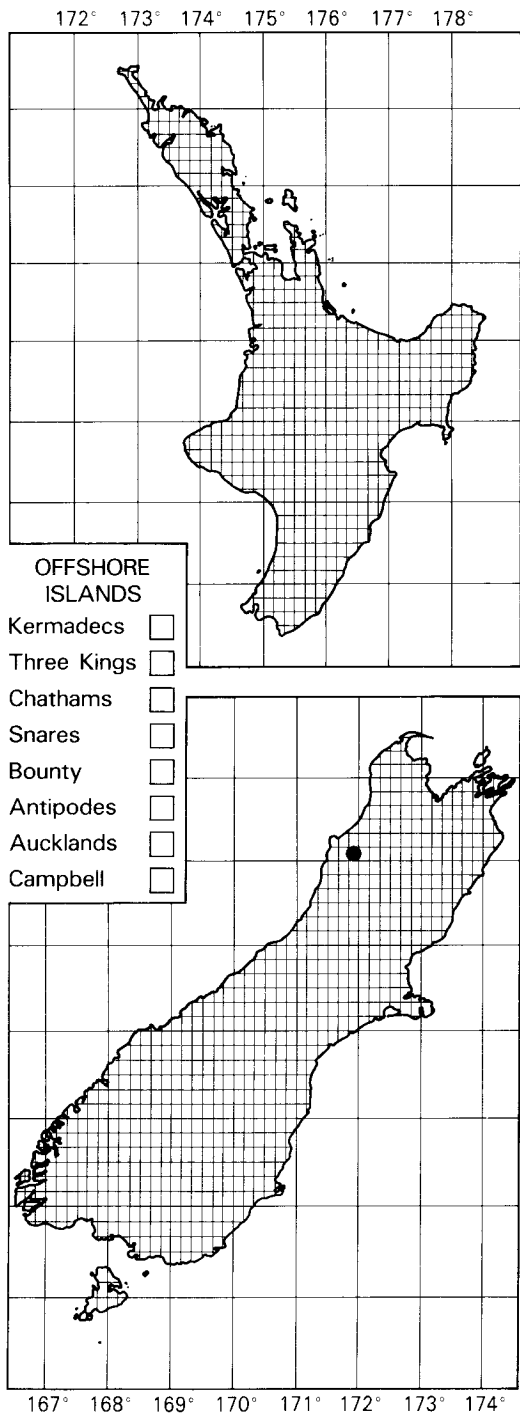
• Map 36 *Betyla eupepla* •



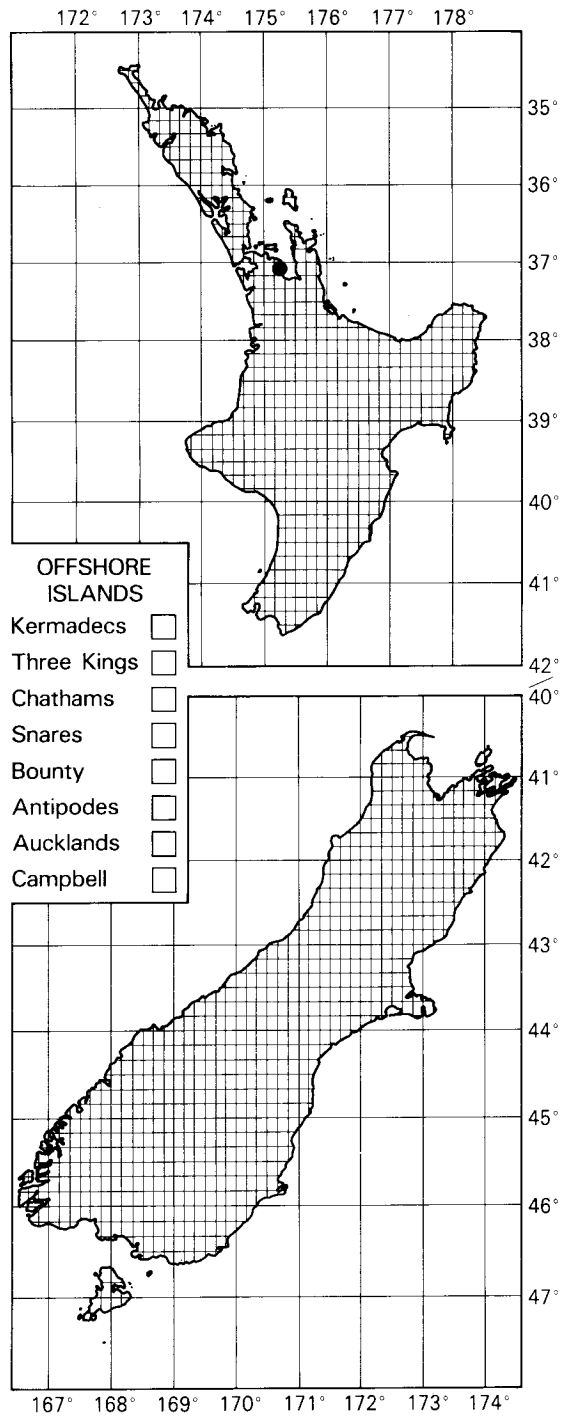
• Map 37 *Betyla tuatara* •



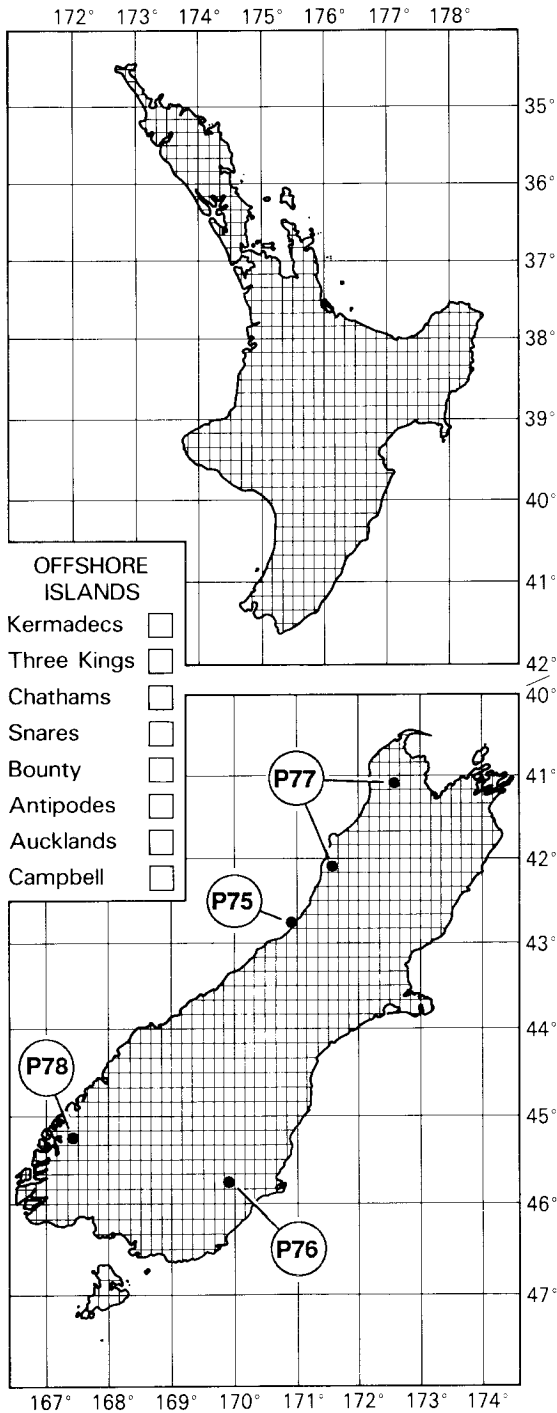
• Map 38 *Betyla wahine* •



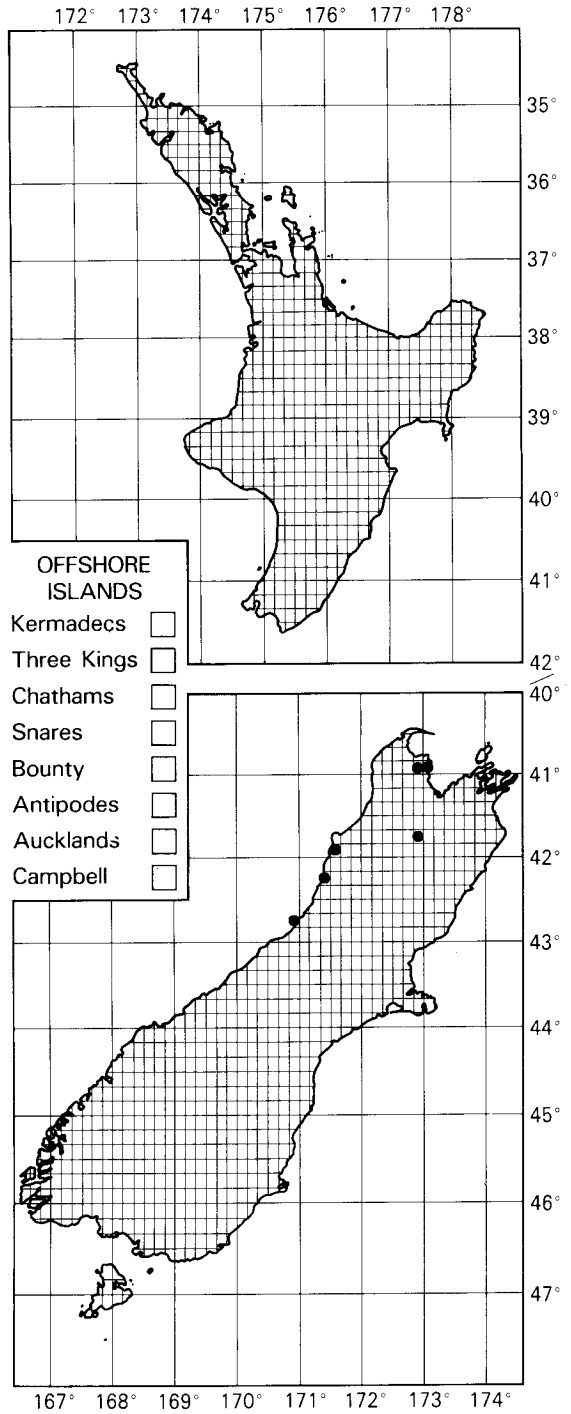
• Map 39 *Betyla paparoa* •



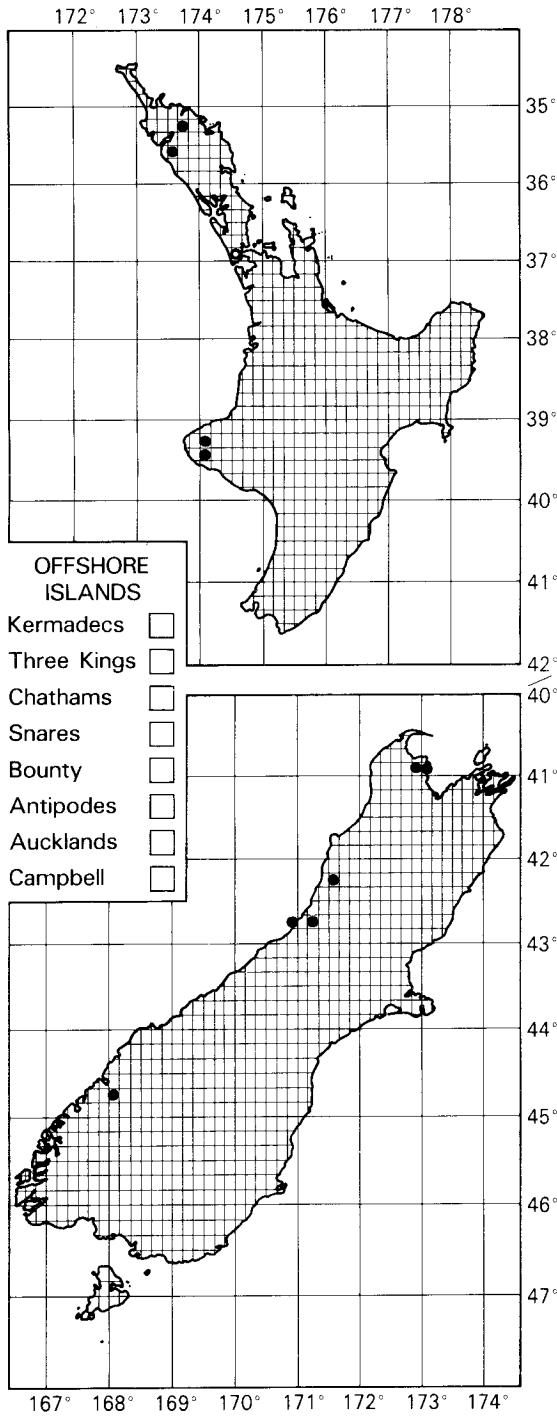
• Map 40 *Betyla midas* •



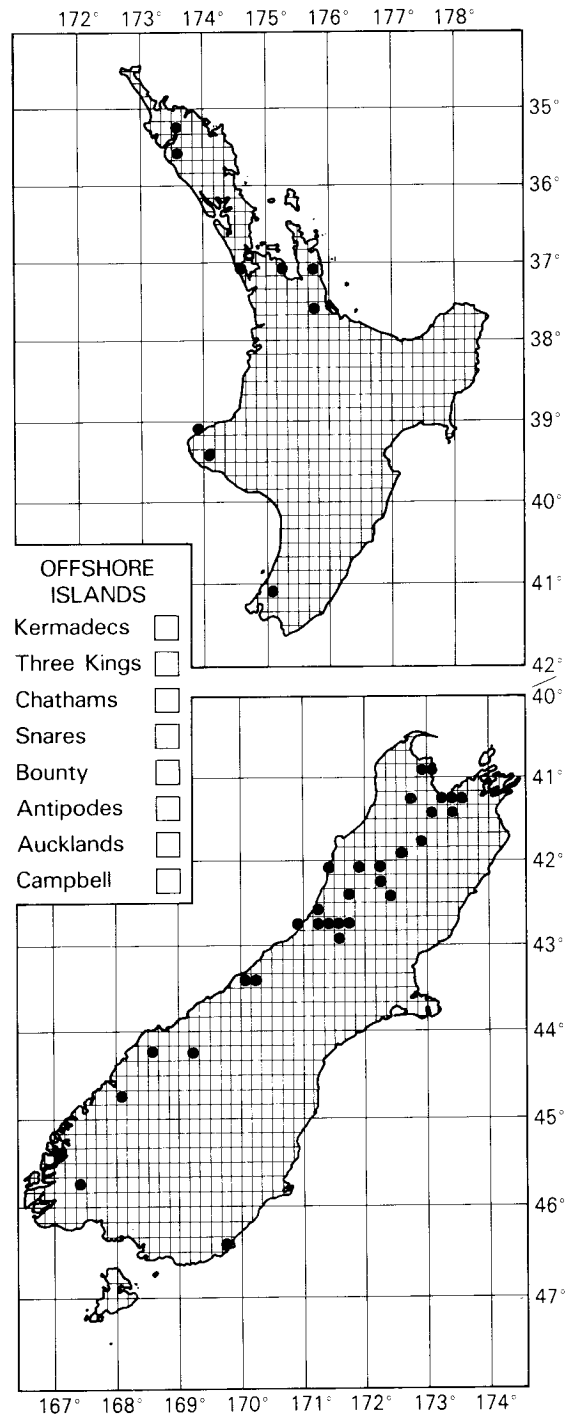
• Map 41 *Betyla* spp. P75-P78 •



• Map 42 *Betyla* sp. P79 •



• Map 43 *Betyla* sp. P80 •



• Map 44 *Betyla* sp. P81 •

TAXONOMIC INDEX

All nominal subfamilies, genera, and species covered in the text are indexed, regardless of their status in taxonomy. Page numbers with the suffix 'k' are those on which a taxon is keyed out. Page numbers in bold type indicate the start of major descriptive sections. Numbers in italic type indicate pages on which a taxon is figured.

- Acanthobetyla* 9
Aczelopria 9
Allobetyla 10
Ambositra 6, 7, 10
AMBOSITRINAE 14k
annettae, *Maoripria* 13, 38, 39k, **41**, 87
aphidius, *Pachyneuron* 35
apotoma, *Perissodryas* 39
Archaeopria 7, 10, 11, 12, 15k, **16**, 20, 90–92, 107–109
auriger, *Betyla* 13, 54k, **58**, 66, 89
Austroxylabis 9
- BELYTINAE 6, 7, 15k
Betyla 6, 7, 10, 11, 13, 14, 15k, 44, 51, **52**, 101–105, 131–141
bolitophilae, *Tanyzonus* 6, 52, 56, 57
- chambersi*, *Zealaptera* 13, **51**, 88
- daedalma*, *Perissodryas* 39
DIAPRIINAE 7, 15k
Diphoropria 7, 10, 11, 13, 14, 15k, **31**, 97, 116–119
Dissoxylabis 7, 9, 10, 11, 45, 52
- earlyi*, *Maoripria* 13, 38, 39k, **42**, 44
Encyrtoscelio 19
eriodes, *Archaeopria* 16, 17k
Eubroncinae 19
eupepla, *Betyla* 13, 54, 55k, **61**, 65
- famosa*, *Ambositra* 17
Fanis 9
- ferruginea*, *Pantolytomyia* 11, 20, 21
flocculosa, *Pantolytomyia* 12, 22k, **23**, 25, 26, 27, 28, 29
fulva, *Betyla* 6, 10, 13, 52, 54, 55k, **56**, 57, 58, 62, 89
- Gnathoceraphron* 19
Gwaihira 10
- insularis*, *Pantolytomyia* 12, 22k, 23k, 26, **27**, 86
- karamea*, *Betyla* 13, 54k, 59, **60**
kuscheli, *Diphoropria* 13, 33k, **36**, 86
- Lathropria* 9, 10
luminosa, *Arachnocampa* 6, 10, 57
- Maoripria* 7, 10, 11, 12, 13, 14, 15k, 31, **37**, 98–99, 120–125
masneri, *Maoripria* 38, 39k, **43**
midas, *Betyla* 13, 55k, 61, **65**
- nauheia*, *Parabetyla* 46k, **49**
ngarara, *Parabetyla* 13, 46k, 47, **48**
nigricans, *Diphoropria* 35
- Pantolytomyia* 7, 10, 11, 12, 15k, 16, **20**, 92–96, 110–115
paparoa, *Betyla* 13, 55k, 61, **65**
Parabetyla 6, 10, 11, 13, 14, 15k, **44**, 51, 52, 99–100
pelor, *Archaeopria* 16, 17k, **18**
Perissodryas 10, 39
pipira, *Parabetyla* 46k, 47, **48**
pokorua, *Parabetyla* 13, 46k, 47, **49**
polita, *Pantolytomyia* 22k, 23k, **26**, 28
pristina, *Archaeopria* 16, 17k, **19**, 85
Propsilomma 9
prosedera, *Betyla* 13, 55k, **57**
Psilus 19
P72, *Maoripria* sp. 39k, **43**, 44
P73, *Maoripria* sp. 39k, **44**

P75, *Betyla* sp. 55k, 66
P76, *Betyla* sp. 55k, 66
P77, *Betyla* sp. 55k, 66
P78, *Betyla* sp. 55k, 67
P79, *Betyla* sp. 55k, 67
P80, *Betyla* sp. 55k, 67
P81, *Betyla* sp. 55k, 68
P94, *Parabetyla* sp. 50
P95, *Parabetyla* sp. 50

rangatira, *Betyla* 13, 54k, 59, 60, 61, 65
Riaworra 7, 9, 52, 53
rufipes, *Diphoropria* 31

Scianomas 7, 9, 10, 52
sinuosa, *Diphoropria* 10, 11, 13, 33k, 36
Spilomicrus 106
spinosa, *Parabetyla* 6, 13, 44, 46k, 47, 48
Stentoriceps 19
Styлаclista 106

tahi, *Parabetyla* 46k, 49, 50
take, *Pantolytomyia* 12, 22k, 23k, 25, 26, 27, 85
Tanyzonus 6, 52
taurangi, *Pantolytomyia* 22k, 23k, 28, 29
thegalea, *Betyla* 13, 54k, 59
tika, *Parabetyla* 45, 46k, 48, 49, 50, 88
Trichopria 35, 41
tuatara, *Betyla* 13, 55k, 61, 63, 65
tungane, *Pantolytomyia* 22k, 25

verticillata, *Maoripria* 37, 38, 39k, 87

wahine, *Betyla* 13, 55k, 61, 64
wairua, *Pantolytomyia* 22k, 23k, 26, 28

Zealaptera 10, 11, 13, 14, 15k, 44, 51, 52, 101,
126–127

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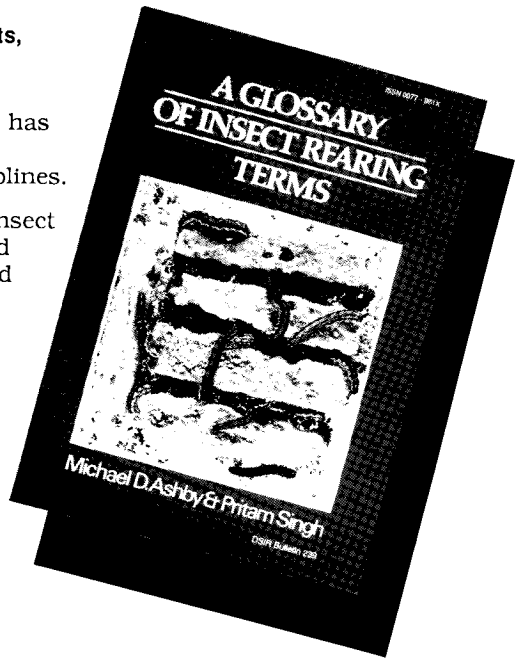
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Number 15

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(Insecta: Hymenoptera:
Diapriidae)



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No. 14 Lepidoptera — annotated catalogue, and keys to family-group taxa, by J. S. Dugdale. ISBN 0-477-02518-8. 248 p. Published 23 September 1988. 264 p. Price NZ\$49.95 (overseas US\$49.95).

No. 15 Ambositrinae (Insecta: Hymenoptera: Diapriidae), by I. D. Naumann. ISBN 0-477-02535-8. 168 p. Publication date and price to be announced.

IN PREPARATION (and scheduled for early publication)

Nepticulidae, by H. Donner & C. Wilkinson. Chalcidoidea (part), by J. S. Noyes & E. W. Valentine. Mantodea, by G. W. Ramsay.

CHECKLIST OF TAXA

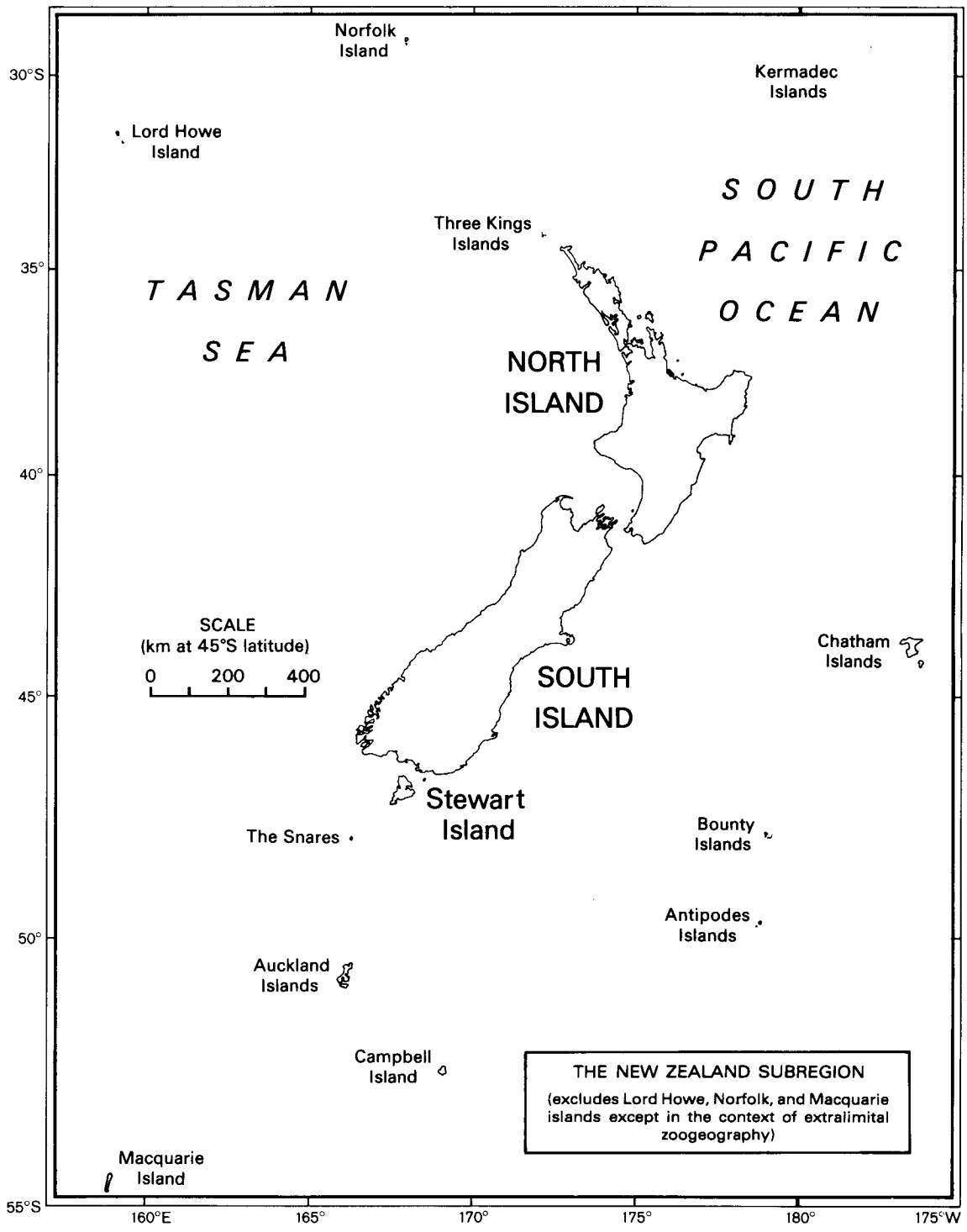
INTRODUCTION

KEYS TO TAXA

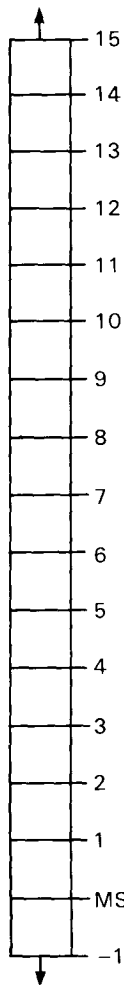
DESCRIPTIONS

APPENDICES

ILLUSTRATIONS



TAXON :

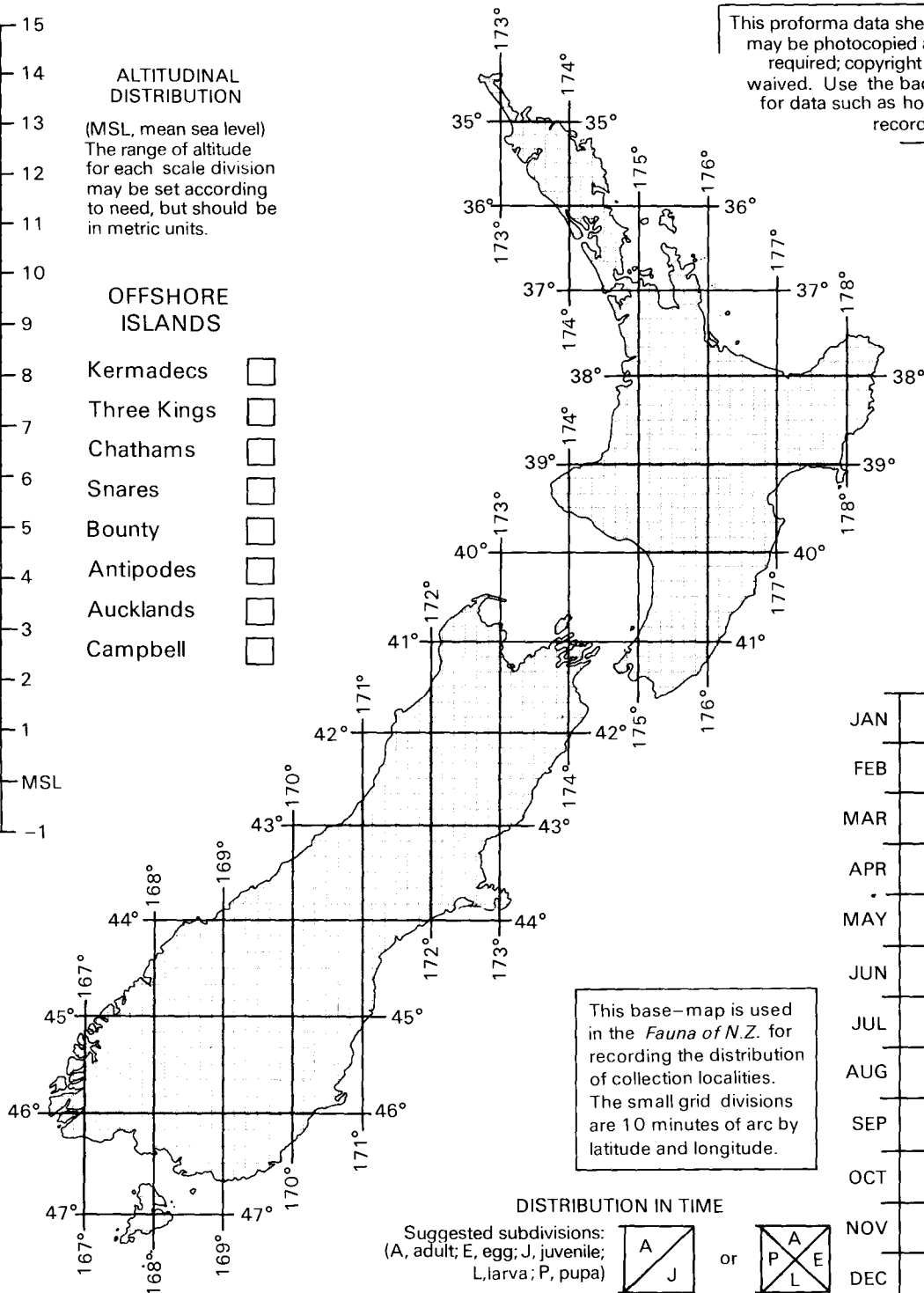


ALTITUDINAL DISTRIBUTION

(MSL, mean sea level)
The range of altitude for each scale division may be set according to need, but should be in metric units.

OFFSHORE ISLANDS

- Kermadecs
- Three Kings
- Chathams
- Snares
- Bounty
- Antipodes
- Aucklands
- Campbell



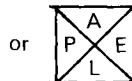
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This base-map is used in the *Fauna of N.Z.* for recording the distribution of collection localities. The small grid divisions are 10 minutes of arc by latitude and longitude.

DISTRIBUTION IN TIME

Suggested subdivisions:
(A, adult; E, egg; J, juvenile;
L, larva; P, pupa)



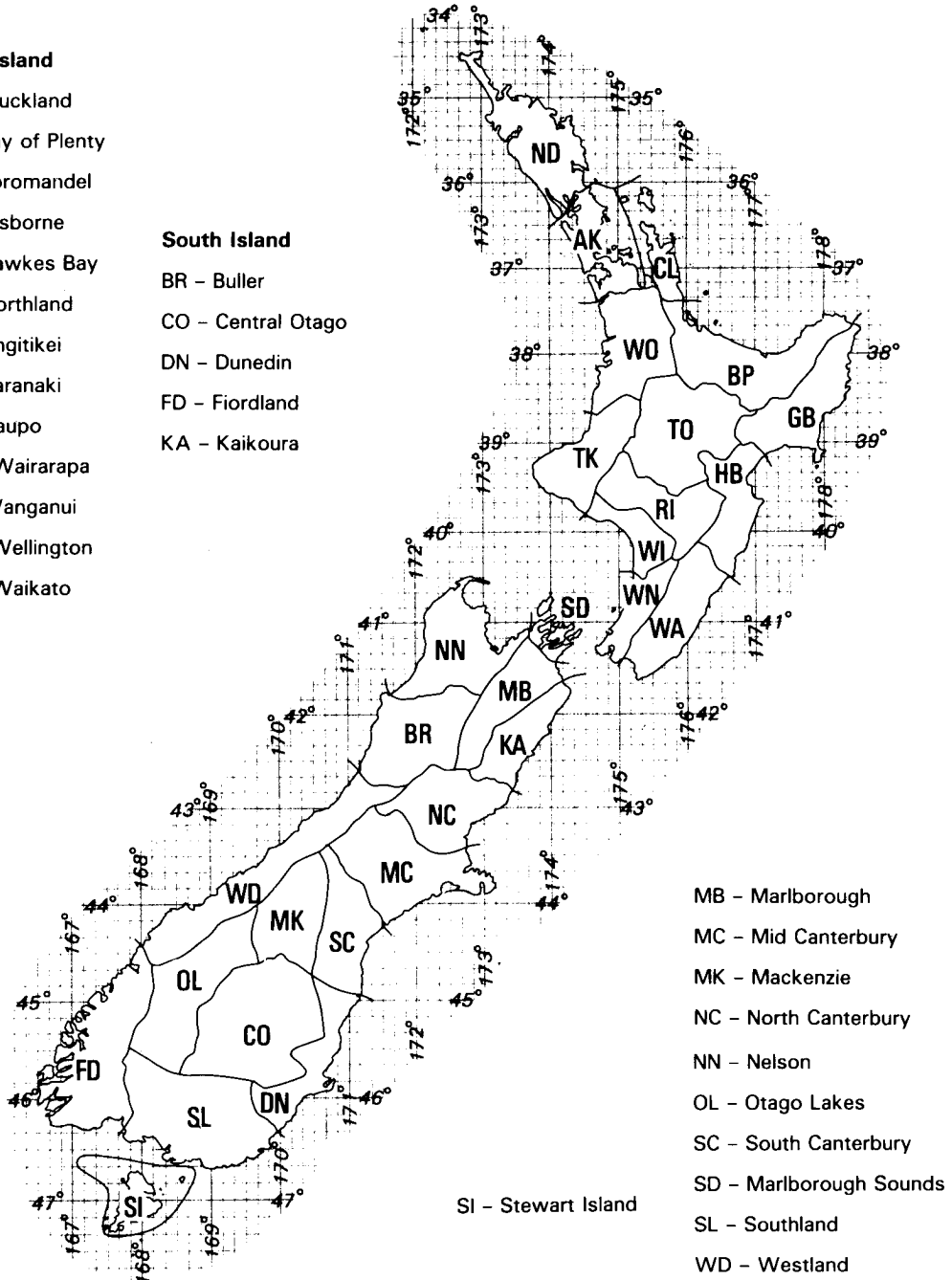
or

North Island

- AK - Auckland
- BP - Bay of Plenty
- CL - Coromandel
- GB - Gisborne
- HB - Hawkes Bay
- ND - Northland
- RI - Rangitikei
- TK - Taranaki
- TO - Taupo
- WA - Wairarapa
- WI - Wanganui
- WN - Wellington
- WO - Waikato

South Island

- BR - Buller
- CO - Central Otago
- DN - Dunedin
- FD - Fiordland
- KA - Kaikoura



Area codes and boundaries proposed by Crosby *et al.* (1976)
for use with specimen locality data

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