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**Front cover:** The insects depicted are morphological variants of the highly variable species *Tetracnemoidea bicolor*, ♀.

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## FOREWORD

In New Zealand, terrestrial invertebrate systematics began in a concerted way when a group dedicated to systematics was formed in Entomology Division, DSIR, in the early 1960s. In 1988 we mark the twenty-fifth anniversary of the establishment of that group, and it is timely to reflect on past events and achievements.

In the early years the group was based in Nelson, on the South Island. It moved in 1973 to the Mt Albert Research Centre, in Auckland, where the New Zealand Arthropod Collection grew and developed and, in 1982, the 'Fauna of New Zealand' was begun.

Most of the group's early members are still associated with it – three as full-time scientists, and three as research associates – and this has ensured a continuity of expertise and of esprit that has been of tremendous benefit. We are confident that the Systematics Group and the 'Fauna' will continue to have a central role in entomology and invertebrate systematics for the next twenty-five years.

The group has always sought to develop strong links with other institutions and individuals working in this field, in New Zealand and overseas. In particular the 'Fauna' has provided a vehicle for publication of definitive taxonomic studies on New Zealand insects and other terrestrial invertebrates, by specialists in New Zealand and by colleagues throughout the world. Perhaps the closest of the special relationships that have been developed over the years is that with the Entomology Department of the British Museum (Natural History). It is appropriate that Systematics Group's jubilee year should be marked with the publication of two commemorative 'Fauna' contributions that reflect this particular relationship: John Noyes's Encyrtidae and John Dugdale's Lepidoptera catalogue. The groundwork for each volume was laid during reciprocal study visits, Noyes to NZAC and Dugdale to BMNH.

It is five years since the 'Fauna' series began. Twelve volumes comprising 1600 pages are now in print, and we are assured of continued support from other contributors and from subscribers. We are confident therefore that the 'Fauna' was well conceived, is making a significant contribution to biology, and has a very definite future. Indeed Entomology Division is firmly committed to the objective of providing authoritative and comprehensive guides to identification of insects and other terrestrial invertebrates through the medium of the 'Fauna' series.

It is a pleasure to acknowledge the achievements of Systematics Group in its first twenty-five years, in particular the establishment of the 'Fauna' series, and I wish both the group and the 'Fauna' well for the future.

*J.F. Longworth*

Director  
Entomology Division  
DSIR

## ABSTRACT

Thirty-five genera and 67 species of Encyrtidae are recorded from New Zealand, including the adjacent subantarctic islands. Of these, four of the genera – *Notodusia*, *Odiaglyptus*, *Zelaphycus*, and *Zelencyrtus* – are new, as are 32 of the species. A further genus and three species are recognised but not named. The following new synonymies are proposed: *Kakaoburra* with *Subprionomitus*; *Anarhopus* and *Zealandencyrtus* with *Tetracnemoidea*; *Quaylea aliena* and *Cerchysius whittieri* with *Coccidoctonus dubius*; *Litomastix maculata* with *Copidosoma floridanum*; *Eucomys proserpinensis* and *E. hortensis* with *Encyrtus infelix*; *Eucomys argenticoxa*, *E. hibisci*, *E. aurantifasciata*, and *E. argentiscapus* with *Encyrtus lecaniorum*; and *Antipodencyrtus procellosus* and *Zealandencyrtus yasumatsui* with *Tetracnemoidea bicolor*. Five new combinations are proposed: *Copidosoma floridanum*, *Subprionomitus angeliconini*, *Subprionomitus ferus*, *Tetracnemoidea sydneyensis*, and *Zelaphycus aspidioti*. A lectotype is designated for *Cheiloneurus gonatopodis*, and the subtribe Mayridiina is given tribal status. The text includes a diagnosis of the Encyrtidae; a summary of the biology and life history of the family; notes on the use of encyrtids in biological control in New Zealand; methods of collecting and preserving encyrtids; a discussion of the probable origins and distribution of the New Zealand fauna; keys to the genera and species; descriptions or redescriptions of all the taxa; notes on their systematic relationship with taxa in other parts of the world; notes on the distribution of each species; and, where available, information on their hosts. Sufficient illustrations are included to facilitate recognition of taxa and discrimination of diagnostic characters.

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## INTRODUCTION

The family Encyrtidae is one of the largest in the Chalcidoidea, comprising nearly 3200 described species. Almost all species are internal parasites of other insects, spiders, mites, or ticks. Most are solitary primary parasites but many are gregarious, polyembryonic, or hyperparasitic. Within the Chalcidoidea the encyrtids, along with the Aphelinidae, have been the most utilised in biological control, particularly of homopterous pests. It is therefore perhaps surprising that, as with most groups of Hymenoptera Parasitica, the family has received very little attention in New Zealand. Indeed Valentine (1970) noted only 25 described species from these islands, and a further 60 undescribed endemic species.

The first New Zealand encyrtid to be noted in the literature was mentioned by Kirk (1898), when he found an unnamed species (recorded as *Tetracnemus*) parasitising *Pseudococcus longispinus* (Targioni-Tozzetti) (recorded as *Dactylopius adonidum*) on vines and ferns in a greenhouse at Mount Eden, Auckland. This parasite was later described as *Tetracnemus brounii* by Timberlake (1929), who had earlier (1916) described *Aphycus claviger* from two females and a male collected at Auckland; this latter species is still known only from the type-series. Since then, three genera and four species have been described from the mainland and offshore

islands, viz *Antipodencyrtus procellosus* Kerrich (1964), *Aphycomorpha aspidioti* Tachikawa & Valentine (1969a), *Adelencyrtoides novaezealandiae* Tachikawa & Valentine (1969b), and *Zealandencyrtus yasumatsui* Tachikawa & Valentine (1971). A further seventeen described species have been recorded from New Zealand, plus four undetermined species recorded in specified genera. Seven of these were introduced for biological control purposes (see below).

In 1980-1981, as a result of an exchange visit organised with the Department of Scientific and Industrial Research, I had the opportunity to collect and study New Zealand Encyrtidae. This revision results from a detailed study of all the material available to me, and is intended to enable students and field workers alike to attempt to identify any encyrtids that they may encounter. To that end I have constructed keys to facilitate identification, and have outlined the best techniques for rearing, collecting, and preserving specimens. Also provided are notes relating the genera and species found in New Zealand to the world fauna.

A world-wide review of encyrtid hosts is given by Tachikawa (1970, 1974c, 1978, 1981). Observations on the biology of Encyrtidae in New Zealand are very scant and lacking in detail. The available information is noted for each species, and supplementary notes are added from information published in other parts of the world.

The most comprehensive sources of information on Encyrtidae are given by Trjapitzin (1973a, b) for overall classification; Trjapitzin (1971a) for the Palearctic; Trjapitzin & Gordh (1978a, b) and Gordh (1979) for the Nearctic; Annecke & Insley (1970) and Prinsloo & Annecke (1979) for the Afrotropical region; Noyes (1980) for the Neotropical region; and Noyes & Hayat (1984) for the Indo-Pacific region.

## DIAGNOSIS OF THE ENCYRTIDAE

Encyrtidae can be distinguished by the following combination of characters (see also Figures 1-5). General habitus fairly squat and robust. Length varying from about 0.3 mm to 3.0 mm.

Head with antennae situated variously near mouth margin to about halfway between mouth margin and anterior ocellus; scape length at least about one-third head width; pedicel short, subconical or flattened; female flagellum cylindrical to very broadened and flattened, 4-9-segmented; male flagellum cylindrical to slightly flattened or with branched segments, 3-8-segmented; a true anellus absent in both sexes; apical segment larger than those preceding, or distalmost 2-4 segments separated by septa only and forming a distinct club.

Eyes moderately large, usually longer than shortest distance between eye and mouth margin. Mandibles ranging from long and narrow with 1 long, sickle-shaped tooth to very broad, with 4 teeth or without teeth. Pronotum strongly transverse, usually shorter than mesoscutum. Mesoscutum transverse, without notaular lines or, if present, then lines extremely shallow, curved, and indistinct. Scutellum shield-shaped. Prepectus moderately large and free. Mesopleurum enlarged, occupying more than half of the thorax in lateral view, and often touching base of gaster. Forewing fully developed or reduced, occasionally absent; linea calva present; marginal vein generally very short, not more than 6-7 $\times$  as long as broad, rarely longer; postmarginal and stigmal veins usually subequal in length, not very long, the postmarginal vein occasionally absent or considerably longer than the stigmal. Middle coxae, in profile, level with middle of mesopleurum; middle tibial spur relatively long and stout, usually subequal in length to basal segment of middle tarsus.

Abdomen with 2nd segment indistinct, extremely short and broad, so that gaster (abdominal segments 3-12) usually broadly sessile; 9th and 10th tergites fused; cercal plates advanced, often strongly so and then often situated in anterior third of gaster; last visible abdominal sternite (hypopygium) reaching variously about one-third along gaster to past apex of last tergite; ovipositor hidden or well exerted.

## DIAGNOSTIC CHARACTERS

Unless otherwise stated in the captions, all figures were drawn directly from slide-mounted material using a drawing tube attachment on a compound microscope. Relative measurements can therefore be taken straight from these figures. Such measurements must not be made where the points of reference were not equidistant from the objective of the microscope when the drawings were made, e.g., width of scape (the scape is rarely absolutely flat on a slide-mounted specimen), distance of antennal toruli from mouth margin, length of malar space, eye length, POL and OOL, etc. These measurements can be made reliably only from dry, card-mounted specimens.

### Head (Figures 1-3)

**ANTENNAL CLUB.** This is composed of from one to three segments; if more than one is present then these are separated by complete or partial sutures and are not as distinctly separated as the funicle segments. The sensory plate on the ventral surface of the club often becomes inflated during slide-

making, and any oblique truncation may not be clearly visible. For this reason it is better to ascertain the presence or absence of an oblique or transverse truncation of the club using dry, card-mounted specimens.

**ANTENNAL FUNICLE.** This excludes the anellus ("false ring-joint" of Timberlake 1922b, pp. 168 and 172), which may be present or absent but is almost always hidden by the pedicel in card-mounted specimens. In the encyrtids the anellus never bears setae, whereas funicle segments always bear setae. **EYE.** Measurements of length and width are the maximum and minimum diameters respectively; the points from which the measurements are taken should be equidistant from the objective of the microscope (i.e., both in focus simultaneously).

**FRONTOVERTEX.** The width is measured across the anterior ocellus or at its narrowest point, whichever is stated in the text.

**HEAD DEPTH.** The shortest distance from the anteriormost part of the head to the occipital margin when the head is viewed in profile.

**HEAD WIDTH.** The maximum width of the head in facial view.

**MALAR SPACE.** The minimum distance between the eye and the mouth margin.

**MALAR SULCUS.** The line joining the lower eye margin to the mouth margin; often absent, but indicated by a slight change in sculpture.

**MANDIBLES.** The dentition can vary as follows: without teeth (Figure 164); with one acute tooth (Figure 105); two acute teeth (Figures 99, 233, and 254); one tooth and a broad truncation (Figures 24, 275, and 279); two teeth and a truncation (Figures 6 and 17); two acute teeth and an obtuse upper tooth (Figures 9 and 30); three acute teeth (Figures 128, 217, and 260); or four teeth (Figures 95 and 195). The distinctions are often very obscure, for instance between two teeth and a truncation, two acute teeth and an obtuse upper tooth, and three acute teeth. Similarly for the difference between one tooth and a truncation and two teeth and a truncation, three and four teeth or two teeth and a truncation, and four teeth.

**OOL.** The minimum distance between the eye margin and the nearest posterior ocellus.

**OPL.** The minimum distance between a posterior ocellus and the occipital margin.

**POL.** The minimum distance between the posterior ocelli.

### Thorax (Figures 1 and 2)

**FOREWING (Figure 1).** **BASAL CELL:** the area bounded by the linea calva, the submarginal vein, and a line of setae, usually present, which is separated from the posterior wing margin by a narrow, naked strip.

**FILUM SPINOSUM:** a series of peg-like bristles, distinctly stouter than adjacent setae, on the distal margin of the linea calva.

**FOREWING LENGTH:** measured from the proximal part of the costal cell to the wing apex.

**FOREWING WIDTH:** measured across the greatest width of the wing at right angles to the anterior wing margin.

**LENGTH OF MARGINAL SETAE:** the length of the longest marginal setae.

**LINEA CALVA:** an oblique, hairless line extending from just below the marginal and stigmal veins to the posterior margin of the wing.

**MARGINAL VEIN:** measured from where the submarginal vein reaches the anterior wing margin, or from where the anterior edge of the venation at the junction of the submarginal vein is abruptly angled and not from the subapical hyaline break of the submarginal vein.

**PARASTIGMA:** a very slight to strong swelling of the apical third of the stigmal vein.

**POSTMARGINAL VEIN:** length is measured from the distal margin of the junction of the stigmal and marginal veins to its apex; the apex is usually indicated by a single, relatively long, suberect seta.

**STIGMAL VEIN:** measured from the distal margin of the junction of the stigmal and marginal veins to its apex; there are usually three or four circular sensilla at the apex.

**UNCUS:** a beak-like process often arising from the apex of the stigmal vein.

**MESOPLEURUM.** Recent research (Gibson 1986\*) has shown the large, modified area below the wings which makes up the greater part of the side of the thorax to be only a part of the mesopleurum.

**METAPLEURUM.** A very narrow strip connecting the hindwing base to the hind coxa; often hidden by the posterior margin of the mesopleurum.

**NOTAULAR LINES.** Very shallowly impressed, curved lines sometimes present on the mesoscutum. They may be difficult to see in dry-mounted material unless viewed under the correct light conditions.

**PROPODEUM.** The true first abdominal segment, which has become appressed to the thorax and thus has the appearance of being part of it; length is measured along the midline.

**SCUTELLUM.** Length is measured along the midline; width excludes the axillae.

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\*NOTE ADDED IN PRESS. Gibson (pp. 699 and 703-704) uses the term 'acropleuron' for this area (Gibson, G.A.P. 1986: Mesothoracic skeletomusculature and mechanics of flight and jumping in Eupelminae (Hymenoptera, Chalcidoidea: Eupelmidae). *Canadian entomologist* 118: 691-728). For present purposes, however, the term 'mesopleurum' has been employed.

**Gaster** (Figures 1, 2, 4, and 5)

**AEDEAGUS.** Usually very simple, flat and gradually tapering distally; occasionally spatulate or with various processes subapically. Length is measured from the proximal parts of the apodemes (the rods at the base of the aedeagus) to its apex.

**CERCI.** Relative position is measured in dry-mounted material; if measured in material that has been in alcohol, critical-point dried, or slide-mounted the gaster may become distended, and the cerci will be positioned relatively nearer the apex. **DIGITUS.** A finger-like process from the side of the distal part of the phallobase, often with from one to four sclerotised teeth or hooks at its apex.

**GASTER.** The third to twelfth abdominal segments, i.e., excluding the first (propodeum) and second (petiole) segments.

**GONOSTYLUS.** The third valvula or ovipositor sheath, as seen in slide-mounted material.

**HYPOPYGIUM.** The seventh abdominal sternite (= fifth gastral sternite). The relative position of the apex is measured in dry-mounted material.

**LAST TERGITE.** The fused ninth and tenth abdominal tergites (seventh and eighth gastral tergites). Its length is the shortest distance from its apex to an imaginary line connecting the cercal plates.

**OVIPOSITOR.** Length is measured as shown in Figure 4. The length of the exerted part is measured from the apex of the last tergite in dry-mounted material.

**OVIPOSITOR SHEATH.** The gonostylus as seen in dry-mounted material.

**PARAMERE.** A process from the distal part of the phallobase, outside the digitus and often with a single short seta at its apex; sometimes more or less absent.

**PARATERGITE.** A narrow, sclerotised, membranous strip connecting the outer plates of the ovipositor to the cercal plates and usually also to the last tergite of the gaster. Normally present in the Tetraneurinae, but present in only very few Encyrtinae.

**PHALLOBASE.** A tube-like structure enclosing the base of the aedeagus, sometimes with complex elements distally.

## SYNOPSIS OF ENCYRTID CLASSIFICATION

The following is an attempt to define the tribes of Encyrtidae represented in New Zealand according to Trjapitzin's (1973a, b) classification. This is the most comprehensive treatment of the Encyrtidae to date, but is badly in need of revision since it has been based largely on the Palearctic fauna and has not been derived using modern classificatory or phylogenetic methods. Many of the genera found

in New Zealand are therefore difficult to place reliably.

The family is divided into two subfamilies, Tetracneminae and Encyrtinae.

### Subfamily TETRACNEMINAE

\* Mandibles bidentate; † forewing without a filum spinosum; setae on basal cell of similar size to those beneath apex of venation (Figures 101 and 190); † parasites of Pseudococcidae (Homoptera). FEMALE – † gaster with last tergite more or less shield-shaped or triangular, its anterior margin almost straight, hardly curved; hypopygium reaching apex of gaster; ovipositor with outer plates relatively narrow, not triangular (Figures 290 and 361), strongly attached to last tergite by a membranous area or by paratergites; gonostyli fused to 2nd valvifers, immovable (Figures 290 and 361). MALE – \* antennae branched (Figures 324–326) or with scale-like sensilla on distal flagellar segments (Figures 291–294, 362, and 364).

Trjapitzin divides this subfamily into 12 tribes, 2 of which are represented in New Zealand.

#### Tribe Tetracnemini

FEMALE – 2nd valvifers very slender, almost filamentous, with gonostyli clearly broader; outer plates of ovipositor attached to last tergite by membrane only. MALE – antennae branched, without scale-like sensilla (Figures 324–326).

- *Tetracnemoidea*.

#### Tribe Anagyrini

FEMALE – 2nd valvifers relatively broad, with gonostyli not or hardly broader (Figures 290 and 361); outer plates of ovipositor attached to last tergite and cercal plate by paratergite. MALE – antennae not branched, almost always with scale-like sensilla on distal flagellar segments (Figures 291–294, 362, and 364).

#### Subtribe Anagyrina

Body robust, not flattened; pronotum not longitudinally, medially divided; \* where wings fully developed, lineal calva interrupted on dorsal surface by several lines of setae near hind margin (Figures 101, 203, 360, 365, and 367).

- *Alamella*, *Gyrarusioidea*, *Leptomastidea*, *Notodusmetia*, *Odiaglyptus*, *Tongyus*.

#### Subtribe Rhoipiina

Body dorsoventrally flattened; pronotum in winged species divided down midline (Figure 297) (division sometimes represented by a short suture in wingless species, as in Figure 288); in winged species, lineal calva not interrupted on dorsal surface of wing (Figure 298).

- *Rhopus*.

### Subfamily ENCYRTINAE

Mandibles occasionally bidentate, but usually otherwise, edentate or with 1–4 teeth; † forewing with filum spinosum present (Figures 8, 26, 43, 75, and 178); \* setae on proximal margin of lineal calva distinctly larger than those in disc below apex of venation. FEMALE – gaster with last tergite U-shaped (Figure 257), its anterior margin strongly curved; hypopygium often not reaching apex of gaster; † ovipositor with outer valves relatively broad and triangular; gonostyli free, not fused to 2nd valvifers (Figures 4, 37, and 70). MALE – antennae without scale-like sensilla, † not branched.

Trjapitzin subdivides this subfamily into 36 tribes, 11 of which are represented in New Zealand.

[This subfamily appears to be extremely homoplastic, and thus most of the included tribes are very difficult to define.]

#### Tribe Microteryni

Mesopleurum often enlarged, posteriorly nearly touching basal segment of gaster, and thus in side view separating propodeum from hind coxa (Figure 110); † mandibles tridentate, occasionally with upper tooth oblique, thus giving the appearance of 2 teeth and a truncation; in winged species, forewing with marginal vein about as long as stigmal vein or longer; † primary and secondary parasites of Coccidae and Psyllidae. FEMALE – antennal toruli usually not separated from mouth margin by more than their own length or by more than the distance between them; hypopygium reaching or not reaching apex of gaster. MALE – parameres relatively short (Figures 122, 181, and 232).

- *Austrochoreia*, *Coccidoctonus*, *Epiblatticida*, *Microterys*.

#### Tribe Cheiloneurini

Mesopleurum rarely enlarged posteriorly; mandibles tridentate or with 2 teeth and a distinct truncation; \* hyperparasites of Homoptera. FEMALE – antennal toruli usually not separated from mouth margin by more than their own length or by more than the distance between them; \* scutellum with a tuft of setae at apex (Figure 371); † hypopygium not reaching apex of gaster. MALE – parameres very short, not prominent.

- *Cheiloneurus*, *Zaomma*.

#### Tribe Cerapterocerini

Mesopleurum not enlarged posteriorly; mandibles tridentate; \* hyperparasites of Coccidae. FEMALE – † antenna with scape broadened and flattened, and

\* not true for many extralimital species

† not true for very few extralimital species

with flagellum broadened and at least slightly flattened (Figure 187); hypopygium not reaching apex of gaster.

- *Eusemion*.

### Tribe Habrolepidini

Mandible with a very strong, socketed, peg-like structure on inner surface near lowermost margin (Figures 95, 182, and 191) and with 4 teeth or 1 or 2 teeth and a broad truncation; scutellum flat; parasites of Diaspididae and Asterolecaniidae. FEMALE – head more or less triangular in profile, with frontovertex flat and forming an acute angle with face; forewing stigmal vein short, usually shorter than marginal vein (Figures 97, 184, and 194); hypopygium not reaching apex of gaster. MALE – \* antenna with 2 funicle segments and a long, unsegmented club (Figure 185).

- *Adelencyrtus*, *Epitetracnemus*, *Habrolepis*.

### Tribe Trechnitini

#### Subtribe Metaprionomitina

† Mandible with 1 tooth and a broad truncation; † forewing marginal vein more or less punctiform, postmarginal and stigmal veins relatively long, subequal in length, the stigmal forming an angle of about 50° with anterior wing margin (Figures 177, 281, and 285); † parasites of Psyllidae. FEMALE – † hypopygium not reaching apex of gaster. MALE – \* parameres relatively long, nearly as long as digiti (Figures 278 and 283).

- *Psyllaephagus*.

### Tribe Aphycini

Mandible with 2 or 3 acute teeth; † body non-metallic, usually whitish orange to dark brown.

#### Subtribe Aphycina

\* Parasites of Pseudococcidae. FEMALE – gaster with hypopygium reaching apex; ovipositor clearly exerted. MALE – antenna almost identical to that of female, except club, which is solid instead of 3-segmented.

- ?*Metanotalia*, *Pseuococcobius*.

#### Subtribe Paraphycina

\* Parasites of Coccidae and Asterolecaniidae. FEMALE – † gaster with hypopygium not reaching apex; † ovipositor not exerted. MALE – antenna usually clearly different from that of female, at least in coloration.

- *Metaphycus*.

[It is likely that the subtribe containing *Metaphycus* is incorrectly named – see Noyes & Hayat 1984, pp. 317–318.]

### Tribe Bothriothoracini

\* Mandibles with 2 or 3 acute teeth; \* scutellum flat and very smooth; \* forewing venation yellow or yellowish brown; \* parasites of dipterous puparia. FEMALE – † hypopygium reaching or almost reaching apex of gaster. MALE – \* antenna with an 8-segmented flagellum (Figure 310).

- *Parectromoides*, *Tachinaephagus*.

### Tribe Copidosomatini

Mandibles with 3 acute teeth, occasionally with upper tooth rounded; † body shining green or blue; occipital margin sharp or narrowly rounded; polyembryonic parasites of insect larvae. FEMALE – hypopygium reaching or not reaching apex of gaster. MALE – genitalia with parameres elongate, often with elaborate processes on digiti, parameres, or even aedeagus (Figures 142, 149, and 159).

#### Subtribe Copidosomatina

Forewing postmarginal vein not longer than stigmal vein, which usually lacks an uncus; sensilla at apex of stigmal vein usually arranged symmetrically in a square (Figures 151, 155, and 162); polyembryonic parasites of larvae of Lepidoptera. FEMALE – hypopygium reaching or not reaching apex of gaster.

- *Copidosoma*, *Zelencyrtus*.

#### Subtribe Ageniaspidina

Forewing postmarginal vein clearly longer than stigmal vein, which has at least a short uncus and sensilla not arranged in a square (Figure 383); polyembryonic parasites of larvae of Yponomeutidae and Oecophoridae (Lepidoptera). FEMALE – hypopygium not reaching apex of gaster.

- Genus A.

#### Subtribe Coelopenyrtina

Forewing postmarginal vein not longer than stigmal vein (Figures 138 and 146), which has an uncus and sensilla not arranged in a square; † polyembryonic parasites of larvae of Apidae and Hylaeidae (Hymenoptera). FEMALE – hypopygium more or less reaching apex of gaster.

### Tribe Encyrtini

Mandibles edentate, apically rounded (Figure 164); scutellum of both sexes usually with an apical tuft of setae (Figure 167); forewing marginal vein short, stigmal vein long and strongly curved. FEMALE – postmarginal vein long, subequal to stigmal vein (Figure 166); gonostyli broad, fused to 2nd valvifers (Figure 168). MALE – postmarginal vein longer than stigmal vein; genitalia with parameres about as long as digiti (Figures 171 and 175).

- *Encyrtus*.

**Table 1** Possible faunal relationships of New Zealand's Encyrtidae

<p><b>Endemic (31)</b>  <i>Adelencyrtoides</i> spp. (14)  <i>Austrochoreia antipodis</i>  <i>Coelopencyrtus</i> spp. (2)  <i>Copidosoma exvallis</i>  <i>Metaphycus reductor</i>  <i>Notodusmetia coroneti</i>  <i>Paraglyptus biformis</i>  <i>Pseudococcobius annulipes</i>  <i>Rhopus anceps</i>  <i>Tetracnemoidea brounii</i>  <i>Tetracnemoidea zelandica</i>  <i>Tongyus</i> spp. (3)  <i>Zelaphycus aspidiotei</i>  <i>Zelencyrtus latifrons</i>                      Genus A</p> <p><b>Indigenous (ex Australia) (8)</b>  <i>Cheiloneurus antipodis</i>  <i>Metaphycus aurantiacus</i>  <i>Metaphycus claviger</i>  <i>Parectromoides varipes</i>  <i>Protyndarichoides cinctiventris</i>  <i>Rhopus garibaldia</i>  <i>Subprionomitus ferus</i>  <i>Tetracnemoidea bicolor</i></p> <p><b>Introduced (Europe) (10)*</b>  <i>Adelencyrtus aulacaspidis</i>  <i>Arrhenophagus chionaspidis</i>  <i>Epitetracnemus zetterstedti</i>  <i>Eusemion cornigerum</i>  <i>Habrolepis dalmanni</i>                      ?<i>Lamennaisia ambigua</i>  <i>Leptomastidea abnormis</i>  <i>Metanotalia maderensis</i>                      ?<i>Rhopus</i> sp. A  <i>Zaomma lambinus</i></p> <p>*<i>Habrolepis dalmanni</i> introduced from N. America, but probably from stock originating in Europe</p>	<p><b>Introduced (Australia) (14)</b>  <i>Alamella mira</i>  <i>Arrhenophagoidea coloripes</i>  <i>Cheiloneurus gonatopodis</i>  <i>Coccidoctonus dubius</i>                      ?<i>Encyrtus infelix</i>                      ?<i>Encyrtus lecaniorum</i>  <i>Epiblatticida minutissima</i>  <i>Psyllaephagus acaciae</i>  <i>Psyllaephagus pilosus</i>  <i>Psyllaephagus</i> sp. A  <i>Tachinaephagus zelandicus</i>  <i>Tetracnemoidea brevicornis</i>  <i>Tetracnemoidea sydneyensis</i></p>	<p><b>Introduced (Hawaii) (1)</b>  <i>Gyranusoidea advena</i></p> <p><b>Introduced (S. America) (3)</b>  <i>Copidosoma desantisi</i>  <i>Copidosoma koehleri</i>  <i>Tetracnemoidea peregrina</i></p> <p><b>Introduced (N. America) (1)</b>  <i>Microterys flavus</i></p> <p><b>Introduced (Japan) (1)</b>  <i>Metaphycus timberlakei</i></p> <p><b>Introduced (S. Africa) (1)</b>  <i>Metaphycus lounsburyi</i></p>
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**Table 3** Components of New Zealand's encyrtid fauna known from the main offshore and subantarctic islands; conventions as in Table 2. The endemic species are thought to have originated on New Zealand's main islands, the indigenous species to be self-introduced from elsewhere.

	end.	ind.	int.
Three Kings islands	1	1	
Chatham Islands	3	2	
Stewart Island	10	2	
The Snares islands	1		
Antipodes Islands		1	
Auckland Islands	1	1	
Campbell Island	1	1	1

**Table 2** Summary of the known distribution of the species of Encyrtidae on the North and South islands of New Zealand: end., endemic; ind., indigenous; int., introduced. The introduced species *Leptomastidea abnormis* and *Copidosoma koehleri* are not included because they appear to have failed to establish, and *C. desantisi* because it was not released.

Both islands			North I. only			South I. only		
end.	ind.	int.	end.	ind.	int.	end.	ind.	int.
18	4	15	5	2	8	8	2	5

### Tribe Arrhenophagini

Head with a transverse membranous line between antennal toruli and anterior ocellus (Figure 105); mandibles with 1 acute tooth (Figure 105); tarsi 4- or 5-segmented; forewing venation represented by a fuscous patch only (Figures 107 and 109), the submarginal vein with not more than 5 setae dorsally; parasites of diaspid scales. FEMALE – † antenna with funicle 3- or 4-segmented, the segments strongly transverse and appressed to club, which is relatively large and longer than pedicel and funicle combined (Figures 106 and 108).

• *Arrhenophagoidea*, *Arrhenophagus*.

[*Arrhenophagoidea* has been placed in the tribe Psyllechthriini by Trjapitzin (1973b). In my view it is better placed in the Arrhenophagini, since the only character to separate the two genera thus included is the number of segments in the tarsi.]

### Tribe Mayridiini new status

Mandibles with 3 acute teeth; occipital margin rounded; \* forewing marginal vein relatively long, at least about as long as stigmal vein. FEMALE – antennal toruli well separated from mouth margin.

• *Subprionomitus*.

[*Subprionomitus* has been placed in the Microteryini by Trjapitzin (1973b), but in my opinion it is more closely related to *Mayridia*, type-genus of the Mayridiini. The subtribe Mayridiina, previously placed in the tribe Miraini, is here given tribal status because the Miraini are incorrectly placed in the Encyrtinae; see Noyes & Hayat 1984, p. 296.]

### Encyrtinae incertae sedis

*Adelencyrtoides* – forewing marginal vein 2–3× as long as broad, postmarginal vein almost always clearly longer than stigmal (Figures 8, 13, 26, 35, etc.); mandible never with 3 acute teeth.

*Lamennaisia* – scutellum with silky, striate sculpture (Figure 197); mandible with 4 unequal teeth (Figure 195).

*Protyndarichoides* – forewing stigmal vein sessile, marginal vein relatively long (Figure 263); mandible with 3 acute teeth. FEMALE – ovipositor distinctly upturned in profile, with outer plates very broadly triangular (Figure 4).

*Zelaphycus* – body orange or orange-brown; mandible with 2 teeth and an oblique truncation.

## FAUNAL RELATIONSHIPS

The probable origins of the New Zealand encyrtid fauna are presented in Table 1. Of the 70 species of Encyrtidae recorded from New Zealand, more than half are thought to be either endemic or indigenous. For the purposes of this study a species

is regarded as endemic if it is not known to exist, or have existed, outside New Zealand. A species is here regarded as indigenous if it is known from outside New Zealand and is likely to have reached here without the aid of man. All such species have probably originated from Australia. Unfortunately our knowledge of the Australian encyrtid fauna is far from complete, and therefore it is difficult to distinguish between endemic and indigenous species. Similarly, it is not easy to distinguish between species which have found their way to New Zealand naturally from Australia and those that have been introduced recently by man. It is also likely that species associated with exotic plants were introduced with these plants; e.g., *Psyllaephagus* species, parasites of psyllids on *Acacia* and *Eucalyptus*.

Of the species which have probably been brought to New Zealand recently by man, nine are known to have been introduced intentionally for biological control purposes (see below). It is possible that a further one or two species were knowingly introduced from elsewhere, but that these introductions went unrecorded.

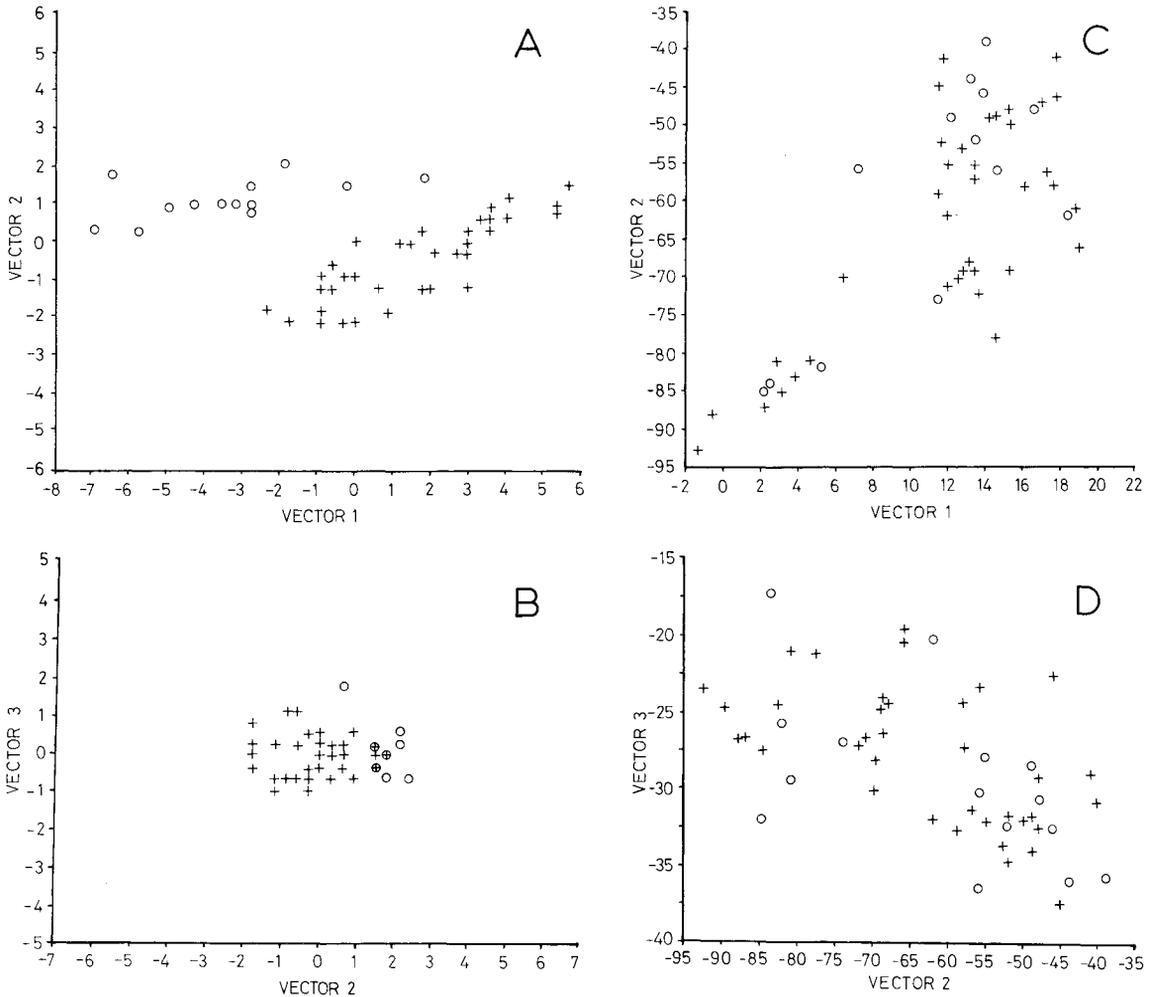
Nearly all introduced species are associated with pastures, gardens, and forests, although an exception, *Eusemion cornigerum*, is associated with alpine habitats above 1000 m.

All endemic species appear to be associated with native plants in gardens, native forests, or subalpine and alpine native grasslands.

## DISTRIBUTION IN NEW ZEALAND

Table 2 summarises the known distribution of the species of Encyrtidae on the two main islands of New Zealand. It can be seen that about 60% of the species thought to be endemic are found on both the North and South islands, whereas about 25% have been found on the South Island only and 15% on the North Island only. Of those found on the South Island only, *Rhopus anceps*, *Notodusmetia coroneti*, and perhaps also *Adelencyrtoides tridens* are exclusively associated with alpine or subalpine habitats; the others are associated mainly with native forests. Of the endemic species recorded solely from the North Island, only Genus A may be restricted to alpine habitats. It must be pointed out that these data probably reflect the intensity of collecting in the various parts of New Zealand to a greater extent than the actual distribution of the species.

Table 3 summarises the known components of the encyrtid fauna of the main offshore and subantarctic islands. Again, these data probably reflect collecting effort rather than the numbers of species actually occurring on each island.



**Text-figure 1** Plots of scores achieved in a principal component analysis of 49 individuals of *Adelencyrtoides novae-zealandiae*; A, B, scores achieved with 'normal' data input; C, D, same scores, but effect of size removed using a logarithmic transformation; + group 1, O group 2 (see text, p. 39, for explanation).

### INTRASPECIFIC VARIATION IN NEW ZEALAND

A striking feature of the New Zealand encyrtids is the extreme intraspecific variability of most of the endemic or indigenous species. Indeed, fairly detailed preliminary studies indicated that there might be as many as 53 endemic or indigenous species present in the material examined, whereas this revision recognises only 39. Among those species for which sizeable samples have been examined ( $n > 25$ ), many appear to exhibit a greater degree of variation than is known to exist in any encyrtid

species outside New Zealand. This variation is not limited to endemic species; it is greatest in *Tetracnemoidea bicolor*, which is likely to be Australian in origin, and which has been described four times in three different genera. Furthermore, variation does not appear to be linked to geographical distribution or to altitude, except perhaps in *Odiaglyptus biformis*, of which completely orange forms are known from more northerly latitudes, and in *Adelencyrtoides variabilis*, which is generally larger and darker in more southerly latitudes.

This variation is often so extreme that given small, isolated samples of a single species it is very easy to accept that several species may be present. However, with larger samples it becomes impossible to divide the material into discrete morphological segregates. Principal component analysis has been used in an attempt to recognise morphological segregates of some of the more variable species, for which it was difficult to accept that only one species was present, viz *Adelencyrtoides blastothrichus*, *A. inconstans*, *A. novaezealandiae*, *A. otago*, *A. variabilis*, *Austrochoreia antipodis*, and *Tetracnemoidea brouni*. The results of these analyses for *Adelencyrtoides novaezealandiae* are presented in Text-figure 1. An attempted analysis of *Tetracnemoidea bicolor* proved unsatisfactory because the presence or absence of wings and the segmentation of the antennal club tended to independently distinguish groups. While it is easy enough to remove the effect of segmentation, it is difficult to do the same for the presence or absence of wings because the relative length of wings has an effect on some of the characters used in the analysis, e.g., relative length of the pronotum, mesoscutum, and scutellum.

Intraspecific variation, both geographic and individual, has been noted in other groups of insects in New Zealand, but unfortunately very little information on this has been published to date. Franciscolo (1980) noted extreme individual variation in the mordellid beetle *Stenomordellaria neglecta* (Broun), and Butcher (1984) noted an unusual degree of variation in some species of the carabid genus *Holcaspis*, although apparently not to the extent indicated by the present study. J.C. Watt (pers. comm.) maintains that all coleopterists who have worked on the New Zealand fauna have found considerable geographic and individual variation within species. The phenomenon has also been noted in Thysanoptera (L.A. Mound, pers. comm.) and other groups of Hymenoptera Parasitica, e.g., Ichneumonidae (I.D. Gauld, pers. comm.) and Proctotrupoidea (L. Masner, pers. comm.). In the words of one: "It is as though someone has taken the gene pool and given it a good stir". Watt (1983) comments that many beetles with reduced or vestigial wings have limited capability for dispersion and thus they tend to form series of semi-isolated populations with limited gene flow. When such populations come together again they may fail to interbreed, having speciated, or may interbreed producing complex patterns of geographic variation. While this may account for unusual geographic variation in the species of many groups, it is unlikely to be the reason for the extreme individual variation noted in indigenous species of Encyrtidae, for two reasons. First, populations of

encyrtids are likely to be isolated for only relatively short periods because, unlike beetles, even flightless individuals can be wind-carried for considerable distances. This would allow periodic genetic exchange between even well separated populations. Second, it is possible that encyrtids are a relatively recent addition to the New Zealand fauna; many species may even have appeared here in the last 10 000 years or so, i.e., since the last glaciation.

It is probable that many vacant ecological niches have become available only relatively recently. The main hosts in New Zealand are Coccoidea, which are relatively diverse on these islands, there being probably at least 500 endemic or indigenous species and a further 150 recently introduced (J.M. Cox, pers. comm.). About half of the species of Pseudococcidae recognised by Cox (1987) are known from alpine or subalpine habitats, and many are restricted to individual mountains or mountain ranges. Such localised distribution suggests that the species concerned have evolved since the last glaciation, the females being completely flightless, fairly sedentary, and unlikely to be dispersed by wind; a wider distribution could be expected if they had earlier origins. This may also be the case with the other major families of Coccoidea represented in New Zealand, but this is unknown at present. Thus, it is possible that their parasites, which are readily dispersed by wind, are at present adapting to particular hosts and particular habitats, resulting in a high level of genetic variability which in turn gives rise to extensive phenotypic variation. Genetic variability could be maintained by periodic gene exchange between otherwise isolated populations by means of wind-carried individuals.

## BIOLOGY AND LIFE HISTORY

A review of encyrtid biology is given by Clausen (1940), and surveys of the hosts of encyrtids are presented by Trjapitzin (1972) and Tachikawa (1981). With but a few exceptions – *Microterys* species, predators of the eggs of Coccidae; see Silvestri (1919b), DeBach (1939), and Sugonjaev (1934) – all species of Encyrtidae for which the biology is known are internal parasites or hyperparasites of holometabolous insects, spiders, ticks, and mites. They are most commonly associated with species of the superfamily Coccoidea (Homoptera). Encyrtids may be solitary, or gregarious (several parasites living within a single host, e.g., some *Metaphycus* species), or polyembryonic (more than one individual developing from a single egg, e.g., *Copidosoma* species).

Species of encyrtid may be either arrhenotokous (biparental reproduction) or thelytokous (males not

known, or rare). Sometimes a single species can exhibit both types of reproduction depending on the location of the population. A species that is normally arrhenotokous may become thelytokous at the natural limits of its range or if its range becomes accidentally extended, e.g., *Protyndarichoides cinctiventris*, which is biparental in Australia but apparently uniparental in New Zealand. Conversely, species which are normally thelytokous may produce males if the ovipositing female is exposed to high temperatures during its development (Wilson & Woolcock 1960a, b; Gordh & Lacey 1976; Laraichi 1978) or a combination of high temperature and unfavourable host (Flanders 1942a). Biparental species may produce an abnormally high proportion of males if reared on an unusual host (Teran & DeBach 1963). The food plant, or the condition of the food plant fed upon by the host, may also affect the sex ratio of the parasite (Flanders 1942b).

The encyrtid egg is dumbbell-shaped. The swollen part of the egg which contains the embryo is connected to a second swollen part (the bulb) via a narrow tube (the neck). The bulb may be larger or smaller than the part containing the embryo. Parts of the connecting tube and the egg proper may have a conspicuously sculptured appearance, this area most commonly being called the aeroscopic plate. Eggs without an aeroscopic plate are generally deposited free within the host, but those with an aeroscopic plate are deposited so that the neck of the egg passes through the host's body wall and the bulb is external. The aeroscopic plate aids the respiration of early-instar larvae which possess an open (metapneustic) tracheal system by conveying atmospheric air to them. Such larvae stay attached to the remains of the egg after hatching, whereas early-instar larvae without open tracheal systems become detached from the egg after hatching. The different types of egg found in the Encyrtidae have been described by Silvestri (1919a, b), Parker (1924), and Maple (1947).

The larvae of encyrtids vary from almost spherical to oval or broad at the head end and tapering towards the tail, which may be bifurcate. The first-instar larva may be apneustic (without spiracles), obtaining oxygen by diffusion from the body fluids of the host, or it may be metapneustic (possessing a pair of functioning terminal spiracles), having access to atmospheric oxygen by means of the aeroscopic plate of the egg. So far as is known there are either three or four larval instars, depending on the species. The final-instar larva has been reported as having between eleven and fourteen segments. Nine pairs of spiracles are present, on segments 3–11 or 4–12. The larvae of various encyrtid species have been described and figured by Silvestri (1919a,

b), Parker (1924), Chumakova (1961), Kfir & Rosen (1980), and Rosen & Alon (1983).

The encyrtid pupa is formed within the integument of the host (except probably in *Microterys sylvius* (Dalman)), after the entire body contents have been consumed and waste materials (meconium) have been voided into the cavity thus formed. Some species even pupate within the living host, killing it only when the adult parasite emerges; e.g., *Encyrtus infelix* (Embleton) (Embleton 1904). The pupa is exarate, i.e., has the appendages free and visible externally. Pupae of various encyrtids have been figured by Taylor (1935), Kfir & Rosen (1980), and Rosen & Alon (1983).

## ENCYRTIDS IN BIOLOGICAL CONTROL

The family Encyrtidae is one of the most important insect groups to be used in the biological control of insect pests. In a review of biological control edited by Clausen (1978) it is apparent that more species of Encyrtidae have been used than any other single family of insects except Coccinellidae and Braconidae. Clausen's review lists no fewer than 97 programmes worldwide in which at least partial control of the target pest species was achieved using encyrtids as the main controlling agent. Full economic control was achieved in 32 instances. Use of encyrtids has been greatest in the control of homopterous pests of agriculture and horticulture, notably of Coccidae and Pseudococcidae.

In New Zealand, encyrtids have been widely employed in the attempted control of several agricultural and horticultural pests since the early part of this century. Of the nine species recorded as having been introduced for this purpose, three have proved effective in controlling the target species. The first recorded introductions were in 1921, when *Microterys flavus* and *Coccidoctonus dubius* were liberated in the Nelson area. *M. flavus* was introduced against *Coccus hesperidum*, a pest of citrus and greenhouse plants, and has since controlled this pest to a considerable extent (Gourlay 1930b; Miller *et al.* 1936). *C. dubius*, a hyperparasite, was introduced in the mistaken belief that it was a primary parasite of *Saissetia oleae*. It has since been reared in small numbers, as a hyperparasite of pteromalid parasites of *S. oleae* and *Eriococcus* sp. (Valentine 1967). *Metaphycus lounsburyi*, a native of South Africa, was introduced into the Nelson area in 1922 against *Saissetia oleae*, a pest of fruit trees (Miller *et al.* 1936). It has become established, having recently been found in the Auckland area. A most successful introduction programme was then undertaken against the golden oak scale, *Asterolecanium variolosum*. This was proving to be a major

pest of oak in many areas, and in 1923 a control programme was initiated using *Habrolepis dalmani*. Between that year and 1928, eight consignments of the parasite were received from Washington State and released in the Christchurch and Nelson areas. The first adults were recovered in the field in 1925 in the Nelson area, and by 1933 the parasite had spread to most areas where the scale was present (Gourlay 1935). Control was achieved, and the scale is now no longer considered a pest (see Doull 1955).

Most subsequent control programmes have been less successful. *Leptomastidea abnormis* was introduced in an effort to control mealybug on fruit trees, but apparently it failed to become established (Miller *et al.* 1936). In 1933 *Tetracnemoidea brevicornis* was introduced from Australia against mealybug on fruit trees (Bartlett in Clausen 1978). Although it became established it has not been successful (Miller *et al.* 1936). *Copidosoma desantisi* (as *C. koehlerii*) was imported from Australia in 1949 for release against *Phthorimaea operculella*, a pest of potato, but was not released. In 1964 *Copidosoma koehlerii* was introduced from California for control of the same pest. It was released in several areas of both main islands (E.W. Valentine, pers. comm.), but apparently failed to establish. The most recent use of encyrtids in biocontrol programmes in New Zealand was the introduction in 1969 of *Copidosoma floridanum* from Australia for the control of *Chrysodeixis eriosoma*, one of the most serious pests of horticulture in New Zealand. The parasite has since become well established, and is proving effective as a controlling agent (Thomas 1975; as *Litomastix* sp.).

Other established species which may have been introduced for biocontrol purposes, but for which no introductions have been recorded, are: *Encyrtus infelix* to control *Saissetia oleae*; *Encyrtus lecaniorum* to control *Coccus hesperidum*; *Metaphycus timberlakei* to control *Parthenolecanium persicae*; *Tachinaephagus zealandicus* to control synanthropic Diptera; and *Tetracnemoidea peregrina* and *T. sydneyensis* to control *Pseudococcus longispinus*.

## COLLECTING AND PRESERVING ENCYRTIDS

The following is a summary of a paper detailing the most useful methods employed for collecting and preserving chalcids (Noyes 1982).

### Collecting

• **SWEEPING.** Probably the easiest way of collecting representatives of this family in large numbers. A tough net is swept through grass or other vegetation, and individual encyrtids are extracted using an aspirator ('pooter'). They are then killed in an

atmosphere of ethyl acetate. A method sometimes employed is to deposit the entire contents of the net into alcohol or a polythene bag containing ethyl acetate for subsequent sorting under a dissecting microscope. This can be very time-consuming, although it does have the advantage that a greater number of specimens can be collected in a given time. The sorting of the material so collected can be made easier if a 1-cm mesh is placed over the mouth of the sweep-net to filter out larger pieces of debris such as leaves.

Ideally the net should have a handle about 1 m long and a head about 40 cm long in the shape of an almost equilateral triangle, with one side very slightly longer than the other two. The centre of the longest side is attached to the handle. This configuration allows the head of the net to be held firmly against the ground whilst sweeping on grassland or similar vegetation. This can be important, because many encyrtids – e.g., *Rhopus* species – will only be found low down in the vegetation. The net-bag, which fits over the triangular frame, ideally should be about 60 cm deep and should be made of durable material which allows the easy passage of air (i.e., not canvas). Strengthening with a narrow strip of canvas around the mouth of the bag should help protect it from premature wear.

• **REARING FROM KNOWN HOSTS.** Probably the most rewarding way of obtaining encyrtids, since the biological information so gathered may prove of great value to taxonomists as well as those interested in biological control.

The likely host should be placed in a suitable non-airtight container, e.g., a glass tube with a cotton wool plug, gelatin capsule, or emergence box (a cardboard box with a glass tube placed over an inverted funnel positioned over a hole cut in the lid should suffice). After the parasite emerges it should not be killed for at least 2 hours to allow the wings to harden properly.

If possible each potential host should be separated from others and also from the food plant. This will prevent erroneous observations, since it is possible that several species of coccid may be present on a piece of twig. Parasitised individuals can often be distinguished from normal, healthy ones by a difference in behaviour (e.g., caterpillars) or darker coloration (e.g., coccids).

• **MALAISE TRAP.** If correctly sited and constructed the Malaise trap can be an excellent means of collecting encyrtids. A suitable design has been described by Townes (1972). The insects should be collected into 70% ethanol.

• **YELLOW PAN TRAPS.** If correctly sited, yellow pans are excellent for collecting encyrtids. The trap consists of a tray about 6–7 cm deep, about 30 cm

square, and painted bright yellow on the inside. This is sunk into the ground or laid on the surface in a suitable habitat such as grassland or a forest clearing. The tray is half-filled with water, and a few drops of detergent are added to break the surface tension. The trap must be emptied daily otherwise the insects collected will deteriorate very badly, and will be of no use for taxonomic purposes. Collection is facilitated if a fine net is used to scoop out the insects. It is possible to empty the trap less frequently – every 4 or 5 days – if saturated salt solution or a 50/50 mix of ethylene glycol and water is used as the collecting medium.

Before transferring the insects to alcohol it is essential that they be thoroughly rinsed in clean water to remove any traces of detergent or other chemicals.

- **SUCTION OR VACUUM SAMPLER.** This is a very good apparatus for collecting encyrtids on grassland. However, sorting the catch can be tedious and very time-consuming.

- **BEATING** is not a very good method of collecting encyrtids since they generally fly or jump off the beating tray before they can be collected, particularly if the weather is warm and sunny.

- **PITFALL TRAPPING** can be very productive in grassland, particularly where it is generally too windy for sweeping or if the use of yellow pans is impractical. The traps can be sunk into the ground or placed in grass tussocks. The specimens can be collected into a strong solution of picric acid and later transferred to 70% ethanol.

Other methods which can be used for collecting encyrtids, but which are generally not very productive, are: (i) pyrethrum spraying or insecticide fogging of small bushes, rotten logs, etc.; and (ii) using a suction trap.

### Preservation

- **STORING UNMOUNTED MATERIAL.** Specimens collected dry should not be stored in alcohol but, immediately after killing, should be placed carefully either (i) in gelatin capsules and held in place with finely teased cotton wool, or (ii) between layers of tissue or cellulose wadding in an airtight box containing thymol to inhibit mould.

Specimens collected into alcohol can be treated in two different ways: (i) stored in 70% ethanol in a cool, dark place to reduce discoloration; (ii) critical-point dried and then stored in gelatin capsules, as above. Critical-point drying is a technique used for preparing specimens for scanning electron microscopy, but can also be used for drying bulk material from alcohol. This latter method is advantageous because it reduces the risk of the

specimen collapsing and shrivelling as it dries (see Gordh & Hall 1979).

- **MOUNTING ON CARD.** Ideally specimens are mounted, using water-soluble glue, on a card rectangle rather than a card point. Although mounting on a rectangle requires more practice than point-mounting it has the advantages that specimens are better protected, and many characters can be seen more clearly against the white background.

Before mounting, specimens killed more than 24 hours previously with ethyl acetate, or some other agent, and stored dry should be relaxed in an atmosphere of glacial acetic acid in an airtight container (about 0.5–0.75 ml of acetic acid per litre of container), or in water vapour. Recently killed specimens should be soft enough to mount without risk of damage. Specimens stored in alcohol should be dried either (i) by placing them on a flat, absorbent surface such as a library record card or (ii) by critical-point drying. If dried on a card, then the wings must be positioned flat against the card to prevent them from folding. Specimens which have been critical-point dried are still slightly flexible, particularly if killed in water and detergent and left for 24 hours before transferring to 70% ethanol. However, wings or antennae may be in a difficult position, and are liable to be broken if they are moved. To prevent this the specimens can be transferred to a small drop of 95% ethanol on a record card and then dried using the same technique as from 70% ethanol. Most specimens will not collapse but the alcohol softens the cuticle enough to prevent breakage of the appendages when they are moved.

Mounting is best done by placing a small drop of glue on the card with the blunt end of a nylon-headed size 0 continental pin set in the handle of a paint brush (the nylon head is removed by gently squeezing it between a pair of forceps). The specimen should be picked up quickly using the brush, moistened with a minute quantity of saliva, and transferred to the drop of glue; it should be attached by the mesopleurum so that the axis of the body is at about 45° to the card. If the glue is of the correct consistency it should be dry within a second or two of placing the specimen on it. The wings and antennae can then be moved into the desired position.

- **MOUNTING ON MICROSCOPE SLIDES.** There are two main types of medium commonly used for mounting small insects: (i) water-soluble, e.g., Hoyer's, Berlese, etc.; and (ii) balsam. The water-soluble mountants are more convenient, but are only temporary, and their use in serious taxonomic study is not recommended. Although much more difficult to use, balsam is more suitable since the resulting mounts are permanent.

For best results each specimen should be dissected and the component parts placed on a slide under five separate coverslips 6 or 7 mm in diameter. Component parts should be placed in exactly the same position on each slide to facilitate comparison of different specimens. These parts should be arranged in the same manner as the five spots on the face of a die: top left – wings; top right – antennae; bottom right – head; bottom left – thorax (+ gaster if male); centre – dissected gaster (female) or genitalia (male). Each part should be inverted, to allow for inversion of the image when examining with a compound microscope.

The following sequence consistently gives good results when making slides using balsam.

- (1) Remove the wings and arrange them neatly in the required position in a very small drop of balsam on the slide. This is made easier if the specimen has been mounted previously on a card rectangle.
- (2) Clear the specimen in a 10% solution of potassium hydroxide (KOH) according to its previous treatment, as follows: (a) a specimen which has been collected dry and never placed in alcohol – 48 hours at 20°C; (b) a specimen which has either been collected into alcohol or stored in alcohol – 72 hours at 20°C or 24 hours at 20°C followed by 24 hours at 40°C.
- (3) Remove the KOH and replace with four or five drops of glacial acetic acid.
- (4) After 10 minutes replace with distilled water.
- (5) Dehydrate with aqueous ethanol in the sequence 35%, 70%, 90%, 95%, at 10-minute intervals.
- (6) After 10 minutes add three drops of clove oil; leave the cover off the dish to allow the alcohol to evaporate.
- (7) Using a pair of minuten pins, dissect the head away from the thorax and transfer it to a small drop of balsam in the required position on the slide.
- (8) Knock off the antennae with a minuten pin and transfer them to a drop of balsam in the required position on the slide, arranging symmetrically.
- (9) Turn the head on to its facial aspect, pull out the labrum and maxilla using a pin, and open the mandibles. Arrange the mouthparts and head with the head positioned occiput downwards.
- (10) Transfer the thorax and abdomen to a drop of balsam on the slide in the required position.
- (11) Female – carefully pull the gaster from the propodeum and transfer to a fifth drop of balsam on the slide. Male – carefully dissect out the genitalia and transfer to a fifth drop of balsam on the slide; arrange with the ventral aspect uppermost.

- (12) Female only. Pull the sternites away from the tergites, leaving the ovipositor attached to the tergites.
- (13) Female only. Encyrtinae – pull the ovipositor away from the tergites and arrange ventral side uppermost; gently flatten with a blunt object. Tetracneminae – place the tergites dorsal surface uppermost with the ovipositor still attached, and pull the ovipositor out from underneath the tergites, but still attached; with a minuten pin separate the two halves at the fulcrum and gently pull them apart, leaving the outer plates still attached to the last tergite; arrange neatly.
- (14) Place the slide in a drying oven at 40°C for at least a week.
- (15) Remove the slide from the oven, place a small drop of balsam on each part in turn, and cover with 6 mm coverslips. Ensure that the coverslips are perfectly horizontal. This requires both practice and balsam of the correct consistency. [When a 5×2.5-cm glass tube half-filled with balsam is inverted, then the balsam should not run immediately to the other end but should do so over a period of 4 or 5 seconds.]

NOTE. It is easier to separate the antennae and head of smaller specimens before they are cleared in KOH. If this is done they can be attached to the thorax with a very minute drop of balsam to prevent their being lost during the clearing and dehydration stages. They should separate easily in clove oil.

### TEXT CONVENTIONS

The abbreviations used for repositories follow the four-letter system established by Watt (1979).

ANIC	Australian National Insect Collection, CSIRO, Canberra, Australia
BMNH	British Museum (Natural History), London, U.K.
BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.
CNCI	Canadian National Collection of Insects, Biosystematics Research Institute, Ottawa, Canada
HCOE	Hope Entomological Collections, University Museum, Oxford, U.K.
ICTJ	Ishii Collection, Division of Entomology, National Institute of Agro-Environmental Sciences, Tsukuba, Japan
MACN	Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Buenos Aires, Argentina
MLPA	Facultad de Ciencias Naturales y Museo, La Plata, Argentina

NHMW	Naturhistorisches Museum, Wien (Vienna), Austria
NMID	National Museum of Ireland, Dublin, Eire
NRSS	Swedish Natural History Museum, Stockholm, Sweden
NZAC	New Zealand Arthropod Collection, Entomology Division, DSIR, Auckland, New Zealand
PPRI	Plant Protection Research Institute, Pretoria, South Africa
QMBA	Queensland Museum, Brisbane, Australia
UCRC	University of California, Riverside, California, U.S.A.
USNM	United States National Museum of Natural History, Washington D.C., U.S.A.
ZILR	Zoological Institute, Academy of Sciences, Leningrad, U.S.S.R.
ZMUC	Zoological Museum, University of Cambridge, U.K.

### KEY TO GENERA OF ENCYRTIDAE KNOWN FROM NEW ZEALAND

- 01 Face with a transverse membranous line between eyes, below anterior ocellus, connected to antennal toruli by a second membranous line which bifurcates above toruli (Fig. 105); antennal funicle in female consisting of 3 or 4 strongly transverse segments which are not clearly separated, and which are appressed to the large, unsegmented club, in male consisting of 6 subquadrate or transverse segments, not clearly separated, which are clothed in setae; longest seta distinctly longer than the diameter of any funicle segment. Smaller species, length less than 0.75 mm ... 02
- Face without membranous lines; tarsi always 5-segmented; antennal funicle comprising 2, 5, 6, or 7 segments; if funicle segments not clearly visible (some males), then setae on flagellum shorter than diameter of segments. Generally larger species, length greater than 0.75 mm ... 03
- 02(01) Tarsi 4-segmented ... (p. 57) .. *Arrhenophagus*
- Tarsi 5-segmented ... (p. 56) .. *Arrhenophagoidea*
- 03(01) Funicle 5-segmented; male antenna branched (Fig. 324–326) ... (p. 113) .. *Tetracnemoidea*
- Funicle with 2, 6, or 7 segments; male antenna not branched ... 04

- 04(03) Forewing shortened, not reaching halfway along gaster and usually not reaching posterior margin of 1st gastral tergite ... 05
- Forewing not shortened, or if slightly so then clearly reaching more than halfway along gaster ... 09
- 05(04) Mesopleurum not expanded posteriorly, its posterior margin clearly separated from gaster by propodeum and metapleurum together; in lateral view propodeum and metapleurum clearly in contact with hind coxa (Fig. 2) ... 06
- Mesopleurum expanded posteriorly, its posterior margin obscuring propodeum and metapleurum laterally and almost touching base of gaster; in lateral view hind coxa appearing separated from propodeum and metapleurum (Fig. 110) ... 07
- 06(05) Body conspicuously flattened dorsoventrally and yellow or brown, never metallic ... (p. 106) .. *Rhopus*
- Body robust, not flattened dorsoventrally and usually dark green or blue with a strong metallic lustre, although occasionally reddish-orange with a weak but distinct metallic lustre ... (p. 94) .. *Odiaglyptus*
- 07(05) Scutellum very small, much shorter than the relatively long exposed propodeum (Fig. 205); vestiges of forewings white ... (p. 84) .. *Metanotalia*
- Scutellum relatively large and shield-shaped, clearly several times longer than propodeum, which is more or less hidden by base of gaster and scutellum; vestiges of forewings infuscate ... 08
- 08(07) Pronotum covering most of mesoscutum, its posterior margin straight or convex (Fig. 115, 116); body covered with conspicuous, dark brown setae ... (p. 58) .. *Austrochoreia*
- Pronotum covering much less than anterior half of mesoscutum, its posterior margin conspicuously emarginate medially; body covered with conspicuous white setae ... (p. 92) .. *Notodusmetia*
- 09(04) Antennal scape and flagellum conspicuously broadened and flattened (Fig. 187) ... (p. 78) .. *Eusemion*
- Antennal scape occasionally broadened and flattened, but flagellum more or less cylindrical ... 10

- 10(09) Antenna with 9 flagellar segments, or if with only 8 (*Rhopus* sp.) then club 2-segmented (Fig. 296), funicle 6-segmented, and mandibles bidentate. Females only ... 11  
 —Antenna with not more than 8 flagellar segments; club entire, and funicle with either 6 or 7 segments; if flagellum 8-segmented, then club entire (Fig. 156, 377) and mandibles tridentate. Some females (*Copidosoma*, *Zelencyrtus*), all males ... 44
- FEMALES**
- 11(10) Forewing with a distinct infusate pattern (Fig. 13, 125, 127, 166, 194, 203, 269) ... 12  
 —Forewing hyaline, occasionally with a very small infusate area below marginal vein and near base of wing (Fig. 146, 157) ... 22
- 12(11) Scutellum with an apical tuft of setae or a pair of flattened, lamelliform setae (Fig. 167, 193) ... 13  
 —Apex of scutellum simple ... 15
- 13(12) Scutellum with an apical pair of flattened, lamelliform setae (Fig. 193) ... (p. 80) .. *Habrolepis*  
 —Scutellum with apical setae arranged in a tuft (Fig. 167) ... 14
- 14(13) Marginal vein longer than stigmal vein (Fig. 125, 127); distance between antennal toruli about twice that separating them from mouth margin; mandible tridentate ... (p. 61) .. *Cheiloneris*  
 —Marginal vein at most about half as long as stigmal vein (Fig. 166); distance between antennal toruli not more than half greater than that separating them from mouth margin; mandible edentate ... (p. 71) .. *Encyrtus*
- 15(12) Mandible bidentate; antenna with 1st funicle segment as long as pedicel or longer (Fig. 201, 358, 359, 364) ... 16  
 —Mandible with 1 or 2 teeth and a truncation, 3 teeth, or 4 teeth; antenna with 1st funicle segment usually not longer than pedicel ... 17
- 16(15) Scape subcylindrical, at least about 5× as long as broad; funicle segments cylindrical, at least twice as long as broad (Fig. 201); forewing with 3 fuscous fasciae and postmarginal vein much longer than stigmal vein (Fig. 203) ... (p. 83) .. *Leptomastidea*
- Scape broadened and flattened, less than 4× as long as broad; funicle segments flattened, the 6th subquadrate (Fig. 358, 359, 364); forewing with only 1 or 2 fuscous fasciae, and postmarginal vein not longer than stigmal vein (Fig. 360, 365, 367) ... (p. 123) .. *Tongyus*
- 17(15) Forewing postmarginal vein at least about as long as stigmal vein or longer (Fig. 14, 68) ... (p. 28) .. *Adelencyrtoides*  
 —Forewing postmarginal vein distinctly shorter than stigmal vein (Fig. 125, 127, 184, 223, 229) ... 18
- 18(17) Forewing with a very conspicuous transverse, hyaline fascia from apex of venation, and distad of this 2 wedge-shaped hyaline spots (Fig. 229) ... (p. 91) .. *Microterys*  
 —Forewing not so marked (Fig. 125, 127, 184, 223) ... 19
- 19(18) Forewing marginal vein longer than stigmal vein (Fig. 125, 127, 184) ... 20  
 —Forewing marginal vein shorter than stigmal vein (Fig. 223, 269) ... 21
- 20(19) Forewing distad of apex of submarginal vein with at least 4 well defined hyaline spots (Fig. 184); first 4 funicle segments strongly transverse (Fig. 183) ... (p. 76) .. *Epitetracnemus*  
 —Forewing distad of apex of submarginal vein with only 2 or 3 very diffuse, ill defined, paler or hyaline areas (Fig. 125, 127); first 4 funicle segments each at least a little longer than broad (Fig. 124, 126) ... (p. 61) .. *Cheiloneris*
- 21(19) Club dark brown, contrasting with white apical segments of funicle (Fig. 222); ovipositor not exerted ... (p. 85) .. *Metaphycus*  
 —Club and apical segments of funicle unicolorous, white; exerted part of ovipositor at least about one-quarter as long as gaster ... (p. 101) .. *Pseudococcobius*
- 22(11) Scutellum with a subapical tuft of setae (Fig. 371) ... (p. 129) .. *Zaomma*  
 —Scutellum without a subapical tuft of setae ... 23
- 23(22) Forewing postmarginal vein reaching or exceeding apex of stigmal vein ... 24

- Forewing postmarginal vein not reaching apex of stigmal vein ... 33
- 24(23) Exserted part of ovipositor (measured from apex of last tergite) at least half as long as dorsum of gaster ... (p. 63) .. *Coccidoctonus*  
—Ovipositor not exserted, or hardly so ... 25
- 25(24) Mandible with 2 teeth (Fig. 99); hypopygium reaching apex of gaster ... 26  
—Mandible with 3 acute teeth, or 1 tooth and a broad truncation, or 2 teeth and a truncation; hypopygium occasionally reaching apex of gaster, but usually much shorter ... 28
- 26(25) In facial view, antennal torulus situated very high on head, its ventral margin about level with ventral margin of eye (Fig. 98); 1st funicle segment about 3× as long as pedicel (Fig. 100) ... (p. 55) .. *Alamella*  
—In facial view, antennal torulus situated near mouth margin, its ventral margin clearly much lower than ventral eye margin; 1st funicle segment not longer than pedicel, or hardly so (Fig. 189, 255) ... 27
- 27(26) Scape broadened and flattened, much less than 4× as long as broad (Fig. 189); forewing postmarginal vein at least twice as long as stigmal vein, and linea calva closed near posterior margin by at least 5 lines of setae (Fig. 190) ... (p. 79) .. *Gyranusioidea*  
—Scape subcylindrical, at least 4× as long as broad (Fig. 255); forewing postmarginal vein shorter than stigmal vein, and linea calva not closed near posterior margin (Fig. 256) ... (p. 98) .. *Parectromoides*
- 28(25) Body orange or orange-brown ... (p. 131) .. *Zelaphycus*  
—Body at least partly green, blue, or dark brown and often lustrous ... 29
- 29(28) Forewing stigmal vein short, subsessile (Fig. 263); gaster in lateral view with ovipositor strongly curving upwards towards apex ... (p. 100) .. *Protyndarichoides*  
—Forewing stigmal vein moderately long and distinct, not subsessile; gaster in lateral view with ovipositor more or less straight, not curving upwards ... 30
- 30(29) Scutellum flat, with extremely shallow reticulate sculpture, thus appearing more or less smooth and polished; body covered with conspicuous, long, erect, dark setae (Fig. 1) ... (p. 112) .. *Tachinaephagus*  
—Scutellum clearly convex, conspicuously sculptured; body covered with setae which, although often long and erect, are not particularly conspicuous ... 31
- 31(30) Mandible with 3 acute teeth; scutellum moderately convex throughout ... (p. 134) .. Genus A  
—Mandible with 4 teeth or 2 teeth and a truncation; scutellum dorsally more or less flat ... 32
- 32(31) Mandible with 4 teeth (Fig. 95); forewing postmarginal vein about as long as stigmal vein, hardly ever longer (Fig. 97) ... (p. 54) .. *Adelencyrtus*  
—Mandible with 2 teeth and a truncation; forewing postmarginal vein usually conspicuously longer than stigmal vein, occasionally about as long (Fig. 8, 26, 36, 43, etc.) ... (p. 27) .. *Adelencyrtoidea*
- 33(23) Body yellowish, orange, reddish-brown, or orange-brown matt, never with a metallic lustre ... 34  
—Body generally dark brown, occasionally partly reddish, with a distinct metallic blue, green, or brassy lustre, at least in part ... 36
- 34(33) Body dorsoventrally flattened; pronotum medially completely hidden by head, and thus not visible in card-mounted material ... (p. 106) .. *Rhopus*  
—Body robust, not dorsoventrally flattened; pronotum medially clearly visible in card-mounted material ... 35
- 35(34) Forewing with linea calva interrupted near posterior margin by several lines of setae (Fig. 208, 212, 214, 219, 223); mandible tridentate (Fig. 217) ... (p. 85) .. *Metaphycus*  
—Forewing with linea calva not interrupted (Fig. 375); mandible with 2 teeth and a truncation (Fig. 373) ... (p. 131) .. *Zelaphycus*
- 36(33) Antenna with funicle segments 2–5 longer than broad ... 37

- Antenna with at least some funicle segments between numbers 2 and 5 quadrate or transverse ... 40
- 37(36) Scutellum with striate-reticulate sculpture (Fig. 197) of silky appearance, contrasting with squamiform-reticulate sculpture of mesoscutum ... (p. 82) .. *Lamennaisia*  
—Scutellum with squamiform-reticulate or reticulate sculpture not of silky appearance ... 38
- 38(37) First funicle segment longer than pedicel; mandible bidentate ... (p. 123) .. *Tongyus*  
—First funicle segment shorter than pedicel; mandible tridentate ... 39
- 39(38) Antennal torulus separated from mouth margin by about its own length; hypopygium not reaching apex of gaster ... (p. 110) .. *Subprionomitus*  
—Antennal torulus separated from mouth margin by less than its own length; hypopygium reaching apex of gaster ... (p. 68) .. *Copidosoma*
- 40(36) Ovipositor exerted, the exerted part about one-third as long as gaster and slightly but distinctly downcurved ... (p. 75) .. *Epiblatticida*  
—Ovipositor not exerted, or hardly so ... 41
- 41(40) Mouth opening very wide, much wider than distance between outer margins of antennal toruli or half head width (Fig. 3); mandible with 3 distinct teeth, the upper one often apically truncate or rounded or reduced (Fig. 136, 143, 307) ... 42  
—Mouth opening of more normal size, not or hardly exceeding about one-third head width; mandible with 1 or 2 teeth and a broad truncation ... 43
- 42(41) Scutellum with extremely shallow sculpture, thus appearing polished and shiny, contrasting strongly with mesoscutum; 1st funicle segment longer than broad, the remainder subquadrate or slightly transverse (Fig. 1, 308) ... (p. 112) .. *Tachinaephagus*  
—Scutellum with sculpture similar to that on mesoscutum, although shallow not appearing polished or particularly shiny; antennae with all funicle segments strongly transverse (Fig. 139, 148) ... (p. 65) .. *Coelopenyrtus*
- 43(41) Scutellum with moderately deep punctate-reticulate sculpture contrasting strongly with shallow, squamiform-reticulate sculpture of mesoscutum; forewing marginal vein 2–3× as long as broad (Fig. 97); mandible with 4 teeth (Fig. 95) ... (p. 54) .. *Adelencyrtus*  
—Sculpture of scutellum and mesoscutum more or less the same; forewing marginal vein punctiform or only slightly longer than broad (Fig. 274, 281); mandible with 1 or 2 teeth and a broad truncation (Fig. 279) ... (p. 103) .. *Psyllaephagus*
- 44(10) Club with apex strongly obliquely truncate (Fig. 156, 158) or transversely truncate (Fig. 377). Males and females ... 45  
—Club with apex rounded or pointed. Males only ... 46
- FEMALES AND MALES
- 45(44) Club with apex strongly obliquely truncate; at most only the first 2 funicle segments longer than broad (Fig. 156, 158); forewing with sensilla at apex of stigmal vein arranged more or less symmetrically in a square (Fig. 157; also as in Fig. 162). Males and females ... (p. 68) .. *Copidosoma*  
—Club with apex transversely truncate (Fig. 377); all funicle segments longer than broad (Fig. 377); forewing with sensilla at apex of stigmal vein not arranged in a square (Fig. 378). Females only ... (p. 133) *Zelencyrtus*
- MALES
- 46(44) Setae on flagellar segments at least 1.5× as long as diameter of segment; all funicle segments longer than broad ... 47  
—Setae on flagellar segments not longer than diameter of segments, or hardly so; funicle segments often transverse ... 60
- 47(46) Scutellum with setae near apex arranged in a tuft (as in Fig. 167) ... (p. 71) .. *Encyrtus*  
—Scutellum without an apical tuft of setae ... 48
- 48(47) Scutellum with striate-reticulate sculpture of silky appearance, contrasting

- with squamiform-reticulate sculpture of mesoscutum (as in Fig. 197); coxae dark brown ... (p. 82) .. *Lamennaisia*  
—Scutellum not with striate-reticulate sculpture, or if appearing so, then coxae orange ... 49
- 49(48) Mandible bidentate ... 50  
—Mandible with 2 teeth and a truncation, or tridentate ... 52
- 50(49) Forewing with 3, sometimes inconspicuous, fuscous fasciae (as in Fig. 203) ... (p. 83) .. *Leptomastidea*  
—Forewing hyaline ... 51
- 51(50) Forewing postmarginal vein shorter than stigmal vein ... (p. 106) .. *Rhopus*  
—Forewing postmarginal vein a little longer than stigmal vein (Figure 103) ... (p. 55) .. *Alamella*
- 52(49) Forewing postmarginal vein longer than stigmal vein (Fig. 92, 94, 231) ... 53  
—Forewing postmarginal vein not longer than stigmal vein ... 55
- 53(52) Coxae yellow ... (p. 91) .. *Microterys*  
—At least 1 pair of coxae dark brown ... 54
- 54(53) Mandible tridentate; aedeagus longer than middle tibia ... (p. 63) .. *Coccidoctonus*  
—Mandible with 2 teeth and a truncation; aedeagus shorter than middle tibia ... (p. 27) .. *Adelencyrtoidea*
- 55(52) Mandible tridentate, the upper tooth sometimes truncate ... 56  
—Mandible with 2 teeth and a truncation... 58
- 56(55) Coxae yellowish-orange or whitish ... (p. 61) .. *Cheiloneurus*  
—Coxae dark brown ... 57
- 57(56) Hind coxa and base of gaster dark brown; antennal funicle with dorsal setae about as long as ventral setae; mandible with upper tooth transversely truncate (as in Fig. 369) ... (p. 129) .. *Zaomma*  
—Hind coxa and base of gaster orange, contrasting with other coxae and remainder of gaster, which are dark brown; antennal funicle with dorsal setae at least about twice as long as ventral setae (Fig. 264); mandible with 3 very sharp teeth (as in Fig. 260)... (p. 100) .. *Protyndarichoides*
- 58(55) Lower parts of face yellowish-brown (body probably matt, not metallic) ... (p. 131) .. *Zelaphycus*  
—Head completely dark brown with a slight metallic blue, green, brassy, or purple sheen ... 59
- 59(58) Scape relatively very short, only about half as long as minimum width of frontovertex; 1st funicle segment only about 1.5× as long as broad (Fig. 180); 3rd (upper) tooth of mandible developed, but broadly truncate (Fig. 179) ... (p. 75) .. *Epiblatticida*  
—Scape relatively longer, about three-quarters as long as minimum width of frontovertex; all funicle segments at least about twice as long as broad; mandible above 2nd (upper) tooth broadly truncate ... (p. 27) .. *?Adelencyrtoidea*
- 60(46) Antenna with funicle 2-segmented and clava relatively extremely long and cylindrical (Fig. 185) ... 61  
—Antenna with funicle 6-segmented and clava occasionally relatively very long and cylindrical ... 62
- 61(60) Forewing with linea calva interrupted by 2 or 3 setae on dorsal surface ... (p. 80) .. *Habrolepis*  
—Forewing with linea calva not interrupted on dorsal surface (Fig. 186) ... (p. 76) .. *Epitetracnemus*
- 62(60) Flagellum 8-segmented; all funicle segments longer than broad (Fig. 310) ... (p. 112) .. *Tachinaephagus*  
—Flagellum 7-segmented, or if appearing 8-segmented then all funicle segments transverse (Fig. 148) ... 63
- 63(62) Mandible bidentate ... (p. 123) .. *Tongyus*  
—Mandible with 1 or 2 teeth and a truncation, or 3 teeth ... 64
- 64(63) Forewing postmarginal vein longer than stigmal vein (Fig. 92, 94, 231) ... 65  
—Forewing postmarginal vein not longer than stigmal vein ... 67
- 65(64) Coxae yellow; funicle segments longer than broad ... (p. 91) .. *Microterys*  
—Either at least some coxae dark brown or not all funicle segments longer than broad ... 66

- 66(65) Eyes relatively small, separated from occipital margin by about the diameter of an ocellus; mandible with 3 sharp teeth; antenna with all funicle segments longer than broad ... (p. 133) .. *Zelencyrtus*  
 —Eyes of more normal size, more or less reaching occipital margin; mandible with 2 teeth and a truncation; antenna occasionally with 1 or more transverse funicle segments ... (p. 27) .. *Adelencyrtoides* ... 72
- 67(64) Forewing with marginal vein punctiform, sensilla at apex of stigmal vein arranged in a square, and uncus absent (as in Fig. 162) ... (p. 68) .. *Copidosoma*  
 —Forewing either with marginal vein clearly longer than broad or, if punctiform, then sensilla at apex of stigmal vein not arranged in a square, and uncus present ... 68
- 68(67) Head in facial view with upper margin of antennal toruli not above lower margin of eyes ... 69  
 —Head in facial view with upper margin of antennal toruli distinctly above lower margin of eyes ... 71
- 69(68) Apical flagellar segments white, contrasting with darker basal segments ... (p. 101) .. *Pseudococcobius*  
 —Antennal flagellum unicolorous, or with clava conspicuously darker than apical funicle segments ... 70
- 70(69) Body dark brown with a slight but distinct metallic blue, green, or brassy sheen; 1st funicle segment at least one-quarter as wide as pedicel (Fig. 141, 148); head in facial view with upper margin of torulus much lower than lower margin of eye (Fig. 140) ... (p. 65) .. *Coelopencyrtus*  
 —Body orange, or if dark brown then matt and never with a metallic sheen; 1st funicle segment not wider than pedicel or hardly so (Fig. 210, 216, 220, 225); head in facial view with upper margin of torulus usually about level with lower margin of eye, although occasionally slightly below (Fig. 224) ... (p. 85) .. *Metaphycus*
- 71(68) Forewing marginal vein distinctly longer than stigmal vein, about 2.5–3.0× as long as broad (Fig. 305); antenna with all funicle segments at least twice as long as broad (Fig. 304) ... (p. 110) .. *Subprionomitus*  
 —Forewing marginal vein shorter than stigmal vein, not more than twice as long as broad; antenna with at least some funicle segments much less than twice as long as broad ... 72
- 72(71) Eye relatively small, separated from occipital margin by at least about the diameter of an ocellus; all segments of antennal funicle at least 1.5× as long as broad (Fig. 381); mandible tridentate (Fig. 380) ... (p. 133) .. *Zelencyrtus*  
 —Eye of more normal size, more or less reaching occipital margin; segments of antennal funicle much less than 1.5× as long as broad, often transverse or quadrate (Fig. 276, 282, 284); mandible with 1 or 2 teeth and a truncation (Fig. 275) ... (p. 103) .. *Psyllaephagus*

## DESCRIPTIONS

### Genus *Adelencyrtoides* Tachikawa & Valentine

Tachikawa & Valentine, 1969b: 548. Noyes & Hayat, 1984: 223. Type species *Adelencyrtoides novaezealandiae* Tachikawa & Valentine, by original designation; New Zealand.

The original generic description is augmented in order to include 13 species here described as new.

Small to moderate-sized encyrtids 0.5–1.7 mm in length. Body generally dark and at least slightly metallic, but occasionally largely pale and non-metallic.

**Female.** HEAD in facial view about 1.1–1.3× as broad as long, in profile about 1.5–2.0× as long as deep and almost triangular; vertex slightly to distinctly convex, and face almost flat, their planes or tangents forming an angle of about 90–100° at top of antennal scrobes, or head in profile rather more gradually and evenly curved anteriorly. Eye about 1.2–1.3× as long as broad, distinctly hairy, not quite reaching to slightly overreaching occipital margin, which is acute and occasionally carinate; posterior margin almost straight. Malar space about 0.5–0.8× as long as eye; malar sulcus present. Frontovortex about 0.2–0.5× as wide as head. Ocelli forming a strongly acute to very obtuse angle; posterior ocellus separated from occipital margin by a little more than its own diameter to more than twice its diameter, and from eye by less than its own diameter to a little more. Antennal scrobes fairly shallow but distinct, reaching about 0.5–0.7× distance from antennal toruli to anterior ocellus.

Antennal torulus separated from mouth margin by much less than its own length to much more, and from other torulus by about 1.5× its own length, its dorsal margin distinctly below ventral margin of eye to slightly above. Clypeal margin almost straight, but slightly excised between antennal toruli. Antennal scape subcylindrical to distinctly broadened and flattened, about 3.5–6.5× as long as broad and about 0.7–2.5× as long as minimum width of frontovertex. Pedicel conical, from much longer than 1st funicle segment to a little shorter. Funicle 6-segmented, the segments subequal in size, or proximal segments distinctly smaller than distal ones, all of which are cylindrical and transverse to distinctly longer than broad. Club 3-segmented, from about half as long as funicle to slightly longer; apex more or less rounded or slightly obliquely truncate. Setae on funicle relatively short, the longest not or hardly longer than the diameter of its segment of origin. Longitudinal sensilla variously present on all flagellar segments to only on 5th and 6th funicle segments and clava. Frontovertex with very shallow to moderately shallow reticulate or coarsely punctate-reticulate sculpture, this usually becoming gradually shallower squamiform-reticulate on lower parts of face and on gena; setae generally about as long as the diameter of an ocellus. Mandible variously with 1 tooth and a very broad truncation, 2 teeth and a broad truncation, 2 teeth and a narrow truncation, or appearing almost quadridentate. Maxillary palpus 4-segmented; labial palpus 3-segmented.

THORAX in lateral view moderately deep, with metapleurum and propodeum visibly in contact with hind coxa, and dorsally with mesoscutum and scutellum more or less flat; in dorsal view with pronotum very short and only just visible behind head, its posterior margin concave and evenly curved. Visible part of mesoscutum about 1.5× as broad as long; notaular lines absent; axillae more or less meeting. Scutellum about as broad as long or distinctly longer than broad, a little shorter than mesoscutum; apex slightly acute. Propodeum medially about one-sixth as long as scutellum. Mesoscutum and scutellum with raised, squamiform-reticulate sculpture that is usually shallow but sometimes much deeper on scutellum; dorsum and sides of thorax occasionally with coarse, punctate-reticulate sculpture. Setae on dorsum of thorax short, fairly sparse and inconspicuous. Forewing hyaline or slightly infusate, about 2.0–2.5× as long as broad, occasionally slightly shortened and only just reaching apex of gaster; linea calva sometimes interrupted just below middle, sometimes closed near posterior wing margin; filum spinosum present; venation pale yellow to dark brown; submarginal vein with a subapical hyaline break, not

conspicuously swollen in its apical third; marginal vein about 2.0–4.0× as long as broad and about half as long as postmarginal vein, which is usually much longer than stigmal vein, though occasionally about as long; costal cell about 12.0–16.0× as long as broad, with a single line of setae dorsally in distal half or so. Hindwing hyaline, about two-thirds as long as forewing, about 3.0–4.0× as long as broad; marginal fringe about one-twelfth to one-third maximum wing width; costal cell not wider than submarginal vein; apex of venation reaching about two-thirds along wing. Middle tibia with spur slightly shorter than basal segment of tarsus to about as long.

GASTER much shorter than thorax; cercal plates in anterior half. Paratergites absent. Last tergite about 0.3–0.7× as long as middle tibia, broadly rounded to slightly acute apically. Hypopygium reaching from about two-thirds along gaster to more or less to apex. Ovipositor not exerted or hardly so, about 0.5–1.5× as long as middle tibia. Gonostyli free, about one-sixth to one-third as long as ovipositor.

**Male.** Often smaller, darker, and less metallic than female, but generally differing as follows. Antennal scape usually shorter, about 2.5–4.0× as long as broad; pedicel conical, about twice as long as broad; funicle segments cylindrical in cross-section, varying from anelliform to several times longer than broad; funicle setae much shorter than diameter of segment or several times longer; club entire, apically more or less rounded or pointed, about 0.2–2.0× as long as funicle. Genitalia with aedeagus about 0.3–0.5× as long as middle tibia; digiti each armed with a pair of hooks; parameres each with a pair of setae, one below base of outer apical process and one at its apex.

**Distribution.** Known only from New Zealand, including the Chatham Islands. Fourteen species are recognised.

**Remarks.** *Adelencyrtoides* is the largest and morphologically the most diverse of the apparently endemic encyrtid genera in New Zealand. It can be extremely difficult to separate closely related species, not least because most of the species appear to be very variable. To reliably identify most specimens, particularly males, good slide-mounted preparations are essential.

*Adelencyrtoides* appears to be very variable, particularly in some characters generally regarded as important in defining genera. It can be characterised most easily by the structure of the mandible, which although variable is of the same basic type throughout (i.e., variations on two teeth and a trun-

cation), and by the forewing venation, which generally has the postmarginal a good deal longer than the stigmal and only rarely about as long. Future work may indicate that the species included here represent several different genera. In this respect *A. tridens* is probably the most deserving of separate generic status, in having the ovipositor and hypopygium markedly different in structure from other species placed here. *A. blastothrichus*, on the other hand, could be placed in genus *Blastothrix*, especially if considered in isolation from other species of *Adelencyrtoides*. This leads to the possibility that *Adelencyrtoides* as understood here may provide a link between the genera of the tribe Habrolepidini and the genera related to *Blastothrix* (subtribe Blastothrichina) and *Psyllaephagus* (subtribe Metapronomitina). These two subtribes are, probably incorrectly, placed in separate tribes – Aphycini and Trechnitini respectively – by Trjapitzin (1973b). The putative link is suggested by the structure of the mandible, in some instances having only one tooth and a broad truncation and in others appearing almost quadridentate. The former condition is characteristic of *Blastothrix* spp. and *Psyllaephagus* spp., and the latter of species in the Habrolepidini. Further, head shape varies from the triangular profile characteristic of the Habrolepidini to the more evenly curved anterior profile found in *Blastothrix* and *Psyllaephagus*. However, those species of *Adelencyrtoides* with the more evenly curved head profile have the forewing venation and arrangement of basal setae similar to the condition found in *novaezealandiae*, the type species of this genus. *A. novaezealandiae* is the most similar to species placed in the Habrolepidini. However, species of *Adelencyrtoides* differ from all genera currently placed in Habrolepidini (see Trjapitzin 1973b) in lacking a stout, peg-like structure on the lower, inner surface of the mandible. Taking into consideration general morphology, in particular the structure of the mandible, ovipositor, hypopygium, and forewing venation, and that all species are probably endemic to New Zealand, it seems likely that the species described below belong to a monophyletic group, and are thus best treated under a single genus.

#### KEY TO SPECIES OF ADELENCYRTOIDES

- 01 Antennal flagellum 9-segmented  
 ... FEMALES ... 02  
 —Antennal flagellum 7-segmented  
 ... MALES ... 15
- FEMALES
- 02(01) Frontoververtex at narrowest point  
 much less than one-quarter as wide as  
 head ... (p. 31) .. *acutus*

- Frontoververtex at narrowest point more  
 than one-quarter as wide as head ... 03
- 03(02) Either scape shorter than minimum  
 width of frontoververtex and club less than  
 half as long as funicle, or ocelli extremely  
 large, the diameter of the anterior ocellus  
 at least equal to POL; 1st funicle segment  
 usually longer than pedicel, and 6th seg-  
 ment often much longer than broad; fron-  
 tovertex immediately above antennal  
 scrobes usually dull green, never with a  
 strong blue lustre ... 04
- Either scape at least as long as minimum  
 width of frontoververtex, or club at least half  
 as long as funicle, or, if scape and club  
 shorter, then frontoververtex immediately  
 above scrobes with a strong blue lustre;  
 ocelli of normal size, the diameter of the  
 anterior ocellus always much smaller than  
 POL; 1st funicle segment never longer  
 than pedicel, and 6th segment not longer  
 than broad ... 05
- 04(03) Frontoververtex at narrowest point  
 more than half as wide as head; scape less  
 than 3.0× as long as broad. (p. 37) .. *micrus*  
 —Frontoververtex at narrowest point less than  
 half as wide as head; scape more than  
 3.5× as long as broad ... (p. 34) .. *inconstans*
- 05(03) Frontoververtex at narrowest point at  
 least half as wide as head; forewing post-  
 marginal vein not longer than stigmal  
 vein (Fig. 68) ... (p. 47) .. *tridens*  
 —Frontoververtex at narrowest point less than  
 half as wide as head; forewing postmar-  
 ginal vein only rarely as short as stigmal  
 vein ... 06
- 06(05) Mesoscutum dull, with a barely dis-  
 cernible green or blue lustre ... 07  
 —Mesoscutum shiny, with a conspicuous  
 blue, green, or purplish lustre ... 10
- 07(06) Antennal funicle unicolorous brown;  
 forewing with linea calva not interrupted  
 (Fig. 75); outer suture of club complete,  
 subparallel to inner suture (Fig. 74)  
 ... (p. 48) .. *unicolor*  
 —Antenna with 6th funicle segment and  
 occasionally 5th yellow or pale brown, at  
 least a little paler than remainder of funi-  
 cle, which is dark brown; if funicle unico-  
 lorous brown (very rarely), then forewing  
 with linea calva interrupted by 1 or 2  
 lines of setae (Fig. 43), and outer suture  
 of club incomplete and dorsally oblique  
 on outer face (Fig. 40–42) ... 08

- 08(07) Club at least as long as scape, usually a little longer, with outer suture incomplete and strongly, obliquely curving towards apex of outer surface (Fig. 40–42) ... (p. 39) .. *otago*  
 —Club not longer than scape, usually a little shorter, with both sutures complete and subparallel (Fig. 61, 64) ... 09
- 09(08) Scutellum dull, without a very shiny, metallic subapical band; forewing basad of linea calva with setae relatively sparse, arranged in 4 or 5 irregular lines (Fig. 62); posterior ocellus about equidistant from eye margin and occiput ... (p. 45) .. *similis*  
 —Scutellum dull, but with a conspicuous metallic green subapical band contrasting with metallic purple apex; forewing basad of linea calva with setae relatively dense, arranged in 7 or 8 more or less regular lines (Fig. 65); posterior ocellus slightly closer to eye margin than to occipital margin ... (p. 46) .. *suavis*
- 10(06) Antennal radicle at least as long as torulus; funicle segments longer than broad, or occasionally 6th segment subquadrate, but never transverse (Fig. 53, 57); flagellar segments unicolorous dark brown; scape at least 5× as long as broad ... 11  
 —Antennal radicle shorter than torulus; usually at least 6th funicle segment transverse, though occasionally a little longer than broad, subquadrate; flagellum often with yellow or pale segments contrasting with the remainder, which are dark brown; scape sometimes about 5× as long as broad, but usually shorter ... 12
- 11(10) Mesoscutum with fine, coarse, punctate-reticulate sculpture (Fig. 54); forewing basal cell more or less hairy throughout; linea calva interrupted by 2 or 3 lines of setae (Fig. 55) ... (p. 43) .. *pilosus*  
 —Mesoscutum with shallow, almost smooth reticulate sculpture, nearly squamiform-reticulate (Fig. 58); forewing basal cell more or less naked in proximal half or so; linea calva interrupted by at most 1 or 2 setae (Fig. 59) ... (p. 44) .. *proximus*
- 12(10) Either forewing with linea calva interrupted by 2 or 3 lines of setae, or propodeum laterally with numerous conspicuous, pale setae extending down sides towards hind coxa; tegula with base yellow or orange; head and thorax often completely covered with regular, deep, punctate-reticulate sculpture ... 13  
 —Forewing with linea calva not interrupted, or interrupted by only a single seta; propodeum outside spiracle with at most only a few setae, these not extending down sides towards hind coxa; tegula almost always unicolorous dark brown, only very rarely partly yellow or orange; head and thorax never with deep, regular, punctate-reticulate sculpture ... 14
- 13(12) Propodeum laterally with several conspicuous setae outside spiracle, extending down sides; sculpture on head and dorsum of thorax deep, rough, punctate-reticulate (Fig. 12), only very rarely shallower ... (p. 32) .. *blastothrichus*  
 —Propodeum laterally with only 1 or 2 inconspicuous setae immediately outside spiracle, naked below; sculpture on head and dorsum of thorax shallow, squamiform-reticulate; occasionally scutellum anteriorly with deeper, more or less reticulate sculpture ... (p. 38) .. *novaezealandiae*
- 14(12) Hypopygium posteromedially produced into a narrow projection very nearly reaching apex of gaster (Fig. 51); eye clearly separated from occipital margin; hind femur with a distinct metallic green lustre ... (p. 42) .. *palustris*  
 —Hypopygium not produced into a narrow projection (Fig. 85); eye reaching occipital margin; hind femur not metallic ... (p. 51) .. *variabilis*

#### MALES

- 15(01) Funicle with at least one segment transverse; club at least half as long as funicle (Fig. 38, 90, 91, 93) ... 16  
 —Funicle segments longer than broad, at most 1st or 6th subquadrate; club not more than half as long as funicle ... 19
- 16(15) Club at least about twice as long as funicle; all funicle segments strongly transverse (Fig. 38) ... (p. 38) .. *novaezealandiae*  
 —Club not or hardly longer than funicle; some funicle segments quadrate or longer than broad (Fig. 90, 91, 93) ... 17
- 17(16) Antennal flagellum clothed in relatively short hairs, those on club relatively dense, not longer than one-quarter diameter of club (Fig. 90) ... (p. 53) .. *sp. A*

- Antennal flagellum clothed in relatively long hairs, those on club relatively sparse, the longest about half diameter of club (Fig. 91, 93) ... 18
- 18(17) Forewing with linea calva interrupted by several setae (Fig. 95); funicle segments transverse, the first 1 or 2 subquadrate; club very nearly as long as funicle (Fig. 92) ... (p. 53) .. **sp. B**  
 —Forewing with linea calva completely open, not interrupted (Fig. 94); funicle at least 1.5× as long as club, with at least the first 3 segments longer than broad (Fig. 93) ... (p. 54) .. **sp. C**
- 19(15) Antennal flagellum, or at least apical half of club, clothed in very short, subapically bifurcating setae (Fig. 45, 76, 88) ... 19  
 —Antennal flagellum clothed in normal, elongate setae (Fig. 16, 22, 28) ... 22
- 20(19) All segments of antennal flagellum clothed in very short, bifurcating setae (Fig. 76) ... (p. 48) .. **unicolor**  
 —Funicle and basal half of club clothed in elongate setae which do not bifurcate subapically (Fig. 45, 88) ... 21
- 21(20) Middle tibia about 2.5× as long as aedeagus; forewing with linea calva not interrupted, or rarely so; mandible with upper, truncate part relatively short, occasionally almost tridentate in appearance (Fig. 86, 87) ... (p. 51) .. **variabilis**  
 —Middle tibia about twice as long as aedeagus; forewing usually with linea calva interrupted by several setae, rarely entire; mandible with upper truncate part usually very broad, never tridentate in appearance (Fig. 44) ... (p. 39) .. **otago**
- 22(19) Mandible with upper, truncate part very short, almost tridentate in appearance (Fig. 15) ... (p. 32) .. **blastothrichus**  
 —Mandible with upper, truncate part relatively broad, clearly with 1 or 2 teeth and a broad truncation (as in Fig. 17, 24) ... 23
- 23(22) Frontovortex relatively broad, distinctly more than half as wide as head; eye small, separated from occipital margin by at least the diameter of a posterior ocellus ... (p. 37) .. **mucro**  
 —Frontovortex at most a little more than half as wide as head; eye separated from occipital margin by less than the diameter of an ocellus ... (p. 34) .. **inconstans**

### *Adelencyrtoides acutus* new species

Figures 6–8

**Female.** Length range 1.11–1.43 mm ( $n = 21$ ).

**Holotype.** Length 1.30 mm. Head and dorsum of thorax metallic blue; lower parts of face rather more green; antenna, including radicle, dark brown; posterior margin of pronotum and sides of mesoscutum tending towards orange; sides of thorax, tegulae, metanotum, propodeum except sides, and legs including coxae orange; wings hyaline, with yellowish venation; gaster dark brown with a slight metallic green or brassy sheen.

**HEAD** in profile more or less triangular; frontovertex moderately convex, its tangent forming an angle of about 90° with face; ocelli forming an angle of about 45°; eye slightly overreaching occipital margin; antennal torulus separated from mouth margin by about two-thirds its own length, and from other torulus by about 1.5× its own length, its upper margin clearly below lower margin of eye. Sculpture on frontovertex fine, raised, moderately deep, punctate-reticulate, becoming distinctly shallower and more longitudinally elongate on face below top of antennal scrobes. Setae on frontovertex about as long as the diameter of an ocellus, those on interantennal prominence about 1.5× as long. Clypeus and gena almost smooth. Mandible as in Figure 6. Relative dimensions: head length 67, width 79, depth 40; minimum frontovertex width 17.5; eye length 50, width 43; OPL 10; POL 7.5; OOL 0.5; scape length 35, maximum width 9.5; other proportions of antenna as in Figure 7.

**THORAX.** Sculpture on mesoscutum shallow, raised punctate-reticulate, a little shallower and more squamiform anteriorly and a little deeper posteriorly; scutellum with sculpture generally the same but finer and deeper, on sides more elongate, and extreme apex abruptly smooth and polished; mesopleurum almost completely smooth, but with some irregular, very shallow raised sculpture; propodeum with irregular shallow sculpture which is almost carinate medially, but sides above hind coxae completely smooth. Setae on dorsum not very dense, on anterior part of mesoscutum about as long as on frontovertex, but posteriorly becoming gradually more elongate, and pair at apex of scutellum about 4.0× as long; propodeal spiracle with only 2 setae outside it. Middle tibia with spur very slightly shorter than basal tarsal segment. Relative dimensions: forewing length 230, width 90, venation and setation similar to Figure 8; hindwing length 164, width 42, marginal fringe 6.

**GASTER** about 0.8× as long as thorax. Hypopygium reaching about three-quarters along gaster.

**Paratype.** Relative lengths: ovipositor 84; gonostylus 20; last tergite 66; middle tibia 116.

**Variation.** Colour generally stable, but in one specimen mesopleurum and hind femur slightly infusate and metanotum and propodeum brown. Scape about 4.0–4.5× as long as broad. Frontovertex width about one-fifth to a little less than one-quarter head width. First funicle segment about 1.2–1.8× as long as broad, 0.6–0.8× as long as pedicel, the other segments varying accordingly. Gonostyli as little as 0.2× as long as ovipositor.

**Male.** Unknown.

**Type data.** **Holotype** female: New Zealand, AK, Waitakere Range, Jan 1981, J.S. Noyes (NZAC).

**Paratypes** (23 females). ND – 2, Waipoua State Forest, sweeping, 4 Feb 1975, AKW; 1, Omahuta State Forest, 6 Oct 1980, JSN. AK – 20, Waitakere Range, Nov 1980 (2) and Jan 1981 (18), JSN.

**Material examined.** Type series only (NZAC, BMNH, CNCI, USNM, UCRC, PPRI, ZILR).

ND, AK / —.

Habitats noted: kauri [*Agathis australis*] forest with scattered clumps of *Gahnia*.

Adults have been collected in January, February, October, and November.

**Biology.** Unknown.

**Remarks.** With its narrow frontovertex and very acute ocellar angle, *A. acutus* is probably the easiest member of its genus to recognise. The material examined appears to vary less than in most other species of *Adelencyrtoides*.

### *Adelencyrtoides blastothrichus* new species

Figures 9–16

**Female.** Length range 0.98–1.75 mm ( $n = 142$ ).

**Holotype.** Length 1.43 mm. Head and dorsum of thorax dark metallic green mixed slightly with coppery purple, especially on head and scutellum; antenna mostly dark brown, but radicle, base of scape, and apex of pedicel more or less testaceous, 6th funicle segment yellow, and 5th yellow-brown; tegula orange, its apex infusate; legs, including coxae, and sides of thorax orange; fore and middle tibiae slightly infusate near base, hind tibia with 2 conspicuous brown rings, one near base and the other near apex; apical tarsal segments dark brown; propodeum slightly tinged with orange medially and along posterior margin; forewing more or less hyaline, distinctly infusate below apex of venation across to posterior margin, and with dark brown venation; gaster similar in coloration to thorax but

less metallic. Head and dorsum of thorax covered with conspicuous translucent setae, these fairly dense down sides of propodeum and on sides of gaster near base.

**HEAD** in profile more or less triangular. Frontovertex strongly convex, its tangent forming an angle of about 90° with face. Ocelli forming an angle of about 70°. Eye slightly overreaching occipital margin. Antennal torulus separated from mouth margin by a little less than its own length, and from other torulus by about twice its own length, its upper margin slightly below lower margin of eye. Sculpture on frontovertex coarse, raised, deep, punctate-reticulate, on lower parts of face and genae very similar but a little shallower. Setae on frontovertex about as long as the diameter of an ocellus, those on interantennal prominence about 1.5× as long. Mandible as in Figure 9. Relative dimensions: head length 72, width 90, depth 41; minimum frontovertex width 24.5; eye length 49, width 44; OPL 6.5; POL 12.5; OOL 1; scape length 38, maximum width 9.5; other proportions of antenna as in Figure 10.

**THORAX.** Sculpture on dorsum and mesopleurum coarse, raised, punctate-reticulate (Figure 12), on propodeum similar laterally but medially less regular; that on scutellum generally the same but finer and deeper, and extreme apex abruptly smoother and almost polished, but with very shallow sculpture. Setae on dorsum of thorax moderately dense, at apex of scutellum about 3× as long as on anterior part of mesoscutum; sides of propodeum outside spiracle clothed in fairly dense, conspicuous setae. Middle tibia with spur very slightly shorter than basal tarsal segment. Relative dimensions: forewing length 250, width 108, venation and setation similar to Figures 13 and 14; hindwing length 173, width 51, marginal fringe 6.

**GASTER** about three-quarters as long as thorax. Ovipositor very slightly exerted. Hypopygium reaching to about halfway along gaster.

**Paratype.** Relative lengths: ovipositor 89; gonostylus 15; last tergite 53; middle tibia 105. Last tergite of gaster with apex broadly rounded.

**Variation.** Colour variable, but body generally distinctly metallic: head and dorsum of thorax often distinctly blue or purple; mesopleurum occasionally distinctly infusate, sometimes almost concolorous with dorsum of thorax; antennae sometimes unicolorous dark brown; legs occasionally with coxae brown, femora and tibiae slightly infusate, and the 2 brown rings on hind tibia coalescing. Sculpture of head and thorax almost always conspicuously punctate-reticulate, rarely much shallower, particularly on dorsum of thorax, where it may be very shallow but distinctly reticulate. Frontovertex about 0.25–0.4× as wide as head. Scape

about 3.5–4.5× as long as broad; 1st funicle segment slightly transverse to about 1.5× as long as broad, the other segments varying accordingly (see Figures 10 and 11). Postmarginal vein occasionally only a little longer than stigmal vein; linea calva occasionally uninterrupted. Ovipositor about 0.8–1.2× as long as middle tibia. Gonostyli about one-fifth to one-quarter as long as ovipositor.

**Male.** Length range 0.92–1.22 mm ( $n = 9$ ).

Generally smaller and darker than female; sides of thorax concolorous with dorsum; forewings hyaline; antenna brown; legs dark brown except for middle tarsus, which is whitish yellow with apical segment dark brown; setae on head and dorsum of thorax dark brown. Frontoververtex relatively wider than in female; ocelli forming a slightly obtuse angle; eye not quite reaching occipital margin; antennal torulus separated from mouth margin and from other torulus by about 1.5× its own length, its dorsal margin a little above ventral margin of eye. Sculpture of head and thorax similar but shallower and of larger mesh, appearing more coarse. Mandible as in Figure 15. Antenna as in Figure 16, without any bifurcating setae on flagellum. Genitalia of typical form for genus; aedeagus a little less than half as long as middle tibia. Relative dimensions, paratype 1 (card-mounted): head length 55, depth 30, width 72; minimum frontoververtex width 38; malar space 24; eye length 35, width 28; OPL 4; POL 18; OOL 5; scape length 22, maximum width 8. Relative lengths, paratype 2 (slide-mounted): aedeagus 39; middle tibia 85.

**Variation.** Funicle segments varying in relative length, mostly as in Figure 16, but occasionally 6th segment transverse. Forewing venation and sculpture of thorax varying as in female.

**Type data.** **Holotype** female: New Zealand, BR, Lake Rotorua, mixed *Podocarpus* and *Nothofagus*, 5 March 1981, J.S. Noyes (NZAC).

**Paratypes** (158 females, 10 males). **ND** – 9 females, Paihia, 7 ex *Ctenochiton* sp. on *Corynocarpus laevigatus*, 9 Mar 1962, RAC; 1 female, near Te Matua Ngahere, Waipoua State Forest, sweeping, 19 Sep 1977, LLD; 1 female, Waipoua State Forest, along Waipoua Stm, 70 m, Malaise trap in forest clearing, 16–21 Mar 1978, S&JP; 1 female, Omahuta State Forest, 6 Oct 1980, JSN; 1 male, Poor Knights Is, Tawhiti Rahi, E ridge, sweeping, Dec 1980, MFT. **AK** – 1 female, Orewa, on pohutukawa, Feb 1960, EWV; 1 female, Auckland, ex *Ctenochiton* sp. mature female on *Griselinia littoralis*, 22 Jun 1964, EWV; 1 female, Lynfield, Malaise trap, 7 Apr 1980, GK; 1 male, Lynfield, Sabritzky Bush, 24 Jul 1980, GK; 8 females, 1 male, Lynfield,

Aug 1980 (4♀), Sep 1980 (1♀, ♂), Oct 1980 (1♀), Nov 1980 (1♀), and Jan 1981 (1♀), GK; 4 females, 1 male, Huia, Malaise trap in bush, Jul (1♀, ♂), and Dec 1980, BMM; 3 females, Titirangi, Malaise trap in garden, Jul (1), Nov (1), and Dec 1980, PAM; 7 females, 1 male, Birkenhead, Malaise trap in second-growth bush, Sep (2♀, ♂), Oct (2♀), Nov (2♀), and Dec 1980, JFL; 22 females, Waitakere Range, Sep 1980 (4), Oct 1980 (9), Nov 1980 (5), Dec 1980 (2), and Jan 1981 (2), JSN; 2 females, Titirangi, Malaise trap in garden, Oct 1980, GWR; 1 female, Massey, swept, 2 Jan 1981, EWV; 1 female, Cornwallis Park, reared adult *Ctenochiton ?piperis* on *Vitex lucens*, 4 Feb 1981, EWV. **CL** – 1 female, Kauaeranga [Valley], ex *Ctenochiton* on nikau, 20 Jan 1960; 5 females, Kauaeranga Valley, 14 Nov 1980, JSN; 2 females, 2 males, 9 km E of Tapu, 15 Nov 1980, E1312, JSN; 3 females, 19 km E of Tapu, 31 Jan 1981, JSN. **TO** – 1 female, Tongariro National Park, 5 km N of Okahune, 700 m, mixed *Podocarpus*, 23 Feb 1981, JSN. **GB** – 1 female, Te Kaha, maize, 11 Feb 1959, ACE. **WI** – 2 females, Palmerston North, Munro's Bush, Jan (1) and Feb 1981, PW. **WN** – 1 female, Paiaka, from *Ctenochiton* sp. on *Phormium*, 30 May 1958, RAC; 2 females, Balance Bridge Reserve, litter 75/25, 3 Jan 1975, JCW; 1 female, Eastbourne, 50 m, mixed *Podocarpus* and *Nothofagus*, 28 Feb 1981, JSN; 1 female, Tararua Range, Clouston Park, 600 m, 2 Mar 1981, JSN.

**SD** – 1 female, Stephens I., 14–28 Jan 1933, ESG; 1 female, French Pass, *Phormium colensoi*, 6 Feb 1971, GK. **NN** – 1 female, Appleby, swept from lucerne, 19 Mar 1963; 1 female, Atawhai, from grass, 4 Apr 1965; 1 female, West Haven Inlet, *Inglisia* sp. near mort. female *Hedycarya arborea*, 28 Jan 1966, JAdeB; 1 female, Mt Lodestone, 3800' [1140 m], ex *Ctenochiton* sp. on *Dracophyllum traversii*, 17 Nov 1969, JAdeB; 1 female, Upper Takaka R., asbestos mine track, 700 m, mixed *Nothofagus* forest, 2 Dec 1980, NV7W; 3 females, Cobb Ridge (S), 1100 m, native tussock grassland, 3 Dec 1980, NV&W; 1 female, Kaihoka Lakes, coastal forest, 4 Dec 1980, NV7W; 2 females, Totaranui, 600 m, mixed *Podocarpus* forest, 5 Dec 1980, NV&W; 3 females, Canaan Saddle, *Nothofagus* and *Podocarpus*, 7 Dec 1980, NV&W; 2 females, Whangamoa Saddle, *Nothofagus* and *Podocarpus* forest, 13 Dec 1980, NV&W. **MB** – 2 females, Wairau, Red Hills, 3600' [1080 m], swept red tussock, 22 Mar 1972, EWV; 1 female, Wairau, Red Hills, 3470' [1040 m], swept mixed vegetation under *Leptospermum*, 23 Mar 1972, EWV; 1 female, Wairau, Red Hills, 3470' [1040 m], swept *Leptospermum*, 23 Mar 1972, EWV; 1 female, Pelorus Bridge, *Podocarpus* forest, 13 Dec 1980,

NV&W; 1 female, Pelorus Bridge, *Podocarpus* and *Nothofagus*, 20 Mar 1981, JSN. BR - 1 female, Punakaiki, ex *Ctenochiton* sp., 23 Jan 1962, EWV; 5 females, Marsden Valley, 24 Apr 1969, EWV; 14 females, Mt Robert, swept grasses, 7 Nov 1971, EWV; 1 female, 1 male, Mt Robert, 600-1400 m, *Nothofagus* forest and grass, 10 Dec 1980, NV&W; 5 females, L. Rotoroa, *Podocarpus* and *Nothofagus*, 5 Mar 1981, JSN. WD - 1 female, Hokitika, 20 m, Malaise trap, *Podocarpus* bog, 26-30 Jan 1978, S&JP; 1 female, L. Paringa, *Podocarpus* and *Nothofagus*, 15 Mar 1981, JSN; 5 females, L. Kaniere, mixed *Podocarpus*, 18 Mar 1981, JSN; 1 female, 15 km E of Haast, *Nothofagus*, broadleaf, and *Podocarpus*, 14 Mar 1981, JSN. MC - 4 females, Mt Murchison, swept cushion grass, 21 Nov 1971, EWV; 3 females, Banks Peninsula, Price's Valley, Malaise trap at edge of native bush, Nov 1980 (1), Dec 1980 (1), and Apr 1981 (1), RPM. MK - 1 female, L. Tekapo, Malaise trap in tussock near pine plantation, Nov 1980, PQ. OL - 1 female, Makarora, Malaise trap, *Nothofagus* forest edge, 21-24 Jan 1978, S&JP; 2 females, Mt Aspiring National Park, Makarora, *Nothofagus*, *Podocarpus*, and broadleaf, swept, 25 Jan 1981, N&V; 1 female, Kinloch State Forest, Dart R., *Nothofagus* forest, broadleaf, grasses, and *P. totara*, swept, Jan 1981, N&V. DN - 1 female, Mt Maungatua, 300 m, litter 73/104, 27 Mar 1973, GK. FD - 1 female, Wilmot Pass, 750 m, litter 70/80, 22 Jan 1970, JSD; 1 female, Wilmot Pass, Manapouri, 610 m, to light and sweeping *Polystichum*, Jan 1970, JSD; 1 female, Milford Sound, *Nothofagus* and *Podocarpus*, 10 Mar 1981, JSN.

**Material examined.** Type series only (NZAC, BMNH, CNCI, USNM, UCRC, PPRI, ZILR).

ND, AK, CL, GB, TO, WI, WN / SD, NN, MB, BR, WD, MC, MK, OL, DN, FD.

Recorded from around sea level to about 1400 m (BR, Mt Robert).

Habitats noted: mixed *Podocarpus* and *Nothofagus*; *Corynocarpus laevigatus*; *Podocarpus totara*; *Podocarpus* bog; forest clearing; coastal forest; nikau [*Rhopalostylis sapida*]; pohutukawa [*Metrosideros excelsa*]; garden; maize; second-growth bush; litter; *Phormium colensoi*; *Phormium* sp.; lucerne; grass; native tussock grassland; red tussock; cushion grass; mixed vegetation under *Leptospermum*; *Leptospermum*; tussock near pine plantation; *Polystichum*; *Dracophyllum traversii*.

Adults have been recorded in every month except May.

**Biology.** A parasite of coccids (Homoptera: Coccidae). Reared from *Ctenochiton* sp. on *Dracophyllum traversii*, *Griselinia littoralis*, *Corynocarpus*

*laevigatus*, and *Phormium* sp., from *Ctenochiton* ?*piperis* Maskell on *Vitex lucens*, and from *Inglisia* sp. on *Hedycarya arborea*.

**Remarks.** *A. blastothrichus* bears a very strong resemblance to species of *Blastothrix* Mayr, and viewed in isolation from the species included here in *Adelencyrtoides* could well be placed in that genus. It appears to differ from *Blastothrix* only in the shape of the mandible: in *blastothrichus* each mandible has two teeth and a relatively short truncation, giving it an almost tridentate appearance, whereas in *Blastothrix* the mandible has one or perhaps two teeth and a very broad truncation. This character could be used also to separate *blastothrichus* from most other *Adelencyrtoides* species, although several specimens of *novaezealandiae* and *variabilis* examined have mandibles approaching the condition found in *blastothrichus*. Until the relationships between *Blastothrix*, *Adelencyrtoides*, and the genera of the tribe Habrolepidini can be studied in more detail (see Remarks on genus *Adelencyrtoides*), *blastothrichus* is better placed in *Adelencyrtoides* than in *Blastothrix* or even a new genus.

This species can be distinguished from congeners by the relatively deep punctate-reticulate sculpture of the head and thorax, and by the sides of the propodeum being pilose. Superficially it resembles *A. pilosus*, but it can be separated by the relatively shorter funicle segments and antennal radicle, the angle between the ocelli, and the relative distance of the antennal toruli from the mouth margin.

### *Adelencyrtoides inconstans* new species

Figures 17-23

**Female.** Length range 0.86-1.67 mm ( $n = 134$ ).

**Holotype.** Length 1.16 mm. Head and dorsum of thorax dark metallic green mixed with slightly coppery purple, especially on scutellum; antenna mostly testaceous, but on apex of scape and pedicel mixed with brownish; club brown; base of tegula orange, apex brown; sides of thorax and coxae dark brown; legs testaceous yellow; fore tibia brownish on outer face; middle tibia with an inconspicuous sub-basal brownish ring; hind tibia with 2 inconspicuous brown rings, one near base and the other subapical; apical tarsal segments dark brown; forewing more or less hyaline, very weakly infuscate below marginal vein, with dark brown venation; head and dorsum of thorax covered with inconspicuous brown setae; gaster purplish brown, with basal tergite weakly metallic green.

HEAD in profile more or less triangular, but with frontovertex strongly convex, its tangent forming an angle of about 110° with face. Ocelli forming an

angle of about 90°. Eye reaching occipital margin. Antennal torulus separated from mouth margin by about its own length, and from other torulus by about 1.5× its own length, its upper margin slightly below lower margin of eye. Sculpture on frontovertex coarse, raised, irregular, reticulate, on lower parts of face very similar but very much shallower; gena almost smooth. Setae on frontovertex about as long as the diameter of an ocellus, those on interantennal prominence about 1.5× as long; eye densely and conspicuously hairy. Mandible as in Figure 17. Relative dimensions: head length 61, width 76, depth 31; minimum frontovertex width 33; eye length 38, width 32; malar space 25; OPL 2.5; POL 16; OOL 4; scape length 29, maximum width 8; length of pedicel + flagellum 91; other proportions of antenna as in Figure 18.

**THORAX.** Sculpture on dorsum shallow, raised, reticulate, that on scutellum of slightly smaller mesh than on mesoscutum; mesopleurum with very shallow, irregular, longitudinally elongate, reticulate sculpture; propodeum smooth medially but with some shallow, irregular sculpture around spiracle. Setae on dorsum moderately dense, about 1.5× as long as those on vertex; setae on apex of scutellum about 3.0–4.0× as long as those on vertex; sides of propodeum outside spiracle clothed in fairly numerous, conspicuous, translucent setae which extend down sides. Middle tibia with spur about as long as basal tarsal segment. Forewing basal cell with about 70–80 setae on ventral surface; lineal calva interrupted by 2 lines of setae. Relative dimensions: forewing length 243, width 111, venation and setation similar to Figure 20; hindwing length 168, width 52, marginal fringe 6.

**GASTER** about three-quarters as long as thorax. Ovipositor not exerted. Hypopygium (Figure 21) reaching about two-thirds along gaster.

**Paratype.** Relative lengths: ovipositor 87; gonostylus 17.5; last tergite 49; middle tibia 112. Last tergite of gaster with apex broadly rounded.

**Variation.** Head and thorax from dark brown with a barely visible metallic green or purplish sheen to distinctly shining green or bluish; scutellum often tinged coppery; frontovertex comparatively dull, never with a strong blue lustre immediately above antennal scrobes, though area around ocelli occasionally dull bluish; antenna often entirely brown; tegulae occasionally entirely brown, particularly in larger specimens with smoother sculpture; forewings occasionally distinctly infumate across entire width below marginal vein; fore and hind legs occasionally almost entirely dark brown, except for tarsi; in darker specimens, middle legs generally noticeably paler than the others. Sculpture of head varying from quite smooth to

fairly deep, as in holotype, and that on thorax varying similarly but usually shallower. Scape about 3.5–4.5× as long as broad; 1st funicle segment about 0.3–0.8× as long as broad and 0.8–1.4× as long as pedicel, the others varying accordingly, and the 6th always nearly as long as broad or longer; relative width of funicle segments and number of longitudinal sensilla on each segment varying considerably (see Figures 18 and 19). Frontovertex about 0.4–0.5× as wide as head. Ocelli more or less normal in size to relatively very large – diameter of anterior ocellus often greater than POL, with corresponding variation in OPL:POL:OOL. Forewing postmarginal vein occasionally about as long as stigmal vein; number of setae on ventral surface of basal cell varying from about 10 to well over 100; lineal calva often uninterrupted. Propodeum outside spiracle sometimes with no more than 3 setae. Ovipositor about 0.5–0.8× as long as middle tibia and 4.0–5.0× as long as gonostyli. Specimens longer than 1.25 mm generally with shallower sculpture, uninterrupted lineal calva, and fewer setae on ventral surface of forewing basal cell.

**Male.** Length range 1.25–1.67 mm ( $n = 6$ ).

Generally very similar to female, except for antennae (Figure 22), which lack bifurcating setae on the flagellum, and genitalia (Figure 23). Relative dimensions, paratype 1 (card-mounted): head length 75, width 89; minimum frontovertex width 45; malar space 26; eye length 41, width 36; OPL 5; POL 20.5; OOL 6; scape length 32, maximum width 9. Relative lengths, paratype 2 (slide-mounted): aedeagus 42; middle tibia 113.

**Variation.** Generally as in female. Aedeagus about 0.2–0.3× as long as middle tibia.

**Type data.** **Holotype** female: New Zealand, BR, Lake Rotorua, 11 December 1980, J.S. Noyes, E.W. Valentine, and A.K. Walker (NZAC).

**Paratypes** (158 females, 9 males). ND – 1 female, Waipoua State Forest, 3 Oct 1980, JSN; 1 female, Omahuta State Forest, 6 Oct 1980, JSN; 2 females, Poor Knights Is, Tawhiti Rahi, Dec 1980, CFB. AK – 2 females, 1 male, Waiwera, ex *Ctenochiton ?viridis*, Dec 1963, EWV; 1 female, Huia, Aug 1980, BMM; 2 females, Lynfield, 31 Aug (1) and Nov 1980, GK; 1 female, Kauri Park, 23 Aug 1980, JSN; 1 female, Waitakere, 20 Sep 1980, EWV; 7 females, Waitakere Range, Oct 1980 (2), Nov 1980 (1), Dec 1980 (1), and Jan 1981 (3), JSN; 3 females, Birkenhead, Malaise trap in second-growth bush, Oct 1980 (1), Nov 1980 (1), and Jan 1981 (1), JFL. CL – 11 females, The Aldermen, Ruamahuanui I., 8–12 Nov 1972, GWR (1 on *Coprosma*, 1 on *Meliclytus*, 5 on *Pittosporum*); 3 females, 3 males, Ohi-

nau I., litter 72/234, 25 Nov 1972, GWR; 1 female, Ohena Is, Korenga I., litter 72/233–243, 27 Nov 1972, GWR; 4 females, 1 male, 9 km E of Tapu, 15 Nov 1980, JSN; 1 female, Kauaeranga Valley, 1 Feb 1981, JSN. **WO** – 20 females, 2 males, Raglan, egg mass of *Ctenochiton viridis* on *Corynocarpus laevigatus*, 16 Jan 1977, JSR. **RI** – 1 female, Ruahine Range, 1400 m, in tussock and alpine meadow, ex pan trap, 8 Feb 1980, CFB.

**NN** – 1 female, Nelson, ex mealybug on ivy, 11 Dec 1926, ESG; 1 female, Aniseed Valley, *Eriococcus* sp. mature ♀ on *Podocarpus ferrugineus*, 20 Dec 1965, DBR; 2 females, 1 male, West Haven Inlet, *Ctenochiton viridis* on *Hedycarya arborea*, 17 Jan 1966, JAdeB; 2 females, Garden Valley, ex *Eriococcus elaeocarpi* on *Elaeocarpus ?hookerianus*, 26 Aug 1968, JAdeB; 3 females, Whangamoa Saddle, ex *Ctenochiton* on *Pseudopanax crassifolium*, 28 Oct 1971, JAdeB; 2 females, Kaihoka Lakes, coastal forest, 4 Dec 1980, NV&W; 1 female, Totaranui, 600 m, mixed *Podocarpus* forest, 5 Dec 1980, NV&W; 1 female, Cobb Reservoir, 850 m, mixed native grassland, 6 Dec 1980, NV&W; 1 female, Eve's Valley, *Podocarpus* forest, 8 Dec 1980, NV&W; 1 female, Cobb Reservoir, Malaise trap, Feb 1981, RC. **MB** – 1 female, Pelorus Bridge, *Podocarpus* forest, 13 Dec 1980, NV&W; 1 female, Black Birch Station, 1400 m, *Cassinia* sp., 18 Feb 1970, GK; 1 female, Black Birch Range, on beech in gully, 18 Feb 1970, GW. **KA** – 1 female, Clarence Valley, swept grasses, 12 Feb 1969, EWV. **BR** – 3 females, Marsden Valley, ex *Ctenochiton viridis* ovipositing ♀♀ on *Hedycarya arborea*, 10 Jan 1964, BBG; 2 females, L. Rotoiti, 600 m (1), Malaise trap at edge of *Nothofagus* forest, Nov and Dec 1980, FD; 3 females, St Arnaud, 600 m, *Nothofagus* forest, 9 Dec 1980, NV&W; 5 females, L. Rotoroa, 11 Dec 1980, NV&W; 4 females, L. Rotoroa, *Podocarpus* and *Nothofagus*, 5 Mar 1981, JSN. **WD** – 3 females, Hokitika, L. Mahinapua Reserve, Malaise trap, 26–30 Jan 1978, S&JP; 4 females, L. Paringa, mixed *Podocarpus* and *Nothofagus*, 15 Mar 1981, JSN; 4 females, L. Mahinapua, broadleaf and *Nothofagus*, 17 Mar 1981, JSN; 4 females, L. Kanieri, mixed *Podocarpus*, 18 Mar 1981, JSN. **MC** – 18 females, Banks Peninsula, Price's Valley, Malaise trap at edge of native bush, Oct 1980 (2), Nov 1980 (12), Dec 1980 (3), and Apr 1981 (1), RPM. **OL** – 1 female, Owaka, Malaise trap in *Nothofagus* forest, 13–20 Jan 1978, S&JP; 16 females, Makarora West, S of [Mt Aspiring] National Park, *Nothofagus* forest, *Coprosma*, and *Pseudowintera*, 18 Jan 1981, NV&W; 4 females, 1 male, L. Hawea, *Nothofagus*, broadleaf, and *P. totara*, Jan 1981, N&V; 1 female, Mt Aspiring N.P., Makarora, *Nothofagus*, *Podocarpus*, and broadleaf, 25 Jan 1981, N&V. **SL** – 2 females, Invercargill, *Ctenochiton* sp. on *Wintera*

*colorata*, Jan 1961, EWV.

**SI** – 4 females, 1 male, Mason Bay, 27 Feb 1968, EWV.

**Material examined.** Type series only (NZAC, BMNH, USNM, UCRC, CNCI, ZILR, ANIC).

**ND, AK, CL, WO, RI / NN, MB, KA, BR, WD, MC, OL, SL / SI.**

Recorded from around sea level to about 1400 m (RI, Ruahine Range).

Habitats noted: kauri forest; mixed *Podocarpus* and *Nothofagus*; mixed broadleaf and *Nothofagus*; edge of *Nothofagus* forest; *Nothofagus*, *Coprosma*, and *Pseudowintera*; *P. colorata*; *Cassinia* sp.; second-growth bush; *Pittosporum*; *Cassinia*; *Podocarpus* bog; litter; tussock and alpine meadow; grasses.

Adults have been collected in January–April and August–December.

**Biology.** A parasite of *Ctenochiton viridis* Maskell (Homoptera: Coccidae) on *Hedycarya arborea* and *Corynocarpus laevigatus*; and of *Ctenochiton* sp. on *Pseudopanax crassifolium* and *Pseudowintera colorata*. Also reared from *Eriococcus elaeocarpi* Hoy (Homoptera: Eriococcidae) on *Elaeocarpus ?hookerianus*, and *Eriococcus* sp. on *Podocarpus ferrugineus*. *A. inconstans* has been reared together with *Adelencyrtoides unicolor* and *A. variabilis* from *Ctenochiton viridis* Maskell.

**Remarks.** *A. inconstans* varies considerably. Females may be confused occasionally with *novaezealandiae* or *variabilis*. Generally they can be separated from both by their relatively wider frontovertex and longer funicle segments. Further, they can be distinguished from *novaezealandiae* by the duller frontovertex, which is unicolorous dull green or bluish; in *novaezealandiae* the frontovertex around the ocelli is shining green and above the antennal scrobes is shining blue. They can be separated from *variabilis* by normally having the base of the tegula yellow and the linea calva of the forewing interrupted; in *variabilis* the tegula is always completely dark brown and the linea calva is never interrupted. Males can be separated easily by the consistently different structure of the antennae (see key, and Figures 38 and 88).

This species is closest to *mucro*, but *inconstans* females can be separated by the relatively slightly shorter antennae with the flagellum not longer than 1.3× the width of the head, relatively narrower frontovertex, larger eyes, and more or less straight posterior margin of the hypopygium (see Figure 85). *A. mucro* has the combined length of the antennal pedicel and flagellum at least 1.5× the width of the head, and the hypopygium has a very marked

posteromedian projection (Figure 27). The males can be separated by the relative width of the frontovertex, but this character may not be reliable.

### *Adelencyrtoides mucro* new species

Figures 24–28

**Female.** Length range 1.24–1.47 mm ( $n = 3$ ).

**Holotype.** Length 1.43 mm. Head and dorsum of thorax dull metallic dark green mixed slightly with coppery purple, especially on genae and anterior part of scutellum; antenna dark brown; tegula dark orange-brown; mesopleurum chestnut-brown; remainder of sides of thorax, including coxae, dark brown; legs mostly testaceous yellow, but fore femur and tibia largely dark brown, middle femur with an inconspicuous subapical brownish ring, and hind femur and tibia mostly dark brown; apical tarsal segments dark brown; forewing more or less hyaline, but very weakly infumate from below marginal vein to apex, and with dark brown venation; head and dorsum of thorax covered with inconspicuous brown setae; gaster purplish brown.

**HEAD** in profile rather shallow. Frontovertex fairly convex, its tangent forming an angle of about  $110^\circ$  with face. Ocelli forming an angle of about  $95^\circ$ . Eye not quite reaching occipital margin, comparatively small. Antennal torulus separated from mouth margin by about its own length and from other torulus by about  $1.5\times$  its own length, its upper margin slightly above lower margin of eyes. Frontovertex fairly smooth, with raised, fairly regular, reticulate sculpture; very similar but very much shallower sculpture on lower parts of face; gena and interantennal prominence almost smooth. Setae on frontovertex each a little longer than the diameter of an ocellus, those on interantennal prominence about  $1.5\times$  as long; eye conspicuously hairy. Mandible as in Figure 24. Relative dimensions: head length 66, width 78, depth 36; minimum frontovertex width 46; eye length 33, width 27; malar space 24; OPL 5; POL 22; OOL 9; scape length 31, maximum width 11; length of pedicel + flagellum 124; other proportions of antenna as in Figure 25.

**THORAX.** Sculpture on mesoscutum shallow, regular, raised, reticulate, on scutellum similar but more squamiform, and becoming much smoother towards apex; mesopleurum with very shallow, irregular, longitudinally elongate, reticulate sculpture; propodeum smooth medially but with some shallow, irregular sculpture around spiracle. Setae on dorsum of thorax moderately dense, about  $1.5$ – $2.0\times$  as long as those on vertex; setae towards apex of scutellum about  $3.0$ – $4.0\times$  as long as those on vertex; propodeum outside each spiracle with about

10 conspicuous translucent setae, these not extending down sides. Middle tibia with spur about as long as basal tarsal segment. Linea calva interrupted by 1 or 2 setae. Relative dimensions: forewing length 248, width 102, venation and setation similar to Figure 26; hindwing length 169, width 47, marginal fringe 8.

**GASTER** about three-quarters as long as thorax. Exserted part of ovipositor about one-sixth as long as gaster. Hypopygium strongly produced posteromedially (Figure 27), reaching slightly past apex of gaster. Relative lengths: last tergite 27; [middle tibia 92].

**Paratype.** Relative lengths: ovipositor 91; gonostylus 22.5; middle tibia 125.

**Variation.** One female has slightly darker legs and tegulae, and the hypopygium not quite as strongly produced medially and not quite reaching apex of gaster.

**Male.** Length 1.27 mm ( $n = 1$ ).

Generally very similar to female, except for antennae (Figure 28), which lack bifurcating setae on flagellum, and genitalia. Relative dimensions, paratype 1 (card-mounted): head length 58, width 72; minimum frontovertex width 45; malar space 26; eye length 29, width 23; OPL 5.5; POL 20.5; OOL 10; scape length 25, maximum width 9. Relative lengths, paratype 2 (slide-mounted): aedeagus 40; middle tibia 95.

**Variation.** Impossible to assess from the material available, but probably similar to that found in female, or in males of other species of *Adelencyrtoides*.

**Type data.** **Holotype** female: New Zealand, SI, Rakeahua Camp, 16 February 1968, 1472, E.W. Valentine (NZAC).

**Paratypes** (2 females, 2 males): 1 female, 2 males, OL, Coronet Peak, 1640 m, tussock, alpine shrubs, *Hebe*, and mat plants, Jan 1981, N&V; 1 female, FD, Barrier Range, Little Red Hill, Mt Annetta, 914–1372 m, 2 Jan 1975, tussock, JSD.

**Material examined.** Type specimens only (BMNH, NZAC).

— / OL, FD / SI.

Collected at altitudes up to 1640 m (OL, Coronet Peak).

Habitats noted: tussock, alpine shrubs, *Hebe*, and mat plants.

Adults have been collected in January and February.

**Biology.** Unknown, but almost certainly a parasite of *Ctenochiton* spp. and possibly other coccids (Homoptera: Coccidae).

**Remarks.** *A. mucro* is very close to *A. inconstans* (see Remarks under *inconstans*). The males cannot be reliably separated in the material available, but the difference in the shape of the hypopygium (cf. Figures 21 and 27) and the relative length of the antennae and antennal segments (cf. Figures 18, 19, and 25) should suffice to separate the females.

***Adelencyrtoides novaezealandiae*  
Tachikawa & Valentine**

Figures 29–38

Tachikawa & Valentine, 1969b: 548–552.

This species was described in some detail by Tachikawa & Valentine, but their description can be augmented usefully as follows.

**Female.** Length range 0.63–1.48 mm ( $n = 298$ ).

**Holotype.** Length 1.10 mm. Frontoververtex around ocelli dark metallic green, and immediately anterior to this deep metallic purplish blue; face green; mouth margin coppery; cheeks and temples blue; antennal radicle, apex of pedicel, and funicle testaceous brown, but 5th and 6th funicle segments a little paler; base of pedicel, scape, and club brown; dorsum of thorax dark metallic green strongly mixed with bluish and brassy; tegula yellow or orange, its apex infuscate; sides of thorax brown; coxae dark brown; foreleg brown; middle leg more or less testaceous yellow, but slightly marked with brown, particularly near base of tibia; hind femur and tibia dark brown; hind tarsus testaceous yellow, the apical segments a little darker; propodeum brown; forewing more or less hyaline, inconspicuously infuscate below marginal vein, with dark brown venation; dorsum of thorax covered with inconspicuous brown setae; gaster dark purplish brown, its basal tergites slightly metallic green.

**HEAD** in profile more or less triangular, but frontoververtex slightly convex, its tangent angled a little less than 90° to face. Ocelli forming an angle of about 90°. Eye reaching occipital margin. Antennal torulus separated from mouth margin by a little less than its own length and from other torulus by about twice its own length, its upper margin slightly below lower margin of eye. Sculpture on frontoververtex coarse, raised, moderately deep, punctate-reticulate, becoming shallower squamiform-reticulate at top of antennal scrobes and even shallower on genae and interantennal prominence. Setae on frontoververtex about as long as the diameter of an ocellus, those on interantennal prominence about 1.5× as long. Mandible as in Figure 29. Relative

dimensions: head length 46, width 62, depth 32; minimum frontoververtex width 22; eye length 34, width 31; OPL 6; POL 12; OOL 2; scape length 23, maximum width 7; other proportions of antenna much as in Figure 33.

**THORAX.** Sculpture on dorsum shallow, raised, squamiform-reticulate; apex of scutellum almost smooth; mesopleurum with shallow, irregular, longitudinally elongate, reticulate sculpture. Setae on dorsum moderately dense, about twice as long at apex of scutellum as on anterior part of mesoscutum; sides of propodeum outside spiracle with only 2 or 3 setae, these not extending downwards. Middle tibia with spur only slightly shorter than basal tarsal segment. Relative dimensions: forewing length 189, width 81, venation and setation much as in Figures 35 and 36; hindwing length 130, width 36, marginal fringe 5.

**GASTER** slightly shorter than thorax. Ovipositor (Figure 37) very slightly exerted. Hypopygium reaching about two-thirds along gaster.

**Non-type material** (slide-mounted). Relative lengths: ovipositor 65; gonostylus 15; last tergite 34; middle tibia 50. Last tergite of gaster with apex broadly rounded.

**Variation.** Colour very variable, but body always generally distinctly metallic, head always slightly green around ocelli, and area at top of antennal scrobes always distinctly blue or purplish; antennal flagellum occasionally almost entirely yellowish or brownish, but distalmost 2 segments of funicle always a little paler; dorsum of thorax often entirely bluish or completely lacking blue coloration, sometimes distinctly brassy, particularly on scutellum; mesopleurum, prepectus, and legs (including coxae) often orange or whitish yellow; legs occasionally very extensively dark brown, but middle leg in general with femur conspicuously paler than tibia; hind tibia often with 2 inconspicuous, dark brown rings, one near base, the other near apex. Sculpture of head and thorax occasionally shallower and smoother than described, particularly on dorsum of thorax, where it may be very shallow, though distinctly reticulate. Frontoververtex about one-quarter to one-third as wide as head. Mandible varying as in Figures 29 and 30. Scape about 3.5–5.0× as long as broad; 1st funicle segment from slightly transverse to about 1.3× as long as broad, but always shorter than pedicel, and other funicle segments varying accordingly (Figures 31–34). Forewing occasionally reduced, only just extending past apex of gaster; postmarginal vein occasionally only a little longer than stigmal vein. Ovipositor about 0.8–1.3× as long as middle tibia, 4.0–5.0× as long as gonostyli.

**Male.** Length range 0.57–1.00 mm ( $n = 23$ ).

Generally smaller and darker than female. Head blue; dorsum of thorax dull green with a slight brassy sheen; sides of thorax dull purple-brown, not metallic; forewing hyaline; antenna testaceous yellow, but pedicel dark brown; legs as in female, but slightly darker. Frontoververtex relatively wider than in female. Ocelli forming a slightly obtuse angle. Eye more or less reaching occipital margin. Antennal torulus separated from mouth margin by about  $1.5\times$  its own length and from other torulus by about twice its own length, its dorsal margin a little above ventral margin of eye. Sculpture of head and thorax shallower than in female and of larger mesh, appearing more coarse. Antenna (Figure 38) with some bifurcating setae on extreme apex of club. Genitalia of typical form for genus; aedeagus about two-thirds as long as middle tibia. Relative dimensions, slide-mounted specimen: head width 70; minimum frontoververtex width 34; relative proportions of antennal segments as in Fig. 38; aedeagus length 34; middle tibia 57.

**Variation.** Comparatively slight: funicle segments occasionally dark brown; forewing venation and sculpture of thorax varying as in female.

**Type data.** **Holotype** female: New Zealand, NN, Richmond, on *Podocarpus totara*, 9 October 1961, D.B. Read, "Holotype *Adelencyrtoides novaezealandiae* Tachikawa and Valentine" (NZAC).

**Paratypes** (2 females, 4 males): 1 female, 1 male, same data as holotype; 2 males, same data but 6 Oct 1961; 1 female, 1 male, same data but 18 Oct 1961 (NZAC).

**Material examined.** Type series, plus 373 non-type examples (349 females, 24 males; BMNH, NZAC, CNCI, USNM, UCRC, ZILR, PPRI, ANIC).

ND, AK, CL, BP, TO, WN / SD, MB, NN, BR, WD, MC, MK, OL, CO, FD, SL / SI / Chatham Is.

Recorded from around sea level to about 1300 m.

Habitats noted: *Nothofagus solandri*; *Nothofagus fusca* bush; alpine *Nothofagus* forest; *Nothofagus* and mixed broadleaf forest; *Podocarpus totara*; *Prumnopitys ferruginea*; coastal forest; mixed *Podocarpus* and *Nothofagus* forest; tussock, alpine shrubs, *Hebe*, and mat plants; second-growth bush; kauri [*Agathis australis*] forest; *Dysoxylum spectabile*; *Cyathodes fasciculatum*; *Coprosma*; *Astelia*; *Weinmannia racemosa*; *Pseudowintera*; garden; red tussock; *Leucopogon fasciculatus*; *Pittosporum tenuifolium*; *Dionella* sp.; mixed vegetation; tussock, grasses, *Discaria*, *Juncus*, *Rosa*, and *Pimelea*; native grassland and *Sphagnum* bog.

Adults have been collected in all months except May and June.

**Biology.** A parasite of diaspid scales (Homoptera: Diaspididae), reared from *Eulepidosaphes pyriformis* (Maskell) on *Podocarpus totara*, *Ackama rosaeifolia*, *Weinmannia racemosa*, and *Astelia* sp.; *Leucaspis podocarpi* Green on *Podocarpus totara*; ?*Leucaspis* sp. on *Dysoxylum spectabile* and *Cyathodes fasciculatus*; and unidentified diaspid scales on *Prumnopitys ferruginea*, *Ackama rosaeifolia*, and *Coprosma repens*.

**Remarks.** Specimens of *A. novaezealandiae* appear to fall into two groups: (1) smaller individuals with relatively shorter flagellar segments (as in Figures 31 and 33), shorter ovipositor, and sides of thorax dark brown; and (2) larger individuals with proportionately longer flagellar segments (as in Figures 32 and 34), longer ovipositor, and sides of thorax often orange or orange-brown. Specimens of the latter form have been examined from scattered localities on both main islands. For the present the two groups are treated as a single species, since these differences seem to reflect only the effects of size, i.e., larger individuals have relatively longer funicle segments and a relatively longer ovipositor. This is supported by the result of a principal component analysis undertaken on the 12 most variable characters measured in 49 specimens (see Text-figure 1, p. 16). The effect of size was removed using a logarithmic correction of the data. The plots of the scores of the analysis showed a more or less uniform scatter of points, specimens of the two groups being well interspersed (Text-figure 1c,d).

Some females of *novaezealandiae* can be confused with females of *inconstans*, *variabilis*, or *blastothrichus*. From specimens of *blastothrichus* with unusually shallow sculpture on the head and thorax they can be separated most reliably by the lack of setae extending down the side of the propodeum; from *variabilis* by the interrupted linea calva of the forewing and usually by the yellow or orange base to the tegula (see Remarks under *variabilis*); and from *inconstans* by the distinctly metallic blue colour of the frontoververtex immediately above the antennal scrobes. Other characters are not consistently different. On the other hand the males of these species are easier to separate, being consistently different in the antennal characters given in the key (see Figures 16, 22, 38, and 88).

### *Adelencyrtoides otago* new species

Figures 39–47

**Female.** Length range 0.70–1.23 mm ( $n = 259$ ).

**Holotype.** Length 1.10 mm. Frontoververtex more or less black, with slight metallic blue and purple reflections; temples bluish; across top of antennal

scrobes purple, and below this blue-green; mouth margin and gena coppery purple; antenna dark brown, but 6th funicle segment yellowish, and 5th yellowish brown; dorsum of thorax black with very slight brassy, green, or coppery reflections; extreme apex of scutellum dark metallic blue; sides of thorax and legs dark brown; propodeum immediately below spiracle metallic blue; middle tibial spur and middle and hind tarsi yellowish; apical segment of tarsi dark brown; forewing hyaline, slightly infuscate below marginal vein; head and thorax covered with inconspicuous, dark brown setae; gaster dark brown, the basal tergite slightly greenish, the remainder distinctly purplish; exerted part of gonostyli brown.

**HEAD** in profile with frontovertex distinctly convex, its tangent forming an angle of about 90° with face. Ocelli forming an angle of a little less than 90°. Eye reaching occipital margin. Antennal torulus separated from mouth margin by about its own length and from other torulus by about 1.5× its own length, its upper margin clearly below lower margin of eye; club with outer suture incomplete and strongly oblique below break. Sculpture on frontovertex shallow, raised, regular, reticulate, of small mesh, on gena similar but very much shallower and longitudinally elongate; sculpture on interantennal prominence also clearly shallower. Setae on frontovertex about as long as the diameter of an ocellus, those on interantennal prominence about 1.5× as long; eye with dense, short hairs about as long as the diameter of a facet. Mandible as in Figure 39. Relative dimensions: head length 54, width 67, depth 33; minimum frontovertex width 23.5; eye length 36, width 32; malar space 24; OPL 6; POL 9; OOL 4; scape length 24, maximum width 7.5; other proportions of antenna as in Figure 41.

**THORAX.** Sculpture of dorsum shallow, raised, reticulate; mesopleurum almost smooth but with shallow, irregular, reticulate sculpture; propodeum more or less smooth medially but roughly sculptured around spiracle. Setae on dorsum of thorax moderately dense, inconspicuous, subequal in length, about 1.5× as long as those on vertex; setae at apex of scutellum about 3.0–4.0× as long as those on vertex; propodeum outside spiracle with only 3 or 4 translucent setae, these not extending down sides. Middle tibial spur a little shorter than basal tarsal segment. Forewing with linea calva interrupted by 2 lines of setae. Relative dimensions: forewing length 180, width 81, venation and setation similar to Figure 43; hindwing length 118, width 35, marginal fringe 5.

**GASTER** about three-quarters as long as thorax. Exserted part of ovipositor about one-eighth as long

as gaster. Hypopygium reaching about two-thirds along gaster.

**Paratype.** Relative lengths: ovipositor 94; gonostylus 20; last tergite 48; middle tibia 75. Last tergite of gaster with apex broadly rounded.

**Variation.** General coloration fairly constant, but antennal flagellum rarely entirely dark brown, and legs occasionally slightly paler, with apices of femora and tibiae testaceous; wings sometimes entirely hyaline. Antennae the most variable, particularly in breadth of segments: scape about 3.0–4.5× as long as broad; 1st funicle segment about 0.8–1.0× as long as broad, 6th about 0.6–1.2× as long as broad, and other segments varying accordingly; club from three-quarters as long as funicle to a little longer (see Figures 40–42); frontovertex about one-fifth to one-quarter as wide as head; ovipositor about 1.0–1.8× as long as middle tibia, 4.0–5.0× as long as a gonostylus.

**Male.** Length range 0.56–1.03 mm ( $n = 13$ ).

Generally very similar to female, but differing in relatively wider frontovertex and structure of antennae (Figures 45 and 46) and genitalia (Figure 47). Mandible as in Figure 44. Antennal club with bifurcating setae in apical half. Relative dimensions, paratype 1 (card-mounted): head width 56; minimum frontovertex width 29; eye length 25, maximum width 21; malar space 20; OPL 3.5; POL 13; OOL 3.5; scape length 18, maximum width 7. Relative lengths, paratype 2 (slide-mounted): aedeagus 28.5; middle tibia 66.

**Variation.** Aedeagus length varying from slightly less to slightly more than half length of middle tibia.

**Type data.** **Holotype** female: New Zealand, NN, Upper Takaka River, asbestos mine track, 700 m, mixed *Nothofagus* forest, 7 December 1980, J.S. Noyes, E.W. Valentine, and A.K. Walker (NZAC).

**Paratypes** (294 females, 18 males). ND – 3 females, Maunganui Bluff, *Phormium tenax*, 26 Nov 1962, RAC; 2 females, 1 male, Whangarei, ex scale on *Cyathodes*, 15 Jun 1965, DBR; 8 females, Poor Knights Is, Tawhiti Rahi, Dec 1980, as follows – 2, MFT (1) and CFB (1); 3, ex *Poliaspis media* Mask. on *Samolus*, CFB; 1, ex *Poliaspis media* on *Phormium tenax*, CFB; 1, Malaise trap; 1, plateau at end of S track, sweeping, MFT. AK – 1 female, Lynfield, Malaise trap, 3 Apr 1979, GK; 4 females, Lynfield, 10 Aug 1980 (1), Sep 1980 (2), and Jun 1981 (1), GK; 1 female, Massey, 12 Mar 1980, EWV; 2 females, Huia, ?*Leucaspis* sp. on *Cyathodes fasciculatum*, 18 Sep 1980, CFB; 2 females, Huia, Malaise trap in bush, Oct (1) and Dec 1980, BMM; 2 females, Waitakere Range, Jan 1981, JSN. CL – 1 female, 1 male, Kauaeranga Valley, 14 Nov 1980

(♂) and 1 Feb 1981 (♀), JSN; 4 females, 19 km E of Tapu, 31 Jan 1981, JSN. **BP** – 4 females, Mamaku Plateau, Galaxy Road 27 km W of Rotorua, Malaise trap, 6–11 Mar 1978, S&JP; 1 female, 40 km W of Rotorua, Fitzgerald Glade, 24 Mar 1981, JSN. **TO** – 1 female, 20 miles [32 km] S of Turangi, 19 Feb 1979, LAM. **TK** – 1 female, Pouakai Trig, 1400 m, litter 75/207, 3 Dec 1975, JSD. **WN** – 5 females, 1 male, *Phormium* scale, Paiaka, May 1950, RAC; 2 females, 1 male, Paekakariki, ex scale on *Phormium tenax*, 6 Oct 1964, EWW; 2 females, Rimutaka Forest Park (S), 250 m, mixed *Podocarpus* and *Nothofagus*, 27 Feb 1981, JSN; 4 females, 1 male, Eastbourne, 50 m, mixed *Podocarpus* and *Nothofagus*, 28 Feb 1981, JSN; 1 female, Petone, Francis Bell Reserve, 50 m, mixed *Podocarpus* and *Nothofagus*, 20 Feb 1981, JSN; 2 females, Tararua Range, 600 m, Clouston Park, 2 Mar 1981, JSN.

**NN** – 2 females, Mapua, on *Phormium tenax*, 3 Jan 1962, EWW; 1 female, Collins Valley, on *Fuchsia excorticata*, 22 Jan 1962, EWW; 1 female, Rodding Valley, scale mature ♀♀, *Olearia virgata serpentina*, 30 Sep 1965, GWR; 1 female, Nelson, scale immature ♀♀ on *Phormium tenax* (ornamental), 29 Jul 1965, BBG; 2 females, Eve's Bush, diaspidid on *Cyathodes fasciculata*, Sep 1966, EC; 1 female, W of Mossburn, ex moss, 29 Oct 1966, JIT; 5 females, 2 males, Wangapeka, ex scale on *Raoulia australis tenuicaulis*, 15 Aug 1968, JSD; 4 females, 1 male, Wangapeka, ex scale on *Raoulia* sp., Sep 1968, JSD; 3 females, 1 male, Mt Lodestone, 3800' [1140 m], ex scale on leaves of *Draconophyllum traversii*, 10 Dec 1969, JAdeB; 2 females, Eve's Valley, ex scale insect on *Cyathodes fasciculata*, 29 Nov 1972, JAdeB; 2 females, Mt Arthur, 5000' [1500 m], ex scale on *Coprosma pumila*, 10 Dec 1969, JAdeB; 1 female, Mt Domett, 1350 m, litter 75/168, 1 Dec 1971, GK; 2 females, Whangamo Saddle, Malaise trap, 1–3 Feb 1978, S&JP; 1 female, Karamea, Kongahu, Malaise trap, Dec 1980; 8 females, Upper Takaka R., asbestos mine track, 700 m, mixed *Nothofagus* forest, 2 Dec 1980, NV&W; 3 females, 1 male, Cobb Ridge (S), alpine *Nothofagus* forest, 1100 m, 3 Dec 1980, NV&W; 6 females, Cobb Reservoir, 850 m, mixed native grassland, 6 Dec 1980, NV&W; 1 female, Canaan Saddle, *Nothofagus* and mixed *Podocarpus*, 7 Dec 1980, NV&W; 3 females, Whangamo Saddle, *Nothofagus* and mixed *Podocarpus* forest, 13 Dec 1980, NV&W. **MB** – 3 females, Balloon Hill, 14 Mar 1964, JAdeB; 2 females, Wairau Valley East, ex Diapriinae mature ♀ on *Phormium tenax*, 8 Oct 1964, DBR; 1 female, 2 males, Saxton Pass, ex *Polaspis media* on *Pimelia* sp., 15 Sep 1966, JAdeB; 1 female, Saxton Pass, *Pimelia* sp., Sep 1966, JAdeB; 4 females, 3 males, Red Hills, Wairau (3♀,

3600' [1080 m], swept from red tussock; 1♀, 2♂, 3470' [1040 m], swept from tussock and jointed rush; 1♂, 3500' [1150 m], swept red tussock mixed), 22–24 Mar 1972, EWW. **KA** – 7 females, Kaikoura, ex scale on *Phormium colensoi*, 9 Mar 1965, BBG. **BR** – 1 female, Mt Robert, swept grasses, 7 Nov 1971, EWW; 1 female, S of Reefton, Tawhai State Forest, litter 72/75, 28 Jan 1972, JMB; 1 female, L. Rotoiti, Malaise trap by forest stream, 4–9 Feb 1978, S&JP; 8 females, Mt Robert, 4 Feb 1979, LAM; 1 female, Nelson Lakes National Park, Mt Robert track, 1005 m, in grass, 4 Feb 1979, AKW; 3 females, L. Rotoiti, 600 m, Malaise trap at edge of *Nothofagus* forest, Nov 1980, FD; 11 females, St Arnaud, 600 m, *Nothofagus* forest (3) and native grassland and *Sphagnum* bog (8), 9 Dec 1980, NV&W; 30 females, Mt Robert, 600–1400 m, *Nothofagus* forest and grass, 10 Dec 1980, NV&W; 1 female, L. Rotorua, 11 Dec 1980, NV&W; 3 females, L. Rotorua, mixed *Podocarpus* and *Nothofagus*, 5 Mar 1981, JSN. **WD** – 2 females, Little Man Creek, from *Raoulia*, 4 Nov 1965, ACE; 1 female, Hokitika, L. Mahinapua Reserve, 20 m, *Podocarpus* bog, 26–30 Jan 1978, S&JP; 1 female, L. Kaniere, mixed *Podocarpus*, 18 Mar 1981, JSN. **MC** – 2 females, Broken River, on matagouri, 23 Oct 1962, JIT; 1 female, 1 male, Cass, on *Leucopogon fraseri*, 30 Oct 1962, JIT; 3 females, Banks Peninsula, Price's Valley, Malaise trap at edge of native bush, Oct 1980 (1), Jan 1981 (2), RPM. **SC** – 14 females, 2 males, Timaru, on *Phormium tenax*, 21 Jan 1961, EWW. **MK** – 1 female, L. Tekapo, Malaise trap in tussock near pine plantation, Nov 1980, PQ. **OL** – 6 females, Makarora, Malaise trap at *Nothofagus* forest edge, 21–24 Jan 1978, S&JP; 1 female, Dart Hut, Malaise trap in open, 13–15 Feb 1980, JSD; 6 females, Makarora West S of [Mt Aspiring] National Park, *Nothofagus* forest, *Coprosma*, and *Pseudowintera*, 18 Jan 1981, N&V; 22 females, Mt Aspiring N.P., Makarora, *Nothofagus*, *Podocarpus*, and broadleaf, 25 Jan 1981, N&V; 3 females, Coronet Peak, 1200 m, tussock grasses, *Hebe* and alpine herbs, Jan 1981, N&V; 1 female, Mt Aspiring N.P., Makarora, *Nothofagus* and mixed *Podocarpus*, 13 Mar 1981, JSN; 1 female, Mt Aspiring N.P., 12 km N of Makarora, *Nothofagus* and mixed *Podocarpus*, 14 Mar 1981, JSN. **CO** – 2 females, Kyeburn, scale on stems of *Coprosma*, 9 Nov 1968, TT; 7 females, Mt Pisa near Wanaka, ex scale on *Pimelia*, 10 Sep 1968, TT; 7 females, 1 male, Waipori, 520 m, pit trap in tussock, Nov 1978 (2♀, ♂), Nov–Dec 1978 (3♀), Dec 1978 – Mar 1979 (1♀), and Mar–Apr 1979 (1♀), BIPB; 6 females, Rocklands Station, 800 m, pit trap in tussock, Dec 1978 (4), Feb 1979 (1), and Apr 1979 (1), BIPB; 1 female, Roaring Meg, tus-

sock grasses, *Discaria*, *Rosa*, *Juncus*, and *Pimelia*, 13 Jan 1981, N&V. FD – 1 female, “Fiordland”, ex *Raoulia* from dry riverbed, 11 Jan 1967, AKW. SL – 3 females, Invercargill, on *Suttonia australis*, 21 Jan 1961, EWV.

SI – 3 females, Rakeahua Camp, 11 Feb 1968, EWV; 3 females, Rakeahua River, swept from low growth, 22 Feb 1968, EWV; 9 females, Freshwater, 25 Feb 1968, EWV; 6 females, NE Long I. [Big South Cape I.], *Phormium tenax*, 15 Nov 1968, JMcb.

**Material examined.** Type series only (NZAC, BMNH, USNM, CNCI, UCRC, ZILR, PPRI, ANIC).

ND, AK, CL, BP, TK, TO, WN / NN, MB, KA, BR, WD, MC, SC, MK, OL, CO, FD, SL / SI.

Recorded from around sea level to about 1525 m (BR, Mt Robert).

Habitats noted: mixed broadleaf; mixed *Podocarpus* and *Nothofagus*; edge of *Nothofagus* forest; *Nothofagus* forest, *Coprosma*, and *Pseudowintera*; *Podocarpus* bog; edge of native bush; *Cyathodes fasciculata*; *Cyathodes* sp.; *Phormium tenax*; *Samolus*; *Suttonia australis*; *Fuchsia excorticata*; *Dracophyllum traversii*; *Olearia virgata* var. *serpentina*; *Raoulia* sp.; *Coprosma pumila*; *Leptospermum* sp.; grasses, *Discaria*, *Rosa*, *Juncus*, and *Pimelia*; tussock near pine plantation; tussock, grasses, *Hebe*, and alpine shrubs; litter.

Adults have been collected in all months except May.

**Biology.** A parasite of diaspid scales (Homoptera: Diaspididae), reared from *Poliaspis media* Maskell on *Samolus* sp. and *Pimelia* sp.; *Poliaspis argentatus* Brittin on *Cyathodes* sp.; and ?*Leucaspis* sp. on *Cyathodes fasciculata*. Also reared from unidentified diaspid scales on *Phormium tenax* and *P. colensoi*, *Olearia virgata* var. *serpentina*, *Raoulia* spp., *Coprosma pumila*, and *Dracophyllum traversii*.

**Remarks.** The material is divisible into two groups of specimens, with the funicle segments relatively broader or narrower (cf. Figures 40–42). The difference is most probably a reflection of individual size, and therefore the two groups are treated here as a single species. This decision is supported by the results of a principal component analysis of the 8 most variable characters exhibited by 33 individuals representing both groups. The effect of size was removed using a logarithmic correction of the data. The plots of the resulting scores were similar to those achieved with *A. novaezealandiae*.

Head shape, the presence of an interrupted linea calva, and biology suggest that *otago* is nearest to

*novaezealandiae*, but it is most likely to be confused with *suavis*, *similis*, or *unicolor*. In addition to the characters given in the key, it can be separated from *suavis* and *similis* on head shape and the relative position of the ocelli.

### *Adelencyrtoides palustris* new species

Figures 48–51

**Female.** Length range 1.03–1.16 mm ( $n = 5$ ).

**Holotype.** Length 1.16 mm. Head and dorsum of thorax dark metallic blue with a slight greenish lustre, particularly on head below top of antennal scrobes; antennae dark brown, but scape and basal half or so of pedicel with a fairly strong, dark metallic green lustre; tegula with a metallic blue lustre; extreme apex of scutellum darker metallic blue; sides of thorax, including coxae, with a dark metallic blue sheen; legs mostly dark brown with a slight dark blue sheen; apices of femora and tibiae testaceous-yellow; middle and hind tarsi and middle tibial spur testaceous yellow, and apical tarsal segments dark brown; forewing hyaline, with a slight infuscate area across wing below marginal vein; head and thorax covered with inconspicuous dark brown setae; gaster dark brown, but basal tergite distinctly bluish and the remainder greenish; exerted part of gonostyli dark brown.

HEAD in profile with frontovertex distinctly convex, its tangent forming an angle of about 100° with face. Ocelli forming an angle of a little less than 90°. Eye not quite reaching occipital margin. Antennal torulus separated from mouth margin by slightly less than its own length and from other torulus by about 1.5× its own length, its upper margin clearly below lower margin of eye. Sculpture on frontovertex shallow, raised, fairly regular, reticulate, on gena similar but very much shallower and longitudinally elongate, and on interantennal prominence also clearly shallower. Setae on frontovertex about as long as the diameter of an ocellus, those on interantennal prominence about 1.5× as long; eye with dense, short hairs each about as long as the diameter of a facet or a little shorter. Mandible as in Figure 48. Relative dimensions: head length 60, width 66, depth 31; minimum frontovertex width 27; eye length 37, width 29; malar space 24; OPL 5; POL 15; OOL 4; scape length 27, maximum width 6; other proportions of antenna as in Figure 49.

THORAX. Sculpture on dorsum shallow, raised, reticulate, on mesopleurum shallower, finer; propodeum with very shallow, irregular sculpture medially, but deeper around spiracle. Setae on dorsum moderately dense but inconspicuous, subequal in length, about 1.5× as long as those on

vertex; setae towards apex of scutellum about 3.0–4.0× as long as those on vertex; propodeum outside spiracle with only 2 or 3 translucent setae, these not extending down sides. Middle tibia with spur a little shorter than basal tarsal segment. Forewing with linea calva not interrupted. Relative dimensions: forewing length 174, width 72, venation and setation similar to Figure 50; hindwing length 128, width 33, marginal fringe 5.

**GASTER** only slightly shorter than thorax. Exserted part of ovipositor about one-eighth as long as gaster. Hypopygium slightly produced posteromedially, very nearly reaching apex of gaster (Figure 51).

**Paratype.** Relative lengths: ovipositor 96; gonostylus 22; last tergite 27; middle tibia 82. Last tergite of gaster with apex very broadly rounded.

**Variation.** Negligible in the material available.

**Male.** Unknown.

**Type data.** **Holotype** female: New Zealand, BR, St Arnaud, 600 m, native grassland and *Sphagnum* bog, 9 December 1980, J.S. Noyes, E.W. Valentine, and A.K. Walker (NZAC).

**Paratypes:** 5 females, same data as holotype.

**Material examined.** Type series only (NZAC, BMNH).

**Biology.** Unknown.

**Remarks.** *A. palustris* is closest in appearance to *A. variabilis*, but can be separated using the key characters.

### *Adelencyrtoides pilosus* new species

Figures 52–55

**Female.** Length range 0.95–1.52 mm ( $n = 17$ ).

**Holotype.** Length 1.33 mm. Head and dorsum of thorax generally dark metallic green and – depending on angle of view – mixed purple or coppery purple, especially on frontovertex, genae, pronotum, and sides and apex of scutellum; antenna mostly dark brown, but scape and pedicel with a slight metallic green lustre; base of tegula amber, apex brown; sides of thorax coloured more or less as dorsum, but perhaps slightly more bluish; prepectus largely orange; fore coxa dark brown mixed with slightly testaceous, middle coxa amber on inner face and dark brown on outer face, hind coxa dark brown with a slight metallic lustre; fore and middle legs mostly amber, but femora and tibiae largely mixed with brown; fore tarsi dusky; middle

leg with spur and tarsi amber, but apical tarsal segment brown; hind leg dark brown, but tarsus amber, and apical tarsal segment dark brown; head and dorsum of thorax covered with conspicuous pale setae; apical half of scutellum with dark brown setae; forewing hyaline, with dark brown venation; gaster dark purple, the basal tergite slightly greenish medially.

**HEAD** in profile with frontovertex strongly convex, its tangent forming an angle of slightly more than 110° with face. Ocelli forming an angle of slightly less than 90°. Eye reaching occipital margin. Antennal torulus separated from mouth margin by about half its own length and from other torulus by slightly more than its own length, its upper margin well below lower margin of eye. Sculpture on frontovertex fine, raised, regular, punctate-reticulate, very similar on lower parts of face and gena; setae on frontovertex about as long as the diameter of an ocellus, those on interantennal prominence about 1.5× as long; eye densely and conspicuously hairy, each hair slightly longer than the diameter of a facet. Mandible as in Figure 52. Relative dimensions: head length 67, width 76, depth 36; minimum frontovertex width 22; eye length 44, width 35; malar space 28; OPL 6; POL 13; OOL 1.5; scape length 40, maximum width 9.5; other proportions of antenna as in Figure 53.

**THORAX.** Sculpture similar to that on head (Figure 54), but of slightly larger mesh on lower parts of mesopleurum; extreme apex of scutellum smooth; propodeum with very shallow reticulate sculpture medially, but much deeper laterally around spiracle. Setae on dorsum quite dense, a little longer than those on vertex; setae on apex of scutellum about 3.0–4.0× as long as those on vertex; sides of propodeum outside spiracle with about 10 translucent setae, these hardly extending down sides; metapleurum with a conspicuous line of setae more or less reaching hind coxa. Middle tibia with spur about as long as basal tarsal segment. Forewing with linea calva interrupted by 2 lines of setae. Relative dimensions: forewing length 218, width 91, venation and setation similar to Figure 55; hindwing length 159, width 47, marginal fringe 7.5.

**GASTER** about three-quarters as long as thorax. Ovipositor slightly exserted. Hypopygium nearly reaching apex of gaster.

**Paratype.** Relative lengths: ovipositor 104; gonostylus 29; last tergite 41; middle tibia 105. Last tergite of gaster with apex very broadly rounded.

**Variation.** Green colour of thoracic dorsum sometimes almost entirely lost, the dorsum then being mostly purple or bluish and perhaps quite dull. Smaller specimens generally with relatively shorter flagellar segments than holotype, and conversely relatively longer in larger specimens (small-

est specimen at hand has funicle segments hardly longer than broad, and largest specimen has funicle segments about twice as long as broad). Relative width of frontovertex and relative length of forewing veins also varying slightly.

**Male.** Unknown, but possibly that described here as *Adelencyrtoides* sp. A or sp. B.

**Type data.** **Holotype** female: New Zealand, OL, Kirk's Bush [Kidd's Bush], Lake Hawea, *Nothofagus* forest, broadleaf, and *P. totara*, swept, January 1981, J.S. Noyes & E.W. Valentine (NZAC).

**Paratypes** (18 females). **MB** - 1, Red Hills, Wairau, 3600' [1080 m], swept red tussock, 22 Mar 1972, EWV. **BR** - 1, Mt Robert, swept grasses, 7 Mar 1972, PAH; 1, L. Rotoiti, 600 m, Malaise trap, edge of *Nothofagus* forest, Nov 1980, FD; 1, St Arnaud, 600 m, *Nothofagus* forest, 9 Dec 1980, NV&W; 1, Mt Robert, 600-1400 m, *Nothofagus* forest and grass, 10 Dec 1980, NV&W. **MK** - 1, Ahuriri Valley, ex litter, 23 Jan 1966, JIT. **OL** - 11, same data as holotype.

**Material examined.** Type series only (NZAC, BMNH, CNCI).

— / MB, BR, MK, OL.

Collected at altitudes up to about 1100 m (MB, Red Hills).

Habitats noted: *Nothofagus* forest, broadleaf, and *Podocarpus totara*; *Nothofagus* forest; red tussock; grasses; litter.

Adults have been collected in January, March, November, and December.

**Biology.** Unknown.

**Remarks.** *A. pilosus* is superficially very similar to *A. blastothrichus*, but can be separated by the relatively longer funicle segments, closer placement of the antennal toruli to the mouth margin, and shape of the mandible. It is closest to *proximus*, but can be separated by the key characters.

### *Adelencyrtoides proximus* new species

Figures 56-59

**Female.** Length range 1.06-1.41 mm ( $n = 21$ ).

**Holotype.** Length 1.29 mm. Head and dorsum of thorax metallic blue-green mixed with slightly coppery purple, especially on thorax; antenna mostly dark brown, but scape and pedicel slightly darker; base of tegula amber, apex brown; sides of thorax very much as dorsum; prepectus largely amber in posterior half; coxae dark brown with a

metallic blue-green lustre, but middle coxa amber on inner surface; fore and middle legs largely amber, but mixed with dark brown, especially on tibiae; fore tarsi brown; middle tibia with spur and tarsus yellow-amber, apical segment dark brown; hind leg dark brown, the femur with a slight metallic lustre; hind tarsus yellowish, but distalmost 2 segments dark brown; forewing with a distinct fuscous cloud below apex of venation, which is dark brown; head and dorsum of thorax covered with moderately conspicuous translucent or pale brown setae; setae in distal half of scutellum dark brown; gaster purplish brown, its basal tergite weakly metallic purple.

**HEAD** in profile with frontovertex strongly convex, its tangent forming an angle of about 110° with face. Ocelli forming an angle of a little less than 90°. Eye reaching occipital margin. Antennal torulus separated from mouth margin by half its own length and from other torulus by about its own length, its upper margin well below lower margin of eye. Sculpture on frontovertex shallow, raised, regular, reticulate, very similar on lower parts of face and on gena. Setae on frontovertex about as long as the diameter of an ocellus, those on inter-antennal prominence about 1.5× as long; eye with dense, conspicuous hairs each slightly longer than the diameter of a facet. Mandible as in Figure 56. Relative dimensions: head length 70, width 84, depth 39; minimum frontovertex width 28; eye length 48, width 37; malar space 30; OPL 5.5; POL 16; OOL 2; scape length 37, maximum width 8.5; other proportions of antenna as in Figure 57.

**THORAX.** Sculpture of dorsum similar to that on frontovertex but shallower and less regular (Figure 59); mesopleurum similar, but sculpture more longitudinally elongate ventrally; propodeum almost smooth medially and with deeper, irregular sculpture around spiracle. Setae on dorsum moderately dense, about 1.5× as long as those on vertex; setae on apex of scutellum about 3.0-4.0× as long as those on vertex; sides of propodeum outside spiracle with about 10 conspicuous translucent setae, these not extending down sides; metapleurum with a line of setae extending nearly to hind coxa. Middle tibia with spur about as long as basal tarsal segment. Forewing with linea calva not interrupted. Relative dimensions: forewing length 218, width 97, venation and setation similar to Figure 59; hindwing length 163, width 52, marginal fringe 6.

**GASTER** about three-quarters as long as thorax. Ovipositor hardly exerted. Hypopygium reaching slightly more than three-quarters along gaster.

**Paratype.** Relative lengths: ovipositor 113; gonostylus 31; last tergite 45; middle tibia 114. Last tergite of gaster with apex very broadly rounded.

**Variation.** Head and thorax sometimes without purple sheen, i.e., completely green; scutellum

sometimes strongly blue. Antennal segments varying in relative length: scape from slightly less than  $5.0\times$  as long as broad to about  $5.5\times$ ; 1st funicle segment about  $1.25\text{--}1.50\times$  as long as broad. Linea calva of forewing occasionally interrupted by 1 or 2 setae.

**Male.** Unknown, but possibly that described here as *Adelencyrtoides* sp. A or sp. B.

**Type data.** **Holotype** female: New Zealand, OL, Kirk's Bush [Kidd's Bush], L. Hawea, *Nothofagus* forest, broadleaf, and *P. totara*, swept, January 1981, J.S. Noyes & E.W. Valentine (NZAC).

**Paratypes** (26 females). **TO** – 11, Tongariro National Park, Chateau Tongariro, 950 m, *Nothofagus* forest, 22 Feb 1981, E987, JSN.

**NN** – 2, Totaranui, 600 m, *Podocarpus* forest, 5 Dec 1980, NV&W; 2, Upper Takaka R., asbestos mine track, 700 m, mixed *Nothofagus* forest, 2 Dec 1980, NV&W; 1, Whangamoia Saddle, 27 Jan – 3 Feb 1979, *Nothofagus* forest, AKW & LAM. **BR** – 2, St Arnaud, 600 m, *Nothofagus* forest, 9 Dec 1980, NV&W. **NC-MC** – 1, Mt Murchison, 4000' [1200 m], swept cushion grass, 21 Nov 1971, EWV. **OL** – 6, same data as holotype. **FD** – 1, L. Monowai, ex leaf mould, 27 Feb 1962, JIT.

**Material examined.** Type series only (NZAC, BMNH, CNCI).

TO / NN, BR, NC-MC, OL, FD.

Collected at altitudes up to 1200 m (NC-MC, Mt Murchison).

Habitats noted: *Nothofagus* forest, broadleaf, and *Podocarpus totara*; *Podocarpus* forest; cushion grass; leaf mould.

Adults have been collected in January, February, November, and December.

**Biology.** Unknown.

**Remarks.** *A. proximus* is very close to *A. pilosus*, and was at first considered to be a form of it. However, sculpture, wing setation, and infuscation are consistently different between the two, and no intermediate forms have been noted, even from localities where both species occur together (Lake Hawea and St Arnaud).

In some instances *proximus* might be confused with *variabilis*, but it can be distinguished reliably by having a yellow base to the tegula, relatively lower placement of the antennal torulus, and relatively longer antennal radicle. In *variabilis* the tegula is completely brown, the antennal torulus is generally separated from the mouth margin by at least about its own length, and the antennal radicle is shorter than the torulus.

### *Adelencyrtoides similis* new species

Figures 60–62

**Female.** Length range 0.92–1.49 mm ( $n = 100$ ).

**Holotype.** Length 1.16 mm. Frontovortex more or less black, with a slight dark blue sheen; a metallic purple band across face immediately above scrobes, and below this metallic green; gena and mouth margin coppery purple; antenna dark brown, but extreme apex of scape testaceous, 6th funicle segment yellow, and 5th yellowish-brown; pronotum dark purplish brown; mesoscutum dull metallic dark green; tegula completely brown; scutellum dull metallic green with a distinct coppery sheen, its extreme apex green; sides of thorax and coxae dark purplish brown; legs mostly dark brown, but extreme apices of femora and tibiae testaceous yellow, and middle tibia more broadly so distally; fore tarsus brown; middle tibial spur and middle and hind tarsi, except 5th joint, yellow-amber; forewing more or less hyaline, but slightly infuscate near base and across wing from marginal vein; head and thorax covered with inconspicuous dark brown setae; sides of propodeum outside spiracle metallic green; gaster dark purplish brown, its basal tergite and to some extent sternites with a metallic green sheen.

**HEAD** in profile with frontovortex convex, its tangent forming an angle of about  $95^\circ$  with face. Ocelli forming an angle of a little less than  $90^\circ$ . Eye reaching occipital margin. Antennal torulus separated from mouth margin by about two-thirds its own length and from other torulus by slightly more than its own length, its upper margin well below lower margin of eye. Sculpture of frontovortex shallow, raised, regular, reticulate, very similar on lower parts of face and on gena, but on interantennal prominence squamiform-reticulate. Setae on frontovortex about as long as the diameter of an ocellus, those on interantennal prominence about  $1.5\times$  as long; eye with relatively sparse, not very conspicuous hairs, each about as long as the diameter of a facet. Mandible as in Figure 60. Relative dimensions: head length 65, width 78, depth 36; minimum frontovortex width 31; eye length 42, width 35; malar space 28; OPL 4; POL 15; OOL 4; scape length 33, maximum width 8; other proportions of antenna as in Figure 61.

**THORAX.** Dorsum with sculpture similar to that on frontovortex but shallower, less regular, and slightly squamiform; mesopleurum similar, but sculpture finer and much smoother; propodeum almost smooth medially and with deeper, irregular sculpture around spiracle. Setae on dorsum moderately dense, about  $1.5\times$  as long as those on vertex; setae on apex of scutellum about  $3.0\text{--}4.0\times$  as long as those on vertex; sides of propodeum outside

spiracle with about 3 or 4 inconspicuous translucent setae, these not extending down sides; metapleurum without setae. Scutellum with several curious, corpuscle-like structures internally along sides, visible on cleared, slide-mounted specimens. Middle tibia with spur very slightly shorter than basal tarsal segment. Forewing with linea calva not interrupted. Relative dimensions: forewing length 221, width 95, venation and setation similar to Figure 62; hindwing length 145, width 43, marginal fringe 5.

**GASTER** about three-quarters as long as thorax. Ovipositor hardly exerted. Hypopygium reaching slightly more than three-quarters along gaster.

**Paratype.** Relative lengths: ovipositor 81; gonostylus 20; last tergite 49; middle tibia 78. Last tergite of gaster with apex broadly rounded.

**Variation.** Colour varying very little, though in some specimens forewings almost completely hyaline, and mesoscutum occasionally dark purple. Antennal segments varying in relative length: scape about 4.0–5.0× as long as broad; 1st and 6th funicle segments from about as long as broad to about 1.3×, the other segments varying accordingly. Frontoververtex width about half to one-third head width. Ovipositor about 1.0–1.3× as long as middle tibia and about 3.5–4.5× as long as gonostyli. Linea calva of forewing occasionally interrupted by a single seta.

**Male.** Unknown.

**Type data.** **Holotype** female: New Zealand, WN, Tararua Forest Park (south), 750 m, mixed *Podocarpus*, 1 March 1981, J.S. Noyes (NZAC).

**Paratypes** (117 females). **AK** – 1, Huia, ex eriococcid on *Cyathodes fasciculatum*, 12 Sep – 19 Oct 1980, CFB; 1, Lynfield, Nov 1980, GK; 4, Waitakere Range, Nov 1980 (1), Dec 1980 (1), and Jan 1981 (2), JSN. **CL** – 1, The Aldermen, Ruamahuanui I., litter 72/203, 14 Nov 1972, GWR. **TO** – 1, Tongariro National Park, Chateau Tongariro, 950 m, *Nothofagus* forest, 23 Feb 1981, JSN; 16, Tongariro N.P., 5 km N of Okahune, 700 m, mixed *Podocarpus*, 24 Feb (15) and 22 Mar 1981, JSN. **WI-WN** – 1, Palmerston North, Munro's bush, Feb 1981, PW. **WN** – 2, Stokes Valley, beaten from foliage, 30 Dec 1958, BAH; 12, same data as holotype; 7, Tararua Range, Clouston Park, 600 m, 2 Mar 1981, JSN.

**NN** – 1, Whangamoia Saddle, *Nothofagus* and *Podocarpus* forest, 13 Dec 1980, NV&W. **MB** – 1, Pelorus Bridge, *Podocarpus* forest, 13 Dec 1980, NV&W; 1, Pelorus Bridge, mixed *Podocarpus* and *Nothofagus*, 4 Mar 1981, JSN. **BR** – 1, L. Rotoiti, Malaise trap by forest stream, 4–9 Feb 1978, S&JP; 1, L. Rotoroa, 11 Dec 1980, NV&W; 15, L. Roto-

roa, mixed *Podocarpus* and *Nothofagus*, 5 Mar 1981, JSN. **WD** – 1, Hokitika, L. Mahinapua Reserve, *Podocarpus* bog, 26–30 Jan 1978, S&JP; 1, 7.7 km SE of Kumara, 90 m, *Podocarpus* and broadleaf, 8–22 Feb 1980, AN & MT; 7, L. Paringa, mixed *Podocarpus* and *Nothofagus*, 15 Mar 1981, JSN; 10, L. Mahinapua, mixed broadleaf and *Nothofagus*, 17 Mar 1981, JSN; 9, L. Kanierie, mixed *Podocarpus*, 18 Mar 1981, JSN. **MC** – 1, Mt Algidus, tin trap, 18 Mar 1965. **SC** – 1, Waimate, Kelsey's Bush, 700' [210 m], ex leaf litter, 20 Jan 1966, JIT. **OL** – 1, Kirk's [Kidd's] Bush, L. Hawea, *Nothofagus* forest, broadleaf, and *P. totara*, Jan 1981, N&V; 1, Mt Aspiring National Park, Makarora, *Nothofagus* and *Podocarpus*, 13 Mar 1981, JSN; 1, Mt Aspiring N.P., Makarora, *Nothofagus* and *Podocarpus*, 13 Mar 1981, JSN; 1, Mt Aspiring N.P., 12 km N of Makarora, *Nothofagus* and *Podocarpus*, 14 Mar 1981, JSN. **CO** – 1, Cromwell Gorge, 2 km SE of Cromwell, litter 74/89, 21 Nov 1974, JCW.

**SI** – 1, Rakeahua Camp, 11 Feb 1968, EWV; 2, [Paterson Inlet], S.W. Arm, general sweeping, 23 Feb 1968, EWV; 6, Mason Bay, 26 Feb 1968, EWV.

**Material examined.** Type series only (NZAC, BMNH, CNCI, USNM, UCRC, PPRI, ZILR, ANIC).

**AK, CL, TO, WI, WN / NN, MB, BR, WD, MC, SC, OL, CO / SI.**

Collected from around sea level up to about 750 m (WN, Tararua Forest Park).

Habitats noted: *Nothofagus*, broadleaf, and *Podocarpus totara*; mixed *Podocarpus* and *Nothofagus*; *Podocarpus* and broadleaf; *Podocarpus* bog; *Cyathodes fasciculata*.

Adults have been collected in January–March and October–December.

**Biology.** Reared from an unidentified eriococcid (Homoptera: Eriococcidae) on *Cyathodes fasciculata*.

**Remarks.** *A. similis* is superficially very similar to *A. otago* (see Remarks under that species). It is closest to *suavis*, but can be separated by the key characters.

### *Adelencyrtoides suavis* new species

Figures 63–65

**Female.** Length range 0.70–1.03 mm ( $n = 6$ ).

**Holotype.** Length 0.9 mm. Frontoververtex more or less black, with a slight dark blue sheen; a metallic purple band across face immediately above scrobes,

below this bright metallic green, then a second, less conspicuous purple band immediately above antennal toruli, and below this bright green; mouth margin and gena coppery; antenna dark brown, but 6th funicle segment yellow; pronotum and mesoscutum dark brown with a very slight brassy lustre; tegula brown; scutellum dark purplish brown, hardly lustrous, with a bright metallic green subapical band contrasting with extreme apex, which is shining purple and blue (visible only from some angles of view); sides of propodeum outside spiracle metallic green; thorax and coxae dark purplish brown; legs mostly dark brown, but extreme apices of middle and hind femora and tibiae testaceous yellow; fore tarsus brown; middle tibial spur and middle and hind tarsi, except 5th joint, yellow-amber; forewing more or less hyaline, but slightly infuscate near base and across wing from marginal vein; head and thorax covered with inconspicuous dark brown setae; gaster dark purplish brown, its basal tergite and to some extent sternites with a metallic green sheen.

**HEAD** in profile with frontovertex convex, its tangent forming an angle of about 90° with face. Ocelli forming an angle of a little less than 90°. Eye reaching occipital margin. Antennal torulus separated from mouth margin by about its own length and from other torulus by about twice its own length, its upper margin well below lower margin of eye. Sculpture on frontovertex shallow, raised, regular, reticulate, on lower parts of face and gena squamiform-reticulate, becoming much shallower towards mouth margin. Setae on frontovertex about as long as the diameter of an ocellus, those on interantennal prominence about 1.5× as long; eye with relatively sparse, inconspicuous hairs about as long as the diameter of a facet. Mandible as in Figure 63. Relative dimensions: head length 50, width 63, depth 28; minimum frontovertex width 23; eye length 30, width 29.5; malar space 23; OPL 3; POL 13; OOL 2.5; scape length 25.5, maximum width 7; other proportions of antenna as in Figure 64.

**THORAX.** Sculpture on mesoscutum squamiform-reticulate, shallower and of larger mesh than that on frontovertex; scutellum similar, but sculpture deeper and of smaller mesh; extreme apex of scutellum very polished; mesopleurum with very shallow, irregular sculpture; propodeum with several irregular, very shallow carinae medially, but laterally around spiracle with deeper, irregular reticulate sculpture. Setae on dorsum of thorax moderately dense, about 1.5× as long as those on vertex; setae on apex of scutellum about 3.0× as long as those on vertex; sides of propodeum outside spiracle with about 2 or 3 inconspicuous translucent setae, these not extending down sides; metapleurum without any setae. Scutellum without internal

structures like those found in *similis*. Middle tibia with spur very slightly shorter than basal tarsal segment. Forewing with linea calva interrupted by 1 or 2 lines of setae. Relative dimensions: forewing length 163, width 73, venation and setation similar to Figure 65; hindwing length 115, width 31, marginal fringe 6.

**GASTER** about four-fifths as long as thorax. Ovipositor hardly exerted. Hypopygium reaching about three-quarters along gaster.

**Paratype.** Relative lengths: ovipositor 58; gonostylus 14.5; last tergite 42; middle tibia 73. Last tergite of gaster with apex broadly rounded.

**Variation.** Middle leg sometimes paler than in holotype, with femur broadly testaceous apically and tibia with a broad, testaceous band medially.

**Male.** Unknown.

**Type data.** **Holotype** female: New Zealand, NN, Kaihoka Lakes, coastal forest, 4 December 1980, J.S. Noyes, E.W. Valentine, & A.K. Walker (NZAC).

**Paratypes** (8 females). NN – 1, same data as holotype. BR – L. Rotoroa, mixed *Podocarpus* and *Nothofagus*, 5 Mar 1981, JSN. WD – 1, L. Paringa, mixed *Podocarpus* and *Nothofagus*, 15 Mar 1981, JSN. SL – 3, Invercargill, ex ?*Ctenochiton* sp. on *Wintera colorata*, Jan 1961, EWW.

**Material examined.** Type series only (NZAC, BMNH).

— / NN, BR, WD, SL.

Habitats noted: coastal forest; lakeside *Nothofagus* and *Podocarpus*; *Pseudowintera colorata*.

Adults have been collected in March and December.

**Biology.** Reared from a scale, probably *Ctenochiton* sp. (Homoptera: Coccidae), on *Pseudowintera colorata*.

**Remarks.** *A. suavis* is superficially very similar to *A. otago* (see Remarks under that species). It is closest to *similis*, but in addition to the key characters it can be separated by its lack of the curious, corpuscle-like structures found internally, along the sides of the scutellum, in *similis*.

### *Adelencyrtoides tridens* new species

Figures 66–70

**Female.** Length range about 0.90–1.27 mm ( $n = 2$ ).

**Holotype.** Length 1.27 mm. Head and dorsum of thorax very dark green, slightly lustrous, but

anterior to ocelli coppery, and below this coppery purple; antenna dark brown; posterior margin of pronotum purplish; scutellum very slightly purplish; tegula, sides of thorax, and coxae dark brown; legs mostly dark brown, but extreme apices of femora and tibiae except hind tibia slightly testaceous; fore tarsus brown; middle tibia more or less testaceous yellow, with a broad, inconspicuous, brownish band medially; middle tibial spur and middle and hind tarsi, except 5th joint, pale orange-brown; forewing more or less hyaline, but slightly infusate near base and across wing from marginal vein, with dark brown venation; head and thorax covered with inconspicuous dark brown setae; gaster dark purplish brown, its basal tergite with a metallic green sheen.

HEAD in profile with frontovertex convex, its tangent forming an angle of about  $100^\circ$  with face. Ocelli forming an angle of about  $90^\circ$ . Eye not quite reaching occipital margin. Antennal torulus separated from mouth margin and from other torulus by a little more than its own length, its upper margin well below lower margin of eye. Sculpture on frontovertex shallow, raised, very irregular, reticulate, very similar on lower parts of face, but on gena longitudinally elongate, shallow; interantennal prominence with squamiform-reticulate sculpture. Setae on frontovertex about as long as the diameter of an ocellus, those on interantennal prominence about  $1.5\times$  as long; eye with relatively dense, fairly conspicuous hairs slightly longer than the diameter of a facet. Mandible as in Figure 66. Relative dimensions: head length 67, width 78, depth 39; minimum frontovertex width 40; eye length 37, width 33; malar space 31; OPL 6; POL 21; OOL 7; scape length 33, maximum width 7; other proportions of antenna as in Figure 67.

THORAX. Dorsum with fairly regular, squamiform-reticulate sculpture about as deep as that on frontovertex; sculpture on scutellum gradually becoming shallower towards apex; mesopleurum similar, but sculpture shallower and much smoother, almost totally smooth posteriorly; propodeum medially with very conspicuous, irregular, raised, reticulate sculpture; sculpture around spiracle very similar, extending down sides of propodeum towards hind coxa. Setae on dorsum moderately dense, about twice as long as those on vertex; setae on apex of scutellum about  $2.0\text{--}3.0\times$  as long as those on vertex; sides of propodeum outside spiracle with several very inconspicuous, short, dark brown setae extending downwards nearly to hind coxa; metapleurum without any setae. Middle tibia with spur very slightly shorter than basal tarsal segment. Forewing with linea calva not interrupted. Relative dimensions: forewing length 223, width 100, venation and setation similar to Figure

68; hindwing length 147, width 45, marginal fringe 5.

GASTER about three-quarters as long as thorax. Ovipositor hardly exerted. Hypopygium very nearly reaching apex of gaster, produced posteriorly into 3 lobes, one medially and the others laterally (Figure 69).

**Paratype.** Relative lengths: ovipositor 77; gonostylus 20; last tergite 40; middle tibia 82. Last tergite of gaster with apex rounded. Ovipositor (Figure 70) with outer plates relatively broad.

**Variation.** Very little in the two specimens at hand.

**Male.** Unknown.

**Type data.** **Holotype** female: New Zealand, OL [*sic*; should be SL], Owaka, Malaise trap in *Nothofagus* bush, 13–20 January 1978, S. & J. Peck (NZAC).

**Paratype:** 1 female, CO, Old Man Range, Obelisk, 1829 m, 15 Feb 1978, GWR (BMNH).

**Material examined.** Type specimens only.

**Biology.** Unknown.

**Remarks.** The very broad outer plates of the ovipositor, three-lobed hypopygium, and relatively wide frontovertex readily distinguish *A. tridens* from all other species included in *Adelencyrtoides*. Further material may reveal the same degree of variation in forewing venation as is found in congeners, and hence the presence of a short postmarginal vein may not be a reliable distinguishing character.

### *Adelencyrtoides unicolor* new species

Figures 71–77

**Female.** Length range 0.79–1.59 mm ( $n = 105$ ).

**Holotype.** Length 1.30 mm. Frontovertex dull, metallic dark green; area between posterior ocelli and occipital margin dark blue; a very narrow, dark blue band across frontovertex immediately above antennal scrobes, and a slightly broader one immediately above toruli, continued on to genae; temples dark blue; mouth margin green; antenna dark brown, the scape very slightly metallic; dorsum of thorax dark brown, with a dull metallic blue sheen and slight brassy reflections; extreme apex of scutellum metallic purple; sides of thorax dark brown; propodeum immediately below spiracle metallic brownish purple, with a slight brassy sheen; coxae dark brown; fore and hind femora and tibiae dark brown, their extreme apices slightly testaceous; middle leg mostly testaceous mixed with

dark brown, especially on tibia; fore tarsus brown; middle tibial spur and middle and hind tarsi yellow-amber, but apical segments dark brown; forewing hyaline, slightly infusate below marginal vein; head and thorax covered with inconspicuous dark brown setae; gaster dark purplish brown, its basal tergites and venter greenish; exerted part of gonostyli honey yellow.

**HEAD** in profile with frontovertex distinctly convex, its tangent forming an angle of about  $100^\circ$  with face. Ocelli forming an angle of about  $80^\circ$ . Eye reaching occipital margin. Antennal torulus separated from mouth margin by about half its own length and from other torulus by about  $1.3\times$  its own length, its upper margin clearly below lower margin of eye. Sculpture on frontovertex moderately deep, raised, regular, reticulate, on lower parts of face similar but very much shallower; gena with more longitudinally elongate sculpture. Setae on frontovertex about as long as the diameter of an ocellus, on interantennal prominence about  $1.5\times$  as long; eye with moderately dense, short hairs about as long as the diameter of a facet. Mandible as in Figure 71. Relative dimensions: head length 60, width 72, depth 36; minimum frontovertex width 23; eye length 41, width 34; malar space 26; OPL 4; POL 12.5; OOL 3; scape length 40, maximum width 7.5; other proportions of antenna as in Figure 74.

**THORAX.** Sculpture on dorsum shallow, raised, reticulate, on mesopleurum shallow, fairly regular, reticulate; propodeum with some shallow, irregular sculpture medially, more roughly sculptured around spiracle. Setae on dorsum moderately dense, inconspicuous, about  $1.5\times$  as long as those on vertex; setae at apex of scutellum about  $3.0\times$  as long those on vertex; propodeum outside spiracle with only 4 or 5 translucent setae, these not extending down sides. Middle tibia with spur a little shorter than basal tarsal segment. Forewing with linea calva not interrupted. Relative dimensions: forewing length 198, width 87, venation and setation similar to Figure 75; hindwing length 145, width 44, marginal fringe 5.5.

**GASTER**, including ovipositor, about as long as thorax. Exserted part of ovipositor about one-sixth as long as gaster. Hypopygium reaching about two-thirds along gaster.

**Paratype.** Relative lengths: ovipositor 151; gonostylus 49; last tergite 62; middle tibia 99. Last tergite of gaster with apex more or less pointed.

**Variation.** Band across top of antennal scrobes occasionally coppery, the one below sometimes missing; behind ocelli sometimes greenish; occasionally head almost entirely blue, particularly on frontovertex; antennal flagellum occasionally brownish testaceous; middle tibia and femur some-

times completely dark brown or almost totally yellowish; forewing sometimes lightly infusate proximad of apex of venation. Antennal segments varying in relative breadth: scape about  $5.0\text{--}6.5\times$  as long as broad; 1st funicle segment  $1.0\text{--}2.0\times$  as long as broad, 6th  $1.0\text{--}1.5\times$ , other segments varying accordingly (Figures 72–74); frontovertex about half to one-third as wide as head; relative proportions of forewing venation fairly constant; ovipositor about  $1.2\text{--}1.6\times$  as long as middle tibia and about  $4.0\text{--}5.0\times$  as long as gonostylus.

**Male.** Length range 0.68–1.43 mm ( $n = 17$ ).

Generally very similar to female, except for relatively wider frontovertex, structure of antennae (Figure 76), and genitalia (Figure 77). Bifurcating setae present on all flagellar segments. Relative dimensions, paratype 1 (card-mounted): head width 74; minimum frontovertex width 37; eye length 35, maximum width 28; malar space 21; OPL 2.5; POL 19.5; OOL 4; scape length 23, maximum width 7.5. Relative lengths, paratype 2 (slide-mounted): aedeagus 62; middle tibia 88.

**Variation.** Some variation in coloration as in females. Sixth segment of funicle sometimes distinctly transverse, with other segments correspondingly shorter. Aedeagus occasionally a little more than three-quarters as long as middle tibia.

**Type data.** **Holotype** female: New Zealand, OL, Makarora West, S of [Mt Aspiring] National Park, *Nothofagus* forest, *Coprosma*, and *Pseudowintera*, swept, 18 January 1981, J.S. Noyes & E.W. Valentine (NZAC).

**Paratypes** (113 females, 19 males). **ND** – 2 females, 1 male, Poor Knights Is, Tawhiti Rahi, Dec 1980, 1♀ off pohutukawa infested with *Anoplaspis metrosideri* Maskell + *Lechanochiton* sp. + *Paracoccus morrisoni* Brittin, CFB, 1♀, ♂ sweeping, MFT. **AK** – 2 females, Orewa, on pohutukawa, Feb 1960, EWW; 1 male, Waitakere, ex pseudococcids on *Olearia furfuracea*, 4 Sep 1968, RAC; 1 female, Cornwallis Beach, Aug 1980, JSN; 2 females, 1 male, Titirangi, Malaise trap in garden, Sep (1♀) and Oct 1980, GWR; 5 females, Waitakere Range, Sep 1980 (2), Oct 1980 (2), and Jan 1981, JSN; 1 male, Birkenhead, Malaise trap in second-growth bush, Nov 1980, JFL. **CL** – 1 male, 9 km E of Tapu, 15 Nov 1980, JSN. **TO** – 1 male, Kaimanawa Forest Park SSE of Taupo (Mill Rd), *Nothofagus*, AN & MT; 1 female, Tongariro National Park, Chateau Tongariro, 950 m, *Nothofagus* forest, 23 Feb 1981, JSN; 2 females, Tongariro N.P. 5 km N of Okahune, 700 m, mixed *Podocarpus*, 24 Feb 1981, JSN. **WN** – 1 female, Tararua Range, 600 m, Clouston Park, 2 Mar 1981, JSN.

NN – 3 females, Collins Valley, on *Fuchsia excorticata*, 23 Jan 1962, EWW; 1 female, Wangapeka, ex scale on *Raoulia ?australis tenuicaulis*, 15 Aug 1968, JSD; 2 females, Nelson, Top House, ex *Madarococcus* on *Nothofagus fusca*, 24 Mar 1972, JSD; 1 female, Lee Valley, beating *Leptospermum* foliage, 22 Mar 1977, AKW; 3 females, Whangamoia Saddle, Malaise trap, 1–3 Feb 1978, S&JP; 1 female, Cobb Reservoir, 31 Jan 1979, LAM; 3 females, Cobb Ridge, 1100 m, alpine *Nothofagus* forest, 4 Dec 1980, NV&W; 1 female, Cobb Reservoir, 850 m, mixed native grassland, 6 Dec 1980, NV&W; 1 female, Eve's Valley, *Podocarpus* forest, 8 Dec 1980, NV&W. NN-MB – 2 females, Mt Fell, 13 Mar 1969, EWW. MB – 2 females, 1 male, Pelorus Bridge, *Podocarpus* forest, 13 Dec 1980, NVW; 1 female, Red Hills, Wairau, 3670' [1100 m], swept red tussock, 23 Mar 1972, EWW; 1 female, Pelorus Bridge, mixed *Podocarpus* and *Nothofagus*, 4 Mar 1981, JSN. BR – 3 females, Mt Robert, swept grasses, 7 Nov 1971, EWW; 1 female, 1 male, Mt Robert, swept beech, 7 Mar 1972, PAH; 5 females, 1 male, L. Rotoiti, Malaise trap at edge of *Nothofagus* forest, 600 m, Nov 1980 (1♀, ♂), Dec 1980 (1♀), Jan 1981 (2♀), and Mar 1981 (1♀), FD; 4 females, St Arnaud, 600 m, *Nothofagus* forest, 9 Dec 1980, NV&W; 3 females, Mt Robert, *Nothofagus* forest and grass, 600–1400 m, 10 Dec 1980, NV&W; 3 females, L. Rotoroa, 11 Dec 1980, NV&W. WD – 1 female, Hokitika, L. Mahinapua Reserve, 20 m, *Podocarpus* bog, Malaise trap, 26–30 Jan 1978, S&JP; 3 females, 15 km W of Haast, *Nothofagus*, mixed broadleaf, and *Podocarpus*, 14 Mar 1981, JSN; 1 female, L. Paringa, mixed *Podocarpus* and *Nothofagus*, 15 Mar 1981, JSN; 2 females, L. Kanieri, mixed *Podocarpus*, 18 Mar 1981, JSN. MC – 4 females, Banks Peninsula, Price's Valley, Malaise trap at edge of native bush, Nov 1980 (1) and Mar 1981 (3), RPM. MK – 1 female, L. Tekapo, Malaise trap in tussock near pine plantation, Nov 1980, PQ. OL – 3 females, 2 males, Makarora, Malaise trap, *Nothofagus* forest edge, 21–24 Jan 1978, S&JP; 1 female, Dart Hut, Malaise trap in bush, 13–14 Feb 1980, JSD; 2 females, Coronet Peak, tussock, alpine shrubs, *Hebe*, and mat plants, 1640 m, Jan 1981, N&V; 1 male, Kinloch State Forest, Dart R., *Nothofagus* forest, grass, broadleaf, and *P. totara*, Jan 1981, N&V; 6 females, L. Hawea, Kirk's [Kidd's] Bush, *Nothofagus* forest, broadleaf, and *P. totara*, Jan 1981, N&V; 29 females, 7 males, Makarora West, S of [Mt Aspiring] National Park, *Nothofagus* forest, *Coprosma*, and *Pseudowintera*, 18 Jan 1981, N&V; 4 females, Mt Aspiring N.P., Makarora, *Nothofagus*, *Podocarpus*, and broadleaf, 25 Jan 1981, N&V; 3 females, Mt Aspiring N.P., Makarora, *Nothofagus*

and mixed *Podocarpus*, 14 Mar 1981, JSN; 1 female, Mt Aspiring N.P., 12 km N of Makarora, *Nothofagus* and mixed *Podocarpus*, 14 Mar 1981, JSN. CO – 1 female, Kawarau Gorge, Roaring Meg, 490 m, Malaise trap, 7–12 Mar 1979, JCW. FD – 1 female, Barrier R., Little Red Hills, beating *Nothofagus*, 1067 m, 2 Feb 1975, GWR. SL – [Invercargill], Queen's Garden, ex mealybug on *Alectryon excelsus*, 1 Dec 1967, EWW.

SI – 2 males, Freshwater, 25 Feb 1968, EWW.

**Material examined.** Type series only (NZAC, BMNH, CNCI, USNM, UCRC, PPRI, ZILR, ANIC).

ND, AK, CL, TO, WN / NN, MB, BR, WD, MC, SC, OL, CO, FD, SL / SI.

Recorded from about sea level to 1100 m (NN, Cobb Ridge).

-Habitats noted: *Nothofagus*; mixed broadleaf; mixed *Podocarpus*; *Podocarpus totara*; *Podocarpus* bog; pohutukawa [*Metrosideros excelsa*]; *Coprosma* and *Pseudowintera*; *Alectryon excelsus*; *Leptospermum*; *Olearia furfuracea*; *Fuchsia excorticata*; *Raoulia*; second-growth bush; garden; tussock near pine plantation; native grassland; red tussock; native grassland; tussock, alpine shrubs, *Hebe*, and mat plants.

Adults have been collected in January–March and September–December.

**Biology.** Reared from *Madarococcus* sp. (Homoptera: Eriococcidae) on *Nothofagus fusca*, and from pohutukawa infested with *Anoplaspis metrosideri* Maskell (Homoptera: Diaspididae), *Lechanochiton* sp. (Homoptera: Coccidae), and *Paracoccus glaucus* (Maskell) (Homoptera: Pseudococcidae). Also from an unidentified scale on *Raoulia ?australis* or *R. ?tenuicaulis* which was also parasitised by *Adelencyrtoides otago*, and from *Ctenochiton viridis* (Homoptera: Coccidae) which was also parasitised by *Adelencyrtoides inconstans* and *A. variabilis*. The wide range of hosts, and the fact that this species has been reared at the same time as others of the genus, suggests that it may be hyperparasitic.

**Remarks.** *A. unicolor* is a fairly distinctive species, the female being recognised by the relatively long antennal segments, distribution of setae in the basal cell, weakly metallic thorax, and distinctly exerted ovipositor with pale-coloured gonostyli. The male can be recognised by the bifurcating setae on all flagellar segments.

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## *Adelencyrtoides variabilis* new species

Figures 78–89

**Female.** Length range 0.79–1.59 mm ( $n = 302$ ).

**Holotype.** Length 1.14 mm. Head dark metallic green, but blue between ocelli and occipital margin, between top of antennal scrobes and toruli, and on temples; antenna with scape, pedicel, and club dark brown, flagellum and radicle testaceous brown; pronotum green, with purplish reflections; mesoscutum metallic green, with brassy and some purplish and bluish reflections; scutellum darker green, slightly coppery and brassy; tegula dark brown; sides of thorax, coxae, and propodeum dark brown; sides of propodeum outside spiracle metallic blue; fore and hind femora and tibiae mostly dark brown, but apices testaceous yellow, more broadly so on foreleg; fore tarsus testaceous brown; middle leg mostly testaceous, but on femur slightly mixed with dark brown, and tibia broadly dark brown in proximal half; middle tibial spur and middle and hind tarsi yellowish; apical segment of tarsi dark brown; extreme apex of scutellum dark metallic blue; forewing almost hyaline, but lightly infuscate across wing from below distal two-thirds of submarginal vein to apex of venation; head and thorax covered with inconspicuous dark brown setae; gaster dark purplish brown, its basal tergite slightly greenish.

**HEAD** in profile with frontovertex distinctly convex, its tangent forming an angle of about  $100^\circ$  with face. Ocelli forming an angle of about  $80^\circ$ . Eye more or less reaching occipital margin. Antennal torulus separated from mouth margin and from other torulus by slightly more than its own length, its upper margin clearly below lower margin of eye. Sculpture on frontovertex shallow, raised, irregular, reticulate, on interantennal prominence similar but very much shallower, and on genae longitudinally elongate squamiform-reticulate. Setae on frontovertex about as long as the diameter of an ocellus, those on interantennal prominence about  $1.5\times$  as long; eye with fairly dense, short hairs each about as long as the diameter of a facet. Mandible as in Figure 78. Relative dimensions: head length 58, width 69, depth 37; minimum frontovertex width 26; eye length 37, width 31; malar space 27; OPL 7; POL 12; OOL 3.5; scape length 28, maximum width 8; other proportions of antenna as in Figure 80.

**THORAX.** Sculpture on mesoscutum shallow, raised, squamiform-reticulate to almost reticulate, on scutellum deeper, more regular, reticulate, and on mesopleurum shallow, irregular, reticulate; propodeum more or less smooth medially but with some irregular, shallow carinae, and more roughly sculptured around spiracle. Setae on dorsum

moderately dense, inconspicuous, subequal in length, about  $1.5\times$  as long as those on vertex; setae at apex of scutellum about  $3.0\text{--}4.0\times$  as long as those on vertex; propodeum outside spiracle with only 3 or 4 translucent setae, these not extending down sides. Middle tibia with spur a little shorter than basal tarsal segment. Forewing with linea calva interrupted by a single seta. Relative dimensions: forewing length 214, width 93, venation and setation similar to Figures 82 and 83; hindwing length 138, width 40, marginal fringe 6.

**GASTER** about three-quarters as long as thorax. Ovipositor not exerted. Hypopygium (Figure 85) reaching about three-quarters along gaster.

**Paratype.** Relative lengths: ovipositor 75; gonostylus 17; last tergite 58; middle tibia 91. Last tergite of gaster with apex broadly rounded.

**Variation.** Smaller specimens tending to be more extensively blue, or even purplish, larger ones more extensively green; a few specimens with tegulae partly yellowish; antenna often completely dark brown, or sometimes 5th and 6th funicle segments conspicuously paler; legs sometimes darker than in holotype, but middle femur generally distinctly paler than tibia; forewing in smaller specimens often hyaline, and in larger specimens often more distinctly infuscate than in holotype (Figures 82 and 84). Scape variable, about  $4.0\text{--}5.0\times$  as long as broad; 1st funicle segment about  $1.0\text{--}1.5\times$  as long as broad, half to three-quarters as long as pedicel, 6th segment generally slightly transverse or quadrate, other segments varying accordingly (Figures 79–81). Frontovertex half to one-third as wide as head, with POL:OOL and other proportions of head varying accordingly. Sculpture of mesoscutum occasionally much shallower than in holotype. Forewing in some specimens with postmarginal vein only about as long as stigmal vein, but as a rule considerably longer; linea calva usually uninterrupted by setae. Ovipositor from about three-quarters as long as middle tibia and  $4.0\times$  as long as gonostyli (larger specimens) to  $1.3\times$  as long as middle tibia and  $5.5\times$  as long as gonostyli (smaller specimens).

**Male.** Length range 0.88–1.24 mm ( $n = 23$ ).

Similar to female, but darker and less metallic. Generally dark purplish brown, with slight bluish and brassy reflections; face metallic green, but mouth margin and gena coppery; forewing hyaline. Mandible as in Figures 86 and 87. Clava with bifurcating setae in distal half (Figure 88). Genitalia as in Figure 89. Relative dimensions, paratype 1 (card-mounted): head width 70; minimum frontovertex width 37; eye length 33, maximum width 26; malar space 26; OPL 5; POL 17.5; OOL 5; scape

length 23.5, maximum width 8. Relative lengths, paratype 2 (slide-mounted): aedeagus 43; middle tibia 101.

**Variation.** Very little in the material available.

**Type data.** **Holotype** female: New Zealand, OL, Kirk's [Kidd's] Bush, Lake Hawea, *Nothofagus*, broadleaf, and *P. totara*, January 1981, J.S. Noyes & E.W. Valentine (NZAC).

**Paratypes** (342 females, 29 males). **ND** – 1 female, Ngaiotonga Forest, sweep, 29 Feb 1960, RAC; 1 female, Glenbervie, *Podocarpus totara*, swept, 24 Jul 1980, EWV; 2 females, Omahuta State Forest, 6 Oct 1980, JSN; 2 females, Waipu Cove, 7 Oct 1980, JSN; 1 female, Poor Knights Is, Tawhiti Rahi, sweeping, Dec 1980, MFT. **AK** – 3 females, Ponui I., ?*Trioza irregularis* on *Neopanax colensoi*, 10 Jun 1967, DBM; 1 female, Lynfield, Tropicana Drive, 8 Feb 1976, GK; 1 female, Lynfield, Feb 1981, GK; 1 female, Huia, Aug 1980, BMM; 4 females, Huia, Malaise trap in bush, Dec 1980 (2), Jan 1981 (1), and Mar 1981 (1), BMM; 32 females, 5 males, Birkenhead, Malaise trap in second-growth bush, Sep 1980 (3♀, 3♂), Oct 1980 (13♀), Nov 1980 (8♀, 2♂), Dec 1980 (7♀), and Jan 1981 (1♀), JFL; 15 females, 1 male, Waitakere Range, Sep 1980 (2♀, ♂), Oct 1980 (4♀), Nov 1980 (4♀), Dec 1980 (2♀), and Jan 1981 (3♀), JSN; 3 females, Titirangi, Malaise trap in garden, Oct 1980, PAM (1) and GWR (2). **CL** – 1 female, Kennedy Bay, Malaise trap, 7 May 1969, HAO; 2 females, Kauaeranga Valley, 14 Nov 1980 and 1 Feb 1981, JSN; 1 female, 9 km E of Tapu, 15 Nov 1980, JSN; 9 females, 1 male, 19 km E of Tapu, 31 Jan 1981, JSN. **TO** – 1 female, L. Taupo, *Ctenochiton viridis* mature ♀ on *Nothopanax arboreum*, 24 Jan 1966, AKW. **WN** – 5 females, Otaki Forks, ex *Inglisia* sp. on *Podocarpus totara*, 4 Oct 1980, CFB; 1 female, Rimutaka Forest Park (S), mixed *Podocarpus* and *Nothofagus*, 50 m, 28 Feb 1981, JSN; 1 female, Petone, Francis Bell Reserve, 50 m, mixed *Podocarpus* and *Nothofagus*, 28 Feb 1981, JSN; 3 females, 1 male, Rimutaka Forest Park (S), mixed *Podocarpus*, 1 Mar 1981, JSN; 1 female, Tararua Range, 600 m, Clouston Park, 2 Mar 1981, JSN.

**NN** – 3 females, 1 male, Nelson, ex *Ctenochiton perforatus* on *Pittosporum*, 20 Nov 1961, EWV; 1 female, Riwaka, on *Podocarpus totara*, 27 Aug 1962, DBR; 2 males, Whangamoa, ex *Ctenochiton* on *Griselinia littoralis*, 8 Oct 1962, EWV; 2 females, 4 males, Whangamoa, ex *Ctenochiton viridis* on *Griselinia littoralis*, 2 Nov 1964, EWV; 3 females, 3 males, Kaiteriteri, *Ctenochiton viridis* on *Nothopanax arboreum*, 4 Feb 1965, DBR; 2 females, Kaihoka Lakes, 10 Jan 1966, AKW; 1 female, L. Sylvester, Cobb, 1300 m, 31 Mar 1969, JSD; 1

female, Garden Valley [= Gardiner Gully], ex scale (near *Eriochiton*) on *Griselinia littoralis*, 20 Oct 1969, JAdEB; 2 females, Upper Takaka R., asbestos mine track, mixed *Nothofagus* forest, 700 m, 2 Dec 1980, NV&W; 2 females, Kaihoka Lakes, coastal forest, 4 Dec 1980, NV&W; 13 females, Farewell Spit, under *Leptospermum*, 4 Dec 1980, NV&W; 7 females, Totaranui, mixed *Podocarpus* forest, 600 m, 5 Dec 1980, NV&W; 1 female, Canaan Saddle, *Nothofagus* and mixed *Podocarpus*, 7 Dec 1980, NV&W; 3 females, Eve's Valley, *Podocarpus* forest, 9 Dec 1980, NV&W; 7 females, Whangamoa Saddle, *Nothofagus* and mixed *Podocarpus* forest, 13 Dec 1980, NV&W. **NN-MB** – 1 female, Mt Fell, 13 Mar 1969, EWV. **MB** – 1 female, Red Hills, Wairau, 3470' [1040 m], swept *Leptospermum*, 23 Mar 1972, EWV; 3 females, 1 male, Pelorus Bridge, ex *Ctenochiton viridis* on *Nothopanax arboreum*, 12 Feb 1962, EWV; 4 females, Pelorus Bridge, ex *Ctenochiton viridis* mature ♀ on *Nothopanax arboreum*, 12 Feb 1963, DBR; 6 females, 2 males, Pelorus Bridge, *Ctenochiton viridis* mature ♀ on *Nothopanax arboreum*, 6–8 Apr 1964, DBR; 13 females, Pelorus Bridge, *Podocarpus* forest, 13 Dec 1980, NV&W; 1 female, Pelorus Bridge, mixed *Nothofagus* and *Podocarpus*, 4 Mar 1981, JSN; 2 females, Pelorus Bridge, mixed *Podocarpus* and *Nothofagus*, 20 Mar 1981, JSN. **BR** – 3 females, Punakaiki, ex *Ctenochiton* sp., 23 Jan 1962, EWV; 1 female, W. Inangahua, Fletcher's Creek, 25 Jan 1972, JSD & HPM; 4 females, L. Rotoiti, 600 m, Malaise trap at edge of *Nothofagus* forest, Nov 1980 (1), Jan 1981 (2), and Mar 1981 (1), FD; 7 females, L. Rotoroa, 11 Dec 1980, NV&W; 73 females, 1 male, L. Rotoroa, mixed *Podocarpus* and *Nothofagus*, 5 Mar 1981, JSN. **WD** – 1 female, L. Paringa, mixed *Podocarpus* and *Nothofagus*, 15 Mar 1981, JSN; 7 females, L. Mahinapua, mixed broadleaf and *Nothofagus*, 17 Mar 1981, JSN; 8 females, L. Kaniere, mixed *Podocarpus*, 18 Mar 1981, JSN. **MC** – 4 females, Banks Peninsula, Price's Valley, Malaise trap at edge of native bush, Nov 1980 (2) and Apr 1981 (2), RPM. **MK** – 1 female, Mt Cook National Park, Tasman Valley, 1 km W of Unwin Hut, 2300' [690 m], low shrubs at *Nothofagus* wood margins, 30 Jan 1972, WJK & PSB. **OL** – 23 females, 8 males, L. Hawea, Kirk's [Kidd's] Bush, *Nothofagus*, broadleaf, and *P. totara*, Jan 1981, N&V; 3 females, Makarora West, S of [Mt Aspiring] National Park, *Nothofagus* forest, *Coprosma*, and *Pseudowintera*, 18 Jan 1981, N&V; 3 females, Mt Aspiring N.P., Makarora, *Nothofagus*, *Podocarpus*, and broadleaf, 25 Jan 1981, N&V; 1 female, Mt Aspiring N.P., Makarora, *Nothofagus* and mixed *Podocarpus*, 13 Mar 1981, JSN. **FD** – 2 females, Upper Pyke R., Simonin Creek, Malaise trap, 23

Jan - 1 Feb 1979, JSD; 1 female, Milford Sound, *Nothofagus* and mixed *Podocarpus*, 10 Mar 1981, JSN. SL - 4 females, 3 males, Invercargill, ex ?*Ctenochiton* sp. on *Wintera colorata*, Jan 1961, EWV; 4 females, Owaka, Malaise trap in *Nothofagus* bush, 13-20 Jan 1978, S&JP.

SI - 1 female, Rakeahua R., swept from low growth, 22 Feb 1968, EWV; 1 female, 1 male, Freshwater, 25 Feb 1968, EWV; 2 females, Mason Bay, 26 Feb 1968, EWV; 1 male, Thule, 28 Feb 1968, EWV.

**Material examined.** Type series only (NZAC, BMNH, CNCI, USNM, UCRC, ZILR, PPRI, ANIC).

ND, AK, CL, TO, WN / NN, MB, BR, WD, MC, MK, OL, FD, SL / SI.

Recorded from around sea level to about 1300 m (NN, L. Sylvester).

Habitats noted: broadleaf; *Podocarpus*; *P. totara*; *Nothofagus*; *Neopanax colensoi*; *Pittosporum*; *Coprosma*; *Pseudowintera*; *P. colorata*; *Nothopanax arboreus*; *Griselinia littoralis*; second-growth bush; edge of native bush; garden; native tussock.

Adults have been collected in all months except May.

**Biology.** Reared from *Ctenochiton viridis* Maskell (Homoptera: Coccidae) on *Nothopanax arboreus* and *Griselinia littoralis*; from *Ctenochiton perforatus* Maskell on *Pittosporum*; from *Ctenochiton* sp. on *Griselinia* sp. and *Pseudowintera colorata*; and from an unidentified coccid on *Griselinia littoralis*. Some material reared from *C. viridis* has included specimens of *A. inconstans* and *A. unicolor*. Also reared from *Inglisia* sp. (Homoptera: Coccidae) on *Podocarpus totara*, and from a psyllid (Homoptera: Psyllidae) - probably *Trioza irregularis* (Ferris & Klyver) - on *Neopanax colensoi*.

**Remarks.** Separation of females of *A. variabilis* and *A. novaezealandiae* is extremely difficult, since most characters seem to be unreliable. However, the two species are certainly distinct because of the considerable difference in structure of the male antennae (cf. Figures 38 and 88) and different host affinities (*novaezealandiae* has been reared only from diaspid scales). It is possible that some specimens here included under *variabilis* may actually belong to *novaezealandiae*, and vice versa. Females of *variabilis* are characterised by the linea calva of the forewing being entire or interrupted by only a single seta, and the tegula most often being entirely brown, though occasionally partly yellowish or orange. In *novaezealandiae* the linea calva is interrupted by several setae, and the tegula is always

partly orange or yellow (see also Remarks under *Adelencyrtoides* sp. A, below).

Some females of *A. blastothrichus* with unusually shallow sculpture on the head and thorax may be confused with *variabilis*. Females of *blastothrichus* always have relatively dense, conspicuous setae on the sides of the propodeum, which more or less extend to the hind coxa; *variabilis* females have relatively sparse, inconspicuous setae outside the propodeal spiracle which do not extend down the sides.

### ***Adelencyrtoides* sp. A**

Figure 90

This name is applied to a collection of males of uncertain identity. They are very similar in appearance to *novaezealandiae* males, but differ in the proportions of the antennal segments (cf. Figures 38 and 90).

**Material examined.** Three slide-mounted males, all from BR (NZAC): 1, W. Inangahua, Fletcher's Creek, moss and litter 72/179, 19 Sep 1972, JSD; 1, L. Rotoiti, Malaise trap by forest stream, 4-9 Feb 1978, S&JP; 1, L. Rotoiti, 600 m, Malaise trap at edge of *Nothofagus* forest, Nov 1980, FD.

**Biology.** Unknown.

**Remarks.** These specimens may represent two species or perhaps even three. One has the linea calva interrupted by a line of setae, and in the others it is complete. They may be males of one of the species described under *Adelencyrtoides*, possibly *pilosus* or *proximus*, but identification will not be positive until both sexes have been reared together.

### ***Adelencyrtoides* sp. B**

Figures 91 and 92

This name is applied to a collection of males which are similar in appearance to *novaezealandiae* males but differ in the relative proportions of the antennal segments (cf. Figures 38 and 91). Forewing venation and setation as in Figure 92.

**Material examined.** Five males (NZAC): 2, AK, Birkenhead, Oct and Nov 1980, Malaise trap in second-growth bush, JFL; 1, CL, Kauaeranga Valley, 14 Nov 1980, JSN; 2, NN, Whangamoia Saddle, 1-3 Feb 1978, Malaise trap, S&JP.

**Biology.** Unknown.

**Remarks.** Possibly these males represent a species already described here under *Adelencyrtoides*, but identification depends on a positive association of identical males reared together with females.

### *Adelencyrtoides* sp. C

Figures 93 and 94

This name is applied to a collection of males which are similar to *variabilis* males but have relatively shorter distal funicle segments and lack bifurcating setae on the club (cf. Figures 88 and 93). They are also very similar to males of *inconstans*, but differ in having relatively shorter funicle segments. Forewing venation and setation as in Figure 94.

**Material examined.** Five males, TO, L. Taupo, 17 Jan 1966, ex *Trioza* sp. on *Hebe* sp., 1129/2, AKW (NZAC).

**Biology.** Reared from *Trioza* sp. (Homoptera: Psyllidae) on *Hebe* sp.

**Remarks.** It is noteworthy that these males were reared from *Trioza* sp., as this psyllid genus has also been recorded as a host for *A. variabilis*. Variation in the latter species is very extensive, but the female specimens of *variabilis* reared from psyllids are more or less identical to those reared from coccids. This raises the possibility that males of *variabilis* are polymorphic, or that the occurrence of bifurcate setae on the clava is an unreliable character. It also suggests that there may be a further, undetected species in the *novaezealandiae*, *variabilis*, *inconstans* complex which is virtually indistinguishable from *variabilis*. These questions will remain unanswered until more material can be reared.

### Genus *Adelencyrtus* Ashmead

Ashmead, 1900: 401. Compere & Annecke, 1961: 49–58 (key to species). Noyes & Hayat, 1984: 223–224 (review of Indo-Pacific species). Type species *Encyrtus chionaspidis* Howard, by original designation; Sri Lanka.

**Female.** HEAD more or less triangular in profile, with tangents of frontovertex and face forming an angle of less than 90°. Antenna with funicle 6-segmented, club 3-segmented. Mandible with 4 teeth. Maxillary palpus 4-segmented; labial palpus 2- or 3-segmented.

THORAX more or less flat. Sculpture on scutellum generally conspicuously more coarse than on

mesoscutum. Forewing hyaline or infusate, with a pair of opposite, triangular hyaline areas at apex of venation; marginal vein about 2.0–3.0× as long as broad; postmarginal vein about as long as stigmal vein or a little longer; lineae calva not interrupted; filum spinosum present.

GASTER. Hypopygium not reaching more than about two-thirds along gaster. Ovipositor with gonostyli free.

**Male.** Generally very similar to female, but antenna with 2 funicle segments and a very long unsegmented club, and forewing always hyaline.

**Biology.** Parasites of diaspid scales (Homoptera: Diaspididae).

**Distribution.** Cosmopolitan. Of the 26 species, one is known from New Zealand.

**Remarks.** *Adelencyrtus* belongs to the tribe Habrolepidini, subtribe Habrolepidina (see Trjapitzin 1973b). All genera of this subtribe have the male antenna characteristically with two funicle segments and a long, unsegmented club. *Adelencyrtus* is nearest to *Epitetracnemus*, and can often be difficult to separate (see Remarks under *Epitetracnemus*). It is also similar to *Adelencyrtoides*, but differs in the relatively shorter forewing postmarginal vein and the structure of the male antenna (see also Remarks under *Adelencyrtoides*).

### *Adelencyrtus aulacaspidis* (Brèthes)

Figures 95–97

Brèthes, 1914: 29. Mercet, 1921: 294. Valentine, 1967: 1122.

**Female.** Length range 0.71–1.13 mm ( $n = 3$ ).

Frontovertex metallic green or blue-green; eyes margined with purple; anterior margin of frontovertex and face below it purple; antenna with scape and pedicel dark brown, flagellum testaceous brown, distalmost 2 funicle segments a little paler; pronotum and mesoscutum largely purple, but mesoscutum with a slight mixed blue and green lustre centrally; scutellum more or less matt dark purple medially, with sides and apex shining green; coxae, femora, and tibiae marked extensively with dark brown, but remainder of legs yellow; forewing hyaline, without contrasting areas of pale and dark setae; sides of propodeum metallic green; gaster dark purple-brown, its basal tergite metallic green.

HEAD. Mandible as in Figure 95. Relative dimensions, specimen 1 (card-mounted): head width 53, length 43, depth 27; frontovertex width

20; eye length 28, width 25; malar space 20; OPL 7; POL 9; OOL 2.5; scape length 19, maximum width 6; other proportions of funicle segments as in Figure 96.

**THORAX.** Sculpture on mesoscutum shallow, raised, squamiform-reticulate, on scutellum deeper reticulate. Forewing venation as in Figure 97. Relative dimensions, specimen 2 (slide-mounted): forewing length 90, width 36, marginal fringe 4; hindwing length 61, width 9, marginal fringe 4.

**GASTER** about as long as thorax. Ovipositor exerted, the exerted part about one-eighth as long as gaster. Relative lengths, specimen 2: last tergite 31; ovipositor 51; gonostylus 14 [middle tibia 36].

**Male.** Unknown.

**Type data.** **Holotype** female: Chile, Santiago, ex *Aulacaspis rosae*, October 1913, C.E. Porter (MACN) [not seen].

**Material examined.** Five non-type females from New Zealand (NZAC, BMNH).

HB / NN, MB.

Habitats noted: *Rubus ?cissoides*; rose.

Adults have been collected in March, May, and November.

**Biology.** A parasite of *Aulacaspis rosae* (Bouché) (Homoptera: Diaspididae).

**Remarks.** *A. aulacaspidis* was first described from Chile, but its origin is not known with certainty. It is also found in various other South American countries, the U.S.A. (California), Europe, and Africa. It was first noted in New Zealand by Valentine (1967).

### Genus *Alamella* Agarwal

Agarwal, 1966: 74. Annecke, 1969: 453–457. Type species *Alamella flava* Agarwal, by original designation; India.

**Female.** **HEAD.** Frontovertex at least as wide as an eye. Antennal torulus with ventral margin slightly above lower margin of eye (see Figure 98); antenna very characteristic, with scape short and flagellum having the appearance of 7 long funicle segments and a 2-segmented club. Mandible bidentate. Maxillary palpus 4-segmented; labial palpus 3-segmented. Frontovertex with fine, shallow, raised, reticulate sculpture.

**THORAX.** Sculpture of mesoscutum fine, elongate, squamiform-reticulate, of silky appearance; scutellum with similar sculpture to frontovertex.

Forewing hyaline; submarginal vein with a subapical hyaline break; marginal vein short, postmarginal and stigmal veins relatively long; linea calva interrupted; filum spinosum absent.

**GASTER.** Hypopygium reaching apex of gaster. Paratergites present. Last tergite over twice as long as combined median lengths of remaining gastral tergites. Ovipositor with gonostyli fused to 2nd valvifers, which are relatively broad and not filamentous.

**Male.** Generally similar to female except in structure of antennae and genitalia (see description of *A. mira*, below).

**Biology.** Parasites of mealybugs (Homoptera: Pseudococcidae).

**Distribution.** Of the three known species, only one is from New Zealand. The genus is also represented in Africa, Pakistan, India, and Taiwan.

**Remarks.** *Alamella* belongs to the subfamily Tetracneminae, tribe Anagyrini. Within that tribe the female can be recognised by the structure of the antenna and the unusually high placement of the antennal toruli. The male, however, is very similar to others of the tribe and difficult to separate with any certainty. Males of this group usually have curious, scale-like setae on the sixth funicle segment or club, as in the two previously described species of *Alamella*, but these appear to be absent in the new species described below.

### *Alamella mira* new species

Figures 98–104

**Female.** Length range 1.24–1.71 mm ( $n = 2$ ).

**Holotype.** Length 1.24 mm. Head black, but dorsal margin of eye and area between mouth and antennal toruli orange; antennal radicle pale brown; scape dark brown, but paler along ventral margin, and near base whitish; pedicel and flagellum dark brown; setae on frontovertex, face, and genae silvery white; pronotal dorsum and anterior margin of mesoscutum black; remainder of thorax orange, slightly dusky on axillae, and with an elongate brown spot in centre of scutellum; coxae more or less white, but on outer face of fore and hind coxae mixed with brown; fore and middle femora and tibiae dirty white mixed slightly with brown; fore tarsus pale brown; middle tarsus whitish yellow; hind femur dirty white, dorsally dark brown; hind tibia and tarsus dark brown; wings hyaline, with dark brown venation; propodeum dark brown, but medially orange-brown; mesoscutum and anterior

half of scutellum clothed in short, conspicuous, dark brown setae; anterior half of scutellum and sides of propodeum clothed in silvery white setae; gaster dark brown, with a few conspicuous silvery setae basally.

**HEAD** as in Figure 98. Ocelli forming an angle of about 110°. Sculpture immediately in front of anterior ocellus very regular, behind this less regular, and on lower parts of face and genae longitudinally elongate squamiform-reticulate. Mandible as in Figure 99. Relative dimensions: head width 70, length 62; minimum frontovertex width 42; eye length 36, width 29; malar space 20; OPL 2; POL 16; OOL 9; scape length 29, maximum width 9.5; other proportions of antenna as in Figure 100.

**THORAX.** Middle tibial spur about three-quarters as long as basal tarsal segment. Relative dimensions: forewing length 218, width 96, venation and setation as in Figure 101; hindwing length 131, width 40.

**GASTER** about as long as thorax.

**Paratype.** Relative lengths: last tergite 100; ovipositor 81; gonostylus about 19; middle tibia 112.

**Male.** Length 1.13 mm ( $n = 1$ ).

Generally similar to female, but darker, and differing in structure of antennae (Figure 102) and genitalia (Figure 104). Head and dorsum of thorax almost entirely dark brown; antennal torulus connected to mouth margin by an orange line; sides and venter of thorax more or less orange. Forewing venation and setation as in Figure 103. Relative dimensions, specimen 1 (card-mounted): head width 73, length 58; minimum frontovertex width 44; eye length 33, width 27; malar space 20; OPL 2; POL 18; OOL 9. Relative lengths, specimen 2 (slide-mounted): aedeagus 45.5; middle tibia 93.

**Type data.** **Holotype** female: New Zealand, AK, St Heliers, ex *Pseudococcus longispinus* on citrus, 7 February 1981, E.W. Valentine (NZAC).

**Paratypes** (2 females, 2 males). AK - 1 female, 1 male, same data as holotype; 1 female, type locality, swept, 14 Mar 1981, EWV; 1 male, Massey, 7 Feb 1981, EWV.

**Material examined.** Type specimens only (NZAC, BMNH).

**Biology.** A parasite of *Pseudococcus longispinus* Targioni-Tozzetti (Homoptera: Pseudococcidae).

**Remarks.** Females of *A. mira* can be distinguished by having the head and the anterior part of the thoracic dorsum largely black; in other described species of the genus the head and thorax are more or less completely yellow. In addition, the

forewing posteromarginal vein in *mira* is relatively long, and the middle tibial spur is relatively short; in the other species the postmarginal vein is very much shorter than the stigmal vein, and the middle tibia has the spur only slightly shorter than the basal tarsal sequent. Males can be separated on colour, the relative length of the forewing postmarginal vein, and the apparent absence of scale-like sensillae on the distal flagellar segments in *mira* (in both other described species these are present).

The association of *A. mira* with *Pseudococcus longispinus* suggests that it has been accidentally recently introduced from Australia, although it has yet to be found in that country.

### Genus *Arrhenophagoidea* Girault

Girault, 1915a: 73. Annecke & Prinsloo, 1974: 40. Type species *Arrhenophagoidea coloripes* Girault, by original designation; Australia.

**Female.** Body generally pale brown or dark brown, never metallic. Small species, generally less than 0.75 mm in length.

**HEAD.** Ocelli forming an obtuse angle. Frontovertex slightly wider than half head width, with a transverse membranous line between eyes, below anterior ocellus, almost connected to antennal toruli by a vertical membranous line which may bifurcate slightly above toruli. Antennal torulus separated from mouth margin by about its own length, its dorsal margin well below lower margin of eye; scape slightly broadened; funicle with 3-6 transverse segments; club entire or 2-segmented, and occasionally with an incomplete 2nd suture. Mandible with a single long tooth (see Figure 105).

**THORAX** without notaular lines. Tarsi 5-segmented. Forewing broad, less than twice as long as broad; submarginal vein with not more than 5 setae on dorsal surface; apex of venation not clearly defined, represented by a fuscous patch only.

**GASTER.** Hypopygium reaching to about three-quarters length of gaster. Paratergites absent. Gonostyli slender, free, longer than spur of middle tibia.

**Male.** Very similar to female, but antennae situated relatively higher on face, each with funicle 6-segmented and club entire or 2-segmented; funicle segments subquadrate or longer than broad, clothed in setae longer than the diameter of a segment.

**Biology.** Parasites of diaspid scales (Homoptera: Diaspididae).

**Distribution.** Of the five described species, one is known from New Zealand. The genus is also represented in South America, Africa, and Australia.

## *Arrhenophagoidea coloripes* Girault

Figures 105–107

Girault, 1915a: 73. Valentine, 1963: 11; 1967: 1122.  
Annecke & Prinsloo, 1974: 41.

**Female.** Length range 0.40–0.49 mm ( $n = 14$ ).

Body dark brown, very slightly shiny; antenna yellowish, with club slightly infusate; legs with coxae and femora dark brown, but apices of middle femora yellowish; tibiae yellowish with a dark brown band, that on hind leg broad; tarsi yellowish.

**HEAD** (Figure 105) with transverse membranous line not quite reaching eye margins, and vertical line bifurcating a little below this; clypeal margin strongly produced medially; sculpture shallow, raised; antenna with funicle 3-segmented. Relative dimensions: frontovertex width 36; scape length 24; other proportions as in Figure 106.

**THORAX.** Sculpture on mesoscutum shallow, raised, squamiform-reticulate, on scutellum longitudinally elongate-reticulate. Forewing with 5 setae on submarginal vein; base of wing and setation as in Figure 107. Relative dimensions: forewing length 60, width 29, marginal fringe 3.5; hindwing length 40, width 7, marginal fringe 4.5.

**GASTER** slightly shorter than thorax. Relative lengths: ovipositor 38; gonostylus 14 [middle tibia 44].

**Male.** Not available for description.

**Type data.** **Holotype** female on slide with holotype of *Paroligosita biclavata* Girault: “*Arrhenophagoidea coloripes* Gir. + Dodd ♀ type” “2971” (QMBA). According to Girault (1915) the holotype was collected at Ingham, Queensland, on 17 February 1913.

**Material examined.** Holotype female, plus 19 non-type examples: Australia – 2 females, 1 male; New Zealand – 16 females (NZAC, BMNH).

AK / —.

Habitats noted: phoenix palm; *Ficus rubiginosa*.

Adults have been collected in February and March.

**Biology.** Reared from *Chionaspis* sp. and males of *Aulacaspis* sp. (Homoptera: Diaspididae).

**Remarks.** The male of *A. coloripes* is apparently very rare, as it is known only from a single slide-mounted example in the Queensland Museum. It is in very poor condition, and hence cannot be figured here.

## Genus *Arrhenophagus* Aurivillius

Aurivillius, 1888: 144. Annecke & Prinsloo, 1974: 34–40.  
Type species *Arrhenophagus chionaspidis* Aurivillius, by monotypy; Sweden.

Closely resembling *Arrhenophagoidea*, but differing in having 4-segmented tarsi (cf. 5-segmented).

**Biology.** Parasites of diaspid scales (Homoptera: Diaspididae).

**Distribution.** Of the two described species, one is known from New Zealand. The genus is cosmopolitan.

## *Arrhenophagus chionaspidis* Aurivillius

Figures 108 and 109

Aurivillius, 1888: 142. Valentine, 1963: 12; 1967: 1122.  
Annecke & Prinsloo, 1974: 36–37.

**Female.** Length range 0.54–0.68 mm ( $n = 6$ ).

Body generally dark brown, very slightly shiny; antenna with scape pale yellow, pedicel and flagellum brown; legs pale yellow, but coxae pale yellow-brown; wings hyaline.

**HEAD** (viewed anteriorly) with clypeus strongly produced medially, emarginate near base of mandibles; frontovertex with shallow, raised, reticulate sculpture, that below transverse membranous line rather less regular, and becoming more elongate lower on face (generally very similar to that of *Arrhenophagoidea coloripes*, Figure 105); antenna with 2–4 funicle segments (Figure 108).

**THORAX.** Sculpture on mesoscutum squamiform-reticulate, on scutellum longitudinally elongate reticulate, becoming much longer along midline. Forewing submarginal vein with only 2 setae dorsally; base of wing and setation as in Figure 109. Relative dimensions: forewing length 55, width 25, marginal fringe 4; hindwing length 33, width 4, marginal fringe 5.

**GASTER** slightly longer than thorax. Relative lengths: ovipositor 33; gonostylus 8.5 [middle tibia 40].

**Male.** Not available for description. According to Annecke & Prinsloo (1974) generally similar to female, but antenna with 4 funicle segments.

**Type data.** **Syntype** females: Sweden, ex *Chionaspis salicis* (Linnaeus) (NRSS, PPRI) [not seen].

**Material examined.** Seven non-type females from New Zealand (NZAC).

HB / NN.

Habitat noted: rose.

Adults have been collected in February and May.

**Biology.** Reared from males of *Aulacaspis rosae* (Bouché) (Homoptera: Diaspididae) on rose (Valentine 1963, 1967).

**Remarks.** The male of this cosmopolitan species is known from only two specimens (see Annecke & Prinsloo 1974).

### Genus *Austrochoreia* Girault

Girault, 1929: 3. Noyes & Hayat, 1984: 237. Type species *Austrochoreia laticutum* Girault, by monotypy; Australia.

**Female.** HEAD in facial view about 1.20–1.25× as broad as long, in profile about 1.5–1.7× as long as deep, fairly evenly rounded anteriorly but distinctly flatter on frontovertex and face. Frontovertex about 0.3–0.5× as wide as head; tangents of frontovertex and face forming an angle of about 100° at top of antennal scrobes. Eye oval but with posterior margin almost straight, about 1.2–1.3× as long as broad, reaching or almost reaching occipital margin, which is sharply angled, bearing extremely short, very inconspicuous, sparse hairs. Malar space about 1.5–1.6× as long as eye; malar sulcus present. Ocelli absent or, if present, minute and forming an angle of about 90°; posterior ocellus separated from occipital margin and eye margin by at least about its own diameter. Antennal scrobes very shallow to moderately deep, straight, more or less meeting dorsally, reaching about 0.4–0.5× distance from antennal toruli to anterior ocellus; antennal torulus separated from mouth margin and from other torulus by about 1.5× its own length, or slightly closer to mouth margin, its dorsal margin clearly below ventral margin of eye; clypeal margin almost straight; scape subcylindrical to distinctly broadened and flattened, 2.5–5.0× as long as broad, and from a little longer than minimum width of frontovertex to distinctly shorter; pedicel conical, much longer than 1st funicle segment; funicle 6-segmented, the segments cylindrical, subequal in length or becoming longer distally, and gradually widening distally; club 3-segmented, occasionally with one suture or both incomplete or poorly defined, from about half as long as funicle to only a little shorter than funicle, its apex at least slightly truncate; setae on funicle relatively short, the longest shorter than the diameter of the smallest segment or about as long; longitudinal sensilla present on at least the distalmost 2 funicle segments and club. Frontovertex with sculpture very shallow, irregular, raised, reticulate, becoming

gradually shallower squamiform-reticulate on lower parts of face and on genae; setae very short, often inconspicuous, sometimes arising from conspicuous punctures, which give dimpled appearance of a golf ball. Mandible with 3 acute teeth, the upper tooth sometimes less acute than the others. Maxillary palpus 3-segmented or 4-segmented; labial palpus 3-segmented.

THORAX in lateral view relatively deep, with metapleurum and propodeum clearly very broadly separated from hind coxa by the very enlarged mesopleurum (see Figure 110), dorsally with mesoscutum and scutellum flat; in dorsal view with pronotum fairly long, plainly visible behind head, its posterior margin straight or slightly convex, evenly curved, and completely or almost completely covering mesoscutum. Visible part of mesoscutum not less than 6.0× as broad as long; notaular lines absent; axillae widely separate, more or less fused to scutellum. Scutellum about 1.5–1.8× as broad as long, externally at least 2.5× as long as mesoscutum, its apex very broadly rounded or broadly truncate. Propodeum completely hidden by base of gaster. Mesoscutum and scutellum with extremely shallow to fairly shallow, raised, reticulate or squamiform-reticulate sculpture. Setae on dorsum short, fairly sparse and inconspicuous in dorsal view, in some species arising from punctures which give dorsum a dimpled appearance similar to the surface of a golf ball. Wings very reduced, the forewing not reaching more than half-way along 1st gastral tergite; forewing apically pointed, infusate, in resting position partly covered by lateral and apical margins of scutellum, which are produced as a very narrow flange. Middle tibia with spur about as long as basal segment of tarsus, or distinctly shorter.

GASTER slightly longer than thorax or, if distended, then nearly twice as long as thorax, with 1st tergite covering basal one-third to two-fifths and cercal plates in about distal one-fifth or so. Paratergites absent. Last tergite about 0.5–0.8× as long as middle tibia, broadly rounded apically. Hypopygium reaching about two-thirds along gaster or very nearly to apex. Ovipositor hardly exerted, or with exerted part about as long as middle tibial spur, from slightly longer than middle tibia to nearly twice as long. Gonostyli free, about half to one-quarter as long as ovipositor.

**Male.** Very similar to female, generally differing as follows. Antennal scape broader, not more than 4.0× as long as broad; pedicel conical, about twice as long as broad, only a little longer than 1st funicle segment; funicle 6-segmented, the segments cylindrical in cross-section, from slightly transverse to nearly twice as long as broad; longest setae on funi-

cle at least slightly longer than diameter of smallest funicle segment; club entire, apically rounded or slightly pointed, about 0.3–0.4× as long as funicle. Genitalia with digiti each armed with a pair of hooks; parameres each with a pair of setae, one below base of outer apical process and one at apex of process; aedeagus slightly more than half as long as middle tibia to nearly as long.

**Distribution.** Of three species now recognised, one very variable species, described here as new, is known from New Zealand including Chatham Island. The genus is also represented in Australia.

**Remarks.** *Austrochoreia* is probably related to *Semen* Hoffer, *Discodes* Foerster, and *Choreia* Westwood (Encyrtinae, tribe Discodini). It can be separated by the combination of abbreviated wings, elongate pronotum largely or entirely covering the mesoscutum, and lack of notaular lines.

### *Austrochoreia antipodis* new species

Figures 110–122

**Female** as in Figure 110. Length range 0.49–1.49 mm ( $n = 357$ )

**Holotype.** Length 1.14 mm. Body largely black, with slight metallic green and brassy reflections; antenna dark brown, but 5th and 6th funicle segments yellowish; legs dark brown, but apices of femora and tibiae more or less testaceous brown or pale brown, and apex of middle tibia, middle tibial spur, and basal segments of tarsi amber; forewing dark brown; apex of ovipositor sheath amber.

**HEAD.** Ocelli minute, not clearly visible. Eye more or less reaching occipital margin, which is carinate. Frontovortex with shallow, setiferous punctures separated from each other by at least about their own diameter; sculpture between punctures very shallow, raised, reticulate, but between eye and antennal scrobe and on gena more longitudinally elongate, and on antennal scrobe very elongate, almost striate; setae not very conspicuous, and those on eye relatively short. Mandible as in Figure 111. Relative dimensions: head width 79, length 66; minimum frontovortex width 29; eye length 46, width 37; malar space 24; scape length 29, maximum width 8; other proportions of antenna as in Figure 112.

**THORAX.** Mesoscutum exposed posteriorly, the visible part medially about 30× as broad as long. Scutellum broadly rounded apically (Figure 116). Forewing as in Figure 118.

**GASTER** about one-quarter longer than thorax. Hypopygium reaching slightly more than three-

quarters along gaster. Exserted part of ovipositor about as long as spur of middle tibia.

**Paratype.** Maxillary palpi 4-segmented. Relative lengths: last tergite 30; ovipositor 70; gonostylus 16; middle tibia 45.

**Variation.** Colour variable: body, including legs, from more or less completely black with weak metallic reflections to completely reddish-brown; antenna sometimes almost completely yellowish; forewing occasionally nearly hyaline. Frontovortex about 0.4–0.6× as wide as head, with corresponding variation in relative proportions of eye length to malar space. Eye usually more or less reaching occipital margin, but in specimens with broader frontovortex sometimes separated by more than the diameter of a facet. Antennal scape 3.0–4.0× (rarely 5.0×) as long as broad; pedicel 0.3–0.5× as long as scape; funicle segments distinctly transverse, or some very slightly longer than broad, the 1st about 0.3–0.5× as long as pedicel, the others varying correspondingly (Figures 112–114). Maxillary palpus occasionally 3-segmented. Exposed part of mesoscutum sometimes as little as about 6.0× as long as broad. Apex of scutellum sometimes truncate (Figure 115). Forewings (Figures 117 and 118) meeting medially or separated by a distance up to that separating axillae. Gaster occasionally somewhat distended, about 1.5× as long as thorax. Hypopygium sometimes nearly reaching apex of gaster. Ovipositor about 1.2–1.9× as long as middle tibia.

**Male.** Length 0.63–1.33 mm ( $n = 100$ ).

Generally similar to female, but differing in structure of antenna (Figures 119–121) and genitalia (Figure 122). Relative dimensions, specimen 1 (card-mounted): head width 68, length 56; minimum frontovortex width 27; eye length 38, width 32; malar space 29; OPL 8; POL 17; OOL 4; scape length 25, width 7. Relative lengths, specimen 2 (slide-mounted): aedeagus 45; middle tibia 66.

**Variation.** Similar to that in female, especially in coloration and width of frontovortex. Eye usually reaching occipital margin, but occasionally separated by the diameter of a facet. Scape 2.5–4.0× as long as broad; funicle segments varying in relative length, from distinctly longer than broad to quadrate or slightly transverse, with setae about as long as the diameter of a segment to twice as long. Aedeagus about 0.7–0.8× as long as middle tibia.

**Type data.** **Holotype** female: New Zealand, BR, Mount Robert, 600–1400 m, *Nothofagus* forest and grass, 10 December 1980, J.S. Noyes, E.W. Valentine, & A.K. Walker (NZAC).

**Paratypes** (373 females, 108 males). AK – 2 females, Waitakere Range, Jan 1981, JSN. TK – 2 females, Pouakai Range, W edge of Hump Plateau,

swards, 75/201, 2 Dec 1975, JSD. TO – 1 female, Tongariro National Park, 5 km N of Ohakune, mixed *Podocarpus*, 700 m, 23 Feb 1981, JSN. RI – 2 females, Ruahine Range, Mt Te Atuaoparapara, swards 70/108, 1700 m, 22 Feb 1970, GWR; 6 females, Ruahine Range, 1400 m, ex pan trap in tussock and alpine meadow, 8 Feb 1980, CFB. WN – 1 female, Rimutaka Forest Park (S), mixed *Podocarpus* and *Nothofagus*, 250 m, 26 Feb 1981, JSN; 11 females, 2 males, [Wellington], Island Bay, 30 Mar 1931, ESG.

SD – 8 females, Stephens I., sweeping from tussock (7), 20 Feb 1971, GWR. NN – 5 females, 4 males, Dun Mtn, 4 Feb 1924, AP; 1 male, Mt Arthur, 25 Jan 1924, AP; 4 females, 2 males, Mt Cobb, ex *Eriococcus* sp. on *Chionochloa australis*, 6 Dec 1960; 3 females, 3 males, Burgoo Creek, ex *Eriococcus* sp. on *Chionochloa* sp.; 1 female, Mt Arthur summit, 1778 m, mats 71/79, 22 Mar 1971, JMcB; 1 female, Mt Arthur, 1341 m, swards, 71/91, 24 Mar 1971, JSD; 1 female, Mt Domett, 1520 m, litter 71/161, 30 Nov 1971, JSD; 8 females, 1 male, Mt Domett, 1250 m, mats 71/174 (♀) and 71/178, 30 Nov 1971, GK; 1 female, Mt Domett, summit, mats 71/166, Dec 1971, JMcB; 1 female, Mt Domett, summit, moss 71/185, Dec 1971, GWR; 1 female, L. Sylvester, mealybug on *Chionochloa* sp., 4 May 1972, JAdeB; 1 female, Lee Valley, beating *Leptospermum* foliage, 22 Mar 1977, AKW; 4 females, Farewell Spit, 1 Feb 1979, LAM; 1 female, Cobb Ridge (S), 1100 m, alpine *Nothofagus* forest, 3 Dec 1980, NV&W; 2 females, Cobb Reservoir, 850 m, mixed native grassland, 6 Dec 1980, NV&W. NN-MB – 1 male, Mt Fell, 13 Mar 1969, EWV; 1 female, 32 males, Johnson/Fell Peak saddle, Richmond Range, litter 59/103, 13 Mar 1959, JSD. MB – 2 females, Red Hills, Wairau, 3470' [1040 m], sweeping red tussock (1) and swept tussock/jointed rush (1), 23 Mar 1972, EWV; 2 females, Red Hills, Wairau, ex mealybug on *Chionochloa*, 23 Mar 1972, JAdeB; 4 females, Red Hills, Wairau, 3600' [1080 m], swept red tussock mix, 24 Mar 1972, EWV. BR – 5 females, 1 male, Mt Robert, 4000' [1200 m], ex eriococcid, 16 Dec 1934, ESG; 1 female, [Travers Range], Angelus Hut, 5700' [1710 m], ex ?*Eriococcus danthoniae* on *Chionochloa australis*, 5 Feb 1964, JSD; 22 females, 2 males, Mt Robert, 15 Mar 1968, EWV; 1 female, Paparoa Range, Mt Dewar, 1300 m, mats 69/255, 11 Dec 1969, JCW; 1 female, Nelson Lakes National Park, Mt Robert track, 1005 m, in grass, 4 Feb 1979, AKW; 18 females, St Arnaud, native grassland and *Sphagnum* bog, 9 Dec 1980, NV&W; 27 females, 18 males, Mt Robert, *Nothofagus* forest and grass, 600–1400 m, 10 Dec 1980, NV&W. MC – 1 female, Waimakariri, ex mealybug on *Cyathodes*, 15 Nov 1968, EC; 9 females, Mt Murchison, 4000' [1200

m], swept cushion grass, 21 Nov 1971, EWV; 2 females, Banks Peninsula, Price's Valley, Malaise trap at edge of native bush, Feb (1) and Apr 1981, RPM. OL – 5 females, 3 males, Coronet Peak, 1640 m, tussock, alpine shrubs, *Hebe*, and mat plants, Jan 1981, N&V; 16 females, 3 males, Coronet Peak, 1200 m, tussock, grasses, *Hebe*, and alpine shrubs, Jan 1981, N&V; 7 females, 2 males, Crown Peak, 1200 m, tussock, shrubs, and alpine herbs, 24 Jan 1981, N&V. CO – 2 females, 1 male, Dunstan Range, moss 71/4, 1560 m, 13 Jan 1971, JSD; 4 females, Pisa Range, gully behind Mt MacKay, 1737 m, turf 74/90, 23 Nov 1974, JCW; 4 females, Rock Peak, 2 km E of Crown Range saddle, litter 74/113, 27 Nov 1974, JCW; 3 females, Old Man Range, Shingle Road, 1372 m, litter 75/127, 15 Mar 1975, JCW; 1 female, Hector Range, Ben Nevis, 1950 m, litter 75/139, 14 Mar 1975, JCW; 2 females, Kawarau Gorge, Roaring Meg, upper powerhouse, moss 75/100, 17 Mar 1975, JCW; 13 females, 9 males, Waipori, 520 m, pit trap in tussock, Nov–Dec 1978 (2♀, 2♂), Dec 1978 – Jan 1979 (2♀, 4♂), Dec 1978 – Mar 1979 (2♀, 1♂), 2–16 Jan 1979, (4♀, 1♂), and Feb – Mar 1979 (3♀, 1♂), BIPB; 66 females, 12 males, Rocklands Station, 800 m, pit trap in tussock, Dec 1978 (19♀, 6♂), Jan 1979 (15♀, 2♂), Feb 1979 (9♀), Apr 1979 (1♀), Nov 1979 (7♀), Dec 1979 (4♀, 3♂), and Jan 1980 (11♀, 1♂), BIPB; 38 females, 15 males, Watt's Rock, tussock, grasses, *Juncus*, and *Sphagnum*, 1200 m, Jan 1981, N&V; 13 females, Roaring Meg, tussock, grasses, *Discaria*, *Rosa*, *Juncus*, *Pimelia*, 13 Jan 1981, N&V. DN – 1 female, Mt Maungatua, moss in tussock, 2500' [750 m], 14 Jan 1965, JIT. FD – 1 female, Turret Range, Mt Grey, 1200 m, mats 70/45, 14 Jan 1970, GWR; 1 female, Turret Range, Manapouri, halfway up to Wolfe Flat, sweeping, 22 Jan 1970, ACE; 1 male, Wilmot Pass, Mt Barber, 1100 m, litter 70/13, JSD & JH; 2 females, Mt Barber, Wilmot Pass, 1200 m, mats 70/21, 8 Jan 1970, GK; 1 male, Wilmot Pass, Manapouri, 750 m, moss 70/79, 22 Jan 1970, JSD; 1 female, Pointburn Valley, main flat, sweeping tussock, 9 Dec 1972, ACE; 1 female, W. Olivine Range, Simonin Pass, 1067 m, litter 75/37, 23 Jan 1975, GWR; 2 females, W. Olivine Range, Tempest Spur, litter 75/46, 30 Jan 1975, GWR; 1 female, W. Olivine Range, Red Mtn, litter 75/47, 29 Jan 1975, GWR; 3 females, W. Olivine Range, Tempest Spur, whole mats and soil 75/55, 1463 m, 25 Jan 1975, GWR; 1 female, Olivine Range, Red Mtn, litter 75/54, 29 Jan 1975, GWR; 2 females, 1 male, Darran Mtns, Tutoko Bench, 1158 m, litter 77/17 (♂) and swards and mosses 77/24 (♀♀), 13 Jan 1977, JSD. SL – 2 females, Mataura [Valley], Eyre Mtns, moss 71/17, 1524 m, 17 Jan 1971, JSD; 1 female, Cannibal Bay, Owaka, sifted kelp debris and plants 78/31, 14 Jan

1978, GK.

SI - 9 females, 1 male, Table Hill, 14-15 Feb 1968, EWW; 9 females, 1 male, Mt Rakeahua, 21 Feb 1968, EWW; 4 females, [Paterson Inlet], S.W. Arm, 24 Feb 1968, EWW; 1 female, Rakeahua Valley, swept from tussock, 22 Feb 1969, EWW.

Chatham Is - 3 females, Chatham I., Waitangi, ex scale on *Pimelia arenaria*, 9 Feb 1961, EWW.

**Material examined.** Type series only (NZAC, BMNH).

AK, TK, TO, RI, WN / SD, NN, MB, BR, MC, OL, CO, DN, FD, SL / SI / Chatham Is.

Recorded from about sea level to 1950 m (CO, Ben Nevis).

Habitats noted: mixed *Podocarpus*; mixed *Podocarpus* and *Nothofagus*; alpine *Nothofagus* forest; *Nothofagus* forest and grass; edge of native bush; *Leptospermum* foliage; tussock, grasses, *Discaria*, *Rosa*, *Juncus*, and *Pimelea*; *Pimelea arenaria*; *Cyathodes*; native grassland and *Sphagnum* bog; tussock, grasses, *Juncus*, and *Sphagnum*; mixed native grassland; *Chionochloa australis*; tussock, alpine shrubs, *Hebe*, and mat plants; tussock; red tussock; cushion grass; tussock and alpine meadow; tussock and jointed rush; turf; litter; moss; swards; mats; whole mats and soil; sifted kelp debris and plants.

Adults have been collected in January-May, November, and December.

**Biology.** A parasite of eriococcids (Homoptera: Eriococcidae). Reared from *Eriococcus ?danthoniae* Maskell and *Eriococcus* sp. on *Chionochloa* sp. Also recorded from an unidentified scale on *Pimelea arenaria* and, probably erroneously, from mealybugs (Homoptera: Pseudococcidae) on *Cyathodes* sp.

**Remarks.** *A. antipodis* is a remarkably variable species. Specimens appear to fall loosely into two groups, in which the females can be separated as follows.

Group 1: body slightly flattened in appearance; eye smaller, well separated from occipital margin; frontovertex width at least about half head width; maxillary palpi apparently always 3-segmented; scutellum truncate apically; forewings in resting position well separated at midline; gaster at least about 1.5× as long as thorax; ovipositor at least 1.7× as long as middle tibia.

Group 2: body robust; eye larger, more or less reaching occipital margin; frontovertex width less than half head width; maxillary palpi almost always

4-segmented; scutellum broadly rounded apically; forewings in resting position more or less meeting in midline; gaster only a little longer than thorax; ovipositor not more than 1.7× as long as middle tibia.

Within both groups morphological variation is considerable, and for every character or virtually any combination of characters given above, intermediates exist. Furthermore, both forms may occur within the same area. In one locality (BR, Mount Robert) males belonging to one form were collected with females of the other, and no specimens of the opposite sex of either form were found. On this evidence the above material is treated as belonging to a single species. Future experimental work may show that it represents a species complex.

*A. antipodis* can be separated from *A. laticutum* Girault by its relatively shorter ovipositor and the position of the apex of the hypopygium. In *laticutum* the ovipositor is about 2.5× as long as the middle tibia and the hypopygium does not reach three-quarters along the gaster. In the third species, *keatsi* (Girault), the pronotum completely covers the mesoscutum and the hypopygium reaches only about halfway along the gaster.

### Genus *Cheiloneurus* Westwood

Westwood, 1833: 343. Trjapitzin, 1971b: 123-125. Hayat *et al.* 1975: 45-47. Khan & Agarwal, 1978: 21. Noyes & Hayat, 1984: 249-250. Type species *Encyrtus elegans* Dalman, by monotypy; Sweden.

**Female.** HEAD. Mandible with 3 acute teeth, or 2 teeth and a truncation. Female antenna 11-segmented.

THORAX. Scutellum usually with apical setae long, numerous, dense, in the form of a distinct tuft. Forewing distinctly infusate distally from apical one-third of submarginal vein, which is slightly bowed towards hind margin at this point; marginal vein at least 4.0× as long as broad; stigmal vein relatively short, with apex of uncus hardly separated from anterior margin of wing.

GASTER. Hypopygium reaching half-way along gaster or a little more. Gonostyli free. Paratergites absent.

**Male.** Similar to female, but antennae 9-segmented and clothed in whorls of long setae, scutellum without an apical tuft of setae, and forewing hyaline.

**Biology.** Hyperparasites of other insects, notably Homoptera, via Dryinidae and other chalcids, mainly Aphelinidae and Encyrtidae.

**Distribution.** Cosmopolitan. Well over 100 species are known, many of them described from Australia by Girault (see Noyes & Hayat 1984, pp. 249–250), but only two are recognised from New Zealand.

**Remarks.** Males of *Cheiloneurus* are very difficult to distinguish, but in New Zealand it should be possible to recognise them from the key characters.

#### KEY TO SPECIES OF *CHEILONEURUS* KNOWN FROM NEW ZEALAND

- 01 Antenna 9-segmented, clothed in whorls of long setae each several times as long as the diameter of a segment (Fig. 129); head and scutellum dark green, metallic  
... MALE .. *gonatopodis*
- Antenna 11-segmented, and clava 3-segmented, both clothed in relatively short setae not arranged in whorls and each not or hardly longer than the diameter of a segment (Fig. 124, 126); head and scutellum orange  
... FEMALES .. 02
- 02(01) Anterior one-third or so of mesoscutum orange; propodeum around spiracle densely clothed in silvery setae; hind femora and tibiae mostly yellowish orange, not or hardly marked with dark brown  
... *gonatopodis*
- Mesoscutum metallic green, not marked with orange; propodeum around spiracle with only about 5 pale brown setae; hind femora and tibiae largely marked with dark brown  
... *antipodis*

#### *Cheiloneurus antipodis* new species

Figures 123–125

**Female.** Length range 1.51–1.56 mm ( $n = 2$ )

**Holotype.** Length 1.51 mm. Head orange, mixed with metallic green on genae posteriorly; scape, pedicel, and proximal 5 funicle segments testaceous yellow; 6th funicle segment and club dark brown; pronotum orange, but brownish on neck; mesoscutum metallic green, clothed with silvery setae in posterior half; scutellum, prepectus, anterior part of mesopleurum, and prosternum medially orange; prosternum laterally, mesosternum, and mesopleurum posteriorly dark brown, slightly purplish and brassy; metanotum dark brown; fore coxa whitish; middle and hind coxae orange; fore and middle legs mostly orange, but slightly marked with brown on fore femur and tibia; middle tibia with

a basal white ring, and below this a dark brown ring; hind femur dark brown; hind tibia dark brown, its apex proximally white, distally yellow; foretarsus slightly brownish distally; hind tarsus white, its pretarsus dark brown; forewing infusate as in Figure 125; hindwing hyaline; propodeum metallic green, but on sides purplish; gaster dark brown, strongly purple; basal tergite metallic green; exerted part of ovipositor honey-yellow.

**HEAD** in profile rounded at top of antennal scrobes, the frontovertex fairly convex; tangents of frontovertex and face forming an angle of about 90°. Ocelli forming an angle of about 65°. Sculpture on frontovertex shallow, raised, reticulate, becoming rather irregular on lower parts of face, and on gena becoming more or less longitudinally elongate squamiform-reticulate. Setae on frontovertex about as long as diameter of anterior ocellus or a little longer, not conspicuous; eye more or less naked. Mandibles tridentate or possibly with 2 teeth and a narrow truncation, and hence appearing tridentate (Figure 123). Relative dimensions: head width 75, length 61, depth 41; minimum frontovertex width 21; OPL 11; POL 10; POL 2.5; eye length 44, width 38; malar space 23; scape length 34, width 7.5; other proportions of antenna as in Figure 124.

**THORAX** in profile with propodeum very narrowly in contact with hind coxa. Pronotum medially about two-thirds as long as mesoscutum; posterior margin only very slightly concave. Mesoscutum densely setose in distal half, with very shallow, fine, raised, squamiform-reticulate sculpture. Scutellum with sculpture similar but conspicuously deeper and longitudinally elongate, apically with a distinct but thin tuft of setae. Propodeum medially very smooth and shiny, about one-fifth as long as scutellum; outside spiracle with only 5 setae, which extend downwards. Relative dimensions: forewing length 175, width 66, venation and setation as in Figure 125; hindwing length 145, width 36.

**GASTER** slightly longer than thorax. Last tergite slightly longer than middle tibia. Hypopygium reaching about two-fifths along gaster. Ovipositor only very slightly exerted.

**Paratype.** Relative lengths: last tergite 112; ovipositor 160; gonostylus 35; middle tibia 98.

**Variation.** Negligible in the material available.

**Male.** Unknown.

**Type data.** **Holotype** female: New Zealand, BR, Lake Rotoiti, Malaise trap, January 1981, F. Dodge (NZAC).

**Paratypes:** 2 females, NN, Karamea, Malaise trap, Jan 1981, JJ.

**Material examined.** Type specimens only (NZAC, BMNH).

**Biology.** Unknown.

**Remarks.** *C. antipodis* is closest to *C. purpureicinctus* Girault, known only from Australia, which differs as follows: scape hardly longer than minimum width of frontovertex; mesoscutum with anterior half yellowish orange; mesopleurum and propodeum completely yellowish; gaster mostly yellow.

### *Cheiloneurus gonatopodis* Perkins

Figures 126–130

Perkins, 1906: 261.

**Female.** Length range 0.98–1.29 mm ( $n = 34$ ).

Body largely amber, orange, or orange-brown; club dark brown; posterior two-thirds of mesoscutum with a slight metallic green or blue lustre, clothed with conspicuous silvery setae; propodeum around spiracle densely clothed with silvery setae; forewing infusate as in Figure 127; gaster mixed dark brown.

**HEAD.** Mandible with 3 acute teeth. Frontover-  
tex with minimum width at most about one-fifth  
head width. Scape at least about  $3.0\times$  as long as  
minimum width of frontovertex. Relative dimen-  
sions, specimen 1 (card-mounted): head width 64,  
length 62, depth 40; minimum frontovertex width  
14; eye length 45, width 35; malar space 27; OPL  
7; POL 5; OOL 2; other proportions of antenna as  
in Figure 126.

**THORAX.** Scutellum with an apical tuft of setae.  
Forewing venation and setation as in Figure 127.  
Relative dimensions, specimen 1: forewing length  
157, width 47, marginal fringe 5; hindwing length  
120, width 28, marginal fringe 9.

**GASTER.** Hypopygium reaching about two-thirds  
along gaster. Ovipositor not exerted. Relative  
lengths, specimen 2 (slide-mounted): last tergite 38;  
ovipositor 44; gonostylus 10 [middle tibia 49].

**Male.** Length range 0.83–1.19 mm ( $n = 10$ ).

Within New Zealand males of this species can  
be recognised by the form of the antennae (Figure  
129), wing venation (Figure 130), and coloration  
(as follows): mesoscutum and head bright metallic  
green, though often mixed with purplish; scutellum  
dark green, relatively dull; mesopleurum purplish;  
legs, including coxae, completely yellowish amber;  
gaster dark brown with purple reflections; basal ter-  
gite metallic green. Mandible as in Figure 128.

**Type data.** **Syntypes**, 2 females mounted on a  
single card: “2264”, “Childers Q Oct.15.04”,  
“*Cheiloneurus gonatopodis* type [209]” (BPBM).  
The specimen furthest from the pin is here desig-  
nated **lectotype**.

**Material examined.** Type specimens, plus 46 non-  
type examples (35 females, 11 males) from New  
Zealand (NZAC, BMNH, CNCI, USNM, PPRI,  
ZILR, UCRC).

ND, AK, CL, WN / NN.

Recorded from about sea level to 250 m (WN,  
Rimutaka Forest Park).

Habitats noted: near flax; *Coprosma* and *Meli-  
cytus*; litter under *Scirpus* and grass; mixed *Podo-  
carpus* and *Nothofagus*.

Adults have been collected or reared in January–  
April, July, August, November, and December.

**Biology.** A parasite of *Dicondylus bicolor* Gourlay  
(Hymenoptera: Dryinidae) (det. M. Olmi) para-  
sitising *Nilaparvata myersi* Muir (Homoptera:  
Delphacidae).

**Remarks.** *C. gonatopodis* was described originally  
from Queensland, Australia. It has since been found  
in Mauritius and Madagascar, as well as New  
Zealand.

### Genus *Coccidoctonus* Crawford

Crawford, 1912: 167. Noyes & Hayat, 1984: 254.

**Female.** **HEAD.** Antenna 11-segmented. Mandible  
tridentate. Maxillary palpus 4-segmented; labial  
palpus 3-segmented. Eye moderately hairy. Anten-  
nal torulus with dorsal margin below ventral mar-  
gin of eyes. Occipital margin acute.

**THORAX** in profile with metapleurum and pro-  
podeum together quite broadly in contact with hind  
coxae. Wings hyaline. Forewing marginal vein not  
long; postmarginal vein longer than the relatively  
elongate stigmal vein.

**GASTER.** Ovipositor distinctly exerted. Hypo-  
pygium elongate, extending well past apex of last  
tergite.

**Male.** Similar to female, but antennae 9-seg-  
mented and clothed in setae conspicuously longer  
than the diameter of a segment, and genital struc-  
ture different.

**Biology.** Hyperparasites of Coccidae, Pseudococ-  
cidae, Eriococcidae, and Psyllidae (Homoptera) via  
Pteromalidae and Encyrtidae.

**Distribution.** Seven species are recognised, only one of them from New Zealand. Also known from the New World, India, Australia, and Hawaii.

**Remarks.** *Coccidoctonus* can be recognised on three main characters – the tridentate mandible, elongate postmarginal vein, and elongate hypopygium.

### *Coccidoctonus dubius* (Girault)

Figures 131–135

Girault, 1915: 102.

*whittieri* Girault, 1918: 66. Smith & Compere, 1928: 292–294. Valentine, 1963: 12; 1967: 1124. **New synonymy.**  
*aliena* Timberlake, 1919: 216. **New synonymy.**

**Female.** Length range (excluding ovipositor) 0.97–2.00 mm ( $n = 22$ ).

Head black, with slight green and brassy reflections on frontovertex; face below top of scrobes bluish or purplish; scape and pedicel black, slightly metallic green or brassy; funicle and club dark brown, but segments 5 and 6 of funicle occasionally a little paler; thorax black, but centre of mesoscutum faintly greenish or brassy mixed with purple, and border purplish; scutellum green, coppery medially; wings hyaline; coxae, femora, and tibiae mostly dark brown; middle femur with a pale sub-basal ring; middle tibia with apex and spur yellowish; fore and hind tarsi testaceous brown, middle tarsi yellowish; sides of propodeum metallic green; gaster dark purplish-brown; basal tergite metallic green edged with purple.

**HEAD.** Sculpture on frontovertex shallow, raised, reticulate between antennal scrobes and eyes, but on lower parts of face more longitudinally elongate. First funicle segment smallest. Mandible as in Figure 131. Relative dimensions, specimen 1 (card-mounted): head width 93, length 90, depth 53; frontovertex width 24; eye length 58, width 47; malar space 34; OPL 8; POL 14; OOL 1; scape length 32, maximum width 10; other proportions of antenna as in Figure 132.

**THORAX.** Sculpture on mesoscutum very fine, raised, shallow, squamiform-reticulate, on scutellum slightly more coarse and irregular. Forewing venation and setation generally as in Figure 133; linea calva interrupted near posterior margin. Relative dimensions, specimen 1: forewing length 238, width 101, marginal fringe 5; hindwing length 173, width 56, marginal fringe 5.

**GASTER.** Exserted part of ovipositor (measured from apex of last tergite) very nearly as long as gaster. Hypopygium exceeding apex of last tergite by nearly as much as length of middle tibial spur.

Relative lengths, specimen 2 (slide-mounted): last tergite 34; ovipositor 119; gonostylus 46 [middle tibia 53].

**Male.** Length range 0.93–1.56 mm ( $n = 22$ ).

Essentially very similar to female, differing mostly in structure of antennae (Figure 134) and genitalia (Figure 135), and in relatively wider frontovertex. Relative dimensions (slide-mounted specimen): head width 48, length 40; frontovertex width 19; scape length 15; middle tibia length 43; aedeagus length 50.

**Type data.** *Rhopalencyrtoidea dubia*, **holotype** female: part on card labelled “*Rhopalencyrtoidea dubia* Girault ♀ Type”, part on slide labelled “*Rhopalencyrtoidea dubia* Gir. ♀ type”; according to Girault (1915, p. 102) the specimen was caught in New South Wales, Chindera, Tweed River by A.P. Dodd on 14 May 1914 (QMBA).

*Cerchysius whittieri*, two **syntype** females: U.S.A., California, San Francisco, ex *Saissetia oleae*, A. Crawford, U.S.N.M. Type No. 20663 (USNM) [not seen].

*Quaylea aliena*, **holotype** female: Honolulu, Oahu, on weeds infested with *Saissetia nigra* (Nietner), 7 July 1916, P.H. Timberlake (USNM) [not seen]. **Paratypes** (20 females, 8 males): 3 females, same data as holotype; 7 females, 5 males, Honolulu, ex *Saissetia nigra*, 22 May – 6 Jun 1919, P.H. Timberlake; 2 females, Honolulu, ex *Scutellista cyanea* Motschulsky, Feb 1906, Kotinsky; 2 females, Honolulu, ex *Asterolecanium* sp. on bamboo, Sep 1905, Kotinsky; 2 females, 1 male, Honolulu, ex *Asterolecanium pustulans* (Cockerell), Dec 1915, Ehrhorn; 1 male, Oahu, Diamond Head, ex *Asterolecanium pustulans* (Cockerell), 7 Apr 1918, Swezey; 3 females, Hawaii, Kona, ex *Coccus viridis* (Green) on coffee, Dec 1915, 25 Aug 1916, 8 Sep 1916, Pemberton; 1 male, Hawaii, Kona, ex *Saissetia hemisphaerica* (Targioni-Tozzetti), Dec 1915, Pemberton; 1 female, Hawaii, Kilauea, on *Dodonaea*, 27 Jun 1917, Swezey (probably in USNM, UCRC, BPBM) [not seen].

**Material examined.** Holotype female of *Rhopalencyrtoidea dubia*, plus 50 non-type examples: 2 females, 2 males, U.S.A., California, determined as *Quaylea whittieri* by P.H. Timberlake; 10 females, 6 males, Australia; 14 females, 16 males, New Zealand (NZAC, BMNH).

ND / NN.

**Habitats noted:** *Bignonia* sp.; *Nothofagus ?clifortioides*; lemon; citrus; mangrove.

Adults have been collected or reared in February–May, August, and October.

**Biology.** In New Zealand, reared as a hyperparasite of the following Homoptera via the pteromalids *Moranila californica* (Howard) and *Aphobetus* sp. (Valentine 1967, p. 1124); *Saissetia oleae* (Bernard) (Coccidae) on lemon and *Bignonia* sp.; *Ceroplastes sinensis* Del Guercio (Coccidae) on mangrove; *Gascardia destructor* (Newstead) (Coccidae) on citrus and lemon; *Eriococcus* sp. (Eriococcidae) on *Nothofagus* sp. and *Nothofagus ?cliffortioides*.

**Remarks.** *C. dubius* is native to Australia, and was introduced into California in 1901 (Bartlett in Clausen 1978) and New Zealand in 1921 in the mistaken belief that it was a primary parasite of *Saissetia oleae* (Bernard) (Valentine 1967). However, there is no indication that this species adversely affects control of this pest by chalcid primary parasites in either country.

### Genus *Coelopencyrtus* Timberlake

Timberlake, 1919a: 218; 1922: 135–142. Burks, 1958: 22–26. Annecke, 1968: 249–258. Type species *Coelopencyrtus odyneri* Timberlake, by original designation; Hawaii.

**Female.** Body usually metallic green, rarely yellow.

**HEAD.** Mandibles relatively very large, strongly tridentate. Mouth opening generally very wide, often exceeding minimum width of frontovertex. Occipital margin not sharp, slightly rounded. Antenna inserted about midway between lower margin of eye and mouth margin or a little below this; scape cylindrical or slightly flattened; funicle 6-segmented, the segments usually strongly transverse, though occasionally longer than broad; club 3-segmented.

**THORAX** in profile with metapleurum and propodeum very broadly in contact with hind coxa, dorsally rather flat. Pronotum with posterior margin hardly concave. Mesoscutum without notaular lines. Forewing hyaline; marginal vein 2.0–3.0× as long as broad, about as long as stigmal vein or postmarginal vein.

**GASTER** a little shorter than thorax. Hypopygium more or less reaching apex of gaster. Last tergite much shorter than middle tibia. Paratergites absent. Gonostyli free.

**Male.** Generally similar to female, but head occasionally much modified in shape, with frontovertex greatly raised above eyes. Antenna 9-segmented, but occasionally scape expanded posteriorly or anteriorly, and funicle segments often greatly broadened, flattened, or even branched. Genitalia fairly simple; digiti each armed with a pair of apical

hooks; parameres each with a single apical seta and often with an additional subapical seta.

**Biology.** Polyembryonic parasites of the larvae of Xylocopidae, Apidae, and Hyleidae (Hymenoptera).

**Distribution.** This cosmopolitan genus of 27 species is represented in New Zealand by only two, both described here as new.

**Remarks.** The centre of diversity for *Coelopencyrtus* appears to be the Pacific.

### KEY TO SPECIES OF *COELOPENYRTUS* KNOWN FROM NEW ZEALAND

- 01 Antenna 11-segmented; funicle segments not broadened, the proximal segments clearly narrower than the pedicel (Fig. 137, 144, 145) ... FEMALES .. 02  
 —Antenna 9-segmented; funicle segments broadened, all at least a little broader than the pedicel (Fig. 141, 148) ... MALES .. 03

#### FEMALES

- 02(01) Head in facial view with frontovertex not wider than an eye; frontovertex relatively shiny, dark green, contrasting strongly with dorsal part of interantennal prominence and face, which are dark purplish-blue ... *australis*  
 —Head in facial view with frontovertex clearly broader than an eye; frontovertex relatively dull, dark green, not contrasting strongly with dorsal part of interantennal prominence and face, which are almost concolorous ... *maori*

#### MALES

- 03(01) Antenna with 2nd–4th funicle segments broadest, and 1st segment about as broad as the 6th or a little narrower (Fig. 141) ... *australis*  
 —Antenna with 1st funicle segment broadest, about 1.5× as broad as the 6th, the segments gradually narrowing distad (Fig. 148) ... *maori*

### *Coelopencyrtus australis* new species

Figures 136–142

**Female.** Length range 0.92–1.60 mm ( $n = 25$ ).

**Holotype.** Length 1.43 mm. Frontovertex dark green mixed with coppery; face below top of anten-

nal scrobes dark blue, with mouth margin and antennal scrobes in part metallic green; antenna dark brown, the scape very slightly brassy; head with moderately conspicuous dark brown setae; thorax dark brown; mesoscutum with a slight blue and purplish lustre; scutellum rather more strongly purplish, with a distinct brassy lustre; sides of thorax and legs, except middle and hind tarsi, dark brown; middle tibial spur and middle and hind tarsi yellow, the pretarsi dark brown; wings hyaline, with dark brown venation; propodeum dark brown; dorsum of thorax clothed with dark brown setae; propodeum outside spiracle with 4 or 5 translucent setae; gaster dark purplish-brown; exerted part of ovipositor dark brown.

**HEAD.** Setae on eyes generally dense, each a little longer than the diameter of a facet, those on frontovertex each about as long as the diameter of an ocellus. Ocelli forming an angle of about 80°. Clypeal margin convex, distinctly and broadly produced medially. Frontovertex with very fine, raised, squamiform-reticulate sculpture of granulate appearance, this more transversely elongate on antennal scrobes, and more longitudinally elongate on genae. Mandible as in Figure 136. Relative dimensions: head width 77, length 72, depth 37; width of mouth opening 41; minimum frontovertex width 24; eye length 42, width 35; malar space 26; OPL 7; POL 13; OOL 0.25; scape length 28, maximum width 7.5; other proportions of antenna as in Figure 137.

**THORAX** dorsally fairly smooth, with shallow, fine, raised, squamiform-reticulate sculpture on mesoscutum and scutellum. Forewing with lineal calva entire, not closed near posterior margin. Relative dimensions: forewing length 180, width 81, venation and setation as in Figure 138; hindwing length 140, width 42, marginal fringe 4.

**GASTER** with exerted part of ovipositor (measured from apex of last tergite) about one-sixth as long as gaster and two-thirds as long as middle tibial spur.

**Paratype.** Hypopygium as in Figure 139. Relative lengths: middle tibia 92; ovipositor 91; gonostylus 41; last tergite 58.

**Variation.** Very little in the material available: lineal calva of forewing either entire or interrupted by 1–3 setae near posterior margin; exerted part of ovipositor very often relatively shorter than in holotype.

**Male.** Length range 1.05–1.25 mm ( $n = 5$ ).

Generally similar to female, but differing in the head being slightly less shiny and with colours not contrasting as strongly, relatively wider frontovertex (Figure 140), antennae (Figure 141), posterior ocelli relatively nearer occipital margin, and

genitalia (Figure 142). Relative dimensions, specimen 1 (card-mounted): head width 63, length 51; width of mouth opening 26; minimum frontovertex width 29; OPL 3; POL 16; OOL 2.5; eye length 29, width 26; malar space 21; scape length 21, maximum width 9. Relative lengths, specimen 2 (slide-mounted): middle tibia 74; aedeagus 61.

**Variation.** Very slight. In one specimen the funicle segments appear to be relatively longer than those figured, but since all the antennal segments seem to be slightly distended this impression may be false.

**Type data.** **Holotype** female: New Zealand, TO, Kaingaroa, 8 December 1959, N.O. Secombe (NZAC).

**Paratypes** (27 females, 6 males). **Three Kings Is** – 2 females, Great I., Nov 1970, JCW (1) and JMcB (1).

**ND** – 1 female, Waipoua, ex larva collected with *Sirex noctilio* Aug 1963, emerged Jan 1964, JMC. **AK** – 1 female, Lynfield, Nov 1980, GK. **TO** – 8 females, 1 male, same data as holotype. **HB** – 1 female, Napier, Bluff Hill, garden, 11–15 Mar 1980, CFB & MFT. **WI-WN** – 1 female, Palmerston North, Munro's Bush, Malaise trap, Mar 1981, PW. **WN** – 1 male, Rimutaka Forest Park (S), mixed *Podocarpus* and *Nothofagus*, 250 m, 26 Feb 1981, JSN.

**NN** – 5 females, 1 male, Nelson, 3 Jan 1931, ESG; 1 female, Richmond, swept potatoes, 5 Mar 1971, EWV. **OL** – 2 females, 2 males, Makarora, Malaise trap, *Nothofagus* forest edge, 21–24 Jan 1978, S&JP. **SL** – 1 female, Invercargill, Queen's Park, *Fuchsia* flowers and foliage, 14 Mar 1977, AKW.

**Chatham Is** – 1 female, Chatham I., Awatotara, beating, 6–19 Feb 1967, GK; 1 female, Chatham I., Tuku, fern, 20 Feb 1967, GWR; 1 female, Chatham I., D.V. streamside, grass + sedge, 21 Feb 1967, EWV; 1 male, Chatham I., L. Rangitai, *Pimelia*, 2 Mar 1967, EWV.

**Material examined.** Type series only (NZAC, BMNH).

Three Kings Is / ND, AK, TO, HB, WI, WN / NN, OL, SL / Chatham I.

Recorded from about sea level to 250 m (WN, Rimutaka Forest Park).

Habitats noted: garden; mixed *Podocarpus* and *Nothofagus*; *Nothofagus* forest edge; potatoes; *Fuchsia* foliage and flowers; grass and sedge; *Pimelea*.

Adults have been collected in January–March, November, and December.

**Biology.** Reared from an unknown larva, very probably that of a solitary bee (Hymenoptera).

**Remarks.** *C. australis* is very similar to *C. maori*. Its females can be separated by the relatively longer gonostyli (nearly half as long as ovipositor), narrower frontovertex, more conspicuously hairy eyes, coloration of frontovertex and face, and shape of hypopygium (cf. Figures 139 and 147). Males can be separated by the key characters.

This species is similar to *kaalae* (Ashmead) and *orbi* Timberlake from Hawaii, and to *arenarius* Erdoes from Europe. Females of *kaalae* have a relatively wider frontovertex, but are otherwise almost indistinguishable; the males have branched antennae. *C. orbi* has more or less naked eyes and a more or less straight clypeal margin; *arenarius* has a more or less straight clypeal margin, and in the male a different-shaped head and antennae with a relatively much longer pedicel and the sixth funicle segment very much narrower than the first.

### ***Coelopencyrtus maori* new species**

Figures 143–149

**Female.** Length range 0.97–1.35 mm ( $n = 6$ ).

**Holotype.** Length 1.11 mm. Frontovertex dark, dull, metallic green mixed slightly with brassy; face at top of antennal scrobes and between eye and scrobe slightly purplish; antenna dark brown, with scape very slightly brassy; head setae moderately conspicuous, dark brown; thorax dark brown; mesoscutum slightly metallic green and brassy; scutellum slightly coppery; sides of thorax and legs, except apices of femora and tibiae and proximal segments of middle and hind tarsi, dark brown; apices of femora and tibiae, middle tibial spur, and proximal segments of middle and hind tarsi yellowish; wings hyaline, with dark brown venation; propodeum dark brown; dorsum of thorax clothed with dark brown setae; propodeum outside spiracle with 4 or 5 translucent setae; gaster dark purplish brown; exerted part of ovipositor dark brown.

**HEAD.** Setae on eyes generally dense, fairly conspicuous, a little shorter than the diameter of a facet, those on frontovertex about as long as the diameter of an ocellus. Ocelli forming an angle of about 80°. Clypeal margin only slightly produced, almost straight. Sculpture on frontovertex very fine, raised, squamiform-reticulate, of granulate appearance, becoming more longitudinally elongate on gena. Mandible as in Figure 143. Relative dimensions: head width 67, length 58, depth 35; width of mouth opening 35; minimum frontovertex width 27.5; eye length 34, width 27; malar space 23; OPL 7; POL 14; OOL 3; scape length 25, maximum width 7; other proportions of antenna as in Figure 144.

**THORAX** dorsally smooth, but with shallow, fine, raised, squamiform-reticulate sculpture on meso-

scutum and scutellum. Forewing with linea calva interrupted by 3 or 4 setae and closed by a single line of setae near posterior margin. Relative dimensions: forewing length 162, width 70, venation and setation as in Figure 146; hindwing length 112, width 34, marginal fringe 4.5.

**GASTER.** Exserted part of ovipositor (measured from apex of last tergite) about one-eighth as long as gaster, two-thirds as long as middle tibial spur.

**Paratype.** Hypopygium as in Figure 147. Relative lengths: middle tibia 83; ovipositor 86; gonostylus 30; last tergite 45.

**Variation.** Very slight in the material available: antennae as in Figures 144 and 145; legs sometimes paler and testaceous instead of dark brown; linea calva sometimes open near posterior margin of forewing; exerted part of ovipositor very often relatively shorter than in holotype.

**Male.** Length range 0.68–1.11 mm ( $n = 2$ ).

Generally similar to female, but differing in the antennae (Figure 148), relatively slightly wider frontovertex, and genitalia (Figure 149). Relative dimensions, specimen 1 (card-mounted): head width 65, length 57; width of mouth opening 32; minimum frontovertex width 30; OPL 5; POL 17; OOL 3.5; eye length 30, width 26; malar space 23; scape length 26, maximum width 11. Relative lengths, specimen 2 (slide-mounted): middle tibia 78; aedeagus 61.

**Variation.** Very slight in the material available.

**Type data.** **Holotype** female: New Zealand, OL, Makarora West, south of [Mt Aspiring] National Park, *Nothofagus* forest, *Coprosma*, and *Pseudowintera*, 18 January 1981, J.S. Noyes & E.W. Valentine (NZAC).

**Paratypes** (8 females, 4 males). **GB** – 5 females, 1 male, L. Waikaremoana, litter 72/18, 17 Jan 1972, GWR.

**NN** – 2 females, Brightwater, Snowden's Bush, 5 Mar 1927, ESG; 2 males, Whangamoia Saddle, Malaise trap, 1–3 Feb 1978, SP.

Also 1 female, 1 male, FR 283 [no further data].

**Material examined.** Type series only (NZAC, BMNH).

**GB / NN, OL.**

Habitats noted: *Nothofagus* forest, *Coprosma*, and *Pseudowintera*; litter.

Adults have been collected in January–March.

**Biology.** Unknown.

**Remarks.** *C. maori* is very similar to *C. australis* (see Remarks under *australis*), and superficially to *C. hylaeoleter* Burks, described from North Amer-

ica. The females are difficult to distinguish, but in *hylaeoleter* the setae on the eyes are extremely short and inconspicuous, the lower parts of the face are dark purplish, and the linea calva is entire. Males, on the other hand, are easier: according to Burks (1958) the male of *hylaeoleter* has the pedicel half as long as the scape and equalling the combined lengths of the first two funicle segments, and the funicle is simple, not branched or flattened (the latter inferred from his comparison with *orbi* Timberlake).

### Genus *Copidosoma* Ratzeburg

Ratzeburg, 1844: 157. Noyes & Hayat, 1984: 257–258.  
Type species *Copidosoma boucheanum* Ratzeburg,  
by monotypy; Germany.

**Female.** Body usually metallic green with brassy, purple, or blue reflections, although some non-metallic species are known; forewing hyaline or distinctly smoky.

**HEAD.** Occipital margin very sharp. Antennal toruli close to mouth margin. Mandible with 3 subequal acute teeth. Scape cylindrical, often relatively very long; funicle 6-segmented, the segments varying from strongly transverse to several times longer than broad; club entire, 2-segmented or 3-segmented, its apex transversely or obliquely truncate or rounded.

**THORAX** in profile with metapleurum and propodeum broadly in contact with hind coxa. Forewing marginal vein variously punctiform to 3.0–4.0× as long as broad; postmarginal vein usually present, never longer than stigmal vein; stigmal lacking an uncus, and with apical sensilla arranged symmetrically in a square; linea calva entire; filum spinosum present. Propodeum medially short.

**GASTER** shorter than thorax to considerably longer. Ovipositor not exerted to greatly exerted. Hypopygium variously reaching from about half-way along gaster to apex. Paratergites absent. Gonostyli free, or sometimes fused to 2nd valvifers.

**Male.** Generally very similar to female, differing most in antennal and genital structure. Antenna 9-segmented, in some species almost identical to that of female, in others markedly different, the segments often much longer or much shorter, and clothed in relatively long, serrate or branched hairs. Genitalia relatively elaborate: phallobase often with many setae posteriorly; paramere often very long and distinct, with several long setae or various projections; digitus often very long, with several teeth apically; aedeagus occasionally armed with 1 or 2 subapical projections ventrally.

**Biology.** Polyembryonic parasites of lepidopteran larvae.

**Distribution.** Cosmopolitan. Of the 150 or so described species, only four are known from New Zealand.

**Remarks.** *Copidosoma* is morphologically very diverse, but all species have a very characteristic arrangement of sensilla at the apex of the stigmal vein and lack an uncus, as in all other genera placed in the subtribe Copidosomatina by Trjapitzin (1973b). These latter genera have yet to be found in New Zealand. Outside the Copidosomatina only one genus in the subfamily Encyrtinae has so far been noted with a similar arrangement at the apex of the stigmal vein – *Paratetracnemoidea* Girault. This can be separated from *Copidosoma* and from other genera of the subtribe on many characters, but most easily by the presence of a short, horn-like projection between the antennal toruli, and by the middle tooth of the mandible being very much the longest.

### KEY TO SPECIES OF *COPIDOSOMA* KNOWN FROM NEW ZEALAND

- 01 Forewing marginal vein punctiform, not or hardly longer than broad (Fig. 151, 162)... 02  
—Forewing marginal vein at least twice as long as broad (Fig. 154, 155, 157) ... 03
- 02(01) Posterior ocellus separated from eye margin by about its own diameter; funicle segments relatively narrower (female – 2nd funicle segment about twice as long as broad (Fig. 150); male – 1st funicle segment at least twice as long as broad (Fig. 152)); forewing postmarginal vein about as long as marginal vein (Fig. 151) ... *desantisi*  
—Posterior ocellus separated from eye margin by about half its diameter; funicle segments relatively broader (female – 2nd funicle segment about 1.5× as long as broad (Fig. 161); male – 1st funicle segment less than twice as long as broad (Fig. 163)); forewing postmarginal vein much shorter than marginal vein (Fig. 162) ... *koehleri*
- 03(01) Apex of club rounded; at least some funicle segments longer than broad (Fig. 153). Female: club 3-segmented; exerted part of ovipositor at least about one-fifth as long as gaster. Male: unknown ... *exvallis*

—Apex of club strongly obliquely truncate, the truncate surface clearly much longer than remainder of ventral surface; all funicle segments transverse or quadrate, none longer than broad (Fig. 156, 158). Female: club entire (Fig. 158); ovipositor not exerted. Male: antenna very similar to that of female (Fig. 158) ... *floridanum*

### *Copidosoma desantisi* Annecke & Mynhardt

Figures 150–152

Annecke & Mynhardt, 1974: 32.

*koehleri* Blanchard. Tachikawa, 1968: 113–115 [mis-identification].

Very similar to *koehleri*, but separable on comparison of the following characters with those given for *koehleri*.

**Female.** Length range 1.13–1.38 mm ( $n = 5$ ).

Middle tibia almost completely dark brown, but apically very narrowly amber; middle tibial spur dusky yellow; middle and hind tarsi orange-brown.

**HEAD.** Proportions of antennae as in Figure 150. Relative dimensions: OPL 2; POL 19.5; OOL 4.

**THORAX.** Forewing venation as in Figure 151.

**GASTER.** Exserted part of ovipositor about one-eighth as long as gaster.

**Male.** Length 1.32 mm ( $n = 1$ ).

Generally similar to female, but differing in its slightly wider frontovertex, slightly higher placement of antennal toruli, antennae (Figure 152), and genitalia. Relative dimensions: OPL 2.5; POL 22; OOL 6.

**Type data.** **Holotype** female: U.S.A., California, Albany, lab. stock F25 of parents from Limanche (Chile), ex *Phthorimaea operculella*, 1973, L. Caltagirone (MLPA) [not examined].

**Paratypes:** 164 females, 119 males, same data as holotype.

**Material examined.** Three non-type females from New Zealand (NZAC).

**Biology.** A polyembryonic parasite of larvae of *Phthorimaea operculella* (Zeller) (Lepidoptera: Gelechiidae).

**Remarks.** The above specimens of *C. desantisi* were imported from Australia in November 1949, but there is no record of the species having been released in New Zealand (E.W. Valentine, pers. comm.).

*C. desantisi* is very close to *C. koehleri*, and has been confused with it in the past. It can be separated reliably by the key characters, and by comparison of the characters listed above (see also Annecke & Mynhardt 1974).

### *Copidosoma exvallis* new species

Figures 153–155

**Female.** Length (including ovipositor) 1.44 mm.

Frontovertex dark metallic green, but anterior to ocelli almost blackish; eye margin very narrowly coppery; antennae dark brown. Pronotum dark purplish brown with some brassy reflections; mesoscutum metallic green, the posterior margin a little coppery; scutellum metallic green, but largely coppery in middle; sides of thorax dark brown, weakly brassy; coxae, fore femur and hind femur, tibia, and tarsus dark brown; fore tibia and tarsus and middle femur and tibia testaceous yellow; middle tibial spur and tarsus yellow; propodeum dark brown, but on side above coxa slightly metallic green; gaster dark purplish brown; exserted part of ovipositor dark brown.

**HEAD.** Ocelli forming an angle of about 90°. Antennal scrobes distinct but shallow, straight, meeting dorsally, reaching a little more than halfway from toruli to anterior ocellus; torulus separated from mouth margin by about half its own length, its dorsal margin a little below ventral margin of eye; club 3-segmented, apically rounded. Relative dimensions: head width 68, length 67, depth 36; minimum frontovertex width 34; OPL 4; POL 17; OOL 6; eye length 40, width 29; malar space 27; scape length 40, maximum width 6.5; other proportions of antenna as in Figure 153.

**THORAX.** Sculpture on mesoscutum, scutellum, and mesopleurum shallow, raised, reticulate, on scutellum irregular, longitudinally elongate, shallow towards apex and sides. Propodeum medially about one-seventh as long as scutellum, with 6 or 7 translucent setae outside spiracle. Relative dimensions: forewing length 196, width 90, venation and setation as in Figures 154 and 155; hindwing length 129, width 41, marginal fringe 5.

**GASTER.** A little shorter than thorax. Exserted part of ovipositor about one-fifth as long as gaster and four-fifths as long as middle tibial spur. Last tergite about four-fifths as long as middle tibia. Hypopygium more or less reaching apex of gaster.

**Male.** Unknown.

**Type data.** **Holotype** female: New Zealand, CL, Kauaeranga Valley, 1 February 1981, J.S. Noyes (NZAC).

**Material examined.** Holotype only.

Habitat noted: secondary kauri forest.

**Biology.** Unknown.

**Remarks.** *C. exvallis* is probably closest to *C. insularis* Timberlake, described from the Marquesas Islands, but *insularis* has a wider frontovertex (about one-third head width), ocelli forming a near-equilateral triangle, POL about three times OOL, the first funicle segment as large as the second, and the forewing marginal vein about twice as long as broad and three-quarters as long as the stigmal vein.

### *Copidosoma floridanum* (Ashmead)

status reversed, new combination

Figures 156–159

Ashmead, 1900: 365. De Santis, 1964: 285–288. Valentine, 1974: 1230, 1231, 1233 (*Litomastix* sp.). Cumber, 1975: 1425 (*Litomastix* sp.). Thomas, 1975: 1510 (*Litomastix* sp.). Roberts, 1979: 56 (*Litomastix* sp.).  
*maculata* Ishii, 1928: 115. Tachikawa, 1963: 199. Early, 1984: 280–281. **New synonymy.**

This species has been illustrated, as *Litomastix* sp., by Valentine (1974, p. 1230, fig. 1) and Cumber (1975, p. 1425, fig. 5).

**Female.** Length range 0.79–1.11 mm ( $n = 19$ ).

Frontovertex dark green or blue-green, slightly shiny; face dark purple or green mixed with coppery purple; scape and pedicel very dark brown, but scape slightly metallic green; flagellum dark brown; funicle sometimes conspicuously paler testaceous brown; pronotum and scutellum purple, but scutellum mixed with coppery, its apex metallic green; mesoscutum green, very shiny; mesopleurum purple; legs very dark brown, but extreme apices of femora and tibiae amber-brown; middle tibial spur yellowish, and tarsi testaceous brown; wings hyaline, very slightly smoky below marginal vein; propodeum dark purple-brown; gaster dark purple-brown.

**HEAD.** Sculpture on frontovertex and face shallow, raised, reticulate, on genae rather more elongate. Relative dimensions, specimen 1 (card-mounted): head width 58, length 60, depth 28; frontovertex width 32; eye length 32, width 24; malar space 23; OPL 3; POL 18; OOL 5.5; scape length 33, width 6; other proportions of antenna as in Figure 156.

**THORAX.** Mesoscutum with shallow, raised, reticulate to squamiform-reticulate sculpture. Scutel-

lum with similar but slightly finer sculpture, its sides and apex smooth, shining. Proportions of venation and distribution of setae as in Figure 157. Relative dimensions, specimen 2 (slide-mounted): forewing length 105, width 49.5, length of marginal fringe 3; hindwing length 75, width 20, length of marginal fringe 3.5.

**GASTER** about as long as thorax. Ovipositor not exerted. Hypopygium reaching to about three-fifths along gaster. Relative lengths, specimen 2: last tergite 73; ovipositor 79; gonostylus about 31 [middle tibia 109].

**Male.** Length range 0.98–1.11 mm ( $n = 22$ ).

Extremely similar to female and often difficult to separate, differing slightly in structure of antennae (Figure 158) and genitalia (Figure 159).

**Type data.** *Berecynthus floridanus*, **syntypes:** 3 females (or 2 females, 1 male) on card point, labelled “Bisc. Bay, Fla”, “Head mounte”, “Type No. 4850 U.S.N.M.”, “*Berecynthus floridanus* Ash. ♀”; parts on slide labelled “*Berecynthus floridanus* Ashm. ♀ type”, “4850” (USNM).

*Litomastix maculata* Ishii, **syntypes:** several females, Japan, Ozuki, Kanagawa-ken, June 1923 (ICTJ) [not seen].

**Material examined.** Syntypes of *floridanum*, plus 92 non-type examples: 2 females, 1 male from Japan, determined as *Litomastix maculata* Ishii by T. Tachikawa; 55 females, 34 males from New Zealand (NZAC, BMNH).

ND, AK, CL, BP / NN, MB, BR, MC.

Habitats noted: mixed *Podocarpus* and broad-leaf; kauri forest; second-growth bush; garden; tomato.

Adults have been collected in January–May and October–December.

**Biology.** A polyembryonic parasite of larvae of *Chrysodeixis eriosoma* (Doubleday) (Lepidoptera: Noctuidae).

**Remarks.** The specimens from Japan determined as *maculata* by Tachikawa are indistinguishable morphologically from material compared with the syntypes of *floridanum*. However, they do differ in having a slightly more metallic mesoscutum. This difference is here considered to be within the range of variation of *floridanum*, and hence the two nominal species are treated as synonymous.

*C. floridanum* was introduced into New Zealand from Australia in 1969 in an attempt to control *Chrysodeixis eriosoma* (= *chalcites*; misidentification). Since then it has become firmly established in several localities, and is proving particularly effi-

cient as a control agent (Thomas 1975, p. 1510; as *Litomastix* sp.). See also Valentine (1974), Cumber (1975), and Roberts (1979) (as *Litomastix* sp.).

This species is very close to, but distinct from *truncatellum* (Dalman). The female differs in the first segment of the funicle being subequal to the second, whereas in *truncatellum* it is distinctly smaller. The male differs in the aedeagus being simple subapically, whereas in *truncatellum* it has a pair of submedian, subapical hooks. It is probable that all published records of *truncatellum* as a parasite of plusiine Lepidoptera are erroneous and actually refer to *floridanum*. During this study a small amount of reared material from Europe and North America has been studied (BMNH). Specimens from plusiine Lepidoptera have proved to be *floridanum*, whereas *truncatellum* has been reared only from *Apamea monoglypha* (Hufnagel) (Noctuidae: Amphipyrrinae). A more detailed treatment of these species will be published elsewhere.

### *Copidosoma koehleri* Blanchard

Figures 160–163

Blanchard, 1940: 107. Annecke & Mynhardt, 1974: 32. *uruguayensis* Tachikawa, 1968: 115.

**Female.** Length range (including ovipositor) 1.14–1.21 mm ( $n = 4$ ).

Head dull purple-brown with slight green and brassy reflections on frontovertex; antenna dark brown, but scape slightly metallic green; pronotum and scutellum purple, slightly coppery; mesoscutum metallic green or bluish green with faint coppery, purple, and brassy reflections; mesopleurum purple mixed with blue; coxae dark brown; femora and tibiae dark brown, but apices of middle and hind femora and tibiae yellow, and middle tibia distally more broadly so; foretarsus yellow-brown; middle tibial spur and middle and hind tibiae yellow; pretarsi dark brown; wings hyaline; propodeum with sides shining green; gaster dark purple-brown, its 1st tergite shining green.

**HEAD.** Sculpture shallow, fairly regular, raised, and reticulate on frontovertex, becoming longitudinally elongate and squamiform-reticulate on lower parts of face and genae. Mandible as in Figure 160. Relative dimensions, specimen 1 (card-mounted): head width 63, length 60, depth 35; frontovertex width 29; eye length 36, width 27; malar space 23; OPL 3.5; POL 17; OOL 2.5; scape length 36, width 6.5; other proportions of antenna as in Figure 161.

**THORAX.** Sculpture on mesoscutum shallow, raised, squamiform-reticulate, but medially near posterior margin more or less reticulate. Scutellum

with similar sculpture to that near hind margin of mesoscutum, but more elongate near sides, and with apex almost smooth. Forewing venation as in Figure 162. Relative dimensions, specimen 2 (slide-mounted): forewing length 97, width 44, marginal fringe 2; hindwing length 68, width 20, marginal fringe 2.

**GASTER** slightly shorter than thorax. Hypopygium more or less reaching apex of gaster. Ovipositor exerted, the exerted part about  $0.2\times$  as long as gaster. Relative lengths, specimen 2: last tergite 32; ovipositor 64; gonostylus 21 [middle tibia 43].

**Male.** Length range 0.87–1.03 mm ( $n = 4$ ).

Very similar to female, except for very slightly wider frontovertex, higher placement of antennal toruli, and structure of antennae (Figure 163) and genitalia. Relative dimensions: specimen 1 (card-mounted) – OPL 3; POL 24.5; OOL 4.5; specimen 2 (slide-mounted) – head width 97; frontovertex width 51; aedeagus length 86; middle tibia length 94.

**Type data.** Lectotype female: Argentina, Tandil, January 1938, Koehler (MLPA).

**Paralectotypes:** 6 females, same data as lectotype (MLPA, PPRI).

**Material examined.** Lectotype female, plus 8 non-type examples (4 females, 4 males; voucher specimens, NZAC).

**Biology.** A polyembryonic parasite of larvae of *Phthorimaea operculella* (Zeller) (Lepidoptera: Gelechiidae).

**Remarks.** *C. koehleri* was introduced into New Zealand in 1964 from the laboratories of the Commonwealth Institute of Biological Control at Fontana, California, U.S.A. to control potato tuber moth, *Phthorimaea operculella* (E.W. Valentine, pers. comm.). It was released at Nelson (NN), Lincoln (MC), and Palmerston North (WI–WN) (E.W. Valentine, pers. comm.) but has not been recovered since, and therefore has probably failed to establish. It is very close to *C. desantisi* (see Remarks under *desantisi*).

### Genus *Encyrtus* Latreille

Latreille, 1809: 31. Graham, 1969: 305–311. Sugonjaev & Gordh, 1981: 883–897. Type species *Chrysis infida* Rossi, by designation of Latreille (1810, p. 436); Italy.

**Female.** HEAD. Occipital margin sharp. Fronto-

vertex generally relatively broad. Antennal torulus a little lower than lower margin of eye; scape subcylindrical; funicle 6-segmented; club 3-segmented, apically rounded. Mandible edentate, broadly rounded apically.

THORAX in profile with propodeum broadly in contact with hind coxa, and metapleurum almost completely hidden. Mesoscutum and scutellum convex; scutellum with a subapical tuft of setae. Forewing infusate below submarginal vein and from level with marginal vein to apex; marginal vein short, not more than twice as long as broad and several times shorter than postmarginal vein, which is subequal to the strongly curved stigmal vein.

GASTER a little shorter than thorax. Last tergite a little shorter than middle tibia, its anterior margin very strongly concave. Hypopygium very nearly reaching apex of gaster. Paratergites absent. Gonostyli fused to 2nd valvifers.

**Male.** Generally similar to female, but usually smaller and paler or darker. Antenna 9-segmented; torulus with lower margin about level with lower margin of eye; funicle segments clothed in whorls of long setae; club entire. Forewing often hyaline or slightly infusate; postmarginal vein at least a little longer than stigmal vein. Genitalia with digiti relatively long, often very broad, and often each with 3 or more subapical hooks; process of paramere long.

**Biology.** Parasites of Coccidae (Homoptera).

**Distribution.** Cosmopolitan. Of the 40 or so described species, only two are known from New Zealand.

**Remarks.** *Encyrtus* is recognised easily by the tuft of setae at the apex of the scutellum and the infusate forewing with a relatively short marginal vein and long postmarginal and stigmal veins. Males have not yet been reported from New Zealand, but are nonetheless included in the key to species, below.

#### KEY TO SPECIES OF *ENCYRTUS* KNOWN FROM NEW ZEALAND

- 01 Forewing infusate (Fig. 166); antenna 11-segmented; club 3-segmented; funicle clothed in setae much shorter than the diameter of a segment (Fig. 165, 172)  
... FEMALES .. 02  
—Forewing hyaline; antenna 9-segmented; club entire; funicle clothed in whorls of

setae clearly much longer than the diameter of a segment (Fig. 169, 174)

... MALES .. 03

#### FEMALES

- 02(01) Mesoscutum medially blackish, laterally reddish; antennal funicle reddish or at least paler proximally; sculpture of mesoscutum medially shallow, squamiform-reticulate, contrasting with deeper longitudinally striate-reticulate sculpture laterally; gena with numerous short, brown hairs each not or hardly longer than those on frontovertex ... *infelix*  
—Mesoscutum more or less entirely reddish, sometimes with front or hind margin infusate; antennal funicle dark brown; sculpture of mesoscutum longitudinally striate-reticulate medially as well as laterally; gena with numerous conspicuous, elongate black hairs about twice as long as those on frontovertex ... *lecaniorum*

#### MALES

- 03(01) Head and dorsum of thorax mostly dark brown; scape clearly longer than combined length of pedicel and 1st funicle segment (Fig. 169); sculpture in centre of mesoscutum more or less polygonal or squamiform (Fig. 170), contrasting with longitudinally striate-reticulate sculpture laterally; genitalia with digiti relatively slender, subapically hardly wider than posterior projection of paramere (Fig. 171) ... *infelix*  
—Head and dorsum of thorax largely whitish and reddish marked with dark brown below eye, along anterior margin of mesoscutum, and occasionally also in middle of mesoscutum and scutellum; scape about as long as combined length of pedicel and 1st funicle segment (Fig. 174); sculpture in centre of mesoscutum similar to that at sides, longitudinally striate-reticulate (Fig. 173); genitalia with digiti very broad, subapically at least about 5.0× as wide as posterior projection of paramere (Fig. 175) ... *lecaniorum*

#### *Encyrtus infelix* Embleton

Figures 164–171

Embleton, 1902: 223; 1904: 231–254. Gourlay, 1930a: 6; 1930b: 341. Valentine, 1967: 1122. Graham, 1969: 307–308.

*proserpinensis* Girault, 1915: 130. New synonymy.  
*hortensis* Girault, 1915a: 130. New synonymy.

**Female.** Length range 1.41–2.06 mm ( $n = 15$ ).

Head mostly orange-brown, marked with dark brown between posterior ocelli and occipital margin and around mouth margin; scape yellowish, paler apically; pedicel and proximal funicle segments orange; distal funicle segments and club dark brown; thorax orange-brown; posterior margin of pronotum, mesoscutum medially, scutellum at extreme base and apical tuft of setae, and posterior part of mesopleurum dark brown; scutellum at base with numerous silvery-white setae; fore and hind coxae white; middle coxa dark brown; fore and middle femora basally white, apically pale orange; middle femur subapically marked with dark brown; fore and middle tibiae orange, the latter marked with a basal dark brown, longitudinal streak; fore and middle tarsi yellow-orange or orange; hind femur amber marked with a dorsal, longitudinal, dark brown streak; hind tibia dark brown; hind tarsus whitish, but base of proximal segment and pretarsus dark brown; forewing infusate as in Figure 166; propodeum orange-brown; gaster dark purple-brown.

**HEAD** with a transverse carina from antennal scrobe almost to eye margin. Setae on gena not conspicuous, about as long as those on frontovertex. Mandible as in Figure 164. Relative dimensions, specimen 1 (card-mounted): head width 50, length 43, depth 22; frontovertex width 20.5; eye length 29, width 22; malar space 19; OPL 3; POL 12; OOL 2; scape length 22, width 4.5; other proportions of antenna as in Figure 165.

**THORAX.** Mesoscutum with shallow, raised, reticulate to squamiform-reticulate sculpture in centre, laterally with striate-reticulate sculpture. Forewing venation and setation as in Figure 166. Scutellum as in Figure 167. Relative dimensions, specimen 2 (slide-mounted): forewing length 162, width 65, marginal fringe 2; hindwing length 128, width 43, marginal fringe 3.5.

**GASTER** a little shorter than thorax. Hypopygium reaching slightly more than four-fifths along gaster. Ovipositor as in Figure 168. Relative lengths, specimen 2: last tergite 60; ovipositor 28 [middle tibia 78].

**Male.** Length 1.82 mm ( $n = 1$ ).

Body generally dark brown, with small areas of orange on face, sides of mesoscutum, scutellum, and pronotum, and anterior parts of mesopleurum; antenna with scape and pedicel yellow or yellowish, ventral surfaces of funicle segments orange, funicle segments dorsally and club dark brown; legs coloured as in female; forewing hyaline. Similar in general structure to female, but differing in antenna (Figure 169), forewing postmarginal vein much longer than stigmal vein, and genitalia (Figure 171).

Mesoscutum with sculpture as in Figure 170. Relative dimensions, specimen 1: head width 43; frontovertex width 22; OPL 2; POL 13; OOL 3; scape length 15, width 4. Relative lengths, specimen 2: aedeagus 27; middle tibia 56.

**Type data.** *infelix* Embleton: **lectotype** female, England, Cambridge, ex *Lecanium hemisphaericum* Targioni-Tozzetti in greenhouse, A.L. Embleton (ZMUC) [not seen]. **Paralectotypes:** 3 females, same data as lectotype (ZMUC) [not seen].

*proserpinensis* Girault: 2 **syntype** females, Australia, Queensland, Proserpine, forest, 3 November 1912 (on card, labelled “*Eucomys proserpinensis* Gir. ♀ Types”; parts of one specimen – head, hind-leg, foreleg, and left forewing – on slide, labelled “*Eucomys proserpinensis* ♀ 3056”) (QMBA).

*hortensis* Girault: **holotype** female, Australia, Queensland, Cairns, Harvey’s Creek, 4 August 1914, A.P. Dodd (part on card, labelled “*Eucomys hortensis* Gir. ♀ Type”; right forewing on slide, labelled “*Encyrtus newcombi* *Eucomys hortensis* (wing only) ♀ 2997”) (QMBA).

**Material examined.** Type material as above, plus 18 non-type examples (16 females from New Zealand, plus 2 males from India; NZAC, BMNH).

AK / MC.

**Habitats** noted: greenhouses; *Platyserium alcornae*; *Luculia* sp.; *Choysia* sp.

Adults have been collected or reared in February–June, September, and October.

**Biology.** Reared from *Saissetia coffeae* (Walker) (Homoptera: Coccidae) on *Platyserium alcornae* in greenhouses (Gourlay 1930, p. 341) and on *Choysia* sp. Also a single female reared along with *Encyrtus lecaniorum* from *Eulecanium ?corni* (Bouché) (Homoptera: Coccidae). Its biology as a parasite of *S. coffeae* has been described in some detail by Embleton (1904).

**Remarks.** A specimen agreeing well with the syntypes of *Eucomys proserpinensis* has been compared with material determined as *infelix* (BMNH), and falls within the range of variation of *E. infelix*. *E. hortensis* has been synonymised previously with *E. proserpinensis* (Noyes & Hayat 1984, p. 269). The male of *infelix* is very rare, and has yet to be found in New Zealand. *E. infelix* is a cosmopolitan species, and has been an important factor in the control of *Saissetia coffeae* in California since its introduction there from Hawaii in 1921. It was primarily introduced for the control of *Saissetia oleae* (Bernard) (Bartlett in Clausen 1978). There is no record of it having been introduced into New Zealand.

## *Encyrtus lecaniorum* (Mayr)

Figures 172–175

Mayr, 1876: 740, 741. Trjapitzin, 1957: 710–714. Tachikawa, 1963: 88–89. Valentine, 1963: 12; 1967: 1122. Graham, 1969: 306 (key), 308.

*argenticoxa* Girault, 1915a: 129. New synonymy.

*hibisci* Girault, 1915a: 128. New synonymy.

*aurantifasciata* Girault, 1915a: 129. New synonymy.

*argentiscapus* Girault, 1915a: 130. New synonymy.

**Female.** Length range 1.83–2.08 mm ( $n = 8$ ).

Head mostly orange-brown, but with a dark brown streak from gena to lower part of temple; scape yellowish-white, with a dark brown streak along dorsal edge; pedicel and flagellum dark brown; thorax orange-brown; pronotum medially and on posterior margin dark brown; mesoscutum anteriorly dark brown, posteriorly dark orange-brown, these areas separated by a transverse orange-brown band; sides and venter of thorax orange to orange-brown; fore and hind coxae off-white; middle coxa ventrally dark brown, dorsally orange-brown; fore femur yellowish, with a dark brown streak along dorsal and ventral edges; fore tibia similar but darker; middle femur and tibia similar but without the ventral dark brown streak; hind femur dark orange-brown; hind tibia dark brown; foretarsus orange-brown; middle and hind tarsi yellowish, the pretarsi dark brown; basal hind tarsal segment proximally dark brown; forewing infusate more or less as in Figure 166; gaster dark purple-brown.

HEAD with a transverse carina from antennal scrobe almost to eye margin. Setae on gena conspicuous, at least about twice as long as those on frontovertex. Mandible similar to Figure 164. Relative dimensions, specimen 1 (card-mounted): head width 49, length 43, depth 22; frontovertex width 18; eye length 29, width 21; malar space 15; OPL 2; POL 9; OOL 2; scape length 20, width 4.5; other proportions of antenna as in Figure 172.

THORAX with conspicuous, raised, striate-reticulate sculpture throughout. Forewing venation and setation similar to Figure 166, but with group of setae adjacent to parastigma a little less dense. Relative dimensions, specimen 2 (slide-mounted): forewing length 129, width 53, marginal fringe 4; hindwing length 103, width 31.5, marginal fringe 4.5.

GASTER about two-thirds as long as thorax. Hypopygium very nearly reaching apex of gaster. Relative lengths, specimen 2: last tergite 43; ovipositor 47 [middle tibia 65].

**Male.** Length 0.97–1.52 mm ( $n = 3$ ).

Generally very similar in coloration to female, but lower parts of face yellowish-white, temples and occiput dark brown, antennal flagellum pale brown,

forewings hyaline, and gaster ventrally orange.

Similar in general structure to female, but differing in antennae (Figure 174), forewing postmarginal vein longer than stigmal vein, and genitalia (Figure 175). Mesoscutum with sculpture as in Figure 173. Relative dimensions, specimen 1 (card-mounted): head width 37; frontovertex width 21; OPL 1.5; POL 10; OOL 3.5; scape length 12, width 4. Relative lengths, specimen 2 (slide-mounted): aedeagus 29.5; middle tibia 53.

**Type data.** *lecaniorum* Mayr: **syntype** females, Austria, Schoenbrunn, ex *Lecanium* sp., Kollar (NHMW) [not seen].

*argenticoxa* Girault: **syntype** females – 1, Australia, Queensland, Gordonvale, on card point, labelled “*Eucomys argenticoxa* Girault ♀ Type” (QMBA); 1, Australia, Queensland, Ingham [?lost].

*hibisci* Girault: **syntype** females – 2, Australia, Queensland, Mossman, on *Hibiscus*, 30 October 1911; 1, Australia, Queensland, Herbert River, Halifax, 26 February 1913 (QMBA).

*aurantifasciata* Girault: **holotype** female, Australia, Queensland, Innisfail, window, 11 January 1912 (QMBA).

*argentiscapus* Girault: **holotype** female, Australia, New South Wales, Grafton (head, right forewing, and hind legs on slide labelled “*Eucomys argentiscapus* G. ♀”, “Type Hy/3055”) (QMBA).

**Material examined.** Type specimens as above, plus 12 non-type examples (8 females from New Zealand, 4 males from Pakistan, Cyprus, and Mozambique; NZAC, BMNH).

AK / —.

Habitats noted: *Luculia* sp.; *Meryta sinclairii*.

Adults have been reared in February and May.

**Biology.** Reared from *Eulecanium ?corni* (Bouché) (Homoptera: Coccidae) on *Luculia* sp. and from *Coccus* sp. on *Meryta sinclairii*.

**Remarks.** A specimen agreeing with the extant syntype of *Eucomys argenticoxa* has been compared with material determined as *lecaniorum* (BMNH), and falls within the range of variation of this species. *E. hibisci*, *E. aurantifasciata*, and *E. argentiscapus* have previously been synonymised with *argenticoxa* (Noyes & Hayat 1984, p. 269).

The male of this species is relatively rare, and has yet to be found in New Zealand.

Valentine (1963, p. 12; 1967, p. 1122) reported this species as a parasite of *Saissetia coffeae* (Walker). There is no material of *lecaniorum* reared from this host in NZAC, and it is possible that the record was in error for *infelix*.

*E. lecaniorum* is a cosmopolitan species, and has been introduced and established as a parasite of *Coccus hesperidum* Linnaeus (Homoptera: Coccidae) on citrus in Texas, U.S.A. (Bartlett in Clausen 1978, p. 60). There is no record of its introduction into New Zealand.

### Genus *Epiblatticida* Girault

Girault, 1915a: 117. Noyes & Hayat, 1984: 168, 198, 218 (key), 272. Type species *Epiblatticida lambi* Girault, by original designation; Australia.

**Female.** Body dark brown or blackish with slight metallic blue or green reflections on head and thorax.

**HEAD.** Occipital margin sharp. Antennal toruli about midway between mouth margin and lower margin of eye; scape subcylindrical, or a little broadened and flattened; funicle 6-segmented, the segments strongly transverse and broadening distally; club 3-segmented, its apex rounded. Eye with dense, short, almost invisible hairs. Mandible with 2 teeth and a broadly truncate upper tooth.

**THORAX** in profile with metapleurum and propodeum broadly touching hind coxa; notaular lines absent. Scutellum convex. Forewing hyaline; marginal vein about 3.0–4.0× as long as broad, subequal to stigmal vein; postmarginal vein at least a little shorter than stigmal vein; linea calva entire; filum spinosum present. Propodeum medially short.

**GASTER** very slightly shorter than thorax. Ovipositor exerted, the exerted part at least about one-quarter as long as gaster and distinctly down-curved towards apex. Hypopygium slightly exceeding apex of gaster. Paratergites absent. Gonostyli free.

**Male.** Generally very similar to female, differing most in antennal and genital structure. Antenna 9-segmented; toruli with ventral margin a little below lower margin of eye; flagellum clothed in whorls of long setae; funicle segments at least 1.5× as long as broad; club entire. Aedeagus relatively long, at least about two-thirds as long as middle tibia; parameres short, less than half as long as digiti, each with a single seta apically; digiti each with a single apical hook.

**Biology.** Known only for *E. minutissima*, a hyperparasite of *Psylla* sp. (Homoptera: Psyllidae) via *Psyllaephagus* sp. (Hymenoptera: Encyrtidae).

**Distribution.** This genus of five species is represented in New Caledonia, Australia, and New Zealand (one species).

**Remarks.** Females of *Epiblatticida* can be recognised by the combination of short funicle segments, forewing postmarginal vein shorter than stigmal vein, down-curved, exerted ovipositor, and hypopygium slightly exceeding apex of gaster. Males are very difficult to recognise, but in New Zealand are distinguishable by the structure of the antenna, shape of the mandible, and forewing venation.

This genus is closely related to *Coccidoctonus*, but can be separated by the shorter postmarginal vein (in *Coccidoctonus* this vein is longer than the stigmal) and much shorter funicle segments.

### *Epiblatticida minutissima* Girault

Figures 176–181

Girault, 1923: 147. Noyes & Hayat, 1984: 272.

**Female.** Length range (including ovipositor) about 0.85–1.19 mm ( $n = 13$ ).

Frontovertex dull, dark, metallic green, but from top of antennal scrobes downwards purplish; mouth margin green; antenna with radicle dark brown; scape and pedicel blackish with slight brassy reflections; extreme apex of scape and of pedicel testaceous yellow; flagellum testaceous yellow; proximal 4 funicle segments and club conspicuously darker; thorax blackish; pronotum purplish; mesoscutum and scutellum with slight brassy and green reflections, the scutellum also slightly purplish; mesopleurum distinctly purplish; coxae blackish, slightly brassy; femora and tibiae very dark brown, but femora slightly metallic brassy, and tibiae more broadly so, especially middle tibia; apices of femora testaceous yellow; foretarsus testaceous brown; middle tibial spur white; middle and hind tarsi yellow; forewing hyaline, very slightly infusate below marginal vein (see Figure 178); venation dark brown; sides of propodeum above coxae metallic green; gaster dark purplish brown, its basal tergite slightly metallic green; exerted part of ovipositor sheaths dark brown.

**HEAD.** Ocelli forming an angle of about 80°. Sculpture on frontovertex shallow, raised, reticulate, of rough appearance, but more longitudinally elongate on genae and much shallower on inter-antennal prominence. Mandible as in Figure 176. Relative dimensions: head width 62, length 53, depth 31; minimum frontovertex width 24.5; OPL 4; POL 12; OOL 2.5; eye length 34, width 30; malar space 24; scape length 21, maximum width 5.5; other proportions of antenna as in Figure 177.

**THORAX.** Mesoscutum and scutellum with shallow, raised, squamiform-reticulate sculpture, that on scutellum a little deeper, and more longitudinally elongate at sides. Mesopleurum with very

shallow, raised, irregular, reticulate sculpture. Propodeum with about 15 setae outside spiracle, these extending down sides almost to hind coxa. Relative dimensions: forewing length 151, width 69, venation and setation as in Figure 178; hindwing length 105, width 30, marginal fringe 5.

GASTER a little shorter than thorax. Exserted part of ovipositor (measured from apex of last tergite) about one-third as long as gaster, and nearly twice as long as middle tibial spur. Relative lengths: last tergite 46; ovipositor 109; gonostylus 36 [middle tibia 68].

**Variation.** Very slight in the material available. Occasionally fore tibia hardly infusate; holotype with infusate areas of legs less extensive than as described above.

**Male.** Length range 0.79–1.19 mm ( $n = 16$ ).

Generally similar to female except for antennae (Figure 180) and genitalia (Figure 181). Mandible as in Figure 179. Antennal flagellum pale yellowish-brown; face metallic green. Relative dimensions, specimen 1 (card-mounted): head width 60, length 52; minimum frontovertex width 30; eye length 32, width 24; malar space 22; OPL 2.5; POL 14.5; OOL 3.5; scape length 17, width 6.5. Relative lengths, specimen 2 (slide-mounted): aedeagus 49.5; middle tibia 69.

**Variation.** Negligible in the material available.

**Type data.** **Holotype** female on slide with holotype female of *Cristatothorax vinculum* Girault, labelled "*Microencyrtus minutissimus* Gir. ♀ type" (QMBA). According to Girault (1923) the holotype was collected at Wynnum Forest, Queensland.

**Material examined.** Holotype female, plus 20 non-type examples (14 females, 16 males) from New Zealand (NZAC, BMNH, CNCI, USNM, UCRC, PPRI, ZILR, ANIC).

AK / —.

Habitats noted: second-growth bush; citrus; *Acacia baileyana*.

Adults have been collected or reared in January, February, October, and December.

**Biology.** Reared as a hyperparasite of *Psylla acaciaebaileyanae* Froggatt (Homoptera: Psyllidae) via *Psyllaephagus acaciae* new species (see p. 103).

**Remarks.** *E. minutissima* can be separated from congeners by the coloration of the legs (*argentipes* has the fore coxae yellow and only the hind legs darkened), the relative distance of the posterior ocellus from the eye margin (in *aereitibiae* these are nearly touching), and the sculpture of the thoracic

dorsum (in *argentipes*, *lambi*, and *caudata* it is much rougher than in *minutissima*, particularly on the scutellum).

*E. minutissima* is almost certainly a recent, accidental introduction from Australia.

### Genus *Epitetracnemus* Girault

Girault, 1915a: 164. Noyes & Hayat, 1984: 158, 216 (key), 273. Type species *Epitetracnemus sexguttatipennis* Girault, by monotypy; Australia.  
*Anabrolepis* Timberlake, 1920: 431. Tachikawa, 1955: 9–14.

**Female.** Body usually metallic green with brassy, coppery, purple, or blue reflections; forewing infusate, with several distinct hyaline spots.

HEAD in profile distinctly triangular. Frontovertex narrower than eye, rather flat, its tangent forming an angle of about 60° with face; a line of silvery setae extending across face and immediately below each eye. Antennal toruli about midway between mouth and lower margin of eye. Mandible with 4 teeth, or occasionally 2 teeth and a broad, serrate, truncate part; scape slightly broadened and flattened; funicle 6-segmented, the segments quadrate or transverse; club 3-segmented, apically rounded.

THORAX in profile quite flat. Propodeum narrowly in contact with hind coxa. Pronotum in dorsal view with posterior margin rather concave. Forewing with linea calva entire; filum spinosum present; marginal vein about 3.0–4.0× as long as broad; postmarginal vein very short, almost absent; stigmal vein about half as long as marginal vein.

GASTER a little longer than thorax. Last tergite usually about as long as middle tibia or a little longer. Hypopygium reaching a little more than halfway along gaster. Ovipositor usually slightly exserted. Paratergites absent. Gonostyli free.

**Male.** Generally similar to female, differing most in coloration of forewing, head shape, and structure of antennae and genitalia. Forewing hyaline. Antenna 5-segmented; funicle 2-segmented; club long, unsegmented. Head similar to that of female, but frontovertex much wider than an eye. Forewing postmarginal vein distinct, about half as long as stigmal vein. Genitalia with parameres each about half as long as a digitus.

**Biology.** Parasites of diaspid scales (Homoptera: Diaspididae).

**Distribution.** Cosmopolitan. One of the five described species is known from New Zealand.

**Remarks.** *Epitetracnemus* is very closely related to other genera of the subtribe Habrolepidina (in the sense of Trjapitzin). The female is perhaps closest to *Adelencyrtus* on one hand and *Habrolepis* on the other, and may often be difficult to separate from either. In general, species of *Adelencyrtus* lack the line of silvery setae below the eyes and across the face, and the forewing is hyaline or, if infusate, then there are no more than two hyaline spots distad of the venation. Species of *Habrolepis* almost always have a pair of lamelliform setae at the apex of the scutellum and a smaller pair on the occipital margin, behind the ocelli. There is no reliable way of separating males of these genera.

In the key to genera, specimens of *Habrolepis* which have lost the lamelliform setae on the scutellum may run to *Epitetracnemus*. They can be separated immediately by the forewing of *Habrolepis* possessing a subapical hyaline fascia, unknown in *Epitetracnemus*.

### *Epitetracnemus zetterstedtii* (Westwood)

Figures 182–186

Westwood, 1837: 440. Mercet, 1921: 678. Valentine, 1963: 11; 1967: 1122.

**Female.** Length range 1.27–1.43 mm ( $n = 12$ ).

Frontovertex shining green, but across anterior margin of frontovertex purple, and below this a line of silvery setae extending directly beneath each eye to upper area of gena; face below toruli, gena, and temple purple; line of silvery setae becoming a metallic green line across gena; scape, pedicel, and first 4 funicle segments dark brown; funicle segments 5 and 6 yellow; club dark brown, paler apically; dorsum of thorax shining green or blue-green, variously mixed with brassy, blue, and purple; sides and venter of thorax purplish brown; coxae and femora dark brown; fore tibia dark brown basally, yellowish apically; middle tibia yellow with a very narrow, dark brown basal ring; hind tibia dark brown with a narrow, yellow apical ring; fore tarsus yellow testaceous; middle and hind tarsi yellowish-white, the apical segments dark brown; forewings with a strong infusate pattern (see Figure 184); hindwings hyaline; sides of propodeum strongly shining purple; gaster slightly shining purplish brown.

**HEAD.** Frontovertex with very fine, raised, reticulate sculpture. Mandible as in Figure 182. Relative dimensions, specimen 1 (card-mounted): head width 58, length (anterior margin of frontovertex to base of mandible) 50, depth 30; frontovertex width 16; eye length 23, width 32; malar space 27;

OPL 11; POL 8; OOL 1.6; scape length 24, width 8; other proportions of antenna as in Figure 183.

**THORAX.** Sculpture on mesoscutum shallow, raised, squamiform-reticulate, on scutellum raised reticulate medially to squamiform-reticulate laterally, and conspicuously deeper than that on mesoscutum. Forewing venation and setation as in Figure 184. Relative dimensions, specimen 2 (slide-mounted): forewing length 99, width 38, marginal fringe 3; hindwing length 73, width 17, marginal fringe 3.

**GASTER** slightly longer than thorax. Ovipositor hardly exerted. Relative lengths, specimen 2: last tergite 38; ovipositor 56; gonostylus 14 [middle tibia 38].

**Male.** Length range 0.79–0.98 ( $n = 3$ ).

In coloration generally similar to female but much darker; lower parts of face not conspicuously purple; antenna testaceous, but on pedicel, funicle, and scape mixed with dark brown; middle tibia with basal half dark brown; forewing hyaline. In general habitus similar to female, but head not strongly triangular in profile, and frontovertex clearly convex. Antennae, Figure 185; toruli with lower margin about level with lower margin of eye. Forewing venation and setation as in Figure 186. Relative dimensions (slide-mounted specimen): head width 88; frontovertex width 45; scape length 26; middle tibia length 89; aedeagus length 47.

**Type data.** **Lectotype** female: England, "Cb. [Coombe], Aug [18]33" (HCOE) (see Graham 1969, p. 291) [not seen]. **Paralectotypes:** 2 females, presumably same data as lectotype (HCOE) [not seen].

**Material examined.** Three non-type examples (1 female, 2 males) from New Zealand (NZAC).

— / MB.

Habitat noted: apple.

Adults have been reared in November.

**Biology.** Reared from *Lepidosaphes ulmi* Linnaeus (Homoptera: Diaspididae) on apple. Also reported as a parasite of *Quadraspidiotus perniciosus* Comstock (Homoptera: Diaspididae) (Valentine 1967, p. 1122).

**Remarks.** *E. zetterstedtii* can be separated from other species of the genus by the relative proportions of the funicle segments and the pattern of infuscation on the forewing, particularly the relative width of the infusate area separating the two subapical hyaline spots. It is very close to *extraneus* (Timberlake), and may in fact be synonymous.

This European species has very probably been introduced accidentally into New Zealand, since

there is no record of its introduction. It was introduced into Bermuda from Italy in 1947 as a parasite of *Lepidosaphes newsteadi* (Sulc) (Bennett & Hughes 1959, p. 427). It has not been reported since, and therefore probably failed to establish.

### Genus *Eusemion* Dahlbom

Dahlbom, 1857: 293. Annecke, 1967: 100 (key), 103–104. Type species *Encyrtus corniger* Walker, by subsequent monotypy (Thomson 1876, p. 154); Isle of Man, U.K.

**Female.** Body dark, metallic; mesoscutum and scutellum usually dark blue or purple; head variously dark metallic blue, purple, and green; forewing infusate.

**HEAD.** Frontoververtex with dense, shallow, setigerous punctures each about the diameter of an ocellus. Antennal scrobes semicircular, sharply margined by a carina dorsally; torulus about equidistant from mouth margin and lower margin of eye; scape very broad and flattened; funicle segments subequal in width, very transverse, relatively broad and slightly flattened, hence very broadly oval in cross-section; club 3-segmented, a little longer than funicle. Mandible tridentate, the upper tooth apically less acute than the 2 ventral teeth.

**THORAX** in profile with propodeum narrowly in contact with hind coxa, dorsally with mesoscutum and scutellum quite flat; mesoscutum without notaular lines.

**GASTER** a little longer than thorax; last tergite about as long as middle tibia. Ovipositor hardly exerted. Hypopygium reaching about halfway along gaster. Paratergites absent. Gonostyli free.

**Male.** Unknown.

**Biology.** Reported as a parasite of *Coccus hesperidum* Linnaeus (Homoptera: Coccidae) and *Luzulaspis bisetosa* Borchsenius (Homoptera: Coccidae) (see Annecke 1967, p. 104).

**Distribution.** Europe, Japan, the U.S.A., and New Zealand. Monotypic.

**Remarks.** *Eusemion* is probably one of the most distinctive encyrtid genera in New Zealand, being easily separated from others by the combination of flattened antenna and infusate forewing. It has been placed in the tribe Cerapterocerini by Trjapitzin (1973b), and can be distinguished from all other genera of the tribe using the key provided by Annecke (1967, pp. 100–101).

### *Eusemion cornigerum* (Walker)

Figures 187 and 188

Walker, 1838: 114. Waterston, 1917: 314–317. Mercet, 1921: 666–668. Annecke, 1967: 104. Noyes & Hayat, 1984: 277.

**Female.** Length range 0.89–1.43 mm ( $n = 8$ ).

Frontoververtex shining green or blue-green, but on anterior margin and between posterior ocelli and occipital margin blue; antennal scrobes dorsally orange; lower parts of face and genae mixed shining purple, coppery, and blue; antennae very dark brown; thorax dorsally shining dark blue, but posterior margin of pronotum purplish; sides of thorax and venter dark brown; coxae brown, the hind coxae very dark; femora and tibiae mostly dark brown, but fore and middle tibiae yellow-orange in apical half, and hind tibia with a narrow, yellow-orange apical band; tarsi yellow-orange, but apical segment dark brown; forewing distinctly infusate (see Figure 188); gaster dark purple-brown; ovipositor sheaths apically yellow-orange.

**HEAD.** Setae on frontoververtex set in conspicuous punctures. Antennal scrobes semicircular, separated from frontoververtex by a sharp carina. Relative dimensions, specimen 1 (card-mounted): head width 73, length 63, depth 43; frontoververtex width 17; eye length 46, width 39; malar space 29; OPL 5; POL 9; OOL 1.5; scape length (along ventral margin) 42, width 23; other proportions of antenna as in Figure 187.

**THORAX.** Sculpture on mesoscutum shallow, raised, squamiform-reticulate, on scutellum slightly deeper, raised, reticulate medially and becoming slightly irregular and of larger mesh laterally and posteriorly. Forewing venation and setation as in Figure 187. Relative dimensions, specimen 2 (slide-mounted): forewing length 107, width 47, marginal fringe 4; hindwing length 85, width 22, marginal fringe 5.

**GASTER** very slightly shorter than thorax. Ovipositor slightly exerted, the exerted part about one-eighth as long as gaster. Relative lengths, specimen 2 (slide-mounted): ovipositor 67; gonostylus 19 [middle tibia 42].

**Variation.** Orange colour at top of antennal scrobes often replaced by dull purple-brown; a little variation in extent of forewing infuscation, smaller specimens often having the wing relatively paler than shown in Figure 188.

**Male.** Unknown.

**Type data.** Lectotype female: England, Isle of Man, July, Haliday (NMID) (see Graham 1969, p. 288) [not seen]. Remaining syntypes probably lost.

**Material examined.** Nine non-type females from New Zealand (NZAC, BMNH).

BP / NN, BR, OL, CO.

Recorded from altitudes between 600 m and 1700 m.

Habitats noted: *Nothofagus* forest and grass; tussock, *Discaria*, *Rosa*, *Juncus*, and *Pimelia*; tussock, alpine shrubs, *Hebe*, and mat plants; mixed exotic trees.

Adults have been collected in January, February, and December.

**Biology.** Not reared in New Zealand, but Annecke (1967) lists European material reared from *Coccus hesperidum* Linnaeus (Homoptera: Coccidae) and *Luzulaspis bisetosa* Borchsenius (Homoptera: Coccidae).

**Remarks.** *E. cornigerum* has probably been introduced accidentally from Europe. Its apparent preference for higher altitudes in New Zealand is unusual; in England it is usually associated with lowland oak. Possibly the specimens collected at higher altitudes have been carried by the wind from lower-lying areas in which oaks occur.

### Genus *Gyranusoidea* Compere

Compere, 1947: 17. Annecke & Mynhardt, 1970a: 35–42. Shafee *et al.* 1975: 20–23. Kerrich, 1982: 401. Prinsloo, 1983: 103–113. Type species *Gyranusa citrina* Compere, by original designation; Kenya.

**Female.** Body never metallic, usually matt yellow or orange, occasionally brown.

**HEAD.** Occipital margin sharp. Eye moderately hairy. Frontoververtex with fine, regular, raised, reticulate sculpture. Antenna with scape at least slightly broadened and flattened, usually strongly so; funicle 6-segmented, all segments longer than broad; club 3-segmented, apically rounded. Mandible slender, with 2 acute teeth.

**THORAX** in profile with propodeum narrowly in contact with hind coxa, dorsally with mesoscutum and scutellum very slightly convex. Pronotum short, almost hidden by head; notaular lines absent. Mesoscutum and scutellum with similar sculpture to frontoververtex, or perhaps vermiculate-reticulate and often a little shallower. Forewing hyaline, or lightly infuscate below venation or nearer apex of wing; marginal vein about 2.0–4.0× as long as broad, shorter than stigmal vein; postmarginal vein longer than stigmal vein; linea calva closed near posterior margin; setae in basal cell about as long and as dense as those in disc distad of venation; filum spinosum absent.

**GASTER** slightly shorter than thorax. Hypopygium reaching apex of gaster; last tergite at least about half as long as middle tibia. Paratergites present. Gonostylus fused to 2nd valvifer.

**Male.** Similar to female except in coloration, antennal structure, density of setae on forewing, and genitalia. Body generally dark brown, though occasionally concolorous with female. Antenna with scape only slightly broadened; funicle 6-segmented, each segment 2.0–3.0× as long as broad; flagellum clothed in whorls of long setae each at least about 3.0× as long as the diameter of any segment; either 6th funicle segment or club or both with very small, scale-like, sensory setae arranged in a single line; club entire. Setae on forewing less dense than those of female. Genitalia without parameres; digiti short and broad, each bearing a pair of apical hooks.

**Biology.** Parasites of mealybugs (Homoptera: Pseudococcidae).

**Distribution.** Cosmopolitan. Of the 15 described species, one is known from New Zealand.

**Remarks.** *Gyranusoidea* is placed in the tribe Anagyrini, subtribe Anagyrina (Tetracneminae) by Trjapitzin (1973a). It is very difficult to separate from *Anagyrus* Howard on one hand and *Leptomastidea* Mercet on the other, and further detailed work is required to define the limits of these genera objectively. *Anagyrus* has yet to be found in New Zealand, but *Leptomastidea* was introduced in the 1920s, albeit apparently unsuccessfully. Generally, species of *Leptomastidea* have the scape subcylindrical, and for the present can be separated from *Gyranusoidea* on this character.

### *Gyranusoidea advena* Beardsley

Figures 189 and 190

Beardsley, 1969: 303–306. Valentine, 1963: 11 (*Anagyrus* sp.).

**Female.** Length range 1.21–1.51 mm ( $n = 3$ ).

Head off-white, but vertex between posterior ocelli and occipital margin slightly yellowish; vertex and eye margins with conspicuous dark brown setae; remainder of frontoververtex and face clothed with inconspicuous translucent setae; scape dark brown, but with a little less than distal one-third white; pedicel and flagellum dark brown, the apical segments slightly testaceous or yellowish; pronotum with neck dark brown and posterior margin white; mesoscutum pale orange, laterally narrowly white; scutellum orange, with a median longitudi-

nal dark brown streak in proximal half; tegula white, its apex pale fuscous; mesopleurum white; mesosternum and middle coxae on ventral surface dark brown; remainder of thoracic venter white; legs off-white, but hind femur with a very narrow, dark, longitudinal streak dorsally; wings hyaline, with dark brown venation; propodeum off-white, its posterior margin laterally dark brown; mesoscutum and scutellum clothed in translucent setae, with 4 dark setae on scutellum subapically; gaster dorsally dark brown, on sides and venter off-white.

**HEAD.** Frontovortex with very fine, regular, raised, reticulate to squamiform-reticulate sculpture. Ocelli forming an angle of very slightly less than 90°. Eyes conspicuously hairy, each hair at least about as long as the diameter of a facet. Relative dimensions, specimen 1 (card-mounted): head width 74, length 68, depth 36; frontovortex width 36; eye length 44, width 32; malar space 15; OPL 7; POL 17; OOL 6; scape length 42, width 15.5; other proportions of antenna as in Figure 189.

**THORAX.** Dorsum with similar sculpture to frontovortex. Forewing setation and venation as in Figure 190. Relative dimensions, specimen 2 (slide-mounted): forewing length 124, width 52, marginal fringe 2.5; hindwing length 77, width 19, marginal fringe 3.5.

**GASTER** slightly shorter than thorax. Ovipositor protruding a little beyond apex of last tergite, the protruding part a little less than one-sixth as long as gaster. Relative lengths, specimen 2 (slide-mounted): last tergite 42; ovipositor 22; middle tibia 61.

**Male.** Unknown.

**Type data.** **Holotype** female: Hawaiian Is, Kauai, Kokee, 4–7 August 1961, Maa, Miyatake, & Yoshimoto (BPBM) [not seen].

**Paratypes** (9 females): 4, type locality, 13–17 Sep 1965, Beardsley (2) and Yoshimoto (2); 4, Hawaiian Is, Oahu, Tantalus, ex *Pseudococcus pipturicolus* Beardsley, Jun 1957 (3) and May 1960 (1), Beardsley; 1, Oahu, Kaala, ex *Pseudococcus antricolens* Ferris on *Santalum*, 5 Dec 1956, Beardsley (BPBM, Beardsley Collection) [not seen].

**Material examined.** Three non-type examples: 1 female, Hawaii, determined by J.W. Beardsley; 2 females, New Zealand (BMNH, NZAC).

BP / —.

Habitat noted: lemon.

Collected in March.

**Biology.** Reared from *Pseudococcus* sp. (Homoptera: Pseudococcidae) on lemon (Valentine 1963, p. 11).

**Remarks.** *G. advena* can be separated from congeners by the shape and coloration of the scape, more or less unicolorous dark brown funicle segments, orange thoracic dorsum and whitish venter, relative proportions of the forewing venation, and more or less uniformly dense setae in the forewing basal cell.

This species is probably a recent accidental introduction from Hawaii, since there is no record of it having been introduced into New Zealand.

### Genus *Habrolepis* Foerster

Foerster, 1856: 34. Annecke & Mynhardt, 1970a: 128–146. Type species *Encyrtus nubilipennis* Walker, by original designation; England.

**Female.** Body usually metallic green with brassy, coppery, purple, or blue reflections; forewing infuscate, with several distinct hyaline spots and often a subapical fascia.

**HEAD** in profile distinctly triangular. Frontovortex narrower than eye, fairly flat, its tangent forming an angle of about 60° with face. Occipital margin usually with a pair of long, narrow, lamelliform setae behind ocelli. No line of silvery setae below eyes and across face. Antennal torulus with dorsal margin about level with ventral margin of eye or only a little below. Scape subcylindrical to distinctly broadened and flattened; funicle 6-segmented, with all segments quadrate or transverse; club 3-segmented, apically rounded. Mandible with 2 teeth and a truncation.

**THORAX** in profile quite flat. Propodeum narrowly in contact with hind coxa. Pronotum in dorsal view with posterior margin rather concave. Scutellum usually with a pair of large, lamelliform setae (rarely with more). Forewing with linea calva interrupted by 2 or 3 setae; filum spinosum absent or at least not easy to separate from other setae in disc; marginal vein about 3.0–4.0× as long as broad; postmarginal vein very short or more or less absent; stigmal vein not more than half as long as marginal vein.

**GASTER** a little longer than thorax. Hypopygium reaching about halfway along gaster. Ovipositor usually slightly exerted. Paratergites absent. Last tergite usually about as long as middle tibia or a little longer. Gonostyli free.

**Male.** Generally similar to female, differing most in coloration of forewing, antennal structure, head shape, and genital structure. Forewing hyaline or lightly infuscate. Antenna 5-segmented; funicle 2-segmented; club long, unsegmented. Head similar

to that of female, but frontovertex much wider than eye. Forewing postmarginal vein distinct, about as long as stigmal vein; filum spinosum present. Genitalia with parameres about half as long as a digitus; digiti each with a single apical hook.

**Biology.** Parasites of diaspid scales (Homoptera: Diaspididae) or Asterolecaniidae (Homoptera).

**Distribution.** Cosmopolitan. Of the 21 described species, only one is known from New Zealand.

**Remarks.** *Habrolepis* is very closely related to other genera of the subtribe Habrolepidina (in the sense of Trjapitzin 1973b). The female is perhaps closest to *Ruskiniana* Girault and *Epitetracnemus*, and may often be difficult to separate from either. In general, species of *Epitetracnemus* lack the lamelliform setae on the occipital margin and scutellum; have a line of silvery setae below the eyes and across the face; and the forewing always lacks a complete subapical hyaline fascia. Species of *Ruskiniana* have at least five pairs of narrow, elongate, lamelliform setae at the apex of the scutellum. There is no reliable way of separating males of these genera, except perhaps by the key character. Specimens of *Habrolepis* which have lost the lamelliform setae on the scutellum may key out to *Epitetracnemus* (see Remarks under *Epitetracnemus*).

### *Habrolepis dalmanni* (Westwood)

Figures 191–194

Westwood, 1837: 440. Thomson, 1923: 228. Tillyard, 1926: 388. Delucchi, 1965: 295–304. Gourlay, 1930a: 6, 10; 1935: 219–228. Sweetman, 1935: 376. Miller, 1935: 37; 1937: 70; 1944: 41, 44. Miller *et al.* 1936: 586. Doull, 1955: 122. Valentine, 1967: 1122–1123. Graham, 1969: 290–291. Annecke & Mynhardt, 1970b: 134–135. Early, 1984: 290.

**Female.** Length range 0.95–1.27 mm ( $n = 29$ ).

Frontovertex shining green or blue-green; occipital margin behind eyes and on temples strongly purple; anterior margin of frontovertex narrowly coppery purple, below this shining green; mouth margin, interantennal prominence, and genae distinctly bluish or purplish; scape and pedicel dark brown; funicle segments 1–4 testaceous brown, segments 5 and 6 yellow; club at base dark brown, remainder yellowish; pronotum purple-brown mixed with blue or green; mesoscutum shining green or blue strongly mixed with purple, especially laterally; scutellum medially almost matt

brownish-purple, but extreme apex and sides shining blue or purple; mesopleurum shining purplish; coxae and femora dark brown; fore tibia basally dark brown, apically yellowish; middle tibia yellow with a narrow, basal, dark brown ring; hind tibia dark brown; tarsi yellow, but apical joint dark brown; propodeum purple-brown; forewings with infusate pattern as in Figure 194; hindwings hyaline; gaster slightly shining purple-brown.

**HEAD** with a pair of short, scale-like setae on occipital margin, behind posterior ocelli. Frontovertex with shallow, raised, regular, reticulate sculpture of granulate appearance. Mandible as in Figure 191. Relative dimensions, specimen 1 (card-mounted): head width 61, length (anterior margin of frontovertex to base of mandible) 47, depth 30; frontovertex width 22; eye length 22, width 28; malar space 28; OPL 11; POL 13; OOL 2; scape length 25, width 8; other proportions of antenna as in Figure 192.

**THORAX.** Sculpture on mesoscutum shallow, raised, squamiform-reticulate, on scutellum medially slightly elongate, raised, reticulate, much deeper than on mesoscutum, but laterally and towards apex more or less striate-reticulate; extreme apex and sides of scutellum smooth, polished. A pair of large, scale-like setae at apex of scutellum, each slightly longer than scutellum and about 3.0× as long as broad (Figure 193). Forewing venation and setation as in Figure 194. Relative dimensions, specimen 2 (slide-mounted): forewing length 106, width 50, marginal fringe 5; hindwing length 88, width 21, marginal fringe 6.

**GASTER** slightly longer than thorax. Ovipositor slightly exerted, the exerted part a little less than one-sixth as long as gaster. Relative lengths, specimen 2 (slide-mounted): last tegite 45; ovipositor 99; gonostylus 29 [middle tibia 48].

**Male.** Relatively rare, and unknown from New Zealand. Very similar to males of *Epitetracnemus zetterstedtii* (Westwood). Described and figured by Gourlay (1935) and Annecke & Mynhardt (1970).

**Type data.** **Lectotype** female: “20.6.[18]35 Dulwich [England]”, “Dalmanni Wd” (HCOE) (see Graham 1969, p. 291) [not seen].

**Paralectotypes:** 2 females, presumably same data as lectotype (HCOE) [not seen].

**Material examined.** Twenty-nine non-type females from New Zealand (NZAC).

AK, TK, HB / NN, NC, MC, DN.

Habitats noted: clover seed; oak.

Adults have been collected or reared in January–March, November, and December.

**Biology.** A parasite of *Asterolecanium variolosum* (Ratzeburg) (Homoptera: Asterolecaniidae) on oak. Its life history and biology have been described in detail by Gourlay (1935).

**Remarks.** *H. dalmanni* can be separated from congeners by the relative proportions of the funicle segments and the pattern of infuscation on the forewing, particularly the infuscate apex.

This species is a native of North America, Europe, and possibly also Japan. Its introduction into New Zealand from North America, and its spectacular success in controlling the golden oak scale, *A. variolosum*, is well documented (see the references above, notably Gourlay 1935; also Rosen & DeBach in Clausen 1978, pp. 47–48). Also introduced into Australia and Chile for the same purpose, with varying success (Rosen & DeBach in Clausen 1978, p. 48).

### Genus *Lamennaisia* Girault

Girault, 1922: 40. Noyes & Hayat, 1984: 192 (key), 220 (key), 292. Type species *Lamennaisia quadridentata* Girault, by monotypy: Australia.

**Female.** Body usually blackish, variously partially metallic green with slight brassy reflections; forewing hyaline.

**HEAD.** Occipital margin sharp. Eyes hairy, reaching occipital margin. Antennal torulus slightly nearer to mouth margin than to eye margin; scape subcylindrical; funicle 6-segmented, the segments usually at least a little longer than broad; flagellar segments filiform, not distinctly wider distad; club 3-segmented, its apex more or less rounded. Mandible quadridentate, occasionally tridentate (the shorter middle tooth absent).

**THORAX** in profile with mesoscutum and scutellum a little convex. Propodeum narrowly in contact with hind coxa. Pronotum in dorsal view quite short medially, nearly hidden by head. Scutellum with very distinctive striate sculpture, contrasting with very much shallower squamiform-reticulate sculpture of mesoscutum. Forewing with linea calva entire and open; filum spinosum present; marginal vein about twice as long as broad, about as long as stigmal vein; postmarginal vein nearly as long as stigmal vein. Propodeum medially very short.

**GASTER** about three-quarters as long as thorax. Hypopygium nearly reaching apex of gaster. Last tergite about as long as middle tibia. Ovipositor slightly shorter than middle tibia, not exerted. Paratergites absent. Gonostyli free, relatively short, less than one-fifth as long as ovipositor.

**Male.** Generally similar to female, differing most in structure of antennae and genitalia. Antenna 9-segmented; torulus with dorsal margin about level with lower margin of eye; funicle segments longer than broad, clothed in setae at least twice as long as the diameter of a segment. Genitalia with parameres very short, digiti each armed with a single apical hook.

**Biology.** Parasites of the larvae of Lathridiidae (Coleoptera). In Europe reared from *Medicago sativa* (Fabaceae) infested with *Eurytoma roddi* (Gussakovskii) (Hymenoptera: Eurytomidae) (BMNH), and in the U.S.A. from *Bruchus brachialis* Fahreus (Coleoptera: Bruchidae) (Trjapitzin & Gordh 1984), which is phytophagous in seeds of *Vicia* spp. (Fabaceae).

**Distribution.** Cosmopolitan. There are four nominal species, possibly synonymous, one of which is known from New Zealand.

**Remarks.** Species of *Lamennaisia* are recognised by the strigose sculpture of the scutellum, which is silky in appearance, the quadridentate mandible, and in the female by the filiform antenna and the hypopygium very nearly reaching the apex of the gaster.

The genus belongs in the subfamily Encyrtinae, but its relationship with other genera is not easy to determine. It is possibly related to genera placed in the subtribe Syrphophagina (tribe Microterytini; see Trjapitzin 1973b) or to *Cerchysiella* Girault (tribe Bothriothoracini, subtribe Coenocercina; see Trjapitzin 1973b).

### *Lamennaisia ambigua* (Nees)

Figures 195–200

Nees, 1834: 239. Mercet, 1921: 283–285. Trjapitzin, 1963: 884–887. Cumber & Eyles, 1961: 399 (as Hy 89).

**Female.** Length range 0.76–1.03 mm ( $n = 32$ ).

Head black, slightly shiny; antennae dark brown to black; pronotum concolorous with head; mesoscutum similar but with a very slight brassy sheen; scutellum dark olive-green, almost black, with a slight brassy lustre; sides of thorax dark brown to black; legs dark brown, but apex of middle tibia and middle and hind tarsi testaceous yellow; wings hyaline with dark brown venation; propodeum and gaster dark brown to black.

**HEAD.** Sculpture on frontovertex shallow, raised, reticulate, between eye and antennal scrobe becoming longitudinally elongate. Eye with very short, sparse setae, each about as long as the diameter of

a facet. Mandible as in Figure 195. Relative dimensions, specimen 1 (card-mounted): head width 63, length 61, depth 35; frontovertex width 25; eye length 37, width 29; malar space 25; OPL 2.5; POL 14; OOL 1.5; scape length 31, width 5.5; other proportions of antennal segments as in Figure 196.

**THORAX.** Sculpture on mesoscutum shallow, raised, reticulate to squamiform-reticulate, on scutellum fine, raised, striate, of silky appearance (Figure 197). Forewing venation and setation as in Figure 198. Relative dimensions, specimen 2 (slide-mounted): forewing length 114, width 54, marginal fringe 2.5; hindwing length 82, width 25, marginal fringe 3.5.

**GASTER** about as long as thorax. Relative lengths, specimen 2 (slide-mounted): last tergite 32; ovipositor 24; gonostylus 3.5 [middle tibia 37].

**Male.** Length range 0.71–1.03 mm ( $n = 23$ ).

Generally very similar in appearance to female, except for antennae (Figure 199), genitalia (Figure 200), and relatively slightly higher placement of antennal toruli. Relative dimensions: head width 113; frontovertex width 52; scape length 46; middle tibia length 99; aedeagus length 51.

**Type data.** **Holotype** male: West Germany, Stuttgart, Sickerhausen, in leaf litter, 4 April 1811 [probably destroyed].

**Material examined.** Fifty-eight non-type examples (34 females, 24 males) from New Zealand (NZAC, BMNH).

ND, AK, WO, BP, RI, HB, WI / NN.

Habitats noted: *Podocarpus* forest; second-growth bush; maize; wheat; potatoes; red clover.

Adults have been collected or reared in January–April.

**Biology.** Reared from mummified larvae of *Melanophthalma* sp. near *distinguenda* Komolli (det. R.D. Pope) (Coleoptera: Lathridiidae) taken from the exposed tops of maize cobs which had begun to decompose following fungal infection.

**Remarks.** *L. ambigua* is most probably of Palearctic origin, and hence a recent accidental introduction into New Zealand from Europe. However, this is uncertain because of the likelihood that all four nominal species of *Lamennaisia* are synonymous, and that *ambigua* is a cosmopolitan species.

### Genus *Leptomastidea* Mercet

Mercet, 1916: 112; 1924: 252–258. Kerrich, 1982: 402, 403. Noyes & Hayat, 1984: 292. Type species *Leptomastidea aurantiaca* Mercet, by monotypy; Spain.

**Female.** Body never metallic, usually matt and yellow, orange, or occasionally brown.

**HEAD.** Occipital margin sharp. Eye inconspicuously hairy. Frontovertex with fine, regular, raised, reticulate sculpture. Antenna with scape subcylindrical or broadened and flattened; funicle 6-segmented, the segments longer than broad; club 3-segmented, apically rounded. Mandible slender, with 2 acute teeth.

**THORAX** in profile with propodeum narrowly in contact with hind coxa, dorsally with mesoscutum and scutellum very slightly convex. Pronotum short, almost hidden by head; notaular lines absent. Mesoscutum and scutellum with sculpture similar to that on frontovertex, or vermiculate-reticulate, or squamiform-reticulate and often a little shallower. Forewing usually with 1–3 dark fuscous bands, rarely completely hyaline; marginal vein about 2.0–4.0× as long as broad, shorter than stigmal vein; postmarginal vein longer than stigmal vein; linea calva closed in posterior half; setae in basal cell about as long and as dense as those in disc, distad of venation; filum spinosum absent.

**GASTER** slightly shorter than thorax. Hypopygium reaching apex of gaster. Last tergite at least about half as long as middle tibia, usually nearly as long. Paratergites present. Gonostylus fused to 2nd valvifer.

**Male.** Similar to female except in coloration, density of setae on forewing, and structure of antennae and genitalia. Body generally dark brown, though occasionally concolorous with female. Funicle 6-segmented, each segment 2.0–3.0× as long as broad; flagellum clothed in whorls of long setae, each seta at least about 2.0–3.0× as long as the diameter of any segment; 6th funicle segment, or club, or both with very small, slender, scale-like sensory setae arranged in a line; club entire. Forewing sometimes completely hyaline. Genitalia lacking parameres; digiti short and broad, each with a pair of apical hooks.

**Biology.** Parasites of mealybugs (Homoptera: Pseudococcidae).

**Distribution.** Cosmopolitan; 17 species are known, only one of them from New Zealand.

**Remarks.** *Leptomastidea* is placed in the tribe Anagyrini, subtribe Anagyrina (Tetracneminae) by Trjapitzin (1973a). It is often very difficult to

separate from *Gyranusoidea* Compere (see Remarks under *Gyranusoidea*).

### *Leptomastidea abnormis* (Girault)

Figures 201–204

Girault, 1915b: 184–185. Miller *et al.* 1936: 589. Beardsley, 1969: 307–308.

**Female.** Length range 0.63–1.24 mm ( $n = 40$ ).

Frontovertex pale yellow-brown to orange; face whitish; radicle dark brown; scape whitish, with a longitudinal dark brown streak along its dorsal edge; pedicel dark brown proximally, its distal half white; flagellum testaceous yellow, but proximal segments and club slightly darker; pronotum with neck dark brown, posterior margin white; mesoscutum and scutellum pale orange-brown, medially dark brown; tegula white, its apex greyish; sides and venter off-white, but mesosternum marked with dark brown; legs white, or yellowish white with middle coxae conspicuously dark brown ventrally; forewing hyaline, with 3 transverse fuscous fasciae (as in Figure 203); hindwing hyaline, slightly infuscate towards base; propodeum dark brown, with sides and middle orange; gaster pale yellowish white to yellowish orange, the distal half and much of dorsum dark brown.

HEAD with raised, regular, reticulate sculpture of granular appearance. Ocelli forming an angle of slightly less than 90°. Relative dimensions, specimen 1 (card-mounted): head width 58, length 52, depth 28; frontovertex width 29; eye length 36, width 26; malar space 12; OPL 5; POL 11; OOL 5.5; scape length 33, width 6.5; other proportions of antennal segments as in Figure 201.

THORAX. Sculpture on mesoscutum as in Figure 202, on scutellum fine, raised, squamiform-reticulate, becoming striate-reticulate on sides and apex. Forewing venation and setation as in Figure 203. Relative dimensions, specimen 2 (slide-mounted): forewing length 126, width 42, marginal fringe 3; hindwing length 77, width 12, marginal fringe 10.

GASTER slightly shorter than thorax. Ovipositor not exerted. Relative lengths, specimen 2: last tergite 47; ovipositor 27; gonostylus about 6 [middle tibia 57].

**Male.** Length range 0.56–0.95 mm ( $n = 15$ ).

Generally similar to female, differing in slightly higher placement of antennal toruli, antennal structure (Figure 204), forewings with dark markings less conspicuous, slightly darker gaster, and structure of genitalia. Relative dimensions (slide-mounted specimen): head width 89; frontovertex width 51; scape length 45; length of middle tibia 138; aede-

gus length 43.

**Type data.** **Holotype** female: Sicily, ex *Pseudococcus citri*, reared in California State Insectary, 700 xv., H.S. Smith (USNM) [not seen].

**Paratypes:** 3 females, 1 male, same data as holotype (USNM) [not seen].

**Material examined.** Fifty-seven non-type examples (41 females, 16 males) from South America, the U.S.A., Europe, and Africa (BMNH); no material from New Zealand examined.

**Biology.** Not recovered since its introduction into New Zealand in the 1920s. Outside New Zealand primarily known as a parasite of *Planococcus citri* (Risso), but also recorded as a parasite of other species of *Planococcus*, *Phenacoccus*, and *Pseudococcus* (see Peck 1963, pp. 349–351) and several other genera of mealybugs (see Bartlett in Clausen 1978, p. 154) (Homoptera: Pseudococcidae).

**Remarks.** *L. abnormis* was introduced into New Zealand in an effort to control a mealybug on fruit trees. It failed to establish (Miller *et al.* 1936, p. 589), and no specimens have been reported since. It has been introduced into many parts of the world to control *Planococcus citri*. In most instances it has not become established, but it has been responsible for some degree of control of this pest in California and Russia. It has also been introduced, without success, into Kenya and Ghana in attempts to control *Planococcus kenyae* (Le Pelley) and *Planococcoides njalensis* (Laing) and into the United States for the control of *Pseudococcus comstocki* (Kuwana) (see Bartlett in Clausen 1978, pp. 150–160).

### Genus *Metanotalia* Mercet

Mercet, 1921: 175. Type species *Metanotalia hispanica* Mercet, by original designation; Madeira.

**Female.** Body pale brown.

HEAD in frontal view about one-sixth longer than broad. Occipital margin sharp, very concave in dorsal view. Eye naked, not quite reaching occipital margin. Frontovertex with fine, regular, very shallow, raised, reticulate sculpture. Antennal torulus nearly at mouth margin; scape subcylindrical, more than 5.0× as long as broad; funicle shorter than scape, 6-segmented, all segments transverse; club 3-segmented, apically rounded. Mandible slender, with 3 acute teeth, the middle one longest.

THORAX in profile with propodeum broadly separated from hind coxa by posterior margin of

mesopleurum. Pronotum in dorsal view long; posterior margin straight, more than twice as long as mesoscutum. Scutellum minute, concave, about two-thirds as long as mesoscutum. Propodeum long, about two-thirds as long as pronotum. Wings vestigial, almost absent (see Figure 205).

GASTER about two-thirds as long as thorax; last tergite slightly more than half as long as middle tibia. Hypopygium reaching apex of gaster. Ovipositor exerted, the exerted part usually about 0.4× as long as gaster. Paratergites absent. Gonostyli free.

**Male.** Unknown.

**Biology.** Unknown.

**Distribution.** Europe, U.S.A. (California), and New Zealand; monotypic.

**Remarks.** *Metanotalia* is placed in tribe Miraini subtribe Echthroplexiellina (Encyrtinae) by Trjapitzin (1973b). This must be incorrect because *Mira*, the type genus of Miraini, is a member of the subfamily Tetracneminae. *Echthroplexiella* belongs in the Encyrtinae and is very close to *Aphycus* Mayr, which is placed in the tribe Aphycini. The subtribe Echthroplexiellina should therefore be placed in the Aphycini.

*Metanotalia* can be separated from related genera on the combination of elongate pronotum and propodeum, reduced scutellum, and vestigial wings.

### ***Metanotalia maderensis* (Walker)**

Figures 205 and 206

Walker, 1872: 116.

*hispanica* Mercet, 1921: 176-177.

**Female** (Figure 205). Length range (excluding ovipositor) 0.92-1.27 mm ( $n = 13$ ).

Head pale brown; scape concolorous or a little paler; pedicel and flagellum dark brown, but apex of club slightly paler; thorax more or less concolorous with head; tegula white; fore and hind coxae yellowish; middle coxa brown; legs, excluding tarsi, pale brown; middle femur with a broad white ring in its basal half; all femora and tibiae variously mixed with dark brown; tarsi yellowish or yellowish-white, the pretarsi dark brown; forewing rudiment strongly infuscate; gaster dark brown, with slight metallic green, purple, and brassy reflections; ovipositor sheath yellowish, its extreme apex dark brown.

**HEAD.** Frontoververtex with very shallow, raised, squamiform-reticulate sculpture. Ocelli minute,

forming a strongly acute angle. Relative dimensions, specimen 1 (card-mounted): head width 54, length 58, depth 34; frontoververtex width 15.5; eye length 45, width 29; malar space 16; OPL 10; POL 9.5; OOL 1; scape length 34, width 6.5; other proportions of antennal segments as in Figure 206.

**THORAX.** Sculpture on pronotum and mesoscutum very shallow, raised, squamiform-reticulate. Scutellum almost smooth, its sculpture similar to that on mesoscutum but very much shallower. Forewing rudiment very small, about as long as tegula and about half as broad.

GASTER about two-thirds as long as thorax. Ovipositor exerted, the exerted part about one-third as long as gaster. Relative lengths, specimen 2 (slide-mounted): last tergite 20; ovipositor 50; gonostylus 14 [middle tibia 35].

**Male.** Unknown.

**Type data.** *maderensis*, lectotype female: "Madeira Is. Northern Deserta. Wollaston", "Ectroma maderensis", "♀ *Ectroma maderensis* Walker det. J.S. Noyes 1976 Lectotype" (BMNH).

**Material examined.** Lectotype female plus 2 non-type females from New Zealand (NZAC, BMNH). — / NN.

Habitat noted: on ground in wharf.

Collected in January and February.

**Biology.** Unknown.

**Remarks.** *M. maderensis* has probably been accidentally introduced from the Mediterranean region. The two New Zealand specimens examined were collected in 1970 and 1972, so it is possible that the species has established, at least in the Nelson area.

### **Genus *Metaphycus* Mercet**

Mercet, 1917: 138. Timberlake, 1916: 587-639 (key to some world species). Annecke & Mynhardt, 1971, 1972, 1981 (keys to African species). Trjapitzin, 1975 (key to Palearctic species). Type species *Aphycus* (*Metaphycus*) *zebratus* Mercet, by original designation; Spain.

**Female.** Usually yellow, orange, or pale brown, often dark but never metallic; pronotum usually with posterior margin white, paler than remainder of thoracic dorsum, often with a pair of lateral dark spots.

**HEAD.** Occipital margin acute. Antennal torulus situated near mouth margin, below ventral margin of eye; scape often broadened and flattened; funicle 6-segmented, generally with most segments trans-

verse; club 3-segmented. Maxillary palpus with 2, 3, or 4 segments; labial palpus with 2 or 3 segments. Mandible with 3 acute teeth.

THORAX in profile with metapleurum and propodeum broadly in contact with hind coxa. Mesoscutum with or without notaular lines; when present, lines often complete. Forewing marginal vein quadrate or only slightly longer than broad; postmarginal vein often quite long, but always shorter than stigmal vein; setae in basal cell usually as dense or nearly as dense as those in disc, beyond apex of venation; linea calva interrupted by 1 or 2 lines of setae; filum spinosum present.

GASTER short. Hypopygium reaching to about two-thirds length of gaster. Ovipositor usually not exerted, though occasionally strongly so.

**Male.** Similar to female as regards wing structure and general habitus, and sometimes very difficult to separate from females unless slide-mounted. Body colour often partially or completely dark brown, never metallic. Antenna with flagellum variable from clavate and similar to that of female to relatively long and filiform, often clothed with relatively long setae; club entire. Genitalia with digiti each having a pair of apical hooks; posterior processes of parameres fairly short and slender.

**Biology.** Parasites of Coccidae, Diaspididae, Kerridae, Asterolecaniidae, and Eriococcidae (Homoptera).

**Distribution.** Cosmopolitan; about 200 described species, five of them known from New Zealand.

#### KEY TO SPECIES OF *METAPHYCUS* KNOWN FROM NEW ZEALAND

- 01 Antenna 11-segmented (Fig. 207, 211, 213, 218, 222) ... FEMALES ... 02  
—Antenna 9-segmented (Fig. 210, 216, 220, 225) ... MALES ... 06

#### FEMALES

- 02(01) Maxillary palpi 4-segmented; labial palpi 3-segmented; either forewing with a fuscous cloud centrally (Fig. 223), or tibiae with 2 or 3 dark brown bands ... 03  
—Maxillary and labial palpi each with 2 or 3 segments; forewing hyaline; legs immaculate, at most the middle tibia with an obscure spot near base ... 04  
03(02) Forewing with a central fuscous cloud (Fig. 223); legs immaculate; gaster with basal tergite dorsally white ... *timberlakei*

—Forewing hyaline; tibiae pale, each with 2 or 3 dark brown bands; gaster with basal tergite dorsally brown ... *lounsburyi*

- 04(02) Maxillary and labial palpi 3-segmented; frontovertex very nearly half as wide as head; scape with dark band incomplete on outer face, indistinct on inner face ... *reductor*

—Maxillary and labial palpi 2-segmented; frontovertex about one-quarter as wide as head; scape with dark band distinct and more or less complete on both inner and outer faces ... 05

- 05(04) Mesopleurum whitish, distinctly paler than dorsum of thorax; dark band on scape more extensive, more or less covering central two-thirds; forewing about 2.2–2.4× as long as broad ... *claviger*

—Mesopleurum orange, concolorous with dorsum of thorax or only a little paler; dark band on scape less extensive, covering only about middle half; forewing 2.4–2.6× as long as broad ... *aurantiacus*

#### MALES

- 06(01) Maxillary palpi 4-segmented; labial palpi 3-segmented; either antennal flagellum relatively long, at least nearly 1.5× width of head, or tibiae pale, each marked with 2 or 3 dark brown bands ... 07  
—axillary and labial palpi with 2 or 3 segments; antennal flagellum at most only 1.2× longer than width of head; legs immaculate ... 08

- 07(06) Head and thorax more or less completely dark brown; legs immaculate; antennal flagellum filiform; funicle segments longer than broad or quadrate (Fig. 225) ... *timberlakei*

—Head and dorsum of thorax more or less completely orange, but venter of thorax whitish; tibiae pale, each with 2 or 3 dark brown bands; antennal flagellum clavate; funicle segments transverse (Fig. 216) ... *lounsburyi*

- 08(06) Maxillary and labial palpi 3-segmented; antennal flagellum longer than width of head; funicle segments quadrate or longer than broad (Fig. 220) ... *reductor*  
—Maxillary and labial palpi 2-segmented; antennal flagellum shorter than width of head; funicle segments transverse (Fig. 210) ... 09

- 09(08) Gena dark brown ... *claviger*  
—Gena orange ... *aurantiacus*

***Metaphycus aurantiacus* Annecke & Mynhardt**

Figures 208–210

Annecke & Mynhardt, 1981: 60–61. Gourlay, 1930a: 6 (as *claviger*, misidentified); 1930b: 340 (as *claviger*, misidentified).

**Female.** Length range 0.63–1.24 mm ( $n = 38$ ).

Head orange; antennae with scape and club marked with dark brown as in Figure 207; proximal 4 funicle segments brown, remainder yellowish; thorax, including sides and venter, orange; pronotum a little paler, with a pair of lateral dark brown spots near posterior margin; mesoscutum slightly dusky; legs, including coxae, orange; forewing hyaline, with yellow-brown venation; gaster orange, with tergites mixed brownish.

**HEAD.** Frontovortex with irregular, shallow, raised reticulate sculpture of slightly granular appearance. Maxillary and labial palpi 2-segmented. Relative dimensions, specimen 1 (card-mounted): head width 60, length 51, depth 36; frontovortex width 14; eye length 34, width 34; malar space 21; OPL 5; POL 5; OOL 1.5; scape length 27, width 9; other proportions of antenna as in Figure 207.

**THORAX.** Sculpture on mesoscutum shallow, very fine, raised, squamiform-reticulate, on scutellum similar but slightly finer and less regular. Notaular lines indicated in about anterior one-third of mesoscutum only. Forewing venation and setation as in Figure 208. Relative dimensions, specimen 2 (slide-mounted): forewing length 99, width 40, length of marginal fringe 2.5; hindwing length 67, width 13, length of marginal fringe 5.

**GASTER** about as long as thorax. Ovipositor not exerted. Relative lengths, specimen 2: last tergite 55; ovipositor 68; gonostylus 12 [middle tibia 84].

**Male.** Length range 0.57–0.71 mm ( $n = 25$ ).

Generally similar to female except in coloration, relatively higher placement of antennal toruli, and structure of antennae and genitalia. Frontovortex between ocelli dark brown; genae orange; antennal flagellum completely dark brown; dorsum of thorax and gaster dark brown. Proportions of antennal segments as in Figure 210; dorsal margin of antennal torulus very nearly level with ventral margin of eye. Frontovortex width about one-third head width. Mandible as in Figure 209. Relative dimensions (slide-mounted specimen): head width about 33; frontovortex width about 10; scape length 12.5; middle tibia length 27; aedeagus length 12.5.

**Type data.** **Holotype** female: U.S.A., California, Albany, lab. stock ex *Coccus hesperidum*, orig. from Irymple, Vic., Australia, July 1974, C. Kennett

(ANIC).

**Paratypes:** 23 females, 8 males, same data as holotype (ANIC, UCRC, PPRI, BMNH).

**Material examined.** Holotype female, 15 female paratypes, and 5 male paratypes, plus 52 non-type examples (29 females, 23 males) from New Zealand (BMNH, ANIC).

AK, WN / NN, MC.

Recorded from low altitudes only.

Habitats noted: *Benthamia fragifera*; *Abutilon*; pasture; *Meryta sinclairii*; grass and weeds under willow; mixed *Podocarpus* and *Nothofagus*; garden; second-growth bush; native bush; lemon; cherry laurel.

Adults have been collected or reared in all months except August–October.

**Biology.** Reared from *Coccus hesperidum* Linnaeus (Homoptera: Coccidae) on *Benthamia fragifera*, *Meryta sinclairii*, *Laurus nobilis*, *Abutilon* sp., and lemon.

**Remarks.** *M. aurantiacus* is very similar in general appearance to *M. claviger* and *M. reductor*, but can be separated reliably using the key characters.

Gourlay (1930a, b) recorded *claviger* as a parasite of *Coccus hesperidum*. All material of *Metaphycus* in NZAC reared by Gourlay from this host is *aurantiacus*. Thus it seems likely that Gourlay recorded *claviger* in error for *aurantiacus*.

***Metaphycus claviger* (Timberlake)**

Figures 211 and 212

Timberlake, 1916: 620.

**Female.** Length 0.70 mm.

**Holotype.** Head orange; face, genae, and temples whitish-yellow; antenna with scape whitish, but with a broad, dark brown band medially (Figure 211); pedicel in proximal half dark brown, distally whitish-yellow; first 3 funicle segments brown, the remainder yellow; club brown, with distal half of 2nd segment and whole of 3rd yellow; dorsum of thorax orange; pronotum whitish on posterior margin, with a brown spot on either side, medially with a large brown area hidden by head; lateral and posterior margins of mesoscutum very narrowly darker; tegula with base yellow, apex brownish; sides of thorax, including sides of pronotum and propodeum, whitish; legs whitish; wings hyaline, with pale yellow venation; propodeum dorsally brown, medially yellowish; setae on dorsum of thorax pale, conspicuous; gaster dorsally more or less brown or dusky, with sides and venter whitish.

**HEAD.** Setae on eyes generally dense, about as long as the diameter of a facet; setae on frontovertex about as long as the diameter of an ocellus. Ocelli forming a strongly acute angle of about 45°. Relative dimensions: POL 5.5; OOL 1; OPL 3; scape length 23, maximum width 9; other proportions of antenna as in Figure 211.

**THORAX** with notaular lines present, but extending only about one-third across mesoscutum. Sculpture on mesoscutum and scutellum very fine, squamiform-reticulate, of silky appearance, on axillae shallower, more transversely elongate. Relative dimensions: forewing length 58, width 26, other proportions of venation and setation as in Figure 212; hindwing length 40, width 8, marginal fringe 3.

**Paratype.** Maxillary and labial palpi 2-segmented. Relative dimensions: head width 79, length 65; minimum frontovertex width 19; scape length 31; middle tibia length 61; ovipositor length 49; gonostylus length 11; last tergite length 45.

**Male.** Length 0.60 mm.

The single known male is in poor condition, but in all respects is very similar to that of *M. aurantiacus*. It can be distinguished by having infusate cheeks, which in *aurantiacus* are orange and thus concolorous with the rest of the head.

**Type data.** **Holotype** female: New Zealand, AK, Auckland, antenna and wing mounted, Hym. slide 474, Type 18375 U.S.N.M. (USNM).

**Paratypes:** 1 female, 1 male, same data as holotype.

**Material examined.** Type specimens only.

**Biology.** Unknown.

**Remarks.** *M. claviger* is known only from the type specimens, and has probably been recorded in error for *M. aurantiacus* by Gourlay (1930a, b). It is very similar to *aurantiacus*, but the female can be separated reliably using the key characters.

### ***Metaphycus lounsburyi* (Howard)**

Figures 213–216

Howard, 1898: 241 (key), 244. Timberlake, 1916: 590, 591 (key), 610–612. Smith & Compere, 1928: 275–291. Miller *et al.*, 1936: 590. Anneck & Mynhardt, 1971: 335 (key), 335–338.

**Female.** Length range 1.24–1.71 mm ( $n = 8$ ).

Frontovertex orange, with areas surrounding each posterior ocellus infusate; temples and face whi-

tish; occiput dark brown; radicle white mixed with dark brown; scape and pedicel largely whitish mixed with areas of dark brown, as in Figure 213; first 3 funicle segments dark brown, 4th similar but sometimes mixed yellowish, 5th and 6th yellow; club dark brown; pronotum white, but neck and a pair of small lateral spots dark brown; mesoscutum orange, narrowly dark brown anteriorly; axillae and scutellum orange slightly mixed with dark brown; metanotum dark brown; axilla white, with apex infusate; sides and venter of thorax white; legs mostly pale yellow, but fore and middle femora with irregular dark brown markings; tibiae with 3 narrow, dark brown bands, one near base, another at about middle, and one at apex; forewing hyaline; propodeum dark brown, with sides whitish; gaster dorsally dark brown, posterolaterally with narrow, whitish borders, ventral + whitish; exerted part of ovipositor sheaths yellowish.

**HEAD.** Sculpture on frontovertex very fine, raised, reticulate, of granular appearance, at top of antennal scrobes becoming less regular and transversely elongate, and on genae longitudinally elongate. Maxillary palpi 4-segmented; labial palpi 3-segmented. Relative dimensions, specimen 1 (card-mounted): head width 95, length 80, depth 51; frontovertex width 21; eye length 58, width 49; OPL 8; POL 10; OOL 1.5; scape length 43, width 17; other proportions of antennae as in Figure 213.

**THORAX.** Sculpture on mesoscutum and scutellum very fine, raised, squamiform-reticulate, on axillae similar but more transversely elongate. Notaular lines reaching about one-third across mesoscutum. Setae at base of forewing relatively dense (Figure 214); proportions of venation as in Figure 214. Relative dimensions, specimen 2 (slide-mounted): forewing length 148, width 65, marginal fringe 3; hindwing length 104, width 31, marginal fringe 5.

**GASTER** slightly shorter than thorax. Ovipositor slightly exerted, the exerted part about one-eighth as long as gaster. Relative lengths, specimen 2: last tergite 42; ovipositor 49; gonostylus 14 [middle tibia 55].

**Male.** Length range 0.97–1.48 mm ( $n = 7$ ).

Superficially extremely similar to female, and very difficult to distinguish. Differing principally in the 5th and 6th funicle segments being mixed dark brown, solid club (Figure 216), scape about 3.5× as long as broad, and genitalia. Mandible as in Figure 215. Relative dimensions (slide-mounted specimen): head width 107; frontovertex width 33; scape length 49; middle tibia length 101; aedeagus length 38.

**Type data.** **Syntypes:** 4 females, South Africa,

Cape Town, ex *Lecanium oleae*, C.P. Lounsbury, U.S.N.M. type number 5042 (USNM) [not seen].

**Material examined.** Eighteen non-type examples (10 females, 8 males): 4 females, 1 male, U.S.A., California, determined as *lounsburyi* by Timberlake (BMNH); 1 female, 1 male, South Africa, determined as *lounsburyi* by Annecke (BMNH); 5 females, 6 males, New Zealand (NZAC, BMNH).

AK / ?NN.

Adults have been reared in May.

**Biology.** An internal gregarious parasite of *Saissetia oleae* (Bernard) (Homoptera: Coccidae). Its biology has been dealt with in some detail by Smith & Compere (1928).

**Remarks.** *M. lounsburyi* is a native of South Africa, and has been introduced into a number of countries to control *Saissetia oleae*. It has been at least partly successful in California, and has played a major role in the control of this scale in Australia (see Bartlett in Clausen 1978, p. 71). In New Zealand it was released in Nelson in 1922 in an effort to control the scale on fruit trees (Miller *et al.* 1936), but was not subsequently recovered until 1982, when it was found parasitising *S. oleae* in the Auckland area.

### *Metaphycus reductor* new species

Figures 217–221

**Female.** Length 0.70 mm ( $n = 2$ ).

**Holotype.** Frontoververtex orange; face below top of antennal scrobes and on genae yellow; antenna with radicle dusky yellow; scape yellow, with an incomplete brown band from about halfway to about three-quarters along its outer face, and on inner face more or less complete but indistinct (Figure 218); pedicel testaceous, its proximal half brown; funicle with 4 proximal segments testaceous brown, 2 distal segments yellowish; club dark brown; pronotum whitish on posterior margin, with a pair of dark brown spots laterally; dorsum of thorax orange; tegulae white, mixed with dark brown; sides and venter of thorax, including legs, pale yellow; wings hyaline, with yellow-brown venation; propodeum dorsally brownish, medially yellowish, yellow on sides; setae on dorsum of thorax translucent, inconspicuous; gaster dorsally in proximal half more or less brown or dusky, on sides and in distal half yellowish, on venter yellow; exerted part of ovipositor yellow.

**HEAD.** Setae on eyes inconspicuous; setae on frontoververtex also very inconspicuous, each about as long as the diameter of an ocellus. Ocelli form-

ing an acute angle of about 65°; posterior ocelli about equidistant from occipital margin and eye margin. Mandible as in Figure 217. POL:OPL about 2. Scape about 4.0× as long as broad; other proportions of antenna as in Figure 218.

**THORAX.** Notaular lines very indistinct, extending only about one-quarter across mesoscutum. Sculpture on mesoscutum and scutellum fine, shallow, squamiform-reticulate, on axillae shallower, more transversely elongate. Relative dimensions: forewing length 125, width 52, venation and setation as in Figure 219; hindwing length 78, width 17, marginal fringe 9.

**GASTER.** Ovipositor very slightly exerted, the exerted part about one-eighth as long as gaster, and about half as long as middle tibial spur.

**Paratype.** Sculpture on frontoververtex very shallow, raised, squamiform-reticulate, becoming transversely rugose level with top of antennal scrobes, and on gena longitudinally elongate. Maxillary and labial palpi 3-segmented. Relative dimensions: head width 59, length 48; minimum frontoververtex width 27; scape length 23; middle tibia length 45; ovipositor length 40; gonostylus length 8.5; last tergite length 26.

**Variation.** Negligible in the material available.

**Male.** Length range 0.54–0.62 mm ( $n = 4$ ).

Generally similar to female, except in darker colouring and in structure of antennae (Figure 220) and genitalia (Figure 221). Frontoververtex and dorsum of thorax generally orange-brown, mixed with dark brown; antenna dark brown; gena, sides of thorax, and legs pale, dusky brownish yellow; gaster completely dark brown. Antennal torulus without nodules. Relative dimensions: specimen 1 (card-mounted) – scape length 16, width 4.5; specimen 2 (slide-mounted) – head width 61; minimum frontoververtex width 2; scape length 24.5; middle tibia length 54; aedeagus length 26.5.

**Variation.** Very slight; in some specimens dorsum of thorax more or less completely dark brown.

**Type data.** **Holotype** female: New Zealand, AK, Huia, Malaise trap in bush, October 1980, B.M. May (NZAC).

**Paratypes** (1 female, 6 males): 2 males, AK, Huia, Malaise trap in bush, Sep and Nov 1980, BMM; 1 female, AK, Titirangi, Aug 1980, PAM; 1 female, 3 males, AK, Titirangi, Malaise trap in garden, Sep (1♂) and Oct 1980, GWR; 1 female, AK, Waitakere Range, Oct 1980, JSN.

**Material examined.** Type series only (NZAC, BMNH).

AK / —.

Habitats noted: bush; garden.

**Biology.** Unknown.

**Remarks.** *M. reductor* is superficially very similar to *M. luteolus* (Timberlake), a New World species. The female of *luteolus* has the frontovertex about one-third as wide as the head, the ovipositor distinctly longer than the middle tibia, and the apex of the club yellow, contrasting with the dark brown basal segments. The male's antennae are very similar to those of *claviger* and *auranticus*.

Of the species of *Metaphycus* known from New Zealand, *reductor* is most similar to *aurantiacus* and *claviger*. It can be distinguished by the key characters.

### *Metaphycus timberlakei* (Ishii)

Figures 222–225

Ishii, 1923: 108–109. Tachikawa, 1963: 190–191. Valentine, 1964: 7; 1967: 1123.

**Female.** Length range 0.94–1.35 mm ( $n = 28$ ).

Frontovertex orange; temples, face, and genae white, the genae very indistinctly orangy; radicle mixed dark brown; antenna with outer face of scape marked as in Figure 222, inner face less extensively marked with brown; pedicel white, with a broad, dark strip ventrally and a narrower one dorsally; funicle segments 1–3 and club dark brown, remainder of flagellum white; funicle segments 2 and 3 often marked with white; pronotum with neck and a pair of lateral spots dark brown, posterior margin white; dorsum of thorax orange, sides and venter white; tegula white, with apex slightly infuscate; metanotum dark brown; legs white; forewing lightly infuscate, as in Figure 223; propodeum dark brown, its sides white; gaster with dorsum dark brown, first tergite and venter white.

**HEAD.** Sculpture regular, fine, raised, reticulate, of small mesh and granular appearance, below top of antennal scrobes becoming less regular and squamiform-reticulate. Maxillary palpi 4-segmented; labial palpi 3-segmented. Ocelli forming an angle of about 45°. Relative dimensions, specimen 1 (card-mounted): head width 82, length 68, depth 47; eye length 48, width 43; malar space 26; frontovertex width 20; OPL 6; POL 7.5; OOL 3; scape length 36, width 16; other proportions of antenna as in Figure 222.

**THORAX.** Sculpture on mesoscutum very fine, raised, squamiform-reticulate, on scutellum similar but less regular. Notaular lines reaching about half-way across mesoscutum. Forewing venation and setation as in Figure 223. Relative dimensions, specimen 2 (slide-mounted): forewing length 117, width 51, marginal fringe 3; hindwing length 79,

width 19.5, marginal fringe 4.

**GASTER** a little shorter than thorax. Ovipositor not exerted. Relative lengths, specimen 2: last tergite 30; ovipositor 21; gonostylus 3 [middle tibia 41].

**Male.** Length range 0.87–0.97 mm ( $n = 11$ ).

Similar in habitus to female. Body generally dark brown; antennal scrobes entirely or almost entirely orange; scape dark brown mixed with orange-brown; fore coxa yellow, middle and hind coxae brown or yellowish brown; legs dusky yellow, with hind femur and tibia more distinctly dusky; mesopleurum orange anteriorly; prepectus orange; forewing more or less hyaline, but with a slightly infuscate area below apex of venation. Antennal torulus with upper margin more or less level with lower margin of eye; an irregular row of nodules spanning inner margin of torulus (Figure 224); scape about 2.5× as long as broad; other proportions of antenna as in Figure 225. Relative dimensions (slide-mounted specimen): head width 117; frontovertex width 52; scape length 52; middle tibia length 113; aedeagus length 43.

**Type data.** **Syntypes:** “many specimens”, Japan, Nagasaki, reared from *Lecanium* sp. on *Euonymus europaea*, 19 May 1922 (ICTJ) [not seen].

**Material examined.** Forty-one non-type examples (29 females, 12 males) from New Zealand (NZAC, BMNH).

AK, WI / NN.

Adults have been collected in January, February, and October–December.

Habitats noted: orchard; roadside; pear tree; grape vine; potato foliage; grass; second-growth bush.

**Biology.** An internal gregarious parasite of *Lecanium persicae* (Fabricius) (Homoptera: Coccidae). In New Zealand reared from this scale on grape vine and pear. Its biology has been described by Ishii (1932).

**Remarks.** *M. timberlakei* is a native of Japan. It was introduced into Australia about 1907 in an attempt to control *L. persicae*, a serious pest of vine and plum, and has been largely responsible for its control in that country (Wilson 1960). It was first reported from New Zealand by Valentine (1964), who noted it as a parasite of *L. persicae*. There is no record of it having been deliberately introduced.

—⑤—

## Genus *Microterys* Thomson

Thomson, 1876: 155. Rosen, 1976: 479–485. Prinsloo, 1976: 409–423. Noyes & Hayat, 1984: 299. Type species *Encyrtus sylvius* Dalman, 1820, by subsequent designation (Ashmead 1900); Sweden.

**Female.** Body usually yellowish, orange, or testaceous, occasionally dark green or blue and metallic; antennal funicle often bicolorous, with dark and pale segments; forewing infuscate in varying degrees, often entirely, or with 1 or 2 complete or incomplete hyaline fasciae distad of apex of venation.

**HEAD.** Occipital margin acute, but not sharp. Antennal scrobes moderately shallow, not sharply delimited; toruli with dorsal margin about level with lower margin of eye, or slightly below; funicle 6-segmented, the segments transverse, quadrate, or occasionally longer than broad; club 3-segmented. Mandibles tridentate or with 2 acute teeth and a more or less truncate 3rd (upper) tooth.

**THORAX** in profile with mesopleurum at least slightly expanded posteriorly, more or less separating metapleurum and propodeum from posterior coxa. Scutellum usually quite flat, though occasionally convex, and with apex not produced to form a distinct, thin flange. Forewing marginal vein about 2.0–4.0× as long as broad, usually slightly shorter than stigmal vein, which is a little longer than postmarginal vein.

**GASTER** a little shorter than thorax to distinctly longer. Hypopygium not reaching more than two-thirds along gaster, usually not more than half-way. Ovipositor varying from not exerted to well exerted, the exerted part more than half as long as gaster. Paratergites absent. Gonostyli free.

**Male.** Substantially different from female: body generally metallic green; antenna often with scape pale yellow; pedicel and flagellum usually unicolorous, testaceous; forewing entirely hyaline; legs often entirely yellow. Antenna 9-segmented; toruli with base about level with lower margin of eye or a little above; funicle 6-segmented, all segments longer than broad, clothed in setae at least twice as long as the diameter of a segment. Forewing postmarginal vein often slightly longer than stigmal vein.

**Biology.** Parasites of Coccidae, Kermococcidae, and Lecanodiaspididae (Homoptera).

**Distribution.** Cosmopolitan; about 150 species known, only one of them from New Zealand.

**Remarks.** *Microterys* is very close to *Paraphaenodiscus* Girault and *Trichomasthus* Thomson

(Encyrtinae, tribe Microterysiini, subtribe Microterysiina). It can be separated from *Paraphaenodiscus* by the absence of a distinct thin flange at the apex of the scutellum, and from *Trichomasthus* by its more heavily infuscate forewing and generally flatter scutellum. The forewing infuscation of *Trichomasthus*, when present, is limited to a subapical band, and the scutellum is clearly very convex. *Microterys flavus* belongs to the group of species with a distinctly convex scutellum.

### *Microterys flavus* (Howard)

Figures 226–232

Howard in Comstock, 1881: 367. Gourlay, 1930a: 6; 1930b: 340. Miller *et al.*, 1936: 590. Peck, 1963: 387–388. Valentine, 1967: 1123. Prinsloo, 1975: 35; 1976: 410.

**Female.** Length range 1.05–1.50 mm ( $n = 85$ ).

Head, scape, and pedicel orange, the pedicel with a dark brown stripe on inner surface dorsally; funicle segments 1–3 brown, segments 4–6 yellowish white; club dark brown; vertex with a few conspicuous, dark brown setae; thorax orange to pale orange-brown, clothed with conspicuous, dark brown setae; apex of scutellum with a slight purple lustre; legs orange; forewing infuscate as in Figure 229, though outer hyaline fascia occasionally uninterrupted or only narrowly interrupted; hindwing hyaline; propodeum brown medially, orange laterally; gaster dark orange-brown dorsally, orange towards apex and on venter.

**HEAD.** Frontovertex very narrow (Figure 226); sculpture very shallow, fine, raised, reticulate, becoming irregular and transversely elongate below top of antennal scrobes. Ocelli forming an angle of about 15–20°. Mandible tridentate, the upper tooth apically rounded (Figure 227). Relative dimensions, specimen 1 (card-mounted): head width 72, length 70, depth 45; frontovertex width 12; eye length 48, width 40; malar space 31; OPL 9; POL 4.5; OOL 0; scape length 39, width 12; other proportions of antenna as in Figure 228.

**THORAX.** Sculpture very shallow, raised, squamiform-reticulate dorsally, a little deeper on scutellum than on mesoscutum. Scutellum clearly convex. Forewing venation and setation as in Figure 229. Relative dimensions, specimen 2 (slide-mounted): forewing length 116, width 42, marginal fringe 5; hindwing length 86, width 19, marginal fringe 6.

**GASTER** about two-thirds as long as thorax. Ovipositor variously hidden to slightly exerted, the exerted part up to about one-seventh as long as gaster. Relative lengths, specimen 2: last tergite 30; ovipositor 56; gonostylus 12 [middle tibia 50].

**Male.** Length range 0.87–1.03 mm ( $n = 12$ ).

Generally dark brown; head and dorsum of thorax with a moderate metallic green lustre; scape whitish or pale yellowish; pedicel brown; flagellum brownish testaceous; tegula with base yellow, apex fuscous; wings hyaline; legs yellow. Sculpture of head and dorsum of thorax similar to that of female, but of relatively larger mesh. Antenna as in Figure 230; torulus with dorsal margin slightly above lower margin of eye. Forewing postmarginal vein slightly longer than stigmal vein (Figure 231). Genitalia as in Figure 232. Relative dimensions (slide-mounted specimen): head width 73; frontovertex width 38; scape length 28; middle tibia length 69; aedeagus length 40.

**Type data.** **Syntypes:** females and males, U.S.A., California (USNM) [not seen].

**Material examined.** Ninety-nine non-type examples (86 females, 13 males) from New Zealand (BMNH, USNM, NZAC).

ND, AK, WO, BP, TO, WN / SD, NN, MB, BR, WD, MC, OL.

Habitats noted: mixed *Podocarpus* and *Nothofagus*; citrus; apricot; gorse; plant nurseries.

Adults have been collected in every month except July.

**Biology.** A solitary or gregarious parasite of *Coccus hesperidum* Linnaeus (Homoptera: Coccidae), a well known pest of fruit trees. Also recorded as a parasite of *Saissetia oleae* (Bernard) (Homoptera: Coccidae) (Valentine 1967).

**Remarks.** *M. flavus* was introduced into New Zealand, probably from North America, in 1921 to control soft brown scale, *Coccus hesperidum* (Miller *et al.* 1936), and is thought to have had a considerable effect in checking its spread (Gourlay 1930b). For further notes on the history of this cosmopolitan species in New Zealand, see Gourlay (1930a) and Valentine (1967). In other parts of the world it has been recorded as a parasite of various species of *Coccus*, *Lecanium*, *Pulvinaria*, and *Saissetia* (see Peck 1963). For the history of its worldwide use in controlling *Coccus hesperidum* and *Saissetia oleae*, see Bartlett in Clausen (1978).

### ***Notodusmetia* new genus**

Type species *Notodusmetia coroneti* new species.

(The name *Notodusmetia* is derived from the prefix *Noto-* (Greek, 'southern') and *Dusmetia*, a previously described and similar genus of encyrtid; gender masculine.)

**Female.** HEAD in facial view slightly broader than long, in profile about twice as long as deep and anteriorly more or less evenly curved, but frontovertex quite flat. Eye with posterior margin slightly convex, about 1.6 $\times$  as long as broad, with quite short, sparse hairs, and reaching occipital margin, which is sharp. Malar space about one-quarter as long as eye; malar sulcus present. Frontovertex about two-fifths as wide as head. Ocelli forming an angle of about 90°; posterior ocellus about equidistant from occipital margin and eye margin. Antennal scrobes shallow, horseshoe-shaped, short, reaching only about one-fifth distance from antennal toruli to anterior ocellus; torulus separated from mouth margin by less than its own length and from other torulus by about its own length, its dorsal margin clearly above ventral margin of eye; clypeal margin almost straight; scape broadened and flattened, about 3.0 $\times$  as long as broad and slightly longer than minimum width of frontovertex; pedicel conical, longer than any funicle segment; funicle 6-segmented, the segments cylindrical, subequal in length but gradually widening distally; club 3-segmented, about three-quarters as long as funicle, its apex more or less rounded; setae on funicle relatively short, the longest slightly shorter than the diameter of the smallest segment; longitudinal sensilla present on all flagellar segments. Frontovertex with sculpture moderately shallow, irregular, raised, squamiform-reticulate, becoming gradually more longitudinally elongate on lower parts of face and on gena; setae inconspicuous, generally slightly longer than diameter of anterior ocellus. Mandible with 2 acute teeth. Maxillary palpus 4-segmented; labial palpus 3-segmented.

THORAX in lateral view moderately deep. Mesopleurum greatly expanded posteriorly, more or less touching basal segment of gaster and broadly separating metapleurum and propodeum from hind coxa. Mesoscutum slightly convex. Scutellum almost flat. Pronotum in dorsal view moderately short, plainly visible behind head; posterior margin medially emarginate. Visible part of mesoscutum about 3.0 $\times$  as broad as long; notaular lines absent; posterior margin convex, projecting over axillae medially; axillae separated. Scutellum about as long as broad, about 1.5 $\times$  as long as mesoscutum, its apex slightly produced into a lamina, which overhangs propodeum medially. Propodeum short, completely hidden by lamina of scutellum and 1st segment of gaster medially. Mesoscutum and scutellum with sculpture similar to that on frontovertex, but deeper. Setae on dorsum of thorax fairly long, translucent or whitish, quite dense, and hence fairly conspicuous in dorsal view. Forewing infuscate, shortened, hardly reaching posterior margin of 1st gastral tergite. Middle tibia with spur slightly

shorter than basal segment of middle tarsus.

GASTER slightly shorter than thorax; setae on dorsum and sides pale, relatively conspicuous; cercal plates in anterior half. Paratergites present. Last tergite about  $1.3\times$  as long as middle tibia, more or less acute apically. Hypopygium reaching apex of gaster. Ovipositor not exerted, about as long as middle tibia. Gonostyli fused to 2nd valvifers, which are relatively broad.

**Male.** Very similar to female, but differing in relatively higher placement of antennal toruli, and structure of antennae and genitalia. Antennal torulus with ventral margin about level with ventral margin of eye; scape subcylindrical, about  $4.0\times$  as long as broad; pedicel conical, only very slightly longer than broad, shorter than any funicle segment; funicle filiform, with all segments longer than broad, cylindrical; club entire; setae on flagellum long, much longer than the diameter of any segment; ventral surface of club slightly concave; scale-like sensilla on club only. Genitalia lacking parameres; digiti each armed with a pair of apical spines about half as long as digitus.

**Biology.** Unknown, but probably parasites of mealybugs (Homoptera: Pseudococcidae).

**Distribution.** Known only from New Zealand, and only from the type series.

**Remarks.** *Notodusmetia* belongs to the tribe Anagyrini (Tetracneminae), and superficially resembles species of *Dusmetia* Mercet. The latter genus is placed in the tribe Dinocarsiini by Trjapitzin (1973a). Females of *Notodusmetia* can be distinguished from *Dusmetia* by the following characters: sculpture on head and thorax fairly shallow; body slightly shiny; hairs on body translucent, not very conspicuous; notaular lines absent; scutellum apically pointed. Species placed in *Dusmetia* have the sculpture on head and thorax very fine and of silky appearance; the body covered in very conspicuous silvery setae; notaular lines present; and the scutellum apically truncate. Males of *Notodusmetia* can be separated by the setae on the antennal flagellum being relatively long, and the digiti of the genitalia each armed with two long spines. Males of *Dusmetia* have the setae on the antennal flagellum not longer than the diameter of a segment, and the digiti of the genitalia each with two or three short apical teeth.

### *Notodusmetia coroneti* new species

Figures 233–236

**Female.** Length range 1.08–1.35 mm ( $n = 3$ ).

**Holotype.** Length 1.28 mm. Head reddish orange, but between torulus and eye dark brown; mouth margin and gena below eye pale orange; antenna dark brown; scape with a longitudinal, narrow, curved, pale orange stripe on outer surface from base to apex, but interrupted in dorsal one-third; pedicel pale orange in distal half; setae on head translucent; pronotum orange, its posterior margin and neck dark brown; mesoscutum, tegulae, and scutellum dark brown with weak, metallic green reflections; axillae reddish brown; mesopleurum, prepectus, and legs dark orange, the legs mixed brownish, particularly on middle tibia; proximal segments of middle and hind tarsi yellowish; forewing dark brown (see Figure 235); setae on dorsum of thorax translucent but fairly conspicuous; visible part of propodeum dark brown; gaster dark brown, with very weak, metallic brassy reflections; setae on dorsum of gaster translucent or pale.

**HEAD.** Ocelli forming an angle of very nearly  $90^\circ$ . Mandible as in Figure 233. Relative dimensions: head width 86, length 75, depth 40; minimum frontovertex width 34; eye length 57, width 36; malar space 20; OPL 7; POL 16; OOL 8; scape length 40, maximum width 16.5; other proportions of antenna as in Figure 234.

**THORAX.** Relative dimensions: forewing length 59, width 24, venation and setation as in Figure 235; middle tibia length 71.

GASTER slightly shorter than thorax.

**Paratype.** Relative lengths: middle tibia 34; last tergite of gaster 43; ovipositor 33.

**Variation.** Dorsum of thorax sometimes dark orange-brown with weak metallic reflections. Larger specimens have relatively longer funicle segments – in the largest specimen examined the first funicle segment is about  $1.7\times$  as long as broad, and in the smallest it is quadrate.

**Male.** Length range 0.79–1.57 mm ( $n = 21$ ).

Very similar to female, apart from setae on forewing being slightly more dense, and in structure of antennae (Figure 236) and genitalia (Figure 237). Relative dimensions: specimen 1 (card-mounted) – head width 86, length 72, depth 41; minimum frontovertex width 35; eye length 51, width 36; malar space 21; OPL 9; POL 17; OOL 17; scape length 35, maximum width 10; specimen 2 (slide-mounted) – middle tibia length 100; aedeagus length 54.

**Variation.** Similar to that found in female.

**Type data.** Holotype female: New Zealand, CO, Watts Rock, 1200 m, tussock, grasses, *Juncus*, and *Sphagnum*, swept, January 1981, J.S. Noyes & E.W. Valentine (NZAC).

**Paratypes** (5 females, 23 males). MB - 1 female, Wairau, Red Hills, swept from red tussock, 3470' [1040 m], 28 Mar 1972, EWV. MC - 1 female, Banks Peninsula, Price's Valley, Malaise trap at edge of native bush, Jan 1981, RPM. OL - 2 females, 8 males, Crown Peak, tussock, grasses, shrubs, and alpine herbs, 1200 m, 24 Jan 1981, N&V. CO - 1 male, Cromwell Beetle Reserve, Cemetery Road, litter 77/169, 17 Nov 1977, JCW; 14 males, same data as holotype.

**Material examined.** Type series only (NZAC, BMNH).

— / MB, MC, OL, CO.

Recorded from around sea level to 1200 m (CO, Watts Rock; OL, Crown Peak).

Habitats noted: edge of native bush; tussock, grasses, *Juncus*, and *Sphagnum*; red tussock; tussock, shrubs, grasses, and alpine herbs; litter.

Adults have been collected in January, March, and November.

**Biology.** Unknown.

**Remarks.** *N. coroneti* appears to be predominantly associated with subalpine or alpine grassy habitats. The only known exception is the single female collected by Malaise trap at Banks Peninsula (MC), which, although distinctly larger, does not appear to differ significantly from others examined.

### *Odiaglyptus* new genus

Type species *Odiaglyptus bififormis* new species.

(The name *Odiaglyptus* is derived from *odiosus* (Latin, 'troublesome') and *Aglyptus*, a previously described and similar genus of encyrtid; gender masculine.)

**Female.** Body generally shiny and metallic, though occasionally completely reddish and lacking metallic lustre.

**HEAD** in facial view about 1.2× as broad as long, in profile about twice as long as deep and anteriorly more or less evenly curved. Eye about 1.5× as long as broad, with very short, sparse hairs, though appearing naked, and reaching occipital margin, which is sharp; posterior margin slightly concave. Malar space about one-third as long as eye; malar sulcus present, not very distinct. Frontoververtex about

half as wide as head. Ocelli forming an angle of about 90°; posterior ocellus slightly nearer to eye margin than to occipital margin. Antennal scrobes shallow, straight, separated dorsally by interantennal prominence, reaching only about one-third distance from antennal toruli to anterior ocellus; antennal torulus separated from mouth margin by slightly less than its own length, and from other torulus by about three-quarters its own length, its dorsal margin clearly above ventral margin of eye; clypeal margin broadly but shallowly concave; scape slightly to distinctly broadened and flattened, about 2.0–3.0× as long as broad, slightly longer than minimum width of frontoververtex; pedicel conical, not or hardly longer than any funicle segment; funicle 6-segmented, the segments from slightly to distinctly broadened and flattened, gradually shortening distally, the proximal segments clearly longer than broad, the distal segments slightly transverse or longer than broad; club 3-segmented, about one-third as long as funicle, its apex more or less rounded; setae on funicle relatively short, the longest much shorter than the diameter of any segment; longitudinal sensilla present on all flagellar segments. Sculpture on frontoververtex shallow, fine, raised, reticulate, gradually becoming squamiform-reticulate and more longitudinally elongate on lower parts of face and on gena. Setae on frontoververtex very inconspicuous, generally slightly shorter than diameter of anterior ocellus. Mandible with 2 acute teeth. Maxillary palpus 4-segmented; labial palpus 3-segmented.

**THORAX** in lateral view moderately deep. Mesopleurum not expanded posteriorly, separated from basal segment of gaster by metapleurum and propodeum. Mesoscutum flat in profile; scutellum slightly convex. Pronotum in dorsal view moderately long, plainly visible behind head; posterior margin slightly convex. Visible part of mesoscutum about 3.0× as broad as long; notaular lines absent; posterior margin straight. Scutellum about as long as broad, about 1.5× as long as mesoscutum, its apex acute. Propodeum moderately long, about one-third as long as scutellum. Dorsum with squamiform-reticulate sculpture, a little more elongate on pronotum and scutellum than on mesoscutum, and on scutellum slightly deeper. Setae on dorsum fairly long, dark brown or translucent, not very conspicuous in dorsal view; setae on sides of propodeum quite dense, conspicuous, extending downwards to near hind coxa. Forewing shortened, hardly reaching base of gaster; apex truncate, rounded, or slightly pointed. Middle tibia with spur slightly shorter than basal segment of middle tarsus.

**GASTER** about one-third longer than thorax. Cercal plates in anterior half of gaster. Paratergites present. Last tergite about as long as middle tibia,

narrow apically, but more or less truncate. Hypopygium slightly exceeding apex of gaster. Ovipositor slightly exerted, clearly longer than middle tibia. Gonostyli broad, fused to 2nd valvifers, which are about one-third as wide as gonostyli.

**Male.** Very similar to female, but differing in slightly higher placement of antennal toruli, antennal structure, relatively shorter gaster, and genitalia. Antennal torulus with ventral margin about level with ventral margin of eye; scape slightly broadened and flattened, 3.0–4.0× as long as broad, about as long as width of frontovertex; pedicel conical, only very slightly longer than broad, shorter than any funicle segment; funicle filiform, its segments longer than broad and cylindrical; club entire; setae on flagellum each not longer than the diameter of any segment; ventral surface of club very slightly concave; scale-like sensilla on club only. Genitalia without parameres. Digits each armed with 3 short apical spines. Aedeagus spatulate, broadest subapically.

**Biology.** Parasites of mealybugs (Homoptera: Pseudococcidae). Also recorded, probably erroneously, from Eriococcidae (Homoptera).

**Distribution.** Known only from New Zealand, and only from the type species.

**Remarks.** *Odiaglyptus* is probably accommodated best in the tribe Anagyrini, subtribe Anagyrina (Tetracneminae), but superficially resembles *Aglyptus* Foerster, which is placed by Trjapitzin (1973a) in the tribe Dinocarsini. It can be separated from *Aglyptus* by the lack of notaular lines on the mesoscutum and the lack of a pair of basal pits on the scutellum. From other genera of the Anagyrini it can be distinguished by the abbreviated wings, generally metallic body, relatively smooth sculpture of head and thorax, and flattened funicle segments. *Odiaglyptus* may be related to the group of genera which includes *Cyrtocoryphes* Timberlake and *Cryptanusia*, but the virtual absence of wings makes this difficult to ascertain (see Noyes & Hayat 1984, p. 262).

### *Odiaglyptus biformis* new species

Figures 2 and 238–252

Cumber, 1959: 883 (Hy 51, ?*Ectroma* sp.).

**Female** (Figure 2). Length range 0.76–2.55 mm ( $n = 437$ ).

**Holotype.** Length 2.22 mm. Head dark metallic green, but between eye, antennal torulus, and mouth margin coppery; antenna, including radicle, black with brassy and purple reflections, especially on scape; frontovertex and upper parts of face with inconspicuous dark setae; lower parts of face with more conspicuous dark setae; mouth margin with very distinct silvery setae; dorsum of thorax dark metallic green with very slight coppery reflections; mesopleurum dark metallic coppery purple; coxae dark metallic green; fore femur and tibia dark brown, the femur with a broad, longitudinal, yellow-amber streak; fore tarsus yellow-amber, but distalmost 2 segments dark brown; middle leg more or less completely yellowish, the femur slightly marked with dark brown near apex; teeth at apex of tibia and apical tarsal segment dark brown; hind femur and tibia dark brown, slightly paler apically; hind tarsus with proximal segments yellow-amber, apical segments dark brown; forewing almost evenly infusate, but with some ill defined hyaline areas; hindwing hyaline; propodeum medially dark purplish, laterally dark metallic green; setae on dorsum of thorax dark brown or slightly translucent, not very conspicuous but more so on scutellum; setae on sides of propodeum silvery white; gaster dark metallic purplish brown.

**HEAD.** Ocelli forming an angle of about 90°. Relative dimensions: head width 111, length 100, depth 56; minimum frontovertex width 51; eye length 71, width 46; malar space 23; OPL 10; POL 20; OOL 12; scape length 68, maximum width 24; other proportions of antenna similar to Figure 242.

**THORAX.** Relative dimensions: forewing length 55, width 24; venation and setation similar to Figure 249; middle tibia length 115.

**GASTER** with exerted part of ovipositor slightly shorter than spur of middle tibia.

**Paratype.** Relative lengths: middle tibia 46; last tergite of gaster 45; ovipositor length 72.

**Variation.** Body and scape dark metallic green, blue, or occasionally purplish, sometimes with mesopleurum partly or completely reddish brown; specimens from northern North Island usually almost completely reddish, with no metallic lustre, or hardly any; legs variable, from dark brown except for proximal tarsal segments to more or less completely yellow; wings, particularly in paler specimens, occasionally hyaline. Relative width of antennal segments varying as follows: scape about 1.7–4.0× as long as broad, 1st funicle segment 1.1–3.5×, and 6th funicle segment 0.8–1.7× (Figures 238–243). Forewing apex broadly rounded, transversely or slightly obliquely truncate (Figures 244–250).

**Male.** Length range 0.56–1.90 mm ( $n = 190$ ).

Very similar to female, apart from antennae (Figure 251) and genitalia (Figure 252). Lower parts of face covered with dense, conspicuous, silvery or translucent setae. Relative dimensions, specimen 1 (card-mounted): head width 82, length 70, depth 41; minimum frontovertex width 39; eye length 51, width 33; malar space 16; OPL 8; POL 14; OOL 10; scape length 41, maximum width 11. Relative lengths, specimen 2 (slide-mounted): middle tibia 48; aedeagus 37.5.

**Variation.** Colour as in female. Antennal segments in smaller specimens usually relatively shorter: in smallest specimen, scape only slightly more than  $3.0\times$  as long as broad and 1st funicle segment about twice as long as broad; in largest specimens scape about  $4.0\times$  as long as broad and 1st funicle segment about  $3.5\times$  as long as broad.

**Type data.** **Holotype** female: New Zealand, BR, St Arnaud, 600 m, native grassland, *Sphagnum* bog, 9 December 1980, J.S. Noyes, E.W. Valentine, & A.K. Walker (NZAC).

**Paratypes** (447 females, 193 males). ND – 1 male, Dargaville, HY. 51. 21A. PA., pasture, 22 Jan 1957, RAC; 1 female, Waipuna Stream, Spirits Bay, moss 67/274, 9 Nov 1967, JIT & JMcB; 1 female, Tokerau, 4 Oct 1980, JSN; 2 females, Mt Camel, reared from pseudococcid on *Desmoschoenus spiralis*, 20 Oct 1982, CFB. AK – 1 female, Waionui Inlet, swamp vegetation, 23 Sep 1977, BAH; 1 female, Piha, 5 Jul 1980, JSN; 1 male, Piha, 2 Jan 1981, JSN. WO – 2 females, Tahuna, 2 Feb 1924, ESG. TO – 2 females, Minginui State Forest, Otupaka Clearing, first flat, mosses and swards, 77/86, 28 Jul 1977, JSD. TK – 2 females, 1 male, Pouakai trig, swards 75/206, 3 Dec 1975, JSD. RI – 3 females, Ruahine Range, ex pan trap in tussock and alpine meadow, 1400 m, 8 Feb 1980, CFB.

SD – 1 female, 1 male, Stephens I., 20 Feb 1971, GWR. NN – 1 male, Nelson, 6 Mar 1927, ESG; 5 females, 4 males, Todd's Valley, 1♀ on *Juncus*, 14 Apr 1963, 4♀ 4♂ 25 Mar 1965, EWV, remainder 20 Mar 1969, EWV; 1 male, Mapua, DV2, 23 Dec 1965; 1 male, Mapua, DV6, from grasses, 26 Jan 1966; 6 females, 10 males, Takaka Hill, 5♀ 9♂ 5 Jan 1968, EWV, remainder 20 Feb 1968, JAdeB; 3 females, L. Sylvester, Cobb – 1 mats 69/117, 1460 m, 31 Mar 1969, JSD, 1 tussock 69/139, 1300 m, 30 Apr 1969, JSD, 1 litter 69/184, 29 Oct 1969, GWR; 1 female, Mt Domett, litter 71/159, 1494 m, 30 Nov 1971, JSD; 1 female, Cobb Dam, ex mealybug at base of grass, 4 May 1972, JAdeB; 1 female, L. Sylvester, 14 May 1972, JAdeB; 1 female, Nelson, Rough I., sweeping grass, 24 Jan 1976, AKW; 7 females, 23 males, Cobb Reservoir, mixed native grassland, 850 m, 6 Dec 1980, NV&W; 1

female, Canaan Saddle, *Nothofagus* and mixed *Podocarpus*, 7 Dec 1980, NV&W. NN-MB – 2 females, Cannock, Rainbow/Wairau Divide, mats 71/19, 1890 m, 3 Feb 1971, JSD. MB – 2 males, Waihopai, sedge and *Juncus*, D.V.4, 7 Jan 1966; 4 females, 1 male, Ward's Pass, ex mealybug, 19 Aug 1966, JAdeB; 1 female, Molesworth, ex mealybugs on *Poa* sp., 3700' [1110 m], Sep 1966, JAdeB; 3 females, 1 male, Mt Altmarlock, Black Birch Range, 16–17 Feb 1970 – 1♀, ♂, plants 70/121, 1700 m, GK, 1♀ sweeping *Celmisia sessiliflora*, 1700 m, ACE, 1♀ 4800–5100' [1440–1530 m], JSD; 1 female, Black Birch Station, 18 Feb 1970, GK; 1 female, Red Hills, Wairau, ex mealybug on *Chionochloa*, 22 Mar 1972, JAdeB; 1 female, Molesworth, Ward's Pass, ex *Pseudantonina poae*, 3700'

[1110 m], 19 Aug 1972, JAdeB; 5 females, Altmarlock, 4700–5100' [1410–1530 m], on *Celmisia sessiliflora*, 15 Jan 1973, JSD. KA – 6 females, 7 males, Clarence Valley, 12 Feb 1969, EWV. BR – 1 female, Mt Robert, 4000' [1200 m], 16 Dec 1934, ESG; 8 females, 3 males, Mt Robert, 15 Mar 1968, EWV; 1 male, Paparoa Range, Lochnagar Ridge, 1300 m, swards 69/257, 10 Dec 1969, JSD; 1 female, 1 male, Mt Dewar, Lochnagar Ridge, Paparoa Range, 1218 m, swards 69/259, 10 Dec 1969, JSD; 1 female, Lochnagar Ridge, Paparoa Range, mats 69/262, 1218 m, 10 Dec 1969, JSD; 1 female, Paparoa Range E of Mt Dewar, 1129 m, moss 69/252, 12 Dec 1969, JIT; 4 females, Mt Robert, swept grasses, 7 Nov 1971, EWV; 31 females, 7 males, St Arnaud, native grassland, *Sphagnum* bog, 9 Dec 1980, NV&W; 13 females, 1 male, Mt Robert, 600–1400 m, 10 Dec 1980, NV&W; 1 male, Paparoa Range, Mt Dewar, 1067 m, plants 69/235, 3 Dec 1979, JIT. MC – 8 females, Christchurch, 17 Feb 1922, ESG; 8 females, 7 males, Cass, 1962, ECW; 1 male, Tinwald, L. Tarbottom, ex net sweeping, Nov 1956, SMK; 1 male, Waimakariri, ex mealybug on *Cyathodes* sp., 15 Nov 1965; 12 females, 7 males, Lincoln, 14 Nov 1967, CTJ; 4 females, 9 males, Christchurch, Cashmere, 11 Feb 1968, PMJ; 2 females, Tinwald, L. Tarbottom, ex net sweeping, Nov 1975, JMK; 1 female, Banks Peninsula, 4 km E of Akaroa, sweeping paddock, 22 Feb 1976, LLD; 1 male, Nervous Knob, Craigieburn, 5000' [1500 m], sweeping, 24 Feb 1976, LLD; 13 females, Banks Peninsula, Price's Valley, Malaise trap at edge of native bush, Oct 1980 (1), Nov 1980 (8), and Mar 1981 (4), RPM; 1 female, 1 male, "Canterbury", encyrtid sp. 16, EGW. SC – 3 females, Timaru, reared ex mealybug *Pseudantonina poae* in pasture, 16 Oct 1984, JW. MK – 1 female, Hermitage, Thor Lodge, grass sweeping, 10 Jan 1966, ACE; 1 female, 2 males, Mt Cook National Park, Tasman Valley, ½ mile [0.8 km] W

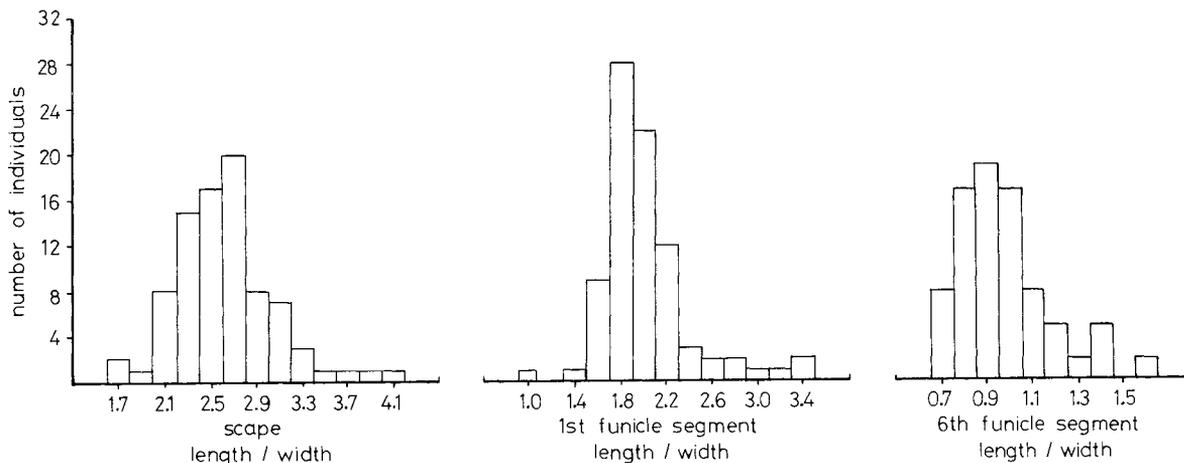
of Unwin Hut, 2300 ft [690 m], sweeping vegetation, 30 Jan 1972, WJK & PSB; 4 females, Mt Cook N.P., Mt Sebastopol, 3800 ft [1140 m], shrubs and grass tussocks around red lakes, 7 Feb 1972, WJK & PSB; 1 female, Mt Cook N.P., 1 mile [1.6 km] N of Hermitage, 2600 ft [780 m], various native shrubs and grasses, 9 Feb 1972, WJK & PSB; 6 females, L. Pukaki, Te Kohai I., 27–28 Jan 1976, CS; 1 female, Ahuriri R. valley, Ben Avon, tussock grass, 2 Mar 1976, WJK; 1 female, Stocking Stream, 820 m, Hooker Valley, 3 Apr 1977, JSD. OL – 1 female, Lindis Pass summit, 970 m, sweeping, 2 Mar 1976, LLD; 1 male, Dart Hut, pan trap in open, 13–15 Feb 1980, JSD; 1 female, Mt Ansted, 1770–2100 m, 18 Feb 1980, JCW; 32 females, 5 males, Coronet Peak, 1640 m, tussock, alpine shrubs, *Hebe*, mat plants, Jan 1981, N&V; 14 females, 1 male, Coronet Peak, 1200 m, tussock, grasses, *Hebe*, alpine shrubs, Jan 1981, N&V; 25 females, 14 males, Kinloch State Forest, Dart R., *Nothofagus* forest, grass, *P. totara*, Jan 1981, N&V; 20 females, Crown Peak, 1700 m, tussock, grasses, shrubs, alpine herbs, 24 Jan 1981, N&V. CO – 6 females, 5 males, Little Kyeburn, ex *Eriococcus* on *Chionochloa*, 9 Nov 1968, TT; 1 male, Rock and Pillar Range, litter 69/195, 1350 m, 11 Nov 1969, JSD; 2 females, 1 male, Mt Bitterness, litter 71/18, 1524 m, JSD; 1 female, Old Man Range, Hyde Rock, 22 Feb 1974, JSD; 1 female, 1 male, Old Woman Range, 1390 m, litter 74/97, 20 Nov 1974, JSD; 26 females, 10 males, N end of Pisa Range, 1554 m, litter 74/102 (25♀, 9♂) and litter 74/105 (remainder), 23 Nov 1974, JSD; 4 females, 4 males, N end of Pisa Range, 1615 m, litter 74/92, 24 Nov 1974, JSD; 2 females, Rock Peak, 2 km E of Crown Range saddle, 1430–1460 m, 27 Nov 1974, JSD; 5 females, Crown Range saddle, Rock Peak, 1430–1460 m, mixed swards, 74/115, JCW; 1 male, Pisa Range, N end, 1555 m, mats 74/117, 24 Nov 1974, JCW; 1 female, Watt's Rock, Carrick Range, 1280 m, litter and moss 75/98, 14 Mar 1975, JCW; 3 females, 2 males, Cromwell Beetle Reserve, *Raoulia australis* 75/129, 17 Mar 1975, JCW; 1 female, Watt's Rock, Carrick Range, 1402 m, cushion plant 75/131, 14 Mar 1975, JCW; 2 females, Ben Nevis, Hector Range, 1950 m, litter 75/139, 14 Mar 1975, JCW; 1 female, 2 km S of Arrowtown, sweeping roadside grass, 14 Feb 1976; 1 female, Old Man Range, 15 km S of Alexandra, 1200 m, tussock grass, 15 Feb 1976, WJK; 2 females, Old Man Range, 15 km S of Alexandra, sweeping, 15 Feb 1976, LLD; 2 females, 4 males, Cromwell Beetle Reserve (Cemetery Rd end), moss 77/170, 1 Nov 1977, JCW; 1 female, 1 male, Kawarau Gorge, Roaring Meg, upper power house, tussocks and litter 77/168, 17 Nov 1977, JCW; 1 female, 1 male.

Carrick Range, Watt's Rock, 1280 m, moss 79/40, 11 Mar 1979, J.C. Watt; 9 females, 3 males, Rocklands Station, 800 m, pit trap in tussock, Dec 1978 (5♀), Jan 1979 (1♀), Feb 1979 (1♀), Apr 1979 (1♀), Nov 1979 (1♀, 3♂), BIPB; 18 females, 7 males, Waipori, 520 m, pit trap in tussock, Nov–Dec 1979 (1♀), Dec 1978 – Mar 1979 (8♀, 4♂), Feb–Mar 1979 (4♀, 2♂), Mar–Apr 1979 (2♀), and Nov–Dec 1979 (3♀, 1♂), BIPB; 26 females, 8 males, Watt's Rock, 1200 m, tussock, grasses, *Juncus*, and *Sphagnum*, Jan 1981, N&V; 7 females, 6 males, Roaring Meg, tussock, grasses, *Discaria*, *Juncus*, *Rosa*, and *Pimelia*, swept, 13 Jan 1981, N&V. FD – 1 female, Turret Range, 1000–1250 m, 9 Jan 1970, JSD; 1 female, Turret Range, Wolfeburn Flat, at night, 15 Jan 1970, JSD; 1 female, Wilmot Pass, Mt Barber, 1100 m, litter 70/13, 8 Jan 1970, JSD & JH; 1 male, Wilmot Pass, Mt Barber, 1100 m, mat 70/16, JSD & JH; 1 male, Mt Grey, Turret Range, 1200 m, mats 70/44, 14 Jan 1970, JSD; 1 female, Manapouri, Mt Barber, 1100 m, 15 Jan 1970, JSD; 1 female, Wolfe Flat Tarn, Turret Range, 1100 m, 23 Jan 1970, JSD; 1 female, Mt Barber, 1350 m, Wilmot Pass, mats and swards 70/83, 23 Jan 1970, ACE; 1 female, Turret Range, 1200 m, grass 70/87, 24 Jan 1970, ACE; 1 female, W Olivine Range, Red Mtn, litter 75/39, 28 Jan 1975, GWR; 1 female, W Olivine Range, Red Mtn, Cascade Face, 1280 m, tussock litter 75/49, 29 Jan 1975, GWR; 1 female, Tempest Spur, W Olivine Range, litter 75/58, 1463 m, litter 75/58, 29 Jan 1979, JSD; 1 female, Takahe Valley, 400 m, above head of L. Orbell National Park, in tussock, 7 Dec 1972, ACE; 2 females, 5 males, Takahe Valley, L. Orbell, sweeping tussock and short grass, 6 Dec 1972, ACE; 1 female, W Olivine Range, Simonin Pass, 1067 m, litter 75/38, 27 Jan 1975, GWR; 1 female, W Olivine Range, Red Mtn, litter 75/39, 11 Mar 1975, GWR; 2 females, 2 males, W Olivine Range, Red Mtn, Cascade Face, litter 75/40, 29 Jan 1975, GWR; 2 males, W Olivine Range, Red Mtn, litter 75/48, 30 Jan 1975, JSD; 1 female, Darran Mtns, Tutoko Bench, Middle Basin, 1615 m, swards 77/11, 14 Jan 1977, JSD. SL – 1 female, 1 male, Takitimu Range, Tower Peak, 30 Jan 1976 – ♀ 1372 m, rock cleft 76/10, JSD, ♂ 1000 m, sweeping bog, LLD.

SI – 1 female, Mt Rakeahua summit, 11 Feb 1968, GK; 5 females, 2 males, Table Hill, 15 Feb 1968, EWV; 10 females, 4 males, Mt Rakeahua, 21 Feb 1968, EWV; 2 females, Mason Bay, 26 Feb 1968, EWV; 1 female, Mt Rakeahua, EWV.

**Material examined.** Type series only (NZAC, BMNH, USNM, UCRC, CNCI, PPRI, ZILR).

ND, AK, WO, TO, TK, RI / SD, NN, MB, KA,



**Text-figure 2** Frequency distribution of individuals of *Odiaglyptus biformis* with differing relative widths of antennal segments.

BR, MC, SC, MK, OL, CO, FD, SL / SI.

Recorded from around sea level to 1950 m (CO, Ben Nevis).

Habitats noted: *Nothofagus*, mixed *Podocarpus*, *P. totara*, and grasses; *Cyathodes*; *Celmisia sessiliflora*; native bush; shrubs and grass tussocks; native grassland and *Sphagnum* bog; tussock, alpine shrubs, *Hebe*, and mat plants; grasses; tussock, grasses, *Discaria*, *Juncus*, *Rosa*, and *Pimelia*; *Poa*; *Chionochloa*; *Desmoschoenus spiralis*; tussock and alpine meadow; sedge and *Juncus*; mosses and swards; litter; paddock; pasture; rock cleft; swamp vegetation.

Adults have been collected in all months except June and September.

**Biology.** Reared from *Balanococcus poae* (Homoptera: Pseudococcidae) on pasture grass, and from unidentified mealybugs on *Poa* sp., *Chionochloa* sp., *Cyathodes* sp., and *Desmoschoenus spiralis*. Also recorded, probably erroneously, from an unidentified eriococcid (Homoptera) on *Chionochloa*.

**Remarks.** *O. biformis* shows considerable variation in the relative width of scape and flagellar segments. Related species from other countries can normally be separated reliably on relatively small differences in the width of antennal segments, notably the scape. This is not the case here, and it appears that this species is typical of many New Zealand insects in showing a high degree of individual variation. The variation in relative width of

scape and flagellar segments more or less follows a normal distribution (see Text-figure 2), and the complete range is often observed in specimens collected together from a single locality (e.g., Watt's Rock, CO).

### Genus *Parectromoides* Girault

Girault, 1915a: 171. Noyes & Hayat, 1984: 192 (key), 213 (key), 320. Type species *Parectromoides magniscutellum* Girault, by original designation; Australia.

**Female.** Body usually blackish, but partially metallic green on face, green, blue, or purple on scutellum, and green or coppery on gaster; forewing hyaline or slightly infused with yellowish; venation yellow.

**HEAD.** Occipital margin sharp. Eyes hairy, overreaching occipital margin. Antennal torulus separated from mouth margin by much less than its own length, its dorsal margin well below lowest margin of eye. Mandible bidentate. Maxillary palpus 4-segmented; labial palpus 3-segmented. Antenna with scape subcylindrical; funicle 6-segmented, the segments usually at least a little longer than broad; flagellar segments filiform, only slightly wider distad; club 3-segmented, its apex more or less rounded.

**THORAX** in profile with mesoscutum and scutellum almost flat, only slightly convex. Propodeum quite broadly reaching hind coxa. Pronotum in dorsal view quite short medially; posterior margin

broadly concave. Forewing with linea calva neither interrupted nor closed; filum spinosum present; marginal vein about 6.0× as long as broad, longer than stigmal vein; postmarginal vein about as long as stigmal vein, or longer; propodeum medially about one-sixth as long as scutellum.

**GASTER** about three-fifths as long as thorax. Hypopygium reaching apex of gaster. Tergites 2–6 with a narrow, median, longitudinal, membranous strip. Last tergite about as long as middle tibia. Ovipositor about twice as long as middle tibia, slightly exserted. Paratergites absent. Outer plates of ovipositor broadest subapically, about 3.5× as long as broad, roughly triangular. Gonostyli free, flattened, about one-quarter as long as ovipositor.

**Male.** Unknown.

**Biology.** Unknown.

**Distribution.** Australia and New Zealand; two (possibly synonymous) species are known, only one of them from New Zealand.

**Remarks.** Noyes & Hayat (1984) placed *Parectromoides* in the Tetracneminae, Charitopidini because of its superficial resemblance to *Clausenia* Ishii. However, a recent detailed examination of slide-mounted material has revealed that this placement is incorrect. The shape of the last gastral tergite, the structure of the ovipositor, and particularly the shape of the outer valves, the absence of paratergites, and the presence of a filum spinosum suggest that it is more closely related to *Tachinaephagus*, which probably belongs in the Bothriothoracini (Encyrtinae).

### *Parectromoides varipes* (Girault)

Figures 253–259

Girault, 1915a: 166.

**Female.** Length range 1.19–1.77 mm ( $n = 10$ ).

Head dark metallic green, but frontovertex dark purplish; antenna, including radicle, dark brown, but scape yellow; thorax excluding scutellum dark brown or black with a weak, metallic dark blue or purple sheen; mesopleurum distinctly purplish; scutellum shining metallic green medially, becoming gradually purple on sides and at apex; forewings hyaline or infused with pale yellow; coxae dark purplish brown; fore femur and tibia dark brown, testaceous at apices; remainder of legs yellowish, but base of middle femur sometimes slightly infuscate; sides of propodeum metallic green; gas-

ter mostly strongly metallic green, but tergites 2–6, sternites, and ovipositor sheaths dark purple-brown.

**HEAD** (Figure 253). Mandible as in Figure 254. Relative dimensions, specimen 1 (card-mounted): head width 98, length 84, depth 45; minimum frontovertex width 19; eye length 62, width 52; malar space 32; OPL 5; POL 8; OOL 0.5; scape length 45, width 10; other proportions of antenna as in Figure 255.

**THORAX.** Forewing setation and venation as in Figure 256; occasionally postmarginal vein hardly longer than stigmal. Relative dimensions, specimen 1: forewing length 243, width 102; hindwing length 162, width 47.

**GASTER.** Last tergite as in Figure 257; hypopygium as in Figure 258; ovipositor as in Figure 259. Relative lengths, specimen 2 (slide-mounted): last tergite 26; ovipositor 66; gonostylus 15 [middle tibia 35].

**Male.** Unknown.

**Type data.** **Holotype** female: Australia, New South Wales, Tweed Heads, jungle near Tweed River, 4 May 1914, A.P. Dodd. Head, wings from right side, and hind tibia and tarsus mounted on a slide labelled "*Parastenoterys varipes*, ♀ 3137", "Type Hy/3137"; remainder of body on a tag labelled "*Parastenoterys varipes* Girault Type ♀", litter, 4 April 1911 (QMBA).

**Material examined.** Holotype female, plus 11 non-type females from New Zealand (NZAC, BMNH). ND, AK / —.

Habitats noted: *Podocarpus totara*; garden.

Adults have been collected in February, March, July, and November.

**Biology.** Unknown.

**Remarks.** The New Zealand specimens of *P. varipes* compare well with the holotype, differing only in having the forewing distinctly infused with pale yellow (completely hyaline in holotype).

This species probably originates from eastern Australia, and has been accidentally introduced into New Zealand, or perhaps wind-carried from Australia to become established in the warmer, more northerly parts of the North Island.

### Genus *Protyndarichoides* Noyes

Noyes, 1980: 224. Noyes & Hayat, 1984: 186 (key), 190 (key), 204 (key), 213 (key), 328. Type species *Protyndarichoides nigriceps* Noyes, by original designation; Trinidad and Tobago, W.I.

**Female.** Body usually metallic green, with reddish or yellow-orange on thorax and gaster; forewing hyaline.

**HEAD.** Occipital margin sharp. Eyes with a few short, inconspicuous setae, reaching occipital margin. Frontovortex about 0.3–0.5× as wide as head. Malar space about two-thirds eye length. Antennal torulus separated from mouth margin by slightly more than its own length, its dorsal margin from well below lowest margin of eye to about level. Mandible with 3 acute teeth. Maxillary palpus 4-segmented; labial palpus 3-segmented. Antenna with scape subcylindrical; funicle 6-segmented, the segments usually at least a little longer than broad; flagellar segments filiform, only slightly wider distad; club 3-segmented, its apex rounded or obliquely truncate.

**THORAX** in profile with mesoscutum and scutellum almost flat, only slightly convex. Propodeum quite broadly reaching hind coxa. Pronotum in dorsal view quite short medially; posterior margin broadly concave; notaular lines absent. Forewing on dorsal surface with linea calva neither interrupted nor closed; filum spinosum present; marginal vein about 2.0–2.5× as long as broad, longer than stigmal vein, which is relatively short and subsessile; postmarginal vein a little shorter than stigmal vein. Propodeum medially about one-quarter as long as scutellum.

**GASTER** about 0.7–0.8× as long as thorax; cerci situated at about midlength. Hypopygium nearly reaching apex of gaster. Last tergite about 0.6–0.8× as long as middle tibia. Paratergites absent. Ovipositor hardly exerted, distinctly curved upwards, about 0.5–0.8× as long as middle tibia; outer plates broadly triangular, less than twice as long as broad. Gonostyli free, narrow, about one-sixth as long as ovipositor.

**Male.** Very similar to female, apart from antennae and genitalia. Antenna with funicle segments each at least about twice as long as broad, clothed in whorls of long setae, the longest about 3.0× as long as the diameter of any segment; club entire. Genitalia with aedeagus about half as long as middle tibia; parameres absent; digiti relatively long and slender, about one-third as long as aedeagus, each with a single, relatively large, blunt hook apically.

**Biology.** Unknown, but associated with Scolytidae (Coleoptera) on *Pinus* sp. in France (BMNH).

**Distribution.** Neotropical, European, Afrotropical, Oriental, and Australasian. Represented in New Zealand by one of the two described species; several undescribed species are known.

**Remarks.** *Protyndarichoides* can be recognised by the subsessile forewing stigmal vein, relatively long antennae, and distinctly upturned ovipositor. Placement of this genus is difficult. It may belong in the Cheiloneurini, as suggested by Noyes & Hayat (1984), but the structure of the ovipositor suggests a close relationship with *Parablatticida* Girault, itself a genus very difficult to place.

### *Protyndarichoides cinctiventris* (Girault)

Figures 4 and 260–265

Girault, 1934: 1. Noyes & Hayat, 1984: 328.

**Female.** Length range 0.63–0.95 mm ( $n = 13$ ).

Head black, with a weak metallic purple and brassy sheen on frontovortex and face; antennae dark brown; thorax concolorous with head, but distal half of scutellum more distinctly purplish; forewing hyaline, with a very small, indistinct cloud beneath marginal vein (see Figure 262); coxae, femora, and tibiae dark brown, the femora and tibiae very slightly paler apically; tarsi testaceous brown; gaster dark brown, its basal segment distinctly orange or orange-brown.

**HEAD.** Sculpture shallow, raised, irregular, reticulate, becoming squamiform on lower parts of face. Setae on eye very inconspicuous, each not longer than the diameter of a facet. Ocelli forming an angle of about 100°. Antennal torulus a little less than half its own length below lowest margin of eye. Mandible as in Figure 260. Relative dimensions, specimen 1 (card-mounted): head width 51, length 49, depth 26; minimum frontovortex width 29; eye length 27, width 20; malar space 21; OPL 2; POL 14; OOL 5; scape length 28, width 5; other proportions of antenna as in Figure 261.

**THORAX.** Mesoscutum with similar sculpture to that on head, but distinctly deeper, more squamiform, and of slightly larger mesh. Scutellum medially with shallow, fine, raised, reticulate sculpture, becoming strigose-reticulate laterally, but distal half more or less smooth. Forewing setation and venation as in Figures 262 and 263. Relative dimensions, specimen 1: forewing length 142, width 62; hindwing length 103, width 25, marginal setae 4.

**GASTER.** Structure of ovipositor as in Figure 4. Relative lengths, specimen 2 (slide-mounted): last tergite 50; ovipositor 45; gonostylus 8 [middle tibia 67].

**Male** (based on Australian specimens). Length range 0.70–0.73 mm ( $n = 2$ ).

Almost identical to female, except for antennae (Figure 264) and genitalia (Figure 265). Relative lengths: aedeagus 25; middle tibia 42.

**Type data.** **Holotype** female on slide: Australia, Queensland, "*Echthrogonatopus cinciventris* Girault, Type, window, Indooroopilly, 28 May 1933" (QMBA).

**Material examined.** Holotype female, plus 15 non-type females from New Zealand (NZAC, BMNH). WI / NN, BR.

Habitat noted: *Nothofagus* forest and grass.

Adults have been collected in January–March and December.

**Biology.** Unknown.

**Remarks.** New Zealand specimens of *P. cinciventris* are slightly paler than their Australian counterparts, the pale ring at the base of the gaster being more distinct on Australian material.

This species can be separated from congeners on body coloration (other species may have the thorax almost completely reddish), antennal structure, relative width of frontovertex, sculpture of scutellum (other species may have the scutellum striate), and relative length of ovipositor.

*P. cinciventris* probably originates in eastern Australia, and has been introduced accidentally into New Zealand, or perhaps wind-carried from Australia. It is apparently established in the North Island and possibly also the northern parts of the South Island. The male has not been found in New Zealand.

### Genus *Pseudococcobius* Timberlake

Timberlake, 1916. Noyes & Hayat, 1984: 160 (key), 162 (key), 198 (key), 202 (key), 329. Type species *Aphycus terryi* Fullaway, by original designation; Hawaii.

**Female.** Body non-metallic, marked variously with orange-brown, dark brown, and off-white; forewing hyaline or with an indistinct infuscate pattern.

**HEAD.** Occipital margin sharp, acute. Eyes conspicuously hairy or appearing naked, with a few very short, inconspicuous setae, not quite reaching occipital margin. Frontovertex about one-third as wide as head. Malar space about two-thirds eye length. Antennal torulus separated from mouth margin by less than half its own length, its dorsal margin slightly below lowest margin of eye. Man-

dible with 3 acute teeth, the middle one longest, or upper tooth more or less absent. Maxillary palpus 4-segmented; labial palpus 2-segmented. Antenna clavate; scape subcylindrical or slightly broadened; funicle 6-segmented, the segments transverse; club 3-segmented, its apex rounded.

**THORAX** in profile with mesoscutum and scutellum almost flat, only slightly convex. Propodeum narrowly reaching hind coxa. Pronotum in dorsal view quite short medially; posterior margin shallowly concave; notaular lines present anteriorly. Forewing brachypterous or fully developed, if fully developed then with linea calva closed and entire or interrupted; filum spinosum present; marginal vein not quite reaching anterior wing margin, about 2.0–3.0 $\times$  as long as broad, slightly longer than postmarginal vein; stigmal vein about twice as long as marginal vein. Propodeum medially less than one-tenth as long as scutellum.

**GASTER** about as long as thorax; cerci situated at about midlength. Hypopygium reaching apex of gaster. Last tergite about three-fifths as long as middle tibia. Paratergites absent. Ovipositor about 1.5–2.0 $\times$  as long as middle tibia, at least slightly exerted, at most with exerted part about one-third as long as gaster. Gonostyli free, about 0.3–0.5 $\times$  as long as ovipositor.

**Male.** Very similar to female, apart from antennae and genitalia. Antenna with club solid. Genitalia with aedeagus about half as long as middle tibia and a little more than twice as long as digitus; digiti each with 2 or 3 apical hooks.

**Biology.** Parasites of Pseudococcidae (Homoptera).

**Distribution.** Europe, Australia, New Zealand, and the Pacific. Known from four described species, and now a new species from New Zealand.

**Remarks.** *Pseudococcobius* can be recognised by the non-metallic body, short, clavate antennae, relatively long middle tooth of mandible, mesoscutum with notaular lines anteriorly, closed linea calva, exerted ovipositor, and hypopygium reaching apex of gaster. It is placed in the Encyrtinae, Aphycini, Aphycina and is nearest to *Aphycus* Mayr, from which it can be separated by the relatively flat frontovertex, eyes distinctly separated from the occipital margin, and body generally conspicuously marked with off-white. *Aphycus* has the frontovertex distinctly convex in profile, eyes generally more or less reaching the occipital margin, and body generally yellow, orange, or dark brown. These two genera should probably be treated as synonymous,

but are kept separate pending a more detailed analysis of related genera.

***Pseudococcobius annulipes* new species**

Figures 266–272

**Female.** Length range (excluding ovipositor) 0.83–0.95 ( $n = 3$ ).

**Holotype.** Length 0.83 mm. Frontoververtex pale orange mixed with off-white; area between and behind posterior ocelli mixed dark brown; dorsal and lateral margins of antennal scrobes narrowly bordered with greyish brown; scrobes, lower parts of face, genae, and behind eyes off-white; scape white proximally, the distal half distinctly mixed with fuscous; pedicel and funicle segments 1–4 dark fuscous; remainder of flagellum white; anterior part of pronotum fuscous, but posterior margin white; mesoscutum medially orange-fuscous, laterally off-white, the notaular lines indicated by very narrow, dark lines anteriorly; axillae orange-white; scutellum mostly dark fuscous, with a darker transverse strip in posterior third or so, a pair of off-white to orangey spots laterally in anterior half, and extreme apex whitish; tegula white, its apex dusky; metanotum dusky; sides and venter of thorax white; propodeum dusky, laterally off-white; wings almost hyaline, but with an indistinct fuscous patch below stigmal vein extending almost halfway across wing (see Figure 269); legs mostly off-white, but femora each with a dusky area subapically; fore tibia with a single, submedian fuscous band, middle and hind tibiae each with 2 fairly distinct fuscous bands; extreme apex of middle tibia dark brown; gaster at extreme base dark brown, first 2 gastral tergites off-white, the remainder fuscous, with segmentation marked in dark brown; venter off-white; ovipositor sheaths off-white, but dark brown apically.

**HEAD.** Sculpture shallow, raised, irregular, reticulate, becoming squamiform on lower parts of face. Setae on eye very inconspicuous, not longer than the diameter of a facet. Ocelli forming an angle of about 70°. Mandible with upper tooth very obtuse, more or less absent (Figure 266). Relative dimensions: head width 53, length 45, depth 30; minimum frontoververtex width 18; eye length 32, width 26; malar space 16; OPL 3; POL 8; OOL 2; scape length 27, width 7; other proportions of antenna as in Figure 267.

**THORAX.** Sculpture on mesoscutum and scutellum vermiculate, reticulate (Figure 268); notaular lines present only near anterolateral margins of mesoscutum. Forewing fully developed, with setation and venation as in Figure 269. Relative dimensions: forewing length 110, width 46; hindwing length 83, width 20, marginal setae 6.

**GASTER.** Relative lengths: gaster 56; exerted part of ovipositor 14 [middle tibial spur 9].

**Paratype.** Relative lengths: middle tibia 54; last tergite of gaster 29; ovipositor 83; gonostylus 30.

**Variation.** Very little in the material available. Some specimens are relatively darker, with the dark marking on the forewings more conspicuous and more extensive, and with a further infusate area at the wing apex.

**Male.** Length range about 0.71–0.90 mm ( $n = 2$ ).

Almost identical to female, except for a very slightly wider frontoververtex (Figure 270), antennae (Figure 271), and genitalia (Figure 272). Relative dimensions, specimen 1 (card-mounted): head width 55, length 52, depth 30; minimum frontoververtex width 21; eye length 32, width 25; malar space 20; OPL 5; POL 11; OOL 2.5; scape length 30, width 8; other proportions of antenna as in Figure 271. Relative lengths, specimen 2 (slide-mounted): aedeagus 31; middle tibia 60.

**Type data.** **Holotype** female: New Zealand, AK, Lynfield, Malaise trap, February 1981, G. Kuschel (NZAC).

**Paratypes** (5 females, 2 males). **AK** – 3 females, data as for holotype, but Mar 1981; 1 male, Birkenhead, Malaise trap in second-growth bush, Mar 1981, JFL. **WO** – 1 male, Waipuna Reserve near Waitomo, litter 77/134, 28 Oct 1977, ARF.

**MC** – 2 females, Banks Peninsula, Price's Valley, Malaise trap at edge of native bush, Dec 1980 (1) and Jan 1981 (1), RPM.

**Material examined.** Type series only (NZAC, BMNH).

AK, WO / MC.

Habitats noted: edge of native bush; second-growth bush; litter.

Adults have been collected in January–March, October, and December.

**Biology.** Unknown.

**Remarks.** *P. annulipes* can be separated from congeners by the coloration of the body, notably the contrasting segments of the antenna, the banded dorsum of the gaster, and the dark bands on the middle and hind tibiae. No other species of the genus has the dorsum of the gaster banded and dark bands on the legs. *P. terryi* has the club conspicuously paler than the funicle, but the width of the frontoververtex is about one-quarter the head width in the female, and less than one-third the head width in the male. In addition, the forewing stigmal vein is nearly twice the combined length of the

marginal and postmarginal veins, whereas in *annulipes* it is less than 1.5× as long.

### Genus *Psyllaephagus* Ashmead

Ashmead, 1900: 382. Noyes & Hayat, 1984: 158 (key), 164 (key), 168 (key), 178 (key), 184 (key), 186 (key), 196 (key), 212 (key), 213 (key), 214 (key), 217 (key), 219 (key), 330. Type species *Encyrtus pachypsyllae* Howard, by original designation; U.S.A.

**Female.** Body usually metallic green, purple, or blue, very rarely non-metallic and largely yellow; forewing hyaline, rarely distinctly infuscate.

**HEAD.** Mandible usually with 1 tooth and a broad truncation, or with 2 teeth and a broad truncation; some species may have a 3rd, obtuse tooth, rendering the mandible more or less tridentate. Antenna variously with all funicle segments transverse to all much longer than broad; club 2-segmented or 3-segmented. Occipital margin sharp or more or less rounded. Eye reaching occipital margin. Antennal torulus generally with its dorsal margin not above lower margin of eye.

**THORAX** in profile with propodeum in contact with hind coxa and separating mesopleurum from base of gaster. Pronotum in dorsal view relatively short; posterior margin broadly convex. Mesoscutum without notaular lines; axillae touching medially, not separated by posterior margin of mesoscutum. Forewing marginal vein generally not longer than broad, though occasionally so; postmarginal vein at least about half as long as stigmal vein, conspicuous; stigmal vein straight, forming an angle of about 45° with anterior wing margin.

**GASTER.** Hypopygium reaching variously from about one-third along gaster to near apex. Cerci situated in proximal half of gaster. Paratergites absent. Ovipositor variously hidden to well exerted, with gonostyli free.

**Male.** Usually very similar to female, but differing in antennal and genital structure. Antennae usually with funicle segments relatively longer than in female, cylindrical to conspicuously broadened and flattened; setae often several times longer than greatest diameter of segments.

**Biology.** Parasites or hyperparasites of nymphs of Psyllidae (Homoptera).

**Distribution.** Cosmopolitan. Comprising about 150 species, only two (or perhaps three) of them known from New Zealand.

**Remarks.** *Psyllaephagus* is placed in the Encyrtinae, Trechnitini, Metaprionomitina. In general the genus can be recognised quite easily by the metallic coloration, distinct venation, and mandibular structure. However, characterisation is complicated by the many included species that are atypical. It can be most easily confused with *Ooencyrtus* Ashmead, species of which mostly parasitise eggs of other insects, although exceptions are known. *Ooencyrtus* is placed in the Microterytini, Ooencyrtina, and can be separated by the enlarged mesopleurum which almost touches the base of the gaster, thus largely obscuring the propodeum in lateral view, and by the posterior margin of the mesoscutum projecting over the axillae and separating them in dorsal view.

Many of the included species were described from Australia by Girault and Riek (see Noyes & Hayat 1984, pp. 330–331). The new species described below do not run well in the key given by Riek, and are therefore not referred to it. Males of some Australian species are bizarre, sometimes having the antennal funicle branched, or the head very broad and flattened anteroposteriorly, or the interantennal prominence greatly protuberant (see Riek 1962).

### KEY TO SPECIES OF *PSYLLAEPHAGUS* KNOWN FROM NEW ZEALAND

- 01 Middle tibia more or less entirely dark brown; dorsum of thorax covered with translucent setae ... *pilosus*  
—Middle tibia entirely, or almost entirely, yellow; dorsum of thorax covered with pale brown setae ... 02
- 02(01) Forecoxa dark brown with a metallic green lustre; forewing with 3 or 4 complete lines of setae basad of linea calva (Fig. 274) ... *acaciae*  
—Forecoxa yellow; forewing with only 2 complete lines of setae basad of linea calva (Fig. 285) ... sp. A

### *Psyllaephagus acaciae* new species

Figures 273–278

**Female.** Length range 0.56–1.10 mm ( $n = 42$ ).

**Holotype.** Length 0.92 mm. Head with frontovertex green, but dull metallic purple between ocelli; face blue; genae green; setae on frontovertex and face very pale brown or translucent; scape dark brown with a slight green lustre, its distal apex slightly testaceous; pedicel similar to scape; flagellum testaceous; distalmost 2 segments of club grey-

ish testaceous; thorax dull, shining green, dorsally mixed with bluish, and with pale brown setae; tegula dark brown, slightly paler basally, its apex distinctly bluish; wings hyaline, but forewing with an indistinct fuscous cloud across it from marginal vein (see Figure 274); coxae dark brown with a conspicuous green lustre; femora dark brown, the apices testaceous yellow, but hind femur with a slight green lustre; fore and hind tibiae dark brown, conspicuously paler in distal half, the apices yellow; middle tibia yellow with a sub-basal brown ring; foretarsus testaceous; middle tibial spur and middle and hind tibiae yellow; distalmost tarsal segment dark brown; gaster purple-brown.

**HEAD.** Sculpture on frontovertex shallow, raised, fairly regular reticulate, becoming squamiform-reticulate on sides of scrobes and on genae. Eye with fairly conspicuous, dense, short hairs much shorter than the diameter of a facet. Occipital margin slightly rounded. Ocelli forming an angle of very slightly less than 90°. Antennal torulus with dorsal margin very slightly below lowest margin of eye; scrobes more or less V-shaped. Setae near mouth margin similar in length and density to those on frontovertex. Mandible with 2 very short teeth and a broad truncation, as in Figure 275. Relative dimensions: head width 65, length 53, depth 28; minimum frontovertex width 28; eye length 37, width 27; malar space 21; OPL 3.5; POL 15; OOL 3.5; scape length 25, maximum width 5; other proportions of antenna as in Figure 273.

**THORAX.** Sculpture on mesoscutum and scutellum shallow, raised, squamiform-reticulate, becoming more longitudinally elongate towards sides of scutellum; mesopleurum with irregular, shallow, fine reticulate sculpture, but almost smooth posteriorly. Forewing setation and venation as in Figure 274. Relative dimensions: forewing length 170, width 73; hindwing length 111, width 29, marginal setae 5.

**GASTER** about two-thirds as long as thorax. Last tergite apically very broadly rounded. Ovipositor hidden. Hypopygium reaching about three-quarters along gaster.

**Paratype.** Relative lengths: middle tibia 69; last tergite 37; ovipositor 66; gonostylus 12.5.

**Variation.** Very slight, except that some specimens are a little darker than the holotype, with the fuscous cloud of the forewing more distinct, whilst in others the forewing is completely hyaline.

**Male.** Length range 0.79–1.03 mm ( $n = 34$ ).

Very similar to female in general appearance, but basal half of tegula pale yellow; fore and middle legs, excluding coxae, almost entirely yellow; eye smaller, and frontovertex a little broader; antennae (Figure 276) with very short, apically branching

setae on all flagellar segments; forewing venation and setation as in Figure 277; and genitalia as in Figure 278. Mandible as in Figure 275. Relative dimensions, specimen 1 (card-mounted); head width 65, length 53, depth 28; frontovertex width 36; eye length 33, width 23; malar space 21; OPL 3; POL 19.5; OOL 4; scape length 20, width 7. Relative lengths, specimen 2 (slide-mounted): middle tibia 67; aedeagus 49.

**Variation.** Very little in the material available.

**Type data.** **Holotype** female: New Zealand, AK, Mt Albert, ex *Psylla acaciaebaileyanae* on *Acacia baileyana*, December 1980, E.W. Valentine (NZAC).

**Paratypes** (48 females, 42 males). **AK** – 18 females, 17 males, same data as holotype; 1 female, St Heliers, 2 Feb 1981, EWV.

**NN** – 6 females, Nelson, 10 Apr 1927 (3) and 8 May 1927 (3), ESG; 6 females, 5 males, Atawhai, 1♀ on pasture, 5 Nov, remainder ex psyllid nymph on *Acacia decurrens*, 27 Nov 1961, EWV; 5 females, 7 males, Nelson, ex *Psylla acaciaebaileyanae*, 11 Jan 1965, AKW; 5 females, 5 males, Nelson, ex *Psylla exquisita* on *Acacia dealbata*, 1 Oct 1965, PI; 5 females, 5 males, Nelson, ex psyllid on *Acacia baileyana*, 16 Oct 1970, EWV; 3 females, 3 males, Nelson, ex *Psylla acaciaebaileyanae* on *Acacia baileyana*, Sep 1971, EWV.

**Material examined.** Type series only (NZAC, BMNH, CNCI, USNM, PPRI, ZILR, UCRC, ANIC).

**AK / NN.**

Habitats noted: *Acacia baileyana*; *A. dealbata*; *A. decurrens*.

Adults have been collected or reared in January, February, April, May, and September–December.

**Biology.** A parasite of nymphs of *Psylla acaciaebaileyanae* Froggatt and *Psylla exquisita* Tuthill (Homoptera: Psyllidae).

**Remarks.** *P. acaciae* is almost certainly a native of Australia, and probably has been accidentally introduced into New Zealand. It is close to a number of described Australian species, but differs as follows. From *xuthus* (Walker) by having the middle tibia conspicuously paler than the femur, and with a brown sub-basal ring (*xuthus* has one extant syntype with the middle femur and tibia completely yellow, and the other with the middle femur paler than the tibia), the antennal scrobes not well delimited and not horseshoe-shaped (the more complete syntype of *xuthus* has the scrobes well delimited dorsally and horseshoe-shaped), and the antenna testaceous (the more complete syntype

of *xuthus* has the antenna completely dark brown). From *aeneoculex* (Girault) by having a dark brown middle femur (yellow in *aeneoculex*). From *dius* Girault by having the legs partially dark brown, the forewing venation dark brown, and the tegulae of the female brown basally (*dius* has the legs, excluding the coxae, completely yellow, the forewing venation yellow, and the tegulae of the female yellow basally). From *rubensi* (Girault) by having the legs partially dark brown (in *rubensi*, excluding the coxae, they are completely yellow). From *semicitripes* Girault by having a darkened scape and dark forecoxae (yellow in *semicitripes*). From *spongitus* Girault by having a completely dark tegula in the female, the forecoxa and legs darkened, and lacking a purple stripe across the top of the antennal scrobes (*spongitus* has the base of the tegula yellow, the legs – excluding middle and hind coxae – yellow, and a purple stripe across the face at the top of the antennal scrobes). From *viridiscutellum* Girault by having a more or less green mesoscutum, testaceous antennal flagellum, and brown forewing venation (in *viridiscutellum* the mesoscutum is purple, the antennal flagellum whitish, and the forewing venation very pale yellow).

### *Psyllaephagus pilosus* new species

Figures 279–283

**Female.** Length range 0.87–1.33 mm ( $n = 78$ ).

**Holotype.** Length 1.33 mm. Head dull, dark, blue-green covered with conspicuous translucent setae; radicle and scape dark brown, the scape with a dark green lustre, its apex slightly testaceous; pedicel as scape; flagellum testaceous brown; thorax blackish, but mesoscutum with a slight purplish lustre, and scutellum slightly brassy; tegula dark brown; wings hyaline, with dark brown venation; legs almost completely dark brown, but coxae, femora, and tibiae with a dark green lustre, and tarsi paler proximally; gaster dark purplish-brown.

**HEAD.** Sculpture on frontovertex shallow, raised, fine, fairly regular punctate-reticulate, becoming squamiform-reticulate on sides of scrobes and on genae. Eye with very conspicuous, dense, short hairs a little shorter than the diameter of a facet. Occipital margin slightly rounded. Antennal torulus with dorsal margin very slightly below lowest margin of eye; scrobes more or less V-shaped. Ocelli forming an angle of very slightly more than 90°. Setae near mouth margin similar in length to those on frontovertex, but much denser. Mandible with 1 tooth and a broad truncation (Figure 279). Relative dimensions: head width 72, length 62, depth 35; frontovertex width 30; eye length 39, width 31; malar space 26; OPL 6; POL 17.5; OOL 2.5; scape

length 28, maximum width 7; other proportions of antenna as in Figure 280.

**THORAX.** Sculpture on mesoscutum and scutellum shallow, raised, squamiform-reticulate, becoming more longitudinally elongate towards sides of scutellum; mesopleurum with irregular, shallow, fine reticulate sculpture, smoother posteriorly. Metapleurum and sides of propodeum clothed in fairly dense, translucent setae which extend downwards to hind coxa. Forewing setation and venation as in Figure 281. Relative dimensions: forewing length 203, width 86; hindwing length 134, width 40, marginal setae 6.

**GASTER** about as long as thorax. Last tergite apically only slightly obtuse, almost pointed. Ovipositor very slightly exerted, almost hidden. Hypopygium reaching slightly more than three-quarters along gaster.

**Paratype.** Relative lengths: middle tibia 95; last tergite 50; ovipositor 127; gonostylus 22.

**Variation.** Very little in the material available.

**Male.** Length range 0.92–1.14 mm ( $n = 19$ ).

Very similar to female in general appearance, but mesoscutum green, contrasting with purplish scutellum, and differing in structure of antennae (Figure 282) and genitalia (Figure 283). Only funicle segments of antenna with some very short, apically branching setae. Relative dimensions, specimen 1 (card-mounted): head width 70, length 55, depth 31; frontovertex width 31; eye length 35, width 26; malar space 24; OPL 4; POL 18; OOL 2; scape length 21, width 8. Relative lengths, specimen 2 (slide-mounted): middle tibia 81; aedeagus 64.

**Variation.** Very little in the material available.

**Type data.** **Holotype** female: New Zealand, OL, Lake Wakatipu, Bob's Cove, *Nothofagus* forest and mixed broadleaf, 23 January 1981, J.S. Noyes & E.W. Valentine (NZAC).

**Paratypes** (80 females, 20 males). **AK** – 5 females, Mt Albert, on eucalypt sp., 26 Feb 1962, RAC; 10 females, Auckland, *Eucalyptus* foliage, 1 Mar 1962, RAC; 1 female, 188 Mt Albert Road, Mt Albert, Malaise trap, 29 Feb 1976, TKC; 1 female, Titi-rangi, Malaise trap in garden, Feb 1981, PAM; 1 female, Massey, garden, swept, 21 Feb 1981, EWV; 2 females, Massey, reared from nymph of *Ctenarytaina eucalypti*, 12 Feb 1982, EWV.

**NN** – 6 females, 1 male, Nelson, 12 Dec 1926 (1♀), 2 Mar 1927 (3♀, ♂), and 5 Apr 1927 (2♀), ESG; 3 females, Nelson, on eucalypt leaf, 24 Mar 1960, EWV; 4 females, 4 males, Nelson, ex *Rhinocola eucalypti* on eucalypt, 2 Nov 1960, EWV; 2 females, Atawhai, ex eucalypt leaf, 23 Mar 1963; 6 females, Atawhai, on *Eucalyptus globulus*, 20 Feb 1965, EWV; 10 females, 3 males, Nelson, on

*Rhinocola eucalypti*, 5 Nov 1966, JMK; 7 females, Nelson, eucalypt leaf, 14 Mar 1971, EWV; 1 female, 1 male, Nelson, ex psyllid on eucalypt. OL – 16 females, 10 males, same data as holotype.

**Material examined.** Type series only (NZAC, BMNH, USNM, UCRC, ZILR, PPRI, CNCI, ANIC).

AK / NN, OL.

Habitats noted: *Eucalyptus globulus*; *Nothofagus* and mixed broadleaf forest; garden.

Adults have been collected or reared in January–April, November, and December.

**Biology.** Parasites of nymphs of *Ctenarytaina eucalypti* Maskell (Homoptera: Psyllidae) on *Eucalyptus globulus*.

**Remarks.** *P. pilosus* is very distinct from other species of its genus, and can be separated by its generally dark coloration and presence of very dense, translucent setae on the dorsum of the thorax. Its association with psyllids on *Eucalyptus* suggests that this species is probably native to Australia. However, no Australian specimens have been seen.

### *Psyllaephagus* sp. A

Figures 284 and 285

In addition to the characters given in the key, this species can be separated from males of other New Zealand species by the structure of the antenna (Figure 284) and the relatively low density of setae at the base of the forewing (Figure 285).

**Material examined.** One male, KA, Seddon, swept from lucerne, 4 Mar 1971 (NZAC).

**Biology.** Unknown, but the modified antenna suggests a probable relationship with Australian species which parasitise the nymphs of psyllids (Homoptera: Psyllidae) on eucalypts.

**Remarks.** This species does not run in Riek's (1962) key to some of the Australian species of *Psyllaephagus*. Even so, it should be recognisable by the structure of the first and third funicle segments. Similar modifications of the proximal segments of the funicle are found in *P. arctatus* Riek and *P. uncinatus* Riek, and are probably important in the courtship behaviour of these species.

The single specimen examined is unlikely to have originated in New Zealand, but was probably wind-carried from Australia.

### Genus *Rhopus* Foerster

Foerster, 1856: 34. Cumber, 1959: 883. Valentine, 1964: 15, 16 (genus near *Xanthoencyrtus*). Type species *Encyrtus piso* Walker, by original designation; U.K.

**Female.** Coloration yellow, orange, red, or brown, never metallic; forewing hyaline. Body distinctly flattened dorsoventrally.

HEAD flattened, prognathous. Occipital margin sharp or slightly rounded. Frontoververtex generally relatively broad, at least about half as wide as head. Normally 1 or 2 conspicuous, relatively long setae present between posterior ocellus and eye margin. Antennal torulus close to mouth margin, with dorsal margin variously from well below lower margin of eye to about level; scape relatively short and broad, usually about half as long as width of frontoververtex; funicle 6-segmented; club 2-segmented or 3-segmented. Mandible narrow, bidentate.

THORAX in profile with propodeum narrowly to broadly reaching hind coxa. Fully winged species and those with fully winged and brachypterous forms have the pronotum very short, longitudinally divided medially, and completely hidden by the head; species with only brachypterous forms have the pronotum undivided and relatively long, sometimes 1.3× as long as mesoscutum and clearly visible behind head. Mesoscutum without notaular lines; axillae clearly separated from scutellum. Wings fully developed, shortened, or absent; in fully winged forms lineae calvae not interrupted, but often closed or nearly so near posterior wing margin; costal cell narrow, usually more than 30× as long as broad; marginal vein 1.5–3.0× as long as broad; postmarginal vein much shorter than marginal vein; stigmal vein about twice as long as marginal vein; marginal fringe of forewing varying from less than one-tenth to more than two-thirds as long as maximum wing width.

GASTER at least about 1.5× as long as thorax. Last tergite at least about 1.5× as long as middle tibia. Cerci situated variously from near base of gaster to about halfway along. Hypopygium reaching apex of gaster. Paratergites present. Ovipositor variously shorter than middle tibia to about twice as long. Gonostyli fused to 2nd valvifers.

**Male.** Generally similar to female, but often much darker. Antennal torulus placed relatively higher than in female, separated from mouth margin by about its own length, and with upper margin well above lower margin of eye. Antenna usually with all funicle segments longer than broad; club entire; scale-like sensilla present on 6th funicle segment, and sometimes also on club at base. Genitalia with parameres very short or absent. Digniti very short to relatively long, as much as one-third or so as

long as aedeagus, each usually armed with a pair of very small hooks apically. Aedeagus from slightly shorter than middle tibia to much longer.

**Biology.** Parasites of Pseudocidae (Homoptera). Also recorded, probably erroneously, from New Zealand as parasites of Eriococcidae (Homoptera).

**Distribution.** Cosmopolitan. Of the 38 or so described species, two (plus one indeterminate) are known from New Zealand.

**Remarks.** *Rhopus* belongs in the Tetracneminae, Anagyrini, Rhopiina. The subtribe is characterised by dorsoventral flattening of the body and by fully winged species possessing a longitudinally divided pronotum. Females of *Rhopus* can be separated by the two- or three-segmented club, the axillae being distinct from the scutellum, the linea calva of winged forms well defined, and the eye longer than the malar space. Females of other rhopine genera either have the club solid and the axillae fused with the scutellum or the linea calva poorly defined and the eye shorter than the malar space. Males are more difficult to separate, but those of *Asitus* Erdoes have the axillae fused with the scutellum, and those of *Hamusencyrtus* Subba Rao & Hayat and *Platy-rhopus* Ferrière have the 6th funicle segment relatively enlarged.

The species of *Rhopus* are very difficult to separate, and to date no reliable revision has been published, excepting perhaps that of Timberlake (1920), who reviewed most of the Hawaiian species. Many European species have been described from males, which have very few reliable taxonomic characters and are virtually impossible to separate.

Noyes & Hayat (1984, p. 146) in their key to genera state that brachypterous species of *Rhopus* have a divided pronotum (see couplet 82). This has since been shown to be incorrect for the endemic Hawaiian and New Zealand species.

#### KEY TO SPECIES OF *RHOPUS* KNOWN FROM NEW ZEALAND

##### MALES AND FEMALES

- 01 Brachypterous, the forewing not or hardly reaching base of gaster; pronotum clearly visible medially, longer than mesoscutum, not longitudinally divided (Fig. 288) ... *anceps*  
—Forewing fully developed, extending past apex of gaster; pronotum medially hidden by head, much shorter than mesoscutum, longitudinally divided (Fig. 297) ... 02

- 02(01) Antenna 10- or 11-segmented, club 2- or 3-segmented; funicle clothed in short setae at most about as long as half the diameter of any segment (Fig. 296) ... FEMALES .. 03  
—Antenna 9-segmented, club solid; funicle clothed in conspicuous, long setae at least as long as the diameter of any segment (Fig. 299) ... MALES .. spp. indet.  
03(02) Club 2-segmented (Fig. 296); antenna unicolorous, testaceous brown ... *garibaldius*  
—Club 3-segmented; antennal club dark brown, contrasting with yellow distal funicle segments ... sp. A

#### *Rhopus anceps* new species

Figures 286–295

**Female.** Length range 0.79–1.83 mm ( $n = 87$ ).

**Holotype.** Length 1.59 mm. Body yellowish brown. Antenna with scape, pedicel, and funicle segments 3–6 testaceous, but segment 3 slightly darker; scape marked along dorsal edge with dark brown; distal half of pedicel yellowish; segments 1 and 2 of club dark brown, apex paler; legs more or less concolorous with remainder of body; forewing hyaline.

**HEAD** sculpture shallow but distinctly squami-form-reticulate below ocelli, becoming rather irregular and rugose around ocelli. Clypeal margin broadly and distinctly emarginate. Relative dimensions: head width 64, length 50, depth 24; minimum frontovertex width 38; eye length 34, width 20; malar space 16; OPL 4; POL 15; OOL 12; scape length 24, maximum width 9; other proportions of antenna similar to Figure 286.

**THORAX** dorsally with shallow, fine, squami-form-reticulate sculpture similar to that below ocelli. Pronotum about 1.3× as long as mesoscutum. Forewing shortened, hardly reaching base of gaster, its apex rounded. Relative dimensions: forewing length 21, width 11, venation and setation similar to Figure 289; middle tibia length 45.

**GASTER** more than twice as long as thorax. Exserted part of ovipositor slightly shorter than spur of middle tibia. (The holotype was collected into a saturated solution of picric acid, and thus the gaster is a little distended.)

**Paratype.** Relative lengths: middle tibia 51; last tergite of gaster 105; ovipositor 129. Ovipositor as in Figure 290.

**Variation.** Body from yellowish orange to dark brown and slightly shiny; funicle segments 3–6 often paler than remainder of flagellum; wings in darker specimens often slightly infusate. Head and thorax

in smaller specimens often more or less smooth. Antennae with scape about 2.0–3.0× as long as broad; funicle segments usually relatively shorter in smaller specimens, the 1st about 0.9–1.1× as long as broad, the 6th about 0.7–1.1×, the others varying accordingly; club 2- or 3-segmented, the segmentation often incomplete (cf. Figures 286 and 287). Pronotum with longitudinal suture sometimes indicated near posterior margin as in Figure 288, but often absent. Forewings transversely truncate, occasionally almost pointed. Last tergite about 1.5–2.2× and ovipositor 1.8–2.5× as long as middle tibia, in smaller specimens these relatively shorter.

**Male.** Length range 0.48–1.67 mm ( $n = 94$ ).

Very similar in structure and coloration to female, apart from antennae and genitalia. Antenna as in Figures 291–294 (note different forms of setae on flagellum); dorsal margin of torulus about level with ventral margin of eye. Genitalia as in Figure 295. Relative dimensions, specimen 1 (card-mounted): head width 63, length 52, depth 25; minimum frontovertex width 40; eye length 32, width 21; malar space 18; OPL 4.5; POL 13; OOL 12; scape length 28, maximum width 9.5. Relative lengths, specimen 2 (slide-mounted): middle tibia 70, aedeagus 66.

**Variation.** Colour varying as in female. Funicle segments in smaller specimens usually relatively shorter: 1st segment about 0.9–2.3× as long as broad, 6th about 1.0–2.1×, others varying accordingly; 2nd and 3rd segments in small specimens occasionally much shorter than 1st and strongly transverse. Difference between forms of non-scale-like setae on flagellum much more obvious in smaller specimens (cf. Figures 291–294). Aedeagus about 0.9–1.2× as long as middle tibia.

**Type data.** **Holotype** female: New Zealand, CO, Rocklands Station, 600 m, pit trap in tussock, January 1980, B.I.P. Barratt (NZAC).

**Paratypes** (95 females, 104 males). **NN** – 1 female, Mt Augustus, 850 m, mat plants 69/168, 8 Oct 1969, JSD; 4 females, L. Sylvester, Cobb Valley, 1300 m, litter 69/181 (1), 1400 m, plants 69/183 (3), 29 Oct 1969, JSD; 4 females, Mt Domett – 2, 1250 m, mats 71/155, 25 Nov 1971, JMcB, 1, 1494 m, litter 71/159, 30 Nov 1971, JSD, 1, 1250 m, litter 71/174, 30 Nov 1971, GK; 2 females, 2 males, L. Sylvester, ex mealybug on *Chionochloa*, 11 Jul 1972, JAdeB. **MB** – 2 females, 1 male, Ward's Pass, 3850' [1155 m], ex *Pseudantonina* sp. on *Raoulia* sp., 10 Oct 1966, JAdeB; 2 females, 1 male, Red Hills, ex mealybug on *Chionochloa*, May 1972, JAdeB. **BR** – 7 females, 1 male, Pararoa Range, Mt Dewar, mats 69/245, 1300 m, 10 Dec 1969, JSD; 3 females,

36 males, Mt Robert, 600–1400 m, *Nothofagus* forest and grass, 10 Dec 1980, NV&W. **OL** – 1 female, 10 males, Coronet Peak, 1200 m, tussock, grasses, *Hebe*, and alpine shrubs, Jan 1981, N&V; 2 males, Coronet Peak, 1640 m, tussock, alpine shrubs, *Hebe*, and mat plants, Jan 1981, N&V; 7 males, 1 female, Crown Peak, 1200 m, tussock, grasses, shrubs, and alpine herbs, 24 Jan 1981, N&V. **CO** – 1 male, Little Kyeburn, ex *Eriococcus* on *Chionochloa*, 9 Nov 1968, TT; 1 female, 1 male, Cromwell Beetle Reserve, *Raoulia australis* 75/129, 17 Mar 1985, JCW; 1 female, Cromwell Beetle Reserve (Cemetery Rd end), moss 77/170, 1 Nov 1977, JCW; 5 females, 6 males, Waipori, 520 m, pit trap in tussock, Dec 1978 – Jan 1979 (3♀, 4♂), Dec 1978 – Mar 1979 (2♀, 1♂), and Feb–Mar 1979 (1♂), BIPB; 34 females, 9 males, Rocklands Station, 800 m, pit trap in tussock, Dec 1978 (21♀, 6♂), Jan 1979 (4♀), Feb 1979 (2♀), Apr 1979 (2♀), Dec 1979 (6♀, 2♂), and Jan 1980 (1♀, 1♂), BIPB; 6 females, 21 males, Watt's Rock, 1200 m, tussock, grasses, *Juncus*, and *Sphagnum*, Jan 1981, N&V; 3 females, 2 males, 8 km S of Bendigo, tussock, grasses, *Discaria*, and *Leptospermum*, 700 m, Jan 1981, N&V; 5 females, 4 males, Roaring Meg, tussock, grasses, *Discaria*, *Rosa*, *Juncus*, and *Pimelia*, 13 Jan 1981, N&V. **FD** – 1 female, Turret Range, N of Percy Saddle, 1100 m, mats 70/37, Jan 1970, GK; 1 female, Turret Range, 1100 m, mats 70/35, 14 Jan 1970, GK; 6 females, 2 males, Wilmot Pass, Mt Barber, 1350 m, grass and litter 70/58, 15 Jan 1970, ACE; 3 females, Darran Mtns, Tutoko Bench, middle basin, 1615 m, swards 77/11, 14 Jan 1977, JSD.

**Material examined.** Type series only (NZAC, BMNH, USNM, UCRC, CNCI, PPRI, ZILR).

— / NN, MB, BR, OL, CO, FD.

An alpine species recorded from 520 m (CO, Waipori) to 1615 m (FD, Darran Mountains).

Habitats noted: *Nothofagus* forest and grass; tussock, grasses, *Hebe*, and alpine shrubs; tussock, grasses, *Discaria*, and *Leptospermum*; tussock, grasses, *Juncus*, and *Sphagnum*; tussock, grasses, *Discaria*, *Rosa*, *Juncus*, and *Pimelia*; *Raoulia*; *R. australis*; *Chionochloa*; mat plants; moss; grass and litter; litter; swards.

Adults have been collected in all months except August and September.

**Biology.** Reared from *Balanococcus* sp. (Homoptera: Pseudococcidae) on *Raoulia* sp., and from an unidentified mealybug on *Chionochloa* sp. Also recorded, probably erroneously, from an unidentified eriococcid (Homoptera: Eriococcidae) on *Chionochloa*.

**Remarks.** *R. anceps* is known only from brachypterous forms, and bears a superficial resemblance to species of the *apterus* group, which are endemic to the Hawaiian Islands (see Timberlake 1920). These species too are known only from brachypterous forms, and are similarly characterised by an elongate, undivided pronotum. This enlargement of the pronotum probably results from reduction in wing size, even to the point of aptery, as in other encyrtid genera. It is rarely found in species with both fully winged and brachypterous forms. *R. anceps* is probably not closely related to the Hawaiian species, because the structure of the male genitalia is very different. In males of the Hawaiian group it is very simple, lacking digiti and parameres, whereas in *anceps* males the digiti are elongate and each armed with two or three apical teeth. Females can be distinguished by the wing vestiges in *anceps* reaching the base of the gaster, and in the Hawaiian species not or hardly reaching the anterior margin of the propodeum.

*R. anceps* is typical of many endemic New Zealand species in that both sexes vary considerably in size and coloration. The greatest variation occurs in the funicle segments of the male, which may be strongly transverse to well over twice as long as broad, depending on the size of the individual. Similar size-related variation in the male antenna can be found in other species of *Rhopus*.

### *Rhopus garibaldi* (Girault)

Figures 296–298

Girault, 1933: 4. Cumber, 1959: 883 (Hy 27, *Rhopus* sp. in part).

**Female.** Length range 0.68–0.94 mm ( $n = 4$ ).

**Specimen 1** (card-mounted). Body generally orange-brown; antennae testaceous brown; sides of mesoscutum and axillae a little paler; legs yellow; wings hyaline.

**HEAD.** Sculpture on frontovertex transversely elongate, shallow, raised, squamiform-reticulate, becoming less elongate below anterior ocellus. A single, distinctly longer seta between posterior ocellus and eye margin, much nearer the former. Antennal torulus with upper margin a little below lowermost margin of eye. Relative dimensions: head width 39, length 33, depth 12; minimum frontovertex width 25; eye length 17.5, width 12.5; malar space 10; OPL 1; POL 12; OOL 6.5; scape length 12, width 4.5; other proportions of antenna as in Figure 296.

**THORAX.** Pronotum longitudinally divided medially (Figure 297). Relative dimensions: fore-

wing length 107, width 37, marginal fringe 6; hindwing length 77, width 10, marginal fringe 8.

GASTER slightly longer than thorax.

**Specimen 2** (slide-mounted). Forewing setation and venation as in Figure 298. Relative lengths: middle tibia 45; last tergite 69; ovipositor 30.

**Variation.** Coloration varying from almost completely yellowish to head and scutellum brown.

**Male.** Unknown.

**Type data.** **Syntype** (probably holotype) female: Australia, Queensland, Wynnum, forest, on slide labelled “♀ *Xanthoencyrtus garibaldi* Gir. Type Wynnum forest” (QMBA).

**Material examined.** Syntype, plus 6 non-type females, 4 from Australia and 2 from New Zealand (NZAC, BMNH).

HB / —.

Habitat noted: pasture.

Collected in February.

**Biology.** Unknown.

**Remarks.** *R. garibaldi* is a native of Australia, and is probably periodically wind-carried to New Zealand. The lack of recently collected material suggests that it is not established.

### *Rhopus* sp. A

Figures 299 and 300

Cumber, 1959: 883 (Hy 27; *Rhopus* sp., in part). Valentine, 1964: 15, 16 (genus near *Xanthoencyrtus*).

Very close to *flavidus* (Mercet), a European species, apparently differing only in the sculpture of the frontovertex and the slightly shorter marginal fringe to the forewing. Male antenna as in Figure 299. Male forewing venation as in Figure 300.

**Material examined.** WN – 1 male, Paekakariki, pasture, 31 Jan 1957, RAC (Hy 27, RS 19 RD).

NN – 1 female, Nelson, ex *Phenacoccus* sp. on apple, 2 Mar 1960; 1 female, Todd's Valley, swept *Juncus*, 11 Dec 1968, EWV (NZAC).

**Biology.** Reared from *Phenacoccus* sp. (Homoptera: Pseudococcidae) on apple.

**Remarks.** The material examined is in poor condition, so comparison with *flavidus* is difficult. Possibly more than one species is represented.

### Genus *Subprionomitus* Mercet

Mercet, 1921: 383. Type species *Subprionomitus cantabricus* Mercet, by original designation; Spain.  
*Kakaoburra* Girault, 1922: 44. Noyes & Hayat, 1984: 190 (key), 289–290. Type species *Kakaoburra fera* Girault, by monotypy; Australia. New synonymy.

**Female.** Body dark metallic blue or green; wings hyaline or slightly infusate below apex of venation.

**HEAD.** Occipital margin acute, rounded. Antennal torulus with dorsal margin a little above ventral margin of eye. Malar sulcus present. Mandible with 3 teeth, the lowermost sharp, the uppermost obtuse, giving an almost truncate appearance. Antenna with scape subcylindrical, relatively short, not or hardly longer than minimum width of frontovertex; funicle 6-segmented, the segments at least a little longer than broad; club 3-segmented, its apex rounded. Eye with very short, almost invisible hairs, reaching occipital margin.

**THORAX** in profile with propodeum narrowly touching hind coxa. Notaular lines absent or obscurely present in anterior one-third of mesoscutum. Scutellum fairly flat. Forewing marginal vein about 4.0–5.0× as long as broad; stigmal vein about half as long as marginal vein; postmarginal vein at least a little shorter than stigmal vein; lineal calva entire or interrupted; filum spinosum present. Propodeum medially short.

**GASTER** about as long as thorax. Ovipositor hardly exerted. Hypopygium reaching a little more than halfway along gaster. Last tergite varying from shorter than middle tibia to a little longer. Ovipositor at least a little longer than middle tibia. Paratergites absent. Gonostyli free.

**Male.** Generally very similar to female, differing most in antennal and genital structure. Antennal toruli with ventral margins well above lower margin of eye. Antenna 9-segmented; flagellum clothed in characteristic very short, apically bifurcating setae and extremely few slightly longer normal setae; funicle segments at least about twice as long as broad; club entire. Eye conspicuously hairy. Aedeagus relatively long, at least about two-thirds as long as middle tibia. Parameres short, less than half as long as digiti, each with a single seta apically. Digiti each with a pair of apical hooks. Phallobase unusually long, about 1.5× as long as aedeagus.

**Biology.** Parasites of mealybugs (Homoptera: Pseudococcidae).

**Distribution.** Europe, central Asia, Australia, and New Zealand. Of the five described species, one is known from New Zealand.

**Remarks.** The type species of *Kakaoburra* is so similar to *S. festucae* (Mayr) (= *cantabricus* Mercet) that the differences (see below) are here considered not to be of generic importance. Hence, *Kakaoburra* is reduced to synonymy under *Subprionomitus*.

Females of this genus can be recognised by the characteristic parallel arrangement of the setae on the dorsal surface of the forewing proximad of the lineal calva, the relative proportions of the forewing venation, and the relatively short scape. Males are characterised by the very short, forked setae on the antennal flagellum and the relatively long phallobase.

The relationship of this genus to others in the Encyrtinae is not at all clear. It has been placed in the Microteriyini, Microteriyina by Trjapitzin (1973b). This is probably incorrect, since it appears to be closest to *Mayridia* Mercet, which has been placed in the subtribe Mayridiina (Trjapitzin 1973b). This latter subtribe has been placed incorrectly in the tribe Miraini (see Noyes & Hayat 1984, pp. 268 and 290).

### *Subprionomitus ferus* Girault new combination

Figures 301–306

Girault, 1922: 44.

Girault's original description is very short, so a full redescription based on New Zealand material is presented here.

**Female.** Length range 1.13–1.60 mm ( $n = 10$ ).

**Specimen 1** (card-mounted). Frontovertex dull, dark, metallic green, mixed slightly with brassy, and behind each posterior ocellus dark blue; face more metallic; antenna with radicle, scape, and proximal two-thirds of pedicel blackish with slight metallic reflections; extreme apex of pedicel and entire flagellum testaceous yellow, but proximal part of each segment a little darker; setae on frontovertex inconspicuous, brown; thorax with pronotum purplish brown; mesoscutum and axillae dark metallic blue, slightly purplish and brassy; scutellum dark metallic green, slightly bluish and coppery basally; mesopleurum anteriorly dark metallic purplish, posteriorly dark metallic green; coxae, femora, and tibiae blackish with slight metallic green reflections; apices of femora and tibiae testaceous, on middle tibia more widely so; fore tarsus brownish; middle tibial spur and tarsus yellowish; hind tarsus yellowish, but distal segments dark brown; setae on dorsum of thorax dark brown; wings hyaline with dark brown venation; propodeum dorsally dark purplish brown, laterally metallic green; setae out-

side propodeal spiracle translucent; gaster dark metallic purple, but basal tergite metallic green, and exerted parts of gonostyli dark brown.

**HEAD.** Ocelli forming an angle of about 80°. Sculpture on frontovertex shallow, raised, slightly irregular reticulate, of rough appearance, becoming shallower on genae and on interantennal prominence. Antennal torulus separated from mouth margin by 1.5× its own length and from other torulus by about its own length. Mandible as in Figure 301. Relative dimensions: head width 66, length 61, depth 37; minimum frontovertex width 28; OPL 6.5; POL 17; OOL 2.5; eye length 44, width 35; malar space 19; scape length 23, maximum width 5; other proportions of antenna as in Figure 302.

**THORAX.** Mesoscutum and scutellum with shallow, raised, reticulate sculpture, that on scutellum a little deeper, and more longitudinally elongate on sides; mesopleurum with very shallow, raised, fairly regular, reticulate sculpture. Propodeum with about 10–15 setae outside spiracle, these extending down sides nearly to hind coxa. Relative dimensions: forewing length 171, width 62, venation and setation as in Figure 303; hindwing length 120, width 25, marginal fringe 5.

**GASTER** slightly shorter than thorax. Exserted part of ovipositor about one-seventh as long as gaster, and about as long as middle tibial spur. Last tergite slightly longer than middle tibia.

**Specimen 2** (slide-mounted). Relative lengths: middle tibia 87; last tergite 110; ovipositor 165; gonostyli 43.

**Variation.** Very little, but larger specimens generally have slightly longer flagellar segments, POL:OOL may approach 10:1, and the forewing marginal vein may be about 5.0× as long as broad.

**Male.** Length range 0.63–1.27 mm ( $n = 39$ ).

Generally similar to female, except for antenna (Figure 304) and genitalia (Figure 306). Interantennal prominence extending from a little above mouth margin to a little above antennal toruli, which are distinctly above lower margin of eye. Antennal scrobes quite deeply impressed; toruli each separated from mouth margin by much more than twice its own length. Forewing venation as in Figure 305. Relative dimensions, specimen 1 (card-mounted): head width 61, length 51, depth 29; minimum frontovertex width 32; eye length 33, width 25; malar space 18; OPL 4; POL 19; OOL 3.5; scape length 19, width 6.5. Relative lengths, specimen 2 (slide-mounted): aedeagus 46; middle tibia 73.

**Variation.** Little in the material available. Smaller specimens generally have shorter flagellar segments, and POL:OOL may be slightly smaller.

**Type data.** **Syntype** female (probably holotype); legs on card, labelled “*Kakaoburra fera* Gir. ♀ type”; head, left forewing, and right antenna on slide, labelled “*Kakaoburra fera* Gir. ♀ type” (QMBA).

**Material examined.** Syntype female, plus 53 non-type examples (12 females, 41 males) from New Zealand (NZAC, BMNH, CNCI, USNM, UCRC, PPRI, ZILR, ANIC).

— / NN, MB, BR, MC, MK, OL, CO, FD.

Recorded from around sea level to 1640 m (OL, Coronet Peak).

Habitats noted: litter; *Chionochloa*; red tussock; tussock near pine plantation; mixed native grassland; *Nothofagus* forest and grass; tussock, *Juncus*, and *Sphagnum*; edge of native bush; tussock, grasses, *Discaria*, *Juncus*, *Rosa*, and *Pimelia*.

Adults have been collected or reared in January–March and December.

**Biology.** Reared from an unidentified mealybug (Homoptera: Pseudococcidae) on *Chionochloa*.

**Remarks.** The single extant syntype female of *Kakaoburra fera* is in extremely poor condition, and direct comparison with New Zealand material is very difficult. The New Zealand specimens appear to differ very little except in the relative length of the postmarginal vein of the forewing (the syntype has the postmarginal vein very nearly as long as the stigmal) and in the coloration of the middle tibia (from Girault’s original description it seems that the middle tibia could be completely yellowish). Therefore, pending examination of freshly collected Australian material, the New Zealand species is tentatively determined as *ferus* in preference to describing a new species on the basis of these uncertain differences.

*Subprionomitus angeliconini* (Girault 1924, p. 6) **new combination** may be considered synonymous with *S. ferus* when freshly collected material can be examined in more detail.

*S. ferus* differs from all European congeners in its uninterrupted linea calva. It differs from the type species in leg coloration, relatively slightly shorter funicle segments, complete lack of notalar lines, shallower sculpture on dorsum of thorax, less dense setae on dorsal surface of forewing proximad of linea calva, longer last tergite of gaster, and longer ovipositor. *S. festucae* has the legs almost completely yellow, funicle segment 1 at least as long as the pedicel, notalar lines present in the anterior third of the mesoscutum, the sculpture on the thoracic dorsum fine and almost punctate-reticulate, the last gastral tergite shorter than the middle tibia, and

the ovipositor only a little longer than the middle tibia.

### Genus *Tachinaephagus* Ashmead

Ashmead, 1904: 304. Subba Rao, 1978. Noyes & Hayat, 1984: 176 (key), 188 (key), 190 (key), 198 (key), 206 (key), 213 (key), 340. Type species *Tachinaephagus zealandicus*, by original designation; Australia.

**Female.** Body variously reddish, reddish brown, or dark brown, sometimes with a slight metallic green lustre; forewing hyaline; venation yellowish brown or orange-brown.

**HEAD.** Occipital margin acute, sharp. Frontovox vertex about half to one-third as wide as head, shallowly sculptured to almost smooth, clothed with conspicuous long setae. Antennal torulus with dorsal margin a little above ventral margin of eye; scape subcylindrical, about as long as minimum width of frontovox vertex; funicle 6-segmented; club 3-segmented, its apex rounded or slightly obliquely truncate. Eye not quite reaching occipital margin, with very long, conspicuous hairs each 2.0–3.0× as long as the diameter of a facet. Malar sulcus present. Mandible with 3 sharp teeth, but occasionally upper tooth almost absent, very short, and obtuse, giving mandible an almost bidentate appearance.

**THORAX** in profile with propodeum narrowly touching hind coxa. Dorsum clothed with conspicuous, long setae; notaular lines absent. Scutellum fairly flat, unsculptured, except perhaps in anterior one-third or so. Forewing marginal vein about 5.0–6.0× as long as broad; stigmal vein about as long as marginal vein; postmarginal vein at least a little shorter than marginal vein; linea calva entire, occasionally closed near posterior margin of wing; filum spinosum present or absent. Propodeum medially quite long, at least about one-quarter as long as scutellum, and with a few irregular carinae medially.

**GASTER** slightly shorter than thorax; cerci in proximal half. Hypopygium generally reaching almost to apex of gaster. Paratergites absent. Ovipositor at least slightly exerted, often markedly so, at least about as long as middle tibia. Gonostyli free, about one-third as long as ovipositor, distinctly flattened from side to side.

**Male.** Generally very similar to female, differing most in antennal and genital structure. Antennal toruli with ventral margins about level with lower margin of eye; antenna 10-segmented; flagellum 8-segmented, clothed in fairly short setae, each shorter than the diameter of a segment; funicle segments longer than broad. Aedeagus relatively short, not

more than about half as long as middle tibia. Parameres absent. Digits short, broad, each with 2 or 3 apical hooks.

**Biology.** Parasites of larvae of Calliphoridae, Muscidae, Sarcophagidae, and Tephritidae (Diptera). Also recorded in New Zealand as a parasite of *Alysia manducator* Panzer (Hymenoptera: Braconidae) itself parasitising muscid puparia (see below).

**Distribution.** Neotropical, Afrotropical, eastern Palearctic, Oriental, and Australasian. Of the ten described species, only the type species is known from New Zealand.

**Remarks.** *Tachinaephagus* belongs in the Encyrtinae, and is probably closest to those genera placed in tribe Bothriothoracini (see Trjapitzin 1973b, Noyes & Hayat 1984). It can be separated from related genera by the following combination of characters: long, conspicuous setae on head and dorsum of thorax; eye not reaching occipital margin; scutellum smooth; forewing with yellowish venation; female hypopygium reaching or nearly reaching apex of gaster, and ovipositor sheath exerted and flattened; and antenna ten-segmented in the male.

### *Tachinaephagus zealandicus* Ashmead

Figures 1, 3, and 307–311

Ashmead, 1904: 304. Gourlay, 1930a: 6; 1930b: 343. Cumber, 1960: 256 (as *Ericydnus?* sp.). Cumber & Eyles, 1961: 399 (as *Ericydnus* sp.). Valentine, 1967: 1124. Subba Rao, 1978: 67 (key), 69. Early, 1984: 276.

**Female** (Figure 1). Length range (excluding ovipositor) 1.13–2.26 mm ( $n = 150$ ).

**Specimen 1** (card-mounted). Head very dark reddish-brown with a slight green sheen; antenna brown; dorsum of thorax dark reddish-brown with a weak metallic green sheen; mesopleurum orange-brown; venter orange; legs amber; wings hyaline, with pale orange-brown venation; gaster dark reddish brown.

**HEAD** (Figure 3). Ocelli forming an angle of slightly less than 90°. Frontovox vertex nearly smooth, but with very shallow, very fine, squamiform-reticulate sculpture. Mouth opening very wide, about three-fifths as wide as head. Mandible with only 2 sharp teeth, the upper one obtuse, almost absent (Figure 307). Eye separated from occipital margin by about half the major diameter of a posterior ocellus. Antennal torulus with upper margin about

level with lower margin of eye. Relative dimensions: head width 46, length 38; minimum frontovertex width 21; eye length 24, width 18; malar space 14; OPL 3.5; POL 7.5; OOL 3.5; scape length 21, width 4.5; other proportions of antenna as in Figures 1 and 308.

**THORAX.** Sculpture on mesoscutum similar to but deeper than that on frontovertex; scutellum with some very shallow sculpture in anterior half, but posteriorly completely smooth. Forewing setation and venation as in Figure 309. Relative dimensions: forewing length 131, width 58, marginal fringe 2; hindwing length 94, width 29, marginal fringe 3.

**GASTER** a little shorter than thorax. Exserted part of ovipositor about one-tenth as long as gaster and about half as long as middle tibial spur. Last tergite apically broadly rounded.

**Specimen 2** (slide-mounted). Relative lengths: middle tibia 62; last tergite 41; ovipositor 69; gonostylus 18.

**Variation.** Very little in the material available.

**Male.** Length range 1.53–2.22 mm ( $n = 41$ ).

Almost identical to female, except for structure of antenna (Figure 310) and genitalia (Figure 311), and antennal torulus with upper margin well above lower margin of eye. Relative lengths: middle tibia 64; aedeagus 26.

**Variation.** Very little in the material available.

**Type data.** **Lectotype** female: Australia, N.S.W., ex pupa of larger locust parasites (USNM) [not seen].

**Material examined.** 193 non-type examples (151 females, 42 males) from New Zealand (NZAC, BMNH).

ND, AK, CL, WO, BP, TK, TO, GB, HB, WI / SD, NN, MB / Campbell I.

Habitats noted: forest; tussock grassland; exotic pasture; orchard; poultry house; cattle yard; animal dung; carcasses of animals; litter.

Adults have been collected or reared in January–April and October–December.

**Biology.** Eggs are laid in the host larva, and the parasites emerge from the host puparia. In New Zealand, reared from the following Diptera: Calliphoridae – *Lucilia sericata* Meigen, *Calliphora quadrimaculata* Swederus, *C. erythrocephala* Meigen, and *C. stygia* Fabricius (Gourlay 1930); Sarcophagidae – *Sarcophaga milleri* Johnson & Hardy (Cumber 1960); Muscidae – *Musca domestica* Linnaeus and *Stomoxys calcitrans* Fabricius (Valentine 1967); Fanniidae – *Fannia canicularis* (Linnaeus) (Subba Rao 1978). Also recorded from

Australia as a parasite of *Stenoterys fulvoventralis* (Dodd) (Subba Rao 1978). Gourlay (1930) recorded it in New Zealand as a hyperparasite of *Alysia manducator* Panzer (Hymenoptera: Braconidae), but this is probably incorrect.

**Remarks.** *T. zealandicus* is at once distinguishable from congeners by the mesopleura being conspicuously paler than the dorsum of the thorax, and the ovipositor hardly exserted. Other species of the genus have either the mesopleura and thoracic dorsum concolorous or the ovipositor well exserted.

This species is distributed throughout the tropics. It may be of some value in the control of synanthropic flies associated with carrion and dung, but nothing has been published to suggest that this is so.

### Genus *Tetracnemoidea* Howard

Howard, 1898: 232. Trjapitzin & Gordh, 1980: 169–175 (world review). Noyes & Hayat, 1984: 143. Type species *Tetracnemoidea australiaensis* Howard, 1898, by monotypy; Australia.

*Anarhopus* Timberlake, 1929: 15. Type species *Anarhopus sydneyensis* Timberlake, by original designation; Australia. **New synonymy.**

*Antipodencyrtus* Kerrich, 1964: 505. Noyes & Hayat, 1984: 342 (synonymy with *Tetracnemoidea*). Type species *Antipodencyrtus procellosus* Kerrich, 1964, by monotypy; Campbell I., N.Z.

*Zealandencyrtus* Tachikawa & Valentine, 1971: 27. Type species *Zealandencyrtus yasumatsui* Tachikawa & Valentine, by original designation. **New synonymy.**

**Female.** **HEAD.** Antennal funicle five-segmented. Mandible bidentate.

**THORAX.** Mesoscutum with or without notaular lines. Forewing, if fully developed, with linea calva anteriorly more or less extending from proximal part of parastigma to apex of stigmal vein, and hence relatively very wide, and with marginal vein relatively short, not more than 2.0–3.0× as long as broad.

**GASTER** with 5th and 6th tergites longitudinally divided medially by a membranous strip (not distinct in small specimens of *bicolor*). Ovipositor not exserted. Second valvifers narrow, more or less filamentous in apical half.

**Male.** Generally similar to female, but antennae branched, face with a line connecting lower margin of antennal torulus to lower margin of eye (except in *bicolor*), and genital structure different.

**Distribution.** Cosmopolitan. Six species are known from New Zealand (including neighbouring subantarctic islands), one purposefully introduced to

control a mealybug pest, one probably accidentally introduced from Australia, one probably accidentally introduced from South America, and three apparently indigenous.

**Remarks.** *Anarhopus* and *Tetracnemoidea* can be distinguished only on the antennal flagellum of the female being flattened (cf. cylindrical) and the 5th funicle segment of the male being branched (cf. unbranched). I do not consider these differences alone to be of generic significance, and therefore place *Anarhopus* in synonymy with *Tetracnemoidea*.

The type species of *Antipodencyrtus* and *Zealandencyrtus* have been shown to be synonymous, not only with each other but also with a third species previously placed in *Tetracnemoidea* (see Remarks under *T. bicolor*). The only major differences from other species of the genus are the occasional reduction in wing size, the relatively narrow forewings, and the male antenna having only three branched segments. I therefore have no hesitation in synonymising these nominal genera.

**KEY TO SPECIES OF TETRACNEMOIDEA  
KNOWN FROM NEW ZEALAND**

- 01 Antenna simple, not branched ... FEMALES .. 02
  - Antenna with at least 3 segments branched ... MALES .. 09
- FEMALES
- 02(01) Forewing fully developed, extending past apex of gaster ... 03
  - Forewing shortened, not reaching apex of gaster ... 08
- 03(02) Forewing with a large fuscous area in disc extending across wing from marginal vein (Fig. 349, 353) ... 04
  - Forewing more or less hyaline or hardly infusate ... 05
- 04(03) Antenna with flagellum bilaterally flattened, the 1st segment only about 0.2× longer than broad, and 4th and 5th segments transverse (Fig. 348) ... (p. 121) .. *sydneyensis*
  - Antenna with flagellum more or less cylindrical; funicle segments longer than broad, the 1st at least nearly twice as long as broad (Fig. 352) ... (p. 122) .. *zelandica*
- 05(03) Antenna with 1st funicle segment smaller than the 2nd (Fig. 344) ... (p. 120) .. *peregrina*
  - Antenna with 1st funicle segment larger and longer than the 2nd ... 06

- 06(05) Antenna with 1st funicle segment not or hardly longer than the 5th, at most only 1.1× as long; 2nd and 3rd funicle segments distinctly smaller than the 4th (Fig. 328); scutellum with a purple or greenish purple lustre; club 3-segmented ... (p. 117) .. *brevicornis*
  - Antenna with 1st funicle segment at least 1.2× as long as the 5th, usually relatively much longer; 2nd to 4th funicle segments subequal or gradually increasing in size, so 3rd segment not noticeably smaller than the 4th; scutellum usually green, occasionally with a slight purplish sheen; club entire, 2- or 3-segmented ... 07
- 07(06) Forewing costal cell very narrow, at least about 15× as long as broad, with at most a single row of setae dorsally in apical half (Fig. 312, 313); club entire, 2- or 3-segmented ... (p. 115) .. *bicolor*
  - Forewing costal cell relatively broad, not more than 10× as long as broad, with 2 or 3 rows of setae dorsally spanning more or less its entire length (Fig. 335); club always 3-segmented ... (p. 119) .. *brounii*
- 08(02) Forewing rudiment hyaline or milky, its apex more or less rounded or oblique and relatively short, often not reaching base of gaster and never reaching posterior margin of 1st gastral tergite (Fig. 314–317); club entire, 2- or 3-segmented ... (p. 115) .. *bicolor*
  - Forewing rudiment hyaline, relatively long, its apex transversely truncate (Fig. 337, 338) and reaching at least to posterior margin of 1st gastral tergite; club always 3-segmented ... (p. 116) .. *brounii*
- MALES
- 09(01) Antenna with 4th segment of funicle not branched (Fig. 324, 325) ... (p. 115) .. *bicolor*
  - Antenna with 4th segment of funicle branched ... 10
- 10(09) Fifth funicle segment with a short but distinct branch (Fig. 350) ... (p. 121) .. *sydneyensis*
  - Fifth funicle segment simple, not branched ... 11
- 11(10) Either 1st funicle segment, measured to apex of ramus, at least 1.8× as long as scape, and usually at least about twice as long, or forewing shortened, not reaching more than halfway along gaster ... 12
  - First funicle segment, measured to apex of ramus, not more than 1.7× as long as

scape; wings always extending past apex of gaster ... 13

12(11) Propodeum strongly metallic green laterally, contrasting with purplish mesopleurum; hind tibia with a well defined proximal white area contrasting with distal half, which is usually dark brown; transverse line connecting lower margin of antennal torulus to eye margin relatively well defined, and with a cluster of minute sensory pits immediately outside torulus (Fig. 354) ... (p. 122) .. *zelandica*

—Propodeum not or hardly metallic laterally and relatively dull, usually more or less concolorous with mesopleurum; hind tibia with proximal half more or less concolorous with apex, from yellow to dark brown, occasionally a little paler, but not conspicuously so; transverse line connecting lower margin of torulus to eye margin not well defined, indicated only by a slight change of sculpture, and without a cluster of minute sensory pits immediately outside torulus (Fig. 339)

... (p. 119) .. *brounii*

13(11) Second segment of funicle with at least 1 longitudinal sensillum (Fig. 346); aedeagus not more than half as long as middle tibia, and apex of paramere with a short, slender, slightly curved bristle (Fig. 347); forewing basal cell relatively densely pilose; head in facial view with dorsal margin of antennal torulus level with lower margin of eye ... (p. 120) .. *peregrina*

—Second segment of funicle without any longitudinal sensilla (Fig. 330); aedeagus more than half as long as middle tibia, usually at least about two-thirds as long, and apex of paramere with a very stout, fang-like process (Fig. 331); forewing basal cell relatively sparsely pilose; head in facial view with dorsal margin of antennal torulus slightly below lower margin of eye

... (p. 117) .. *brevicornis*

### *Tetracnemoidea bicolor* (Girault)

Figures 312–327

Girault, 1915a: 142. Noyes & Hayat, 1984: 342. *tertius* Girault, 1923: 144. Tachikawa, 1974a: 30. 1974b: 44. Trjapitzin & Gordh, 1980: 171. Noyes & Hayat, 1984: 342 (synonymy with *bicolor*).

*procellosus* Kerrich, 1964: 505. Noyes & Hayat, 1984: 342. **New synonymy.**

*yasumatsui* Tachikawa & Valentine, 1971: 28. Noyes & Hayat, 1984: 350. **New synonymy.**

This species shows considerable variation in both morphology and coloration. The following redescription of the female is based on two Australian specimens – one card-mounted (specimen 1) and the other slide-mounted (specimen 2) – which have been compared with the holotype of *Arhopoideus tertius* Girault (QMBA). The section on variation in the female and the description of the male are based on all available New Zealand material, including the holotypes and some paratypes of *procellosus* and *yasumatsui*.

**Female.** Length range 0.62–1.43 mm ( $n = 414$ ).

Head and dorsum of thorax dark metallic green; antenna dark brown, but proximal half of scape and extreme apex of pedicel testaceous yellow; tegula yellow, but extreme apex dark brown; prepectus yellow; mesopleurum dark brown; legs, including coxae, yellow but fore tarsus and apical segments of middle and hind tarsi brown; propodeum and metapleurum yellow-orange, but median part of propodeum dark brown; wings hyaline, with dark brown venation; gaster very dark brown.

**HEAD.** Ocelli forming an angle of about 100°. Frontoververtex with shallow, raised, squamiform-reticulate sculpture of relatively large mesh. Relative dimensions: specimen 1 – head width about 41; minimum frontoververtex width about 25; eye length 25, width 20; malar space 26; OPL 1; POL 12.5; OOL 4.5; scape length 28, maximum width 5.5; other proportions of antenna as in Figure 312; specimen 2 – head width 60; minimum frontoververtex width 33.5.

**THORAX.** Notaular lines extending about two-fifths across mesoscutum. Forewing venation and setation as in Figure 312. Relative dimensions, specimen 2: forewing length 64, width 26, marginal fringe 2; hindwing length 47, width 9.5, marginal fringe 3.

**GASTER** about one-quarter longer than thorax. Relative lengths, specimen 2: last tergite 39; ovipositor 116; gonostylus about 20 [middle tibia 51].

**Variation.** **GENERAL.** Head and thorax from completely dark metallic green (generally in specimens larger than 1.0 mm) to completely pale yellow, with gaster also yellow (generally in specimens smaller than 0.85 mm), with various combinations in between, e.g., thorax pale with head and gaster dark, thorax and gaster pale with head dark; mouth margin between antennal toruli always very dark brown (this just visible in completely dark green specimens); antennae of paler specimens correspondingly paler, but with club usually conspicuously darker than flagellum; fore femur, middle and hind coxae, middle and hind femora, and tibiae sometimes also darkened in varying degrees. Frontoververtex width from slightly more than half head

width in larger specimens to about two-thirds head width in smaller specimens (Figures 312–317). Correspondingly, POL:OOL increasing with decrease in body size, and relative size of ocelli decreasing with body size. Antennal toruli in larger specimens relatively longer, separated by about their own length in larger specimens to about 3.0× their own length in smaller specimens; scape in larger specimens about 5.0× as long as broad, and in smaller specimens as little as 3.0× as long as broad; relative length of funicle segments decreasing with body size, all segments longer than broad in larger specimens, but only 1st segment longer than broad in smallest specimen; club varying from entire, with a partial septum, to 2- or 3-segmented (cf. Figures 318–323). Gaster relatively longer in smaller specimens, sometimes slightly more than 1.5× as long as thorax. Relative length of ovipositor varying from about 1.6–2.3× as long as middle tibia and 2.1–3.3× as long as last tergite, this variation apparently not size-related.

Individuals may be either fully winged or more or less fully winged, with the forewings extending to the apex of the gaster, or brachypterous, with the forewings not reaching the posterior margin of the first tergite (Figures 312–317).

**FULLY WINGED SPECIMENS** (Figures 312 and 313). Forewing occasionally nearly 3.0× as long as broad, with marginal fringe up to one-seventh as wide as wing. Pronotum with posterior margin very concave, so medial length about one-fifth the lateral length and varying from about one-third (in larger specimens) to two-fifths (in smaller specimens) the combined length of mesoscutum and scutellum; notaular lines always present. One female examined has the forewing only just reaching the apex of the gaster, and about 4.0× as long as broad.

**BRACHYPTEROUS SPECIMENS** (Figures 314–317). Forewing sometimes extremely short, only just reaching apex of scutellum, or relatively longer, almost reaching posterior margin of 1st gastral tergite; smaller wings often slightly milky in coloration. Pronotum from hardly to distinctly concave along posterior margin, always relatively longer than in fully winged specimens, its medial length slightly more than two-thirds (in smaller specimens) to about half (in larger specimens) the lateral length and varying from nearly as long (smaller specimens) to about half as long (larger specimens) as combined length of mesoscutum and scutellum; notaular lines often apparently absent in smaller specimens.

**Male.** Length range 0.40–0.79 mm ( $n = 215$ ).

Generally similar to female, except for structure of antennae (Figures 324–326) and genitalia (Figure 327) and relatively slightly higher placement of

antennal torulus. Antennal torulus not connected to lower margin of eye by a line. Aedeagus half as long as middle tibia.

**Variation.** As in female, including the morphological differences between fully winged and brachypterous forms. Two completely yellow fully winged males have been examined, a combination not yet found in any female.

**Type data.** *bicolor* Girault: **holotype** female on slide labelled "*Ectromella bicolor* Gir. ♀ Genotype" (combined length of thorax and gaster 0.85 mm) (QMBA).

*tertius* Girault: **holotype** female on slide labelled "*Arhypoideus tertius* Gir. ♀ Type" (combined length of thorax and gaster 0.75 mm) (QMBA).

*procellosus* Kerrich: **holotype** female on slide labelled "nr New Zealand, Campbell I. N.W. Bay, tussock, 30 December 1962, K. Rennell, *Antipodencyrtus procellosus* sp.n. G.J. Kerrich det. 1964 ♀ HOLOTYPE" (length 1.06 mm) (NZAC); **paratypes** (1 female, 2 males) "Campbell I., N.W. Bay, tussock, 30 December 1962, K. Rennell, *Antipodencyrtus procellosus* sp.n. G.J. Kerrich det. 1964, PARATYPE" (NZAC, BMNH).

*yasumatsui* Tachikawa & Valentine: **holotype** female on card point labelled "Appleby NN 17 March 64 E.W. Valentine HOLOTYPE *Zealandencyrtus yasumatsui* Tachikawa" (length 0.88 mm) (NZAC); **paratypes** (3 females) – 2 "NN, Nelson, 7 June 1962, 529, E.W. Valentine, ♀ *Zealandencyrtus yasumatsui* Tachikawa & Valentine, PARATYPE", 1 "NN, Appleby, 17 March 1964, 734, E.W. Valentine, ♀ *Zealandencyrtus yasumatsui* Tachikawa & Valentine, PARATYPE" (NZAC).

**Material examined.** Type specimens of *bicolor*, *tertius*, *procellosus*, and *yasumatsui*, plus 648 non-type examples (430 females, 218 males) from New Zealand (NZAC, BMNH, CNCI, USNM, UCRC, PPRI, ZILR, ANIC).

AK, TO, TK / SD, NN, MB, BR, WD, MC, SC, OL, CO, DN, FD / SI / Antipodes Is. / Auckland Is. / Campbell I.

Recorded from around sea level to about 1650 m (OL, Coronet Peak).

Habitats noted: *Nothofagus* forest, *Podocarpus totara*, broadleaf, and grasses; *Dracophyllum*; edge of native bush; *Phormium tenax*; *Olearia furfuracea*; *Juncus*; *Chionochoa*; tussock, grasses, *Hebe*, alpine shrubs, and mat plants; native grassland and *Sphagnum* bog; litter; mosses and liverworts.

Adults have been collected in all months of the year except April–July.

**Biology.** A parasite of mealybugs (Homoptera: Pseudococcidae) associated with grassy or shrubby

vegetation. Reared from *Trionymus* sp. on *Juncus* sp., and from unidentified mealybugs on *Phor-mium tenax*, *Olearia furfuracea*, and *Juncus* sp.

**Remarks.** Girault (1915a) incorrectly states the length of the holotype of *bicolor* to be 0.65 mm.

The synonymies proposed above require some explanation, especially since the nominal species concerned were originally described under four separate genera, and all except two are morphologically quite different.

The two similar species, *bicolor* and *tertius*, were described several years apart by Girault, *tertius* at a time when he might not have had access to much of his previously described material. Moreover he probably did not compare the two, because for some inexplicable reason he had described *bicolor* in a completely separate genus from *Arhopoideus*, in which he placed *tertius*.

The two remaining species, *procellosus* and *yasumatsui*, are quite similar to each other, but *procellosus* is the larger (about 1 mm or more in length; *yasumatsui* is generally shorter than 0.9 mm). Both are brachypterous and have a relatively long pronotum and short mesoscutum and scutellum. *Zealandencyrtus yasumatsui* (Figure 317) was described in a genus distinct from *Antipodencyrtus procellosus* on the basis of characters which were considered by Tachikawa & Valentine to warrant generic distinction. At best, even if these species were being treated here as distinct, the distinguishing characters proposed to separate them are hardly significant enough to warrant separate generic status. Three of these characters – the presence or lack of ocelli, the relative length of the funicle segments, and the relative length of the middle basitarsal segment – are clearly size-related in *Tetracnemoidea*. In material of this genus which must undoubtedly belong to a single species, smaller specimens generally have relatively shorter, stouter tarsal segments, smaller ocelli, and shorter funicle segments. It is worth noting that, contrary to the comments of Tachikawa & Valentine, the fifth funicle segment of the holotype of *yasumatsui* is actually nearly 1.2× as long as broad, not as long as broad. The fourth distinguishing character, colour, is also extremely variable in New Zealand species of the genus. Other differences which may be considered to be of generic value can be seen by comparison of Tachikawa & Valentine's fig. 2A and 2B. These are the relative length of the antennal toruli and the distance separating them, the shape of the posterior margin of the pronotum, the length of the forewing, the shape of the posterior margin of the fifth gastral tergite, and the relative distance of the gastral spiracle from the cercus. Critical examination of the material available has also shown that,

except for the shape of the forewing, these characters are size-related. Smaller specimens generally have shorter antennal toruli and straighter posterior margins to the pronotum and fifth and sixth gastral tergites. It should also be pointed out that fig. 2B of Tachikawa & Valentine is slightly inaccurate in that the toruli of the holotype of *procellosus* are separated by at least their own length. There are no reliable characters to separate these two nominal species, and hence they are here considered to be synonymous.

Material of *procellosus* has been collected in several localities together with fully winged specimens which are more or less indistinguishable morphologically from *bicolor*, except perhaps that the New Zealand specimens generally have narrower wings than their Australian counterparts. It therefore seems likely that *bicolor* is the fully winged form of *procellosus*, and hence the two are here also treated as synonymous.

In addition to the variation shown by the forms described as different species, variation in the segmentation of the club has been noted (Figures 312–323). Material collected in several different parts of the South Island has the second (outer) suture of the club absent or incomplete, and occasionally also the first (inner) suture incomplete. This has been noted in both fully winged and brachypterous specimens. In the past this sort of difference has been considered to be of generic value in Encyrtidae, e.g., *Psyllaephagus* and *Calluniphilus*. However, in these specimens no differences are apparent other than the sort of variation normally encountered within one species. On this basis there is no option but to consider them as forms of *bicolor*.

The degree of variation shown by this species in New Zealand is possibly greater than that recognised in any other species of encyrtid elsewhere in the world.

This species is closely related to *brounii* and *zelandica*. All have the relative proportions of the flagellar segments of the female similar, i.e., the second to fourth segments subequal in size and the fifth considerably larger than the first, and the male genitalia are structurally very similar. They can be separated from each other using the key characters.

### *Tetracnemoidea brevicornis* (Girault)

Figures 328–331

Girault, 1915a: 143. Tachikawa, 1974a: 23. Trjapitzin & Gordh, 1980: 169, 171. Early, 1974: 290.  
*pretiosus* Timberlake, 1929: 5. Compere & Smith, 1932: 593. Miller *et al.*, 1936: 589. Valentine, 1963: 12; 1964: 16; 1967: 1123. Tachikawa, 1974a: 23 (synonymy with *brevicornis*). Bartlett in Clausen, 1978: 162, 163.

**Female.** Length range 0.79–1.27 mm ( $n = 80$ ).

Head metallic green; occipital margin narrowly coppery purple; eye margins sometimes purplish; lower parts of face and genae mixed slightly olive-green and coppery; antenna dark brown, but base of scape and apex of pedicel occasionally testaceous yellow; pronotum purplish; mesoscutum metallic green; scutellum dark coppery, slightly purplish, rarely with a slight green sheen; mesopleurum purple; tegula with base yellow, or completely dark brown; legs yellow, but hind coxae dark brown, and middle coxae dark brown ventrally, towards base; wings hyaline; propodeum metallic green, particularly on sides; gaster dark purple-brown, its basal tergite dark metallic green.

**HEAD.** Sculpture on frontovertex shallow, raised, reticulate, becoming more longitudinally elongate on lower parts of face. Ocelli forming an angle of about  $110^\circ$ . Relative dimensions, specimen 1 (card-mounted): head width 62, length 58, depth 30; frontovertex width 32; eye length 34, width 29; malar space 23; OPL 2.5; POL 18; OOL 6; scape length 38, width 7; other proportions of antenna as in Figure 328.

**THORAX.** Sculpture on mesoscutum and scutellum shallow, raised, reticulate, that on scutellum a little shallower. Notaular lines more or less absent, indicated at extreme anterior margin of mesoscutum only. Forewing setation and venation as in Figure 329. Relative dimensions, specimen 2 (slide-mounted): forewing length 92, width 43, marginal fringe 2.5; hindwing length 66, width 20, marginal fringe 4.

**GASTER** slightly shorter than thorax. Ovipositor not exerted. Relative lengths, specimen 2: last tergite 20; ovipositor 50; gonostylus about 12 [middle tibia 34].

**Male.** Length range 0.73–1.03 mm ( $n = 16$ ).

Generally similar to female, differing slightly in coloration and structure of antennae and genitalia. Scutellum often metallic green, hardly coppery or purplish; hind femur, tibia, and tarsus extensively dark brown. Antennal torulus connected to lower margin of eye by an indistinct, interrupted groove, with a line of minute sensory pits along this, adjacent to margin of torulus; antennal segments 1–4 branched (Figure 330). Genitalia with a fairly strong, moderately curved structure from apex of each paramere (Figure 331). Relative dimensions (slide-mounted specimen): head width 113; frontovertex width 59; scape length 40; middle tibia length 109; aedeagus length 67.

**Type data.** *brevicornis* Girault: **holotype** female – part on card labelled “*Arhopoideus brevicornis* Gir.

♀ type”, part on slide labelled “*Arhopoideus brevicornis* ♀ Type Hy/33152” (QMBA) (length stated by Girault to be 1.30 mm).

*pretiosus* Timberlake: **holotype** female with the data “Australia, N.S.W., Sydney, ex *Pseudococcus gahani* Green, January to March 1928” (USNM) [not seen]; **paratypes** (16 females, 34 males) – 1♀, 7♂ same data as holotype, remainder U.S.A., California, Riverside, propagating cages, April and May 1928 (USNM, UCRC, BMNH).

**Material examined.** Holotype of *brevicornis*, 3 female and 3 male paratypes of *pretiosus*, plus 115 non-type examples from New Zealand (97 females, 18 males; NZAC, BMNH).

AK, BP, WI, WN / NN, BR, MC, OL, SL.

Recorded from about sea level to 1640 m (OL, Coronet Peak).

Habitats noted: mixed *Podocarpus* and *Nothofagus*; ngaio [*Myoporum laetum*]; *Ulex europaeus*; *Olearia coriacea*; maize; soya; apple blossom; garden; lucerne; grasses; tussock, grasses, shrubs, alpine plants, *Hebe*, and mat plants.

Adults have been collected in all months except May and June.

**Biology.** Reported as a parasite of *Pseudococcus* sp. (Valentine 1963) and *Phenacoccus graminicola* Leonardi (Valentine 1964). The material examined also includes specimens which have been reared from unidentified mealybugs on ngaio and in the galled tips of *Olearia coriacea*.

**Remarks.** *T. brevicornis* was imported into California from Australia via New Zealand in about 1928 in a bid to control the citrophilus mealybug, *Pseudococcus fragilis* Brain (Compere & Smith 1932). It was later established in New Zealand from importations made in 1933 (Bartlett in Clausen 1978), but was not successful in controlling mealybug on fruit trees (Miller *et al.* 1936, p. 589). A complete bibliography for this species is given by Tachikawa (1974).

Most of the New Zealand specimens examined have the tegula completely dark brown, whereas the holotype of *brevicornis* has the base of the tegula yellow.

This species may be confused with *T. brounii*. Females can be separated best by the relative length of the funicle segments and the coloration of the scutellum (see key to species). Males can be separated reliably on the relative length of the ramus on the first funicle segment, the structure of the paramere, and the relatively long aedeagus (see key to species). In *brevicornis* the aedeagus is at least half as long as the middle tibia, whereas in *brounii* it is not more than about two-fifths as long.

## *Tetracnemoidea brounii* (Timberlake)

Figures 332–343

Kirk, 1898: 218–219 (*Tetracnemus brounii* Howard MS.). Timberlake, 1929: 6. Gourlay, 1930a: 11 (*Tetracnemus brounii* Howard MS.). Valentine, 1967: 1123. Kerrich, 1967: 165, 166 (key), 159. Tachikawa, 1974a: 28. Trjapitzin & Gordh, 1980: 169, 170, 172.

As with *bicolor*, this species too exhibits considerable variation in both morphology and coloration. The following redescription of the female is based on two New Zealand specimens – one card-mounted (specimen 1) and the other slide-mounted (specimen 2) – which have been compared with the holotype of *Tetracnemoidea brounii* Timberlake (USNM). The section on variation in the female and the description of the male are based on all available New Zealand material.

**Female.** Length range 0.71–1.67 mm ( $n = 382$ ).

Head and dorsum of thorax dark metallic green; antenna dark brown; radicle and basal half of scape whitish; extreme apex of pedicel testaceous yellow; tegula whitish, its extreme apex translucent dark brown; prepectus whitish yellow; mesopleurum dark brown; legs whitish yellow, except foretarsus, apical segments of middle and hind tarsi, and base of hind coxa, which are brown; propodeum and metapleurum dark purplish brown; wings hyaline, with dark brown venation; gaster dark purplish brown.

**HEAD.** Ocelli forming an angle of about 120–130°. Sculpture on frontovertex shallow, raised, reticulate, on lower parts of face and genae shallow, raised, squamiform-reticulate. Relative dimensions, specimen 1: head width 62; minimum frontovertex width 32; eye length 31, width 25; malar space 19; OPL 3.5; POL 19; OOL 5.5; scape length 33, maximum width 6; other proportions of antenna as in Figure 333.

**THORAX.** Notaular lines very obscurely indicated in anterior one-third of mesoscutum. Sculpture on mesoscutum conspicuous, raised, reticulate, on scutellum similar but shallower. Forewing venation and setation as in Figures 335 and 336. Relative dimensions, specimen 2: forewing length 90, width 41, marginal fringe 2; hindwing length 61, width 19, marginal fringe 3.5.

**GASTER** very slightly shorter than thorax. Relative lengths, specimen 2: last tergite 30; ovipositor 105; gonostylus about 17 [middle tibia 80].

**Variation.** Scape, including radicle, sometimes completely brown or yellow; head and dorsum of thorax sometimes completely bluish or purplish in part, particularly on cheeks and pronotum, and occasionally coppery purple on anterior part of mesoscutum and scutellum; scutellum occasionally

distinctly brassy or very rarely purple; thorax sometimes partly or almost completely yellow or orange-yellow; tegulae sometimes completely brown; coxae often completely yellow; hind femur sometimes partly or completely brown; in larger specimens, forewing sometimes slightly infumate pale brown distad of linea calva. Frontovertex always about half as wide as head. Ocelli varying a little in size and in the angle they form, down to about 110°, hence POL:OOL ranging from about 3 to slightly less than 4. Antenna with scape varying from about 4.5× as long as broad in smaller specimens to very nearly 6.0× in larger specimens. Relative length of funicle segments increasing with increase in body size – 1st segment in large specimens sometimes very nearly 5.0× as long as broad, and in smallest specimens only about 2.0×, the other segments varying accordingly (Figures 332–334). Sculpture on head and thorax sometimes shallow and quite smooth. Relative length of ovipositor varying, about 1.2–1.8× as long as middle tibia.

Individuals may be fully winged (Figure 335) or brachypterous (Figures 337 and 338), although only two brachypterous specimens are known from the New Zealand mainland, the majority coming from the subantarctic islands. In brachypterous specimens the rudiments of the forewing reach the posterior margin of the first gastral tergite, and have the apex transversely truncate; the eye is very slightly smaller than normal, about 1.4× as long as the malar space, and hence POL:OOL is usually slightly smaller.

**Male.** Length range 0.75–1.33 mm ( $n = 166$ ).

Generally similar to female except for antenna (Figures 340–342), genitalia (Figure 343), relatively wider frontovertex, and relatively slightly higher placement of antennal torulus. Hind femur and tibia always at least partly dark brown; fore and middle legs usually yellowish. Groove connecting torulus to lower eye margin without a cluster of minute sensory pits near torulus (Figure 339). Relative dimensions, specimen 1 (card-mounted): head width 71.5; minimum frontovertex width 45; eye length 30, width 27; malar space 22; OPL 3; POL 22; OOL 6.5; scape length 31, maximum width 7. Relative lengths, specimen 2 (slide-mounted): aedeagus 43; middle tibia 100.

**Variation.** Similar to female, including morphological differences between fully winged and brachypterous forms. Relative length of branches on funicle segments variable – the first, measured from proximal end of segment, sometimes only about 1.8× as long as scape, though usually about twice as long or longer (Figures 340–342). Aedeagus generally about half as long as middle tibia.

Bristle at apex of each posterolateral projection of paramere always straight but varying in relative thickness – usually relatively slender, but occasionally in larger specimens very strongly thickened and slightly flattened.

**Type data.** Holotype female with the data “New Zealand, [NN], Nelson, E.S. Gourlay, 21 March 1927, Holotype, Type No. 42810 U.S.N.M., *Tetracnemus brounii* Timb. Types” (length 0.99 mm) (USNM).

**Material examined.** Holotype female, plus 598 non-type examples (418 females, 180 males; NZAC, BMNH, USNM, UCRC, CNCI, PPRI, ZILR, ANIC).

Three Kings Is / ND, AK, CL, BP, TO, HB, WI, WN / SD, MB, NN, BR, WD, MC, MK, OL, CO, FD, SL / SI / The Snares / Auckland Is / Chatham Is.

Recorded from around sea level to 1160 m (NN, Mt Lodestone).

Habitats noted: *Nothofagus* forest; *Nothofagus*, broadleaf, grass, and *P. totara*; mixed *Podocarpus* and *Nothofagus*; *N. menziesii*; *N. cliffortioides*; *Hebe*; native bush; second-growth bush; miro [*Prumnopitys ferruginea*]; *Podocarpus ferrugineus*; *Actinidia* sp.; *Metrosideros hypericifolia*; *Coprosma* sp.; *Plagianthus*; *Dracophyllum traversii*; *D. arboreum*; *D. longifolium*; *D. oliveri*; *Araucaria excelsa*; *Gymnoloba lanceolata*; *Leptospermum* sp.; *L. scoparium*; *Rubus ?australis*; *Senecio* sp.; *Alectryon excelsus*; *Hedycarya arborea*; *Melicytus ramiflorus*; *Ulex europaeus*; garden; apple; citrus; *Cordyline australis* litter; *Pittosporum tenuifolium*; red tussock; litter; moss; mats; swards.

Adults have been collected in all months except June.

**Biology.** A parasite of mealybugs (Homoptera: Pseudococcidae). Reared from *Nipaeococcus australianus* (Maskell) on *Araucaria excelsa* and *Actinidia* sp.; *Crocodycoccus cottieri* (Brittin) on *Nothofagus menziesii*; *Pseudococcus calceolariae* Maskell on *Gymnoloba lanceolata*; *Dysmicoccus ambiguus* Morrison on *Pittosporum tenuifolium*; and unidentified mealybugs on *Hebe* sp., *Rubus ?australis*, *Metrosideros hypericifolia*, *Nothofagus menziesii*, *N. cliffortioides*, *Dracophyllum oliveri*, *D. traversi*, *D. longifolium*, *Podocarpus ferrugineus*, *Alectryon excelsus*, *Melicytus ramiflorus*, *Senecio* sp., *Coprosma* sp., and citrus. A specimen supposedly reared from *Poliaspis media* (Homoptera: Diaspididae) on *Phormium tenax* has been examined, but this record is almost certainly erroneous. Another specimen is labelled “ex *Morrisonia podocarp* on *Hedycarya arborea*”, but the host name

appears to be incorrect since it cannot be found in the latest checklist of New Zealand insects (Wise 1977). Also recorded, probably erroneously, from *Eriococcus* sp. (Homoptera: Eriococcidae) on *Leptospermum* sp.

**Remarks.** Females of *brounii* can often be difficult to separate from *bicolor*. In fully winged specimens the relative width of the costal cell and the density of setae in the forewing costal cell seem to be reliable (see key to species). In general females of *brounii* are more robust than those of *bicolor*, although this not always so. The species is also extremely close to *zelandica* (see Remarks under *T. zelandica*, below).

### *Tetracnemoidea peregrina* (Compere)

Figures 344–347

Compere, 1939: 59. Erdoes, 1955: 218. Valentine, 1963: 12; 1967: 1123. Kerrich, 1967: 160. Tachikawa, 1974b: 41. Trjapitzin & Gordh, 1980: 169, 171 (key).

**Female.** Length range 0.73–1.05 mm ( $n = 4$ ).

Head dull shining green; occipital margin slightly purplish; lower parts of face mixed coppery purple; antenna with base of scape yellow, apex of scape, pedicel, and flagellum dark brown; pronotum dark purple; mesoscutum shining green; scutellum coppery purple; mesopleurum purple-brown; wings hyaline; legs yellow except for hind coxa and femur, which are almost completely dark brown; propodeum shining green, especially on sides; gaster dark purplish brown, at extreme base metallic green.

**HEAD.** Sculpture on frontovertex very shallow, raised, reticulate, becoming longitudinally elongate squamiform-reticulate on lower parts of face. Ocelli forming an angle of about 90°. Relative dimensions, specimen 1 (card-mounted): head width 57, length 55, depth 31; frontovertex width 30; eye length 33, width 30; malar space 19; OPL 2; POL 15; OOL 5; scape length 28, width 5; other proportions of antenna as in Figure 344.

**THORAX.** Sculpture on mesoscutum very shallow, raised, squamiform-reticulate, on scutellum similar but medially more or less regularly reticulate. Notaular lines indicated on extreme anterior margin of mesoscutum only. Forewing setation and venation as in Figure 345. Relative dimensions, specimen 2 (slide-mounted): forewing length 82, width 41, marginal fringe 2; hindwing length 59, width 19, marginal fringe 2.5.

**GASTER** about as long as thorax. Ovipositor not exerted. Relative lengths, specimen 2 (slide-mounted): last tergite 19; ovipositor 47 [middle tibia 29].

**Male.** Length range 0.80–1.03 mm ( $n = 3$ ).

Generally similar to female, but differing slightly in coloration and structure of antennae and genitalia. Scape more or less entirely dark brown; mesoscutum dull metallic green; scutellum not distinctly purplish or coppery, slightly tinged with brassy; hind tibia and tarsus testaceous brown. Antennal torulus connected to lower margin of eye by an indistinct, uninterrupted groove; a pair of lines, each of about 2 or 3 minute sensory pits, along groove adjacent to margin of torulus. Antennal segments 1–4 branched (Figure 346). Genitalia with a scarcely curved bristle at apex of each paramere (Figure 347). Relative dimensions (slide-mounted specimen): head width 112; frontovertex width 60; scape length 39; middle tibia length 100; aedeagus length 45.

**Type data.** **Holotype** female: Brazil, Rio de Janeiro, ex *Pseudococcus longispinus* (Targioni-Tozzetti), August and September 1935, H. Compere (USNM) [not seen].

**Paratypes** (16 females, 24 males): 14 females, 23 males, same data as holotype; remainder, U.S.A., California, Riverside, reared from material imported from Argentina, Buenos Aires, March 1935, H. Compere (USNM, UCRC, BMNH).

**Material examined.** Three female paratypes, 2 male paratypes, plus the parts of 7 non-type examples (4 females, 3 males) reared from *P. longispinus* on lemon in New Zealand referred to by Valentine (1963) (NZAC).

GB / —.

Habitat noted: lemon.

Adults were reared in April and May.

**Biology.** Reported as a parasite of *Pseudococcus longispinus* Targioni-Tozzetti on lemon (Valentine 1963, p. 12).

**Remarks.** Females of *T. peregrina* are very easy to recognise, since the first funicle segment of the antenna is distinctly smaller than any other. Males, on the other hand, are relatively difficult, but may be recognised in relation to other species in New Zealand by the key characters. The New Zealand material is in poor condition, and its occurrence here cannot be confirmed. However, it is likely that the original determination (by T. Tachikawa; E.W. Valentine, pers. comm.) was correct, since the females are so distinctive. In addition, a single intact slide-mounted male from this series has the structure of the antennae and genitalia similar to that of a slide-mounted paratype.

The discovery of this species and its use in controlling *Pseudococcus longispinus* in California are reviewed by Bartlett in Clausen (1978). A complete bibliography is given by Tachikawa (1974b).

This species is also known from Argentina, Brazil, St Helena, the U.S.A., South Africa, Italy, and France.

***Tetracnemoidea sydneyensis* (Timberlake)  
new combination**

Figures 348–351

Timberlake, 1929: 18. Valentine, 1963: 11; 1967: 1122.

**Female.** Length range 1.05–1.85 mm ( $n = 9$ ).

Head metallic green, with very slight brassy reflections; antennal scape off-white with a broad, longitudinal, dark brown stripe on its outer face; pedicel and flagellum black; pronotum and mesoscutum dark green with some very slight coppery reflections; axillae coppery purple; scutellum dark green, with slight coppery reflections at apex; mesopleurum dark green, strongly purple, and blue; coxae dark brown with purple reflections; femora dark brown, the hind femur particularly so; fore tibia and all tarsi testaceous; middle tibia white, slightly testaceous apically; hind tibia white in proximal half, dark brown distally; forewing with an infusate pattern (see Figure 349); hindwing lightly infusate in distal half; propodeum polished, green; gaster purple-brown, the 1st tergite with a strong purple, blue, and brassy sheen.

**HEAD.** Sculpture on frontovertex shallow, raised, fairly regular, reticulate, extending downwards almost on to genae, where it becomes longitudinally elongate squamiform-reticulate; scrobes with irregular, longitudinally elongate sculpture. Eyes with relatively short setae not longer than the diameter of a facet. Relative dimensions, specimen 1 (card-mounted): head width 91, length 84; depth 47; frontovertex width 40; eye length 53, width 44; malar space 33; OPL 7; POL 20; OOL 7; scape length 56, width 15; other proportions of antenna as in Figure 348.

**THORAX.** Sculpture on mesoscutum shallow, fairly regular, raised, reticulate, on scutellum conspicuously deeper, reticulate, becoming more longitudinally elongate on sides and shallower towards apex; notaular lines absent. Forewing setation and venation as in Figure 349. Relative dimensions, specimen 2 (slide-mounted): forewing length 124, width 55, marginal fringe 3; hindwing length 107, width 30, marginal fringe 3.5.

**GASTER** about four-fifths as long as thorax. Ovipositor hidden. Relative lengths, specimen 2: last tergite 35; ovipositor 84 [middle tibia 60].

**Male.** Length range 0.83–1.43 mm ( $n = 18$ ).

Generally similar to female, but differing slightly in coloration and structure of antennae and genitalia. Scape almost entirely yellowish, but dark brown at extreme apex; legs with distal half or so of fore femur, fore tibia and tarsus, and middle femur and tarsus yellowish orange; middle tibia pale yellow; hind femur, tibia, and tarsus dark brown except for a small yellowish area near base of tibia; wings hyaline. Antennal torulus connected to lower margin of eye by a distinct, uninterrupted groove; a pair of lines, each of about 4–7 minute sensory pits, along groove adjacent to margin of torulus. Funicle segments 1–4 with long branches, segment 5 with a short branch (Figure 350). Genitalia with a straight bristle from apex of each paramere (Figure 351). Relative dimensions, slide-mounted specimen: head width 145; frontovertex width 83; scape length 55; middle tibia length 141; aedeagus length 55.

**Type data.** **Holotype** female: Australia, N.S.W., Sydney, Wahroonga, on orange tree, 8 December 1927, H. Compere (USNM) [not seen].

**Paratypes:** 3 females, Australia, N.S.W., Sydney, Warrawee, ex mealybug in citrus orchard, 1–10 December 1927, H. Compere (USNM, UCRC) [not seen].

**Material examined.** Twenty-one non-type examples (10 females, 11 males) from New Zealand (NZAC, BMNH).

AK / —.

Habitats noted: *Daphne* sp.; garden; *Cordylineaspera*; nest of *Turdus philomelos*.

Adults have been collected in January, February, April, May, and October.

**Biology.** A parasite of *Pseudococcus longispinus* (Targioni-Tozzetti) (Homoptera: Pseudococcidae). For an account of its biology, see Compere & Flinders (1934).

**Remarks.** The female of *T. sydneyensis* can be recognised by the distinctly flattened antennal flagellum, the infuscate forewing, and the presence of relatively deep, regular, punctate-reticulate sculpture on the scutellum. The male can be distinguished by the presence of a short branch on the fifth funicle segment and the quadrate marginal vein of the forewing.

This species was first noted in New Zealand by Valentine (1963). There are no records of its introduction here, and it must therefore be assumed that it is a recent, accidental introduction.

For a brief account of the use of this species in controlling *P. longispinus* in California, see Bartlett

in Clausen (1978).

*A. sydneyensis* is also found in the U.S.A. (introduced), including Hawaii (accidentally introduced), and Australia.

### *Tetracnemoidea zelandica* new species

Figures 352–356

**Female.** Length range 0.95–1.87 mm ( $n = 22$ ).

**Holotype.** Length 1.59 mm. Head bright metallic green, slightly brassy on genae; antennae dark brown; radicle, base of scape, and apex of pedicel slightly testaceous; pronotum purplish brown; mesoscutum bright metallic green; tegula dark brown; axillae purplish brown; scutellum coppery; prepectus largely yellowish testaceous; mesopleurum purple; fore coxa yellow; middle and hind coxae dark brown; fore and middle femora and all tibiae yellow, but on middle tibia slightly mixed with pale brown; fore tarsus testaceous brown; middle tarsus yellow; hind femur dark brown with a slight brassy sheen, but yellow at extreme base; hind tibia white in proximal half, dark brown in distal half; hind tarsus yellow, but testaceous brown towards apex; forewing hyaline, but with a distinct fuscous blotch across middle, from apex of stigmal vein (see Figure 353); hindwing hyaline; propodeum bright metallic green; gaster purplish brown, with a very strong bluish and purplish sheen towards base, its basal tergite medially metallic green.

**HEAD.** Ocelli forming an angle of about 110°. Sculpture on frontovertex shallow, raised, reticulate, on lower parts of face and genae shallow, raised, squamiform-reticulate. Relative dimensions: head width 73; minimum frontovertex width 35; eye length 41, width 33; malar space 26; OPL 4; POL 19.5; OOL 6; scape length 51, maximum width 8; other proportions of antenna as in Figure 352.

**THORAX.** Notaular lines absent (in slide-mounted paratype obscurely visible anteriorly). Sculpture on mesoscutum conspicuous, raised, reticulate, on scutellum similar but shallower. Forewing venation and setation as in Figure 353. Relative dimensions: forewing length 198, width 84, marginal fringe 3; hindwing length 146, width 46, marginal fringe 4.

**GASTER** distended, very slightly longer than thorax (in paratype, gaster not distended and about as long as thorax).

**Paratype.** Relative lengths: last tergite 51; ovipositor 161; gonostylus about 20; middle tibia 115.

**Variation.** Colour varying a little – scutellum sometimes deep purple, and hind tibia occasionally pale yellow in distal half. Frontovertex always about

half as wide as head. Ocelli varying a little in size and in the angle they form, such that POL:OOL varies from slightly less than 3 to slightly more. Scape sometimes slightly broader than in holotype. Relative length of funicle segments increasing with increase in body size: 1st segment in large specimens sometimes about  $3.0\times$  as long as broad, in smallest specimens slightly less than  $2.0\times$ , other segments varying accordingly. Ovipositor about  $1.4\text{--}1.7\times$  as long as middle tibia.

**Male.** Length range 0.95–1.11 mm ( $n = 5$ ).

Generally similar to female except for largely yellowish scape, hyaline forewing, slightly wider frontovertex, slightly higher placement of antennal torulus, and structure of antennae (Figure 355) and genitalia (Figure 356). Antennal torulus connected to lower margin of eye by a conspicuous, narrow line (best visible in slide-mounted material), with a cluster of minute sensory pits adjoining line immediately outside torulus (Figure 354). Relative dimensions: specimen 1 (card-mounted) – eye length 30, width 29; malar space 24; OPL 2; POL 20; OOL 9; scape length 33, maximum width 9; specimen 2 (slide-mounted) – head width 98; minimum frontovertex width 58; scape length 42; aedeagus length 38; middle tibia length 106.

**Variation.** No significant variation in the material available.

**Type data.** **Holotype** female: New Zealand, BR, Lake Rotoiti, 600 m, Malaise trap at edge of *Nothofagus* forest, January 1981, F. Dodge (NZAC).

**Paratypes** (27 females, 6 males). **BP** – 1 female, Rotorua, Forest Research Institute, Feb 1981, JB.

**BR** – 8 females, same data as holotype; 4 females, L. Rotoiti, Malaise trap by forest stream, 4–9 Feb 1978, S&JP; 1 female, L. Rotoiti, 600 m, Malaise trap at edge of *Nothofagus* forest, Dec 1980, FD. **MC** – 4 females, 6 males, Hampden, ex mealybug on gorse, 10 Aug (1 ♀, 1 ♂), 27 Aug (1 ♂), 30 Aug (1 ♀), 5 Sep (1 ♀, 1 ♂), 7 Sep (1 ♂), 9 Sep (1 ♂), 18 Sep (1 ♀), and 1 Oct 1962 (1 ♂), Dept. Agric.; 1 female, Christchurch, ex mealybug on gorse, 22 Feb 1966, no. 92, JAdeB; 1 female, Banks Peninsula, Price's Valley, Malaise trap at edge of native bush, Jan 1981, RPM; 1 female, Woodend, reared *Phenacoccus mali* on Pinelands blackcurrant, 20 Aug 1981, WPT. **OL** – 1 female, Bob's Cove, L. Wakatipu, *Nothofagus* or mixed broadleaf, swept, 23 Jan 1981, N&V; 1 female, Crown Peak, 1200 m, tussock grasses, shrubs, and alpine herbs, swept, 24 Jan 1981, N&V. **SL** – 2 females, Invercargill, sweeping flowering *Senecio jacobaea*, 15 Mar 1977, AKW; 1 female, [mislabelled OL], Owaka, Malaise trap in *Nothofagus* bush, 13–20 Jan 1978, S&JP.

**Material examined.** Type series only (NZAC, BMNH, CNCI).

BP / BR, MC, OL, SL.

Recorded from around sea level to 1200 m (OL, Crown Peak).

Habitats noted: *Nothofagus* forest; mixed broadleaf; native bush; tussock, grasses, shrubs, and alpine herbs; *Senecio jacobaea*; gorse; blackcurrant.

Adults have been collected in January–March, August, and September.

**Biology.** Reared from *Planococcus mali* Ezzat & McConnell (Homoptera: Pseudococcidae) on blackcurrant and from an unidentified mealybug on gorse.

**Remarks.** *T. zelandica* is very close to *T. brounii*, but can be separated using the key characters, notably the infusate forewing of the female, and the highly metallic propodeum and the cluster of minute sensory pits near the antennal toruli in the male. The females of these two species can additionally be separated by the highly metallic propodeum of *zelandica* (in *brounii* generally dull brown, though occasionally slightly metallic green) and the coloration of the hind tibia.

### Genus *Tongyus* Noyes & Hayat

Noyes & Hayat, 1984: 158 (key), 343–344. Type species *Tongyus nesus* Noyes & Hayat, by original designation; Cook Is.

In order to accommodate the New Zealand species here assigned to this genus, the original generic description must be augmented as follows.

**Female.** **HEAD** in facial view slightly broader than long, in profile slightly less than twice as long as broad, anteriorly gradually and more or less evenly curved except along antennal scrobes, where it is almost straight. Eye about  $1.3\text{--}1.5\times$  as long as broad, covered with fairly dense hairs  $1.0\text{--}2.0\times$  as long as the diameter of a facet; posterior margin a little concave, almost straight; eye reaching occipital margin, which is sharp. Malar space about half to one-third as long as eye; sulcus present. Frontovertex about one-third as wide as head. Ocelli forming a nearly equilateral triangle, the posterior ones a little nearer the eye margin than the occipital margin and separated from the latter by about their own major diameter. Antennal scrobes moderately deep, meeting dorsally or separated by the interantennal prominence confluent with the frontovertex, reaching about halfway or less from antennal toruli to anterior ocellus. Antennal toru-

lus separated from mouth margin by not more than about two-thirds its own length, and from other torulus by about half its own length or more; dorsal margin about level with lowest margin of eye or a little above; clypeal margin shallowly excised. Antennal scape broadened, flattened, clearly longer than minimum width of frontovertex; pedicel conical, shorter than 1st funicle segment; all funicle segments longer than broad, the 6th occasionally slightly transverse; flagellar segments slightly flattened; longitudinal sensilla present on all flagellar segments, the longest setae clearly shorter than the diameter of the segment; club 3-segmented, apically rounded. Frontovertex with very fine, raised, shallow to moderately deep, squamiform-reticulate sculpture, and bearing scattered, inconspicuous, translucent setae. Mandible narrow, with 2 acute apical teeth. Maxillary palpus 4-segmented; labial palpus 3-segmented.

THORAX in lateral view moderately deep, with mesoscutum and scutellum very slightly convex. Metapleurum and propodeum together narrowly in contact with hind coxa. Pronotum in dorsal view with hind margin slightly concave. Visible part of mesoscutum about 2.0–3.0× as broad as long; notaular lines present in anterior one-third or absent; posterior margin very clearly convex, slightly produced backwards above axillae, which meet medially. Scutellum about as long as mesoscutum, about as broad as long; apex more or less pointed; sides straight. Propodeum medially short, not more than about one-fifth as long as scutellum. Mesoscutum with sculpture similar to that on frontovertex, but sometimes shallower; scutellum with sculpture as on frontovertex; propodeum medially with sculpture very shallow, but outside spiracles much deeper and less regular; mesopleurum with shallow, very fine, raised, regular, reticulate sculpture. Setae on dorsum fairly dense, translucent or brown, quite conspicuous, particularly on scutellum. Forewing at least partially infusate, about 2.5× as long as broad, but sometimes a little shortened, then hardly reaching apex of gaster; lineal calva interrupted and closed or completely closed in posterior one-third; costal cell about 10–14× as long as broad, with a single line of setae dorsally along its entire length or only in its distal one-third; marginal vein about 3.0–5.0× as long as broad, clearly shorter than stigmal vein, which is as long as postmarginal vein or a little longer. Hindwing about two-thirds as long as forewing, and about 3.0–4.0× as long as broad; marginal fringe about one-eighth as long as maximum width of wing. Middle tibia with spur about as long as basal tarsal segment.

GASTER about as long as thorax; cercal plates in proximal half. Hypopygium reaching apex of gaster. Paratergites present. Last tergite shorter than

middle tibia. Gonostyli fused to 2nd valvifers, about one-third to one-eighth as long as ovipositor.

**Male.** Similar to female, but body generally darker, and differing in structure of antennae and genitalia. Head proportionately a little broader in frontal view. Malar space about half as long as eye. Frontovertex nearly half as wide as head. Ocelli forming almost a right angle, the posterior ones almost equidistant from occipital margin and eye, though a little closer to the former. Antennal toruli separated from mouth margin by much more than their own length, the lowest margins a little below the lowest eye margin. Antennal scape shorter than minimum width of frontovertex, stout, slightly broadened and flattened, a little less than 3.0× as long as broad. Pedicel conical, subquadrate, not more than half as long as any funicle segment, all of which are cylindrical and sometimes beset with long setae, the longest often at least about 4.0× the diameter of any segment; club entire, gradually tapering to a point; longitudinal sensilla present on all flagellar segments; scale-like sensilla on club only. Forewing a little broader than in female; lineal calva interrupted, closed. Genitalia: aedeagus about one-quarter to half as long as middle tibia; digiti about one-fifth as long as aedeagus, each with a pair of apical hooks or long apical spines.

**Biology.** Parasites of mealybugs (Homoptera: Pseudococcidae).

**Distribution.** Pacific islands and New Zealand.

**Remarks.** The New Zealand species placed in *Tongyus* differ from *T. nesus* in several characters: sutures of club parallel; mesoscutum with notaular lines present in anterior one-third; lineal calva of forewing interrupted, narrowly closed posteriorly; forewing basal cell naked proximally; male antenna clothed in setae, which are shorter than diameter of segments; and genitalia with hooks on apices of digiti. In *T. nesus* the equivalent character states are: sutures of club converging; lineal calva of forewing broadly closed posteriorly; notaular lines completely absent; basal cell of forewing evenly and densely pilose; male antenna clothed in setae at least 3.0× as long as diameter of segments; and genitalia with a pair of long apical spines on each digitus.

At present the affinities of *Tongyus* and related genera – i.e., those of the subtribe Anagyryna, in the sense of Trjapitzin (1973a) – are poorly understood, and further, more detailed study may show the above differences to be of generic significance, or that the species here included can be better placed elsewhere.

**KEY TO SPECIES OF *TONGYUS*  
KNOWN FROM NEW ZEALAND**

- 01 Club 3-segmented (Fig. 358, 359, 364, 366)  
... FEMALES ... 02  
—Club entire (Fig. 362, 368) ... MALES ... 04

**FEMALES**

- 02(01) Forewing distad of infusate area  
with all setae unicolorous, i.e., lacking a  
distinct fascia of paler setae (Fig. 360)  
... *costalis*  
—Forewing distad of infusate area with a  
fascia of conspicuously paler setae, con-  
trasting with darker setae towards wing  
apex (Fig. 365, 367) ... 03
- 03(02) Visible part of mesoscutum about  
twice as broad as long; propodeum medi-  
ally at least about one-sixth as long as  
scutellum ... *regis*  
—Visible part of mesoscutum about 3.0×  
as broad as long; propodeum medially not  
more than one-seventh as long as  
scutellum ... *cyrenis*

**MALES**

- 04(01) First funicle segment not more than  
2.2× as long as pedicel; scale-like sensilla  
on 6th funicle segment and club relatively  
slender, each no wider at midlength than  
at base (Fig. 362) ... *costalis*  
—First funicle segment at least about 2.5×  
as long as pedicel; scale-like sensilla on  
6th funicle segment and club relatively  
broad, each about twice as wide at mid-  
length as at base (Fig. 368) ... *regis*

***Tongyus costalis* new species**

Figures 357–363

**Female.** Length range 1.30–2.22 mm ( $n = 99$ ).

**Holotype.** Length 1.59 mm. Head and antennae blackish, but scape very slightly brownish in ventral half; thorax blackish; prepectus largely amber brown; tegula basally brownish; fore coxa pale brown, on outer face dark brown; middle and hind coxae dark brown; legs generally amber brown, but mixed with dark brown, particularly on femora, tibiae, and fore tarsus; forewing hyaline, but with a fuscous mark across disc from parastigma and another across disc from marginal and stigmal veins, these joined in posterior half of wing and thus enclosing a hyaline area below apex of submarginal vein (as in Figure 360); setae distad of

infusate area unicolorous; propodeal spiracle surrounded by very dense, white setae extending downwards to base of hind coxa; gaster blackish, with very slight purplish reflections.

**HEAD.** Sculpture on frontovertex, interantennal prominence, and genae very shallow, fine, raised, squamiform-reticulate, between lower eye margin and mouth margin smooth. Setae on frontovertex about as long as diameter of anterior ocellus, those on lower parts of face about one-quarter longer. Antennal torulus separated from mouth margin and from other torulus by about its own length; dorsal margin clearly above lower margin of eye. First funicle segment hardly wider than pedicel. Setae on eyes fairly conspicuous, distinctly longer than the diameter of a facet. Mandible as in Figure 357. Relative dimensions: head width 95, length 85, depth 45; minimum width of frontovertex 46; OPL 9; POL 19; OOL 9; eye length 55, width 38; malar space 27; scape length 58, maximum width 16; other proportions of antenna as in Figure 358.

**THORAX.** Sculpture on mesoscutum and scutellum similar to that on frontovertex. Visible part of mesoscutum about twice as broad as long; notaular lines not visible. Setae on dorsal surface of forewing costal cell in a line very nearly reaching base of cell, those on ventral surface of hindwing costal cell more or less confluent with submarginal vein. Relative dimension: forewing length 266, width 102; hindwing length 185, width 49, marginal fringe 7. Forewing venation and setation as in Figure 360.

**GASTER** about one-quarter shorter than thorax.

**Paratype.** Relative lengths: middle tibia 60; last tergite 35; ovipositor 27. Gonostyli very short, hardly wider than 2nd valvifers (Figure 361).

**Variation.** Head, including scape in part, and thorax often largely reddish orange; forewing sometimes with infuscation restricted to small areas below parastigma and apex of venation. Frontovertex slightly narrower or wider than in holotype, with resulting variation in relative size of eye, OPL:OOL, and POL:OOL. In smaller specimens funicle segments usually relatively shorter, the 6th slightly transverse, but in larger specimens 6th segment often distinctly longer than broad (Figure 359). Notaular lines sometimes very distinct, particularly in paler specimens. Forewing sometimes reduced, occasionally hardly reaching apex of gaster, about 1.5–2.0× as long as middle tibia, with corresponding variation in relative proportions of venation; postmarginal vein from slightly shorter than stigmal vein to about as long. Ovipositor about one-third to half as long as middle tibia.

**Male.** Length range 0.86–1.94 mm ( $n = 108$ ).

Apart from antennae, genitalia, and less infusate forewing, generally similar to female. First

funicle segment not or hardly more than twice as long as pedicel; scale-like setae on 6th funicle segment and club slender, not or hardly wider at mid-length than at base (Figure 362). Genitalia as in Figure 363. Relative dimensions, specimen 1 (card-mounted): head width 85; minimum frontovertex width 45; OPL 5.5; POL 16; OOL 7; eye length 45, maximum width 32; malar space 25; scape length 47, maximum width 13; other proportions of antenna as in Figure 362. Relative lengths, specimen 2 (slide-mounted): middle tibia 141; aedeagus 49.

**Variation.** Very slight in the material available. Funicle segments varying in relative length, the 1st about 2.0–3.0× as long as broad, the others varying accordingly. Forewing varying in relative size as in female, completely hyaline, or marked as in female but less strongly so. Aedeagus about one-quarter to one-third as long as middle tibia.

**Type data.** **Holotype** female: New Zealand, BR, Mt Robert, 600–1400 m, *Nothofagus* forest and grass, 10 December 1980, J.S. Noyes, E.W. Valentine, & A.K. Walker (NZAC).

**Paratypes** (106 females, 111 males). **AK** – 1 male, Lynfield, Malaise trap, Nov 1980, GK; 1 male, Birkenhead, Malaise trap in second-growth bush, Dec 1980, JFL. **CL** – 3 females, 1 male, 9 km E of Tapu, 15 Nov 1980, JSN; 1 male, 1 km E of Tapu, 31 Jan 1981, JSN; 1 female, Kauaeranga Valley, 1 Feb 1981, JSN. **TO** – 1 female, 2 males, Tongariro National Park, 5 km N of Okahune, 700 m, mixed *Podocarpus*, 24 Feb 1981, JSN. **WN** – 1 female, Rimutaka Forest Park (S), mixed *Podocarpus* and *Nothofagus*, 250 m, 26 Feb 1981, JSN; 1 female, Eastbourne, mixed *Podocarpus* and *Nothofagus*, 50 m, 28 Feb 1981, JSN.

**NN** – 1 female, Mt Arthur, 4000' [1200 m], 22 Jan 1948, RRF; 1 male, 2 miles [3.2 km] beyond Cobb Lake, ex soil and debris 67/89, 17 Feb 1967, FA; 1 male, Takaka Hill, swept grasses, 5 Jan 1968, EWV; 1 male, Whangamoia Saddle, *Nothofagus* forest, 27 Jan – 3 Feb 1979, AKW & LAM; 2 females, Cobb Ridge (S), native tussock grassland, 1100 m, 3 Dec 1980, NV&W; 10 females, 29 males, Cobb Reservoir, mixed native grassland, 850 m, 6 Dec 1980, NV&W; 1 female, 2 males, Canaan Saddle, *Nothofagus* and *Podocarpus*, 7 Dec 1980, NV&W. **MB** – 1 female, Pelorus, ex mealybug on *Leptospermum ericoides*, 21 Mar 1966, DBR; 1 male, Wairau Valley, on wet moss, 2900' [870 m], 7 Sep 1966, LPM; 1 female, Clarence Valley, swept grasses, 12 Feb 1969, EWV; 4 females, 2 males, Wairau, Red Hills, swept red tussock, 3600' [1080 m], 22 Mar (1♀), swept *Leptospermum*, 3470' [1040 m], 23 Mar (1♀, 1♂), swept jointed rushes, 3470' [1040 m], 23 Mar (1♀), and swept red tussock mix,

3500' [1050 m], 24 Mar 1972 (1♀, 1♂), EWV. **BR** – 7 females, 5 males, Mt Robert, 15 Mar 1968, EWV; 3 females, 1 male, L. Rotoiti, Malaise trap by forest stream, 4–9 Feb 1978, S&JP; 3 females, 13 males, St Arnaud, *Nothofagus* forest, 600 m, 9 Dec 1980, NV&W; 26 females, 28 males, Mt Robert, 600–1400 m, *Nothofagus* forest and grass, 10 Dec 1980, NV&W; 4 females, 2 males, L. Rotoroa, 11 Dec 1980, NV&W; 1 female, L. Rotoroa, mixed *Podocarpus* and *Nothofagus*, 5 Mar 1981, JSN. **WD** – 1 male, Paparua Range, Mt Dewar, 1067 m, plants 69/235, 2 Dec 1979, JIT; 2 females, L. Kaniere, mixed *Podocarpus*, 18 Mar 1981, JSN. **MK** – 1 male, Hooker Valley, Hermitage, 740 m, Malaise trap, 30–31 Mar 1977, JSD; 1 female, Hooker Valley, Hermitage area, 762 m, Malaise trap, 31 Mar – 2 Apr 1977, JSD; 1 male, Hooker Valley, Stocking Stream, 820 m, Malaise trap, 3 Apr 1977, JSD; 1 male, Hooker Valley, Hermitage area, Malaise trap, 3–4 Apr 1977, JSD; 1 female, L. Tekapo, Malaise trap in tussock near pine plantation, Nov 1980, PQ. **OL** – 1 female, Queenstown, Coronet Peak, 1615 m, 16 Jan 1971, JSD; 1 female, Lindis Pass summit, 970 m, sweeping, 2 Mar 1976, LLD; 12 females, 3 males, Makarora, Malaise trap, *Nothofagus* forest edge, 21–24 Jan 1978, S&JP; 1 female, 2 males, Kinloch State Forest, Dart River, *Nothofagus* forest, broadleaf, grass, and *P. totara*, swept, Jan 1981, N&V; 1 female, 2 males, Coronet Peak, 1640 m, tussock, alpine shrubs, *Hebe*, and mat plants, swept, Jan 1981, N&V; 1 female, Crown Peak, 1200 m, tussock grasses, shrubs, and alpine herbs, swept, 24 Jan 1981, N&V; 1 male, Mt Aspiring National Park, Makarora, *Nothofagus*, *Podocarpus*, and broadleaf, swept, 25 Jan 1981, N&V. **CO** – 3 males, Kawarau Gorge, Malaise trap, 20 Mar 1975, JCW; 2 males, Kawarau Gorge, Roaring Meg, Malaise trap, 7–12 Mar 1979, JCW; 2 females, 10 males, Waipori, 520 m, pit trap in tussock, Nov 1978 (4♂), Nov–Dec 1978 (1♂), Dec 1978 – Mar 1979 (1♀, 2♂), Feb – Mar 1979 (3♂), and Mar – Apr 1979 (1♀), BIPB; 1 female, 1 male, Rocklands Station, 800 m, pit trap in tussock, Feb (♂) and Nov 1979, BIPB; 1 female, Watt's Rock, tussock, *Juncus*, and *Sphagnum*, swept, Jan 1981, N&V; 2 males, Roaring Meg, tussock, grasses, *Discaria*, *Rosa*, *Juncus*, and *Pimelia*, swept, 13 Jan 1981, N&V. **FD** – 1 male, Milford Sound road, ex moss on rocks, 1 Nov 1966, JIT; 1 male, L. Manapouri, ex mealybug on *Dracophyllum oliveri*, 13 Feb 1968, JAdeB; 5 females, Milford Sound, *Nothofagus* and mixed *Podocarpus*, 10 Mar 1981, JSN. **SL** – 1 male, Hokonui Hills, Hedgehope summit, 610 m, 10 Feb 1976, LLD.

**SI** – 1 female, Thule, 24 Mar 1968, EWV; 1 female, Butterfield Bay, 29 Feb 1968, EWV; 1 male, Leask's Bay, 25 Feb 1962, EWV.

**Material examined.** Type series only (NZAC, BMNH, USNM, CNCI, UCRC, ZILR, PPRI, ANIC).

AK, CL, TO, WN / NN, MB, BR, WD, MK, OL, CO, FD, SL / SI.

Recorded from about sea level to 1640 m (OL, Coronet Peak).

Habitats noted: *Nothofagus*, *Podocarpus*, and broadleaf; *Nothofagus* forest and grass; mixed *Podocarpus*; second-growth bush; *Leptospermum ericoides*; *Leptospermum*; *Dracophyllum oliveri*; tussock near pine plantation; tussock, alpine shrubs, *Hebe*, and mat plants; tussock, *Juncus*, and *Sphagnum*; tussock, grasses, *Discaria*, *Rosa*, and *Pimelia*; red tussock; jointed rushes; native tussock; native grassland; grasses; moss; soil and debris.

Adults have been collected in January–March, September, November, and December.

**Biology.** Reared from mealybugs (Homoptera: Pseudococcidae) on *Leptospermum ericoides* and *Dracophyllum oliveri*.

**Remarks.** *Tongyus costalis* is closest to *T. regis*. In addition to the character given in the key to species, females of these species can be separated by the position of the antennal torulus relative to the ventral eye margin, the width of the first funicle segment relative to the pedicel, the relative length of setae on the eye, the density of dorsal setae on the forewing costal cell, the positioning of ventral setae on the hindwing costal cell, and the width of the gonostylus relative to the second valvifer (see under relevant species descriptions). Males can be separated reliably only by the key characters.

### *Tongyus cyrenis* new species

Figures 364 and 365

**Female.** Length 1.75 mm.

Head largely orange, but dark brown between ocelli and between posterior ocelli and occipital margin, and brownish on temples, between antennal torulus and malar sulcus, and on interantennal prominence; antennae dark brown, with a hint of reddish on outer face of scape; pronotum orange, mixed with dark brown medially, its posterior margin translucent; mesoscutum dark brown with very slight brassy reflections, laterally slightly orange; axillae dark brown; scutellum orange, with a median dark brown stripe; tegula orange proximally, dark brown distally; prepectus orange, its posterior margin translucent; mesopleurum dark orange-brown; coxae, femora except middle femur, and tibiae dark brown; middle femur in proximal half dark brown, in distal half white; fore and hind

tarsi testaceous brown, the pretarsi dark brown; middle tibial spur and middle tarsus white, the 2 distalmost segments dark brown; forewing hyaline with a fuscous patch extending across disc from apical half of venation to posterior wing margin; setae immediately distad of fuscous patch very pale, contrasting with darker setae nearer apex of wing (see Figure 365); hindwing hyaline; propodeum dark brown, its spiracle surrounded by silvery setae extending downwards towards hind coxa; gaster and visible part of gonostylus dark purplish brown.

**HEAD.** Sculpture on frontovertex, interantennal prominence, and genae very shallow, fine, raised, reticulate, between lower eye margin and mouth margin slightly smoother. Setae on frontovertex very sparse, slightly shorter than diameter of anterior ocellus, those on lower parts of face about one-quarter longer. Antennal torulus separated from mouth margin and from other torulus by about its own length; dorsal margin of torulus clearly above lower margin of eye. First funicle segment about  $1.3\times$  as wide as pedicel. Setae on eyes short, fairly inconspicuous, not longer than the diameter of a facet. Relative dimensions: head width 74, length 62, depth 41; minimum width of frontovertex 36; OPL 9; POL 13.5; OOL 7.5; eye length 42; eye width 27; malar space 18; scape length 39, maximum width 14; other proportions of antenna as in Figure 364.

**THORAX.** Sculpture on mesoscutum very shallow, raised, squamiform-reticulate, on scutellum similar to that on frontovertex, but posteriorly more elongate, and apical one-fifth or so and sides quite smooth. Visible part of mesoscutum about  $3.0\times$  as broad as long; notaular lines not visible. Setae on dorsal surface of forewing costal cell in a line extending along distalmost two-thirds only, those on ventral surface of hindwing costal cell more or less confluent with submarginal vein. Propodeum medially not more than about one-seventh as long as scutellum. Relative dimensions: forewing length 187, width 83; hindwing length 128, width 36, marginal fringe 6. Forewing venation and setation as in Figure 365.

**GASTER** about one-quarter longer than thorax. Gonostyli relatively long and slender, at least about  $3.0\times$  as long as broad.

**Male.** Unknown.

**Type data.** **Holotype** female: New Zealand, AK, Huia, Malaise trap in bush, November 1980, B.M. May (NZAC).

**Material examined.** Holotype only.

**Biology.** Unknown.

**Remarks.** *T. cyrenis* can be distinguished from other species included in *Tongyus* by the relatively short mesoscutum (see key to species) and relatively long, slender gonostyli. It bears a superficial resemblance to some species of *Parectromoidella* Girault, but differs from all known species of this genus in the density and distribution of setae at the base of the forewing. All species of *Parectromoidella* have the linea calva completely closed from about halfway across the wing and the basal cell generally densely and evenly pilose.

### *Tongyus regis* new species

Figures 366–368

**Female.** Length range 1.11–2.54 mm ( $n = 30$ ).

**Holotype.** Length 2.14 mm. Head orange; scape orange, bordered with brownish; pedicel orangey brown; flagellum dark brown, the 2 proximal segments slightly orangey brown; thorax orange, but mesopleurum a little darker, and neck of pronotum slightly brownish; legs orange, but middle tarsus basally whitish; forewing hyaline, but with a fuscous mark across disc from parastigma and another across disc from marginal and stigmal veins, the two joined in posterior half of wing and thus enclosing a hyaline area below apex of submarginal vein (as in Figure 367); setae immediately distad of infuscate area forming a curved, pale fascia contrasting with darker setae nearer wing apex; propodeum dark brown; spiracle surrounded by very dense, white setae extending downwards to base of hind coxa; gaster dark brown, but distal two-thirds of dorsum orange.

**HEAD.** Sculpture on frontovertex, interantennal prominence, and genae very shallow, fine, raised, reticulate or squamiform-reticulate, between lower eye margin and mouth margin smooth. Setae on frontovertex about as long as diameter of anterior ocellus, those on lower parts of face about one-quarter longer. Antennal torulus separated from mouth margin and from other torulus by less than its own length; dorsal margin of torulus only slightly above lower margin of eye. First funicle segment at least  $1.5\times$  as wide as pedicel. Setae on eyes not conspicuous, not longer than the diameter of a facet. Relative dimensions: head width 99, length 91, depth 52; minimum width of frontovertex 39; OPL 15; POL 14.5; OOL 6.5; eye length 69, width 44; malar space 24; scape length 64, maximum width 23; other proportions of antenna as in Figure 366.

**THORAX.** Sculpture on mesoscutum and scutellum similar to that on frontovertex, but a little shallower; notaular lines visible in anterior one-third or so. Setae on dorsal surface of forewing costal cell in a line not quite reaching proximal half

of cell; proximal setae on ventral surface of hindwing costal cell towards middle of cell, well separated from submarginal vein. Relative dimensions: forewing length 305, width 110; hindwing length 205, width 57, marginal fringe 10. Forewing venation and setation as in Figure 367.

**GASTER** slightly shorter than thorax.

**Paratype.** Relative lengths: middle tibia 75; last tergite 9; ovipositor 38. Gonostyli short, about twice as wide as 2nd valvifers.

**Variation.** Body often largely testaceous; antenna occasionally with all funicle segments partly or wholly orange; mesoscutum anteriorly and scutellum medially sometimes dark brown. Frontovertex about  $0.3\text{--}0.4\times$  as wide as head, with resulting variation in relative size of eye, and in OPL:OOL and POL:OOL. In smaller specimens funicle segments usually relatively shorter, the 6th slightly transverse, and in larger specimens the 6th segment often distinctly longer than broad. Sculpture on frontovertex and dorsum of thorax of smaller specimens sometimes relatively quite coarse. Ovipositor about  $0.4\text{--}0.5\times$  as long as middle tibia. Gonostyli in one specimen (not slide-mounted) appearing relatively long and slender.

**Male.** Length range 1.21–1.67 mm ( $n = 25$ ).

Generally similar to female apart from antennae, genitalia, usually darker coloration, and less infuscate forewing. Scale-like setae on 6th funicle segment broad, about twice as wide at midlength as at base (Figure 368). First funicle segment distinctly more than twice as long as pedicel. Line of setae on dorsal surface of forewing costal cell usually extending entire length of cell. Genitalia similar to Figure 363. Relative dimensions, specimen 1 (card-mounted): head width 83; minimum frontovertex width 38; OPL 9; POL 13.5; OOL 7; eye length 49.5, maximum width 33; malar space 21; scape length 45, maximum width 17; other proportions of antenna as in Figure 368. Relative lengths, specimen 2 (slide-mounted): middle tibia 162; aedeagus 45.

**Variation.** Very slight in the material available. Colour varying from almost completely reddish orange to completely dark brown. Antennal segments varying in relative length, the first about  $2.5\text{--}3.0\times$  as long as broad, and the others accordingly. Forewing almost completely hyaline or marked as in female, but less strongly so.

**Type data.** **Holotype** female: New Zealand, AK, Waitakere Range, November 1980, E867, J.S. Noyes (NZAC).

**Paratypes** (34 females, 30 males). ND – 1 female, Omahuta State Forest, 6 Oct 1980, JSN; 1 male, Poor Knights Is, Tawhiti Rahi, East Ridge, sweep-

ing, Dec 1980, MFT. AK - 1 male, Waitakere, ex pseudococcids on *Olearia furfuracea*, 4 Sep 1969, RAC; 1 female, Titirangi, Malaise trap, Mar 1980, PAM; 14 females, 10 males, Waitakere Range, Aug 1980 (1♀), Sep 1980 (6♀), Nov 1980 (3♀, 5♂), and Jan 1981 (4♀, 5♂), JSN; 1 female, Dec 1980, GK; 2 females, Huia, Dec 1980 and Apr 1981, BMM. CL - 2 males, 19 km E of Tapu, 31 Jan 1981, JSN; 2 males, Kauaeranga Valley, 14 Nov 1980, JSN; 1 female, Kauaeranga Valley, 1 Feb 1981, JSN. TO - 1 male, Pureora Forest, mealybug (mature ♀) on *Podocarpus totara*, 17 Jun 1965, DBR; 3 males, Tongariro National Park, Chateau Tongariro, 950 m, *Nothofagus* forest, 23 Feb 1981, JSN; 2 males, Tongariro N.P., 5 km N of Ohakune, 700 m, mixed *Podocarpus*, 24 Feb 1981, JSN. WN - 1 female, Petone, Francis Bell Reserve, 50 m, mixed *Podocarpus* and *Nothofagus*, 28 Feb 1981, JSN.

NN - 1 female, 2 males, Maitai Valley, ex mealybug on *Leptospermum ericoides*, 21 Jan 1968, JAdeB; 1 female, Dun Mtn, Third House, base of *Festuca*, 29 Jan 1979, AKW; 1 male, Whangamoa Saddle, *Nothofagus* and *Podocarpus* forest, 13 Dec 1980, NV&W. MB - 1 female, Wairau, Red Hills, 3600' [1080 m], swept red tussock, 23 Mar 1972, EWV. BR - 1 female, L. Rotoroa, 11 Dec 1980, NV&W; 2 males, L. Rotoroa, mixed *Podocarpus* and *Nothofagus*, 5 Mar 1981, JSN. WD - 1 female, L. Kanieri, mixed *Podocarpus*, 18 Mar 1981, JSN. OL - 1 female, Makarora, *Nothofagus* forest edge, Malaise trap, 21-24 Jan, S&JP; 2 females, L. Hawea, Kirk's [Kidd's] Bush, *Nothofagus* forest, broadleaf, and *Podocarpus totara*, Jan 1981, N&V. DN - 1 female, Mt Watkins, 580 m, *Coprosma* sp., 6 Sep 1968, JSD.

SI - 1 female, Miller's Bay, ex mealybug on *Senecio rotundifolius*, 24 Feb 1962, EWV; 1 male, Rakeahua River, swept from low growth, 22 Feb 1968, EWV; 1 male, Freshwater, 25 Feb 1968, EWV; 1 female, Mason Bay, 26 Feb 1968, EWV.

**Material examined.** Type series only (NZAC, BMNH, USNM, CNCI, UCRC, ZILR, PPRI, ANIC).

ND, AK, CL, TO, WN / NN, MB, BR, WD, OL, DN / SI.

Recorded from around sea level to 1100 m (MB, Red Hills).

Habitats noted: *Nothofagus* forest; mixed *Podocarpus*; broadleaf and *P. totara*; *Podocarpus totara*; *Olearia furfuracea*; *Leptospermum ericoides*; *Senecio rotundifolius*; *Coprosma*; low growth; base of *Festuca*; red tussock.

Adults have been collected or reared in all months except May and July.

**Biology.** Reared from mealybugs (Homoptera: Pseudococcidae) on *Olearia furfuracea*, *Podocarpus totara*, *Leptospermum ericoides*, and *Senecio rotundifolium*.

**Remarks.** *T. regis* is closest to *T. cyrenis*, but can be separated by the relative length of the mesoscutum and propodeum. It can be separated from *T. costalis* by several characters other than those given in the key to species (see Remarks under *T. costalis*).

### Genus *Zaomma* Ashmead

Ashmead, 1900: 401. Gordh & Trjapitzin, 1979: 34-40. Prinsloo, 1979: 67-75. Noyes & Hayat, 1984: 150 (key), 349. Type species *Encyrtus argentipes*, by original designation; St Vincent, W.I.

**Female.** Body dark brown or black, faintly metallic; antennae completely dark brown, or with 1 or 2 pale segments; posterior one-third of mesoscutum often with conspicuous silvery setae; wings hyaline; legs with conspicuously contrasting areas of dark brown and yellowish.

**HEAD.** Occipital margin obtuse, sharp. Antennal torulus with dorsal margin well below ventral margin of eye. Malar sulcus present but indistinct. Frontoververtex half to one-third as wide as head, with shallow sculpture. Scape subcylindrical, longer than minimum width of frontoververtex; funicle 6-segmented, the segments generally transverse; club 3-segmented, its apex rounded. Eye very nearly reaching occipital margin, naked. Mandible either with 3 teeth, the upper tooth truncate, or with 2 teeth and a truncation.

**THORAX** in profile with propodeum quite broadly touching hind coxa; notaular lines absent. Scutellum fairly flat, with fairly deep, fine, reticulate or strigose sculpture, and with subapical setae usually arranged in a tuft. Forewing submarginal vein conspicuously swollen in its distal one-third; marginal vein about 2.0-4.0× as long as broad; postmarginal vein subequal to stigmal vein or much shorter; stigmal vein from two-thirds as long as marginal vein to about as long; lineae calvae entire, not closed near posterior margin of wing; filum spinosum present. Propodeum medially short.

**GASTER** about as long as thorax. Cerci in basal half of gaster. Glands present on tergites I and V in all species examined. Hypopygium generally reaching to about two-thirds along gaster. Paratergites absent. Ovipositor usually slightly exerted, often markedly so, longer than middle tibia. Gonostyli free, about one-quarter as long as ovipositor.

**Male.** Generally very similar to female, differing most in structure of antennae and genitalia. Antennal toruli with ventral margins about level with lower margin of eye. Antenna 9-segmented; flagellum 7-segmented, clothed in whorls of long setae, the dorsal ones about twice as long as the ventral ones and more than twice as long as the diameter of any segment; funicle segments longer than broad. Tergal glands present on gaster in all species examined.

Genitalia with parameres very short; digiti moderately long and slender, each with a single apical hook; aedeagus about three-fifths as long as middle tibia.

**Biology.** Hyperparasites of Diaspididae (Homoptera) through other Encyrtidae.

**Distribution.** Cosmopolitan; 13 species are known, only one of them from New Zealand.

**Remarks.** *Zaomma* is intermediate between the Cheiloneurini and Habrolepidini (Encyrtinae). It can be separated from all genera included in these tribes by the presence of glands on the gastral tergites (see Prinsloo 1979), the function of which is unknown. Most species of *Zaomma* have a subapical tuft of setae on the scutellum of the female, a character found also in *Cheiloneurus* and *Prochiloneurus* Silvestri (Cheiloneurini). Species of these genera have the forewings of the female conspicuously darkened, however. *Zaomma* can be confused also with *Adelencyrtus* and *Coccidencyrtus* (Ashmead) (Habrolepidini). Species of *Coccidencyrtus* have the linea calva interrupted and the truncate part of the mandible very broad. Males of *Adelencyrtus* have a two-segmented funicle and a long, unsegmented club, and can thus be distinguished easily from *Zaomma* males. Females of *Adelencyrtus* can be separated best by their lack of silvery setae on the mesoscutum, absence of glands on the gastral tergites, and mandible almost always with four teeth.

### *Zaomma lambinus* (Walker)

Figures 369–372

Walker, 1838: 422. Valentine, 1963: 11; 1967: 1122. Graham, 1969: 270. Gordh & Trjapitzin, 1979: 35 (key).

**Female.** Length range 0.76–1.19 mm ( $n = 34$ ).

**Lectotype.** Length 1.19 mm. Head with frontovertex metallic green; immediately above antennal scrobes and down face to mouth margin deep purple; mouth margin between antennal toruli green;

scape except apex, pedicel except apex, and club dark brown; apex of scape and pedicel yellow; funicle segments 1–4 brown, segments 5 and 6 yellow; thorax dark purple-brown and matt except on posterior half of mesoscutum, which is slightly shining green and covered in silvery setae; posterior margin of mesoscutum purple; coxae brown; femora dark brown, their apices yellow; tibiae yellow, each with a dark brown band above middle, that on hind tibia more extensive and reaching to lower half of tibia; wings hyaline; venation yellow-brown; gaster purplish brown, with a slight green sheen on basal tergite.

**Specimen 1** (card-mounted). HEAD. Ocelli forming an angle of about 90°. Frontovertex with shallow, raised, reticulate sculpture. Relative dimensions: head width 46, length 40, depth 28; minimum frontovertex width 13; eye length 26, width 24; malar space 20; OPL 6; POL 6; OOL 1.5; scape length 21, width 5.5; other proportions of antenna as in Figure 370.

THORAX. Sculpture on mesoscutum deeper than on frontovertex, anteriorly striate-reticulate, near posterior margin medially squamiform-reticulate and a little shallower. Scutellum with a subapical tuft of setae (Figure 371). Forewing setation and venation as in Figure 372. Relative dimensions: forewing length 125, width 51, marginal fringe 4; hindwing length 88, width 20, marginal fringe 5.

GASTER slightly longer than thorax. Ovipositor hardly exerted.

**Specimen 2** (slide-mounted). Mandible as in Figure 369. Gaster with glands present but indistinct. Relative lengths: middle tibia 56; last tergite 47; ovipositor 90; gonostylus 22.

**Variation.** There is slight variation in the extent of the dark coloration of the legs, which in some specimens are slightly paler or even slightly darker than described, in particular the hind tibia, which may be almost completely dark brown. Silvery setae may entirely cover the mesoscutum or be almost absent.

**Male.** The male is extremely rare, and is not available for description. It has been figured in part by Chumakova (1961). It is likely to be not dissimilar to the female, differing mainly in the characters noted in the generic description.

**Type data.** Lectotype female: “*lambinus*”, “*Encyrtus lambinus* Walker”, “Stood under this name in old B.M. Coll. C. Waterhouse”, “British Isles F. Walker Coll.”, “*Encyrtus lambinus* Wlk Ent. Mag. V 1838 p. 422 No. 97 Type ♀ Selected R.D. Eady 1955”, “*Apterencyrtus* sp. (= *Chiloneurinus Mercet*)”, “*Encyrtus lambinus* Walk. LECTOTYPE: ♀ M.deV. Graham det. 1968” (BMNH).

**Material examined.** Lectotype female, plus 33 non-type females, 1 from New Zealand, 32 from Europe (NZAC, BMNH).

— / NN.

Habitat noted: apple.

Adult reared in October.

**Biology.** Reared from ?*Lepidosaphes ulmi* (Linnaeus) (Homoptera: Diaspididae) on apple in New Zealand (Valentine 1963). Recorded as a hyperparasite of a number of other genera of diaspid scales in all parts of the world except Africa.

**Remarks.** *Z. lambinus* can be separated from other described species of *Zaomma* by the combination of distal funicle segments paler than proximal ones, silvery setae on mesoscutum, third tooth of mandible present but truncate, subapical tuft of setae on scutellum, and indistinct 'glands' on tergites of gaster.

### *Zelaphycus* new genus

Type species *Aphycomorpha aspidioti* Tachikawa & Valentine, 1969; New Zealand.

(The name *Zelaphycus* is derived by contraction of the geographical prefix *Zelando-* with *Aphyucus*, a previously described and similar genus of encyrtid; gender masculine.)

The single known male of the type species, described in 1969 by Tachikawa & Valentine, has since been lost. The description given below is therefore taken from their publication.

**Female.** HEAD in facial view about one-third broader than long, in profile about half longer than deep and almost triangular. Vertex slightly convex, and face almost flat, their tangents forming an angle of about 90° at top of antennal scrobes. Eye about 1.4× as long as broad, with extremely short, sparse hairs, reaching occipital margin, which is slightly rounded; posterior margin almost straight. Malar space about 0.6× as long as eye; malar sulcus present. Frontovortex about half as wide as head. Ocelli forming an angle of about 80–85°; posterior ocellus separated from occipital margin by about 1.5× its own diameter, and from eye by about its own diameter. Antennal scrobes shallow, ill defined, reaching about three-fifths of distance from antennal toruli to anterior ocellus. Antennal torulus separated from mouth margin by about its own length, and from other torulus by about 1.5× its own length, its dorsal margin slightly below ventral margin of eye. Clypeal margin almost straight. Scape subcylindrical but slightly broadened, about

4.0× as long as broad, slightly shorter than minimum width of frontovortex; pedicel conical, much longer than 1st funicle segment; funicle 6-segmented, the segments subequal in length but gradually widening distad, all cylindrical; club 3-segmented, about three-quarters as long as funicle, its apex more or less rounded; setae on funicle relatively short, the longest slightly longer than diameter of smallest segment; longitudinal sensilla present on distalmost 3 funicle segments and club. Sculpture on frontovortex moderately shallow, raised, reticulate, becoming gradually shallower squamiform-reticulate on lower parts of face and on gena. Setae inconspicuous, generally about as long as the diameter of an ocellus. Mandible with 2 acute teeth and a short truncation, plus a single bristle on inner surface near ventral margin. Maxillary palpus 4-segmented; labial palpus 3-segmented.

THORAX in lateral view moderately deep, with metapleurum and propodeum visibly narrowly in contact with hind coxa, and dorsally with mesoscutum and scutellum flat. Pronotum in dorsal view short but plainly visible behind head; posterior margin concave, evenly curved. Visible part of mesoscutum about 1.8× as broad as long; notaular lines absent; axillae more or less meeting. Scutellum about as long as broad, about 1.2× as long as mesoscutum, its apex slightly acute. Propodeum medially less than one-tenth as long as scutellum. Mesoscutum and scutellum with fairly shallow, raised, squamiform-reticulate sculpture. Setae on dorsum short, fairly sparse, inconspicuous in dorsal view. Forewing hyaline, slightly more than 2.5× as long as broad; linea calva not interrupted, but very nearly closed near hind margin of wing by a single line of setae; filum spinosum present; venation dark brown; submarginal vein with a subapical hyaline break, not conspicuously swollen in its distal one-third; marginal vein about twice as long as broad, about two-thirds as long as postmarginal vein, which is about as long as stigmal vein; costal cell about 11–12× as long as broad, with a single line of setae dorsally in distal half or so. Hindwing hyaline, about two-thirds as long as forewing and about 4.5× as long as broad; marginal fringe length about one-twelfth to one-quarter maximum wing width; costal cell not wider than submarginal vein, with about 8–10 setae on its ventral surface; apex of venation reaching about two-thirds along wing. Middle tibia with spur slightly shorter than basal segment of middle tarsus.

GASTER slightly longer than thorax. Cercal plates only just in anterior half of gaster. Paratergites absent. Last tergite about three-quarters as long as middle tibia, more or less acute apically. Hypopygium reaching about two-thirds along gaster. Ovipositor hardly exerted, about 1.5× as long as

middle tibia. Gonostyli free, about one-fifth as long as ovipositor.

**Male.** Darker than female, and generally differing as follows. Antennal scape broader, about  $2.5\times$  as long as broad; pedicel conical, only very slightly longer than broad; funicle 6-segmented, its segments cylindrical in cross-section, slightly less than twice as long as broad; longest setae on funicle nearly twice as long as diameter of segments; club entire, apically slightly pointed, about one-third as long as funicle. Genitalia with digiti each armed with a pair of hooks; parameres each with a pair of setae, one below base of outer apical process and one at apex of this process.

**Biology.** Parasites of diaspid scales (Homoptera: Diaspididae).

**Distribution.** Known only from New Zealand, including offshore islands.

**Remarks.** *Zelaphycus* is superficially similar to *Pseudococcobius* Timberlake, particularly in head shape, but differs in the shape of the mandible and in the hypopygium not extending to the apex of the gaster. In *Pseudococcobius* the mandible is strongly tridentate and the hypopygium reaches the apex of the gaster.

The type species of *Zelaphycus* was described originally in *Aphycomorpha* Timberlake. It differs from *A. araucariae*, the type species of that genus, as follows: truncate part of mandible relatively much narrower (in *araucariae* the truncate part is about two-thirds as wide as the apex of the mandible); antennal toruli separated from mouth margin by a greater distance, and upper margins only slightly below lower margin of eye (in *araucariae* separated by less than half their own length, and upper margins at least their own length below lower margin of eye); frontovertex wider (in *araucariae* less than one-quarter as wide as head); and eyes more or less naked (in *araucariae* conspicuously hairy). Moreover, and perhaps most important, the mesopleurum of *Aphycomorpha araucariae* is enlarged posteriorly, separating the metapleurum and propodeum from the hind coxa in lateral view. Hence, *aspidioti* is treated as belonging to a separate genus, here described as new.

***Zelaphycus aspidioti* (Tachikawa & Valentine)  
new combination**

Figures 373–376

Tachikawa & Valentine, 1969a: 535–540.

**Female.** Length range 0.60–1.00 mm ( $n = 15$ ).

Head and antennae orange to orange-brown, but club distinctly infuscate; dorsum of thorax concolorous with head or a little darker; neck of pronotum dark brown; sides and venter of thorax slightly paler than head; legs pale orange; wings hyaline; gaster dark orange-brown to dark brown.

**HEAD.** Sculpture on frontovertex shallow, raised, reticulate, almost granular in appearance, but on lower parts of face and genae more or less squamiform-reticulate. Ocelli forming an angle of about  $90^\circ$ . Mandible as in Figure 373. Relative dimensions, specimen 1 (card-mounted): head width 49, length 39, depth 28; frontovertex width 23; eye length 26, width 22; malar space 17; OPL 6; POL 12; OOL 3.5; scape length 18, width 5.5; other proportions of antenna as in Figure 374.

**THORAX.** Sculpture on mesoscutum and scutellum shallow, raised, reticulate to squamiform-reticulate, conspicuously shallower than on frontovertex. Forewing setation and venation as in Figure 375. Relative dimensions, specimen 2 (slide-mounted): forewing length 73, width 29, marginal fringe 2; hindwing length 50, width 11, marginal fringe 2.5.

**GASTER** about two-thirds as long as thorax. Ovipositor hardly exerted. Relative lengths, specimen 3 (slide-mounted): last tergite 33; ovipositor 39; gonostylus 8; [middle tibia 28].

**Male.** Length 0.9 mm ( $n = 1$ ).

The single male noted by Tachikawa & Valentine (1969a, pp. 538–539) has apparently been lost, and is thus not available for study. The following is taken from their original description. Antenna as in Figure 376.

“Frontovertex, ventral surface of thorax, and abdomen blackish; face yellowish brown; antennal scape yellowish, pedicel and flagellum dusky yellowish; wings hyaline; legs nearly as in female, but hind tibiae somewhat dusky except the ends.”

“Eyes nearly bare; ocelli in an obtuse-angled triangle; antennae inserted rather high above the oral margin, about on the level of the lower corners of eyes; scape somewhat expanded below and about as long as club; pedicel slightly longer than wide; flagellum elongate, not thickened distad and with long subverticillate hairs which are somewhat shorter on the under side; funicle segments all about equal in length and about two times as long as wide, comparatively incised on the upper side at the articulations; club solid, elongate, elliptical, pointed at apex, a little shorter than the two apical funicle segments taken together, abundant hairs gradually shortening towards the apex. Structural characters of thorax, abdomen, legs, and wings about as in

female. Thoracic sculpture similar to that of female. Digitus volsellaris [= digitus] with two denticles."

**Type data.** **Holotype** female: New Zealand, MC, Christchurch, on *Garrya ?elliptica*, December 1960, E.W. Valentine, labelled "HOLOTYPE *Aphycomorpha aspidiotei*, Tachikawa + Valentine" (NZAC).

**Paratypes:** 3 females, same data as holotype; remaining paratypes missing.

**Material examined.** Type series, plus 15 non-type females (NZAC, BMNH).

WN / KA, MC, SL / Chatham Is.

Recorded from around sea level to 600 m (WN, Clouston Park).

Habitats noted: native bush; *Coprosma* sp.; *Garrya ?elliptica*; *Hoheria* sp.; *Hedycarya arborea*; *Asplenium lucidum*; leaf litter.

Adults have been collected in January–April and October–December.

**Biology.** Recorded as a parasite of diaspid scales (Homoptera: Diaspididae). Reared from *Aspidiotus nerii* Bouché on *Garrya ?elliptica* and *Hoheria* sp., and from an unidentified scale on *Hedycarya arborea*.

### ***Zelencyrtus* new genus**

Type species *Zelencyrtus latifrons* new species.

(The name *Zelencyrtus* is derived by contraction of the geographical prefix *Zelando-* with *Encyrtus*, the type genus of the family Encyrtidae; gender masculine.)

**Female.** HEAD in facial view slightly broader than long, in profile about two-thirds longer than deep. Vertex slightly convex, and face almost flat, their tangents forming an angle of a little over 90° at top of antennal scrobes. Eye about one-third longer than broad, with short, sparse hairs, well separated from occipital margin, which is more or less sharp, not carinate; posterior margin almost straight. Malar space about two-thirds as long as eye; malar sulcus present. Frontovortex about half as wide as head. Ocelli forming an angle of about 90°; posterior ocellus separated from occipital margin by about its own diameter, and from eye by slightly more than its diameter. Antennal scrobes moderately deep, apparently Y-shaped, ill defined, nearly reaching anterior ocellus. Antennal torulus separated from mouth margin by about half its own length, and from other torulus by about two-thirds its own length, its dorsal margin about level with ventral margin of eye. Clypeal margin clearly excavate below toruli. Scape subcylindrical, about 6.0×

as long as broad and about as long as minimum width of frontovortex; pedicel conical, much longer than 1st funicle segment; funicle 6-segmented, the cylindrical segments subequal in length but gradually widening distally; club solid, slightly more than half as long as funicle, its apex transversely truncate; setae on funicle relatively short, the longest much shorter than the diameter of the smallest segment. Frontovortex shiny, its sculpture shallow, raised, reticulate, becoming gradually shallower and less regular on lower parts of face and on gena. Setae on frontovortex inconspicuous, generally about as long as the diameter of an ocellus. Mandible with 3 acute teeth, the middle tooth longest.

THORAX in lateral view moderately deep, with metapleurum and propodeum visibly reaching hind coxa, and dorsally with mesoscutum slightly convex and scutellum fairly flat. Pronotum in dorsal view short but plainly visible behind head; posterior margin evenly convex. Visible part of mesoscutum about 1.7× as broad as long; notaular lines absent; axillae meeting. Scutellum slightly longer than broad, about as long as mesoscutum; apex acute. Propodeum medially less than one-sixth as long as scutellum. Sculpture on mesoscutum similar to that on frontovortex, but on scutellum distinctly shallower and less regular. Setae on dorsum quite long, but rather sparse and inconspicuous in dorsal view. Forewing hyaline, slightly more than 2.5× as long as broad; linea calva not interrupted, but very nearly closed near hind margin by a single line of setae; filum spinosum present; venation pale brown; submarginal vein with a subapical hyaline break, slightly swollen in its apical one-third; marginal vein slightly longer than broad, less than half as long as postmarginal vein, which is slightly longer than stigmal vein; costal cell about 13–14× as long as broad, with a single line of setae dorsally. Hindwing hyaline, about two-thirds as long as forewing and about 5.0× as long as broad; marginal fringe length about one-fifth maximum wing width; costal cell not or hardly wider than submarginal vein; apex of venation reaching about three-fifths along wing. Middle tibia with spur slightly longer than basal segment of middle tarsus.

GASTER slightly shorter than thorax; cercal plates about halfway along. Last tergite about three-fifths as long as middle tibia. Hypopygium reaching apex of gaster. Ovipositor slightly exerted.

**Male.** Very similar to female, except for antennae and genitalia. Antennae with flagellum 7-segmented, the segments longer than broad and clothed in relatively short setae, each shorter than the diameter of its segments. Genitalia with parameres long, extending past apices of digiti; digiti relatively long, each with 2 small hooks and 2 small

pegs apically; aedeagus about as long as middle tibia.

**Biology.** Unknown, but almost certainly polyembryonic parasites of lepidopterous larvae.

**Distribution.** Known only from New Zealand.

**Remarks.** *Zelencyrtus* can be placed in subfamily Encyrtinae, tribe Copidosomatini, subtribe Copidosomatina. It is closest to *Copidosoma* and to *Apsilophrys* De Santis, but can be separated from both by its non-carinate occipital margin and the antennal scrobes nearly reaching the anterior ocellus; in both genera the scrobes are generally horseshoe-shaped, and do not nearly reach the anterior ocellus. *Zelencyrtus* also differs from *Copidosoma* in the asymmetric arrangement of the sensilla at the apex of the stigmal vein, although these are arranged in two distinct groups of two, as in *Copidosoma* (in *Copidosoma* they are always arranged in a square). In *Apsilophrys* the eyes reach the occipital margin and the scutellum is very convex.

### *Zelencyrtus latifrons* new species

Figures 5 and 377–381

**Female.** Length 1.0 mm ( $n = 1$ ).

Head dark purple-brown, with a slight green and brassy lustre on frontovertex; face slightly shining dark purple; antenna dark brown, with apices of scape and pedicel slightly paler; pronotum purple-brown, with a slight lustre; mesoscutum metallic green; axillae and scutellum metallic purple, the scutellum green apically; wings hyaline; legs generally dark brown, with apices of femora and tibiae testaceous yellow; middle tibial spur and tarsus yellowish, but apical segment dark brown; fore and hind tarsi testaceous brown, but apical segments darker; gaster dark purple-brown, with a slight metallic sheen.

**HEAD.** Eyes separated from occipital margin by about the diameter of an ocellus. Relative dimensions: head width 56, length 57, depth 30; minimum frontovertex width 31; eye length 30, width 22; malar space 19.5; OPL 3; POL 13; OOL 8; scape length 31, maximum width 6; other proportions of antenna as in Figure 377.

**THORAX.** Sculpture on mesoscutum similar to that on frontovertex. Forewing venation and setation as in Figures 378 and 379. Relative dimensions: forewing length 79, width 28.5, marginal fringe 2; hindwing length 53, width 11, marginal fringe 2.

**GASTER** with exerted part of ovipositor a little shorter than middle tibial spur.

**Male.** Length 1.03 mm ( $n = 1$ ).

Antennal scrobes horseshoe-shaped, nearly reaching anterior ocellus. Mandible as in Figure 380. Antenna as in Figure 381. Genitalia as in Figure 5. Relative dimensions, specimen 1 (card-mounted): head width 60, length 53, depth 29; minimum frontovertex width 33; eye length 30, width 22; malar space 18; OPL 4; POL 17; OOL 6.5; scape length 27, width 6.5. Relative lengths, specimen 2 (slide-mounted): middle tibia 82; aedeagus 77.

**Type data.** **Holotype** female: New Zealand, MK, Lake Tekapo, Malaise trap in tussock near pine plantation, January 1981, P. Quinn (NZAC).

**Paratypes:** 2 males, same data as holotype (BMNH).

**Material examined.** Type specimens only.

**Biology.** Unknown, but probably polyembryonic parasites of Lepidoptera larvae.

## Genus A

Figures 382 and 383

This genus is represented by a single specimen with a damaged scutellum. It can be recognised by the combination of elongate forewing postmarginal vein (Figure 383) and strongly tridentate mandible. Female antenna as in Figure 382.

**Material examined.** One female, TK, Mt Egmont, 2600 m, ex "*Microdoris*" *stellata*, 21 October 1973, J.S. Dugdale (NZAC).

**Biology.** Reared from *Hierodoris stellata* Philpott (Lepidoptera: Oecophoridae).

**Remarks.** This possibly represents an undescribed endemic genus near *Ageniaspis* Dahlbom (Encyrtinae: Copidosomatini: Ageniaspidiina). The female can be separated from females of other genera of this subtribe as follows: from *Ageniaspis* and *Paraleurocerus* Girault by its generally larger size and smoother sculpture on the head and dorsum of the thorax; from *Neapsilophrys* Noyes by the shallower sculpture on the mesoscutum and scutellum and the shorter gaster with less strongly exerted ovipositor; and from *Holcothorax* Mayr by its six-segmented funicle and shallower sculpture on head and thorax. It is probably closest to *Neapsilophrys*, and if necessary could be accommodated there pending examination of further material.

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INDEX OF COLLECTOR'S NAMES

(in alphabetical order of initialisms in lists of specimen data)

ACEyles	EGWhite	JITownsend	PInsley
AKWalker	ESGourlay	JMcBurney	PMJohns
ANewton	EWValentine	JMCox	PQuinn
APhilpott	FAlack	JMKelsey	PSBroomfield
ARFerguson	FDodge	JSDugdale	PWatts
BAHolloway	GKuschel	JSNoyes	RACumber
BBGiven	GWhite	JSRoberts	RCurtis
BIPBarratt	GWRamsay	JWhitford	RPMacfarlane
BMMay	HAOliver	LAMound	RRForster
CFButcher	HPMcColl	LLDeitz	S&JPeck
CSmith	JAdBoer	LPMarchant	SMKelsey
CTJessep	JBain	MFTocker	SPEck
DBMoodie	JCWatt	MThayer	TTachikawa
DBRead	JFLongworth	PAHarman	WJKnight
ECollyer	JHoy	PAMaddison	WPTThomas

Also: N&V – JSNoyes & EWValentine; NV&W – JSNoyes, EWValentine, & AKWalker



APPENDIX: HOST CATALOGUE

Note. Authors' original nomenclature citations for host species are given in the text, but in this list, where relevant, are referred to current senior synonyms.

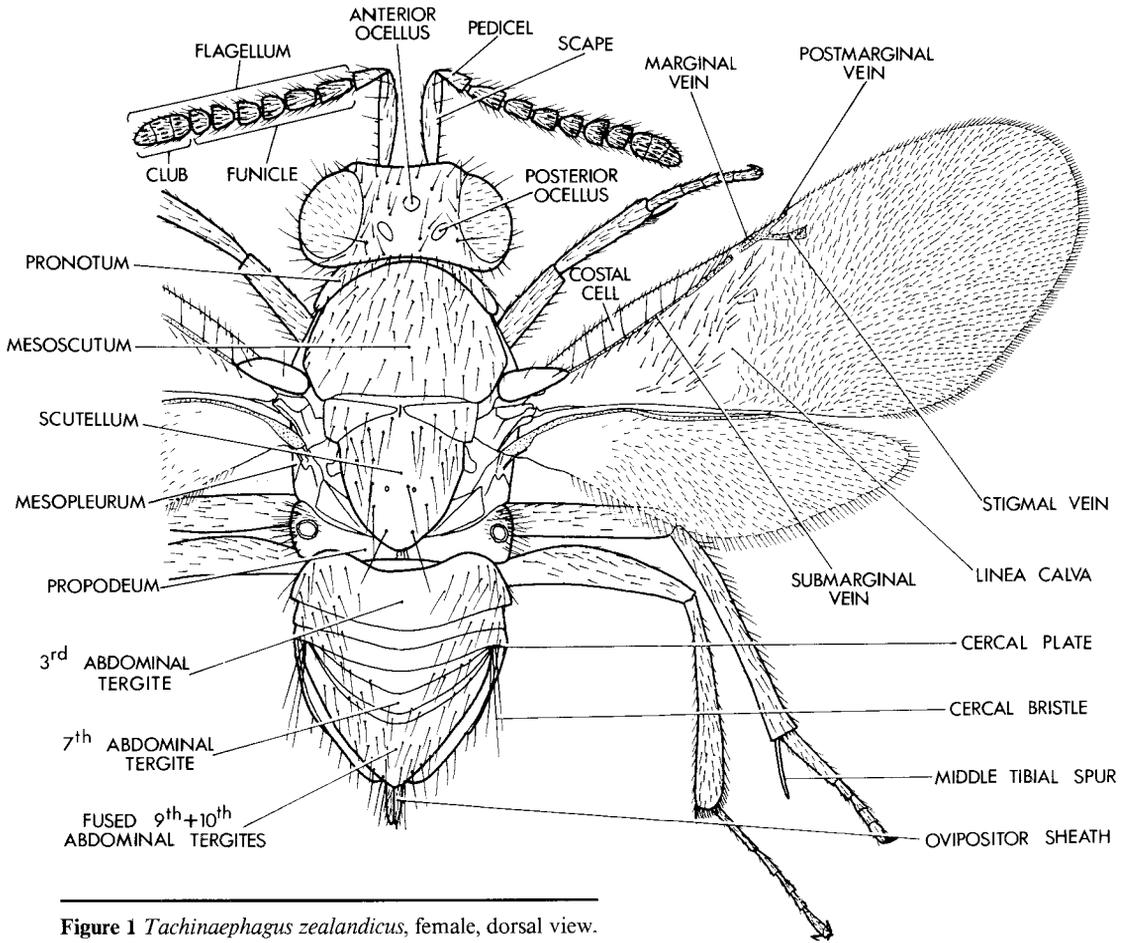
HOST	PARASITE	HOST	PARASITE
<b>Coleoptera</b>		<b>Hemiptera (Homoptera)</b>	
Lathridiidae		Asterolecaniidae	
<i>Melanophthalma</i> sp. nr	<i>Lamennaisia ambigua</i>	<i>Asterolecanium variolosum</i>	<i>Habrolepis dalmanni</i>
<i>distinguenda</i>		Coccidae	
<b>Diptera</b>		<i>Ceroplastes destructor</i>	<i>Coccidoctonus dubius</i>
Calliphoridae		<i>Ceroplastes sinensis</i>	<i>Coccidoctonus dubius</i>
<i>Calliphora erythrocephala</i>	<i>Tachinaephagus</i>	<i>Coccus</i> sp.	<i>Encyrtus lecaniorum</i>
	<i>zealandicus</i>	<i>Coccus hesperidum</i>	<i>Eusemion cornigerum*</i>
<i>Calliphora stygia</i>	<i>Tachinaephagus</i>		<i>Metaphycus aurantiacus</i>
	<i>zealandicus</i>	<i>?Ctenochiton</i> sp.	<i>Microterys flavus</i>
<i>Lucilia sericata</i>	<i>Tachinaephagus</i>	<i>Ctenochiton</i> sp.	<i>Adelencyrtoides suavis</i>
	<i>zealandicus</i>	<i>Ctenochiton perforatus</i>	<i>Adelencyrtoides</i>
<b>Fanniidae</b>		<i>Ctenochiton ?piperis</i>	<i>blastothrichus</i>
<i>Fannia canicularis</i>	<i>Tachinaephagus</i>	<i>Ctenochiton viridis</i>	<i>Adelencyrtoides inconstans</i>
	<i>zealandicus</i>	<i>Eulecanium ?corni</i>	<i>Adelencyrtoides unicolor</i>
<b>Muscidae</b>		<i>Gascardia destructor</i>	<i>Adelencyrtoides variabilis</i>
<i>Musca domestica</i>	<i>Tachinaephagus</i>	<i>Inglisia</i> sp.	<i>Encyrtus infelix</i>
	<i>zealandicus</i>		<i>Encyrtus lecaniorum</i>
<i>Stomoxys calcitrans</i>	<i>Tachinaephagus</i>		(see <i>Ceroplastes destructor</i> )
	<i>zealandicus</i>	<i>Lecanium persicae</i>	<i>Adelencyrtoides</i>
<b>Sarcophagidae</b>		<i>?Lecanochiton</i> sp.	<i>blastothrichus</i>
<i>Sarcophaga milleri</i>	<i>Tachinaephagus</i>		<i>Adelencyrtoides variabilis</i>
	<i>zealandicus</i>		<i>Metaphycus timberlakei</i>
			<i>Adelencyrtoides unicolor</i>

<i>Saissetia coffeae</i>	<i>Encyrtus infelix</i>	<i>Pseudantonina</i> sp.	(see <i>Balanococcus</i> sp.)
<i>Saissetia oleae</i>	<i>Coccidoctonus dubius</i>	<i>Pseudantonina poae</i>	(see <i>Balanococcus poae</i> )
	<i>Metaphycus lounsburyi</i>	<i>Pseudococcus</i> sp.	<i>Gyranusoidea advena</i>
unidentified coccid	<i>Microterys flavus</i>		<i>Leptomastidea abnormis</i> *
	<i>Adelencyrtoides variabilis</i>		<i>Tetracnemoidea brevicornis</i>
Delphacidae		<i>Pseudococcus ambiguus</i>	(see <i>Dysmicoccus ambiguus</i> )
<i>Nilaparvata myersi</i>	<i>Cheiloneurus gonatopodis</i>	<i>Pseudococcus calceolariae</i>	<i>Tetracnemoidea brounii</i>
Diaspididae		<i>Pseudococcus fragilis</i>	(see <i>P. calceolariae</i> )
? <i>Anoplaspis metrosideri</i>	<i>Adelencyrtoides unicolor</i>	<i>Pseudococcus longispinus</i>	<i>Alamella mira</i>
<i>Aspidiotus nerii</i>	<i>Zelaphycus aspidioli</i>		<i>Tetracnemoidea peregrina</i>
<i>Aulacaspis rosae</i>	<i>Adelencyrtus aulacaspidis</i>		<i>Tetracnemoidea sydneyensis</i>
	<i>Arrhenophagus chionaspidis</i>	<i>Trionymus</i> sp.	<i>Tetracnemoidea bicolor</i>
<i>Chionaspis</i> sp.	<i>Arrhenophagoidea coloripes</i>	<i>Trionymus cottieri</i>	(see <i>Crocydoccus cottieri</i> )
<i>Eulepidosaphes pyriformis</i>	<i>Adelencyrtoides novaezealandiae</i>	unidentified pseudococcid	<i>Austrochoreia antipodis</i> †
	<i>Zaomma lambinus</i>		<i>Paraglyptus biformis</i>
? <i>Lepidosaphes ulmi</i>	<i>Epitetracnemus zetterstedtii</i>		<i>Rhopus anceps</i>
<i>Lepidosaphes ulmi</i>	<i>Adelencyrtoides novaezealandiae</i>		<i>Subprionomitus ferus</i>
? <i>Leucaspis</i> sp.	<i>Adelencyrtoides otago</i>		<i>Tetracnemoidea bicolor</i>
	<i>Adelencyrtoides novaezealandiae</i>		<i>Tetracnemoidea brevicornis</i>
<i>Leucaspis podocarpi</i>	<i>Adelencyrtoides otago</i>		<i>Tetracnemoidea brounii</i>
	<i>Adelencyrtoides otago</i>		<i>Tetracnemoidea zelandica</i>
<i>Poliaspis argentosus</i>	<i>Tetracnemoidea brounii</i> †		<i>Tongyus costalis</i>
<i>Poliaspis media</i>	<i>Epitetracnemus zetterstedtii</i>		<i>Tongyus regis</i>
? <i>Quadraspidotus perniciosus</i>	<i>Adelencyrtoides novaezealandiae</i>	Psyllidae	
unidentified diaspid	<i>Adelencyrtoides otago</i>	<i>Ctenarytaina eucalypti</i>	<i>Psyllaephagus pilosus</i>
		<i>Psylla acaciaebaileyanae</i>	<i>Epiblatticida minutissima</i>
Eriococcidae			<i>Psyllaephagus acaciae</i>
<i>Eriococcus</i> sp.	<i>Adelencyrtoides inconstans</i>	? <i>Trioza irregularis</i>	<i>Adelencyrtoides variabilis</i>
	<i>Austrochoreia antipodis</i>	<i>Trioza</i> sp.	<i>Adelencyrtoides</i> sp. C
<i>Eriococcus ?danthoniae</i>	<i>Coccidoctonus dubius</i>	<b>Hymenoptera</b>	
<i>Eriococcus elaeocarpi</i>	<i>Austrochoreia antipodis</i>	<b>Braconidae</b>	
<i>Madarococcus</i> sp.	<i>Adelencyrtoides inconstans</i>	<i>Alysia manducator</i>	? <i>Tachinaephagus zelandicus</i>
unidentified eriococcid	<i>Adelencyrtoides unicolor</i>		
	<i>Adelencyrtoides similis</i>	Dryinidae	
	<i>Paraglyptus biformis</i> †	<i>Dicondylus bicolor</i>	<i>Cheiloneurus gonatopodis</i>
	<i>Rhopus anceps</i> †	Encyrtidae	
		<i>Psyllaephagus acaciae</i>	<i>Epiblatticida minutissima</i>
Pseudococcidae		Pteromalidae	
<i>Balanococcus</i> sp.	<i>Rhopus anceps</i>	<i>Aphobetus</i> sp.	<i>Coccidoctonus dubius</i>
<i>Balanococcus poae</i>	<i>Paraglyptus biformis</i>	<i>Moranila californica</i>	<i>Coccidoctonus dubius</i>
<i>Crocydoccus cottieri</i>	<i>Tetracnemoidea brounii</i>	<b>Lepidoptera</b>	
<i>Dysmicoccus ambiguus</i>	<i>Tetracnemoidea brounii</i>	Gelechiidae	
<i>Nipaecoccus aurilanatus</i>	<i>Tetracnemoidea brounii</i>	<i>Phthorimaea operculella</i>	<i>Copidosoma desantisi</i> *
? <i>Paracoccus glaucus</i>	<i>Adelencyrtoides unicolor</i>		<i>Copidosoma koehleri</i> *
? <i>Paracoccus morrisoni</i>	(see ? <i>P. glaucus</i> )	Noctuidae	
<i>Phenacoccus</i> sp.	<i>Leptomastidea abnormis</i> *	<i>Chrysodeixis eriosoma</i>	<i>Copidosoma floridanum</i>
	<i>Rhopus</i> sp. A	Oecophoridae	
<i>Phenacoccus graminicola</i>	<i>Tetracnemoidea brevicornis</i>	<i>Hierodoris stellata</i>	Genus A
<i>Phenacoccus graminosus</i>	(see <i>P. graminicola</i> )		
<i>Planococcus mali</i>	<i>Tetracnemoidea zelandica</i>		
<i>Planococcus</i> spp.	<i>Leptomastidea abnormis</i> *		

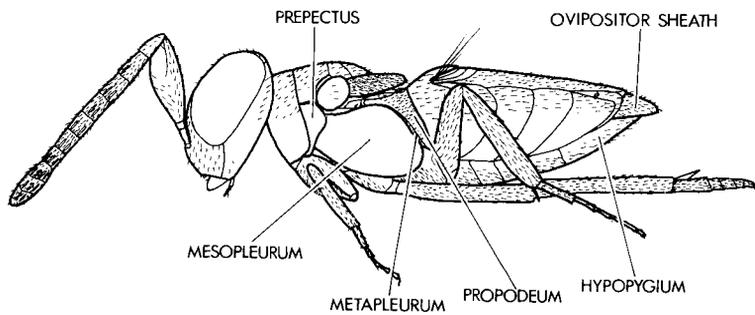
\* Host not recorded in New Zealand

† Doubtful host record

ILLUSTRATIONS



**Figure 1** *Tachinaephagus zealandicus*, female, dorsal view.

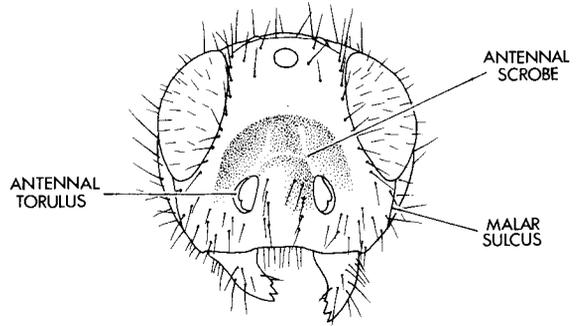


**Figure 2** *Odiaglyptus biformis*, female, lateral view (drawn from card-mounted specimen).

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**Figure 3** *Tachinaephagus zealandicus*, female, head, facial view.

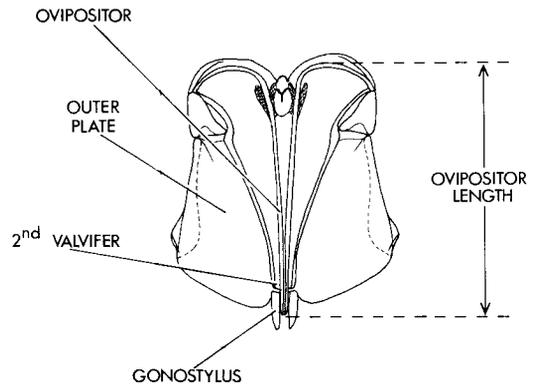
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**Figure 4** *Protyn darichoides cinctiventris*, female genitalia, ventral view.

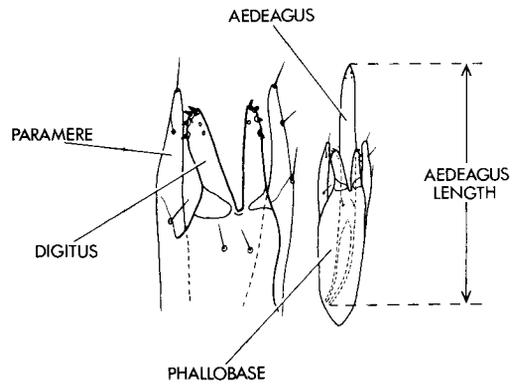
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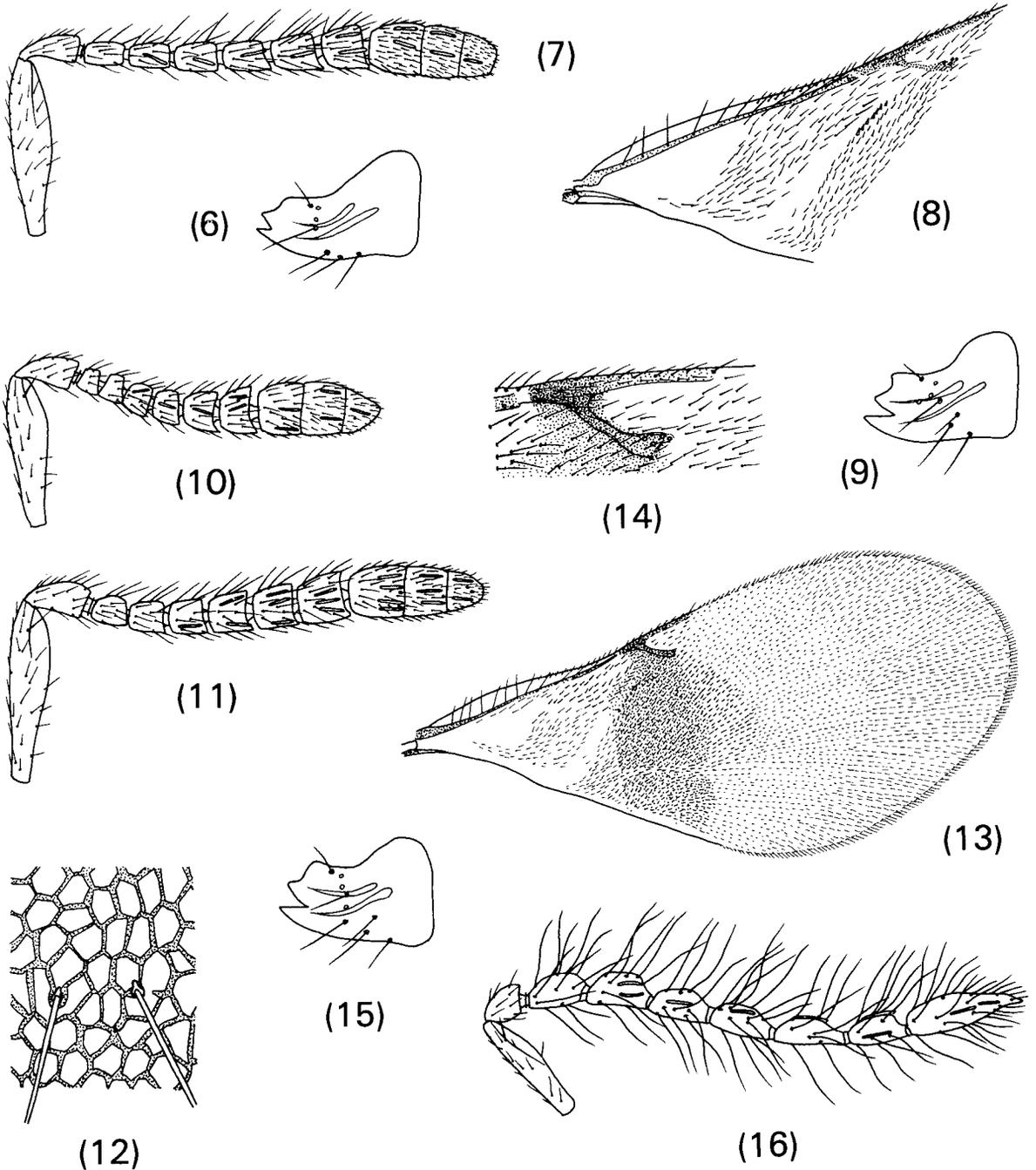


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**Figure 5** *Zelencyrtus latifrons*, male genitalia, ventral view.

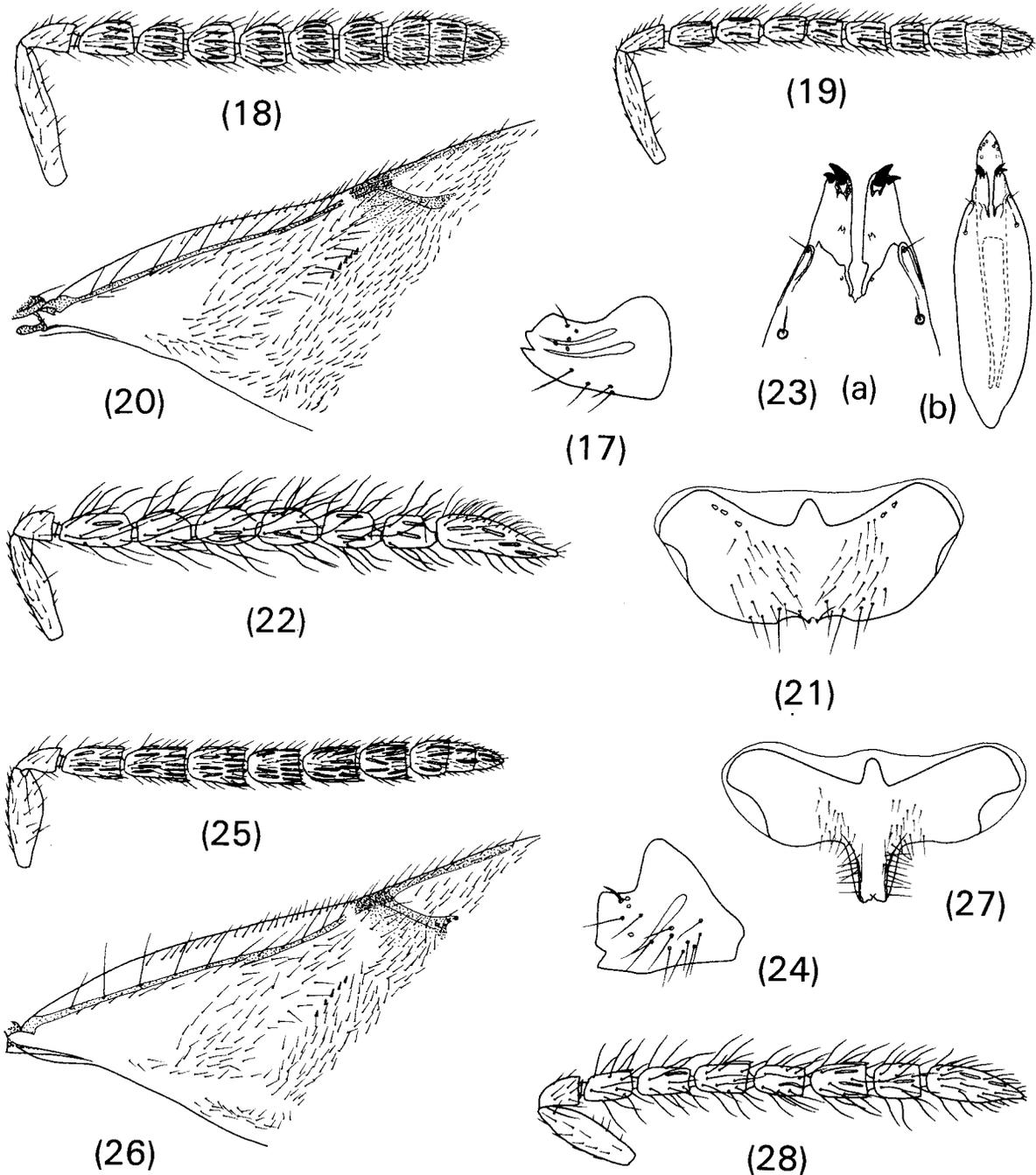
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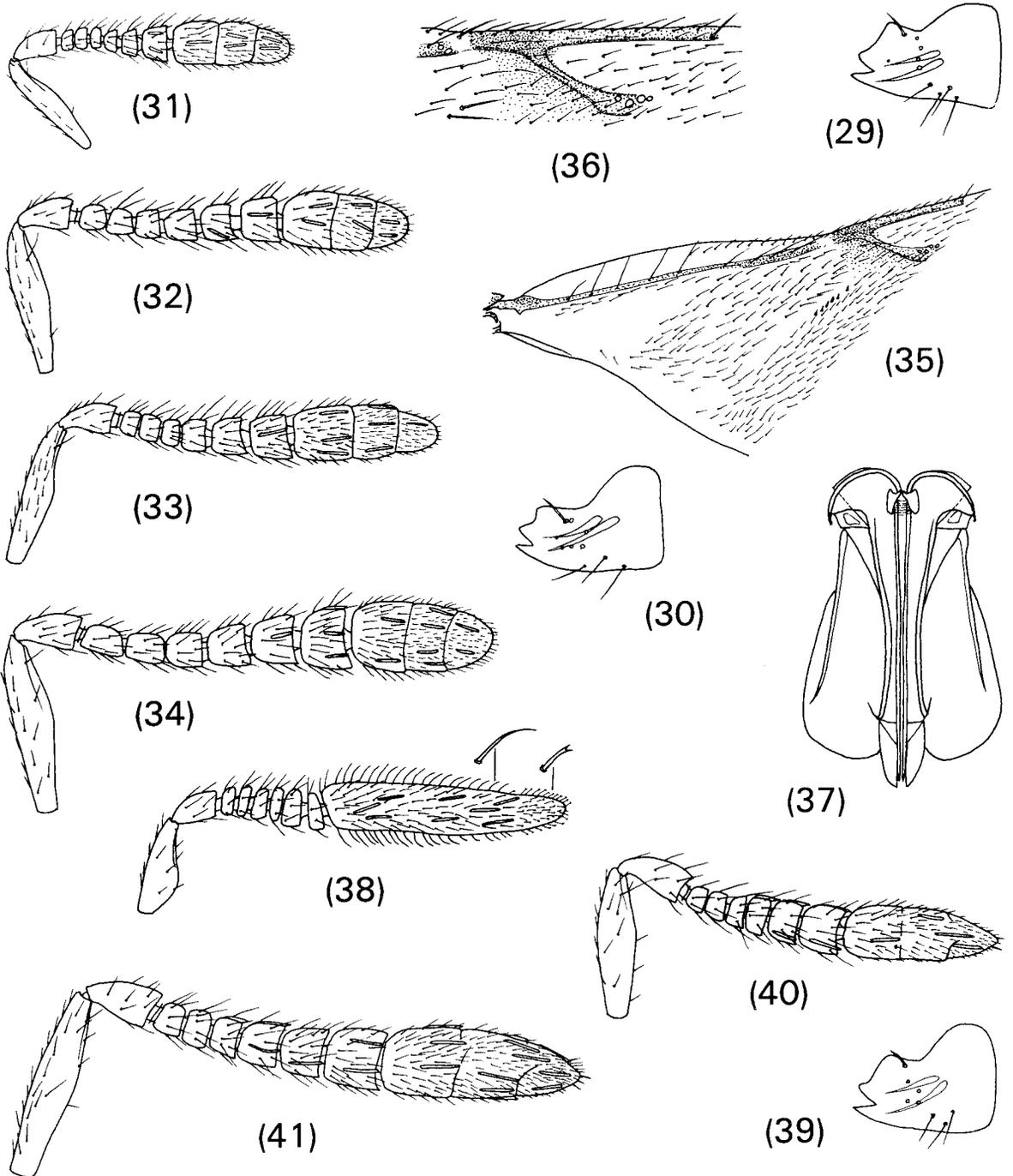


**Figures 6–8** *Adelencyrtoides acutus*, female: (6) left mandible; (7) right antenna, outer aspect; (8) right forewing, upper surface.

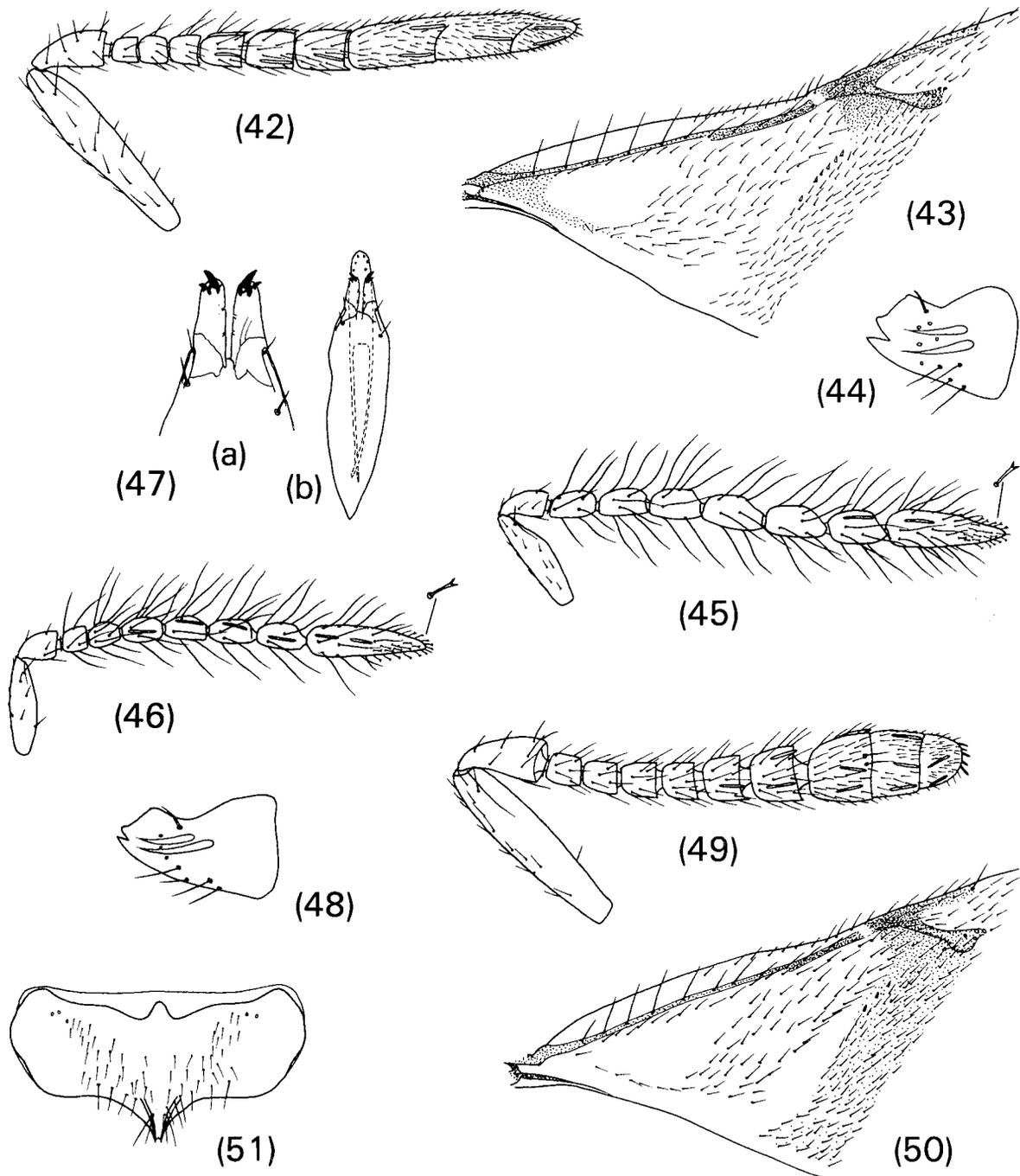
**Figures 9–16** *Adelencyrtoides blastothrichus*: (9) left mandible - ♀; (10, 11) right antenna, outer aspect, variants - ♀; (12) sculpture, mid mesoscutum - ♀ (area c. 0.1 mm square); (13, 14) right forewing, upper surface, and detail of distal venation - ♀; (15) left mandible - ♂; (16) right antenna, outer aspect - ♂.



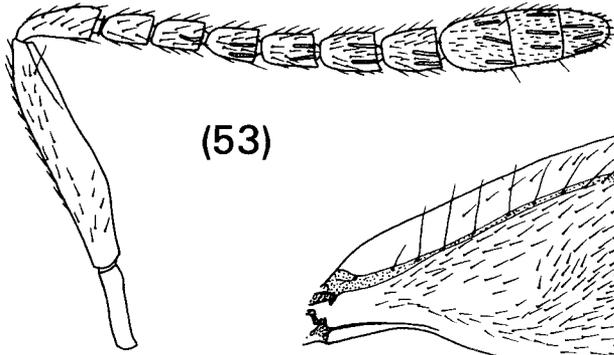
**Figures 17–23** *Adelencyrtoides inconstans*: (17) left mandible - ♀; (18, 19) right antenna, outer aspect, variants - ♀; (20) right forewing, proximal area, upper surface - ♀; (21) hypopygium - ♀; (22) right antenna, outer aspect - ♂; (23) genitalia, ♂ - (a) parameres and digits, (b) entire, ventral aspect.  
**Figures 24–28** *Adelencyrtoides mucro*: (24) left mandible - ♀; (25) right antenna, outer aspect - ♀; (26) right forewing, proximal area, upper surface - ♀; (27) hypopygium - ♀; (28) right antenna, outer aspect - ♂.



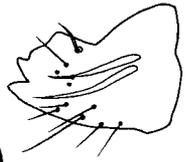
**Figures 29–38** *Adelencyrtoides novaezealandiae*: (29, 30) left mandible - ♀; (31–34) right antenna, outer aspect, variants - ♀; (35, 36) right forewing, upper surface, proximal area, and detail of distal venation - ♀; (37) genitalia - ♀; (38) right antenna, outer aspect - ♂.



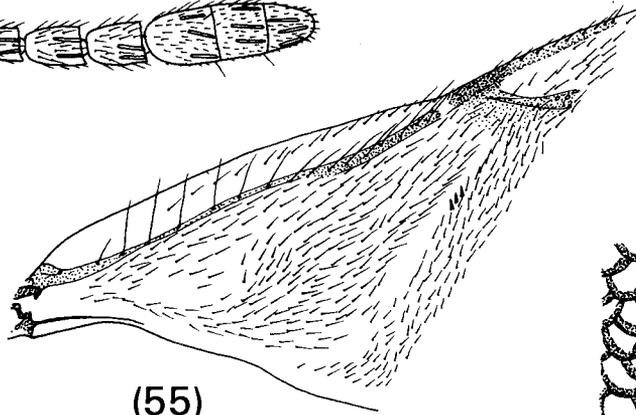
**Figures 39–47** *Adelencyrtoides otago*: (39) left mandible - ♀; (40–42) right antenna, outer aspect, variants - ♀; (43) right forewing, upper surface, proximal area - ♀; (44) left mandible - ♂; (45, 46) right antenna, outer aspect, variants - ♂; (47) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.  
**Figures 48–51** *Adelencyrtoides palustris*, female: (48) left mandible; (49) right antenna, outer aspect; (50) right forewing, upper surface, proximal area; (51) hypopygium.



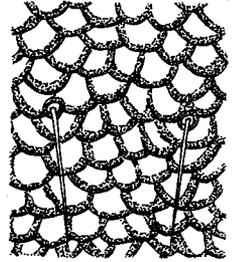
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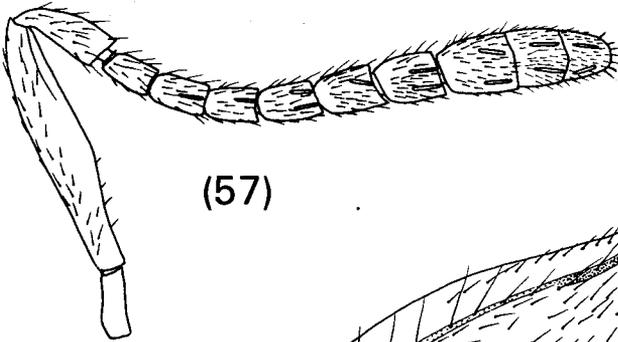
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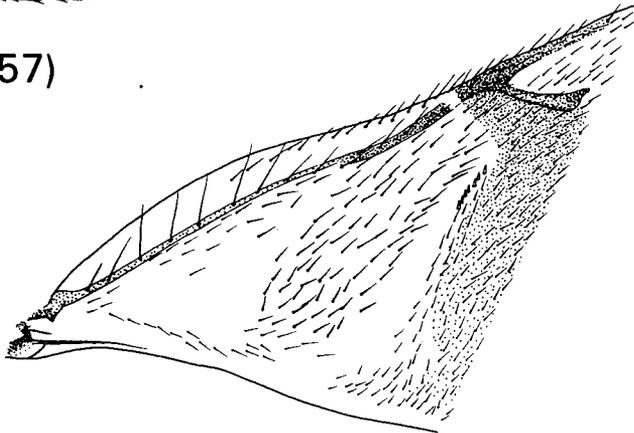
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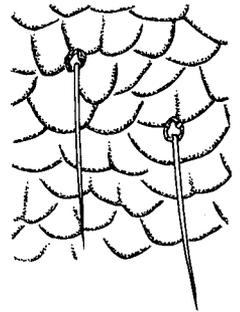
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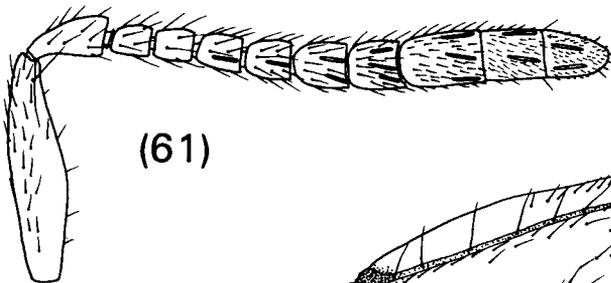
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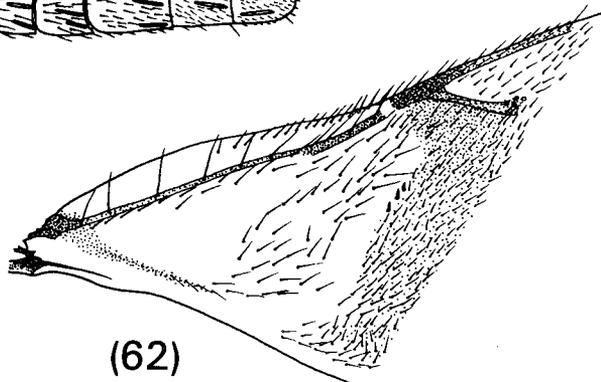
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(58)



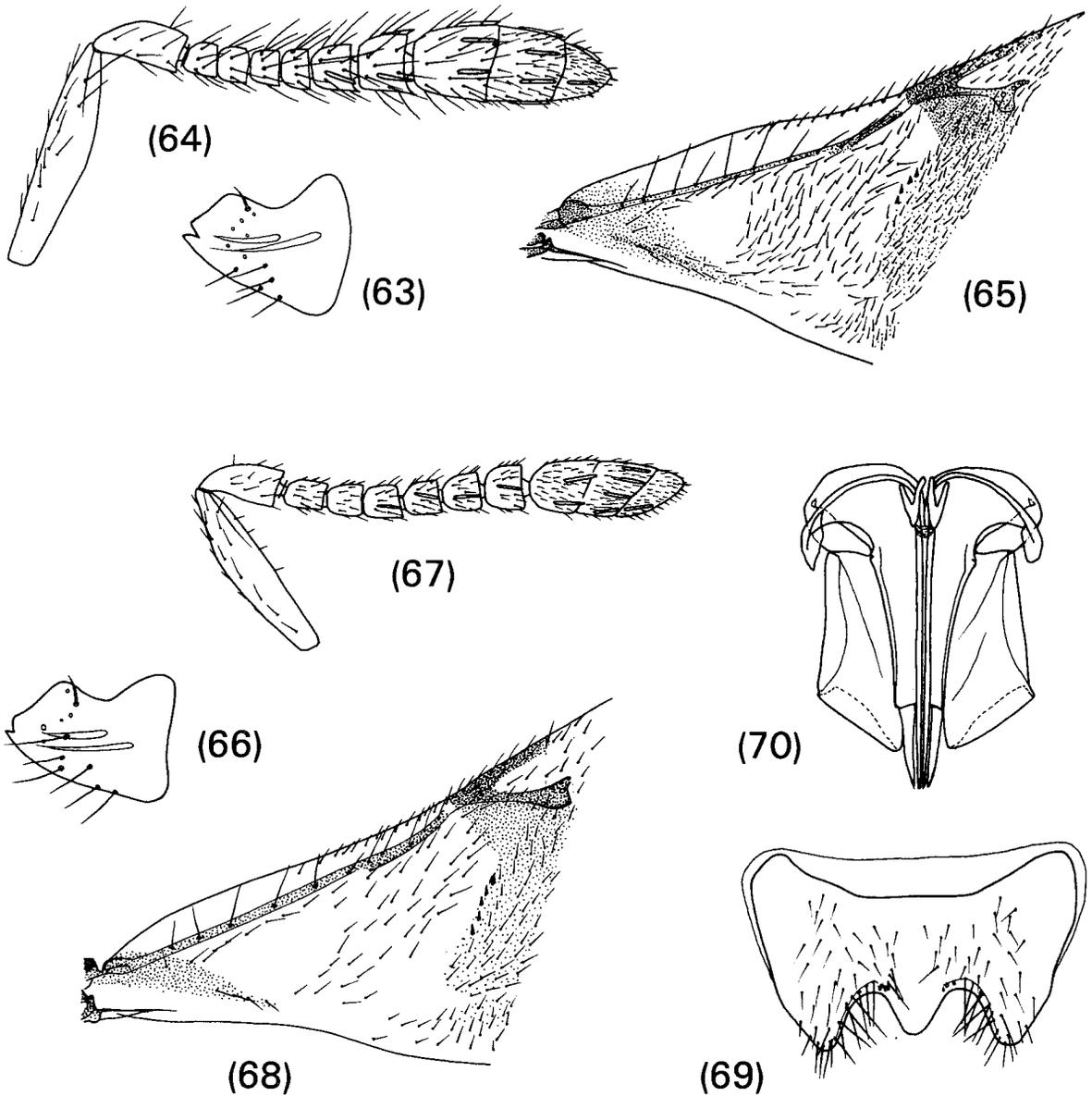
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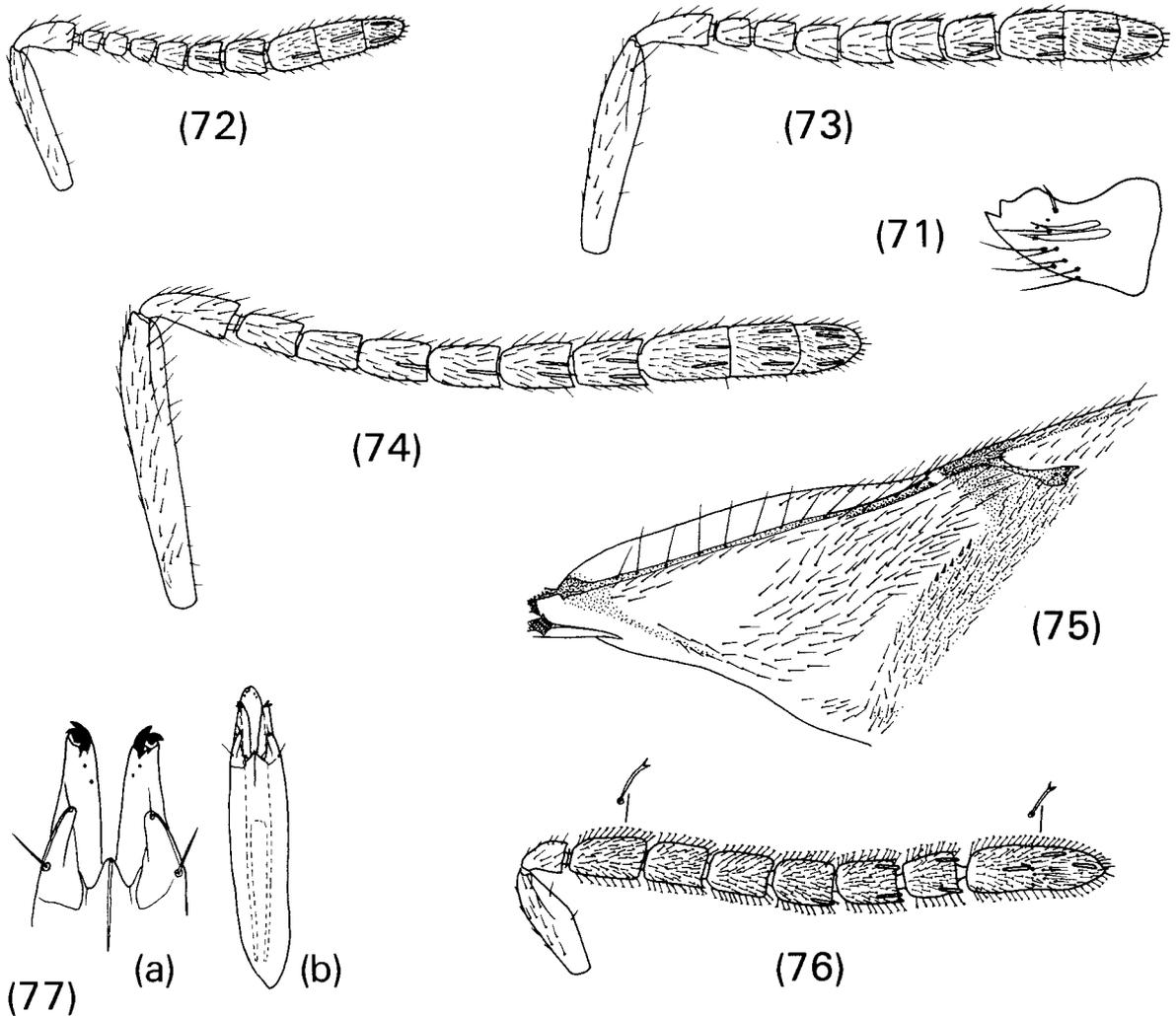
Figures 52–55 *Adelencyrtoides pilosus*, female: (52) left mandible; (53) right antenna, outer aspect; (54) sculpture in mid mesoscutum (area c. 0.1 mm square); (55) right forewing, upper surface, proximal area.

Figures 56–59 *Adelencyrtoides proximus*, female: (56) left mandible; (57) right antenna, outer aspect; (58) sculpture in mid mesoscutum (area c. 0.1 mm square); (59) right forewing, upper surface, proximal area.

Figures 60–62 *Adelencyrtoides similis*, female: (60) left mandible; (61) right antenna, outer aspect; (62) right forewing, upper surface, proximal area.

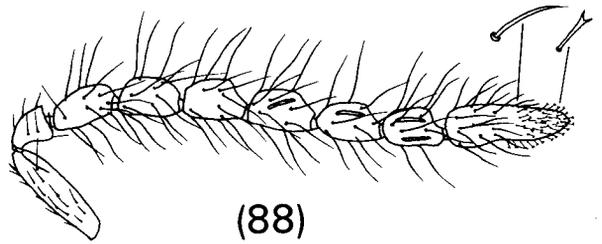
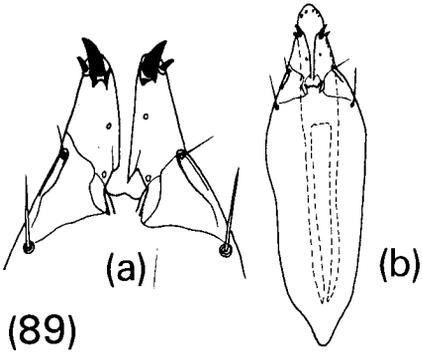
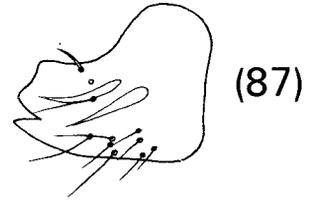
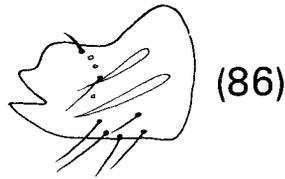
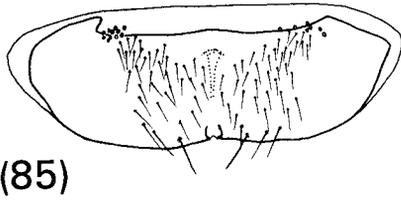
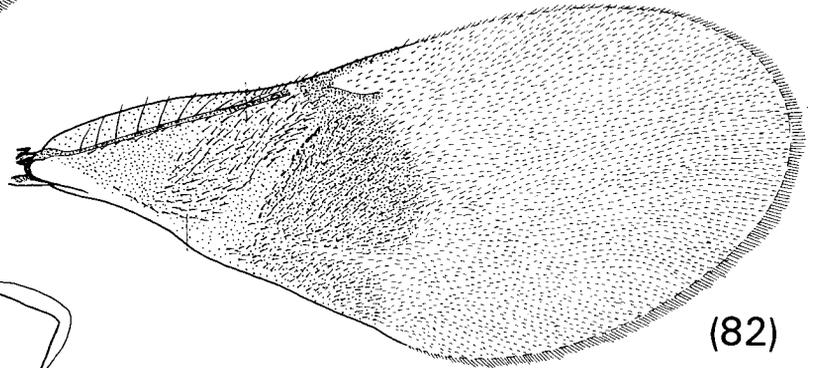
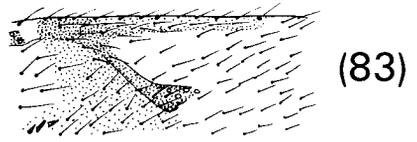
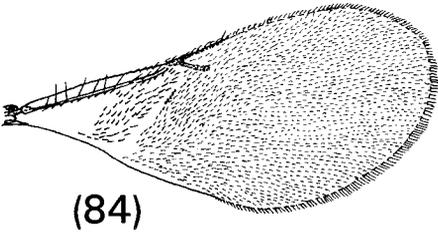
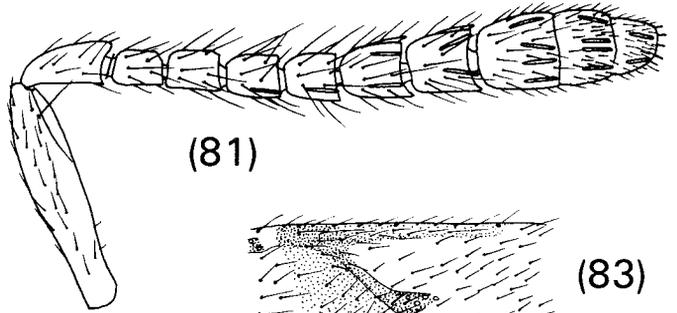
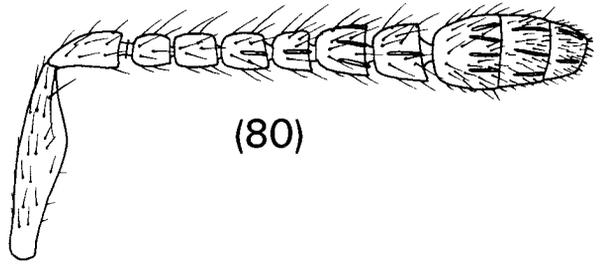
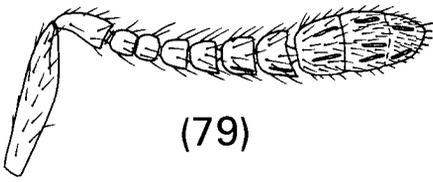
Figures 63–65 *Adelencyrtoides suavis*, female: (63) left mandible; (64) right antenna, outer aspect; (65) right forewing, upper surface, proximal area.

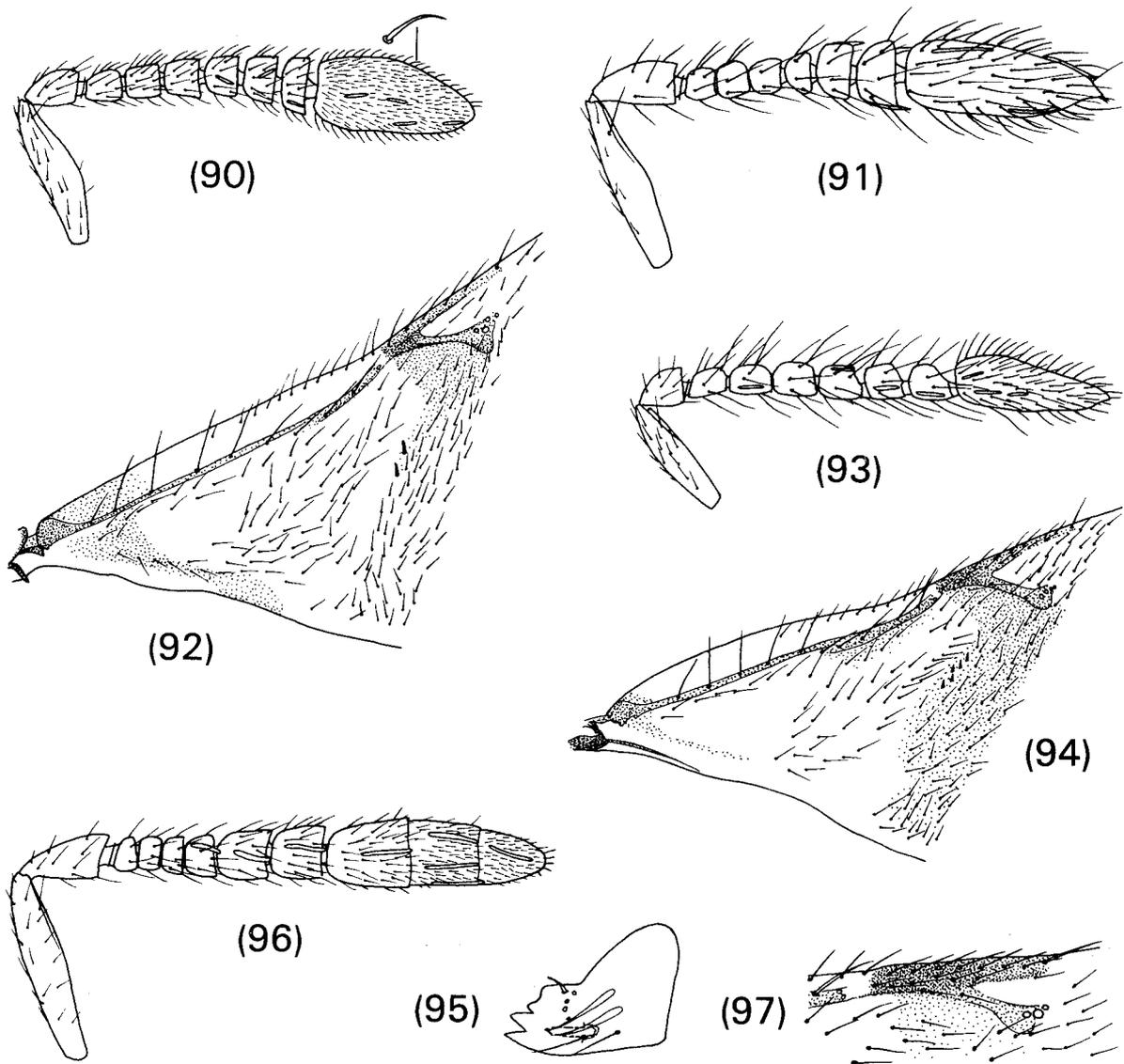
Figures 66–70 *Adelencyrtoides tridens*, female: (66) left mandible; (67) right antenna, outer aspect; (68) right forewing, upper surface, proximal area; (69) hypopygium; (70) genitalia.



**Figures 71-77 *Adelencyrtoides unicolor*:** (71) left mandible - ♀; (72-74) right antenna, outer aspect, variants - ♀; (75) right forewing, upper surface, proximal area - ♀; (76) right antenna, outer aspect - ♂; (77) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral surface.

**Figures 78-89 *Adelencyrtoides variabilis*:** (78) left mandible - ♀; (79-81) right antenna, outer aspect, variants - ♀; (82-84) right forewing, upper surface, variants, and detail of distal venation - ♀; (85) hypopygium ♀; (86, 87) left mandible, variants - ♂; (88) right antenna, outer aspect ♂; (89) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.





**Figure 90** *Adelencyrtoides* sp. A, male, right antenna, outer aspect.

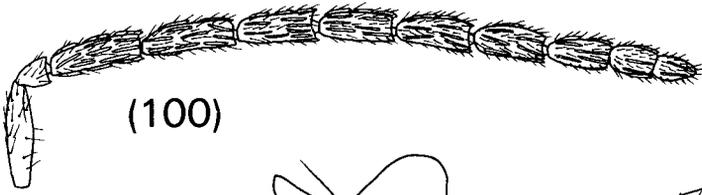
**Figures 91, 92** *Adelencyrtoides* sp. B, male: (91) right antenna, outer aspect; (92) right forewing, upper surface, proximal area.

**Figures 93, 94** *Adelencyrtoides* sp. C, male: (93) right antenna, outer aspect; (94) right forewing, upper surface, proximal area.

**Figures 95-97** *Adelencyrtus aulacaspidis*, female: (95) left mandible; (96) right antenna, outer aspect; (97) right forewing, upper surface, detail of distal venation.

**Figures 98-104** *Alamella mira*: (98) head, facial view - ♀; (99) left mandible - ♀; (100) right antenna, outer aspect - ♀; (101) right forewing, upper surface, proximal area - ♀; (102) right antenna, outer aspect - ♂; (103) right forewing, upper surface, detail of distal venation - ♂; (104) genitalia, ♂ - (a) digiti, (b) entire, ventral surface.

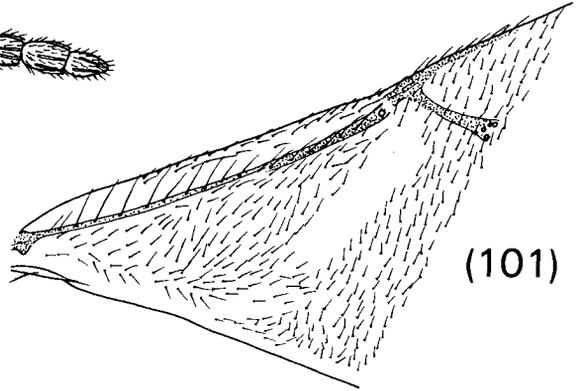
**Figures 105-107** *Arrhenophagoidea coloripes*, female: (105) head, facial aspect; (106) right antenna, outer aspect; (107) right forewing, upper surface, proximal area.



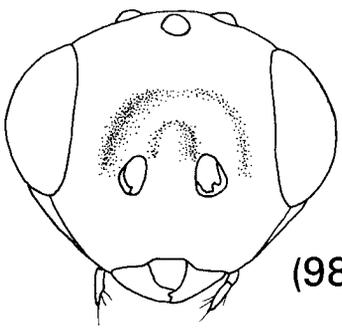
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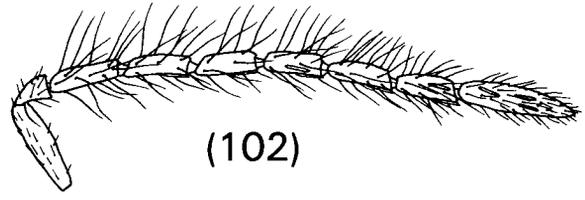
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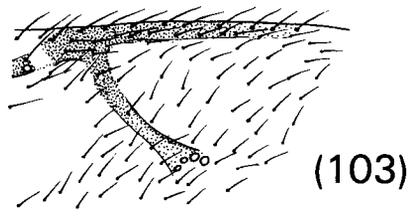
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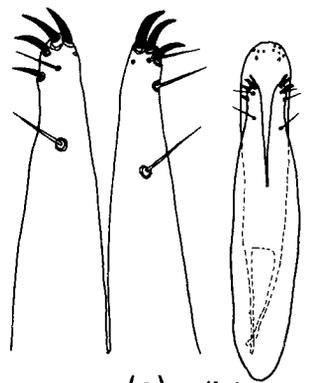
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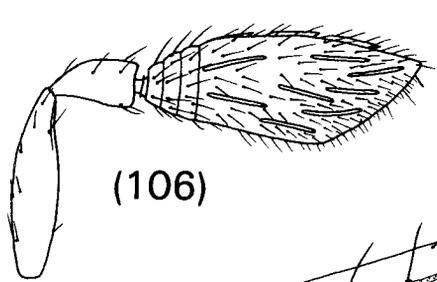
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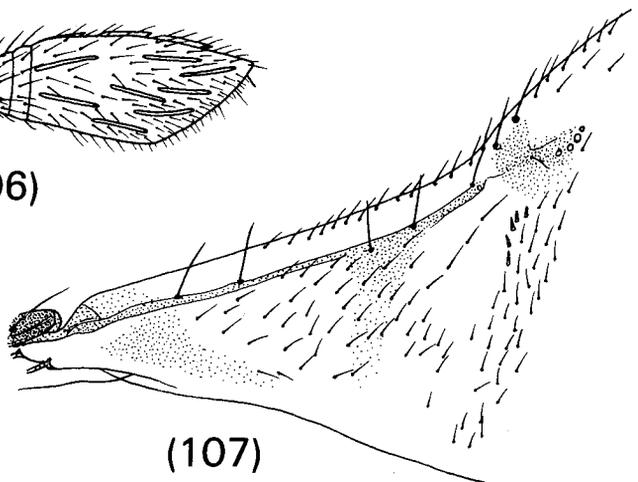
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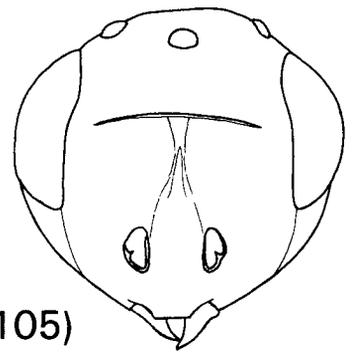
(104) (a) (b)



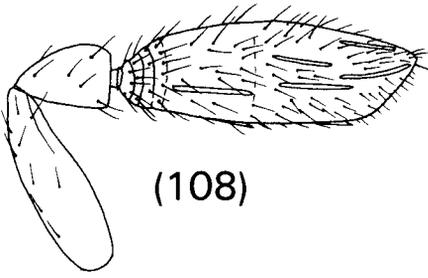
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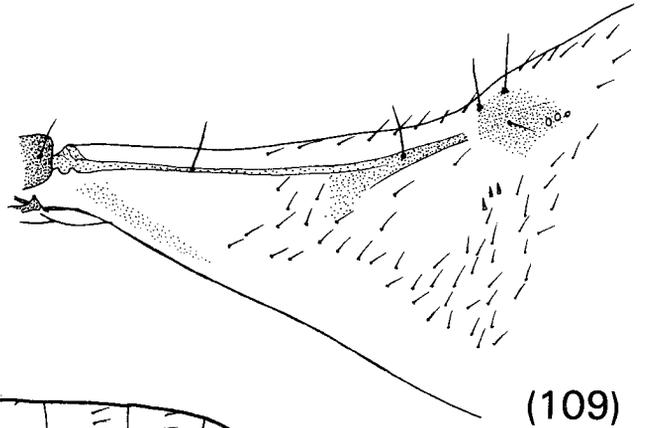
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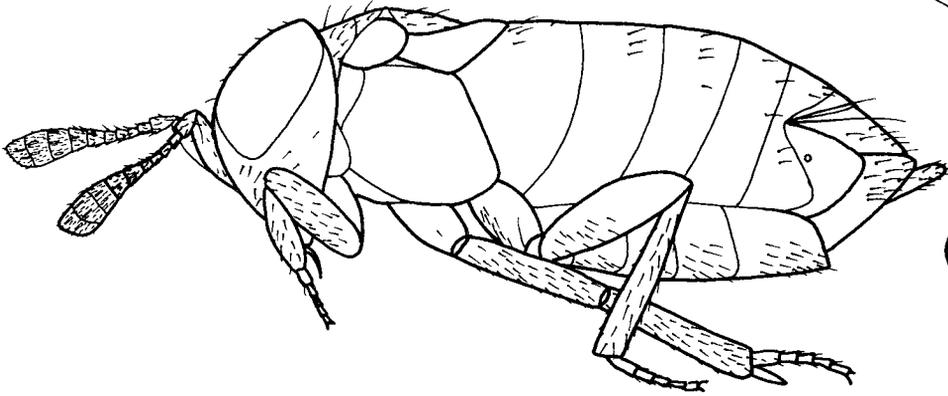
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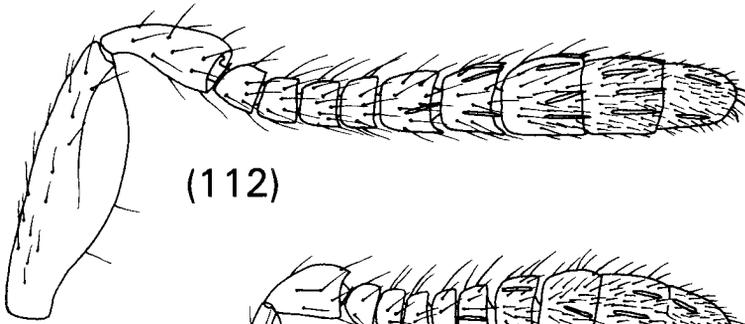
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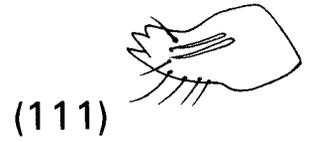
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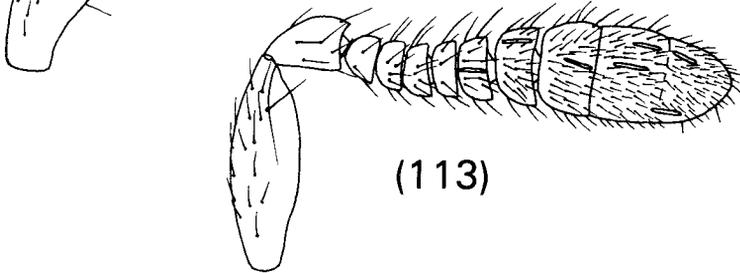
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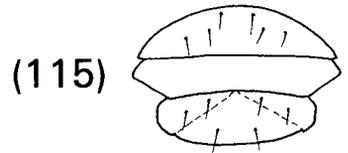
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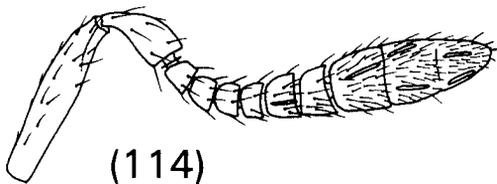
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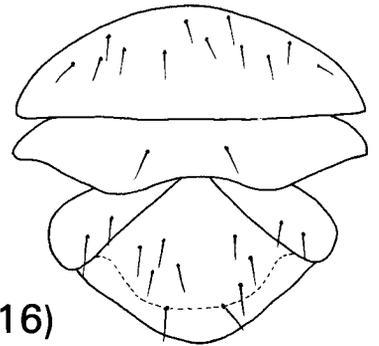
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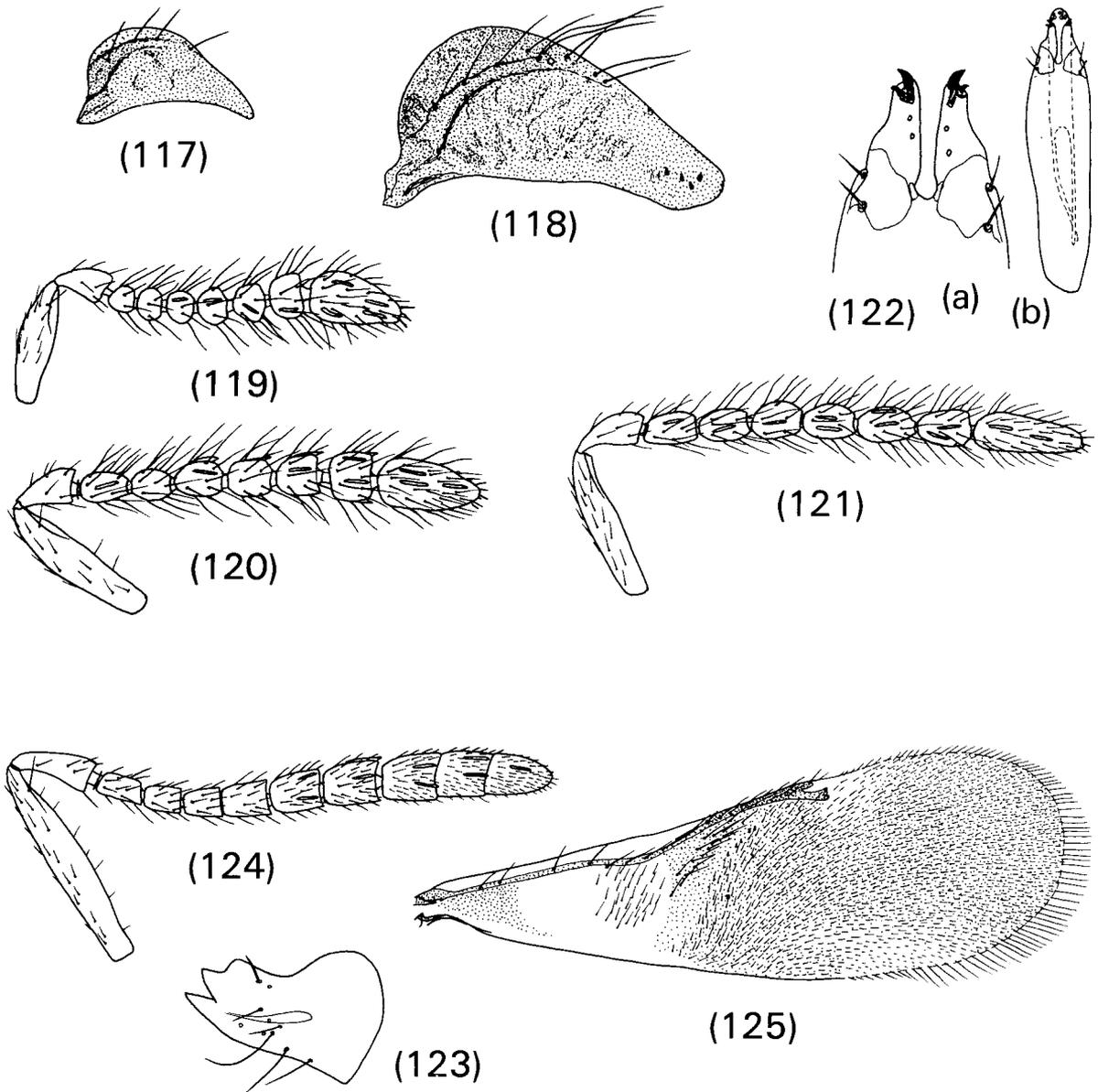
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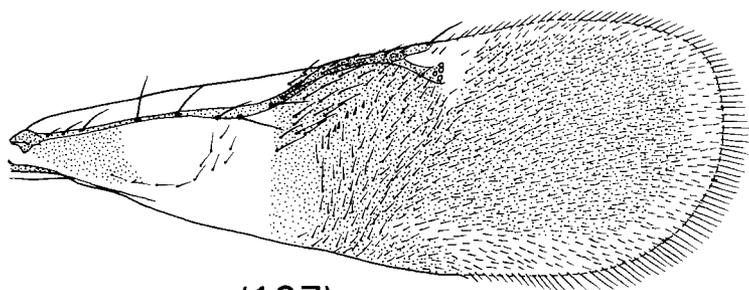
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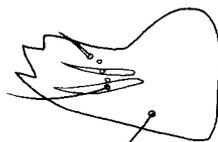
**Figures 108, 109** *Arrhenophagus chionaspidis*, female: (108) right antenna, outer aspect; (109) right forewing, upper surface, proximal area.

**Figures 110–122** *Austrochoreia antipodis*: (110) habitus, lateral - ♀ (drawn from card-mounted specimen); (111) left mandible - ♀; (112–114) right antenna, outer aspect, variants - ♀; (115, 116) pronotum, mesoscutum, and scutellum, variants - ♀; (117, 118) right forewing, upper surface, variants - ♀; (119–121) right antenna, outer aspect, variants - ♂; (122) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.

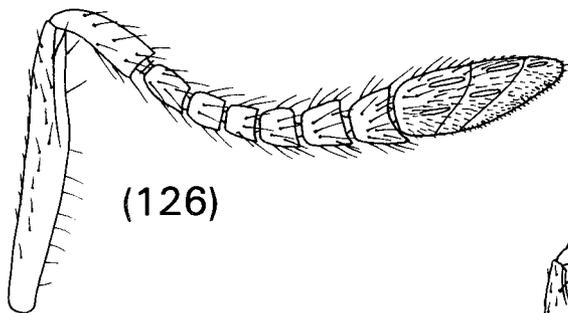
**Figures 123–125** *Cheiloneurus antipodis*, female: (123) left mandible; (124) right antenna, outer aspect; (125) right forewing, upper surface.



(127)



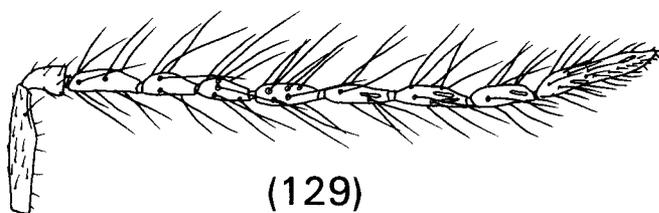
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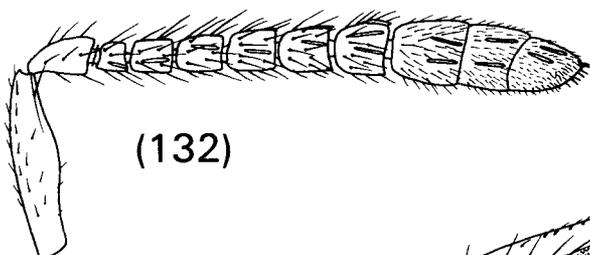
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(130)



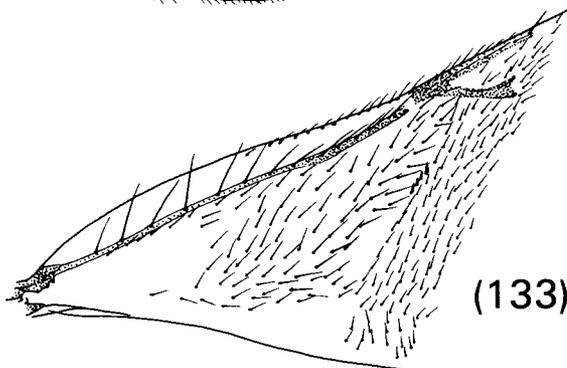
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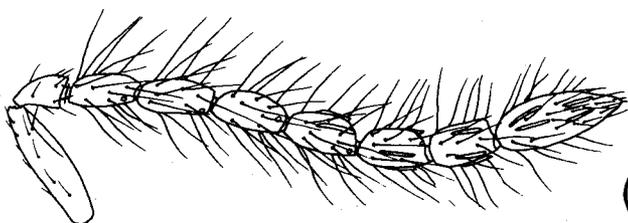
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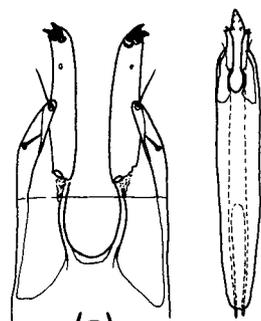
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(133)



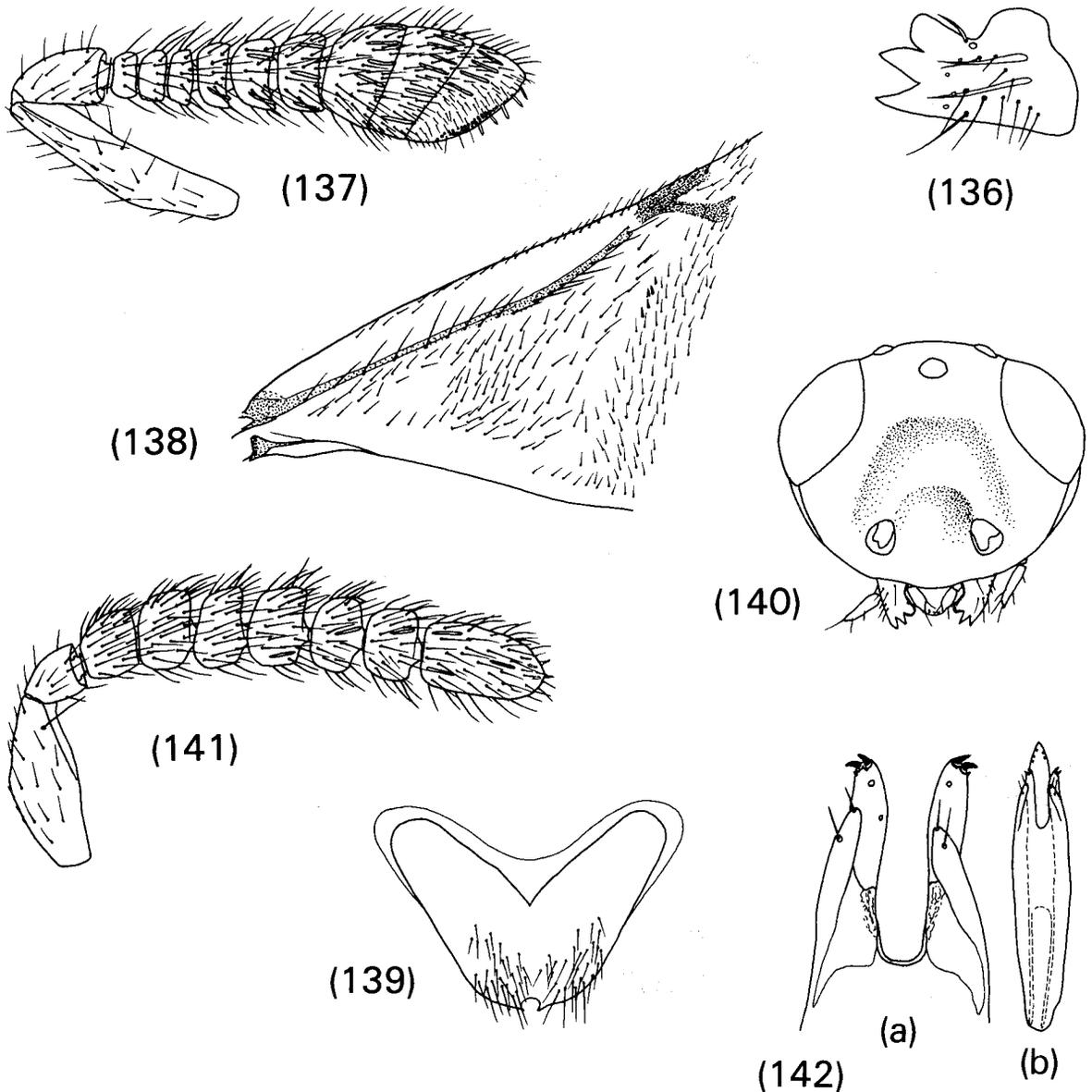
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(135)

(a)

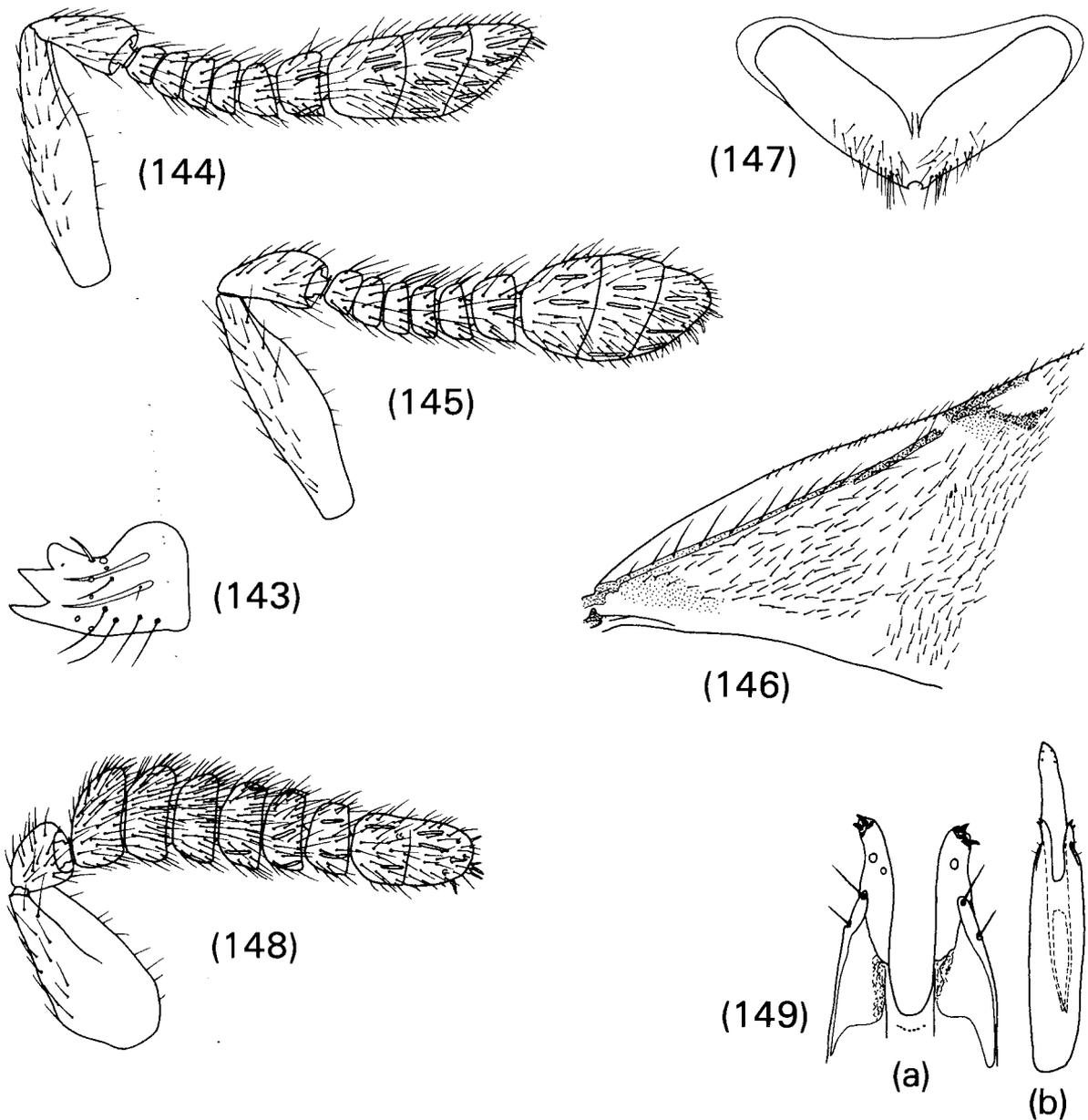
(b)



**Figures 126–130** *Cheiloneurus gonatopodis*: (126) right antenna, outer aspect - ♀; (127) right forewing, upper surface - ♀; (128) left mandible - ♂; (129) right antenna, outer aspect - ♂; (130) right forewing, upper surface, detail of distal venation - ♀.

**Figures 131–135** *Coccidoctonus dubius*: (131) left mandible - ♀; (132) right antenna, outer aspect - ♀; (133) right forewing, upper surface, proximal area - ♀; (134) right antenna, outer aspect - ♂; (135) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.

**Figures 136–142** *Coelopencyrtus australis*: (136) left mandible ♀; (137) right antenna, outer aspect - ♀; (138) right forewing, upper surface, proximal area - ♀; (139) hypopygium - ♀; (140) head, facial aspect - ♂; (141) right antenna, outer aspect - ♂; (142) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.

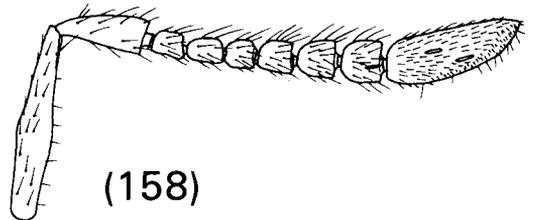
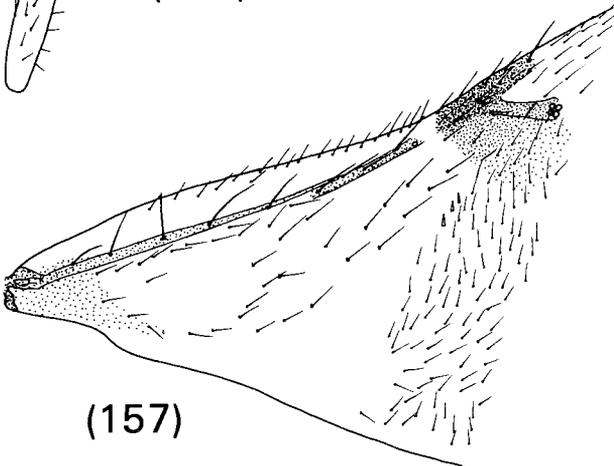
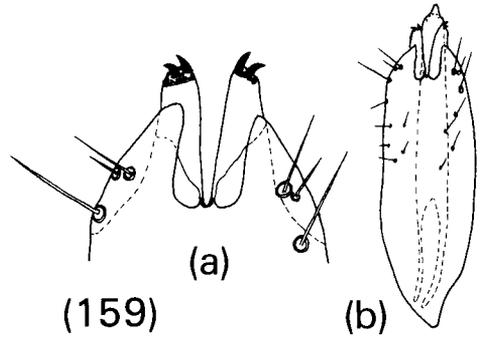
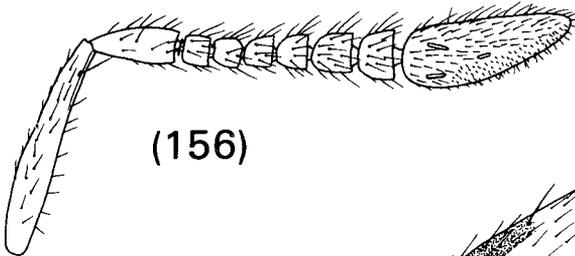
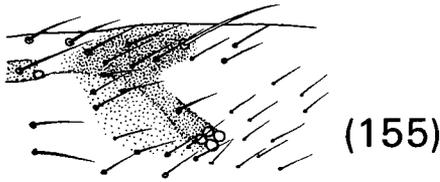
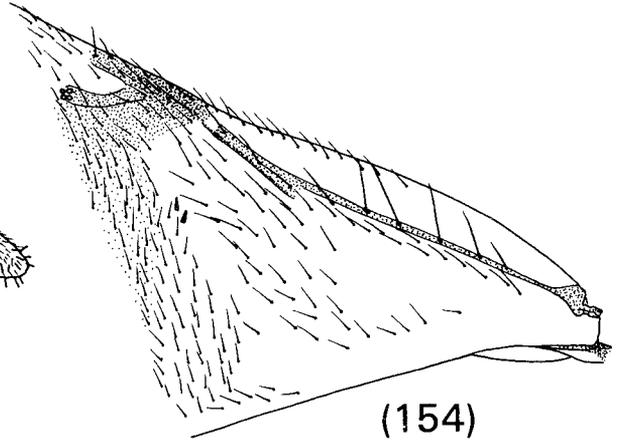
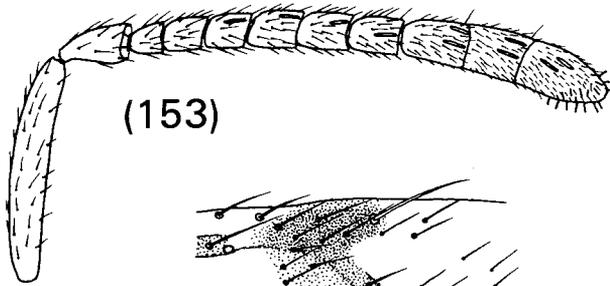
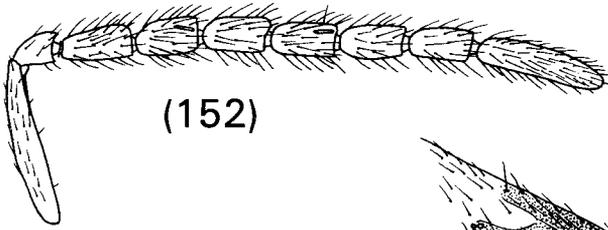
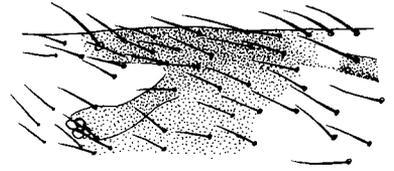
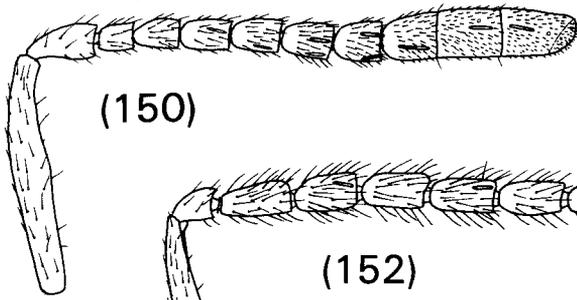


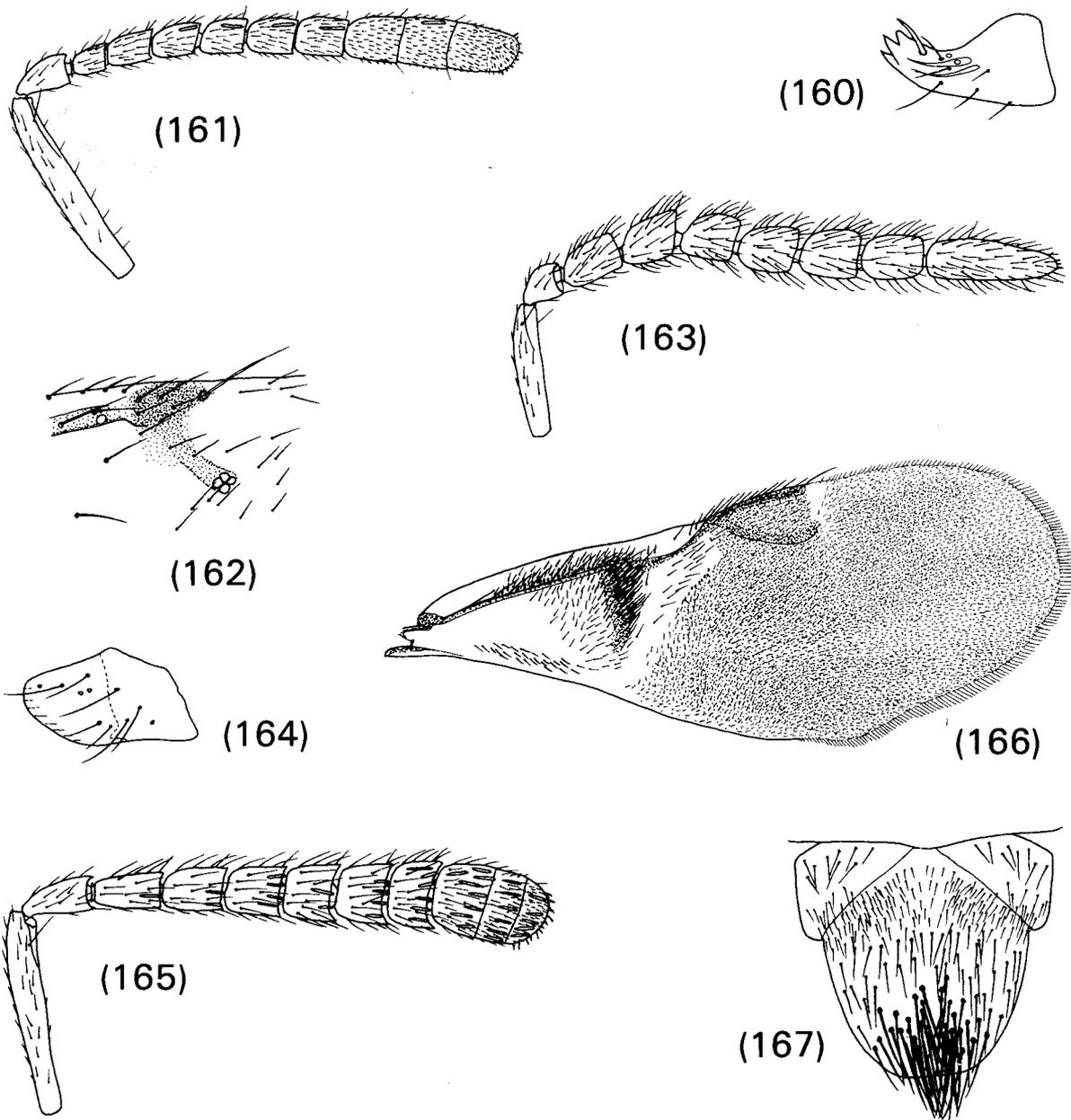
**Figures 143–149** *Coelopencyrtus maori*: (143) left mandible - ♀; (144, 145) right antenna, outer aspect - ♀ (145 with collapsed clava); (146) right forewing, upper surface, proximal area - ♀; (147) hypopygium - ♀; (148) right antenna, outer aspect - ♂; (149) genitalia, ♂ - (a) parameres and digits, (b) entire, ventral aspect.

**Figures 150–152** *Copidosoma desantisi*: (150) right antenna, outer aspect - ♀; (151) right forewing, upper surface, detail of distal venation ♀; (152) right antenna, outer aspect - ♂.

**Figures 153–155** *Copidosoma exvallis*, female: (153) right antenna, outer aspect; (154, 155) left forewing, upper surface, proximal area, and detail of distal venation.

**Figures 156–159** *Copidosoma floridanum*: (156) right antenna, outer aspect - ♀; (157) right forewing, upper surface, proximal area - ♀; (158) right antenna, outer aspect - ♂; (159) genitalia, ♂ - (a) parameres and digits, (b) entire, ventral surface.

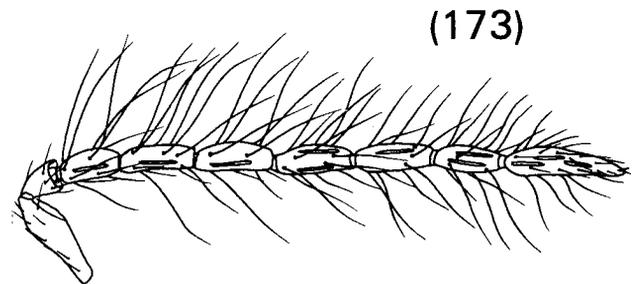
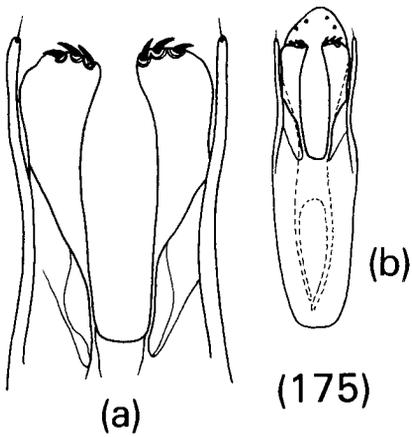
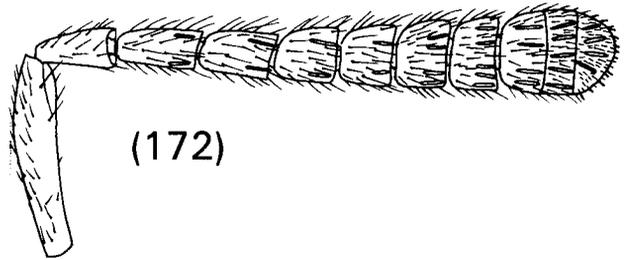
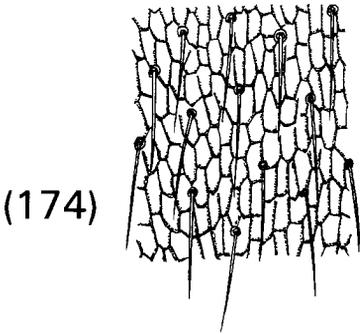
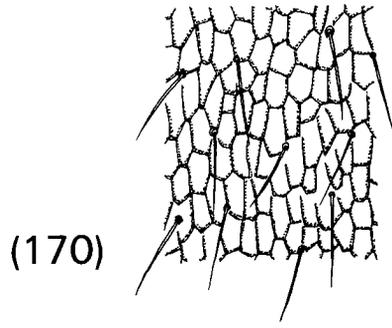
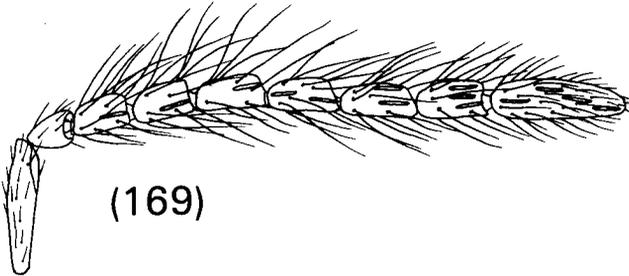
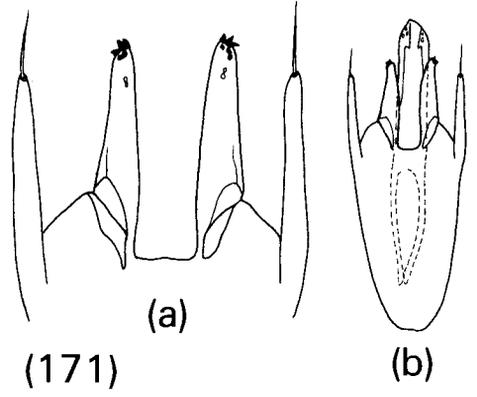
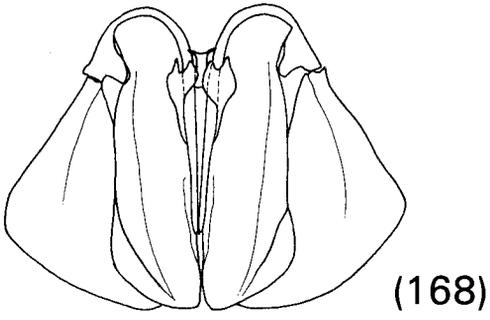


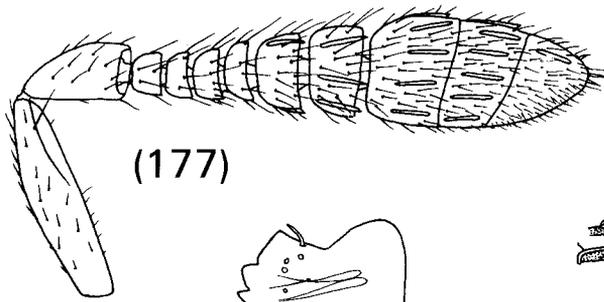


**Figures 160–163** *Copidosoma koehleri*: (160) left mandible - ♀; (161) right antenna, outer aspect - ♀; (162) right forewing, upper surface, detail of distal venation - ♀; (163) right antenna, outer aspect - ♂.

**Figures 164–171** *Encyrtus infelix*: (164) left mandible - ♀; (165) right antenna, outer aspect - ♀; (166) right forewing, upper surface - ♀; (167) scutellum - ♀; (168) genitalia - ♀; (169) right antenna, outer aspect - ♂; (170) sculpture, mid mesoscutum - ♂ (area c. 0.1 mm square); (171) genitalia, ♂ - (a) parameres and digits, (b) entire, ventral aspect.

**Figures 172–175** *Encyrtus lecaniorum*: (172, 173) right antenna, outer aspect - ♀ and ♂; (174) sculpture, mid mesoscutum - ♂ (area c. 0.1 mm square); (175) genitalia, ♂ - (a) parameres and digits, (b) entire, ventral aspect.

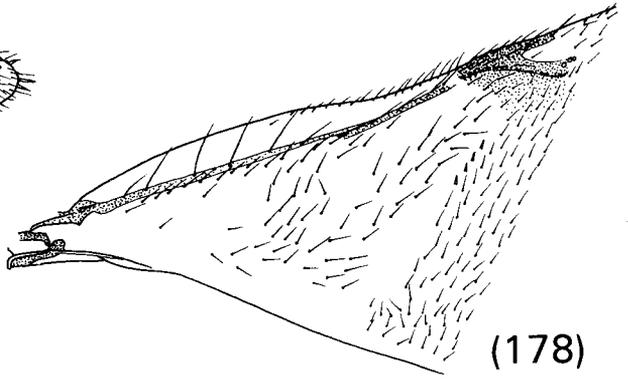




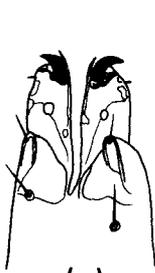
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(176)



(178)



(a)

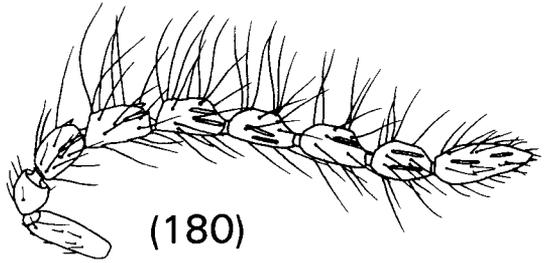


(b)

(181)



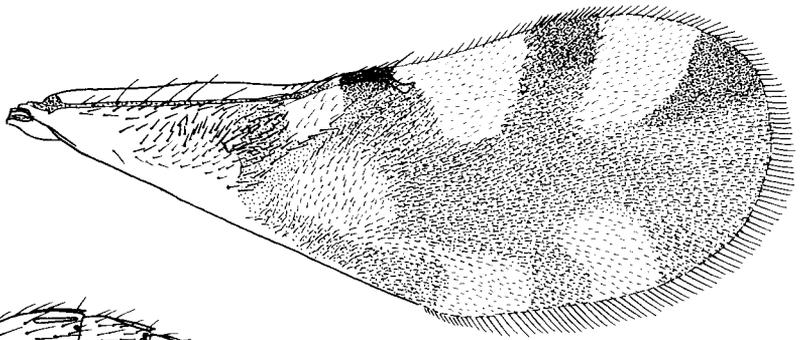
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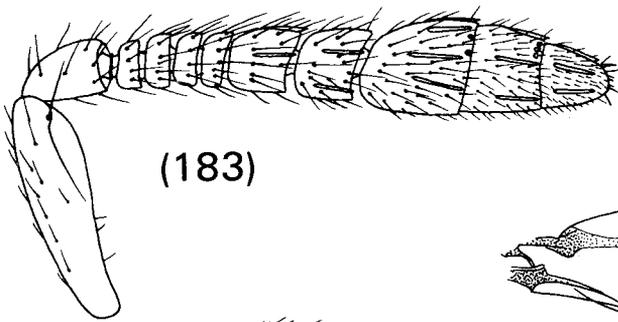
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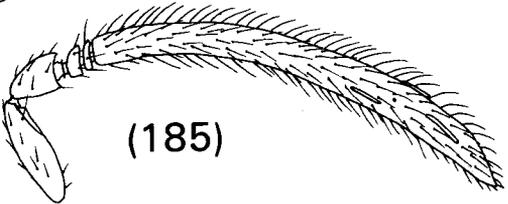
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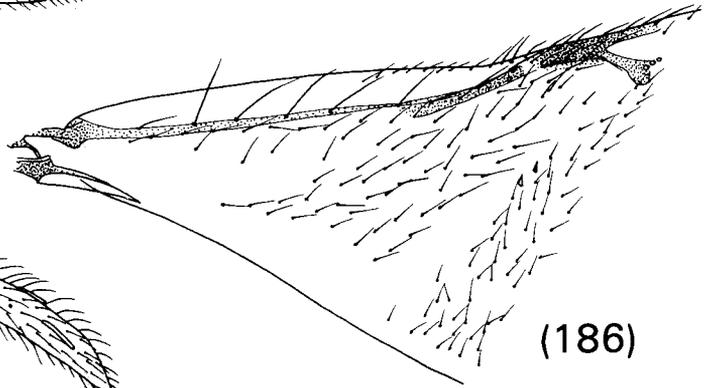
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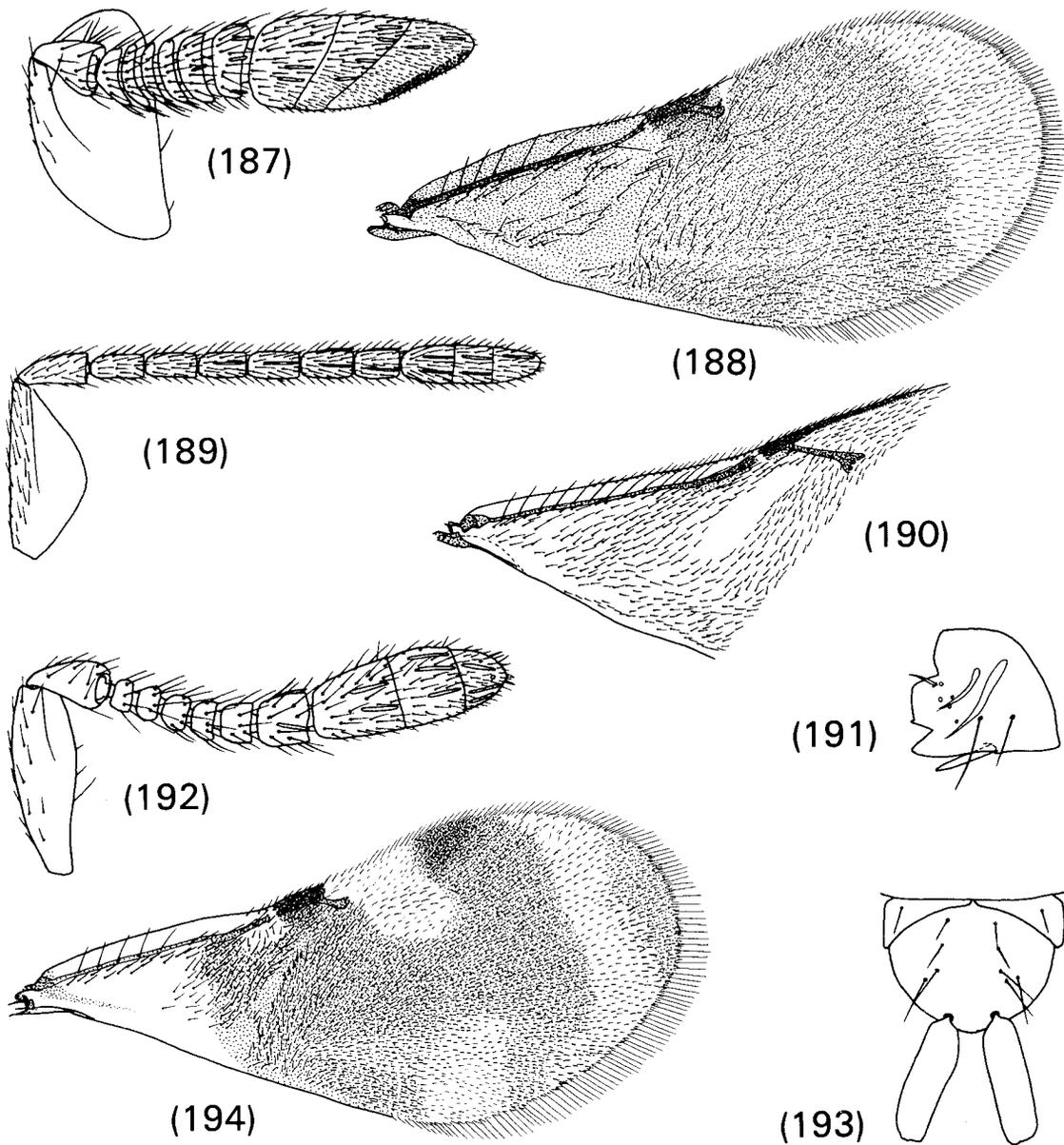
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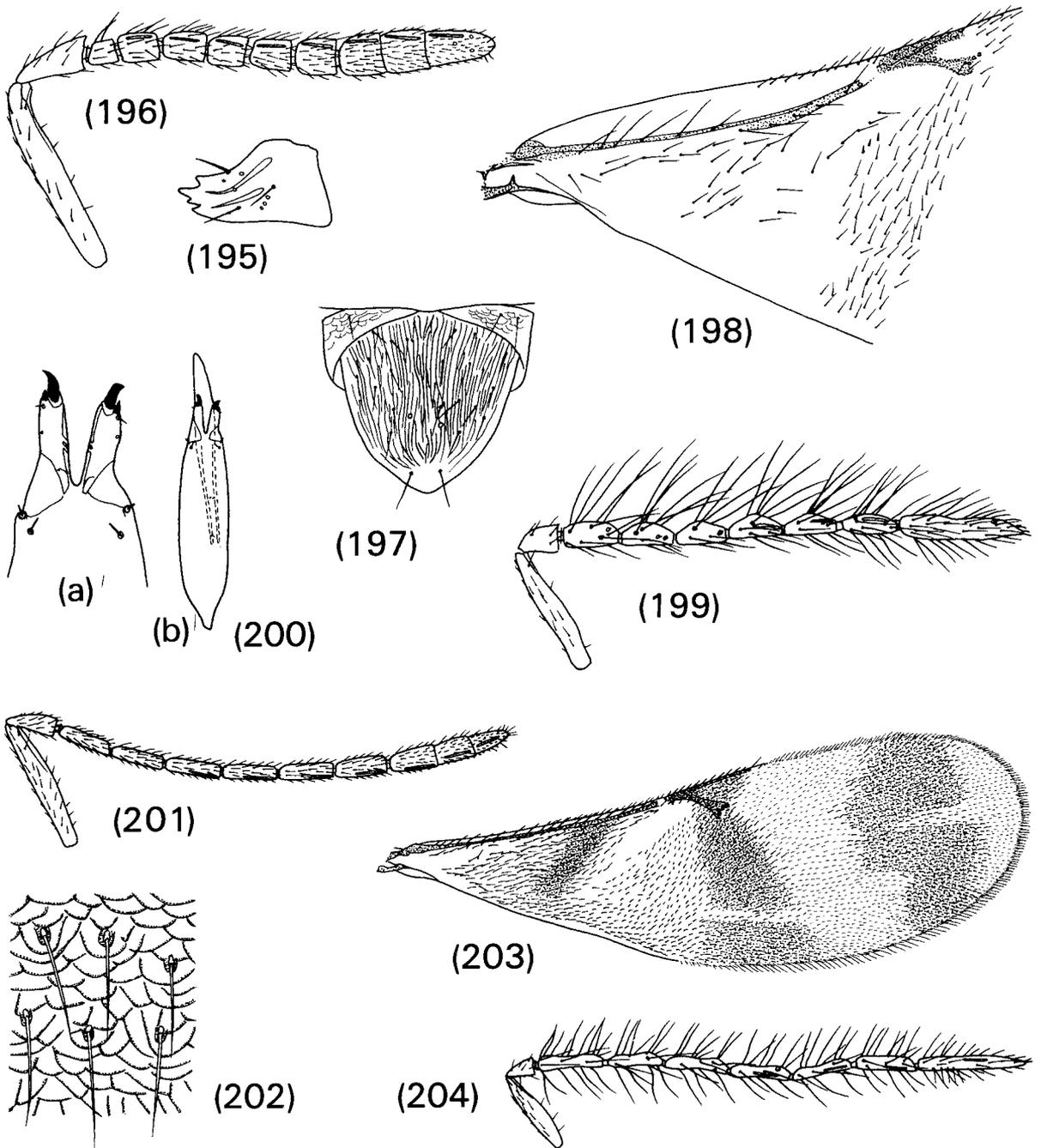
**Figures 176–181** *Epiblatticida minutissima*: (176) left mandible ♀; (177) right antenna, outer aspect - ♀; (178) right forewing, upper surface, proximal area - ♀; (179) left mandible - ♂; (180) right antenna, outer aspect - ♂; (181) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.

**Figures 182–186** *Epitetracnemus zetterstedtii*: (182) left mandible - ♀; (183) right antenna, outer aspect - ♀; (184) right forewing, upper surface - ♀; (185) right antenna, outer aspect - ♂; (186) right forewing, upper surface, proximal area - ♂.

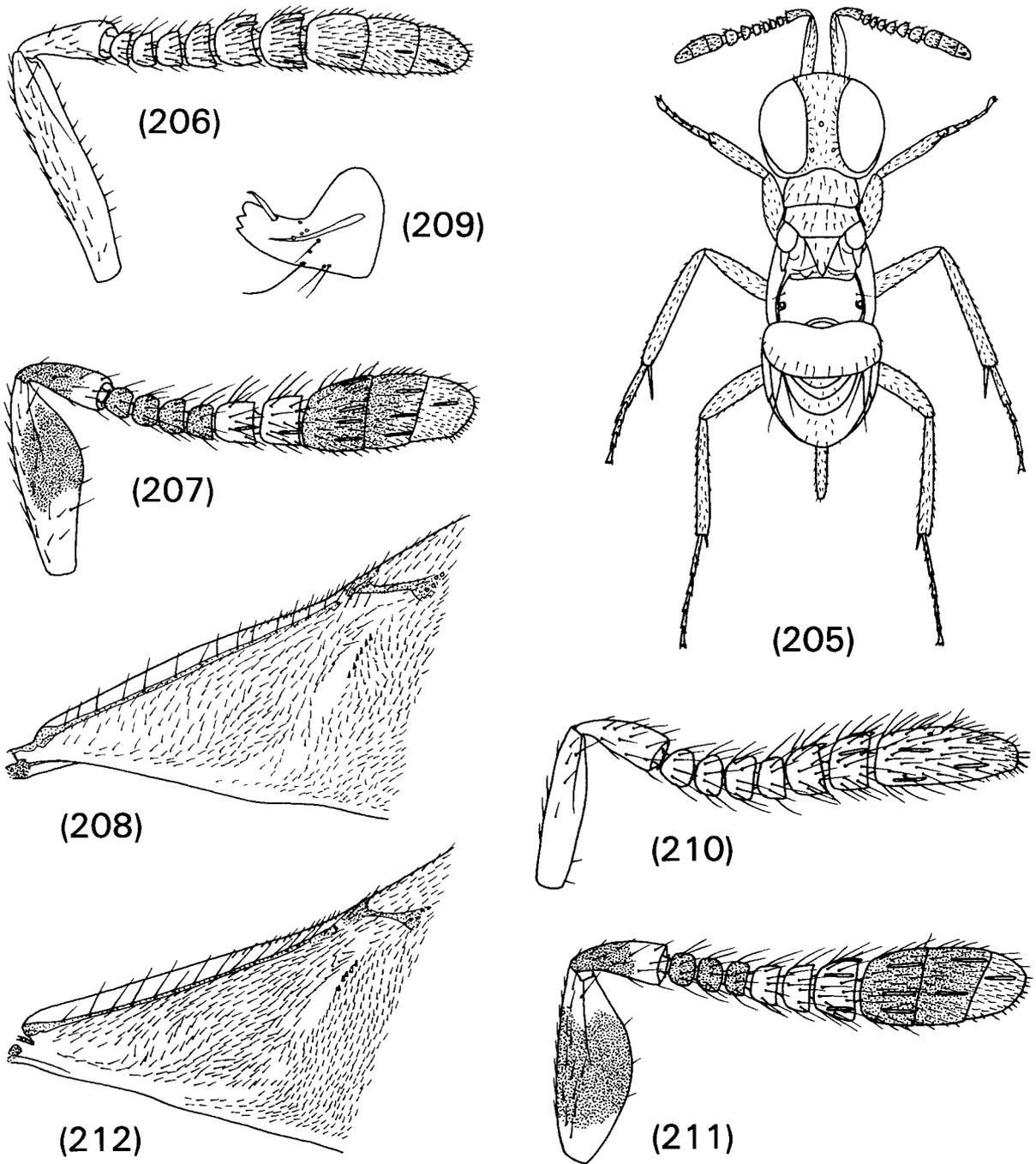
**Figures 187, 188** *Eusemion cornigerum*, female: (187) right antenna, outer aspect; (188) right forewing, upper surface.

**Figures 189, 190** *Gyranusoidea advena*, female: (189) right antenna, outer aspect; (190) right forewing, upper surface.

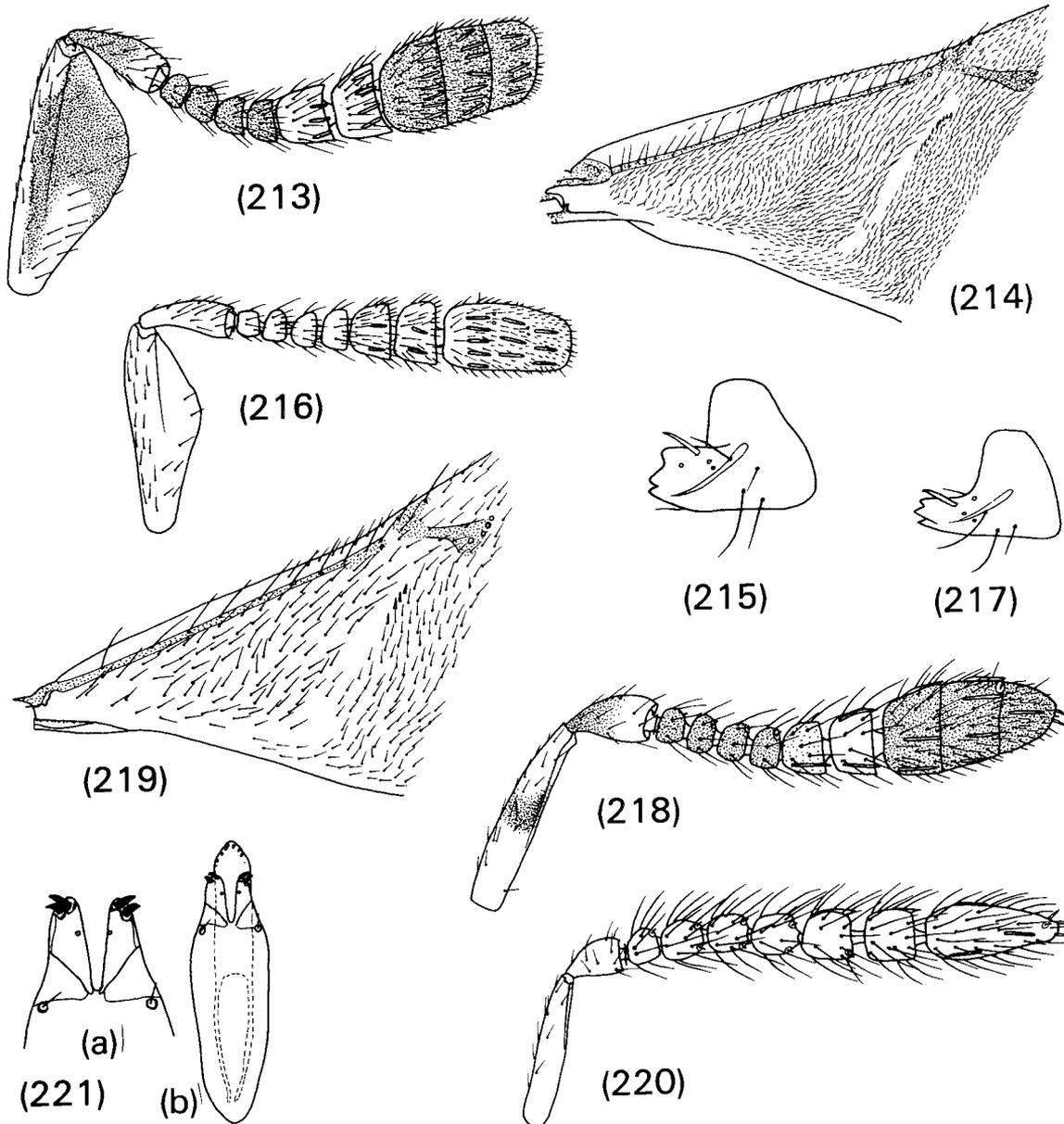
**Figures 191–194** *Habrolepis dalmanni*, female: (191) left mandible; (192) right antenna, outer aspect; (193) scutellum, showing lamelliiform setae at apex; (194) right forewing, upper surface.



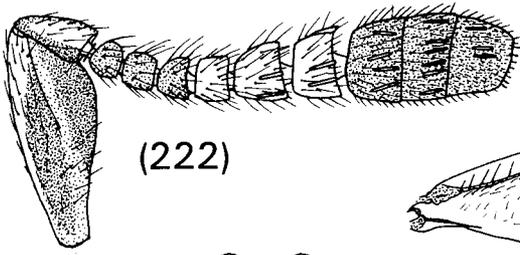
**Figures 195–200** *Lamennaisia ambigua*: (195) left mandible - ♀; (196) right antenna, outer aspect - ♀; (197) scutellum - ♀, showing striate sculpture; (198) right forewing, upper surface, proximal area - ♀; (199) right antenna, outer aspect - ♂; (200) genitalia, ♂ - (a) parameres and digits, (b) entire, ventral aspect.  
**Figures 201–204** *Leptomastidea abnormis*: (201) right antenna, outer aspect - ♀; (202) sculature, mid mesoscutum - ♀ (area c. 0.07 mm square); (203) right forewing, upper surface - ♀; (204) right antenna, outer aspect - ♂.



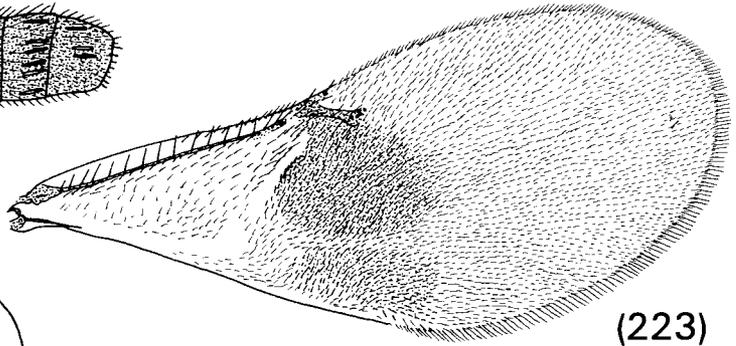
**Figures 205, 206** *Metanotalia maderensis*, female: (205) habitus, dorsal; (206) right antenna, outer aspect.  
**Figures 207–210** *Metaphycus aurantiacus*: (207) right antenna, outer aspect - ♀, showing colour pattern; (208) right forewing, upper surface, proximal area - ♀; (209) left mandible - ♂; (210) right antenna, outer aspect - ♂.  
**Figures 211, 212** *Metaphycus claviger*, female: (211) right antenna, outer aspect, showing colour pattern; (212) right forewing, upper surface, proximal area.



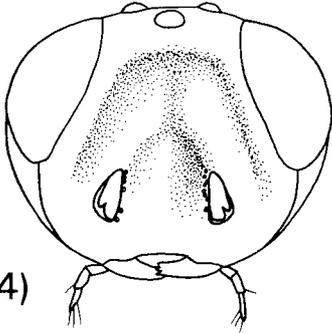
**Figures 213–216** *Metaphycus lounsburyi*: (213) right antenna, outer aspect - ♀, showing colour pattern; (214) right forewing, upper surface, proximal area - ♀; (215) left mandible - ♂; (216) right antenna, outer aspect - ♂.  
**Figures 217–221** *Metaphycus reductor*: (217) left mandible - ♀; (218) right antenna, outer aspect - ♀, showing colour pattern; (219) right forewing, upper surface, proximal area - ♀; (220) right antenna, outer aspect - ♂; (221) genitalia, ♂ - (a) parameres and digits, (b) entire, ventral aspect.  
**Figures 222–225** *Metaphycus timberlakei*: (222) right antenna, outer aspect - ♀, showing colour pattern; (223) right forewing, upper surface - ♀; (224) head, facial aspect - ♂; (225) right antenna, outer aspect - ♂.  
**Figures 226–232** *Microterys flavus*: (226) head, facial aspect - ♀; (227) left mandible - ♀; (228) right antenna, outer aspect - ♀; (229) right forewing, upper surface - ♀; (230) right antenna, outer aspect - ♂; (231) right forewing, upper surface, detail of distal venation - ♂; (232) genitalia, ♂ - (a) parameres and digits, (b) entire, ventral aspect.



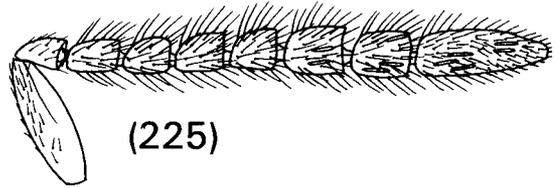
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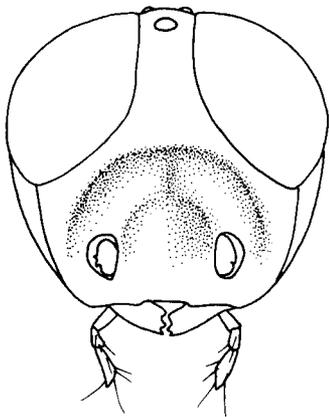
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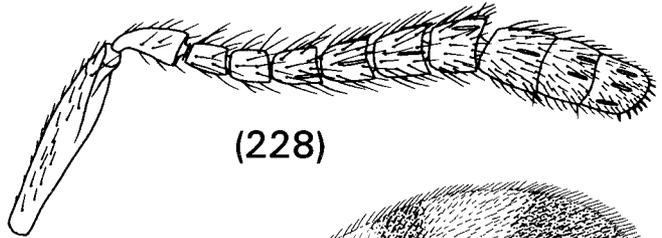
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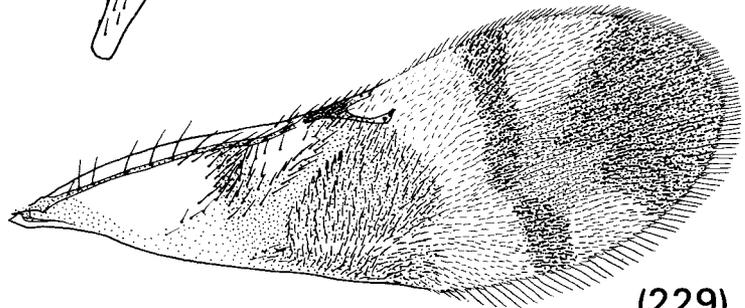
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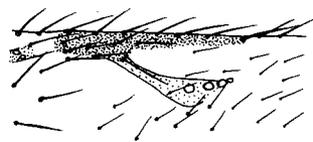
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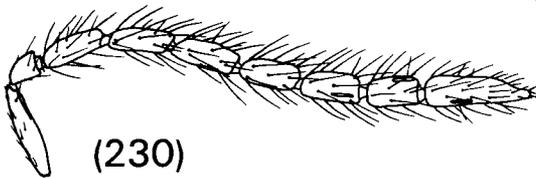
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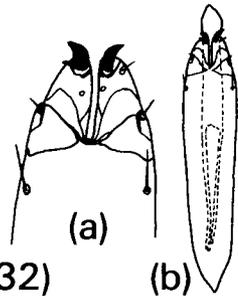
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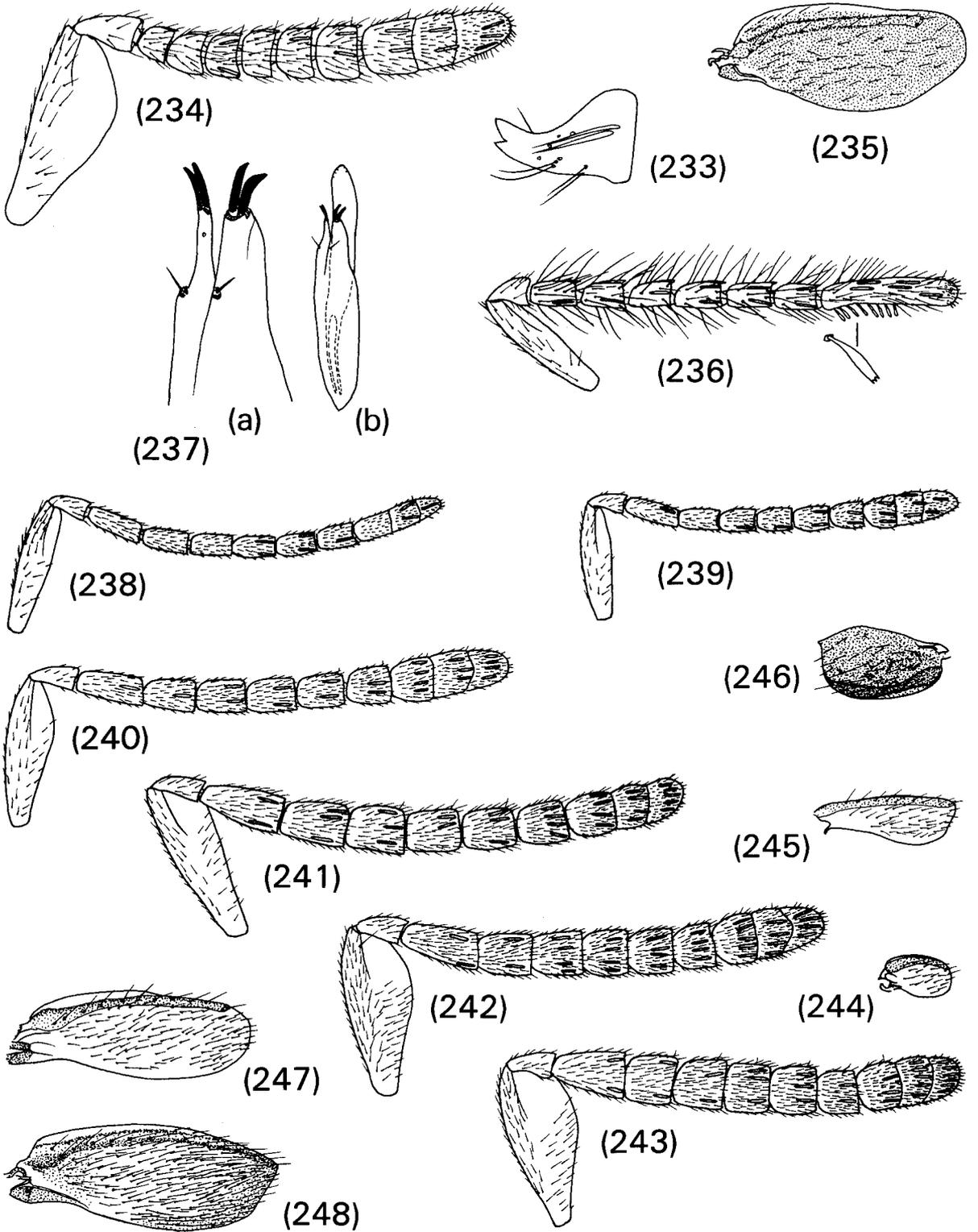


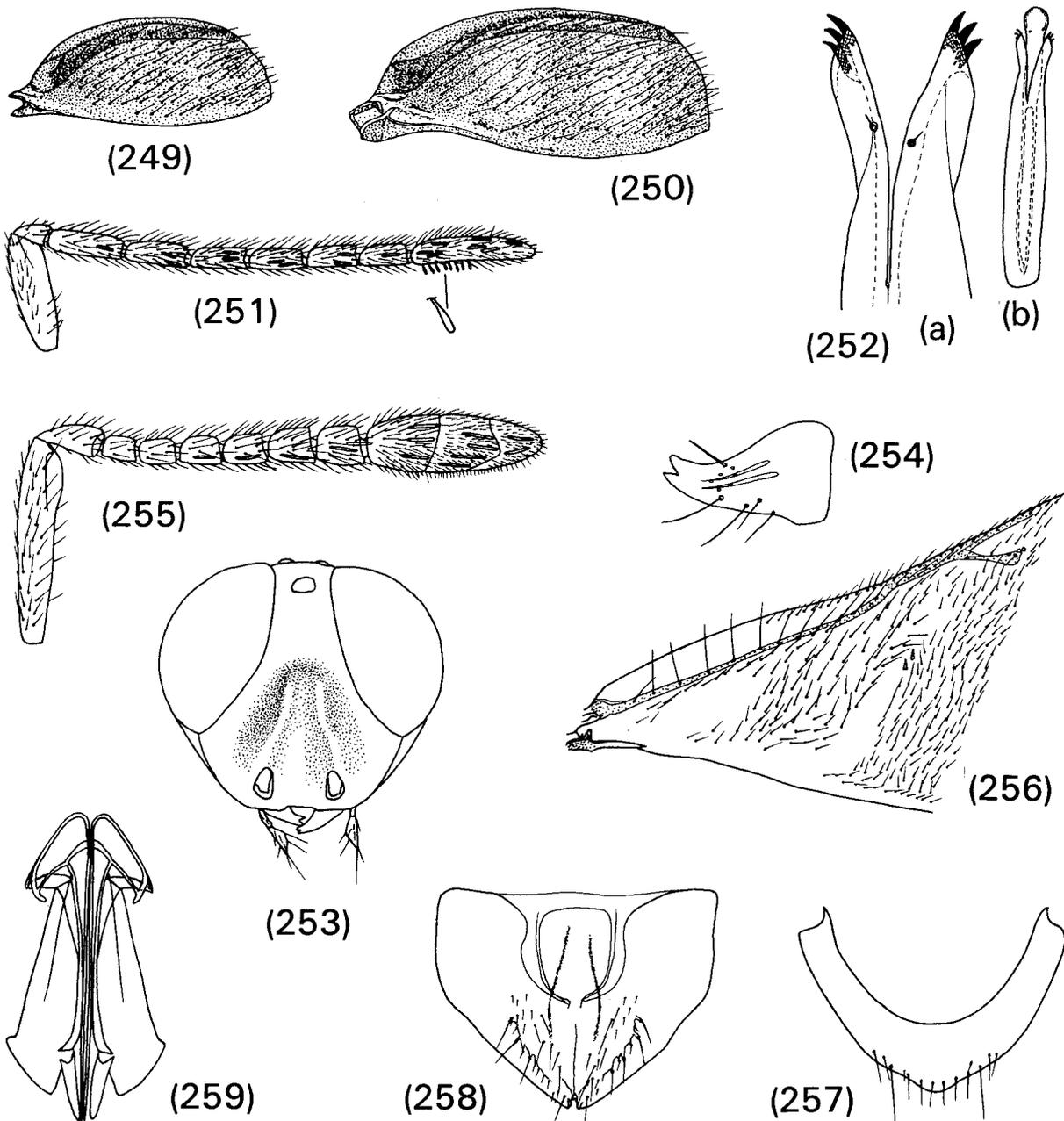
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(232) (a)

(b)

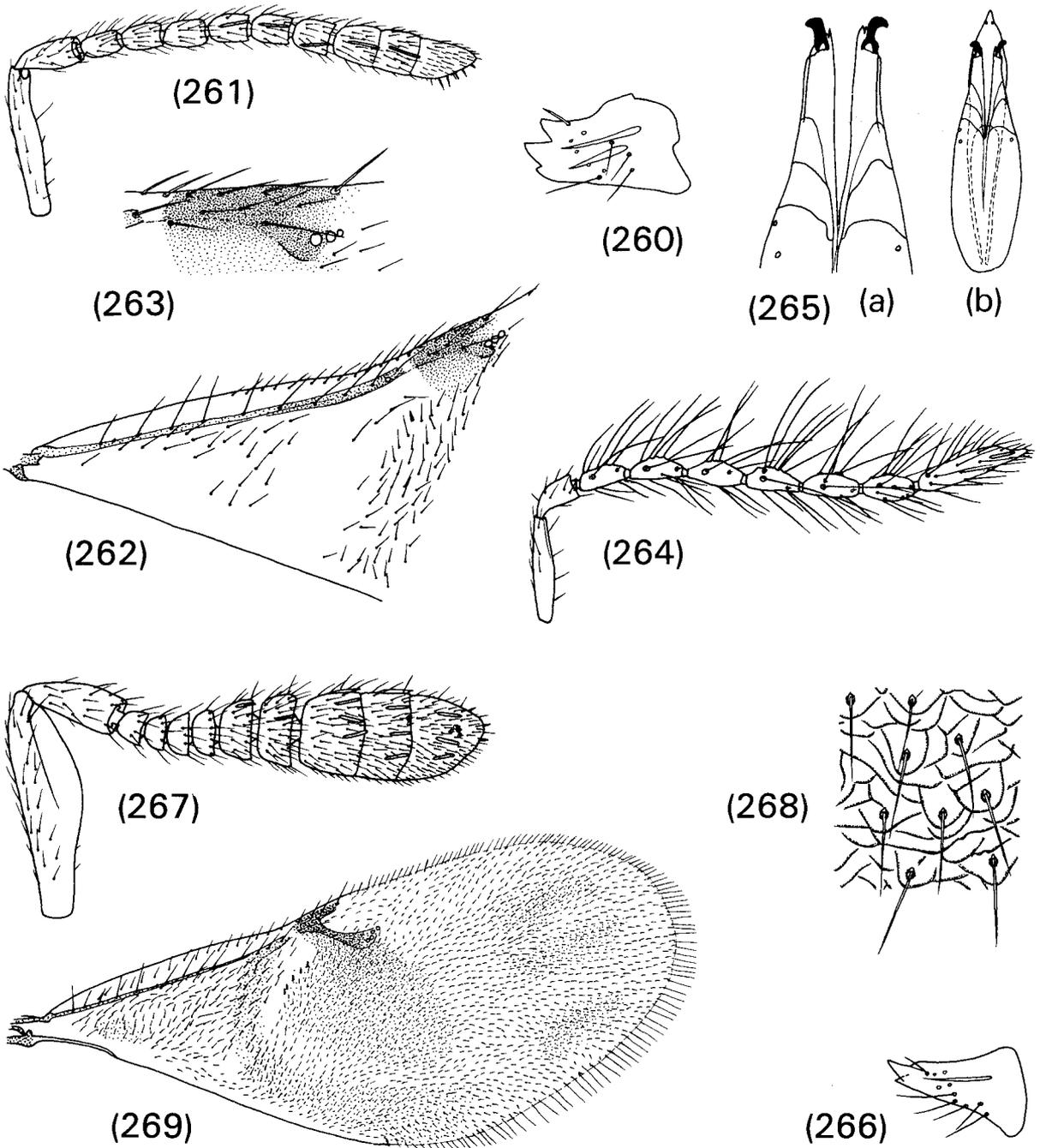




**Figures 233–237** *Notodusmetia coroneti*: (233) left mandible - ♀; (234) right antenna, outer aspect - ♀; (235) right forewing, upper surface ♀; (236) right antenna, outer aspect - ♂; (237) genitalia, ♂ - (a) parameres and digiti, (b) entire, lateroventral aspect.

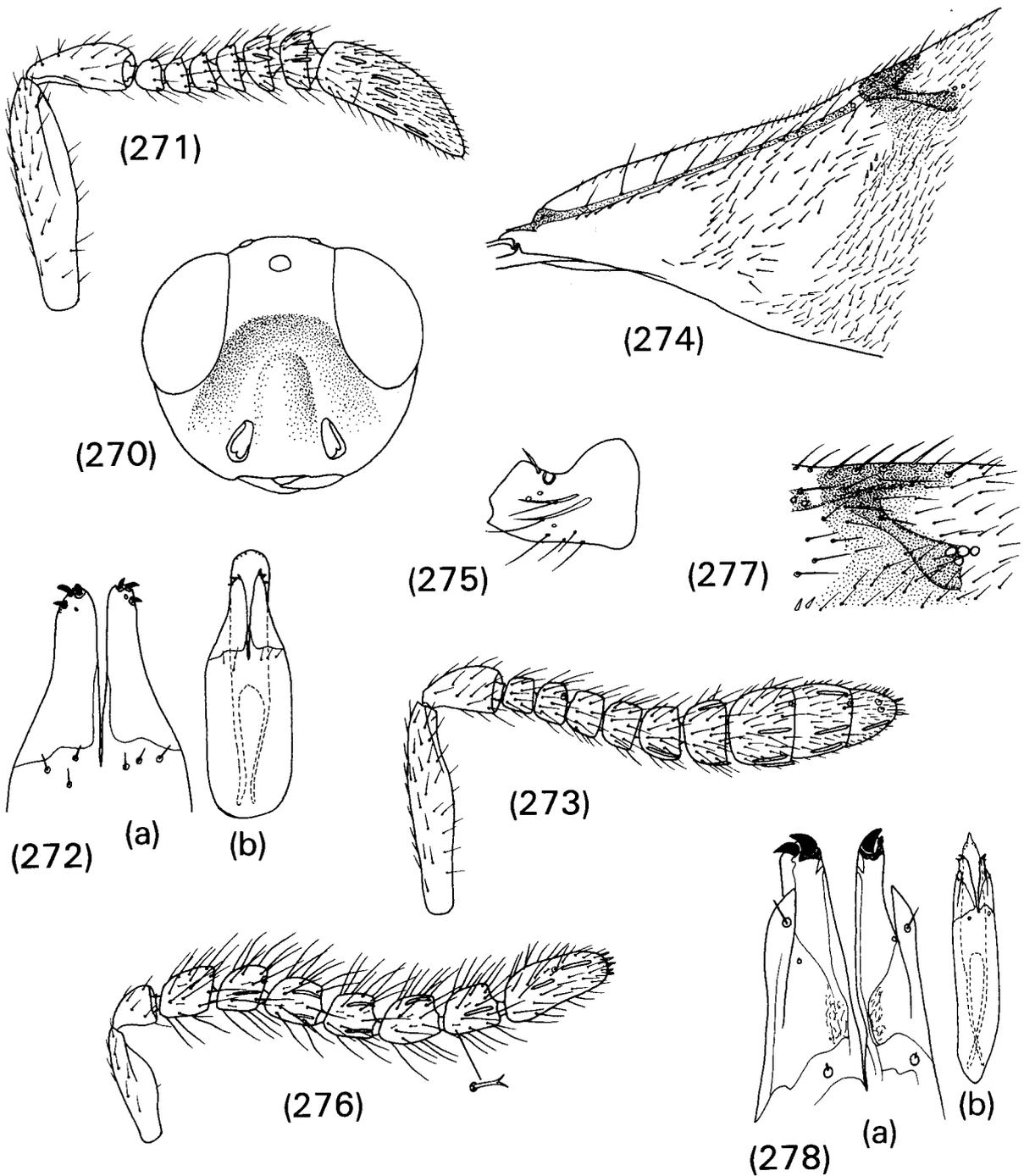
**Figures 238–252** *Odiaglyptus biformis*: (238–243) right antenna, outer aspect, variants - ♀; (244–250) right forewing, upper surface, variants - ♀; (251) right antenna, outer aspect - ♂; (252) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.

**Figures 253–259** *Parectromoides varipes*, female: (253) head, facial aspect; (254) left mandible; (255) right antenna, outer aspect; (256) right forewing, upper surface, proximal area; (257) last tergite; (258) hypopygium; (259) genitalia.



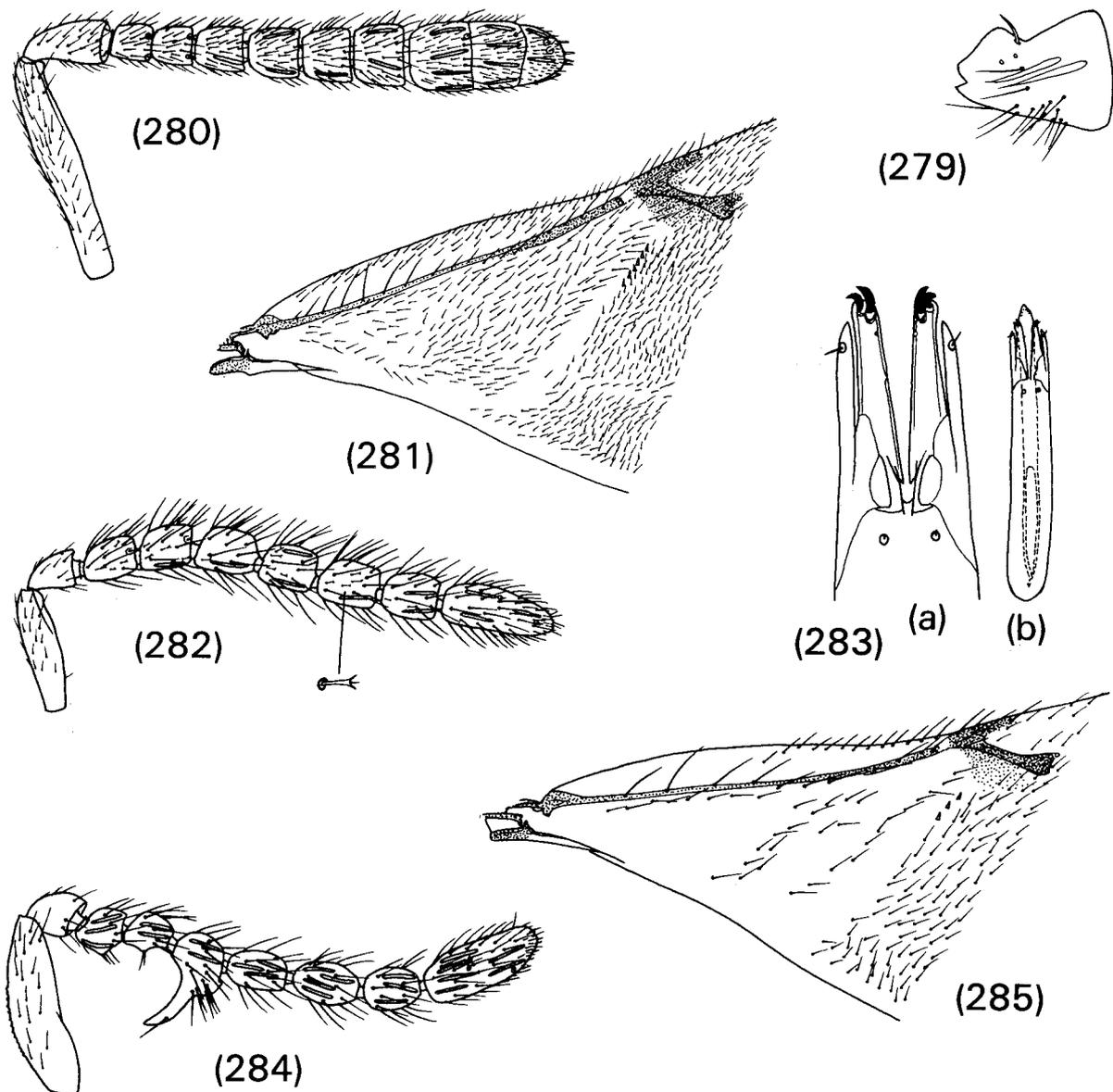
**Figures 260–265** *Protyndarichoides cinctiventris*: (260) left mandible - ♀; (261) right antenna, outer aspect - ♀; (262, 263) right forewing, upper surface, proximal area, and detail of distal venation - ♀; (264) right antenna, outer aspect - ♂; (265) genitalia, ♂ - (a) digiti and distal part of phallobase, (b) entire, ventral aspect.

**Figures 266–272** *Pseudococcobius annulipes*: (266) left mandible - ♀; (267) right antenna, outer aspect - ♀; (268) sculpture, mid mesoscutum - ♀ (area c. 0.08 mm square); (269) right forewing, upper surface - ♀; (270) head, facial



aspect - ♂; (271) right antenna, outer aspect - ♂; (272) genitalia, ♂ - (a) digiti and distal part of phallobase, (b) entire, ventral aspect.

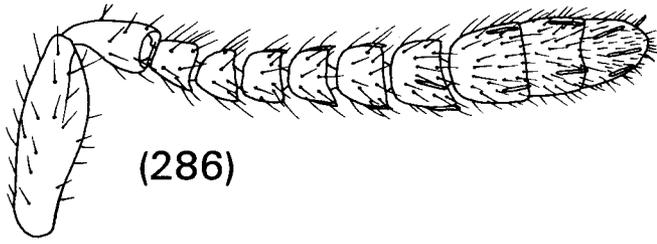
**Figures 273–278** *Psyllaephagus acaciae*: (273) right antenna, outer aspect - ♀; (274) right forewing, upper surface - ♀; (275) left mandible - ♂; (276) right antenna, outer aspect - ♂; (277) right forewing, upper surface, details of distal venation - ♂; (278) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.



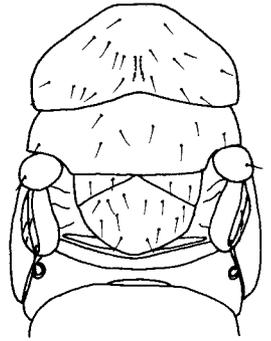
**Figures 279–283** *Psyllaephagus pilosus*: (279) left mandible - ♀; (280) right antenna, outer aspect - ♀; (281) right forewing, upper surface, proximal area - ♀; (282) right antenna, outer aspect - ♂; (283) genitalia - ♂, (a) parameres and digiti, (b) entire, ventral aspect.

**Figures 284, 285** *Psyllaephagus* sp. A, male: (284) right antenna, outer aspect; (285) right forewing, upper surface, proximal area.

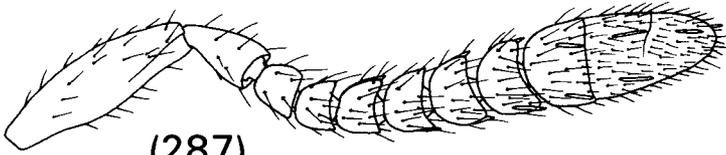
**Figures 286–295** *Rhopus anceps*: (286, 287) right antenna, outer aspect, variants - ♀; (288) thorax, dorsal view - ♀; (289) right forewing, upper surface - ♀; (290) genitalia, left inner aspect - ♀; (291–294) right antenna, outer aspect, variants - ♂; (295) genitalia, ♂ - (a) parameres and digiti, (b) whole, ventral aspect.



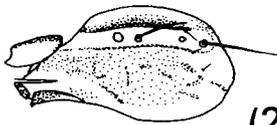
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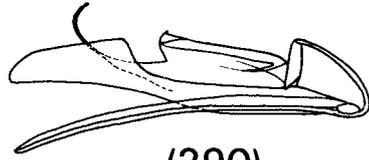
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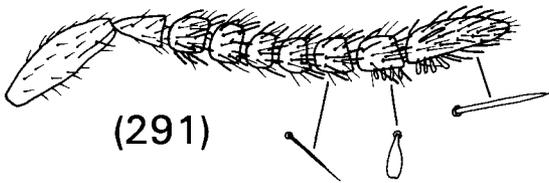
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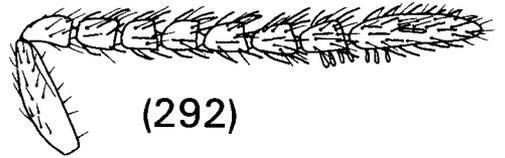
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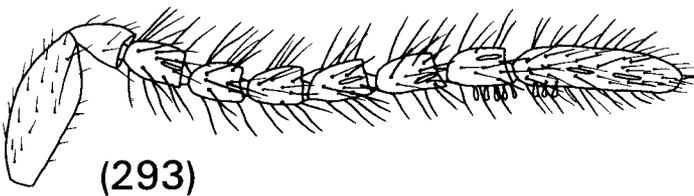
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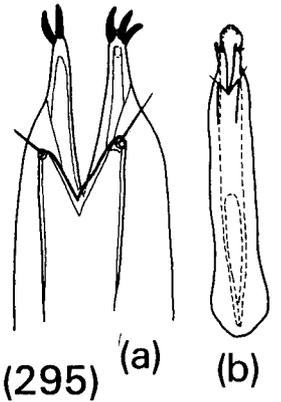
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(292)



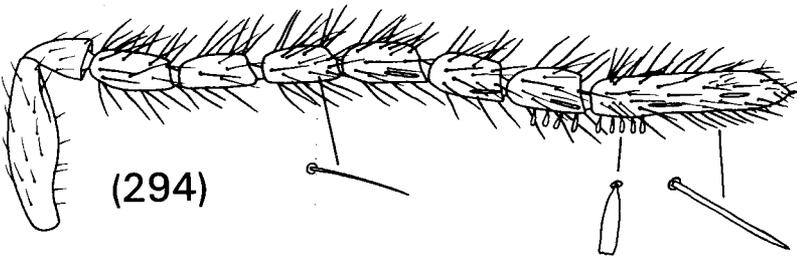
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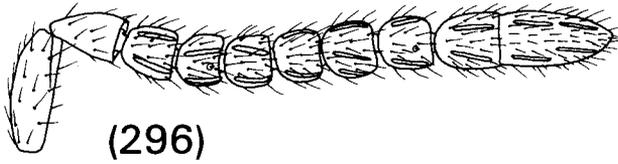
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(a)

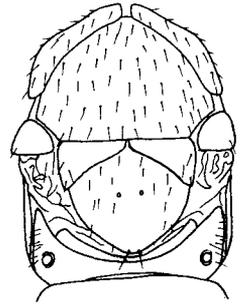
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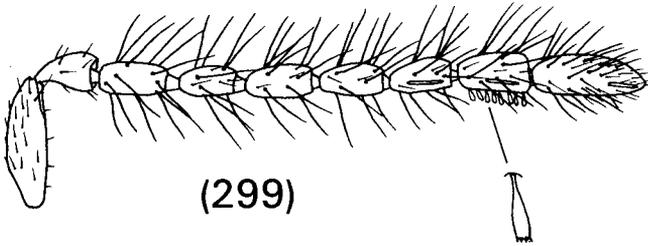
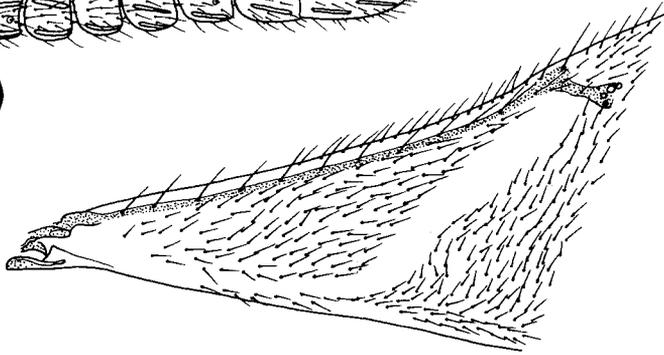


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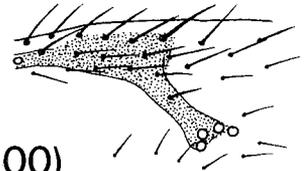


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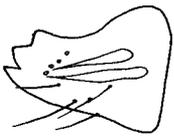
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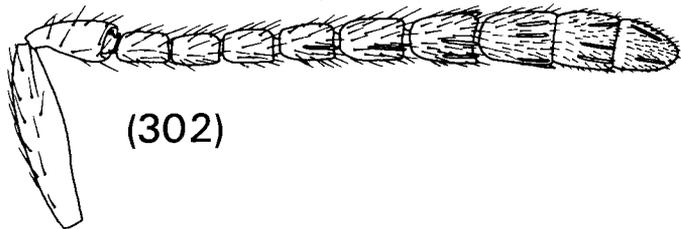
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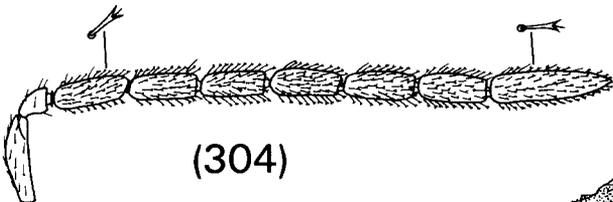
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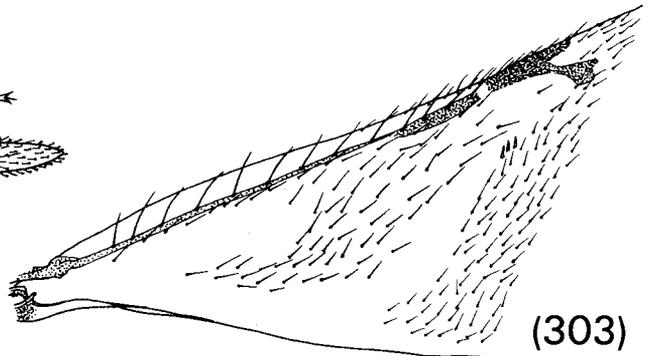
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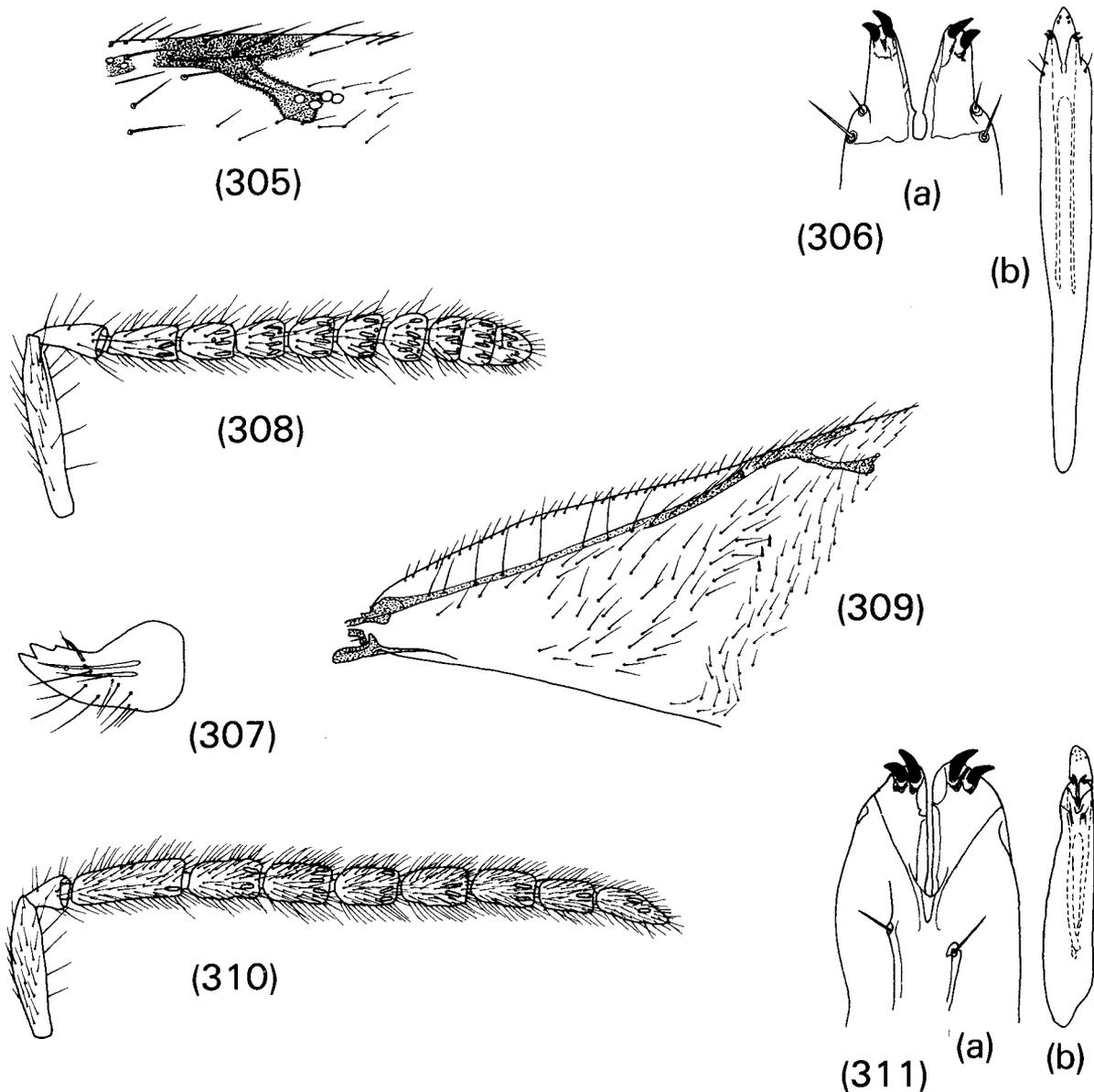
(302)



(304)



(303)

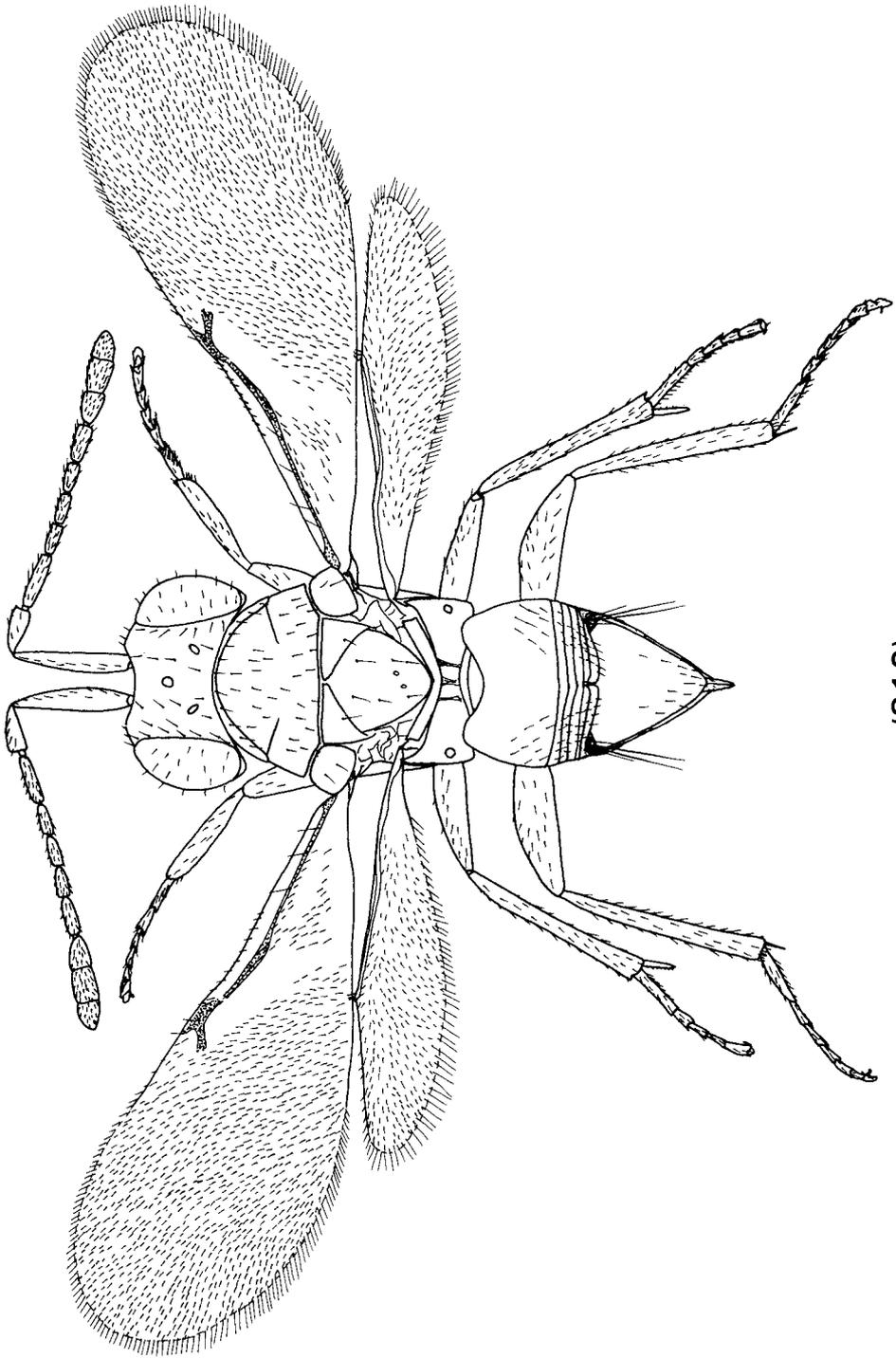


**Figures 296–298** *Rhopus garibaldius*, female: (296) right antenna, outer aspect; (297) thorax, dorsal view; (298) right forewing, upper surface, proximal area.

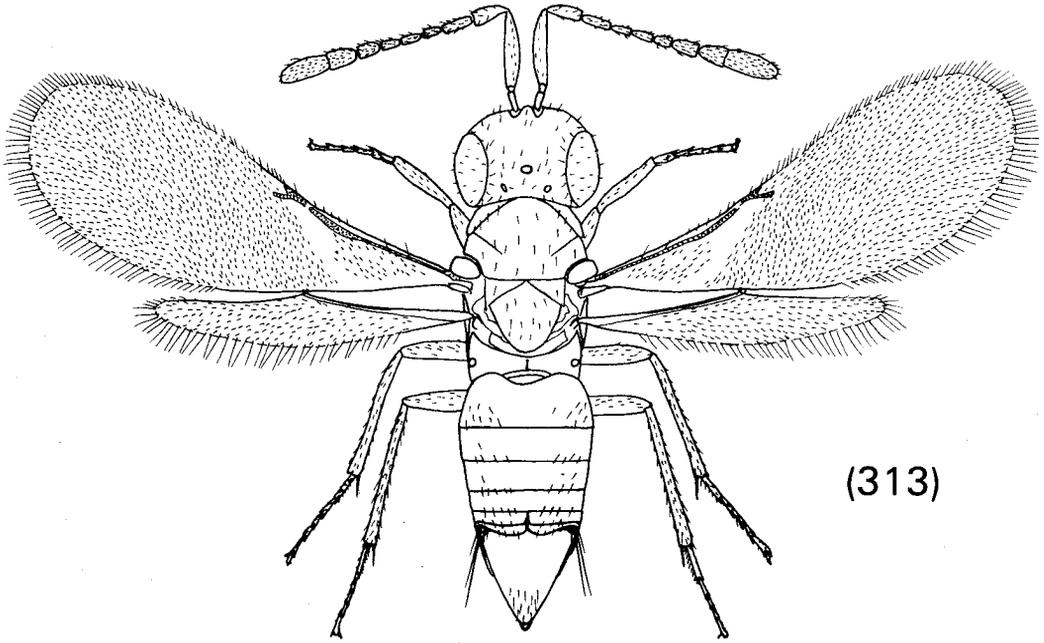
**Figures 299, 300** *Rhopus* sp. A, male: (299) right antenna, outer aspect; (300) right forewing, upper surface, detail of distal venation.

**Figures 301–306** *Subprionomitus ferus*: (301) left mandible - ♀; (302) right antenna, outer aspect - ♀; (303) right forewing, upper surface, proximal area - ♀; (304) right antenna, outer aspect - ♂; (305) right forewing, detail of distal venation - ♂; (306) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.

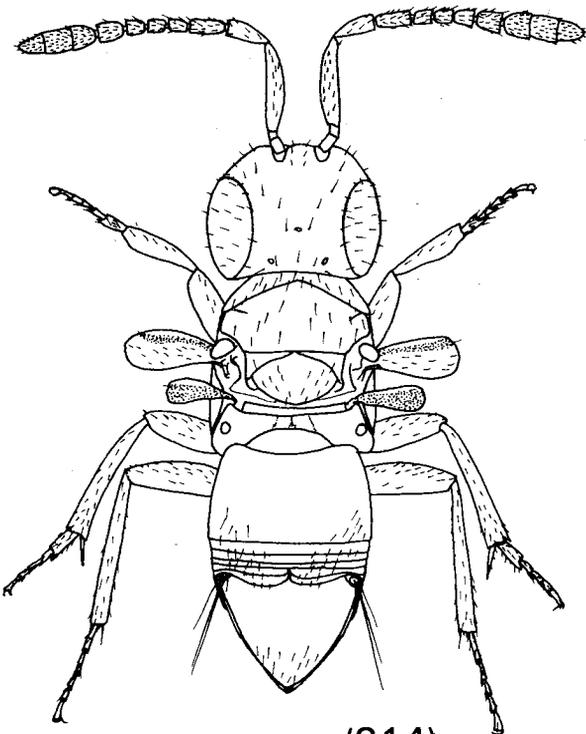
**Figures 307–311** *Tachinaephagus zealandicus*: (307) left mandible - ♀; (308) right antenna, outer aspect - ♀; (309) right forewing, upper surface - ♀; (310) right antenna, outer aspect - ♂; (311) genitalia - ♂, (a) digiti and distal part of phallobase, (b) entire, ventral aspect.



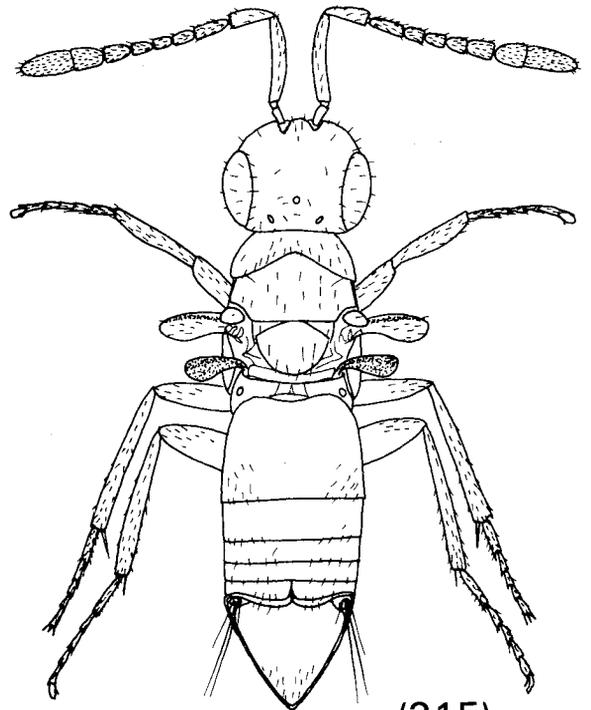
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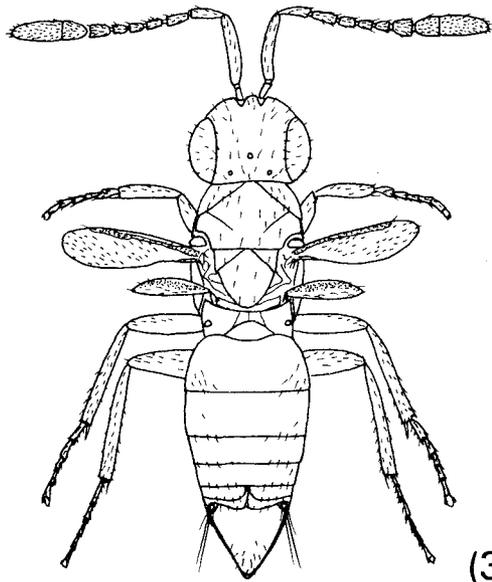
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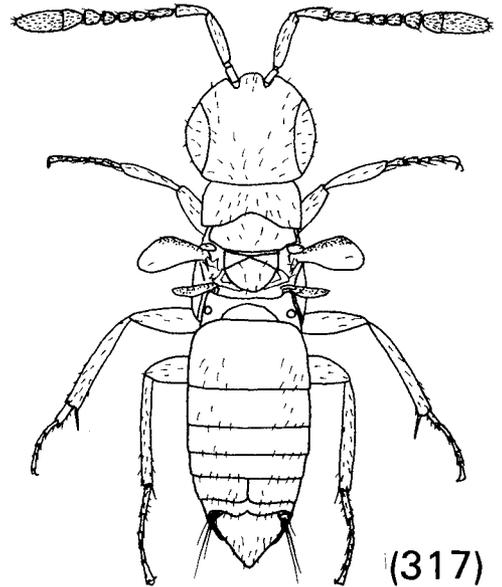
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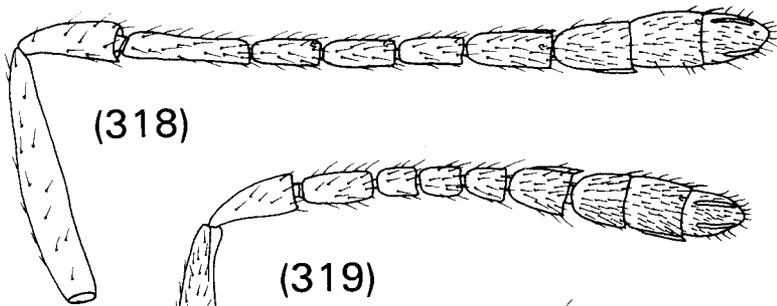
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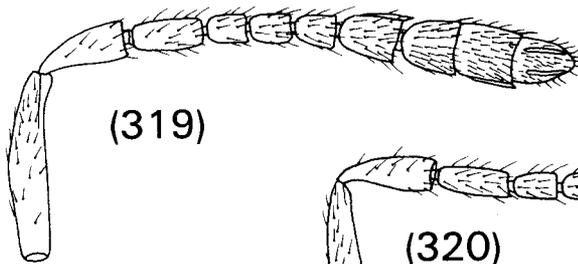
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(317)



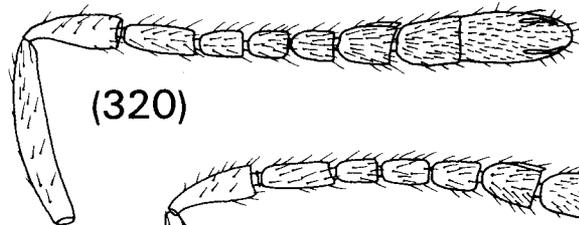
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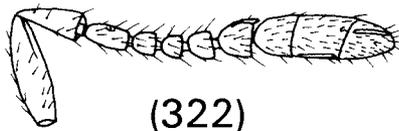
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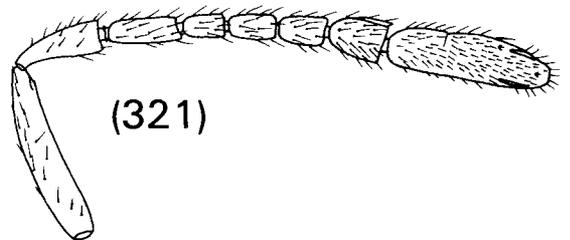
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(321)



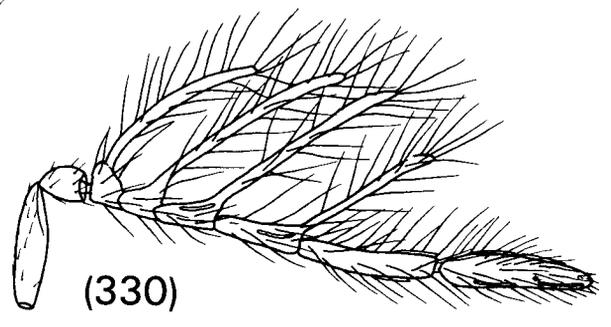
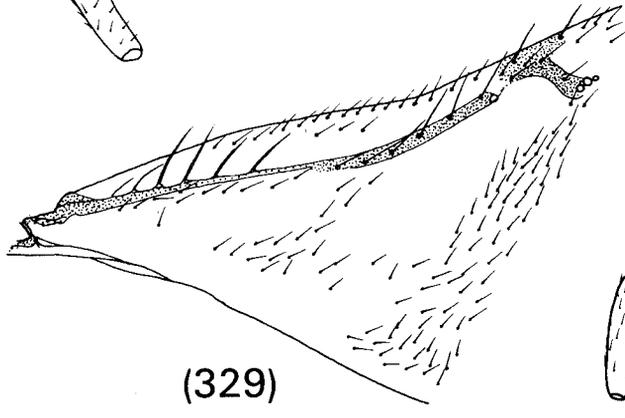
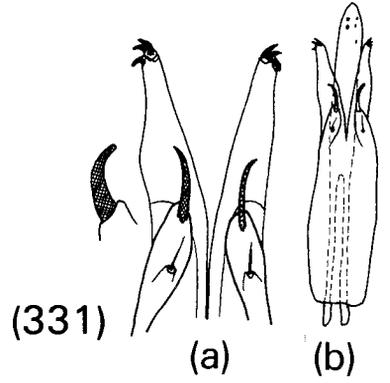
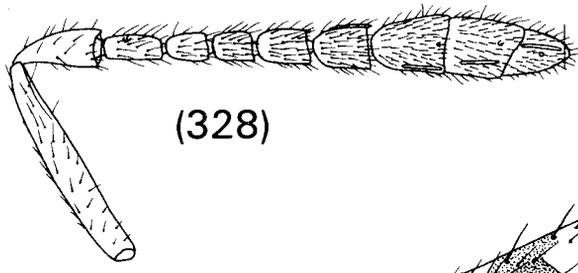
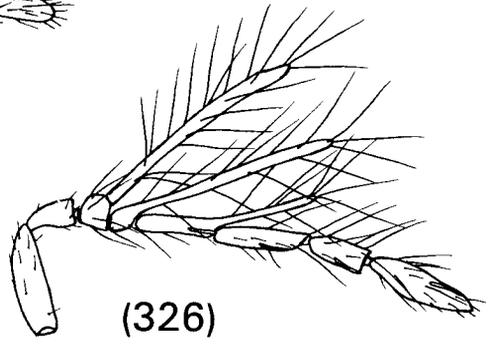
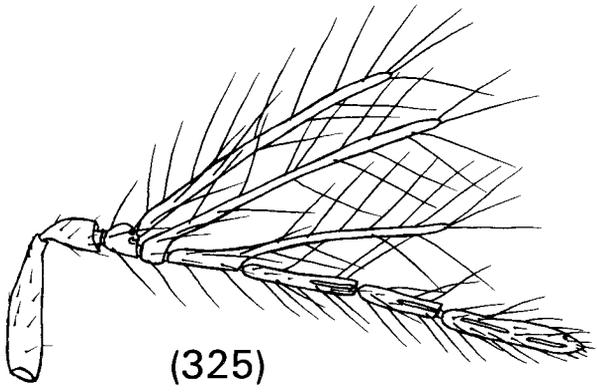
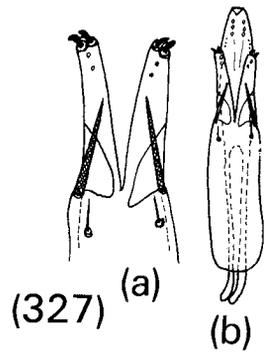
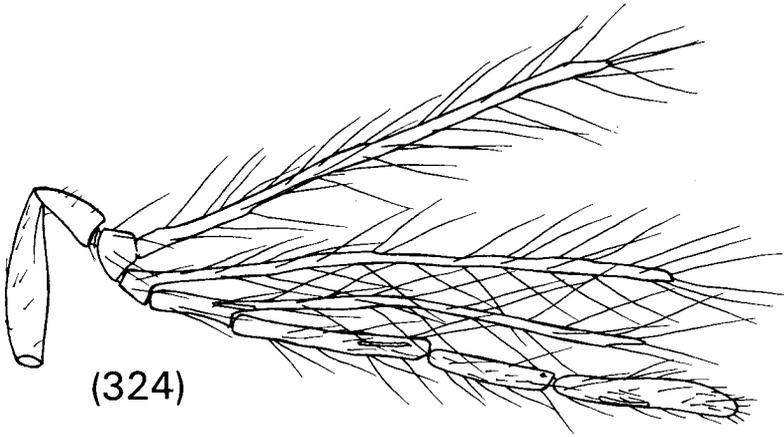
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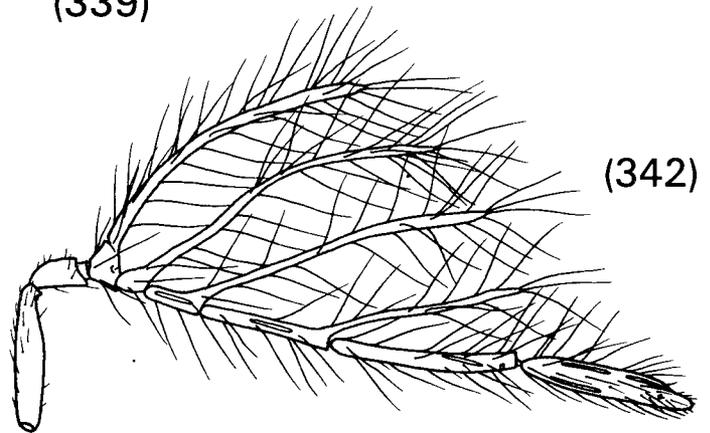
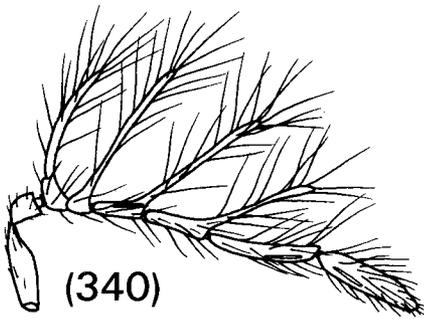
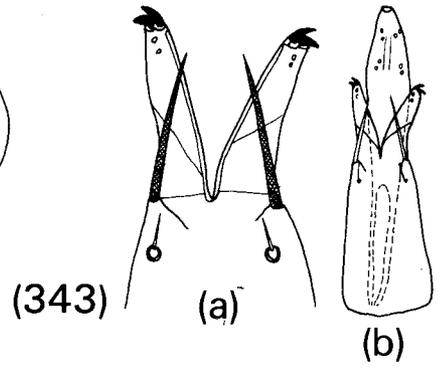
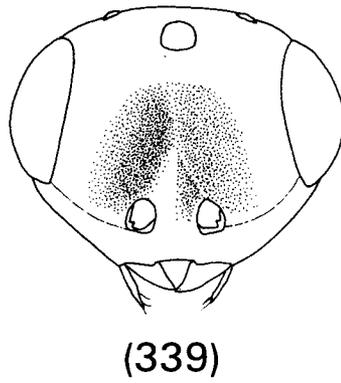
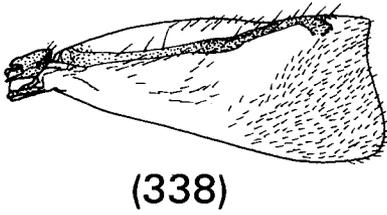
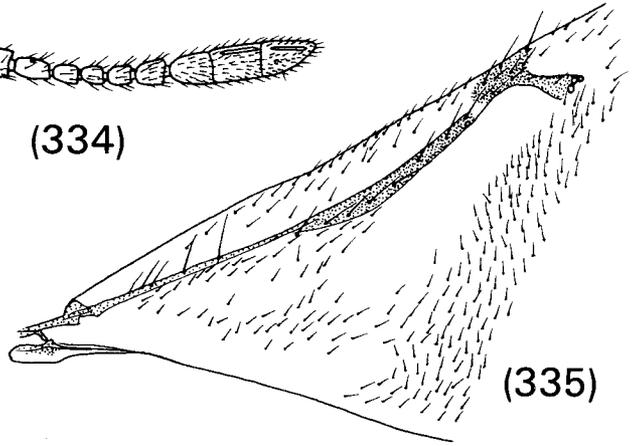
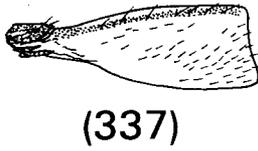
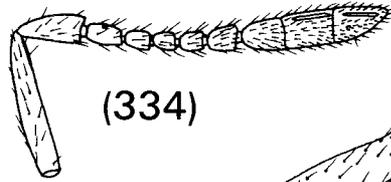
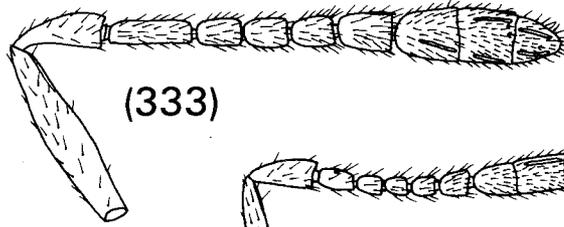
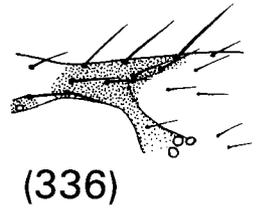
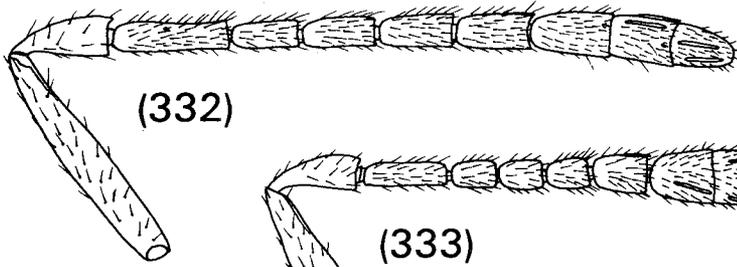


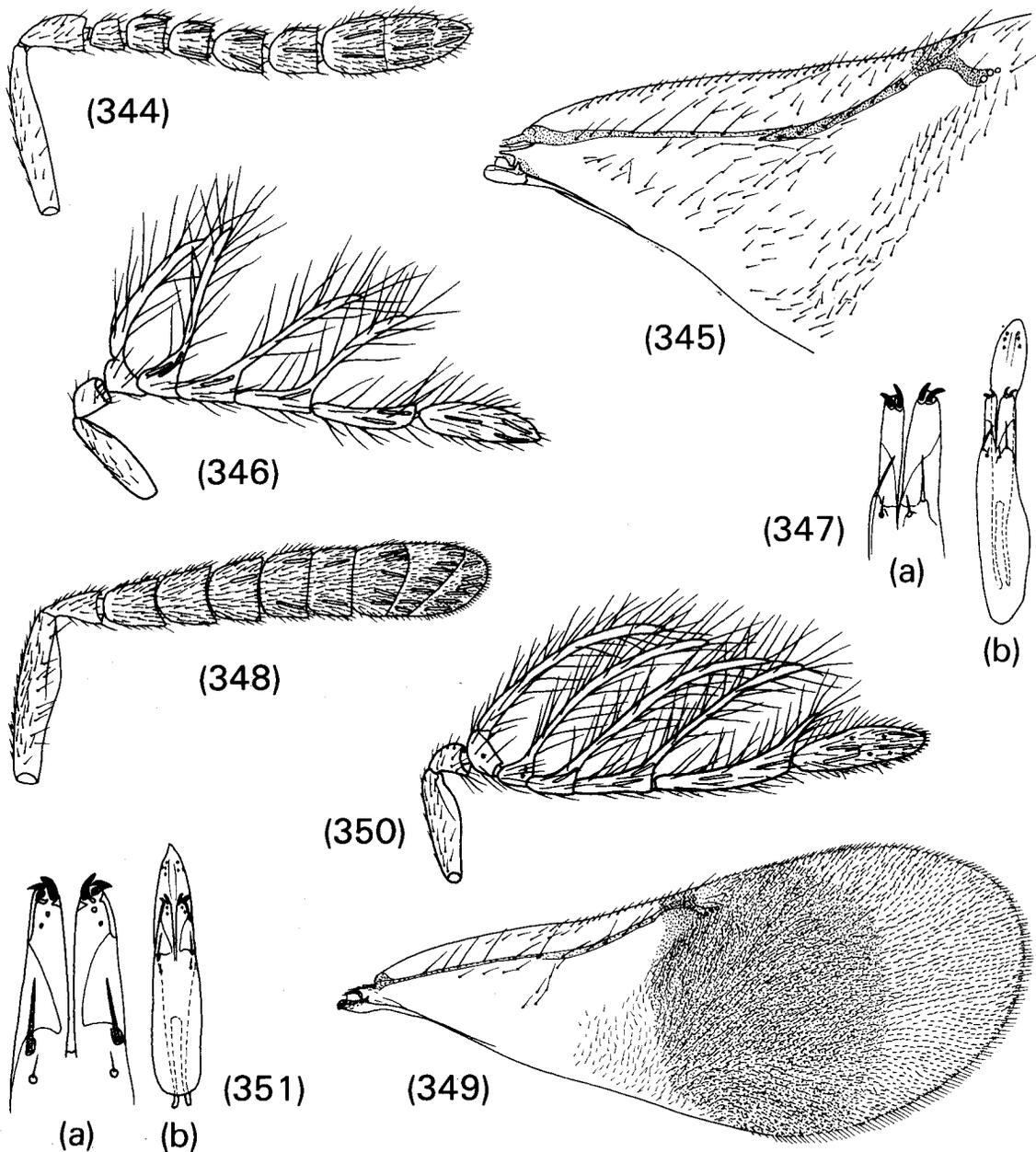
(323)

**Figures 312–317** *Tetracnemoidea bicolor*: (312–317) habitus, dorsal view, variants - ♀ (312, specimen similar to holotype of *bicolor*; 317, paratype of *Zealandencyrtus yasumatsui*); (318–326) right antenna, outer aspect, variants (318–323 - ♀; 324–326 - ♂); (327) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.

**Figures 328–331** *Tetracnemoidea brevicornis*: (328) right antenna, outer aspect - ♀; (329) right forewing, upper surface, proximal area - ♀; (330) right antenna, outer aspect - ♂; (331) genitalia, ♂ - (a) parameres and digiti, with lateral view of process from apex of paramere, (b) entire, ventral aspect.



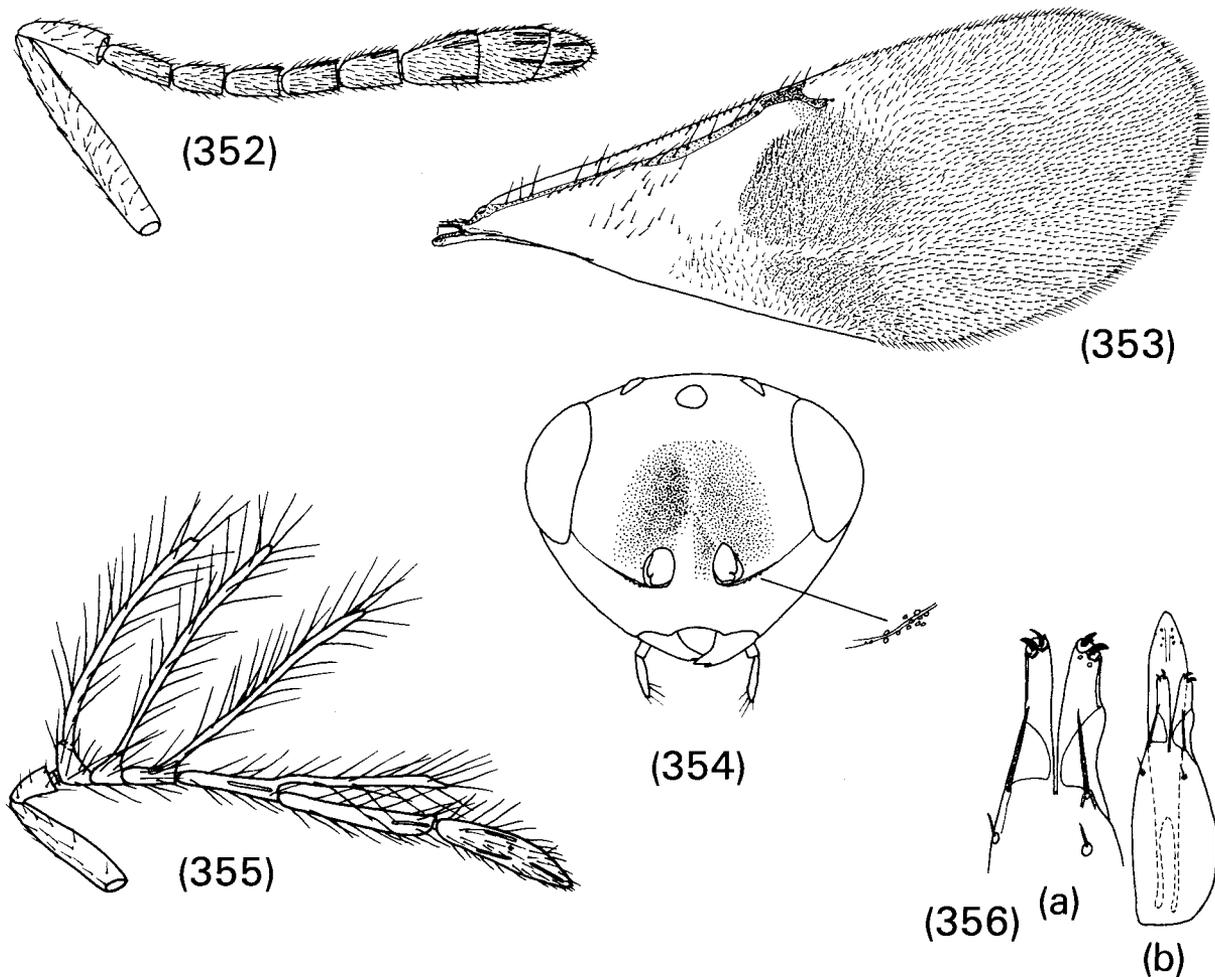




**Figures 332-343** *Tetracnemoidea brownii*: (332-334) right antenna, outer aspect, variants - ♀; (335-338) right forewing, upper surface, ♀ - proximal area, detail of distal venation, and 2 variants of brachypterous form; (339) head, facial aspect - ♂; (340-342) right antenna, outer aspect, variants - ♂; (343) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.

**Figures 344-347** *Tetracnemoidea peregrina*: (344) right antenna, outer aspect - ♀; (345) right forewing, upper surface, proximal area - ♀; (346) right antenna, outer aspect - ♂; (347) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.

**Figures 348-351** *Tetracnemoidea sydneyensis*: (348) right antenna, outer aspect - ♀; (349) right forewing, upper surface - ♀; (350) right antenna, outer aspect - ♂; (351) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.




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**Figures 352–356** *Tetracnemoidea zelandica*: (352) right antenna, outer aspect - ♀; (353) right forewing, upper surface - ♀; (354) head, facial aspect - ♂; (355) right antenna, outer aspect - ♂; (356) genitalia, ♂ - (a) parameres and digiti, (b) entire, ventral aspect.

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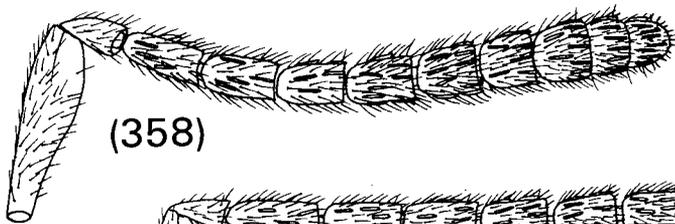


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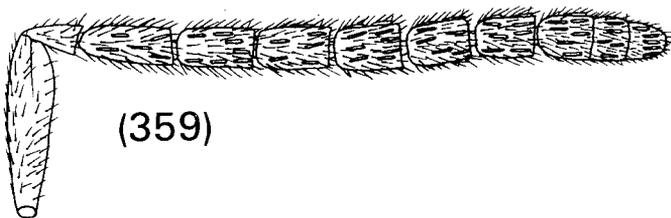
**Figures 357–363** *Tongyus costalis*: (357) left mandible - ♀; (358, 359) right antenna, outer aspect, variants - ♀; (360) right forewing, upper surface - ♀; (361) genitalia, left inner aspect - ♀; (362) right antenna, outer aspect - ♂; (363) genitalia, ♂ - (a) distal part of phallobase and digiti, (b) entire, ventral aspect.

**Figures 364, 365** *Tongyus cyrenis*, female (drawn from card-mounted specimen): (364) right antenna, outer aspect; (365) right forewing, upper surface.

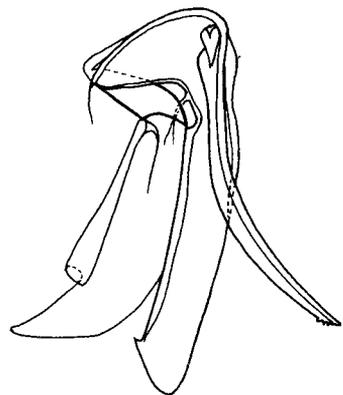
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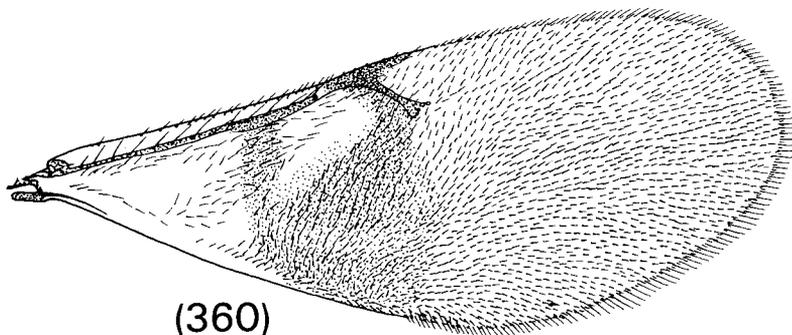
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(359)



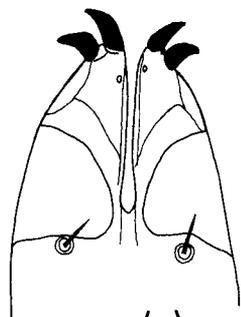
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(360)

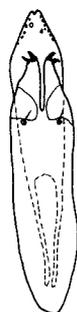


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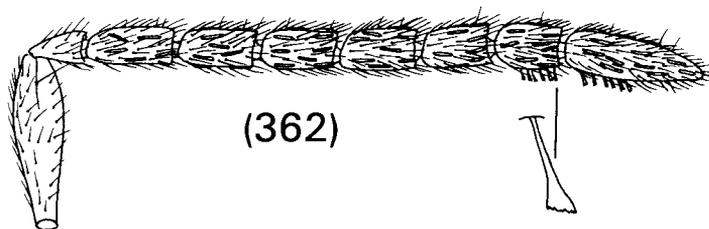


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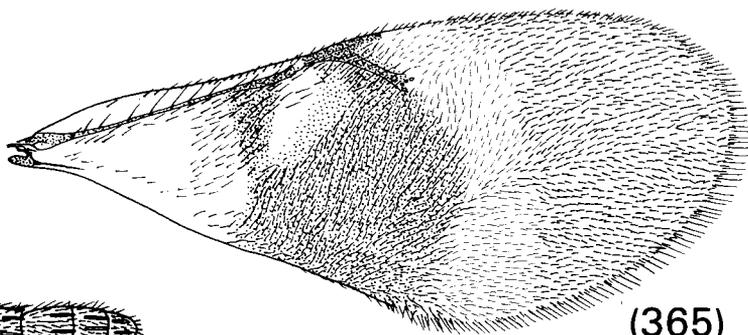
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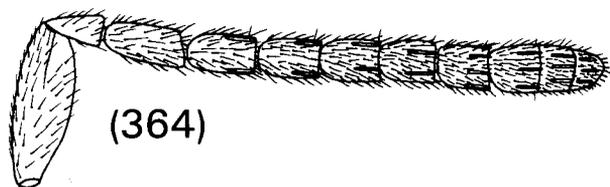
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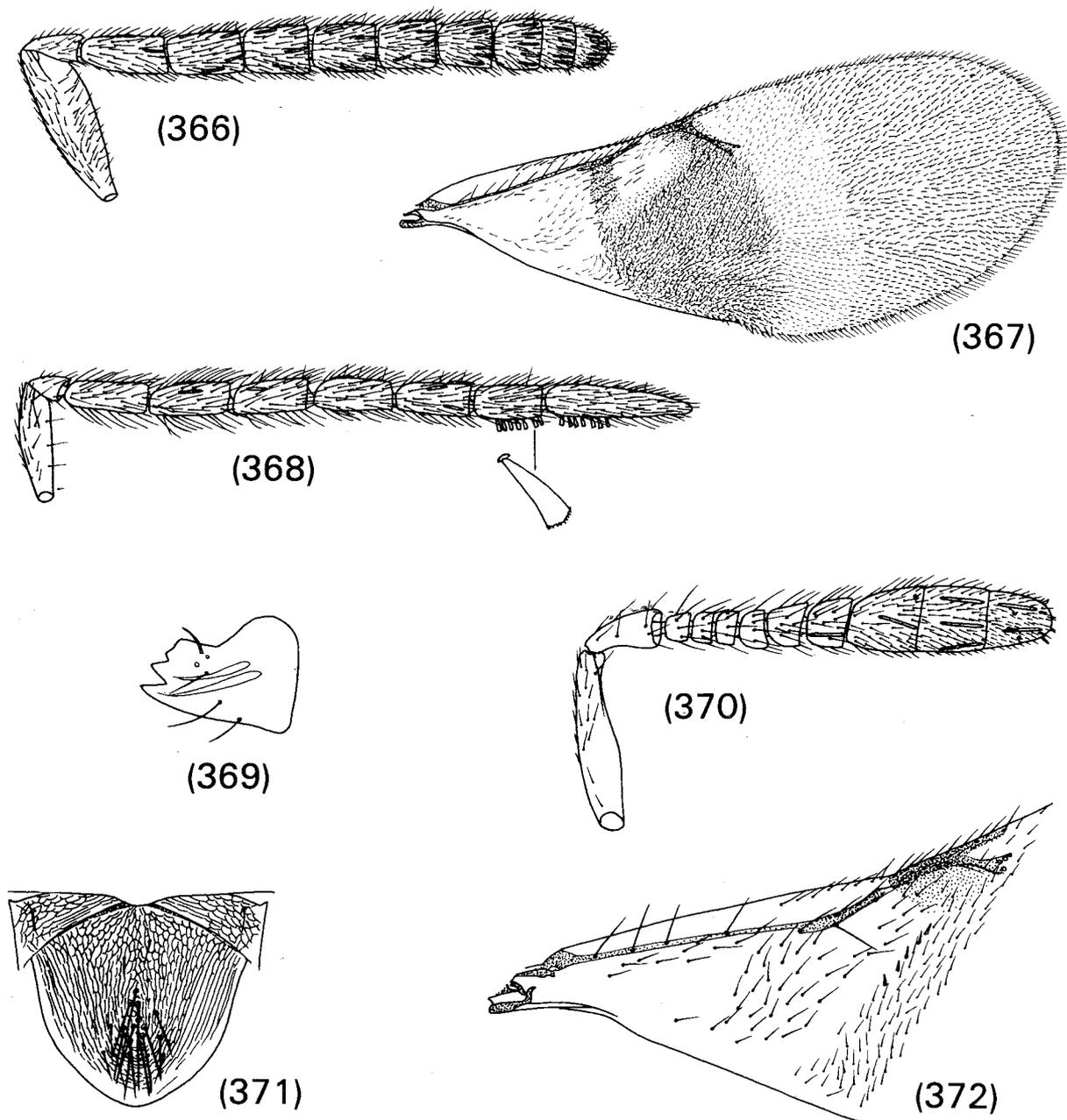
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(365)



(364)



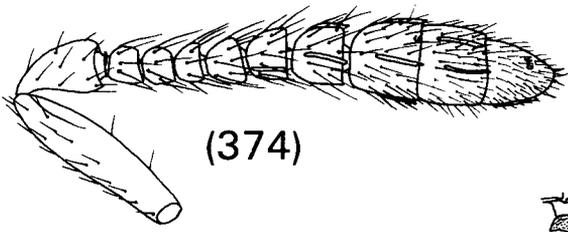
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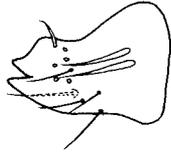
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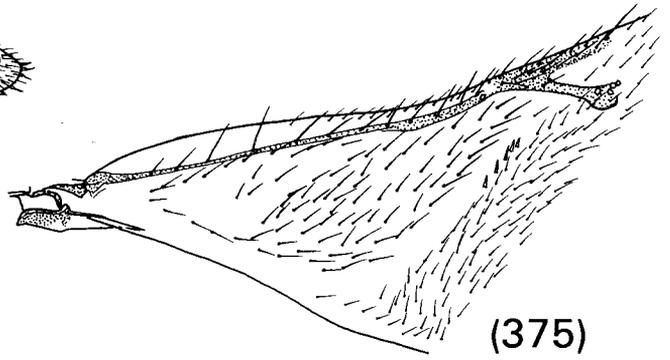
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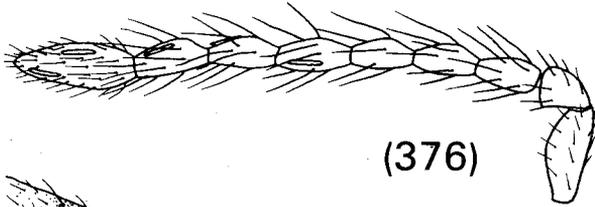
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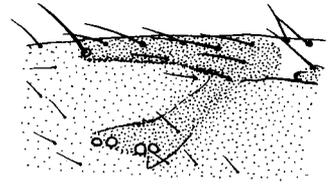
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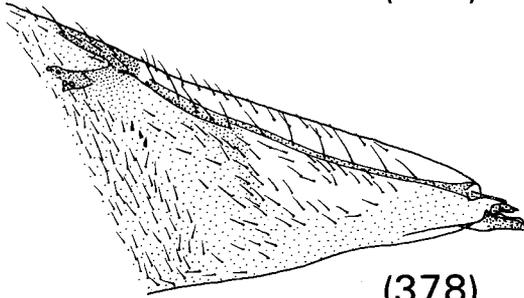
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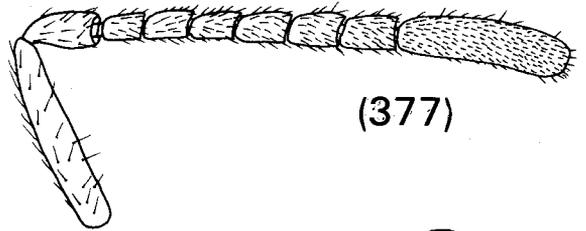
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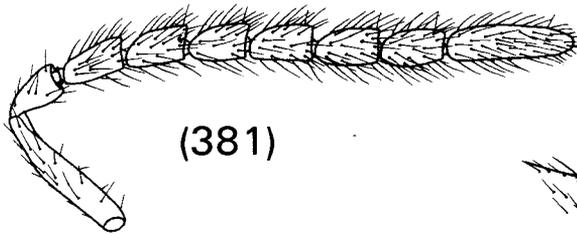
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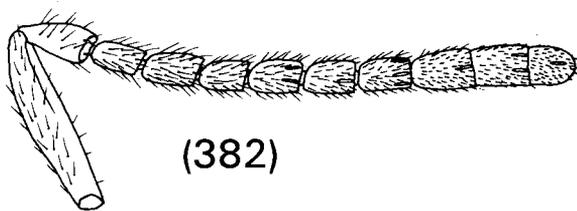
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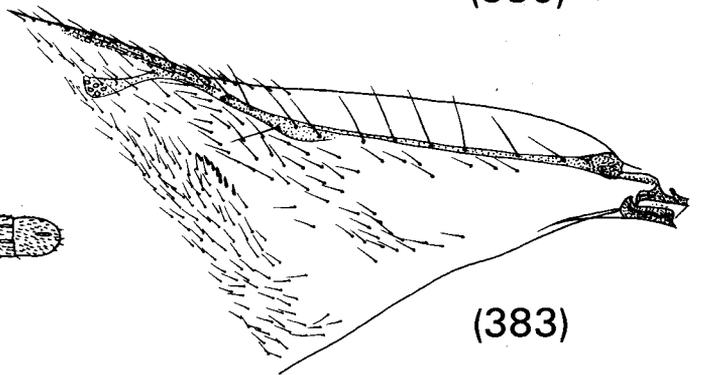
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All nominal genera and species covered in the text are indexed, regardless of their current status in taxonomy. Page numbers with the suffix 'k' are those on which a taxon is keyed out. Page numbers in bold type indicate the start of major descriptive sections. Page numbers in italic type are those on which a taxon is figured. For higher taxa, see 'Synopsis of encyrtid classification', pp. 11–15.

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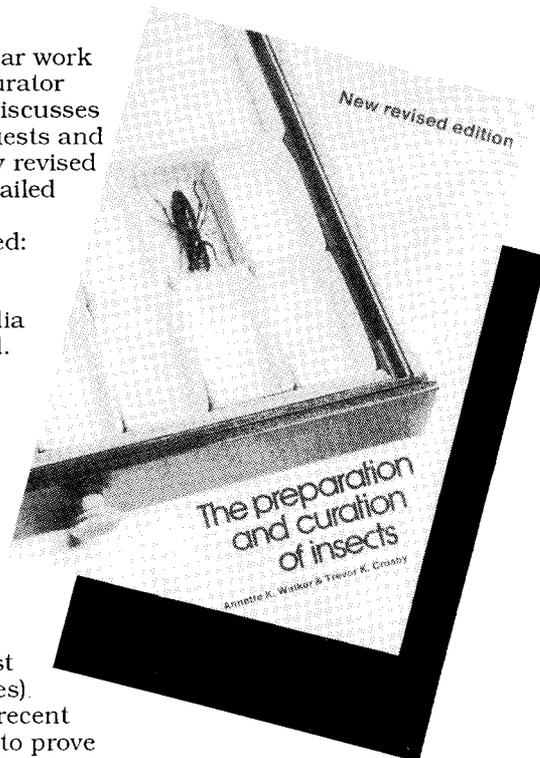
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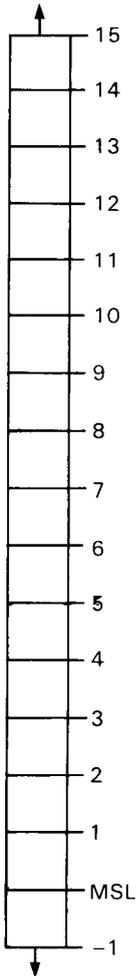
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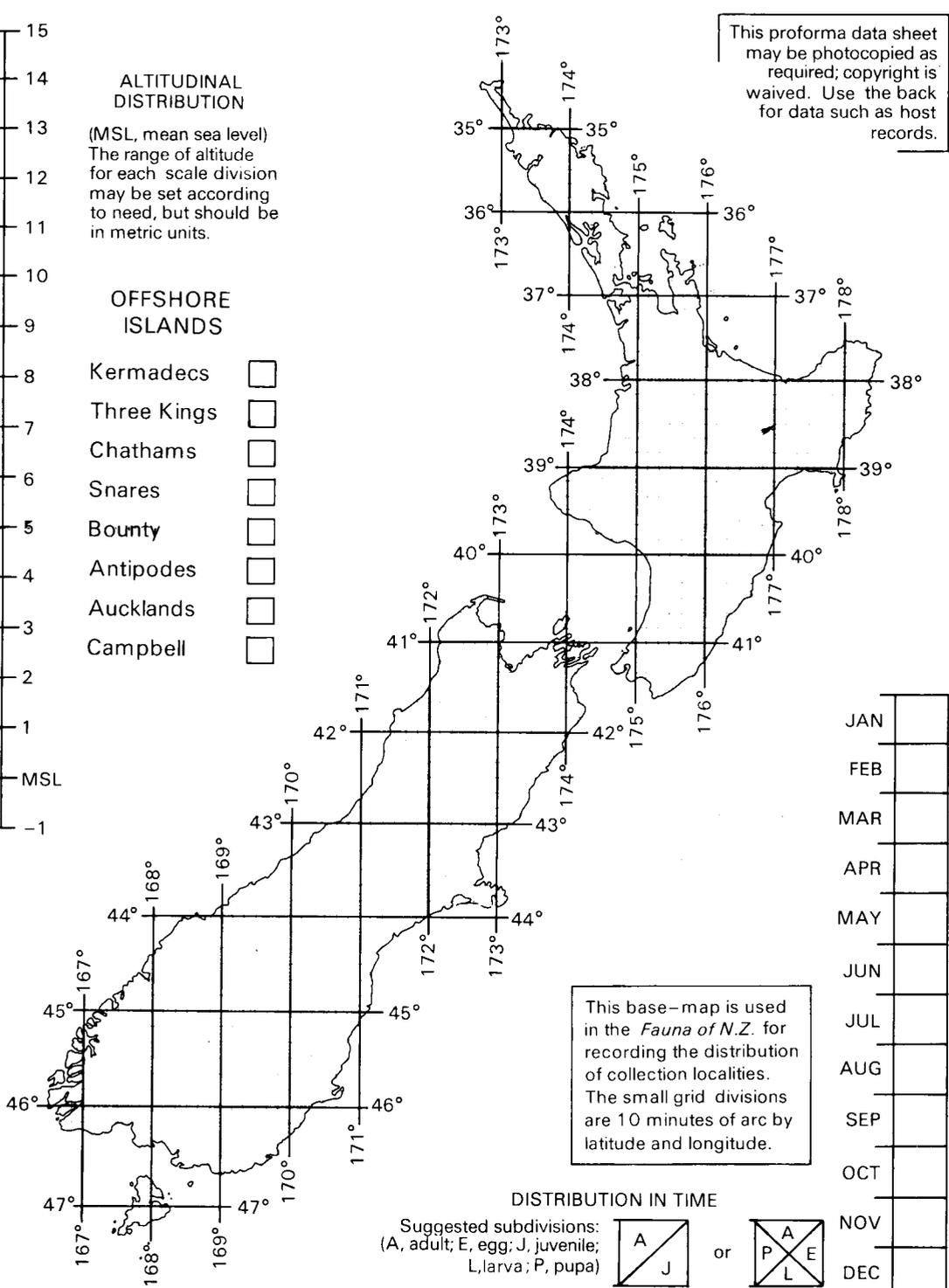


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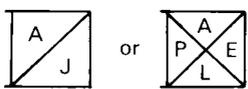
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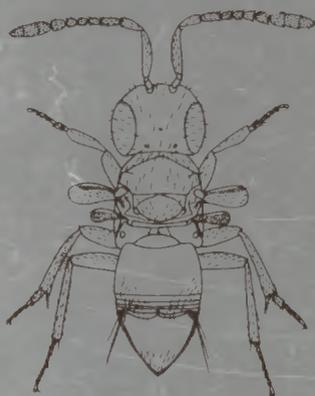
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# Fauna of New Zealand



Number 13

## Encyrtidae

(Insecta: Hymenoptera)

J. S. Noyes

XXV

• ANNIVERSARY ISSUE •

XXV

SYSTEMATICS GROUP, ENTOMOLOGY DIVISION, DSIR

1963-1988

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Insecta Catalogue of Lepidoptera types, and key to family-group taxa, by J. S. Dugdale. Ambositrininae, by I. Naumann. Nepticulidae, by H. Donner & C. Wilkinson. Chalcidoidea (part), by J. S. Noyes & E. W. Valentine.

CHECKLIST OF TAXA

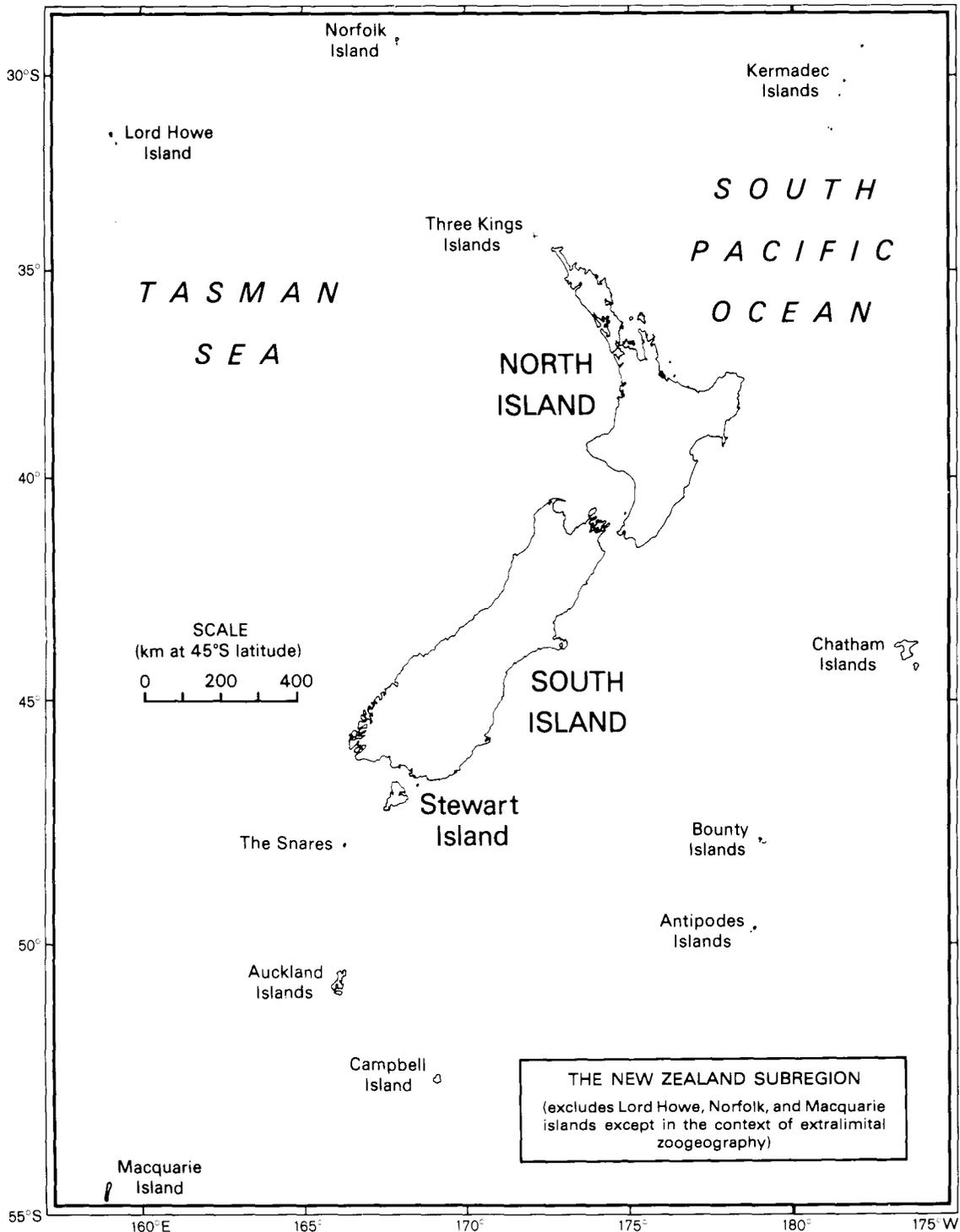
INTRODUCTION

KEY TO TAXA

DESCRIPTIONS

HOST RECORDS

ILLUSTRATIONS

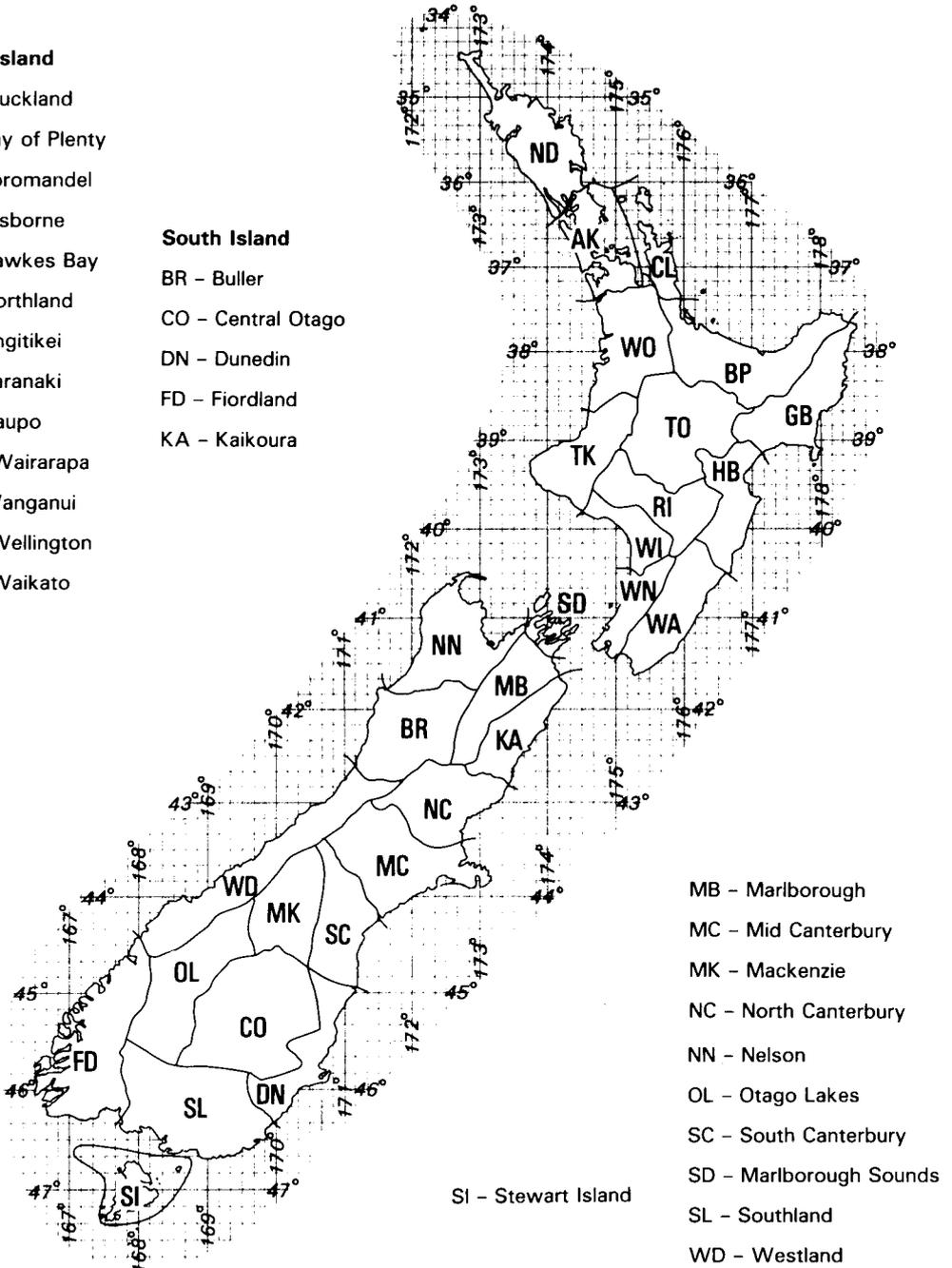


**North Island**

- 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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