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Pseudococcidae

(Insecta: Hemiptera)

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Front cover: The mealybug depicted is *Planococcus mali* Ezzatt & McConnell, ♀

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ABSTRACT

A total of 114 species of mealybugs are described and figured. This total comprises the 47 species hitherto known from New Zealand and 67 newly recorded ones, 61 of which are new to science. They are grouped into 28 genera, of which 8 are new — *Acrochordonus*, *Agastococcus*, *Asaphococcus*, *Chryseococcus*, *Cyphonococcus*, *Crocydococcus*, *Maskellococcus*, and *Renicaula*. Twenty-five new combinations are proposed: *Asaphococcus montanus*, *Chryseococcus arecae*, *C. longispinus*, *Balanococcus cockaynei*, *B. cordylinidis*, *B. danthoniae*, *B. diminutus*, *B. wisei*, *Crocydococcus cottieri*, *Cyphonococcus alpinus*, *C. iceryoides*, *Maskellococcus obtectus*, *Paracoccus canalis*, *P. coriariae*, *P. drimydis*, *P. glaucus*, *P. insolitus*, *P. miro*, *P. zealandicus*, *Rastrococcus asteliae*, *Renicaula chionochloae*, *R. junci*, *R. raouliae*, *Spilococcus leucopogi*, and *Ventrispina otagoensis*. Five synonymies are proposed: *Trionymus dissimilis* Brittin with *Balanococcus danthoniae* (Morrison), *Trionymus chiltoni* Brittin with *Cyphonococcus alpinus* (Maskell), *Trionymus zealandicus* Brittin with *Paracoccus canalis* (Brittin), *Trionymus morrisoni* Brittin with *Paracoccus glaucus* (Maskell), and *Spilococcus cactearum* McKenzie with *S. leucopogi* (Brittin). The subspecies *Trionymus diminutus cordylinidis* Brittin is raised to specific level, and the previously synonymised species *Pseudococcus viticis* Green is resurrected. The text includes a brief historical review of the work previously done on this group in New Zealand, and notes on mounting techniques, morphology, life cycle, and economic importance. Host-plant records are listed where available for each mealybug species, and the mealybugs recorded from each known host-plant are listed in an appendix.

CHECKLIST OF TAXA

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INTRODUCTION

Mealybugs are one of the eight families of Coccoidea represented in New Zealand. Prior to this account 46 species were known from New Zealand. About half of these were identifiable from descriptions scattered through the world literature, and the remainder were known only from inadequate original descriptions. Most of the 116 species now known from New Zealand are indigenous; about five are probably of Australian origin, and nine are more or less cosmopolitan. Despite the large number of species recorded here, the ease with which new species are discovered and the number of species known only from single collections suggest that less than half of the species actually occurring in this country have been dealt with here. Nevertheless, this work should enable species discovered in future to be placed with their close relatives.

Mealybugs are small (1–5 mm in length), plant-feeding insects. A generalised mealybug life cycle is shown in Figure 1. The soft-bodied, wax-covered, wingless females (Figure 2) usually live in secluded positions; the males (Figure 3) are tiny and winged. Identification is based on the female, as this is most readily encountered and is associated with the host plant. Most species produce males, but these are still largely unstudied. Although the females of a few species can be identified with some degree of

certainty while alive, positive identifications require their preparation on glass slides for microscopic examination. Identification of species is based largely on the form and distribution of the different types of wax-producing ducts and pores on the integument.

Two major problems arise in the taxonomic study of mealybugs. First there is the question of how to recognise species. The temperatures at which females develop can greatly alter the expression of the very characters by which they are identified (Cox 1983), and differences in host plant may have a similar effect in species with a narrow host range. Some species complexes may be resolved only by experimental rearing and host-transfer work, and some areas where such work would be beneficial, such as with *Paracoccus glaucus*, are pointed out in the text.

Second, there is the problem of surmising the relationships between the species in order to establish genera. Mealybug species have tended to specialise by reduction of features, and species living in similar habitats tend to look similar. For example, females of the grass-feeding species *Balanococcus botulus*, *Chorizococcus oreophilus*, and *Pseudococcus zelandicus* all have elongate body outlines and small, round circuli, although the close relatives of the latter two species are not grass-feeders and are oval in outline, with large, quadrate circuli. Consequently, species that appear similar in different parts of the world may not, in fact, be closely related, and to place them in the same genus would be to suggest some quite spurious zoogeographical links. Therefore I have erected new genera in some instances where similar-looking species in existing genera do occur overseas, in order to avoid confusing biogeographers working solely from the literature. Future work on adult males may help to indicate valid higher taxa.

During this study several individual, often poorly prepared specimens were examined that probably represent undescribed species. It would be undesirable to describe new species on the basis of such specimens, and so these have been briefly mentioned under Remarks for the species to which they would be referred by the key.

HISTORICAL REVIEW

The New Zealand mealybug fauna was among the first in the world to receive serious study. Between 1879 and 1894 W.M. Maskell (first Registrar of the University of New Zealand), in a series of publications, described twelve mealybug species from New Zealand and recorded the cosmopolitan species *Pseudococcus longispinus*. His descriptions and illustrations dealt mainly with the external appearance of the live insect and with details of legs and antennae, and are consequently of little use in recognising his species today. Fortunately he preserved type smaterial of most of his New Zealand species, which has enabled them to be redescribed.

For the next 21 years the New Zealand mealybugs attracted little attention except for brief notes in overseas catalogues.

The next major worker on New Zealand's mealybugs was G. Brittin, an amateur entomologist and microscopist. Brittin described three new species in 1915, and eighteen new species and one subspecies in 1938, in an account that included most of the New Zealand species known at that time. His species are generally difficult to identify from his descriptions, but type material has been located for all but two of them.

In 1922 J.G. Myers, of the New Zealand Department of Agriculture, published a checklist of New Zealand scale insects and mealybugs. In this he listed the species described by Maskell and Brittin and included records of two further cosmopolitan pest species, *Pseudococcus comstocki* and *P. maritimus*. G. Leonardi (1918) described a new species from New Zealand flax in Italy. H. Morrison (United States Department of Agriculture) (1925) examined Maskell's type material of *P. calceolariae* in order to sort out the confusion concerning the use of this name. In the same paper he also described two new species from New Zealand. E.E. Green (a British amateur entomologist) (1929) described a new species from specimens sent to him from New Zealand for identification.

After Brittin's second paper was published, 18 years passed with little further activity. Then, in 1956, Y.M. Ezzat and H.S. McConnell (University of Maryland, U.S.A.) described two new Zealand species taken in quarantine at Washington, D.C., in their account of the tribe Planococcini.

In 1966 A. Ward (New Zealand Department of Agriculture), in a survey of mealybug species in Hawkes Bay orchards, recorded the cosmopolitan pest species *Pseudococcus affinis* (as *P. obscurus*) from New Zealand for the first time. She also recorded the American species *Phenacoccus graminicola* (as *P. graminosus*), which had been noted previously by van Geldermalsen (New Zealand Department of Agriculture) from Nelson in 1962 as *Phenacoccus* sp. J.A. de Boer (New Zealand Department of Scientific and Industrial Research) (1967a) recorded two other cosmopolitan species, *Vryburgia lounsburyi* and *Rhizoecus falcifer*, from New Zealand for the first time. She also described four new species and redescribed one of Maskell's species (1967b, 1968).

D.J. Williams (Commonwealth Institute of Entomology) and J.A. de Boer (1973) gave an

account of ten species of mealybug from New Zealand. They erected two new genera, redescribed eight species, submerged five nominal indigenous species as junior synonyms of another indigenous species, and synonymised the cosmopolitan pest species *Pseudococcus fragilis* with *P. calceolariae*, which was originally described from New Zealand by Maskell (1879), although it is probably of Australian origin.

In 1974 E.J. Hambleton (United States Department of Agriculture) revised the New Zealand species of *Rhizoecus*, describing three new and apparently endemic species and recording the South African species *R. perprocerus* from this country.

J.M. Cox (New Zealand Ministry of Agriculture and Fisheries) (1977a) demonstrated that published records of *Pseudococcus comstocki* and *P. maritimus* were based on misidentifications of *P. calceolariae* and *P. obscurus* respectively, and in 1978 revised the genus *Rhizoecus* from New Zealand, synonymising two nominal species with species originally described from America, and recording the cosmopolitan pest species *R. dianthi* from New Zealand for the first time.

In 1977 K.A.J. Wise (Auckland Institute and Museum) published a checklist covering some higher taxa of the New Zealand Hexapoda, including Pseudococcidae. L.L. Deitz (1979) briefly summarised the recent literature on mealybug identification, with notes on current nomenclature; and in 1980 L.L. Deitz and M.F. Tocker (New Zealand Department of Scientific and Industrial Research) produced a catalogue of the locations of Maskell's type material which has been invaluable for locating material used in this study.

The account given here is the first attempt since that of Brittin (1938) to present a complete record of the mealybugs known from New Zealand.

MORPHOLOGY OF ADULT FEMALES

BODY FORM (Figure 2). Individual adult females may vary in size according to the environmental conditions under which they developed, and all undergo enlargement during egg production after they reach maturity. However, some species are characteristically very much smaller than others. For instance, all three species of *Asaphococcus* and both species of *Maskellococcus*, which live under the bracts of *Nothofagus*, are very small. Body shape appears to be related to habitat, and is characteristic of species rather than genera. Futhermore, adult females tend to become more rotund as their eggs develop. Species living in the leaf sheaths of grasses are generally elongate, those living underground tend to be rotund, and those living under the bracts of *Nothofagus* are turbinate in outline. On either side of the anal ring the body usually projects slightly to form the anal lobes, on which the ultimate pair of cerarii are borne. In some species this projection is very marked, and in a very few species all the cerarii are borne on the ends of sclerotised, finger-like protuberances. The numbering of the abdominal segments has the vulva between segments VII and VIII (see Figure 6).

ANTENNAE. Most mealybugs have eight-segmented antennae in the proportions shown in Figures 2 and 4. Some genera, such as *Phenacoccus*, typically have nine-segmented antennae; and some genera, and species within other genera, have fewer segments in the antennae, often accompanied by a general reduction in the form of the whole antennae, as in *Renicaula* (Figure 5).

LEGS. A typical mealybug leg is shown in Figure 6. Denticles are present on the tarsal claws of many species around the world, but in New Zealand only two species — *Phenacoccus graminicola* and *Spilococcus leucopogi*, both introduced — have these denticles. Translucent pores are usually present on the hind legs, and the segments on which they occur are characteristic of species and sometimes also of genera. The proportions of the legs vary. Some species, such as *Rastrococcus asteliae*, have distinctly elongate legs, whereas those species that have reduced antennal segments often also have proportionately small, stout, and somewhat distorted hind legs. In these species the translucent pores may extend out on to the surrounding integument, as in Figure 7. In some species not known from New Zealand the legs may drop off at maturity.

SPIRACLES. Mealybugs typically have lightly sclerotised spiracles without pores inside the atria. In some species, such as those in the genus *Renicaula*, each spiracle is heavily sclerotised and has several pores within this sclerotisation.

CIRCULI. Circuli are structures on the midline of the abdominal venter that help the female mealybug adhere to its substrate. Mealybugs may lack circuli, or have any number from one to five, but the most commonly encountered condition is a single circulus situated on the intersegmental line between abdominal segments III and IV. This circulus occurs in a variety of shapes and sizes, often characteristic of the species, and varying from small and round, undivided by the intersegmental fold, to large and hourglass-shaped, with a clear horizontal fold.

OSTIOLES. When a mealybug is disturbed these lip-like structures on the dorsum (see Figure 2)

exude a fast-drying substance that is believed to be a defence against predators. Ostioles are characteristic of mealybugs, and occur as an anterior and a posterior pair, although the anterior pair, and sometimes also the posterior pair, may be absent. In order to prevent the exudate from sticking to the mealybug itself, the lips of the ostioles are usually well provided with wax-producing pores.

CERARII. These are characteristic of mealybugs, and consist of groups of large setae, usually conical, on the lateral margins of the body (see Figure 2). Cerarian setae usually have trilocular pores aggregated around their bases, and are often situated on sclerotised areas of the integument. The conical setae have been shown to produce long rods of stiff wax on which the filamentous wax secreted by the trilocular pores is supported, so producing the characteristic lateral wax filaments of mealybugs (Cox & Pearce 1983). The primitive number of cerarii appears to be seventeen or eighteen pairs, although some species may have more, and many have less than this number. If there are few cerarii, these are generally situated on the posterior abdominal segments with the setae becoming less stout and more flagellate, and with fewer associated trilocular pores around the bases of those cerarii towards the anterior of the body. The most commonly encountered number of conical setae in a cerarius is two, although any number up to about twenty may be found. Most species additionally have flagellate auxiliary setae in the anal lobe cerarii, and some, such as those in the genus *Pseudococcus*, have a few flagellate auxiliary setae in most of the cerarii.

ANAL LOBE BARS. These are lines of sclerotisation on the ventral surface extending forward from the anal lobe setae (see Figure 2). Groups of similar-appearing species tend to have these bars in common, and Ezzat & McConnell (1956) went as far as to place all the genera with anal lobe bars together in a tribe, the Planococcini. Several groups of New Zealand species have these bars, including the species placed in the genera *Crisicoccus*, *Paracoccus*, *Planococcus*, and *Sarococcus*. It is not known whether these bars are a primitive or a derived character, so it is difficult to know how much emphasis to place on them in generic classification. Even if their presence is a derived condition, they may be expected to have been secondarily lost in some species.

ANAL RING. Mealybug anal rings typically have six setae and a double row of cells, as shown in Figure 8. Sometimes unusual forms are encountered, such as the kidney-shaped anal rings of *Reni-caula* (Figure 9), and anal rings with reduced numbers of cells, as in *Rhizoecus* (Figure 10).

PORES. Four different types of wax-producing pore are found in mealybugs. Multilocular disc pores usually have ten loculi and produce short, white wax filaments with a 'C'-shaped cross-section. They are found in most species of mealybug, usually around the vulva, where they contribute to the production of the ovisac, but they may also be found on any part of the dorsal and ventral surfaces. Quinquelocular pores are less widespread among mealybug species, and their presence is often used to characterise genera. In New Zealand only two species have them, *Phenacoccus graminicola* and *Rastrococcus asteliae*. Trilocular pores are found over both surfaces of the body in most species of mealybug, and are characteristic of the family. In some species they may be absent, as in some of the species of *Balanococcus* known from New Zealand. Trilocular pores produce the long, spiralled filaments of wax, coarser than the filaments produced by the multilocular disc pores or quinquelocular pores, that make up the bulk of the wax covering over the insect. This wax is usually white, but may be yellow, tan, or buff in some species. Simple pores, sometimes known as discoidal pores, are usually smaller than the trilocular pores and, if present, are scattered over both body surfaces. Their function is not known.

TUBULAR DUCTS. Tubular ducts produce long, hollow filaments of white wax that are a major constituent of the ovisac. They are found in a variety of forms, the most commonly encountered of which is known as an oral collar tubular duct. These ducts may be entirely simple in form when viewed under the light microscope (Figure 11), or have a distinct sclerotised collar at the end nearest the aperture, and in some species the collars may be distinctly flange-shaped (Figure 12). Oral collar tubular ducts are usually found on the venter of the posterior abdominal segments, but they may be absent, or present anywhere on the ventral and dorsal surfaces. Another form commonly encountered is the oral rim tubular duct. These ducts are similar to oral collar tubular ducts, but have a raised rim of integument around the aperture. In some species, such as those in the genus *Pseudococcus*, these ducts are large and have very distinctive rims. In other species, however, such as some of the New Zealand species here placed in *Paracoccus*, these ducts are no larger than oral collar tubular ducts and the rims are frequently obscure or not apparent, so that the distinction between the two supposed forms of duct becomes questionable. Large, tubular ducts with well defined oral rims are usually relatively less

numerous than oral collar tubular ducts, and are commonly situated singly or in small groups on the dorsal margins of the body segments. Some other unusual and distinctive forms of tubular duct are found, and their presence is often used to help define genera, as in *Acrochordonus* and *Paraferrisia*.

SETAE. Many different types of seta are encountered. Cerarian setae are usually conical (Figure 13), and sometimes on enlarged setal bases (Figure 14). Dorsal body setae may be conical, flagellate (Figure 15), lanceolate (Figure 16), or spine-like (Figure 17). Most ventral body setae are flagellate, and are generally longer than those on the dorsum. Some unusual setal forms occur in mealybugs, and are usually characteristic of species or genera.

AGRICULTURAL IMPORTANCE

Most of the nine more or less cosmopolitan species of mealybug recorded from New Zealand are pests of fruit trees, vines, or ornamental plants in Europe and North America, but only some of them appear to cause problems in New Zealand.

Three species of *Pseudococcus* — *P. affinis* (many New Zealand records are under the names *P. maritimus* and *P. obscurus*), *P. calceolariae* (many New Zealand records under the name *P. comstocki*), and *P. longispinus* (many records under the name *P. adonidum*) — are pests of a wide range of plants throughout the world. *P. longispinus* is the prevalent species on fruit trees and vines in the Auckland area, but is replaced by *P. affinis* on fruit trees, and by *P. calceolariae* on vines, throughout the more southern areas of the country. Some records of *P. calceolariae* may be referable to *P. hypergaeus* or *P. similans*, as the relationships of these three species were not known until Williams (1985) published his account of the Australian mealybugs.

Phenacoccus graminicola (previous New Zealand records under the name *P. graminosus*) is found on grasses in Australia, Europe, South Africa, and North America, but in New Zealand, and particularly around Nelson, is often found under the bark of fruit trees and under the calyces of fruit.

Rhizoecus dianthi and *R. falcifer* are pests on the roots of many glasshouse plants in Europe and North America. *R. dianthi* has been recorded only once from New Zealand (under the name *R. pritchardi*), but *R. falcifer* appears to be relatively common.

Vryburgia lounsburyi is a pest of a variety of bulbs in Europe and North America, but has been recorded only once from New Zealand.

Spilococcus leucopogi is a pest of cacti in Europe and North America (under the name *S. cactearum*), but appears to be uncommon in New Zealand.

Planococcus citri is a serious pest of both fruit trees and ornamental plants in many parts of the world. Although it has been collected from nurseries in New Zealand on a few occasions, it may not be established in this country.

Some native species have become pests. *Balanococcus diminutus* is a pest of ornamental *Phormium* not only in New Zealand but also in Europe and North America. *Balanococcus poae* has been implicated in the die-back of ryegrass and white clover pasture, and *Planococcus mali* has been reported as damaging blackcurrant bushes. *Paracoccus glaucus* is one of the commonest indigenous species, and has been recorded as causing damage to grapefruit trees (Williams & de Boer 1973).

METHODS AND CONVENTIONS

Female mealybugs are far more commonly noticed than are males, adult males (Figure 3) being very small and winged. However, the cocoons in which they emerge from pupae are frequently to be found among colonies of females, and sometimes adult males may be found within these cocoons. Although little work has been done on the systematics of adult males, further work at the generic level may depend on them, and it would be useful for future workers if any adult males found in association with colonies of females were collected and preserved.

As the systematics of mealybugs is based almost entirely on adult females, it is only these that are figured and illustrated in this account. Adult females look very similar to immature females, but are larger and may bear ovisacs (see Figure 2).

COLLECTING. Mealybugs may be found on almost any part of their host plant, many species having characteristic positions. Relatively few species are found in exposed situations such as on the undersides of leaves; one of the more noticeable examples is the green or orange-coloured *Paracoccus glaucus*. Most species live in secluded positions such as under bark, in leaf sheaths and axils, in bracts, under calyces, or in soil on the roots.

Mealybugs should be collected into 80% ethanol. At the same time, as much of the host plant as is necessary for its reliable identification may be taken.

SLIDE PREPARATION. There are many different methods and materials for slide-mounting mealybugs and other Coccoidea. The following method uses Canada balsam, which is known to be durable.

1. With dissecting needle, cut a small slit along ventral midline between 2nd and 3rd pairs of legs.
2. Place in 10% potassium hydroxide (KOH) solution and heat at around 70°C for about 10 minutes, or until body contents become translucent.
3. Transfer to water for about 10 minutes. Gently depress body with needle to expel body contents and compress body dorsoventrally. Return to KOH solution for further heating if maceration is incomplete.
4. Transfer to 40% ethanol for 20 minutes.
5. Transfer to 60% ethanol plus a drop of acid fuchsin for as long as it takes to stain the specimen.
6. Transfer to 90% ethanol for about 20 minutes.
7. Transfer to 100% ethanol for about 20 minutes.
8. Transfer to carbol xylene (3 parts xylene to 1 part carbolic acid crystals) for about 5 minutes; this will remove any wax adhering to the specimen.
9. Return to 100% ethanol for about 5 minutes.
10. Transfer to clove oil for about 20 minutes.
11. Mount in Canada balsam, dorsum downwards.

Good preparations require two critical inputs: accurate timing of maceration, so that the body contents are sufficiently dissolved but the integument with its pores does not become too transparent; and careful manipulation, to expel the body contents and depress the mealybug dorsoventrally.

KEYS TO SPECIES. Unlike the key to genera (opposite page), each key to species is given immediately after the description of the genus.

LECTOTYPE DESIGNATIONS. Lectotypes are here designated for all Brittin's species (except *Trionymus assimilis* and *Trionymus coriariae*, for which type material was not located) if this has not been done previously, even if Brittin mentioned only a single specimen in his original description. In one such instance two identically labelled slides, both bearing the inscription "type", were located.

LABELLING OF TYPE MATERIAL. Unless otherwise indicated, the status of slide-mounted type specimens is clearly shown on the slide and/or its labels. For instance, the lectotypes that I have selected are identified as such on separate round labels.

SPECIMEN REPOSITORIES. Material is held in the following institutions, which are abbreviated according to the system proposed by Watt (1979).

ANIC	Australian National Insect Collection, CSIRO Division of Entomology, Canberra City, A.C.T. 2601, Australia
BMNH	British Museum (Natural History), Cromwell Road, London SW7 5BD, U.K.
CASF	California Academy of Sciences, San Francisco, U.S.A.
CMNZ	Canterbury Museum, Christchurch, N.Z.
FRNZ	Forest Research Institute, New Zealand Forest Service, Rotorua, N.Z.
IEAN	Istituto di Entomologia Agraria dell'Università di Napoli, Portici, Italy
NZAC	New Zealand Arthropod Collection, Entomology Division, DSIR, Mt Albert Research Centre, Auckland, N.Z.
PANZ	Plant Health Diagnostic Station, Ministry of Agriculture and Fisheries, Mt Albert Research Centre, Auckland, N.Z. (now at Lynfield Agricultural Centre, Auckland)
PCNZ	Plant Health Diagnostic Station, MAF, Lincoln, Canterbury, N.Z.
PLNZ	Plant Health Diagnostic Station, MAF, Horticultural Research Centre, Levin, N.Z. (collection now housed at PANZ)
SANC	South African National Collection of Insects, Pretoria, South Africa
UCDC	University of California, Davis, California, U.S.A.
USNM	United States National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560, U.S.A.
WARI	Waite Agricultural Research Institute, Glen Osmond, South Australia

DISTRIBUTION RECORDS. The system of area codes proposed by Crosby *et al.* (1976) has been used to categorise and summarise records. Further details and a reference map are given on the inside back cover. Note that only New Zealand records are summarised under Material Examined, even when specimens from elsewhere were included in the study. Information regarding the extralimital material may be found under Type Data and/or Remarks, as appropriate in context.

HOST RECORDS are listed in the Material Examined section for each species. Where only a common name was given on the slide label, the supposed appropriate scientific name is given in square brackets after it. The mealybug species is then included under this scientific name in the host list appendix. Family and generic names reflect current usage, and may differ from names given in earlier records.

ILLUSTRATIONS. In this contribution mealybugs are illustrated diagramatically, although

each figure is based on a single specimen. All are drawn at about the same size, so the scale of magnification of each is different, and is not indicated. Measurements of the body outline, hind legs, and circulus width are given in the descriptions. The body outline, complete with legs and antennae, was illustrated using a drawing apparatus, and the orientation of the appendages was adjusted. Pores were drawn in by eye, and are shown much larger in proportion to the body outline than in reality so as to be visible on the diagram. Consequently, for species on which small pores are very numerous, fewer could be shown on the diagram than existed in reality. However, an attempt was made to give the same impression in the diagram as was observed from the specimen. Larger and sparser pore and duct types are shown in their actual numbers. Enlargements of the pore and duct types present are shown around the main diagram to help indicate their positions and appearance. These enlargements are not necessarily drawn to the same relative scale. The numbering of the abdominal segments and the standard representations for the more common pore and duct types are shown in a schematic diagram (Figure 2).

The translucent pores which in reality occur on the posterior face of the hind legs are illustrated as if they were on the anterior faces. They could thus be included on the main diagram of each species rather than as an insert.

KEY TO GENERA OF PSEUDOCOCCIDAE RECORDED FROM NEW ZEALAND

01 Antennae 9-segmented; quinquelocular pores present ... 02
— Antennae 5–8-segmented; quinquelocular pores absent ... 03

02(01) Cerarian setae all conical or lanceolate; anal lobe cerarii each with 2 conical or lanceolate setae ... (p. 72) .. ***Phenacoccus***
— Cerarian setae all truncate; anal lobe cerarii each with numerous truncate setae ... (p. 81) .. ***Rastrococcus***

03(01) Cerarii on sclerotised protuberances extending beyond body outline ... 04
— Cerarii not on such sclerotised processes ... 05

04(03) Dorsum with large, drum-shaped tubular ducts ... (p. 14) .. ***Acrochordonus***
— Dorsum without tubular ducts ... (p. 16) .. ***Agastococcus***

05(03) Body outline distinctly turbinate and small (length less than 1.8 mm); on *Nothofagus* ... (p. 51) .. ***Maskellococcus***
— Body of various sizes and shapes, but if outline turbinate, then length more than 2.0 mm; on various hosts, including *Nothofagus* ... 06

06(05) Dorsum with large tubular ducts each surrounded by a sclerotised area; on Podocarpaceae ... (p. 71) .. ***Paraferrisia***
— Body without such ducts; on various hosts, including Podocarpaceae ... 07

07(06) Tarsal claws elongate; cerarii numbering 3 or 4 pairs; antennae 5- or 6-segmented; oral rim tubular ducts each with 1–3 associated simple pores; dorsal setae noticeably long and stout ... (p. 35) .. ***Chryseococcus***
— Tarsal claws various, but if elongate then cerarii numbering 17 pairs; remaining characters various ... 08

08(07) Trochanters quadrate; multilocular disc pores on anterior half only of dorsum; on *Nothofagus* ... (p. 40) .. ***Crocydococcus***
— Trochanters of normal pseudococcid form; multilocular disc pores, if present on dorsum, either evenly distributed or confined to posterior portion; on various hosts, including *Nothofagus* ... 09

09(08) Many dorsal setae conical or lanceolate and the same size, or nearly the same size, as cerarian setae ... 10
— Dorsal setae flagellate except those on abdominal segment VII, which may be conical or lanceolate ... 13

10(09) Some ventral setae lanceolate ... (p. 94) .. ***Ventrispina***
— All ventral setae flagellate ... 11

11(10) Dorsum with numerous multilocular disc pores ... (p. 18) .. ***Asteliacoccus***
— Dorsum without multilocular disc pores ... 12

12(11) Tubular ducts slender, with indistinct rims; anal lobe cerarii each with 2–10 conical setae ... (p. 41) .. ***Cyphonococcus***
— Tubular ducts moderately stout, without rims; anal lobe cerarii each with only 2 conical setae ... (p. 53) .. ***Nipaecoccus***

13(09) Bitubular or tritubular ducts present ... (p. 84) .. ***Rhizoecus***
— Bitubular and tritubular ducts absent.. 14

14(13) Anal ring distinctly kidney-shaped; multilocular disc pores absent; legs and antennae reduced ... (p. 82) .. ***Renicaula***
— Anal ring of normal pseudococcid form; remaining characters various ... 15

15(14) Cerarii absent; body rotund ... (p. 48) .. ***Eurycoccus***
— Cerarii always present on at least anal lobes; body outline various ... 16

16(15) Anal lobe bars absent ... 17
— Anal lobe bars present ... 25

17(16) Oral rim tubular ducts present somewhere on body ... 18
— Oral rim tubular ducts absent ... 22

18(17) Cerarii numbering 0–5 pairs ... 19
— Cerarii numbering 6–17 pairs ... 20

19(18) Dorsum without oral collar tubular ducts ... (p. 34) .. ***Chorizococcus***
— Dorsum with rows of oral collar tubular ducts ... (p. 97) .. ***Vryburgia***

20(18) Abdominal cerarii each with 2 conical setae and several flagellate auxiliary setae ... (p. 76) .. ***Pseudococcus***
— Abdominal cerarii not as above, except for anal lobe cerarii ... 21

21(20) Body elongate; most cerarii with more than 2 conical setae ... (p. 49) .. (in part) ***Laminicoccus***
— Body oval; all cerarii with no more than 2 conical setae ... (p. 93) .. ***Spilococcus***

22(17) Abdominal cerarii each with 2 conical setae and several flagellate auxiliary setae ... (p. 43) .. ***Dysmicoccus*** (Some specimens of *Pseudococcus similans* may be included here)
— Abdominal cerarii not as above, except for anal lobe pair ... 23

23(22) Cerarii numbering 9–17 pairs ... (p. 49) .. (in part) ***Laminicoccus***
— Cerarii numbering 1–5 pairs ... 24

24(23) Tubular ducts absent; body small (length less than 1.8 mm); multilocular disc pores (if present) confined to median areas of posterior abdominal segments ... (p. 16) .. ***Asaphococcus***
— Oral collar tubular ducts present; body length usually more than 1.8 mm; multilocular disc pores usually numerous on both dorsum and venter ... (p. 19) .. ***Balanococcus***

25(16) Anal lobe cerarii each with 2 or 3 conical setae ... 26
— Anal lobe cerarii each with 4–30 conical setae ... 28

26(25) Oral rim tubular ducts present somewhere on body ... (p. 54) .. ***Paracoccus***
— Oral rim tubular ducts absent ... 27

27(26) Cerarii numbering 1–17 pairs (all species known from New Zealand with 1–7 pairs of cerarii, on abdomen only) ... (p. 37) .. ***Crisicoccus***
— Cerarii usually numbering 18 pairs, but some thoracic and abdominal pairs indistinct or missing in individual specimens ... (p. 73) .. ***Planococcus***

28(25) Dorsum with numerous oral collar tubular ducts ... (p. 49) .. ***Ferrisicoccus***
— Dorsum without oral collar tubular ducts ... (p. 90) .. ***Sarococcus***

DESCRIPTIONS

Acrochordonus new genus

Type-species *Acrochordonus chionochloae* new species.

(The name *Acrochordonus* is derived from the Greek '*akrochordon*', meaning 'wart', and refers to the sclerotised protuberances on which the cerarii are borne.)

Body outline oval. Antennae 6-segmented. Legs small; tarsal claws without denticles; translucent pores on hind coxae extending on to surrounding integument. Spiracles of normal pseudococcid form. Circulus present or absent, if present triangular or oval, between abdominal segments III and IV. Cerarii numbering 2–4 pairs at posterior of body, on sclerotised protuberances; each cerarius with several conical setae, but without pores or flagellate auxiliary setae. Anal lobe bars not apparent. Anal ring of normal pseudococcid form, sometimes invaginated into body; setae sometimes distinctly stout.

Multilocular disc pores present or absent, if present confined to median areas of venter. Quinquelocular pores absent. Trilocular pores sparse, of 2

sizes, both of them on venter, but the larger pores only on dorsum. Oral rim tubular ducts absent. Oral collar tubular ducts on venter only. Large, drum-like tubular ducts on both venter and dorsum. Simple pores not apparent. Setae generally lanceolate, sometimes flagellate on venter.

Remarks. *Acrochordonus* is characterised by sclerotised protuberances bearing cerarii at the posterior of the body and by the presence of large, drum-shaped ducts. It is somewhat similar to *Agastococcus*, which also has sclerotised protuberances bearing the cerarii, but the latter genus lacks the large ducts described above.

Only two species of *Acrochordonus* are known, both occurring on *Chionochloa* and recorded only from New Zealand.

KEY TO SPECIES OF *ACROCHORDONUS*

01 Circulus and multilocular disc pores absent; caudal sclerotised protuberances extending well beyond body outline ... (Fig. 18) .. ***chionochloae***

— Circulus and multilocular disc pores present; caudal sclerotised protuberances barely extending beyond body outline ... (Fig. 19) .. ***curtatus***

Acrochordonus chionochloae new species

Figure 18

Live females dark brownish red, covered with a mass of coarse, coiled, white wax strands and with an anal wax tube reaching up to 25 mm in length.

Body outline oval; integument sometimes heavily sclerotised; length 1.3–2.4 mm, width 0.7–1.4 mm. Legs typical of genus; hind trochanter + femur 0.08–0.11 mm long; hind tibia + tarsus 0.08–0.10 mm long. Circulus absent. Cerarii numbering 3 or 4 pairs; each cerarius on a sclerotised protuberance extending well beyond body outline and with several small conical setae. Anal ring with stout setae, invaginated into body.

Venter. Multilocular disc pores absent. Trilocular pores sparsely scattered over head and thorax, and a few on margins of anterior abdominal segments. Setae short, lanceolate.

Dorsum. Trilocular pores larger than on venter, sparsely scattered over abdominal segments, and a few on head and thorax. Drum-shaped tubular ducts larger than on venter, in a marginal band around most of dorsum, but absent from posterior abdominal segments. Setae stout, lanceolate.

Type data. Holotype: adult female, upper right specimen of 4 on slide (circled on coverslip, and position shown on label), New Zealand, NN–MB, Wairau, Red Hills, on *Chionochloa rubra* or *C. macra*, 23 March 1972, J.A. de Boer ("818") (NZAC). **Paratypes**: 11 adult females on 5 slides (including holotype slide), same data as holotype (BMNH, NZAC).

Material examined. Type series, plus 30 non-type adult females (BMNH, NZAC, PCNZ, USNM).

TO / NN–MB, MC, CO.

Collected in February, March, May, August, and September.

Taken from *Chionochloa australis*, *C. rubra*, and *C. macra* (Poaceae).

Remarks. *Acrochordonus chionochloae* can be distinguished from its only known congener *A. curtatus* by its lack of a circulus and multilocular disc pores, and by its much longer sclerotised cerarian protuberances.

Acrochordonus curtatus new species

Figure 19

Appearance of live females not known.

Body outline oval; length (mounted) 1.8–2.9 mm, width 1.0–2.1 mm. Legs typical of genus; hind trochanter + femur 0.11–0.13 mm long; hind tibia + tarsus 0.10–0.12 mm long. Circulus triangular or oval, 0.03–0.05 mm wide. Cerarii numbering 2 pairs, each on a sclerotised protuberance; anal lobe cerarii each with 4 or 5 conical setae; remaining cerarii each with 2 conical setae. Anal ring with slender setae, not invaginated into body.

Venter. Multilocular disc pores present in rows across median area of abdominal segment IV, a few on segment V, and in a group behind each spiracle. Trilocular pores sparse, of 2 sizes, the smaller pores in a group in front of each spiracular aperture and scattered over head, the larger ones scattered over margins of thorax and abdomen. Oral collar tubular ducts scattered over median areas of head, thorax, and abdominal segments I–IV. Large, drum-shaped tubular ducts evenly distributed over marginal areas of thorax and abdomen and in small numbers on median areas of abdominal segments V and VI. Setae generally short and fine, flagellate or lanceolate, but those on abdominal segments VII–IX longer and stouter.

Dorsum. Trilocular pores the same size as larger pores on venter, sparsely scattered over entire dorsum. Drum-shaped tubular ducts larger than those on venter, scattered over entire dorsum. Setae short, stout, lanceolate.

Type data. **Holotype**: adult female alone on slide, New Zealand, BR, Mt Murchison, on *Chionochloa australis*, 10 February 1973, G.C. Kelly ("978") (NZAC). **Paratypes**: 3 adult females together on slide, same data as holotype (BMNH).

Material examined. Type specimens only.

Remarks. See Remarks under *A. chionochloae.*

Agastococcus new genus

Type-species *Agastococcus zelandiensis* new species.

(The name *Agastococcus* is derived from the Greek '*agastos*', meaning 'wonderful', and refers to the extraordinary appearance of the only known species of this genus.)

Body outline elongate-oval, with a lateral fringe of sclerotised processes. Antennae 6-segmented. Legs well developed; tarsal claws without denticles; translucent pores present on hind coxae. Spiracles of normal pseudococcid form. Circulus absent. Ostioles not apparent. Cerarii numbering 8 pairs; anal lobe cerarii and penultimate cerarii each with several stout, elongate, blunt-ended setae at tips of sclerotised processes; remaining cerarii each comprising 2 such setae at tip of an elongate sclerotised process, these processes decreasing in size anteriad.

Multilocular disc pores present around vulva. Quinquelocular pores absent. Trilocular pores moderately numerous, in distinct groups over parts of body. Oral rim tubular ducts absent. Oral collar tubular ducts on venter only. Simple pores apparent on both surfaces. Setae on median areas of venter moderately long, fine, and flagellate; those on dorsum and margins of venter stout, elongate, blunt-ended.

Remarks. *Agastococcus zelandiensis* is superficially similar to the type-species of an Hawaiian genus, *Clavicoccus tribulus* Ferris, which also has cerarii on the end of long, sclerotised processes. The two differ in other characters, and are unlikely to have any true close relationship. The extraordinary appearance of *A. zelandiensis* should prevent it from being confused with any other species of mealybug recorded from New Zealand.

This monotypic genus is known only from New Zealand.

Agastococcus zelandiensis new species

Figure 20

Appearance of live females not known.

Body outline as in generic description; length (mounted) 2.1–4.0 mm, width 1.0–2.4 mm. Legs as in generic description; hind trochanter + femur 0.21–0.23 mm long; hind tibia + tarsus 0.18–0.19 mm long; translucent pores present on hind coxae. Cerarii as in generic description.

Venter. Multilocular disc pores present around vulva. Trilocular pores moderately numerous, in distinct groups over most of venter, but absent from median areas of anterior abdominal segments. Oral collar tubular ducts moderately numerous around entire margin of venter. Simple pores minute, scattered over entire surface. Setae on median areas moderately long and fine, those on margins stout, elongate, blunt-ended.

Dorsum. Multilocular disc pores and oral collar tubular ducts absent. Trilocular pores moderately numerous, generally evenly distributed but sometimes in groups. Simple pores as on venter. Setae blunt-ended, elongate, very stout.

Type data. **Holotype**: adult female alone on slide, New Zealand, BR, Charleston State Forest, 4 Mile Creek [= Four Mile River], on *Dracophyllum* sp., 7 November 1972, J.S. Dugdale ("934") (NZAC). **Paratypes**: 3 adult females on separate slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens only.

Remarks. See Remarks for genus, above.

Asaphococcus new genus

Type-species *Trionymus montanus* Brittin, 1938.

(The name *Asaphococcus* is derived from the Greek '*asaphes*', meaning 'indistinct', and refers to the uncertain relationships of this genus to the other known pseudococcid genera.)

Body small, rotund. Antennae 6- or 7-segmented. Legs small, stout; tarsal claws without denticles; translucent pores sometimes present on hind legs. Spiracles distinctly sclerotised, sometimes with several trilocular pores contained within this sclerotisation. Circulus absent. Posterior pair of ostioles distinct; anterior pair sometimes not apparent. Cerarii numbering 1 or 2 pairs, not on sclerotised areas; each cerarius with 1 or 2 conical setae, a few trilocular pores, and sometimes a few auxiliary setae. Anal lobe bars absent. Anal ring of normal pseudococcid form, but with reduced numbers of cells.

Multilocular disc pores absent or confined to abdominal venter. Quinquelocular pores absent. Trilocular pores sparse. Tubular ducts absent. Simple pores not apparent. Setae fine, flagellate.

Remarks. The affinities of *Asaphococcus* are obscure. It is similar to *Eurycoccus* and *Balanococcus* in often possessing a single pair of cerarii, but differs from both in its greatly reduced numbers of trilocular pores and in the absence of tubular ducts. It is perhaps closest to *Renicaula* with its reduced legs, somewhat modified anal ring, sclerotised spiracles, small number of cerarii, and sparsely distributed trilocular pores, but differs primarily in having the anal ring not distinctively kidney-shaped and the hind coxae not distinctly enlarged.

Asaphococcus is known only from New Zealand, and comprises three species.

KEY TO SPECIES OF *ASAPHOCOCCUS*

01 Multilocular disc pores absent ... (Fig. 22) .. ***amissus***
— Multilocular disc pores present ... 02

02(01) Cerarii on anal lobes only, anterior ostioles not apparent ... (Fig. 21) .. ***agninus***
— Cerarii numbering 2 pairs; anterior pair of ostioles distinct ... (Fig. 23) .. ***montanus***

Asaphococcus agninus new species

Figure 21

Live females red, covered with a mass of white wax.

Body rotund; length (mounted) 0.7–0.9 mm, width 0.6–0.7 mm. Antennae 6-segmented. Legs stout; hind trochanter + femur 0.07–0.08 mm long; hind tibia + tarsus 0.05–0.07 mm long; translucent pores present on hind coxae. Spiracles heavily sclerotised; several trilocular pores contained within this sclerotisation. Anterior ostioles not apparent, posterior pair with sclerotised inner edges to lips; each lip with 1–3 trilocular pores and no more than 1 seta. Cerarii on anal lobes only, each with 2 slender conical setae and a few associated trilocular pores, but without auxiliary setae.

Venter. Multilocular disc pores sparse, in rows across abdominal segments V–IX. Trilocular pores sparsely but evenly distributed. Setae short, very fine.

Dorsum. Trilocular pores evenly distributed. Setae short, very fine.

Type data. Holotype: adult female alone on slide, New Zealand, TO, Taupo, on *Pittosporum*, 31 August 1978, A. Zandvoort ("APHDS 6898") (NZAC). **Paratypes**: 2 adult females on separate slides, same data as holotype; 15 adult females on 6 slides, GB, Gisborne, under bark of *Pittosporum* sp., 1 Aug 1980, R.P. Pollock ("9419") (BMNH, NZAC, USNM).

Material examined. Type series, plus 3 non-type adult females (BMNH, NZAC, PANZ, USNM).

TO, GB, HB / —.

Collected in August and September.

Taken from under bark of *Pittosporum* sp. (Pittosporaceae).

Remarks. *A. agninus* can be distinguished from the other known species of *Asaphococcus* by the presence of multilocular disc pores and the absence of anterior ostioles and penultimate cerarii.

The specific name — Latin, 'relating to a lamb' — alludes to the mass of fleecy white wax covering the live females.

Asaphococcus amissus new species

Figure 22

Appearance of live females not known.

Body rotund; length (mounted) 0.9–1.7 mm, width 0.6–1.2 mm. Antennae 6-segmented. Legs stout; hind trochanter + femur 0.08–0.09 mm long; hind tibia + tarsus 0.07–0.10 mm long; translucent pores present on hind coxae. Spiracles moderately sclerotised, lacking trilocular pores within this sclerotisation. Only posterior pair of ostioles apparent; lips without trilocular pores or setae. Cerarii on anal lobes only, each with 2 slender conical setae and a few associated trilocular pores, but without auxiliary setae.

Venter. Multilocular disc pores absent. Trilocular pores very sparse on median areas, more numerous marginally, otherwise evenly distributed. Setae moderately short and fine.

Dorsum. Trilocular pores sparsely but evenly distributed. Setae short, fine.

Type data. Holotype: adult female, right-hand specimen of 3 on slide (ringed on coverslip, and position shown on label), New Zealand, NN, Eve's Bush, on *Cyathodes fasciculata*, 24 April 1973, J.A. de Boer ("1016") (NZAC). **Paratypes**: 1 adult female, same slide as holotype.

Material examined. Type specimens, plus 5 non-type adult females (BMNH, NZAC).

TO / NN.

Collected in February and April.

Taken from *Cyathodes fasciculata* (Epacridaceae) and *Podocarpus totara* (Podocarpaceae).

Remarks. *A. amissus* can be distinguished from the other known species of *Asaphococcus* by its lack of multilocular disc pores.

Since the five specimens from *Podocarpus totara* are in poor condition, they have not been included in the type series.

The specific name — Latin, 'missing' — alludes to the absence of multilocular disc pores.

Asaphococcus montanus (Brittin) new combination

Figure 23

montanus Brittin, 1938: 333 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

Appearance of live females not known.

Body rotund; length (mounted) 0.8–1.7 mm, width 0.5–1.1 mm. Antennae 6- or 7-segmented. Legs stout; hind trochanter + femur 0.10–0.12 mm long; hind tibia + tarsus 0.10–0.13 mm long; translucent pores not apparent on hind legs. Spiracles only lightly sclerotised, lacking trilocular pores within this sclerotisation. Ostioles distinct; lips each with 1–3 trilocular pores and 1 or 2 setae. Cerarii numbering 2 pairs; anal lobe cerarii each with 2 conical setae, 1–3 long, fine auxiliary setae, and a few trilocular pores; remaining cerarii each with 1 or 2 conical setae but without auxiliary setae or associated trilocular pores.

Venter. Multilocular disc pores present around vulva and sparsely in rows across posteromedian edges of abdominal segments IV–VI. Trilocular pores moderately numerous and evenly distributed. Setae moderately short and fine.

Dorsum. Trilocular pores evenly distributed. Setae moderately short and fine.

Type data. Lectotype (here designated): adult female alone on slide, New Zealand, WD, Otira, in galls of *Phyllocladus* sp., 28 December 1915, G. Brittin ("112") (NZAC).

Material examined. Lectotype, plus 3 non-type adult females (BMNH, NZAC).

TO / KA, WD.

Collected in September, November, and December.

Taken on *Phyllocladus* sp. and *P. alpinus* (Podocarpaceae).

Remarks. The two distinct pairs of ostioles and of cerarii distinguish *A. montanus* from the other known species of *Asaphococcus*.

Genus *Asteliacoccus* Williams

Asteliacoccus Williams, 1985: 51. Type-species *Asteliacoccus margaretae* Williams, 1985, by monotypy and original designation.

Body outline elongate to broadly oval; anal lobes not protruding. Antennae 8-segmented. Legs well developed; hind coxae and sometimes also hind tibiae with translucent pores; tarsal claws without denticles. Spiracles of normal pseudococcid form. Both pairs of ostioles apparent. Circuli absent. Cerarii numbering 3–5 pairs, all on posterior abdominal segments; anal lobe cerarii each with 10–15 conical setae and a loose group of trilocular pores; remaining cerarii with variable numbers of conical setae. Anal lobe bars absent. Anal ring of normal pseudococcid form.

Multilocular disc pores at least moderately numerous over both venter and dorsum, sometimes sparse on median areas of venter. Quinquelocular pores absent. Trilocular pores moderately numerous, evenly distributed. Oral rim tubular ducts absent. Oral collar tubular ducts with collars distinctly sclerotised and extending about halfway up ducts, on venter and sometimes also on dorsum. Simple pores minute, scattered over both venter and dorsum. Setae flagellate on median areas of venter, elsewhere spine-like.

Remarks. *Asteliacoccus* is characterised by the form of the dorsal setae, the nature of the cerarii, and the distribution of multilocular disc pores. Despite its superficial resemblance to other genera with conical or spine-like dorsal setae, such as *Nipaecoccus* and *Ventrispina*, it is probably more closely related to some of the species here placed in *Balanococcus* which are similar in the form of the oral collar tubular ducts, nature of cerarii, and distribution of multilocular disc pores.

Only two species of *Asteliacoccus* are known, one from New Zealand and another from Australia.

Asteliacoccus zelandigena new species

Figure 24

Live females orange-pink, covered with powdery white wax.

Body outline elongate; length 1.7–3.5 mm, width 0.8–2.0 mm. Antennae 8-segmented. Legs typical of genus; hind trochanter + femur 0.27–0.34 mm long; hind tibia + tarsus 0.26–0.29 mm long; a few translucent pores on hind coxae. Both pairs of ostioles distinct; lips each with 6–10 trilocular pores and 0–3 setae. Cerarii numbering 3–5 pairs; only anal lobe cerarii and penultimate cerarii on sclerotised areas; anal lobe cerarii each with 10–15 stout,

conical setae and an associated group of trilocular pores; remaining cerarii frequently indistinct, represented by marginal aggregations of conical setae.

Venter. Multilocular disc pores numerous over entire venter, in rows across abdominal segments. Trilocular pores evenly distributed. Oral collar tubular ducts of 2 sizes, both occurring in rows across median areas of abdominal segments IV–VIII; larger ducts numerous around entire margin. Simple pores not apparent. Setae generally moderately long and somewhat stout, but marginal setae frequently spine-like.

Dorsum. Multilocular disc pores sparsely scattered over entire surface. Trilocular pores evenly distributed. Oral collar tubular ducts the same size as larger ducts on venter, in rows across segments of entire dorsum. Simple pores not apparent. Setae generally spine-like, but conical on median areas of abdominal segments VI and VII and on margins of entire dorsum.

Type data. Holotype: adult female, middle specimen of 3 on slide (ringed on slide, and position shown on label), New Zealand, NC–WD, Arthur's Pass, base of leaves of *Astelia cockaynei*, 9 February 1984, J.M. Cox ("252") (NZAC). **Paratypes**: 9 adult females on 4 slides (including holotype slide), same data as holotype (BMNH, NZAC).

Material examined. Type series, plus 6 non-type adult females (BMNH, NZAC).

— / NN, NC–WD.

Collected in February–April and November.

Taken from *Astelia* sp. and *A. cockaynei* (Liliaceae). Occurring at bases of leaves.

Remarks. *A. zelandigena* is the only species of *Asteliacoccus* known from New Zealand.

Genus *Balanococcus* Williams

Balanococcus Williams, 1962: 13. Type-species *Ripersia scirpi* Green, 1921, by original designation.

Body outline elongate-oval to spherical; anal lobes sometimes markedly protruding. Antennae 5–8-segmented. Legs generally well developed, sometimes reduced and slightly distorted; tarsal claws without denticles; hind coxae sometimes enlarged and beset with translucent pores, these extending on to surrounding integument and sometimes also on hind tibiae. Spiracles of normal pseudococcid form, although often heavily sclerotised. Circuli numbering 0–5, round or oval. Both pairs of ostioles usually apparent, although sometimes reduced as regards numbers of setae and trilocular pores. Cerarii numbering 1–5 pairs, all at posterior end of body; anal lobe cerarii each with 2–16 conical setae (rarely 1); remaining cerarii each with 1–4 conical setae; flagellate auxiliary setae present in anal lobe cerarii only. Anal lobe bars absent. Anal ring of normal pseudococcid form.

Multilocular disc pores present on venter, often in groups around spiracular apertures, and usually on dorsum. Quinquelocular pores absent. Trilocular pores usually numerous and evenly distributed, although sparse or absent in some species. Oral rim tubular ducts absent. Oral collar tubular ducts variably distributed, usually on both venter and dorsum; collar heavily sclerotised, usually distinctly flange-shaped and occupying up to half length of duct. Simple pores usually apparent, from minute to half the size of trilocular pores. Setae variable, from long and fine to short and stout.

Remarks. Within New Zealand *Balanococcus* is similar to *Renicaula* in having legs sometimes somewhat reduced and distorted, and tubular ducts with a heavily sclerotised collar. These two genera can be distinguished by the absence of multilocular disc pores and the unusual form of the anal ring in *Renicaula*. All the New Zealand species previously placed in *Trionymus* are here transferred to *Balanococcus*. These genera are superficially similar, but *Trionymus* can be distinguished by the lack of a sclerotised collar in the oral collar tubular ducts and by the absence of more than three conical setae in each anal lobe cerarius; as many as sixteen conical setae may be present in each anal lobe cerarius in *Balanococcus*. The type-species of *Trionymus*, *Westwoodia perrisii* Signoret, is more similar to *Dysmicoccus* in its form of anal lobe cerarii and tubular ducts than it is to *Balanococcus*. Many species from around the world that are currently placed in *Trionymus* are almost certainly not congeneric with *T. perrisii*.

The type-species of *Balanococcus*, *B. scirpi*, has six-segmented antennae, two conical setae in each anal lobe cerarius, a marginal band of multilocular disc pores on both venter and dorsum, and oral collar tubular ducts each with a very distinct, flange-shaped collar extending halfway up the duct. Some New Zealand species, such as *B. botulus*, are very similar to *B. scirpi* in these characters, but others — such as *B. dracophylli* and *B. abnormalis* — are somewhat different. However, as most of the New Zealand species placed here in *Balanococcus* appear to form a natural group, the description of *Balanococcus* given above has been expanded to contain them. Williams (1985) described a new Australian genus, *Coorongia*, known only from the type-species *C. gahniae*, which is similar to the New Zealand species placed here in *Balanococcus*. Further studies of this whole group of mealybugs from

throughout the world, and perhaps including the males, may indicate whether the Australasian members of the group, including *C. gahniae*, are separate from the Palearctic members or are congeneric. In the latter case, *Coorongia* should be made a synonym of *Balanococcus*.

B. agnostus may not be a member of *Balanococcus*. Its placement is a problem, as it lacks the anal lobe bars of *Crisicoccus* and the plate-like cerarii of *Dysmicoccus* and *Trionymus* as well as the typical form of oral collar tubular ducts of *Balanococus*. On the other hand, it seems inappropriate to erect a new genus for a species that lacks any distinctive characteristics. As it is superficially similar to *B. dracophylli* and *B. mayae*, it has been placed with them in *Balanococcus*.

Balanococcus is known from the Palearctic Region and Oriental Region as well as New Zealand. *B. diminutus* has been introduced into the U.S.A. and Europe on ornamental *Phormium*.

KEY TO SPECIES OF *BALANOCOCCUS* KNOWN FROM NEW ZEALAND

01 Circuli numbering 1–6 ... 02
— Circuli absent ... 17

02(01) Trilocular pores absent from venter, including around spiracular apertures... 03
— Trilocular pores present on venter, at least around spiracular apertures ... 05

03(02) Trilocular pores absent; on *Aciphylla* and *Anisotome* (Fig. 31) ... ***cockaynei***
— Trilocular pores present on dorsum, at least on midline of thorax and abdominal segments I–V ... 04

04(03) Cerarii numbering 4 pairs; oral collar tubular ducts and trilocular pores numerous over entire dorsum; on *Cordyline* (Fig. 34)... (in part) ***cordylinidis***
— Cerarii on anal lobes only; dorsal oral collar tubular ducts on abdominal segment VII only; dorsal trilocular pores on midline of thorax and abdominal segments I–V only; on Poaceae (Fig. 42) ... ***notodanthoniae***

05(02) Body spherical at maturity; antennae 6-segmented; anal lobe cerarii each with 2 conical setae; tubular ducts present on median areas of thoracic venter (Fig. 43) ... ***poae***
— Body outline elongate to broadly oval at maturity; antennae 6–8-segmented; other characters various ... 06

06(05) Dorsal setae on abdominal segments VI–VIII stout, almost conical; circuli numbering 2–4; anal lobes protruding, each with 12–16 conical setae (Fig. 26) ... ***acerbus***
— Dorsal setae on abdominal segments VI–VIII definitely flagellate; circuli numbering 1–3; anal lobes variously shaped, each with 2–8 conical setae ... 07

07(06) Anal lobe cerarii each with 5–8 conical setae ... 08
— Anal lobe cerarii each with 2 or 3 conical setae ... 09

08(07) Multilocular disc pores absent from dorsum of head and thorax (Fig. 39) ... ***gahniicola***
— Multilocular disc pores numerous over entire dorsum (Fig. 44)... ***sexaspinus***

09(07) Anal lobes protruding; anal lobe cerarii each with 3 conical setae (rarely 2); antennae 6- or 7-segmented (Fig. 28) ... ***alpigenus***
— Anal lobes not protruding; anal lobe cerarii each with 2 conical setae; antennae 8-segmented ... 10

10(09) Multilocular disc pores scattered over dorsum of thorax and abdomen ... 11
— Multilocular disc pores absent from dorsum of thorax, if on dorsum of abdomen, then confined to posterior segments ... 14

11(10) Multilocular disc pores few on dorsum, absent from median areas of thoracic venter (Fig. 45) ... ***tunakinensis***
— Multilocular disc pores numerous on dorsum and on median areas of thoracic venter ... 12

12(11) Cerarii numbering 2 pairs; on *Phormium* (Fig. 37) ... ***diminutus***
— Cerarii numbering 3 or 4 pairs; on *Cortaderia* or *Cordyline* ... 13

13(12) Oral collar tubular ducts present on median areas of thoracic venter; on *Cordyline* (Fig. 34)... (in part) ***cordylinidis***
— Oral collar tubular ducts not on median areas of thoracic venter; on *Cortaderia* (Fig. 35) ... ***cortaderiae***

14(10) Dorsal oral collar tubular ducts scattered over entire surface, numerous on median areas of head and abdominal segments VI and VII;

multilocular disc pores usually absent from margins of venter (Fig. 36) ... ***danthoniae***

— Dorsal oral collar tubular ducts absent or confined to margins of abdominal segments VI and VII; multilocular disc pores numerous around margins of venter ... 15

15(14) Multilocular disc pores on median areas of dorsum numbering 10–60; on Cyperaceae (Fig. 29) ... ***botulus***

— Multilocular disc pores on median areas of dorsum numbering no more than 1; on Juncaceae ... 16

16(15) Multilocular disc pores not present on head (Fig. 41) ... ***nelsonensis***

— Multilocular disc pores present on head, between antennae (Fig. 47) ... ***wisei***

17(01) Multilocular disc pores numerous over entire body ... 18

— Multilocular disc pores confined to venter of abdominal segments V–IX... 21

18(17) Body elongate to elongate oval ... 19

— Body spherical ... 20

19(18) Cerarian setae conical; on *Celmisia* (Fig. 30) ... ***celmisiae***

— Cerarian setae turret-shaped; host unknown (Fig. 46) ... ***turriseta***

20(18) Dorsum of abdominal segment VII with predominantly multilocular disc pores (Fig. 32) ... ***conglobatus***

— Dorsum of abdominal segment VII with predominantly trilocular pores (Fig. 33) ... ***contextus***

21(17) Trilocular pores in dense marginal bands on both venter and dorsum; on *Celmisia* (Fig. 25) ... ***aberrans***

— Trilocular pores not in dense marginal bands; not on *Celmisia* ... 22

22(21) Oral collar tubular ducts not present on dorsum (Fig. 27) ... ***agnostus***

— Oral collar tubular ducts present on dorsum ... 23

23(22) Anal lobe cerarii with stout conical setae; multilocular disc pores not extending forwards beyond abdominal segment VI (Fig. 38) ... ***dracophylli***

— Anal lobe cerarii with slender conical setae; multilocular disc pores extending forwards to abdominal segment IV or V (Fig. 40) ... ***mayae***

Balanococcus aberrans new species

Figure 25

Appearance of live females not known.

Body outline elongate; anal lobes not protruding; length (mounted) 2.5–3.8 mm, width 1.0–1.9 mm. Antennae 6–8-segmented. Legs small, somewhat stout; hind trochanter + femur 0.13–0.18 mm long; hind tibia + tarsus 0.13–0.17 mm long; translucent pores present on hind coxae only. Both pairs of ostioles distinct; lips each with 2–10 trilocular pores and no more than 1 seta. Circuli absent. Cerarii numbering 3 or 4 pairs; anal lobe cerarii on sclerotised areas, each with 2 stout conical setae, 1–3 flagellate auxiliary setae, and an associated group of trilocular pores; remaining cerarii usually on sclerotised areas, each with 1 or 2 conical setae but without associated trilocular pores.

Venter. Multilocular disc pores numerous around vulva, in a broad band across median area of abdominal segment VII, and sometimes in small numbers on segment V. Trilocular pores sparse on median areas, but in a dense band around entire margin. Oral collar tubular ducts numbering 2–8 in rows across abdominal segment VII; collars indistinct. Simple pores minute, scattered over entire venter. Setae moderately short and stout.

Dorsum. Multilocular disc pores and oral collar tubular ducts absent. Trilocular pores sparse over most of median areas, although numerous on abdominal segments VII and VIII, and in a dense band around entire margin of venter. Simple pores as on venter. Setae moderately short and stout over most of dorsum, longer on posterior abdominal segments.

Type data. Holotype: adult female alone on slide, New Zealand, NN, Lake Sylvester, on *Celmisia incana*, 29 April 1969, J.A. de Boer ("512") (NZAC). **Paratypes**: 2 adult females on separate slides, same data as holotype (BMNH, NZAC); 3 adult females on 2 slides, NN, Mt Arthur, 4800 ft [1440 m], on *Celmisia sessiliflora*, 16 Nov 1969, S.M. Silcock ("599") (BMNH, NZAC); 2 adult females on separate slides, NN, Mt Arthur, 4000 ft [1200 m], on *Celmisia discolor*, 20 Nov 1969, J.A. de Boer ("593") (BMNH, NZAC); 2 adult females on separate slides, NN, Mt Lodestone, 4700 ft [1410 m], on *Celmisia discolor*, 20 Nov 1969, J.A. de Boer ("598") (NZAC, USNM); 3 adult females on separate slides, BR, Paparoa Range, Mt Dewar, 1697 m, on mat plants (bulk sample 69/238), 2 Dec 1969, J.I. Townsend ("17") (BMNH, NZAC).

Material examined. Type series only.

— / NN, BR.

Collected in April, November, and December.

Taken from *Celmisia discolor, C. incana, C. sessiliflora* (Asteraceae), and from mat plants.

Remarks. *B. aberrans* can be distinguished from all other known species of *Balanococcus* by its dense marginal bands of trilocular pores. Although it differs from most other species of *Balanococcus* in not having numerous oral collar tubular ducts each with a distinctly flange-shaped collar, its dense marginal band of pores, although trilocular and not multilocular, shows its relationship with other members of this genus.

The specific name — Latin, 'aberrant' — alludes to the unusual distribution of trilocular pores.

Balanococcus acerbus new species

Figure 26

Appearance of live females not known.

Body outline elongate-oval; anal lobes protruding; length (mounted) 1.8–3.6 mm, width 0.8–2.0 mm. Antennae 6–8-segmented. Legs small, slightly distorted; hind trochanter + femur 0.14–0.22 mm long; hind tibia + tarsus 0.13–0.22 mm long; large, translucent pores distorting surfaces of hind coxae. Circuli numbering 1–4, each 0.01–0.04 mm wide. Ostioles represented by posterior pair only; lips each with 2–6 trilocular pores, lacking setae. Cerarii only on protruding sclerotised anal lobes, each with 12–16 slender conical setae, without associated trilocular pores or flagellate auxiliary setae; no other cerarii distinct, although some marginal setae larger than surrounding setae.

Venter. Multilocular disc pores numerous over entire venter except for median areas of abdominal segments I–III, densely clustered around spiracular apertures. Trilocular pores sparsely but evenly distributed. Oral collar tubular ducts numerous around margins of entire venter and in rows across median areas of abdominal segments IV–VII; collars distinctly flange-shaped, extending about halfway up duct. Simple pores minute, scattered over entire venter. Setae moderately long and stout over most of venter, but stout, and sometimes spine-like, on margins of posterior abdominal segments.

Dorsum. Multilocular disc pores and oral collar tubular ducts the same size and form as on venter, numerous over entire surface. Trilocular and simple pores as on venter. Setae generally short and stout, but spine-like or almost conical on margins of posterior abdominal segments and on median areas of abdominal segments VII and VIII.

Type data. Holotype: adult female alone on slide, New Zealand, CO, Rocklands Tussock Station, in sedge axils in swamp, 14 April 1983, C.F. Butcher (NZAC). **Paratypes**: 5 adult females on separate slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens, plus 18 non-type adult females (BMNH, NZAC, USNM).

AK / NN, CO.

Collected in February–May.

Taken from sedge, *Carex* sp., and *C. flaviformis* (Cyperaceae) and from *Chionochloa rubra* (Poaceae).

Remarks. *B. acerbus* is similar to *B. sexaspinus* and *B. alpigenus* in body shape, distribution of multilocular disc pores, and in having at least one circulus. It may be distinguished by its almost conical setae on the dorsomedian areas of abdominal segments VII and VIII, and by usually having more than two circuli.

The specific name — Latin, 'rough' — alludes to the short, stout dorsal setae.

Balanococcus agnostus new species

Figure 27

Live females purple, covered with a small quantity of white wax.

Body outline elongate-oval to broadly oval; length (mounted) 0.9–1.9 mm, width 0.5–1.6 mm. Antennae 7-segmented. Legs small, stout; hind trochanter + femur 0.15–0.18 mm long; hind tibia + tarsus 0.12–0.18 mm long; translucent pores present on hind coxae only. Both pairs of ostioles distinct; lips each with 10–16 trilocular pores and 0–2 setae. Circuli absent. Cerarii numbering 4–6 pairs, not on sclerotised areas; anal lobe cerarii each with 2–4 conical setae, 2–5 long, fine, flagellate auxiliary setae, and a small group of trilocular pores; remaining cerarii each with 2 or 3 slender conical setae or stout flagellate setae and a few associated trilocular pores.

Venter. Multilocular disc pores present around vulva and in rows across posteromedian edges of abdominal segments V and VI. Trilocular pores moderately numerous, evenly distributed. Oral collar tubular ducts singly on margins of some thoracic and abdominal segments, without distinct collars. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores and oral collar tubular ducts absent. Trilocular pores, simple pores, and setae as on venter.

Type data. Holotype: adult female, middle specimen of 3 on slide (position shown on label), New

Zealand, AK, Hunua Range, under bark of *Myrsine australis*, 18 January 1983, J.M. Cox ("153") (NZAC). **Paratypes**: 9 adult females on 3 slides (including holotype slide), same data as holotype (BMNH, NZAC); 2 adult females on separate slides, AK, Hunua Falls, in crevice in bark of tree, 18 Aug 1975, J.M. Johannesson (BMNH, NZAC).

Material examined. Type series, plus 6 non-type adult females (BMNH, FRNZ, NZAC).

AK, TO / —.

Collected in January and August.

Taken from *Myrsine australis* (Myrsinaceae) and *Pseudopanax simplex* (Araliaceae). Occurring in crevices in trunks and under bark.

Remarks. See Remarks for genus, above.

The specific name — Latin, 'unknown' — alludes to the uncertain generic affiliation of this species.

Balanococcus alpigenus new species

Figure 28

Appearance of live females not known.

Body outline elongate; anal lobes slightly protruding; length (mounted) 2.3–2.4 mm, width about 1.0 mm. Antennae 6- or 7-segmented. Legs small but well developed; hind trochanter + femur 0.15–0.17 mm long; hind tibia + tarsus 0.13–0.17 mm long; translucent pores present on hind coxae. Circuli numbering 2, one of them between segments III and IV, the other between segments IV and V, each 0.02–0.04 mm wide. Both pairs of ostioles distinct; lips each with 0–3 trilocular pores, but lacking setae. Cerarii numbering 3–5 pairs; anal lobe cerarii on sclerotised areas, each with 2 or 3 large conical setae, 5–8 moderately short, stout, flagellate auxiliary setae, and a few trilocular pores; remaining cerarii not on sclerotised areas, each with 1–4 large conical setae but without associated trilocular pores. Anal ring with 4 rows of cells on ventral portion.

Venter. Multilocular disc pores numerous over entire venter, very dense around margins. Trilocular disc pores moderately numerous, evenly distributed. Oral collar tubular ducts in rows across abdominal segments and numerous around margin of entire venter; collars distinctly flange-shaped, extending about halfway up duct. Simple pores minute, scattered over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores and oral collar tubular ducts the same form and size as on venter, numerous over entire dorsum. Trilocular pores, simple pores, and setae as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, BR, Paparoa Range, Mt Dewar, Lochnagar Ridge, 1218 m, in swards (bulk sample 69/259), 10 December 1969, J.S. Dugdale ("19") (NZAC). **Paratypes**: 2 adult females on separate slides, same data as holotype (BMNH, NZAC); 4 adult females on 2 slides, NN, Mt Domett, in mats (bulk sample 71/155), 23 Nov 1971, J. McBurney ("77-221b J.M.C.") (BMNH, NZAC); 1 adult female with immature on slide, NN, Cobb, Iron Hill, 1450 m, in swards (bulk sample 68/89), 16 Mar 1968, J.S. Dugdale (NZAC).

Material examined. Type series, plus 1 non-type adult female (BMNH, NZAC).

— / NN, BR.

Collected in February, March, November, and December.

Taken from swards, mats, and litter.

Remarks. *B. alpigenus* is very similar to *B. acerbus* and *B. sexaspinus* in having at least one circulus, trilocular pores over the entire body, and an elongate body shape. It can be distinguished by having only two or three conical setae in each anal lobe cerarius.

There is a single specimen (CO, Old Man Range, Hyde Rock, 1645 m, *Celmisia sessiflora* litter 74/17, 22 Feb 1974, J.S. Dugdale, "78-5p J.M.C.") which may be a very small specimen of *B. alpigenus*. It differs from the description of *B. alpigenus* given above in having very few multilocular disc pores on the dorsum, a single, very small circulus, much more elongate cerarian setae, body length only 1.0 mm, and hind trochanter + femur only 0.09 mm long. Although all these differences would be consistent with a very small specimen of *B. alpigenus*, this identification cannot be confirmed until intermediate specimens are found. The characteristics of this specimen have not been included in the description of *B. alpigenus*.

The specific name — Latin 'alpine' — alludes to the altitudes at which all known specimens were collected.

Balanococcus botulus new species

Figure 29

Live females sausage-shaped, pink, covered in fine, white wax.

Body elongate to elongate-oval; anal lobes not protruding; length (mounted) 1.5–3.4 mm, width 0.8–2.2 mm. Antennae 8-segmented. Legs well developed; hind trochanter + femur 0.26–0.29 mm long; hind tibia + tarsus 0.26–0.30 mm long;

translucent pores present on hind coxae only. Circulus small, round, 0.04–0.06 mm wide. Both pairs of ostioles distinct; lips each with 5–12 trilocular pores and no more than 1 seta. Cerarii numbering 2 or 3 pairs, not on sclerotised areas; anal lobe cerarii each with 2 conical setae, 3–6 flagellate auxiliary setae, and a small, loose group of trilocular pores; remaining cerarii each with 1 or 2 conical setae but without associated trilocular pores.

Venter. Multilocular disc pores in wide bands across posterior abdominal segments, numerous in a marginal band around entire venter, including head, but absent from median areas of thorax. Trilocular pores moderately numerous, evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across posterior abdominal segments, the larger ones in rows across all abdominal segments and numerous in marginal band of multilocular disc pores; collar distinctly flange-shaped, extending about one-third the way up duct. Simple pores about half the size of trilocular pores, scattered over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores in rows across median areas of abdominal segments V–VII, totalling 10–60; a few also on margins of abdominal segments IV–VIII. Oral collar tubular ducts the same form and size as larger ducts on venter, in small numbers on margins of abdominal segments IV–VI. Trilocular pores, simple pores, and setae as on venter.

Type data. Holotype: adult female, right-hand specimen of 2 on slide (indicated on coverslip, and position shown on label), New Zealand, AK, Whatipu Beach, on *Cyperus ustulatus*, 2 January 1977, J.M. Cox (NZAC). **Paratypes**: 6 adult females on 3 slides (including holotype slide), same data as holotype (BMNH, USNM); 4 adult females on 2 slides, same data except 29 Dec 1976 (BMNH, NZAC).

Material examined. Type series plus 15 non-type adult females (BMNH, NZAC, USNM).

Three Kings Is / ND, AK / —.

Collected in January, November, and December.

Taken from seed heads of *Cyperus ustulatus* and from roots of *Mariscus* sp. (Cyperaceae).

Remarks. *B. botulus* is very similar to *B. wisei* and *B. nelsonensis*. These three species can be distinguished from each other by their different numbers of multilocular disc pores on the median areas of the dorsum and between the antennae.

The specific name — Latin, 'sausage-shaped' — alludes to the shape of the live females.

Balanococcus celmisiae new species

Figure 30

Live females pink, covered in a mass of white wax.

Body outline broadly oval; anal lobes protruding; length (mounted) 1.8–3.0 mm, width 0.5–1.8 mm. Antennae 7- or 8-segmented. Legs well developed; hind trochanter + femur 0.14–0.18 mm long; hind tibia + tarsus 0.14–0.17 mm long; translucent pores present on hind coxae only. Circuli absent. Ostioles represented by posterior pair only; lips each with 0–6 trilocular pores and no more than 1 seta. Cerarii numbering 2–4 pairs; anal lobe cerarii on sclerotised protuberances, each with 3–6 conical setae but without flagellate auxiliary setae or trilocular pores; remaining cerarii usually on small sclerotised areas, each with 1–4 conical setae but without flagellate auxiliary setae or associated trilocular pores.

Venter. Multilocular disc pores numerous over most of venter, densely aggregated around spiracular apertures. Trilocular pores sparse, in small numbers on median areas of head, thorax, and abdominal segments only. Oral collar tubular ducts around vulva, in rows across abdominal segments V–VII, and numerous around margin of entire venter; collar distinctly flange-shaped, extending about halfway up ducts. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores numerous over entire dorsum. Trilocular pores as on venter. Oral collar tubular ducts the same form and size as on venter, scattered over entire dorsum, more numerous marginally. Simple pores not apparent. Setae moderately short and stout.

Type data. Holotype: adult female alone on slide, New Zealand, NN, Lake Sylvester, on *Celmisia spectabilis* var. *spectabilis*, 29 April 1969, J.A. de Boer ("516") (NZAC). **Paratypes**: 1 adult female alone on slide, same data as holoype (BMNH); 4 adult females on separate slides, NN, Mt Arthur, on *Celmisia spectabilis* var. *spectabilis*, 19 Nov 1969, J.A. de Boer ("602") (BMNH, NZAC).

Material examined. Type specimens, plus 8 non-type adult females (BMNH, NZAC).

— / NN, MC.

Collected in February–May and November.

Taken from *Celmisia spectabilis* and *C. spectabilis* var. *spectabilis* (Asteraceae).

Remarks. The only other known New Zealand species of *Balanococcus* which lack circuli but have numerous dorsal multilocular disc pores are *B. conglobatus* and *B. contextus*, which can be recognised by their globular body form.

Balanococcus cockaynei (Brittin) new combination

Figure 31

cockaynei Brittin, 1915: 153 (*Pseudococcus*). Myers, 1922: 198 (*Pseudococcus*). Wise, 1977: 101 (*Pseudococcus*).

Live females brick-red, covered with copious, rather amorphous-looking, white wax.

Body outline elongate to elongate-oval; anal lobes not protruding; length (mounted) 2.4–3.8 mm, width 1.2–2.2 mm. Antennae 7- or 8-segmented. Legs well developed; hind trochanter + femur 0.17–0.28 mm long; hind tibia + tarsus 0.15–0.27 mm long; translucent pores on hind coxae only. Circuli numbering 3–6, small, round, each 0.02–0.07 mm wide. Both pairs of ostioles distinct; lips each with 0–2 multilocular disc pores and no more than 1 seta. Cerarii numbering 4 or 5 pairs; anal lobe cerarii on sclerotised areas, each with 2 conical setae (rarely 1), 3–6 flagellate auxiliary setae, and a few multilocular disc pores; remaining cerarii not on sclerotised areas, each with 1–3 conical setae but without pores.

Venter. Multilocular disc pores numerous over entire venter, forming a dense marginal band. Trilocular pores absent. Oral collar tubular ducts in rows across abdominal segments, and numerous in marginal band formed by multilocular disc pores; collar flange-shaped, extending about halfway up duct. Simple pores minute, scattered over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores and oral collar tubular ducts the same size and form as on venter, numerous over entire dorsum, forming a dense marginal band. Trilocular pores absent. Simple pores and setae as on venter.

Type data. Lectotype (here designated): adult female alone on slide, New Zealand, DN, Ardgowan, on *Aciphylla* sp., 18 July 1913, G. Brittin ("19") (NZAC).

Material examined. Lectotype, plus 15 non-type adult females (BMNH, NZAC).

TO / NN, MB, MC, DN, OL.

Collected in January, February, April–July, and September–November.

Taken from *Acaena* sp. (Rosaceae), *Aciphylla* sp., *A. subflabellata*, *A. monroi*, *Anisotome aromatica*, and *A. imbricata* (Apiaceae).

Remarks. *B. cockaynei* can be distinguished from the other known New Zealand species of *Balanococcus* by its numerous circuli and lack of trilocular pores.

Balanococcus conglobatus new species

Figure 32

Live females globular, pink, covered with powdery white wax.

Body globular, completely spherical at maturity; anal lobes not protruding; length (mounted) 1.4–3.8 mm, width 0.9–3.0 mm. Antennae 6- or 7-segmented. Legs reduced; hind trochanter + femur 0.08–0.17 mm long; hind tibia + tarsus 0.08–0.16 mm long; hind coxae somewhat enlarged, with numerous translucent pores. Ostioles represented by posterior pair only; lips without pores or setae. Cerarii numbering 1–3 pairs; anal lobe cerarii sometimes on small sclerotised areas, each with 2 conical setae, 2 or 3 flagellate auxiliary setae, and rarely a few trilocular pores; remaining cerarii not on sclerotised areas, each with 1 or 2 conical setae but without associated trilocular pores.

Venter. Multilocular disc pores numerous, evenly distributed over entire venter. Trilocular pores sparsely but evenly distributed, sometimes absent. Oral collar tubular ducts in slightly lower numbers than multilocular disc pores, scattered over entire venter, more numerous marginally; collar flange-shaped, extending about halfway up ducts. Simple pores about half the size of trilocular pores, scattered over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores and oral collar tubular ducts the same size and form as on venter, numerous over entire dorsum. Trilocular pores, simple pores, and setae as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, BR, Paparoa Range, Mt Dewar, Lochnagar Ridge, in swards (bulk sample 69/259), 10 December 1969, J.S. Dugdale ("19") (NZAC). **Paratypes**: 5 adult females on separate slides, same data as holotype (BMNH, NZAC, USNM); 2 adult females on separate slides, same data except (bulk sample 69/247) ("14") (BMNH, NZAC).

Material examined. Type specimens, plus 43 non-type adult females (BMNH, NZAC, USNM).

TO / NN, MB, BR, NC, CO, MK / SI.

Collected in February–May, August, and October–December.

Taken from *Carex flaviformis*, *Oreobolus* sp., *O. pectinatus*, *Uncinia* sp., and sedge (Cyperaceae), *Celmisia armstrongi* and ragwort [*Senecio jacobaea*] (Asteraceae), *Danthonia* sp., *Festuca* sp., and *F. rubra* (Poaceae), swards, and mats. Occurring on roots or at bases of host plants.

Remarks. *B. conglobatus* is similar in body shape

and in its six- or seven-segmented antennae to *B. contextus* and *B. poae*, but differs from *B. poae* in lacking circuli, and from *B. contextus* in having predominantly multilocular disc pores, not trilocular pores, on the dorsum of abdominal segment VII.

B. conglobatus is variable in its numbers of trilocular pores. Some populations apparently lack them, whereas in others trilocular pores are sparsely but evenly distributed over the entire body. Trilocular pores are present in the holotype.

The specific name – Latin, 'made like a ball' – alludes to the spherical body shape at maturity.

Balanococcus contextus new species

Figure 33

Appearance of live females not known.

Body globular, spherical at maturity; anal lobes not protruding; length (mounted) 1.7–2.5 mm, width 1.2–2.1 mm. Legs small, slightly distorted; hind trochanter + femur 0.11–0.18 mm long; hind tibia + tarsus 0.12–0.18 mm long. Both pairs of ostioles apparent; lips each with 2–6 trilocular pores but without setae. Circuli absent. Cerarii numbering 2 or 3 pairs; anal lobe cerarii on sclerotised areas, each with 2 slender conical setae, 2 or 3 flagellate auxiliary setae, and a few associated trilocular pores; remaining cerarii not on sclerotised areas, each with 1 or 2 slender conical or stout flagellate setae but without trilocular pores.

Venter. Multilocular disc pores and trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts sparsely but evenly distributed; collar flange-shaped, extending about halfway up ducts. Simple pores about half the size of trilocular pores, scattered over entire venter. Setae moderately short and fine.

Dorsum. Multilocular disc pores, trilocular pores, oral collar tubular ducts, and simple pores as on venter. Setae moderately long and fine.

Type data. Holotype: adult female alone on slide, New Zealand, NN, Rabbit Island, at base of *Samolus repens*, 7 November 1966, J.A. de Boer ("191") (NZAC). **Paratypes**: 4 adult females on 2 slides, same data as holotype; 1 adult female, NN, Cobb Ridge, on *Raoulia ?glabra*, 5 Jan 1971, J.A. de Boer ("688") (BMNH, NZAC).

Material examined. Type specimens, plus 1 non-type adult female (BMNH, NZAC).

— / NN, BR.

Collected in January and November.

Taken from *Raoulia* sp. and *R. ?glabra* (Asteraceae), and *Samolus repens* (Primulaceae).

Remarks. *B. contextus* is similar to *B. poae* in body shape and distribution of pores and ducts, but differs in lacking circuli. It is also similar to *B. conglobatus* in body shape and absence of circuli, but differs in having considerably more trilocular pores and fewer tubular ducts.

The trivial name – Latin, 'connected' – alludes to its close relationship with these other two species of *Balanococcus*.

Balanococcus cordylinidis (Brittin) new combination, new status

Figure 34

diminutus cordylinidis Brittin, 1938: 343 (*Trionymus*).
Wise, 1977: 103 (*Trionymus*).

Live females orange-pink, with a covering of powdery white wax.

Body outline elongate to elongate-oval; anal lobes not protruding; length (mounted) 2.2–5.3 mm, width 1.0–3.1 mm. Antennae 8-segmented. Legs well developed; hind trochanter + femur 0.34–0.40 mm long; hind tibia + tarsus 0.34–0.37 mm long; translucent pores on hind coxae only. Both pairs of ostioles apparent; lips each with 10–18 trilocular pores and no more than 1 seta. Circulus horizontally oval, 0.08–0.10 mm wide. Cerarii numbering 4 pairs; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 2–4 slender, flagellate auxiliary setae, and a few associated trilocular pores; remaining cerarii not on sclerotised areas, each with 1 or 2 conical setae but without associated trilocular pores.

Venter. Multilocular disc pores and oral collar tubular ducts numerous over entire venter; collars flange-shaped, extending about halfway up duct. Trilocular pores very sparse, sometimes completely absent. Simple pores not apparent. Setae moderately long and stout.

Dorsum. Multilocular disc pores and oral collar tubular ducts the same size and form as on venter, numerous over entire dorsum. Trilocular pores moderately numerous and evenly distributed. Simple pores minute, scattered over entire dorsum. Setae moderately long and stout.

Type data. Lectotype (here designated): adult female alone on slide, New Zealand, NN, Westport, on *Cordyline*, 29 April 1935, G. Brittin ("34") (NZAC). **Paralectotypes** (all on separate slides): 1 adult female, Motueka, NN, on *Cordyline*, 12 Nov 1933, G. Brittin ("34") (NZAC); 1 adult female, Nelson, NN, on *Cordyline*, 7 Jun 1933, G. Brittin ("34") (NZAC); 1 immature female, DN, Oamaru, on *Cordyline*, 7 Sep 1913, G. Brittin ("34") (NZAC).

Material examined. Type specimens, plus 28 non-type adult females (BMNH, NZAC).

WI / NN, KA, MC, DN.

Collected in January, February, April, June, and October–December.

Taken from *Cordyline* sp. and *C. australis* (Agavaceae).

Remarks. *B. cordylinidis* is similar to *B. cortaderiae* and *B. diminutus* in its single circulus, anal lobe cerarii each with only two conical setae, and numerous multilocular disc pores on the dorsum. It can be distinguished by the presence of oral collar tubular ducts and lack of trilocular pores on the median areas of the thoracic venter.

Balanococcus cortaderiae new species

Figure 35

Live females orange-pink, covered with powdery white wax.

Body outline elongate to elongate-oval; anal lobes not protruding; length (mounted) 3.2–6.4 mm, width 1.3–3.3 mm. Antennae 8-segmented. Legs well developed; hind trochanter + femur 0.42–0.55 mm long; hind tibia + tarsus 0.42–0.55 mm long; translucent pores present on hind coxae only. Both pairs of ostioles apparent; lips each with 14–35 trilocular pores and no more than 1 seta. Circulus square or horizontally oval, 0.10–0.17 mm wide. Cerarii numbering 3 pairs (rarely 4); anal lobe cerarii on sclerotised areas, each with 2 conical setae, 4–6 slender, flagellate auxiliary setae, and a few associated trilocular pores; remaining cerarii not on sclerotised areas, each with 1 or 2 conical setae and a small concentration of trilocular pores.

Venter. Multilocular disc pores numerous over entire venter. Trilocular pores moderately numerous over entire venter. Oral collar tubular ducts numerous over entire abdomen and margins of head and thorax, but absent from median areas of head and thorax; collar flange-shaped, extending about one-third the way up duct. Simple pores minute, scattered over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores and oral collar tubular ducts the same size and form as on venter, numerous over entire dorsum. Trilocular pores, simple pores, and setae as on venter.

Type data. Holotype: adult female, left-hand specimen of 2 on slide (position shown on both coverslip and label), New Zealand, TO, Raurimu, on leaves of *Cortaderia fulvida*, 19 September 1977, J.M. Cox (NZAC). **Paratypes**: 7 adult females on 5 slides (including holotype slide), same data as holotype (BMNH, NZAC).

Material examined. Type specimens, plus 17 non-type adult females (BMNH, NZAC).

TO, GB, WN / NN.

Collected in March, September, and December.

Taken from *Cortaderia* sp. and *C. fulvida* (Poaceae).

Remarks. *B. cortaderiae* is most similar to *B. cordylinidis* and *B. diminutus*. It may be distinguished from *B. cordylinidis* by its lack of oral rim tubular ducts on the median areas of the thoracic venter, and from *B. diminutus* by having three or four pairs of cerarii, not two.

Balanococcus danthoniae (Morrison) new combination

Figure 36

danthoniae Morrison, 1925: 494 (*Trionymus*). Brittin, 1938: 342 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

calceolariae Maskell. Maskell, 1884: 138 (*Dactylopius*) [misidentification].

dissimilis Brittin, 1938: 341 (*Trionymus*). **New synonymy.**

Live females brownish purple, covered with white wax extending into 2 pairs of short caudal filaments.

Body outline elongate; anal lobes not protruding; length (mounted) 1.5–5.7 mm, width 0.6–2.4 mm. Antennae 8-segmented. Legs well developed; hind trochanter + femur 0.24–0.51 mm long; hind tibia + tarsus 0.26–0.54 mm long; translucent pores on hind coxae only. Both pairs of ostioles distinct; lips each with 10–25 trilocular pores and no more than 1 seta. Cerarii numbering 2 or 3 pairs; anal lobe cerarii on small sclerotised areas, each with 2 slender conical setae, 3–7 long, flagellate auxiliary setae, and a loose group of trilocular pores; remaining cerarii not on sclerotised areas, each with 1 or 2 slender conical setae, sometimes with a small group of associated trilocular pores.

Venter. Multilocular disc pores in rows across posteromedian edge of abdominal segments IV–VIII and anteromedian edge of VII, sometimes in groups on margins of abdominal segments and sometimes a few scattered over median areas of head and thorax. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across abdominal segments IV–VII, the larger ones sparse to numerous around margins of entire venter; collar flange-shaped, extending about one-third the way up duct. Simple pores minute, sparsely scattered over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores usually absent, but sometimes in small numbers on median areas of abdominal segments VI and VII. Oral collar tubular ducts the same form and size as larger ducts on venter, sparse to moderately numerous over entire dorsum, in rows across body segments. Trilocular pores, simple pores, and setae as on venter.

Type data. *Trionymus danthoniae* Morrison. **Holotype**: adult female alone on slide, New Zealand, SI, Stewart Island, on *Danthonia* sp., September 1880, W.M. Maskell (NZAC).

Trionymus dissimilis Brittin. **Lectotype** (here designated): adult female alone on slide, DN, Ardgowan, on dead leaves, 8 May 1919, G. Brittin ("10") (NZAC). There appears to be some confusion as to the identity of this nominal species. Brittin (1938) refers to two collections "On dead leaves on ground, Oamaru; on *Coprosma* sp., Riwaka, Nelson. Type slides in own collection, No. 10". The lectotype designated here does not bear the name "*dissimilis*", but instead a manuscript name, "*viridis*". The collection data, however, fit those given by Brittin in his original description. Brittin's description of the morphology of this species fits the lectotype designated here, which is in my opinion a specimen of *danthoniae*. Brittin refers to the live females as being light green, which does not fit *danthoniae*. The most likely explanation for this is that Brittin was using material from two separate species for his description of *dissimilis* — *danthoniae*, and a green species on *Coprosma*, such as *Paracoccus glaucus* or *Dysmicoccus viticis*. As the first-mentioned collection data fit the only available specimen, which in turn fits the original description except for colour, it seems appropriate to designate this specimen lectotype, and to synonymise *Trionymus dissimilis* with *Trionymus danthoniae*.

Material examined. Holotype, plus 64 non-type adult females (BMNH, NZAC).

AK, TO, WN / NN, KA, NC, WD, CO, DN, SL / SI.

Collected in January–March, May, June, and September–November.

Taken from *Ammophila arenaria*, *Chionochloa* sp., *C. conspicua*, *C. flavescens*, *C. macra*, *C. pallens*, *C. rubra*, *Dactylis glomeratus*, *Danthonia* sp., *Hierochloe redolens*, *Holcus lanatus*, and *Spinifex hirsutus* (Poaceae), and on dead leaves. Occurring inside the leaf sheaths.

Remarks. *B. danthoniae* is very variable in a number of characters: overall size, distribution of multilocular disc pores (variously absent from marginal areas of venter to present in substantial groups, and present or absent on dorsum); presence or absence of a group of trilocular pores associated with the penultimate pair of cerarii; and the size of oral collar tubular ducts (orifice the same diameter as the trilocular pores to considerably larger) and their numbers. As every combination of these variable characters was encountered, all the material examined here is regarded as belonging to a single species. A more detailed study of this very common and widespread grass-feeding mealybug might reveal the existence of a complex of species.

B. danthoniae may be distinguished from the other known New Zealand species of *Balanococcus* by the combination of a single circulus, anal lobe cerarii each with only two conical setae, and multilocular disc pores not in dense marginal bands on the venter of the thorax and abdomen.

Balanococcus diminutus (Leonardi) new combination

Figure 37

diminutus Leonardi, 1918: 198 (*Pseudococcus*). Morrison, 1925: 495 (*Trionymus*). Lindinger, 1935a: 122 (*Erium*). Brittin, 1938: 342 (*Trionymus*). Ferris, 1950: 261 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

calceolariae Maskell. Maskell, 1884: 138 (*Dactylopius*) [misidentification].

Live females dark red, unevenly covered with powdery white wax, so that 2 darker lines extend down posterior two-thirds of body; wax extending into a pair of caudal filaments of moderate length.

Body outline elongate to elongate-oval; anal lobes not protruding; length (mounted) 2.2–5.8 mm, width 1.2–2.6 mm. Antennae 8-segmented. Legs well developed; hind trochanter + femur 0.33–0.43 mm long; hind tibia + tarsus 0.32–0.46 mm long; translucent pores in a small group on each hind coxa only. Both pairs of ostioles distinct; lips each with 6–15 trilocular pores and no more than 1 seta. Circulus horizontally oval, 0.05–0.16 mm wide. Cerarii numbering 2 pairs (rarely 1); anal lobe cerarii sometimes on sclerotised areas, each with 2 conical setae and a few associated trilocular pores, but without auxiliary setae; remaining cerarii not on sclerotised areas, each with 1 or 2 conical setae and a small concentration of trilocular pores.

Venter. Multilocular disc pores usually numerous over entire venter but occasionally absent from median areas of thorax. Trilocular pores moderately numerous over entire venter. Oral collar tubular ducts numerous on abdomen and margins of head and thorax but absent from median areas of thorax; collar flange-shaped, extending about one-third the way up duct. Simple pores minute, scat-

tered over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores and oral collar tubular ducts the same form and size as on venter, numerous over entire venter. Trilocular pores, simple pores, and setae as on venter.

Type data. **Syntype** females: Italy, Bordighera [not seen].

Material examined. 31 non-type adult females (BMNH, NZAC).

ND, AK, WI / NN, NC.

Collected in January, February, May, June, and November.

Taken from *Phormium* sp., *P. colensoi*, and *P. tenax* (Agavaceae).

Remarks. *B. diminutus* is similar to *B. cordylinidis* and *B. cortaderiae* in having a single circulus, anal lobe cerarii each with only two conical setae, and multilocular disc pores numerous on the dorsum. It can be distinguished from *B. cordylinidis* by its lack of oral collar tubular ducts on the median areas of the thoracic venter, and from both *B. cordylinidis* and *B. cortaderiae* by having no more than two pairs of cerarii. It has been recorded also from the U.S.A, England, and Italy.

Balanococcus dracophylli new species

Figure 38

Live females brick-red, covered with powdery white wax.

Body outline elongate-oval; anal lobes small but distinctly protruding; length (mounted) 2.2–2.8 mm, width 0.8–1.2 mm. Antennae 7- or 8-segmented. Legs well developed; hind trochanter + femur 0.17–0.24 mm long; hind tibia + tarsus 0.20–0.26 mm long; translucent pores on hind coxae only. Both pairs of ostioles distinct; lips each with 3–10 trilocular pores and 1–3 setae. Circuli absent. Cerarii numbering 3 or 4 pairs; anal lobe cerarii on sclerotised areas, each with 2 stout conical setae, 4–7 flagellate auxiliary setae, and a few associated trilocular pores; remaining cerarii sometimes on small sclerotised areas, each with 1–3 stout conical setae and a few associated trilocular pores.

Venter. Multilocular disc pores few, confined to median areas of abdominal segments VI–VIII. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts in rows across median areas of abdominal segments, in small marginal groups on thoracic and abdominal segments, and scattered over thorax; collar small but distinctly sclerotised, extending about one-quarter the way up duct. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Oral collar tubular ducts the same size and form as on venter, in rows across abdominal segments and scattered over head and thorax. Trilocular pores, simple pores, and setae as on venter.

Type data. **Holotype**: adult female alone on slide, New Zealand, NC–WD, Arthur's Pass, in leaf axils of *Dracophyllum longifolium*, 9 February 1983, J.M. Cox ("255") (NZAC). **Paratypes**: 6 adult females on separate slides, same data as holotype (BMNH, NZAC, USNM).

Material examined. Type specimens, plus 24 non-type adult females (BMNH, NZAC, USNM).

— / NC, WD, SL / SI.

Collected in January and February.

Taken from *Dracophyllum longifolium* (Epacridaceae).

Remarks. *B. dracophylli* differs from most of the other known species of *Balanococcus* in completely lacking dorsal multilocular disc pores. However, its form of oral collar tubular ducts and protruding anal lobes indicate its membership of this group. It is similar to *B. mayae* in lacking circuli and dorsal multilocular disc pores yet having oral collar tubular ducts on the dorsum, but differs in having fewer multilocular disc pores and stouter conical setae in the cerarii. *B. dracophylli* is also superficially similar to *Crisicoccus indigenus*, also found on *Dracophyllum*. These two species can be separated readily by the much stouter dorsal setae and lack of dorsal oral collar tubular ducts in *C. indigenus*, as well as by the generic differences.

Balanococcus gahniicola new species

Figure 39

Live females salmon-pink, covered with a mass of filamentous white wax.

Body outline elongate-oval; anal lobes not protruding; length (mounted) 2.5–5.8 mm, width 1.2–2.6 mm. Antennae 8-segmented. Legs well developed; hind trochanter + femur 0.33–0.55 mm long; hind tibia + tarsus 0.34–0.43 mm long; translucent pores on hind coxae and distal end of hind tibiae. Both pairs of ostioles distinct; lips each with 4–12 trilocular pores and no more than 1 seta. Circulus oval, 0.04–0.10 mm wide. Cerarii numbering 3 or 4 pairs, not on sclerotised areas; anal lobe cerarii each with 5–8 conical setae of various

sizes and an associated group of trilocular pores but without flagellate auxiliary setae; remaining cerarii each with 2 conical setae and an associated group of trilocular pores.

Venter. Multilocular disc pores numerous around vulva, in broad bands across median areas of abdominal segments III–VII, a few scattered over marginal areas of abdomen, and in a group on head between antennae. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts around vulva and in rows across median areas of abdominal segments II–VII, the larger ones numerous marginally over entire venter but absent from median areas; collar distinctly flange-shaped, extending about halfway up duct. Simple pores minute, scattered over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores in small numbers on median areas of abdominal segments IV–VII. Oral collar tubular ducts the same form and size as larger ducts on venter, numerous over entire dorsum. Trilocular pores, simple pores, and setae as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, CL, Little Barrier Island, in seed head of *Gahnia lacera*, 30 October 1976, J.M. Cox (NZAC). **Paratypes**: 8 adult females on separate slides, same data as holotype (BMNH, NZAC, USNM).

Material examined. Type specimens, plus 9 non-type adult females (BMNH, NZAC, USNM).

CL / —.

Collected in June and October.

Taken from seed heads and leaf axils of *Gahnia lacera* and *G. setifolia* (Cyperaceae).

Remarks. *B. gahniicola* is similar to *B. acerbus* and *B. sexaspinus* in having at least five conical setae in each anal lobe cerarius, but differs in lacking dorsal multilocular disc pores on the head and thorax.

Balanococcus mayae new species

Figure 40

Appearance of live females not known.

Body outline elongate-oval; anal lobes not protruding; length (mounted) 1.5–2.5 mm, width 0.7–1.0 mm. Antennae 8-segmented. Legs well developed; hind trochanter + femur 0.12–0.21 mm long; hind tibia + tarsus 0.21–0.26 mm long; translucent pores on hind coxae only. Both pairs of ostioles apparent; lips each with 6–12 trilocular pores and 1–4 setae. Circuli absent. Cerarii numbering 1–4 pairs; anal lobe cerarii on small sclerotised areas, each with 2 slender conical setae, 3–5 flagellate auxiliary setae, and a few associated trilocular pores; remaining cerarii not on sclerotised areas, each with 2 slender conical setae and a few associated trilocular pores.

Venter. Multilocular disc pores few, confined to median areas of abdominal segments IV–VIII or V–VIII. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of abdominal segments III–VII, the larger ones in marginal groups on thorax and abdomen; collar somewhat indistinct, extending about one-quarter the way up duct. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Oral collar tubular ducts the same form and size as larger ducts on venter, in rows across abdominal segments and scattered over thorax. Trilocular pores, simple pores, and setae as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, AK, Green Bay, in seed head of *Dracophyllum sinclairii*, 23 November 1976, B. May (NZAC). **Paratypes**: 2 adult females on separate slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens, plus 1 non-type adult female (BMNH, NZAC).

AK , TK / —.

Collected in February and November.

Taken from leaf axils of *Dracophyllum* sp. and from seed head of *D. sinclairii* (Epacridaceae).

Remarks. The non-type specimen, from Mt Egmont, differs from the type specimens in having cerarii restricted to the anal lobes. It may prove to be a different species when more material is available for study. See also Remarks under *B. dracophylli*.

This species has been named for Mrs B.M. May, who collected the type material as well as other material that has been used in this study.

Balanococcus nelsonensis new species

Figure 41

Appearance of live females not known.

Body outline elongate to elongate-oval; anal lobes not protruding; length (mounted) 2.2–4.1 mm, width 0.9–1.9 mm. Antennae 8-segmented. Legs well developed; hind trochanter + femur 0.20–0.29 mm long; hind tibia + tarsus 0.22–0.29 mm long; translucent pores on hind coxae only. Both pairs of ostioles distinct; lips each with 7–12 trilocular

pores and no more than 1 seta. Circulus small, round, 0.03–0.06 mm wide. Cerarii numbering 2 or 3 pairs; anal lobe cerarii on small sclerotised areas, each with 2 conical setae, 3–5 flagellate auxiliary setae, and a small group of trilocular pores; remaining cerarii not on sclerotised areas, each with 1 or 2 conical setae but without associated trilocular pores.

Venter. Multilocular disc pores in wide bands across posterior abdominal segments, numerous marginally on thorax and abdomen, but absent from head and median areas of thorax. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across posterior abdominal segments, the larger ones in rows across all abdominal segments and numerous in marginal band of multilocular disc pores; collar distinctly flange-shaped, extending about one-third the way up duct. Simple pores about half the size of trilocular pores, scattered over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores absent or in small numbers (1–8) on median areas of abdominal segments VI and VII, sometimes a few on margins of abdominal segments IV–VIII. Oral collar tubular ducts the same form and size as larger ducts on venter, in small numbers on margins of segments VI and VII. Trilocular pores, simple pores, and setae as on venter.

Type data. **Holotype**: adult female alone on slide, New Zealand, NN, Rabbit Island, on *Juncus maritimus*, 23 October 1966, J.A. de Boer ("185") (NZAC). **Paratypes**: 2 adult females on separate slides, same data as holotype (BMNH, NZAC); 8 adult females on 2 slides, type locality, on sedge, 4 Sep 1973, J.A. de Boer ("1045") (NZAC); 3 adult females on separate slides, type locality, on *Juncus* sp., 25 Nov 1966, J.A. de Boer ("200") (NZAC).

Material examined. Type series, plus 18 non-type adult females (BMNH, NZAC).

— / NN.

Collected in January, February, April, July, and September–November.

Taken from *Juncus* sp., *J. gregiflorus*, *J. maritimus*, *J. maritimus* var. *australiensis*, and rushes (Juncaceae).

Remarks. See Remarks under *B. botulus*.

Balanococcus notodanthoniae new species

Figure 42

Appearance of live females not known.

Body outline elongate; anal lobes protruding; length (mounted) 1.8–2.6 mm, width 0.5–1.1 mm. Antennae 7-segmented. Legs small, somewhat distorted; hind trochanter + femur 0.10–0.12 mm long; hind tibia + tarsus 0.10–0.12 mm long; translucent pores on hind coxae only, extending on to surrounding integument. Ostioles represented by posterior pair only; lips without pores or setae. Circuli numbering 1–3, each 0.01–0.04 mm wide. Cerarii on anal lobes only, on sclerotised areas, each with 2 slender conical setae but without auxiliary setae or trilocular pores.

Venter. Multilocular disc pores moderately numerous over entire venter, more numerous marginally than on median areas. Trilocular pores absent. Oral collar tubular ducts in rows across abdominal segments V–VIII and moderately numerous around margins of thorax and abdomen, but absent elsewhere; collar flange-shaped, extending about one-third the way up duct. Simple pores minute, scattered over entire venter. Setae short, fine.

Dorsum. Multilocular disc pores moderately numerous over entire dorsum. Trilocular pores confined to a band down midline of thorax and abdominal segments I–V. Oral collar tubular ducts the same form and size as on venter, in small marginal groups on abdominal segments V–VII, but absent elsewhere. Simple pores as on venter. Setae short, stout.

Type data. **Holotype**: adult female alone on slide, New Zealand, KA, Hapuku, on *Notodanthonia* sp., 13 October 1966, J.A. de Boer ("165") (NZAC). **Paratypes**: 3 adult females on 2 slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens only.

Remarks. The distribution of dorsal trilocular pores, presence of at least one circulus, and cerarii restricted to the anal lobes together distinguish *B. notodanthoniae* from the other known New Zealand species of *Balanococcus*.

Balanococcus poae (Maskell) new combination

Figure 43

poae Maskell, 1879: 220 (*Dactylopius*). Fernald, 1903: 107 (*Pseudococcus*). de Boer, 1968: 328 (*Pseudantonina*). Wise, 1977: 101 (*Pseudantonina*).

globatus Brittin, 1915: 155 (*Ripersia*). Synonymised by de Boer (1968).

Live females pink, covered with a mass of white wax.

Body globular at maturity; anal lobes not protruding; length (mounted) 1.2–3.0 mm, width 0.8–2.8 mm. Antennae 6-segmented. Legs small, somewhat distorted; hind trochanter + femur 0.12–0.16 mm long; hind tibia + tarsus 0.10–0.14 mm long; hind coxae considerably enlarged, each with a large group of translucent pores extending on to surrounding integument. Both pairs of ostioles apparent; lips each with 1–8 trilocular pores but without setae. Circuli numbering 1–3, each 0.01–0.05 mm wide. Cerarii numbering 2 or 3 pairs, not on sclerotised areas; anal lobe cerarii each with 2 conical setae (rarely 3), 1–3 flagellate auxiliary setae, and a few trilocular pores; remaining cerarii each with 1 or 2 slender conical setae but without trilocular pores.

Venter. Multilocular disc pores numerous over entire venter, particularly numerous around spiracular apertures. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts numerous over entire venter; collar distinctly flange-shaped, extending about halfway up duct. Simple pores about half the size of trilocular pores, scattered over entire venter. Setae moderately long and stout.

Dorsum. As for venter.

Type data. *Dactylopius poae* Maskell. The type data given in the original description read before the Philosophical Institute of Canterbury on 6 June 1878 (Maskell 1879) was "on roots of the common tussock grass, or rather on the stems close to the ground", but no type material was designated. None of the extant Maskell material is dated prior to 1879. A neotype is here designated in order to avoid confusion in identity now that two other very similar species have been discovered. **Neotype**: adult female alone on slide, labelled in Maskell's handwriting "*Dactylopius poae*, from tussock grass, female - 2nd stage, December 1879, W.M.M." (CMNZ).

Ripersia globatus Brittin. **Lectotype** (here designated): adult female alone on slide, New Zealand, DN, Ardgowan, on moss, 7 October 1913, G. Brittin ("6") (NZAC). **Paralectotype**: adult female alone on slide, same data as lectotype (NZAC). These two slides are labelled "TYPE" in Brittin's handwriting, and fit both the collection data and the description given by Brittin (1915).

Material examined. Type specimens listed above, plus 26 non-type adult females (BMNH, NZAC).

WI, WN / NN, MC, CO, DN.

Collected in February–April and July–November.

Taken from *Agrostis canina, Chionochloa flavescens, C. pallens, Dactylis glomeratus, Holcus* sp., *H. lanatus, Poa* sp., *Puccinellia* ?*vesiculata*, and ryegrass [*Lolium perenne*] (Poaceae), *Carex* sp. (Cyperaceae), and *Gaultheria depressa* (Ericaceae). Occurring on roots and bases of host plants.

Remarks. *B. poae* is similar to both *B. conglobatus* and *B. contextus* in general body form and distribution of pores, but differs from both in possessing circuli. *B. poae* infestations have been implicated in the death of plants during droughts in irrigated ryegrass / white clover pastures (D. Pearson, pers. comm.).

Balanococcus sexaspinus (Brittin) new combination

Figure 44

sexaspinus Brittin, 1915: 154 (*Pseudococcus*). Myers, 1922: 198 (*Pseudococcus*). Brittin, 1938: 344 (*Trionymus*). Williams & de Boer, 1973: 246 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

Live females described by Brittin (1915) as "pale pink, enclosed in a test of white cottony secretion".

Body outline oval to broadly oval; anal lobes not protruding; length (mounted) 2.3–3.6 mm, width 1.4–2.3 mm. Antennae 7- or 8-segmented. Legs well developed; hind trochanter + femur 0.25–0.26 mm long; hind tibia + tarsus 0.22–0.26 mm long; translucent pores present on hind coxae, and sometimes a few on hind tibiae. Both pairs of ostioles apparent; lips each with 4–10 trilocular pores and no more than 1 seta. Circuli numbering 1 or 2, the first between abdominal segments III and IV, the second (if present) between segments II and III; each circulus round or slightly oval, 0.01–0.04 mm wide. Cerarii numbering 4 pairs; anal lobe cerarii on faintly sclerotised areas, each with 6 conical setae, 4–6 stout, flagellate auxiliary setae, a loose group of trilocular pores, and a few simple pores; remaining cerarii not on sclerotised areas, each with 1–4 conical setae and a few loosely associated trilocular pores.

Venter. Multilocular disc pores numerous over entire venter. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts numerous over entire venter; collar distinctly flange-shaped, extending about halfway up duct. Simple pores minute, scattered over entire venter. Setae moderately long and stout.

Dorsum. As for venter.

Type data. Lectotype (designated by Williams & de Boer 1973): adult female alone on slide, New Zealand, BR, Crushington, subterranean on roots [not on label, from original description] of sedge, 18 October 1913, R.W. Raithby [not on label, from

original description] ("G. Brittin, No. 35") (NZAC). **Paralectotype**: adult female alone on slide, same data as lectotype except "on sedge" omitted (NZAC).

Material examined. Type specimens listed above, plus 12 non-type adult females (BMNH, NZAC).

AK / NN, BR.

Collected in April, September, and October.

Taken from *Scirpus aucklandicus* and sedge (Cyperaceae). Occurring on roots of host plant.

Remarks. *B. sexaspinus* is similar to *B. acerbus* and *B. gahniicola* in having at least five conical setae in each anal lobe cerarius. It differs from *B. acerbus* in not having protruding anal lobes nor the dorsal setae on abdominal segments VI–VIII almost conical; and from *B. gahniicola* in having multilocular disc pores numerous over the entire dorsum, including head and thorax.

Balanococcus tunakinensis new species

Figure 45

Appearance of live females not known.

Body outline elongate-oval; anal lobes not protruding; length (mounted) 2.8–3.9 mm, width 1.0–1.7 mm. Antennae 8-segmented. Legs well developed; hind trochanter + femur 0.23–0.26 mm long; hind tibia + tarsus 0.23–0.26 mm long; translucent pores present on hind coxae only. Both pairs of ostioles distinct; lips each with 5–12 trilocular pores and no more than 1 seta. Circulus small, round, 0.03–0.06 mm wide. Cerarii numbering 2 pairs; anal lobe cerarii on small sclerotised areas, each with 2 conical setae, 2–5 flagellate auxiliary setae, and a small group of trilocular pores; penultimate cerarii not on sclerotised areas, each with 1 or 2 conical setae but without associated trilocular pores.

Venter. Multilocular disc pores in wide bands across abdominal segments IV–VIII and in a marginal band around entire venter, absent elsewhere. Trilocular pores numerous and evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across abdominal segments VI and VII, the larger ones in rows across segments IV–VII and moderately numerous in marginal band formed by multilocular disc pores; collar distinctly flange-shaped, extending about one-quarter up duct. Simple pores about one-third the size of trilocular pores, scattered over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores in a marginal band around entire dorsum and scattered over median areas of dorsum. Oral collar tubular ducts the same form and size as larger ducts on venter, numerous in marginal band formed by multilocular disc pores and sparsely scattered over median areas of abdominal segments IV–VII. Trilocular pores, simple pores, and setae as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, SD, Tunakino, on Cyperaceae, 26 April 1971, R. Power ("737") (NZAC). **Paratypes**: 3 adult females on 2 slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens only.

Remarks. *B. tunakinensis* is similar to *B. diminutus* in having well developed legs, a single circulus, anal lobe cerarii each with only two conical setae, and dorsal multilocular disc pores on the head and thorax. It differs in being smaller and in having considerably fewer multilocular disc pores, especially on the venter of the head and thorax.

Balanococcus turriseta new species

Figure 46

Appearance of live female not known.

Body outline elongate-oval; anal lobes not protruding; length (mounted) 1.5–1.7 mm, width about 0.9 mm. Antennae 6-segmented. Legs small, stout; hind coxae enlarged; hind trochanter + femur 0.13–0.15 mm long; hind tibia + tarsus about 0.11 mm long; translucent pores on hind coxae only. Ostioles represented by posterior pair only, without pores or setae. Circuli absent. Cerarii numbering 2 pairs; anal lobe cerarii on lightly sclerotised areas, each with about 8 turret-shaped setae, about 4 stout, flagellate setae, and a loose group of trilocular pores; penultimate cerarii not on sclerotised areas, each represented by 2 or 3 turret-shaped setae but without associated trilocular pores.

Venter. Multilocular disc pores and oral collar tubular ducts numerous over entire venter; collar distinctly flange-shaped, extending about halfway up duct. Trilocular pores sparsely but evenly distributed. Simple pores not apparent. Setae moderately short and stout.

Dorsum. Multilocular disc pores, trilocular pores, oral collar tubular ducts, and simple pores as on venter. Setae moderately long and stout over most of dorsum, but turret-shaped on median area of abdominal segment VII.

Type data. Holotype: adult female, right-hand specimen of 2 on slide (ringed on coverslip and position shown on label), New Zealand, SI, Codfish

Island, on moss and lichen (bulk sample 81/202), 2 December 1981, B.A. Holloway ("84-010d") (NZAC). **Paratype**: adult female on same slide as holotype.

Material examined. Type specimens only (NZAC).
— / SI.
Collected in December.
Taken from moss and lichen.

Remarks. *B. turriseta* can be distinguished from all other known species of *Balanococcus* by its unusual turret-shaped cerarian setae, to which the trivial name — Latin, 'turret' and 'seta' — alludes.

Balanococcus wisei (Williams & de Boer) new combination

Figure 47

wisei Williams & de Boer, 1973: 248 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

Appearance of live females not known.

Body outline elongate to elongate-oval; anal lobes not protruding; length (mounted) 1.8–4.1 mm, width 0.8–2.0 mm. Antennae 8-segmented. Legs well developed; hind trochanter + femur 0.24–0.28 mm long; hind tibia + tarsus 0.24–0.29 mm long; translucent pores on hind coxae only. Both pairs of ostioles apparent; lips each with 5–10 trilocular pores and no more than 1 seta. Circuli numbering 1 or 2, the first round, 0.05–0.07 mm wide, the second (if present) between abdominal segments IV and V, round, about 0.02 mm wide. Cerarii numbering 2 pairs; anal lobe cerarii on small sclerotised areas, each with 2 (rarely 3) conical setae and a few trilocular pores, but without auxiliary setae; penultimate cerarii not on sclerotised areas, each with 2 conical setae but without associated trilocular pores.

Venter. Multilocular disc pores in broad rows across abdominal segments IV–VII and in a marginal band around entire venter, but absent from median areas of thorax. Trilocular pores numerous, evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of abdominal segments VI and VII, the larger ones in rows across segments IV–VII and in a marginal band around thorax and abdomen; collar distinctly flange-shaped, extending about one-third the way up duct. Simple pores minute, scattered over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores and oral collar tubular ducts the same size and form as larger ones on venter, extending around from venter on abdominal segments VII and VIII but no more than 1 pore elsewhere on dorsum. Trilocular pores, simple pores, and setae as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, AK, Mangere, on *Juncus acutus*, 17 March 1960, K.A.J. Wise ("C.I.E. 5450") (NZAC). **Paratypes**: 17 adult females on separate slides, same data as holotype (BMNH, NZAC, USNM).

Material examined. Holotype and 9 paratypes (BMNH, NZAC).

Remarks. *B. wisei* is similar to *B. botulus*, *B. nelsonensis*, and *B. tunakinensis* in having well developed legs and a band of multilocular disc pores around its ventral margins. It can be distinguished by its combination of ventral multilocular disc pores on the head between the antennae and no more than one of these pores on the median areas of the dorsum.

Genus *Chorizococcus* McKenzie

Chorizococcus McKenzie, 1960: 692. Type-species *Chorizococcus wilkeyi* McKenzie, 1960, by original designation.

Body outline elongate to broadly oval; anal lobes not protruding. Antennae 6–8-segmented. Legs well developed; translucent pores usually present on hind coxae, and often in a small, compact group on each hind tibia; tarsal claws without denticles. Spiracles of normal pseudococcid form. Both pairs of ostioles apparent. Circulus (if present) variable in shape and size. Cerarii numbering 0–4 pairs, sometimes on sclerotised areas, each with 2 conical setae and an associated group of trilocular pores; flagellate auxiliary setae in anal lobe cerarii only. Anal lobe bars absent. Anal ring of normal pseudococcid form.

Multilocular disc pores present or absent on both venter and dorsum. Quinquelocular pores absent. Trilocular pores present on both venter and dorsum. Oral rim tubular ducts present on venter or dorsum, or both. Oral collar tubular ducts present on venter, if present on dorsum then not forming rows across segments. Simple pores (if apparent) variable in size. Setae generally of moderate length and thickness.

Remarks. *Chorizococcus* is a poorly defined genus which at the moment probably contains many species that are not congeneric with *C. wilkeyi*. It differs from *Spilococcus* in its fewer pairs of cerarii, from *Vryburgia* in its lack of dorsal rows of oral collar tubular ducts, and from *Paracoccus* in its lack of anal lobe bars. However, anal lobe bars are frequently indistinct and hard to distinguish from ventral sclerotisation of the anal lobes.

The type-species and its close relatives are North American, but species from most parts of the world have been placed in this genus. A group of closely related, elongate species living on grasses or associated with leaf litter is known from Australia (Williams 1985). One of these, *C. rostellum* (Lobell), is also known from North America, and another, *C. oreophilus* Williams, from New Zealand.

Chorizococcus oreophilus Williams

Figure 48

oreophilus Williams, 1985: 84 (*Chorizococcus*).

Appearance of live females not known.

Body outline elongate to elongate-oval; length (mounted) 1.4–3.2 mm, width 0.5–1.2 mm. Antennae 7-segmented (rarely 8-segmented). Legs well developed; hind trochanter + femur 0.18–0.24 mm long; hind tibia + tarsus 0.21–0.26 mm long; translucent pores on hind coxae only. Circulus small, round, 0.01–0.03 mm wide. Both pairs of ostioles apparent, although sometimes indistinct; lips each with 4–9 trilocular pores, but lacking setae. Cerarii on anal lobes only, on small sclerotised areas, each with 2 conical setae, a single flagellate seta, and a few trilocular pores.

Venter. Multilocular disc pores in distinct groups on abdominal segments IV–VIII, and a few sometimes on thorax. Trilocular pores moderately numerous and evenly distributed. Oral rim tubular ducts only slightly larger than oral collar tubular ducts, singly on margins of abdominal segments II–VI and in groups of 1–3 on margins of thoracic segments. Oral collar tubular ducts in rows across abdominal segments IV–IX; collar heavily sclerotised. Simple pores minute, sparsely scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores and oral collar tubular ducts extending around from venter on margins of abdominal segments VI and VII. Oral rim tubular ducts the same size as on venter, in rows of up to 14 across abdominal segments and scattered over head and thorax. Trilocular pores and simple pores as on venter. Setae moderately short and stout.

Type data. Holotype: adult female alone on slide, Australia, New South Wales, Mt Kosciusko, in soil litter in sclerophyll forest of *Eucalyptus delegatensis*, 5 March 1969, T.E. Wood ("16/9T, 23/5") (ANIC).

Material examined. Holotype, plus 5 non-type adult females from New Zealand (ANIC, BMNH, NZAC).

ND, WO / —.

Collected in June and July.

Taken from pasture soil and ryegrass [*Lolium perenne*] (Poaceae).

Chryseococcus new genus

Type-species *Dactylopius arecae* Maskell, 1890.

(The name *Chryseococcus* is derived from the Greek '*chrýseos*', meaning 'golden', and refers to the golden-coloured wax covering of the type-species.)

Body outline oval to spherical. Antennae 6- or 7-segmented. Eyes large, noticeably protruding. Legs well developed, somewhat stout; translucent pores present on hind coxae and sometimes also hind tibiae; tarsal claws distinctly elongate, without denticles. Spiracles of normal pseudococcid form. Both pairs of ostioles apparent; inner edges of lips heavily sclerotised. Circuli absent. Cerarii numbering 3 or 4 pairs at posterior end of body, each with 2 conical setae (rarely 1) and a concentration of trilocular pores; auxiliary setae in anal lobe cerarii only; anal lobe cerarii on large, well defined sclerotised areas; remaining cerarii sometimes on small sclerotised areas. Anal ring of normal pseudococcid form.

Multilocular disc pores confined to abdominal venter. Quinquelocular pores absent. Trilocular pores moderately numerous and evenly distributed. Oral rim tubular ducts usually on both venter and dorsum, sparse or absent in some specimens; each duct with 1–3 simple pores associated with its rim. Oral collar tubular ducts confined to venter of thorax and abdomen; collar somewhat indistinct. Simple pores about one-quarter the size of trilocular pores, sparsely scattered over venter and dorsum; 1–3 such pores associated with rims of most oral rim tubular ducts. Setae long, stout, those on median abdominal dorsum sometimes spine-like.

Remarks. *Chryseococcus* is characterised by having six- or seven-segmented antennae, elongate tarsal claws, long, stout dorsal setae, and oral rim tubular ducts with associated simple pores. Its affinities are obscure, but it is perhaps closest to *Ventrispina*, although readily distinguishable by its lack of lanceolate body setae.

This genus is known only from New Zealand and Australia.

KEY TO SPECIES OF *CHRYSEOCOCCUS* KNOWN FROM NEW ZEALAND

01 Oral rim tubular ducts sparse, never in rows of more than 3 across dor-

sum; dorsal setae stout but flagellate, never spine-like (Fig. 49) ... ***arecae***

— Oral rim tubular ducts numerous, in rows of up to 11 across dorsum; dorsal setae on abdominal segments VI and VII spine-like (Fig. 50) ... ***longispinus***

Chryseococcus arecae (Maskell) new combination

Figure 49

arecae Maskell, 1890: 150 (*Dactylopius*). Maskell, 1893: 231 (*Dactylopius*). Cockerell, 1894: 287 (*Dactylopius*). Maskell, 1895: 132 (*Dactylopius*). Cockerell, 1896: 326 (*Dactylopius*). Cockerell, 1897: 240 (*Dactylopius*). Fernald, 1903: 97 (*Pseudococcus*). Myers, 1922: 198 (*Pseudococcus*). Williams & de Boer, 1973: 230 (*Chorizococcus*). Wise, 1977: 100 (*Chorizococcus*). Williams, 1985: 77 (*Chorizococcus*).

oamaruensis Brittin, 1915: 153 (*Pseudococcus*). Myers, 1922: 198 (*Pseudococcus*). Brittin, 1938: 337 (*Trionymus*). Synonymised by Williams & de Boer (1973).

occulta Brittin, 1915: 155 (*Ripersia*). Brittin, 1938: 334 (*Trionymus*). Synonymised by Williams & de Boer (1973).

raouliae Brittin, 1938: 334 (*Trionymus*). Synonymised by Williams & de Boer (1973).

dendrobii Brittin, 1938: 335 (*Trionymus*). Synonymised by Williams & de Boer (1973).

Live females deep reddish purple, covered with somewhat granular, bright golden wax.

Body outline oval to rotund; length (mounted) 1.4–3.1 mm, width 0.6–2.7 mm. Legs typical of genus; hind trochanter + femur 0.17–0.28 mm long; hind tibia + tarsus 0.20–0.30 mm long. Ostioles typical of genus; lips each with 1–3 setae and 5–12 trilocular pores. Cerarii numbering 4 pairs (rarely 3); anal lobe cerarii each with 2 conical setae, 4–6 auxiliary setae, and a scattering of trilocular pores; remaining cerarii each with 2 conical setae and a few associated trilocular pores.

Venter. Multilocular disc pores sparse, in rows across median areas of abdominal segments V–IX or VI–IX. Oral rim tubular ducts with associated simple pores usually singly on margins of some thoracic and abdominal segments, sometimes absent. Oral collar tubular ducts sparse, in rows across abdominal segments IV–VII. Trilocular pores and simple pores typical of genus. Setae long, stout.

Dorsum. Oral rim tubular ducts with associated simple pores usually singly on submargins and midline of some segments, sometimes entirely absent. Trilocular and simple pores typical of genus. Setae long, stout.

Type data. *Dactylopius arecae* Maskell, 1890. New Zealand, WN, Wellington, on roots of *Areca* [*Rhopalostylis*] *sapida* [from literature]. No Maskell slides dated prior to 1892 have been located. However, Maskell's original description together with his subsequent slides (NZAC) establish the identity of this species.

Pseudococcus oamaruensis Brittin, 1915. **Lectotype** (designated by Williams & de Boer 1973): adult female alone on slide, New Zealand, DN, Oamaru, subterranean on *Aquilegia* sp., 31 October 1912, G. Brittin ("11") (NZAC).

Ripersia occulta Brittin, 1915. **Lectotype** (designated by Williams & de Boer 1973): adult female alone on slide, New Zealand, DN, Oamaru, on roots of grass, 14 July 1913, G. Brittin ("12") (NZAC).

Trionymus raouliae Brittin, 1938. **Lectotype** (designated by Williams & de Boer 1973): adult female alone on slide, New Zealand, BR, Maruia, on *Raoulia* sp., 3 November 1935, G. Brittin ("262") (NZAC).

Trionymus dendrobii Brittin, 1938. **Lectotype** (designated by Williams & de Boer 1973), adult female alone on slide, New Zealand, BR, Westport, on *Dendrobium* sp., 4 October 1935, G. Brittin ("265") (NZAC).

Material examined. Type specimens as listed above, plus 41 non-type adult females (BMNH, NZAC, USNM).

CL, TO, WN / NN, BR, WD, MC, DN, CO, FD.

Collected in January, February, and May–December.

Taken from roots of *Aquilegia* sp. (Ranunculaceae), *Auricula* sp. and *Primula* sp. (Primulaceae), *Dendrobium* sp. (Orchidaceae), *Raoulia* sp. (Asteraceae), *Rhopalostylis sapida* (Palmae), grass and toetoe [*Cortaderia* sp.] (Poaceae), and Chatham Island lilies; on *Anthoxanthum odoratum* (Poaceae) and trunk of ponga [*Cyathea dealbata*] (Cyatheaceae); and in soil, litter, and under moss.

Remarks. *C. arecae*, although obviously closely related to *C. longispinus*, can be easily separated by the characters given in the key. It is one of New Zealand's commonest and most widespread mealybugs, and also occurs in Australia.

Chryseococcus longispinus (Beardsley) new combination

Figure 50

longispinus Beardsley, 1964: 247 (*Nipaecoccus*).

Appearance of live females not known.

Body outline oval to broadly oval; length (mounted) 1.3–3.5 mm, width 0.6–1.7 mm. Antennae 6-segmented. Legs typical of genus; hind trochanter + femur 0.22–0.32 mm long: hind tibia + tarsus 0.21–0.32 mm long. Ostioles typical of genus; lips each with 8–18 trilocular pores and 0–3 setae. Cerarii numbering 3 or 4 pairs; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 4–6 moderately long, spine-like auxiliary setae, and a concentration of trilocular pores; remaining cerarii sometimes on small sclerotised areas, each with 2 conical setae (rarely 1) and a few associated trilocular pores.

Venter. Multilocular disc pores sparsely in rows across median areas of abdominal segments VI–IX. Oral rim tubular ducts with associated trilocular pores in groups of 1–4, on margins of most segments; sometimes a few pores also on median areas of abdominal segments I and II. Oral collar tubular ducts in rows across abdominal segments III–VIII. Trilocular pores and simple pores typical of genus. Setae long, very stout, sometimes almost spine-like.

Dorsum. Oral rim tubular ducts with associated trilocular pores in rows of up to 11 ducts across body. Trilocular pores and simple pores typical of genus. Setae long, very stout, spine-like on median areas of abdominal segments VI and VII.

Type data. Holotype: adult female alone on slide, New Zealand, Campbell Island, Lyall-Beeman Saddle, 70 m, on roots of *Poa* sp., 3–12 December 1961, J.L. Gressitt (NZAC). **Paratypes**: 58 adult females on 13 slides, all Campbell Island.

Material examined. Holotype, plus 11 non-type adult females (BMNH, NZAC).

— / Campbell I.

Collected in February, March, November, and December.

Taken from roots of *Poa* sp. (Poaceae), inside cushion of *Colobanthus* sp. (Caryophyllaceae), under moss and low plants, and in litter and soil.

Remarks. See Remarks under *C. arecae*.

Genus *Crisicoccus* Ferris

Crisicoccus Ferris, 1950: 45. Type-species *Dactylopius pini* Kuwana, 1902, by original designation.

Body outline oval. Antennae 7- or 8-segmented. Legs well developed; translucent pores usually present on hind legs; tarsal claws without denticles. Spiracles of usual pseudococcid form. Circulus usually present. Both pairs of ostioles apparent. Cerarii numbering no more than 17 pairs, each cerarius with 2 conical setae; auxiliary setae in anal lobe cerarii only. Anal lobe bars present. Anal ring of normal pseudococcid form.

Multilocular disc pores usually present on venter only. Quinquelocular pores absent. Trilocular pores present. Oral rim tubular ducts absent. Oral collar tubular ducts on venter and sometimes also dorsum. Simple pores usually apparent. Setae flagellate, variable in length and thickness.

Remarks. *Crisicoccus* is similar to a number of other genera. It differs from *Chorizococcus*, *Spilococcus*, and *Vryburgia* in having anal lobe bars, from *Paracoccus* in lacking oral rim tubular ducts, and from *Planococcus* in having fewer than 18 pairs of cerarii.

Although the type-species and its closest relatives are from the Oriental Region, species from most parts of the world have been placed in *Crisicoccus*.

KEY TO SPECIES OF *CRISICOCCUS* KNOWN FROM NEW ZEALAND

01 Dorsal setae very long (longest seta 0.11–0.19 mm) (Fig. 52) ... ***comatus***
— Dorsal setae only moderately long (longest seta less than 0.03 mm) ... 02

02(01) Circulus absent (Fig. 53) ... ***indigenus***
— Circulus present ... 03

03(02) Dorsum with oral collar tubular ducts (Fig. 51) ... ***australis***
— Dorsum without oral collar tubular ducts (Fig. 54) ... ***tokaanuensis***

Crisicoccus australis new species

Figure 51

Appearance of live females not known.

Body outline oval; length (mounted) 2.1–3.8 mm, width 1.1–2.0 mm. Antennae 8-segmented. Legs typical of genus; hind trochanter + femur 0.29–0.33 mm long; hind tibia + tarsus 0.33–0.34 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, 0.09–0.14 mm wide. Both pairs of ostioles distinct; lips each with 7–20 trilocular pores and 1–4 setae. Cerarii numbering 7 pairs, all on abdomen; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 5–9 flagellate auxiliary setae, a concentration of trilocular pores, a few oral collar tubular ducts, and a few simple pores; remaining cerarii not on sclerotised areas, each with 2 conical setae that become more

slender towards anterior of body and 4–7 associated trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posteromedian edges of abdominal segments IV–VI, and in marginal groups on segments III–VIII. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts numerous on median areas of abdominal segments I–IX, the larger ones scattered over median areas of head, thorax, and abdominal segments I–V and numerous marginally around entire venter. Simple pores about half the size of trilocular pores, sparsely scattered over entire surface. Setae moderately long and fine.

Dorsum. Trilocular pores and simple pores as on venter. Oral collar tubular ducts slightly larger than the larger ones on venter, in marginal groups on abdominal segments II–VII. Setae moderately long and stout.

Type data. **Holotype**: adult female alone on slide, New Zealand, WD, Franz Josef Glacier, Robert's Point Track, 300 m, in leaf axil of *Olearia colensoi*, 6 February 1983, J.M. Cox ("234") (NZAC). **Paratypes**: 2 adult females on separate slides, WD, Franz Josef Glacier, Alex Knob Track, 3500 ft [1050 m], in axils of *Olearia colensoi*, 7 Feb 1976, J.M. Cox (BMNH, NZAC); 7 adult females on 2 slides, SI, Codfish Island, in *Senecio* sp. tips, 26 Nov 1981, B.A. Holloway (BMNH, NZAC).

Material examined. Type specimens only.
— / WD / SI.
Collected in February and November.
Taken from leaf axils of *Olearia colensoi* and tips of *Senecio* sp. (Asteraceae).

Remarks. *C. australis* can be distinguished from the other New Zealand species of *Crisicoccus* by its dorsal oral collar tubular ducts. It is similar to several species of *Paracoccus*, especially *P. podocarpi*, but differs in having dorsal ducts without oral rims.

Crisicoccus comatus new species

Figure 52

Appearance of live females not known.

Body outline oval; length (mounted) 2.1–2.6 mm, width 1.5–1.9 mm. Antennae 7-segmented. Legs typical of genus; hind trochanter + femur 0.24–0.27 mm long; hind tibia + tarsus 0.23–0.26 mm long; translucent pores present on hind tibiae only. Circulus oval, contained within margins of abdominal segment III, 0.03–0.06 mm wide. Both pairs of ostioles distinct; lips each with 16–30 trilocular pores and 6–10 setae. Cerarii on anal lobes only, on small sclerotised areas, each with 2 slender conical setae, 7 or 8 associated flagellate setae, and a concentration of trilocular pores.

Venter. Multilocular disc pores present around vulva and in rows across posteromedian edges of abdominal segments V and VI and anteromedian edge of VI. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts sparse, in a row across abdominal segment VI. Simple pores about half the size of trilocular pores, sparsely scattered over entire surface. Setae very long, moderately stout.

Dorsum. Oral collar tubular ducts absent. Trilocular pores, simple pores, and setae as on venter.

Type data. **Holotype**: adult female alone on slide, New Zealand, AK, Auckland, Swanson, on *Nestegis lanceolatus*, 29 February 1972, B.M. May ("899") (NZAC). **Paratypes**: 2 adult females on separate slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens only.

Remarks. Its very long dorsal setae distinguish *C. comatus* from the other known New Zealand species of *Crisicoccus*, and are alluded to in the specific name — Latin, 'long-haired'.

Crisicoccus indigenus new species

Figure 53

Live females brick-red, covered with powdery white wax.

Body outline elongate-oval; length (mounted) 1.9–3.8 mm, width 0.9–1.7 mm. Antennae 8-segmented. Legs typical of genus; hind trochanter + femur 0.21–0.29 mm long; hind tibia + tarsus 0.22–0.33 mm long; translucent pores on hind coxae and tibiae. Circulus absent. Both pairs of ostioles distinct; lips each with 3–10 trilocular pores and 0–3 setae. Cerarii numbering 3–6 pairs, only the posterior 3 pairs on small sclerotised areas; anal lobe cerarii each with 2 conical setae, 3–5 flagellate setae, and sometimes 1–3 conical auxiliary setae, and a few associated trilocular pores; remaining cerarii each with 2 slender conical setae and a few associated trilocular pores, but without auxiliary setae. Anal lobe bars sometimes indistinct.

Venter. Multilocular disc pores present around vulva, usually in a row across posteromedian edge of abdominal segment VI, and sometimes also across segments IV and V. Trilocular pores moder-

ately numerous and evenly distributed. Oral collar tubular ducts usually of 2 sizes, the smaller ducts sparsely scattered over abdominal segments V–IX and sometimes a few on margins of other body segments, the larger ones occasionally absent but usually in groups of 1–8 on margins of abdominal segments III–VII. Simple pores not apparent. Setae moderately short and fine on median areas, stouter on margins.

Dorsum. Trilocular pores as on venter. Oral collar tubular ducts absent. Simple pores not apparent. Setae short, stout, sometimes almost lanceolate.

Type data. Holotype: adult female, right-hand specimen of 3 on slide (ringed on coverslip, and position shown on label), New Zealand, TK, Mt Egmont, Stratford Plateau, in leaf axils of *Dracophyllum filifolium*, 24 February 1983, J.M. Cox ("292") (NZAC). **Paratypes**: 2 adult females on same slide as holotype; 7 adult females on 2 slides, WD, Mt Shrimpton, near Makaroa, in leaf axils of *Dracophyllum longifolium*, 1 Feb 1983, J.M. Cox ("229") (BMNH, NZAC).

Material examined. Type specimens, plus 8 nontype adult females (BMNH, NZAC).

TO, TK / WD, FD / SI.

Collected in February, March, October, and December.

Taken from *Dracophyllum* sp., *D. filifolium*, *D. longifolium*, and *D. recurvum* (Epacridaceae).

Remarks. The absence of a circulus and the short, almost lanceolate dorsal setae distinguish *C. indigenus* from the other known New Zealand species of *Crisicoccus*. It is superficially similar to two species of *Balanococcus* which are also found on *Dracophyllum*, *B. mayae* and *B. dracophylli*, but can be distinguished readily by its lack of dorsal oral collar tubular ducts, the nature of its dorsal setae, and its anal lobe bars.

A single specimen from Secretary Island, FD (16 January 1983, A.C. Harris, "83-339b") (NZAC) is similar to *C. dracophylli* but differs in having more multilocular disc pores on the venter, more oral collar tubular ducts on the dorsum, and about seven pairs of cerarii. Collection of more specimens will allow its description as a new species.

Two specimens from Tongariro, TO (on *Dracophyllum recurvum*, 25 December 1967, E. Collyer, "331") (NZAC) have very few multilocular disc pores and oral collar tubular ducts, the latter of only one size, yet otherwise appear to be similar to the type material. However, there are three poor specimens from the Rangitaiki Plains, BP (sweeping *Dracophyllum*, 14 March 1980, C.F. Butcher, "80-147a") (NZAC) which also have the characteristics described above, but differ still further in having all auxiliary setae conical rather than flagellate. The characteristics of these three specimens have not been included in the description given above.

The trivial name — Latin, 'native' — alludes to the undoubted indigenous status of this species.

Crisicoccus tokaanuensis new species

Figure 54

Live females purplish brown, covered with a layer of powdery white wax extending into 2 or 3 pairs of lateral filaments at posterior end of body.

Body outline broadly oval; length (mounted) 1.8–1.9 mm, width 1.1–1.2 mm. Legs somewhat stout; hind trochanter + femur 0.19–0.25 mm long; hind tibia + tarsus 0.22–0.28 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, 0.05–0.6 mm wide. Both pairs of ostioles distinct; lips each with 8–14 trilocular pores and 2–4 setae. Cerarii numbering 4–6 pairs, all on posterior abdominal segments; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 6–8 flagellate auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 slender conical setae and 3–8 trilocular pores, but without auxiliary setae.

Venter. Multilocular disc pores present around vulva and sparsely in a row across posteromedian edge of abdominal segment VI. Trilocular pores sparsely but evenly distributed. Oral collar tubular ducts sparsely in rows across median areas of abdominal segments IV–VII, and sometimes larger ducts singly on margins of segments VI and VII. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Trilocular pores as on venter. Oral collar tubular ducts absent. Simple pores not apparent. Setae moderately long and fine.

Type data. Holotype: adult female, left-hand specimen of 3 on slide (ringed on coverslip, and position shown on label), New Zealand, TO, Tokaanu, on leaves and twigs of *Leptospermum* sp., 6 January 1983, J.M. Cox ("99") (NZAC). **Paratypes**: 7 adult females on 4 slides (including holotype slide), same data as holotype (BMNH, NZAC).

Material examined. Type specimens, plus 1 nontype adult female (BMNH, NZAC).

AK, TO / —.

Collected in January.

Taken on *Leptospermum* sp. and *L. scoparium* (Myrtaceae).

Remarks. *C. tokaanuensis* can be distinguished from the other known species of *Crisicoccus* by a combination of characters — lack of dorsal oral rim tubular ducts, presence of a circulus, and dorsal setae of only moderate length. It is similar to a species of *Paracoccus* occurring on *Leptospermum*, *P. miro*, but lacks its oral rim tubular ducts.

Crocydococcus new genus

Type-species *Trionymus cottieri* Brittin, 1938.

(The name *Crocydococcus* is derived from the Greek '*krokýs*', meaning 'fleece', and refers to the flocculent wax covering live females of the type-species.)

Body outline elongate-oval; anal lobes slightly protruding. Antennae 8-segmented. Legs well developed; trochanters quadrate; tarsal claws elongate, without denticles; translucent pores present on hind legs. Spiracles of normal pseudococcid form. Circulus small, round. Ostioles represented by posterior pair only. Cerarii numbering 4 or 5 pairs, all on posterior abdominal segments, each with 2 conical setae and a concentration of trilocular pores; only anal lobe cerarii with flagellate auxiliary setae. Anal lobe bars absent. Anal ring of normal pseudococcid form.

Multilocular disc pores present on both venter and dorsum. Quinquelocular pores absent. Trilocular pores present. Oral rim tubular ducts absent. Oral collar tubular ducts present on venter and dorsum; collars sclerotised, expanded. Simple pores minute, on both surfaces. Setae generally flagellate, but conical on dorsum of abdominal segments VI and VII.

Remarks. The relationships of *Crocydococcus* are obscure, but it is perhaps most similar to *Balanococcus* in its distribution of oral collar tubular ducts and multilocular disc pores, form of circulus, and nature of cerarii. However, its legs, with quadrate trochanters and elongate tarsal claws, are very distinctive.

This monotypic genus is known only from New Zealand.

Crocydococcus cottieri (Brittin) new combination

Figure 55

cottieri Brittin, 1938: 339 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

Live females pale yellow or green; copious, granular white wax completely covering and obscuring adult female and her offspring.

Body outline elongate-oval; length 1.3–1.6 mm, width 0.7–0.9 mm. Legs typical of genus; hind trochanter + femur 0.20–0.25 mm long; hind tibia + tarsus 0.20–0.26 mm long; translucent pores present on hind coxae and tibiae. Circulus small, round, 0.01–0.06 mm wide. Ostioles represented by posterior pair only; lips each with about 3 trilocular pores but without setae. Cerarii numbering 4 or 5 pairs; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 3–5 short, flagellate auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 slender conical setae and a few associated trilocular pores.

Venter. Multilocular disc pores in rows across abdominal segments III–IX. Trilocular pores somewhat sparsely but evenly distributed. Oral collar tubular ducts of the form described for genus (above), of 2 sizes, the smaller ducts in rows across abdominal segments III–VIII, the larger ones scattered over head and thorax and in marginal groups on abdomen. Simple pores minute, scattered over entire surface. Setae moderately long and fine.

Dorsum. Multilocular disc pores numerous over head, thorax, and anterior abdominal segments, and a few scattered over posterior abdominal segments. Trilocular pores as on venter. Oral collar tubular ducts the same size as larger ducts on venter, numerous over head, thorax, and anterior abdominal segments, and a few scattered over posterior abdominal segments. Simple pores as on venter. Setae generally moderately long and fine, but those on median areas of abdominal segments VI and VII conical and similar in size to cerarian setae.

Type data. Lectotype (here designated): adult female, lower specimen of 2 on slide (position indicated on label), New Zealand, WI, Wanganui, on *Nothofagus menziesii*, 2 November 1933, J.W. Whelan (NZAC). **Paralectotypes** (all with same data as lectotype): 1 adult female on same slide as lectotype; 1 adult male alone on slide (NZAC); 1 adult female alone on slide (NZAC).

Material examined. Type specimens listed above, plus 62 non-type adult females (BMNH, FRNZ, NZAC, USNM).

AK, TO, GB, WI / NN, BR, WD, FD.

Collected in January–May, November, and December.

Taken from leaves of *Nothofagus* sp., *N. menziesii*, and *N. solandri* (Fagaceae).

Remarks. *F. cottieri* can be distinguished from all other species of mealybug known from New Zealand by its quadrate trochanters.

Cyphonococcus new genus

Type-species *Dactylopius alpinus*, Maskell, 1884.

(The name *Cyphonococcus* is derived from the Greek '*kyphomatos*', meaning 'a hunchback', and refers to the shape of the live females.)

Body outline broadly oval to spherical (mounted preparations often distorted owing to dorsal surface being larger than ventral surface). Antennae 7- or 8-segmented. Legs well developed; tarsal claws without denticles; translucent pores on hind coxae and sometimes hind tibiae. Spiracles of normal pseudococcid form. Circulus present or absent. Ostioles sometimes represented by posterior pair only. Cerarii numbering 3–5 pairs, all on posterior abdominal segments; anal lobe cerarii with 2–10 conical setae and sometimes several spine-like or flagellate auxiliary setae; remaining cerarii each with 2–4 conical setae.

Multilocular disc pores confined to median areas of abdominal venter. Quinquelocular pores absent. Trilocular pores generally evenly distributed over both surfaces but sometimes concentrated in a marginal band around dorsum. Tubular ducts small, slender, generally with indistinct oral rims, present on venter and usually on dorsum; orifices about same size as trilocular pores. Simple pores minute. Setae conical, some of them as large as cerarian setae, on dorsum of posterior abdominal segments, flagellate on median areas of venter, small conical or flagellate on remaining areas.

Remarks. *Cyphonococcus* is similar to the other genera with dark purplish-red live females (*Chryseococcus*, *Nipaecoccus*, and *Ventrispina*), and is erected for three New Zealand species that do not fit into any of these. It differs from them primarily in the form of its tubular ducts, which are small, slender, and have indistinct oral rims. *Chryseococcus* and *Ventrispina* also have oral rim tubular ducts, but these are larger, and in *Chryseococcus* they have simple pores associated with their orifices.

C. furvus is evidently congeneric with the type-species, despite its different form of anal lobe cerarii, but it is not certain whether *C. iceryoides* is also truly congeneric.

KEY TO SPECIES OF *CYPHONOCOCCUS*

01 With a dense marginal band of trilocular pores and tubular ducts which may appear to be on either venter or dorsum, depending on size and preparation of specimen (Fig. 58) ... ***iceryoides***

— Without such a dense marginal band of trilocular pores and tubular ducts... 02

02(01) Auxiliary setae in anal lobe cerarii short, conical; multilocular disc pores extending forwards to abdominal segment II or III; cerarii numbering 4 pairs (Fig. 56) ... ***alpinus***

— Auxiliary setae in anal lobe cerarii long, slender; multilocular disc pores extending forwards to abdominal segment IV; cerarii numbering 5 pairs (Fig. 57) ... ***furvus***

Cyphonococcus alpinus (Maskell) new combination

Figure 56

alpinus Maskell, 1884: 138 (*Dactylopius*). Fernald, 1903: 97 (*Pseudococcus*). Brittin, 1938: 340 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

chiltoni Brittin, 1938: 340 (*Trionymus*). Wise, 1977: 103 (*Trionymus*). **New synonymy**.

Live females dark red, with 2 pairs of short caudal filaments of white wax; anterior half of body covered in granular yellow wax, posterior half in a cocoon of matted white wax (based on specimens from Desert Road, TO).

Body outline broadly oval to spherical; length (mounted) 1.5–3.6 mm, width 1.1–3.0 mm. Antennae 8-segmented. Legs somewhat stout; hind trochanter + femur 0.18–0.21 mm long; hind tibia + tarsus 0.19–0.21 mm long; translucent pores present on hind coxae and tibiae. Circulus absent. Anterior ostioles not apparent, posterior pair distinct; lips each with 4–15 trilocular pores and 1–3 setae. Cerarii numbering 4 pairs; anal lobe cerarii on sclerotised areas, each with 6–10 conical or spine-like setae of various sizes and a concentration of trilocular pores, but without flagellate setae; remaining cerarii sometimes on small sclerotised areas, each with 1–3 conical setae and an associated group of trilocular pores.

Venter. Multilocular disc pores present around vulva and in rows across posteromedian areas of abdominal segments II–VII (rarely III–VII). Trilocular pores moderately numerous and evenly distributed. Oral rim tubular ducts small, in rows across abdominal segments, in large marginal groups on abdominal segments, and scattered over head and thorax; rims somewhat indistinct. Oral collar tubular ducts absent. Simple pores about one-third the size of trilocular pores, sparsely scattered over entire surface. Setae long, fine.

Dorsum. Multilocular disc pores absent. Trilocular pores moderately numerous, generally evenly

distributed, but aggregated around bases of large conical setae. Oral rim tubular ducts the same size and form as on venter, densely scattered over entire dorsum. Simple pores as on venter. Setae on head, thorax, and anterior abdominal segments lanceolate or spine-like, those on posterior abdominal segments large and conical, several of them as large as cerarian setae.

Type data. *Dactylopius alpinus* Maskell. Given by Maskell (1884) as "on a species of *Veronica* [*Hebe*], sent by Mr D.D. Enys, from the upper valley of the Waimakariri in the Southern Alps, near the glaciers [MC]". No original material has been located, so the species was here identified from Maskell's subsequent material mounted by G. Brittin and J.A. de Boer.

Trionymus chiltoni Brittin. **Lectotype** (here designated): adult female alone on slide, New Zealand, MC, Cass, on *Leucopogon* [*Cyathodes*] sp., 1918, Chilton ("103") (NZAC).

Material examined. 11 adult females mounted from Maskell's subsequent material of *Dactylopius alpinus*, and lectotype of *Trionymus chiltoni*, plus 16 non-type adult females (BMNH, NZAC).

TO / MB, MC.

Collected in January, February, and November.

Taken from *Hebe* sp., *H. brachysiphon*, *H. darwiniana*, and *H. stricta* (Scrophulariaceae) and *Cyathodes* sp. (Epacridaceae). Occurring on stems.

Remarks. *C. alpinus* is very similar to *C. furvus* in having large, conical setae on the posterior abdominal segments only and oral rim tubular ducts numerous over both surfaces of the body. It differs in having predominantly conical setae in the anal lobe cerarii, in having four (not five) pairs of cerarii, and in having multilocular disc pores extending forward to abdominal segment II or III. Apart from a single specimen recorded by Brittin as collected from *Leucopogon* [*Cyathodes*] sp., both species appear to be specific to *Hebe*.

Cyphonococcus furvus new species

Figure 57

Live females rotund, dark purplish-red, with about 3 pairs of short caudal filaments of white wax in a matted cocoon of pale yellow wax.

Body outline oval to spherical; length (mounted) 2.2–3.3 mm, width 1.5–2.8 mm. Antennae 8-segmented. Legs somewhat stout; hind trochanter + femur 0.20–0.25 mm long: hind tibia + tarsus 0.22–0.24 mm long; translucent pores present on hind coxae and tibiae. Circulus absent. Anterior ostioles not apparent, posterior pair distinct; lips each with 4–12 trilocular pores and 1–4 setae. Cerarii numbering 5 pairs; anal lobe cerarii on sclerotised areas, each with 2 stout conical setae, no more than 1 small conical seta, 8–10 stout, flagellate auxiliary setae, and a concentration of trilocular pores; remaining cerarii sometimes on small sclerotised areas, each with 1–4 conical setae and an associated group of trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posteromedian edges of abdominal segments IV–VII, and occasionally a single pore on head. Trilocular pores moderately numerous and evenly distributed. Oral rim tubular ducts small, in rows across median areas of abdominal segments, in large groups on margins of abdominal segments, and scattered over head and thorax; rims somewhat indistinct. Oral collar tubular ducts absent. Simple pores about one-third the size of trilocular pores, scattered over entire surface. Setae long, fine.

Dorsum. Multicolour disc pores absent. Trilocular pores moderately numerous, generally evenly distributed, but aggregated around bases of large conical setae. Oral rim tubular ducts the same size and form as on venter, numerous over entire dorsum. Oral collar tubular ducts absent. Simple pores as on venter. Setae on head, thorax, and anterior abdominal segments lanceolate or spine-like, those on posterior abdominal segments large and conical, many of them as large as cerarian setae.

Type data. Holotype: adult female alone on slide, New Zealand, NN, Lake Sylvester, on *Hebe pauciramosa masonae*, 29 April 1969, J.A. de Boer ("536") (NZAC). **Paratypes**: 1 adult female alone on slide, same data as holotype (BMNH); 3 adult females on 2 slides, BR, "West Coast" [Punakaiki], Pancake Rocks, on *Hebe* sp., 9 May 1965, J.A. de Boer ("33") (BMNH, NZAC); 2 adult females together on slide, BR, Punakaiki, 12 Sep 1972, V.F. Eastop ("13462", "22/77") (BMNH).

Material examined. Type specimens, plus 7 non-type adult females (BMNH, NZAC).

— / NN, BR, NC, WD.

Collected in January–May, October, and November.

Taken from *Hebe* sp., *H. canterburiensis*, *H. elliptica*, and *H. pauciramosa masonae* (Scrophulariaceae).

Remarks. See Remarks under *C. alpinus*.

The specific name — Latin, 'dark-coloured' — alludes to the colour of the live females.

Cyphonococcus iceryoides (Maskell) new combination

Figure 58

iceryoides Maskell, 1892: 33 (*Dactylopius*). Fernald, 1903: 103 (*Pseudococcus*). Brittin, 1938: 344 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

Live females humped in shape, dark purplish-red, covered with somewhat granular golden, tan, or buff-coloured wax, sometimes with a paler stripe down midline; ovisac white, fluted, often raising posterior end of body from substrate.

Body outline broadly oval to spherical; length (mounted) 1.8–5.0 mm, width 1.1–3.7 mm. Antennae 7- or 8-segmented. Legs short, stout; hind trochanter + femur 0.22–0.27 mm long; hind tibia + tarsus 0.19–0.22 mm long; translucent pores present on hind coxae. Circulus quadrate or hourglass-shaped, 0.14–0.21 mm wide. Both pairs of ostioles distinct; lips each with 1–4 trilocular pores and 0–2 setae. Cerarii numbering 3–5 pairs; anal lobe cerarii on sclerotised areas, each with 6–12 conical setae of various sizes and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 conical setae but without associated trilocular pores.

Venter. Multilocular disc pores present around vulva and in rows across posteromedian edges of abdominal segments IV–VII. Trilocular pores moderately numerous and evenly distributed. Tubular ducts of several shapes and sizes, mostly long and thin, and some apparently with oral rims, very numerous in a band around margin of entire venter. Simple pores minute, scattered over entire surface. Setae moderately long and fine on median areas of venter, small and conical on margins.

Dorsum. Multilocular disc pores absent. Trilocular pores sparse on median areas, but in a dense marginal band around entire dorsum. Tubular ducts absent except for a few extending around from ventral surface in large specimens. Simple pores as on venter. Setae conical, of various sizes, those on median areas of abdominal segments VI and VII similar in size to cerarian setae.

Type data. Given by Maskell (1892) as "New Zealand, on *Fagus* [*Nothofagus*] *fusca*, Reefton district [BR]: specimens from Mr. Raithby". **Lectotype** (here designated): adult female alone on slide, labelled "*Dactylopius iceryoides*, adult female, 1891, W.M.M." (NZAC). **Paralectotype**: immature female alone on slide, labelled "*Dactylopius iceryoides*, 2nd stage female, 1891, W.M.M." (NZAC).

Material examined. Type specimens as listed above, plus 29 non-type adult females (BMNH, NZAC).

TO, GB, RI / BR, NC.

Collected in January–March, November, and December.

Taken from *Nothofagus* sp., *N. fusca*, *N. menziesii*, *N. solandri*, and *N. solandri* var. *cliffortioides* (Fagaceae). Occurring on twigs.

Remarks. *C. iceryoides* is a most distinctive species, both in life and when slide-mounted. Specimens examined from the North Island differed in life from those from the South Island in having a stripe of paler wax down the midline, but no other characters were found to suggest the existence of more than one species.

Genus *Dysmicoccus* Ferris

Dysmicoccus Ferris, 1950: 53. Type-species *Dactylopius brevipes* Cockerell, 1893a, by original designation.

Body outline oval to spherical. Antennae 6–8-segmented. Legs generally well developed; tarsal claws sometimes elongate, without denticles; translucent pores often present on hind legs. Spiracles of normal pseudococcid form. Circulus present or absent. Both pairs of ostioles distinct. Cerarii numbering 4–17 pairs; each cerarius with 2 or more conical setae, usually a few flagellate auxiliary setae, and a concentration of trilocular pores. Anal lobe bars absent. Anal ring of normal pseudococcid form.

Multilocular disc pores present or absent on both venter and dorsum. Quinquelocular pores absent. Trilocular pores present. Oral rim tubular ducts absent. Oral collar tubular ducts usually present on venter but rarely on dorsum. Simple pores usually apparent. Setae flagellate.

Remarks. The cosmopolitan genus *Dysmicoccus* is similar to *Pseudococcus*, differing only in lacking oral rim tubular ducts.

KEY TO SPECIES OF *DYSMICOCCUS* KNOWN FROM NEW ZEALAND

01 Cerarii numbering 15–17 pairs; anal lobe cerarii each with 2 conical setae .. 02
— Cerarii numbering 4–13 pairs; anal lobe cerarii each with 4–6 conical setae ... 06

02(01) Multilocular disc pores numerous over entire body (Fig. 64) ... ***rupestris***
— Multilocular disc pores absent or confined to abdominal venter ... 03

03(02) Multilocular disc pores present (Fig. 61) ... ***delitescens***
— Multilocular disc pores absent ... 4

04(03) Dorsomedian areas of thorax and anterior abdominal segments with 7–15 conical setae similar in size to cerarian setae, singly or in pairs; most setae or pairs of setae with 1 or 2 associated flagellate setae and a concentration of trilocular pores (Fig. 63) ... ***ornatus***
— Dorsum without such conical setae ... 05

05(04) Oral collar tubular ducts absent (Fig. 60) ... ***arcanus***
— Oral collar tubular ducts present on abdominal venter (Fig. 62) ... ***formicicola***

06(01) Multilocular disc pores present on venter only; translucent pores absent from hind legs (Fig. 59) ... ***ambiguus***
— Multilocular disc pores present on dorsum and venter; translucent pores present on hind tibiae (Fig. 65) ... ***viticis***

Dysmicoccus ambiguus (Morrison)

Figure 59

ambiguus Morrison, 1925: 448 (*Pseudococcus*). Williams & de Boer, 1973: 233 (*Dysmicoccus*) [in part]. Wise, 1977: 101 (*Dysmicoccus*).

Live females greyish green, with 2 darker lines down either side of midline of abdomen, covered with a thin layer of powdery white wax extending into 2 pairs of slender caudal filaments.

Body outline elongate-oval; length (mounted) 2.3–4.0 mm, width 1.1–1.8 mm. Antennae 8-segmented. Legs well developed; tarsal claws not elongate; hind trochanter + femur 0.41–0.56 mm long; hind tibia + tarsus 0.44–0.57 mm long; translucent pores absent from hind legs. Circulus horizontally oval, confined within margins of abdominal segment III, 0.13–0.26 mm wide. Both pairs of ostioles distinct; lips of anterior pair each with 5–18 trilocular pores and 0–5 setae; lips of posterior pair each with 14–28 trilocular pores and 5–10 setae. Cerarii numbering 4–6 pairs, one on head, the remainder on posterior abdominal segments; anal lobe and penultimate cerarii on somewhat concave sclerotised areas, each with 4–6 conical setae, 4–7 flagellate auxiliary setae, and a concentration of trilocular pores; frontal cerarii on small sclerotised areas, each with 3 or 4 slender conical setae and a few associated trilocular pores; remaining cerarii not on sclerotised areas, each with 2–5 slender conical setae and a few associated trilocular pores.

Venter. Multilocular disc pores present around vulva, and sometimes a few on median area of abdominal segment VI. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of most abdominal segments, the larger ones numerous marginally on most abdominal segments and scattered over head and thorax. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores as on venter. Oral collar tubular ducts larger than on venter, in small numbers on margins of body segments. Simple pores not apparent. Setae moderately short and fine.

Type data. "The holotype of this species was mounted from a pinned specimen included among the specimens of *Pseudococcus calceolariae* in the Maskell collection" (Morrison 1925). **Holotype**: adult female alone on slide, labelled "'Pseudococcus calceolariae Mask., New Zealand, Mask. Coll. No. 80", "Pseudococcus ambiguus, new species, H.M., Holotype" (USNM).

Material examined. Holotype, plus 38 non-type adult females (BMNH, NZAC, USNM).

Three Kings Is / ND, AK, CL / —.

Collected in January–May, September, November, and December.

Taken from *Arthropodium* sp. (Liliaceae), *Avicennia resinifera* (Avicenniaceae), *Brachyglottis* sp. (Asteraceae), *Coprosma australis* (Rubiaceae), *Entelea arborescens* (Tiliaceae), *Hebe* sp. (Scrophulariaceae), *Hedycarya arborea* (Monimiaceae), *Meryta* sp. and *M. sinclairii* (Araliaceae), *Myoporum laetum* (Myoporaceae), *Solanum laciniatum* (Solanaceae), pohutukawa [*Metrosideros excelsa*] (Myrtaceae), and puriri [*Vitex lucens*] (Verbenaceae). Occurring on stems; walks readily.

Remarks. *D. ambiguus* is similar to *D. viticis* in having anal lobe cerarii and penultimate cerarii each with from four to six conical setae on a somewhat concave sclerotised area. It may be distinguished by the absence both of translucent pores from the hind legs and of multilocular disc pores from the dorsum.

Dysmicoccus arcanus new species

Figure 60

Appearance of live females not known.

Body outline broadly oval to spherical; length (mounted) 1.2–2.1 mm, width 0.9–2.1 mm. Antennae 6- or 7-segmented. Legs well developed; tarsal claws elongate; hind trochanter + femur 0.19–0.29 mm long; hind tibia + tarsus 0.24–0.35 mm long; translucent pores not apparent on hind legs. Circulus absent. Both pairs of ostioles distinct; lips each with 6–20 trilocular pores and no more than 1 seta, sclerotised on inner edges. Cerarii numbering 17 pairs, all on sclerotised areas and with concentrations of trilocular pores; anal lobe cerarii each with 2 conical setae and 5–7 flagellate auxiliary setae; remaining cerarii each with 2 or 3 conical setae and 1–7 flagellate auxiliary setae.

Venter. Multilocular disc pores and oral collar tubular ducts absent. Trilocular pores moderately numerous and evenly distributed. Simple pores about one-quarter the size of trilocular pores, scattered over entire surface. Setae moderately long and stout.

Dorsum. As for venter.

Type data. **Holotype**: adult female, middle specimen of 3 on slide (position shown on label), New Zealand, NN, Mt Robert, moss (roots), 7 March 1972, J.A. de Boer ("811") (NZAC). **Paratypes**: 2 adult females on same slide as holotype; 1 adult female alone on slide, NN, Lake Sylvester, on *Coprosma cheesemanii*, 29 Apr 1969, J.A. de Boer ("529") (BMNH); 1 adult female alone on slide, NN, Mt Domett, mats (bulk sample 71/155), J. McBurney ("77-221b J.M.C.") (NZAC).

Material examined. Type specimens, plus 12 non-type adult females (BMNH, NZAC).

— / NN, MC, CO, DN.

Collected in May and September–November.

Taken from roots of *Coprosma cheesemanii* (Rubiaceae), *Raoulia* sp. (Asteraceae), tussock (Poaceae) and moss, and in mats and ants' nests.

Remarks. *D. arcanus* is similar to *D. formicicola*, *D. delitescens*, and *D. ornatus* in having 17 pairs of cerarii, six- or seven-segmented antennae, elongate tarsal claws, and no circulus. It may be distinguished by the absence of both tubular ducts and enlarged dorsal setae.

The specific name — Latin, 'hidden' — alludes to the habitats from which all specimens have been taken.

Dysmicoccus delitescens new species

Figure 61

Appearance of live females not known.

Body outline broadly oval to spherical; length (mounted) about 1.4 mm, width about 0.9 mm. Antennae 6- or 7-segmented. Legs well developed; tarsal claws elongate; hind trochanter + femur 0.30–0.31 mm long; hind tibia + tarsus 0.31–0.34 mm long; translucent pores not apparent on hind legs. Circulus absent. Cerarii numbering 17 pairs, all on sclerotised areas and with concentrations of trilocular pores; anal lobe cerarii each with 2 conical setae and 5–7 flagellate auxiliary setae; remaining cerarii each with 2–5 conical setae and 0–2 flagellate auxiliary setae.

Venter. Multilocular disc pores present around vulva and in rows across abdominal segments V and VI. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts in rows across abdominal segments III–VIII. Simple pores slightly smaller than trilocular pores, scattered over entire surface. Setae long, stout.

Dorsum. Multilocular disc pores and oral collar tubular ducts absent. Trilocular pores, simple pores, and setae as on venter.

Type data. **Holotype**: adult female with 2 immatures on slide, New Zealand, MB, Pelorus Bridge, under dead log in association with ants, 16 May 1973, R. Power ("1022") (NZAC). **Paratype**: adult female, same data as holotype (BMNH).

Material examined. Type specimens only.

Remarks. *D. delitescens* is similar to *D. arcanus*, *D. formicicola*, and *D. ornatus* in having 17 pairs of cerarii, six- or seven-segmented antennae, elongate tarsal claws, and no circulus. It can be distinguished by its multilocular disc pores.

The specific name — Latin, 'hiding' — alludes to the habitat of the type specimens.

Dysmicoccus formicicola (Maskell)

Figure 62

formicicola Maskell, 1892: 38 (*Ripersia*). Cockerell, 1896: 324 (*Ripersia*). Newstead, 1897: 167 (*Ripersia*). Cockerell, 1897: 240 (*Ripersia*). Fernald, 1903: 117 (*Ripersia*). Myers, 1922: 198 (*Ripersia*). Williams & de Boer, 1973: 235 (*Dysmicoccus*). Wise, 1977: 101 (*Dysmicoccus*).

Live females pale orange with a lateral fringe of stout filaments of white wax.

Body outline broadly oval to spherical; length (mounted) 1.2–1.8 mm, width 0.9–1.3 mm. Antennae 6-segmented. Legs well developed; tarsal claws elongate; hind trochanter + femur 0.21–0.26 mm long; hind tibia + tarsus 0.25–0.33 mm long;

translucent pores not apparent on hind legs. Circulus absent. Both pairs of ostioles distinct; lips each with 6–12 trilocular pores and no more than 1 seta, their inner edges sclerotised. Cerarii numbering 17 pairs, all on sclerotised areas and with concentrations of trilocular pores; anal lobe cerarii each with 2 conical setae and 3–7 flagellate auxiliary setae; remaining cerarii each with 2–4 conical setae and 2–5 flagellate auxiliary setae.

Venter. Multilocular disc pores absent. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts sparse to moderately numerous in rows across abdominal segments V–VII and sometimes also IV. Simple pores about one-quarter the size of trilocular pores, scattered over entire surface. Setae moderately long and stout.

Dorsum. Multilocular disc pores and oral collar tubular ducts absent. Trilocular pores, simple pores, and setae as on venter.

Type data. Given by Maskell (1892) as: "In New Zealand, underground, in ants' nests: my specimens are from the Ashburton district [MC], sent to me by Mr W.W. Smith." **Lectotype** (here designated): adult female alone on slide, labelled in Maskell's handwriting "*Ripersia formicicola*, adult female, 1891, W.M.M." (NZAC). **Paralectotype** (here designated): immature female alone on slide, labelled in Maskell's handwriting "*Ripersia formicicola*, larva, 1891, W.M.M." (NZAC).

Material examined. Lectotype and paralectotype, plus 11 non-type adult females (BMNH, NZAC).

TO / MC, CO.

Collected in January, November, and December.

Taken from *Oreobolus pectinatus* (Cyperaceae), pasture, and nest of *Chelaner antarcticus*.

Remarks. *D. formicicola* is similar to *D. delitescens*, *D. arcanus*, and *D. ornatus* in having 17 pairs of cerarii, six-segmented antennae, elongate tarsal claws, and no circulus. It can be distinguished by its combination of absence of multilocular disc pores and presence of oral collar tubular ducts, which are clearly visible in the lectotype.

A single poorly prepared specimen from Ardgowan, DN (in ants' nest, 2 October 1913, G. Brittin) is similar to *D. formicicola*, but differs in having more oral collar tubular ducts and in apparently possessing a circulus.

D. formicicola has been recorded in association with three ant species — *Chelaner antarcticus* (White), *C. smithii* (Forel), and *Huberia striata* (Smith).

—

Dysmicoccus ornatus new species

Figure 63

Live females pale orange, with stout, white wax filaments in a lateral fringe and in a row down the midline.

Body outline broadly oval to spherical; length (mounted) 1.2–1.7 mm, width 0.8–1.2 mm. Antennae 6- or 7-segmented. Legs well developed; tarsal claws elongate; hind trochanter + femur 0.27–0.33 mm long, hind tibia + tarsus 0.35–0.40 mm long; translucent pores not apparent on hind legs. Circulus absent. Both pairs of ostioles distinct; lips each with 3–8 trilocular pores and no more than 1 seta. Cerarii numbering 17 pairs, all on sclerotised areas and with concentrations of trilocular pores; anal lobe cerarii each with 2 conical setae and 5–8 flagellate auxiliary setae; remaining cerarii each with 2–4 conical setae and 1–5 flagellate auxiliary setae.

Venter. Multilocular disc pores and oral collar tubular ducts absent. Trilocular pores moderately numerous and evenly distributed. Simple pores minute, scattered over entire surface. Setae moderately long and stout.

Dorsum. Multilocular disc pores and oral collar tubular ducts absent. Trilocular pores moderately numerous and generally evenly distributed, but aggregated around bases of enlarged setae. Simple pores as on venter. Setae generally moderately long and stout, but median areas of thorax and anterior abdominal segments with 7–15 conical setae similar in size to cerarian setae, singly or in pairs on small sclerotised areas, most of these setae or pairs of setae with 1 or 2 associated flagellate setae and a concentration of trilocular pores.

Type data. Holotype: adult female alone on slide, New Zealand, TO, Tongariro National Park, near The Chateau, in nest of *Chelaner antarcticus* (White), 7 January 1983, J.M. Cox ("103") (NZAC). **Paratypes**: 10 adult females on separate slides, same data as holotype (BMNH, NZAC, USNM).

Material examined. Type series, plus 8 non-type adult females (BMNH, NZAC, USNM).

TO / CO.

Collected in January and April.

Taken from ants' nests.

Remarks. *D. ornatus* is similar to *D. arcanus*, *D. delitescens*, and *D. formicicola* in having 17 pairs of cerarii, six- or seven-segmented antennae, elongate tarsal claws, and no circulus. It can be distinguished by its conical dorsal setae with associated flagellate setae and groups of trilocular pores.

The specific name — Latin, 'ornate' — alludes to the conical dorsal setae.

Dysmicoccus rupestris new species

Figure 64

Appearance of live females not known.

Body outline oval; length (mounted) 2.1–3.5 mm, width 1.2–2.5 mm. Antennae 8-segmented. Legs well developed; tarsal claws not elongate; hind trochanter + femur 0.29–0.39 mm long; hind tibia + tarsus 0.31–0.38 mm long; translucent pores present on hind coxae only. Circulus quadrate, 0.08–0.15 mm wide. Both pairs of ostioles distinct; lips each with 10–20 trilocular pores and 2–6 setae. Cerarii numbering 15–17 pairs; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 5–7 flagellate auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 0–4 conical setae, 5–7 flagellate auxiliary setae, and an associated group of trilocular pores.

Venter. Multilocular disc pores numerous over entire surface. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts in rows across abdominal segments III–VIII. Simple pores about the same size as trilocular pores, sparsely scattered over entire surface. Setae moderately long and fine.

Dorsum. Oral collar tubular ducts absent. Multilocular disc pores, trilocular pores, simple pores, and setae as on venter.

Type data. Holotype: adult female, left-hand specimen of 2 on slide (ringed on coverslip and position shown on label), New Zealand, MB, Rotoiti – Bleinheim Road, Stoney Creek, on roots under boulder, 24 December 1983, V.F. Eastop ("17804") (NZAC). **Paratypes**: 12 adult females on 6 slides (including holotype slide), same data as holotype (BMNH, NZAC, USNM).

Material examined. Type series, plus 2 non-type adult females (BMNH, NZAC, USNM).

TO / MB.

Collected in December.

Taken from roots under boulders and in nest of the ant *Prolasius advena* (Smith).

Remarks. The numerous multilocular disc pores on both surfaces of the body distinguish *D. rupestris* from the other known New Zealand species of *Dysmicoccus*.

The specific name — Latin, 'living among rocks' — alludes to the habitat of the type specimens.

—⊛—

Dysmicoccus viticis (Green) resurrected species

Figure 65

viticis Green, 1929: 374 (*Pseudococcus*).

ambiguus (Morrison). Brittin, 1938: 347 (*Trionymus*) [misidentification]. Williams & de Boer, 1973: 233 (*Dysmicoccus*) [in part, illustration; misidentification].

Live females greyish green, with 2 darker lines down either side of midline of abdomen, covered with a thin layer of powdery white wax extending into 2 pairs of caudal filaments.

Body outline elongate-oval; length (mounted) 2.0–3.5 mm, width 0.9–2.0 mm. Antennae 8-segmented. Legs well developed; tarsal claws not elongate; hind trochanter + femur 0.33–0.51 mm long; hind tibia + tarsus 0.26–0.56 mm long; translucent pores present on hind tibiae only. Circulus horizontally oval, confined within margins of abdominal segment III, 0.03–0.30 mm wide. Both pairs of ostioles distinct; lips of anterior pair each with 4–15 trilocular pores and 0–6 setae; lips of posterior pair each with 12–30 trilocular pores and 3–8 setae. Cerarii numbering 5–13 pairs, at least 1 pair on head; anal lobe and penultimate cerarii on somewhat concave sclerotised areas, each with 4–6 conical setae, 3–6 flagellate auxiliary setae, and a concentration of trilocular pores; frontal cerarii on sclerotised areas, each with 2–4 slender conical setae and an associated group of trilocular pores; remaining cerarii not on sclerotised areas, each with 2–4 slender conical setae and a few associated trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posterior margins of abdominal segments IV–VII, a few on anteromedian edges of segments V–VII, and in groups on median areas of thorax and margins of thorax and abdomen. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of most abdominal segments, the larger ones in groups on margins of thorax and abdomen. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores in rows across abdominal segments III–VII, although these rows sometimes interrupted medially in smaller specimens. Trilocular pores as on venter. Oral collar tubular ducts larger than on venter, in rows across abdominal segments and scattered over head and thorax. Simple pores not apparent. Setae moderately short and fine.

Type data. Holotype: adult female alone on slide, New Zealand, ND, Whangaroa, on *Vitex lucens*, 2 December 1923 [not on slide, from published

description], J.G. Myers ("15", "BM 1940-180") (BMNH).

Material examined. Holotype, plus 56 non-type adult females (BMNH, NZAC).

ND, AK, CL, WI / NN, BR, FD, SL.

Collected in January, March, June, August, November, and December.

Taken from *Alseuosmia macrophylla* (Alseuosmiaceae), *Avicennia resinifera* (Avicenniaceae), *Coprosma* sp. and *C. australis* (Rubiaceae), *Hedycarya arborea* and *Laurelia novae-zelandiae* (Monimiaceae), *Leptospermum* sp. (Myrtaceae), *Loranthus* sp. (Loranthaceae), *Macropiper excelsum* (Piperaceae), *Senecio hectori* (Asteraceae), and *Vitex lucens* (Verbenaceae). Occurring on stems; walks readily.

Remarks. *D. viticis* is similar to *D. ambiguus*, but differs in having both translucent pores on the hind tibiae and multilocular disc pores on the dorsum.

D. viticis was synonymised with *D. ambiguus* by Williams & de Boer (1973), who had access to the holotype only of the latter species. Further material of *D. ambiguus* collected more recently from the North Island has allowed recognition of two distinct species.

Genus *Eurycoccus* Ferris

Eurycoccus Ferris, 1950: 81. Type-species *Pseudococcus jessica* Hollinger, 1916, by original designation.

Body outline broadly oval to spherical. Antennae 6–8-segmented. Legs well developed; tarsal claws without denticles; translucent pores sometimes present on hind legs. Spiracles of normal pseudococcid form. Circulus absent or, if present, variable in size and shape. Both pairs of ostioles distinct. Cerarii absent or restricted to anal lobes. Anal lobe bars absent. Anal ring of normal pseudococcid form.

Multilocular disc pores present on abdominal venter only. Quinquelocular pores absent. Trilocular pores present. Oral rim tubular ducts absent. Simple pores not usually apparent. Setae flagellate, generally fine and of moderate length.

Remarks. *Euryococcus* contains a number of nondescript species which are probably not closely related to each other. They are largely characterised by the absence of features such as oral rim tubular ducts, quinquelocular pores, anal lobe bars, dorsal multilocular disc pores, or oral collar tubular ducts, and by having cerarii absent or on the anal lobes only.

One Australian species, *E. antiscius* Williams, occurs in New Zealand. The genus is also recorded from the U.S.A.

Eurycoccus antiscius Williams

Figure 66

antiscius Williams, 1985: 161 (*Eurycoccus*).

Live females reddish brown, covered with a layer of powdery white wax.

Body rotund; length (mounted) 1.8–2.7 mm, width 1.6–2.5 mm. Antennae 7-segmented. Legs small but well developed; hind trochanter + femur 0.21–0.25 mm long; hind tibia + tarsus 0.20–0.24 mm long; a few translucent pores present on hind coxae. Circulus small, round, 0.02–0.04 mm wide. Both pairs of ostioles distinct; lips each with 10–17 trilocular pores but without setae, their inner edges heavily sclerotised. Cerarii (if recognisable) not on sclerotised areas, each with a pair of flagellate setae slightly thicker than the surrounding setae, but without a concentration of trilocular pores.

Venter. Multilocular disc pores present around vulva and in rows across posteromedian edges of abdominal segments V–VII. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts present in rows across median areas of abdominal segments III–VIII and moderately numerous on margins of most abdominal segments. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Trilocular pores as on venter. Simple pores not apparent. Setae moderately short, very fine.

Type data. Holotype: adult female alone on slide, Australia, Victoria, Leongatha, in ants' nest, 21 April 1927, G.F. Hill (BMNH). **Paratypes** (all Australian): 5 adult females on 4 slides, South Australia, Mount Gambier, on *Cryptostemma [Arctotheca] calendula*, Jul 1953, D.A. Maelzer (BMNH, WARI); 3 adult females on separate slides, A.C.T., Reid, on grass roots, 10 Feb 1961, M. Carver ("BM 1961-273") (BMNH, WARI).

Material examined. Type specimens, plus 6 non-type adult females from New Zealand (BMNH, NZAC, PCNZ, WARI).

WI, WN / MC.

Collected in April and May.

Taken from trunk of ponga [*Cyathea dealbata*] (Cyatheaceae), roots of *Bromus unioloides*, *Dactylis glomerata*, and *Lolium perenne* (all Poaceae), and from roots in association with ants.

Remarks. The rotund body, small, round circulus, and absence of distinct cerarii together distinguish *E. antiscius* from the other known species of New Zealand mealybugs.

Genus *Ferrisicoccus* Ezzat & McConnell

Ferrisicoccus Ezzat & McConnell, 1956: 31. Type-species *Ferrisicoccus angustus* Ezzat & McConnell, 1956, by original designation.

Body outline elongate-oval. Antennae 8-segmented. Legs of normal pseudococcid form; tarsal claws without denticles. Spiracles of normal pseudococcid form. Both pairs of ostioles apparent. Circulus present. Cerarii numbering 7–13 pairs; anal lobe cerarii each with 4–7 conical setae; flagellate auxiliary setae present in anal lobe cerarii, and sometimes in penultimate cerarii. Anal lobe bars present. Anal ring of normal pseudococcid form.

Multilocular disc pores present on venter only. Quinquelocular pores absent. Trilocular pores present. Oral rim tubular ducts usually absent. Oral collar tubular ducts present on both venter and dorsum, those on dorsum large, heavily sclerotised, and in groups or rows across body. Simple pores not apparent. Setae flagellate.

Remarks. *Ferrisicoccus* is similar to *Sarococcus*, which also has anal lobe bars and more than three conical setae in each anal lobe cerarius, but differs in having oral collar tubular ducts on the dorsum. One New Zealand species, *celmisicola*, is here placed in *Ferrisicoccus* because of its close similarity to the type species, *F. angustus*.

The genus is also known from China and the U.S.A.

Ferrisicoccus celmisicola new species

Figure 67

Live females pink, covered with white wax.

Body elongate-oval; length (mounted) 2.5–4.4 mm, width 1.2–2.3 mm. Antennae 8-segmented. Legs well developed; hind trochanter + femur 0.35–0.44 mm long; hind tibia + tarsus 0.37–0.44 mm long; translucent pores not apparent on hind legs. Circulus quadrate or horizontally oval, situated towards posterior edge of abdominal segment III, 0.07–0.12 mm wide. Ostioles distinct; lips each with 20–35 trilocular pores and 3–5 setae. Cerarii numbering 9–13 pairs, all with concentrations of trilocular pores; anal lobe cerarii on sclerotised areas, each with 4–6 conical setae of various sizes and 4–8 flagellate auxiliary setae; penultimate cerarii on sclerotised areas, each with 2–4 conical setae, but without flagellate auxiliary setae; remaining cerarii not on sclerotised areas, each with 1–3 slender con ical setae.

Venter. Multilocular disc pores present around vulva and a few on median area of abdominal segment VI. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts in small groups on margins of most abdominal segments, and a few on margins of thorax. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores as on venter. Oral collar tubular ducts the same size as on venter, in rows across median areas of abdominal segments and in groups on head, thorax, and margins of abdominal segments. Simple pores not apparent. Setae short, of moderate thickness.

Type data. Holotype: adult female alone on slide, New Zealand, NN, Mt Arthur, 4000 ft [1200 m], on *Celmisia dallii*, 20 November 1969, J.A. de Boer ("589") (NZAC). **Paratypes**: 2 adult females on separate slides, same data as holotype (BMNH, NZAC); 2 adult females on separate slides, NN, Wairau, Red Hills, 3500 ft [1050 m], on *Celmisia spectabilis*, 23 Mar 1972, J.A. de Boer ("828") (BMNH, NZAC); 2 adult females together on slide, NC–WD, Arthur's Pass, on *Celmisia* leaves, 23 Jan 1983, C.F. Butcher (BMNH); 3 adult females on 2 slides, NC–WD, Arthur's Pass, on *Celmisia coriacea*, 23 Oct 1967, J.A. de Boer ("258") (NZAC, USNM).

Material examined. Type specimens only.

— / NN, NC–WD.

Collected in January, March, October, and November.

Taken from *Celmisia* sp., *C. coriacea*, *C. dallii*, and *C. spectabilis* (Asteraceae).

Remarks. *F. celmisicola* is a distinctive species apparently specific to *Celmisia*. It differs from the type-species of the genus, *F. angustus*, in lacking oral collar tubular ducts on the median area of the venter.

Genus *Laminicoccus* Williams

Laminicoccus Williams, 1960: 416. Type-species *Tylococcus giffardi* Ehrhorn, 1916 (= *Dactylopius pandani* Cockerell, 1895), by original designation.

Body outline elongate to broadly oval; anal lobes not protruding. Antennae 8-segmented. Legs well

developed, sometimes elongate; tarsal claws without denticles; translucent pores sometimes present on hind legs. Spiracles of normal pseudococcid form. Circulus (if present) round, oval, or hourglass-shaped. Both pairs of ostioles distinct. Cerarii numbering 17 pairs, most on distinct sclerotised areas; each cerarius with 1–16 conical setae and a concentration of trilocular pores, with or without flagellate auxiliary setae. Anal lobe bars absent. Anal ring of normal pseudococcid form.

Multilocular disc pores (if present) usually restricted to venter. Quinquelocular pores absent. Trilocular pores present, those on dorsum frequently distinctly larger than those on venter. Oral rim tubular ducts sometimes present. Oral collar tubular ducts present on venter, sometimes also on dorsum. Simple pores usually apparent, smaller than trilocular pores. Setae on venter long, fine, flagellate, those on dorsum also flagellate, varying in length and thickness.

Remarks. The three species from New Zealand here placed in *Laminicoccus* are very similar, and differ from the type-species only in having considerably fewer multilocular disc pores and oral collar tubular ducts, and in lacking these ducts on the dorsum.

The genus is known also from Micronesia, South Pacific islands, and Australia.

KEY TO SPECIES OF *LAMINICOCCUS* KNOWN FROM NEW ZEALAND

01 Circulus absent (Fig. 68) ... ***asteliae***
— Circulus present ... 02

02(01) Multilocular disc pores absent; anal lobe cerarii each with 2 conical setae (Fig. 69) ... ***eastopi***
— Multilocular disc pores numbering 20–40; anal lobe cerarii each with 10-16 conical setae (Fig. 70) ... ***flandersi***

Laminicoccus asteliae new species

Figure 68

Live females pale orange, covered with powdery white wax extending into a lateral fringe of stout filaments.

Body elongate to elongate-oval; length (mounted) 1.6–3.6 mm, width 0.8–1.7 mm. Legs normal for genus; hind trochanter + femur 0.36–0.45 mm long; hind tibia + tarsus 0.32–0.38 mm long; translucent pores present on hind coxae only. Circulus absent. Ostioles distinct; lips each with 3–30 trilocular pores and 0–15 setae. Cerarii all on slightly protruding sclerotised areas, with concentrations of trilocular pores; anal lobe cerarii and penultimate cerarii each with 8–16 conical setae and 8–18 flagellate auxiliary setae; remaining cerarii each with 6–12 conical setae but without flagellate auxiliary setae.

Venter. Multilocular disc pores absent, or 1 or 2 pores present around vulva. Trilocular pores sparsely but evenly distributed. Oral rim tubular ducts absent. Oral collar tubular ducts numbering 1–5 around vulva. Simple pores about one-quarter the size of trilocular pores, sparsely scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores and tubular ducts absent. Trilocular pores about the same size as on venter, sparsely but evenly distributed. Simple pores minute, scattered over entire dorsum. Setae short, stout.

Type data. Holotype: adult female alone on slide, New Zealand, AK, Auckland, Titirangi, at base of leaves of *Astelia trinervia*, 13 January 1983, J.M. Cox ("141") (NZAC). **Paratypes**: 8 adult females on 4 slides, same data as holotype (BMNH, NZAC, USNM).

Material examined. Type specimens, plus 25 non-type adult females (BMNH, FRNZ, NZAC, USNM).

ND, AK, BP, TO, RI / —.

Collected in January, February, and May.

Taken from *Astelia* sp., *A. trinervia*, and *Collospermum* sp. (Liliaceae).

Remarks. The absence of a circulus distinguishes *L. asteliae* from the other two species of *Laminicoccus* known from New Zealand. It is common on *Astelia* in the North Island.

Laminicoccus eastopi new species

Figure 69

Appearance of live females not known.

Body outline elongate; length 2.2–3.8 mm, width 0.7–1.7 mm. Legs elongate; hind trochanter + femur 0.45–0.53 mm long; hind tibia + tarsus 0.45–0.53 mm long; translucent pores not apparent on hind legs. Circulus quadrate, protruding, 0.06–0.15 mm wide. Ostioles distinct; lips each with 12–25 trilocular pores and 0–8 setae. Cerarii all with concentrations of trilocular pores and a few simple pores; anal lobe cerarii and penultimate cerarii on large sclerotised areas, each with 2 conical setae and 10–20 flagellate auxiliary setae; frontal cerarii on large sclerotised areas, each with 3–8 conical

setae and 3–5 flagellate auxiliary setae; remaining cerarii usually on small sclerotised areas, each with 2–8 conical setae and 0–4 flagellate auxiliary setae.

Venter. Multilocular disc pores absent. Trilocular pores moderately numerous and evenly distributed. Oral rim tubular ducts small, singly on margins of abdominal segments II–VI, and totalling 2–6 on venter. Oral collar tubular ducts in small numbers on median areas of abdominal segments VI and VII, and totalling 3–6 on venter. Simple pores about half the size of trilocular pores, sparsely scattered over venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores and tubular ducts absent. Trilocular pores slightly larger than on venter, moderately numerous and evenly distributed. Simple pores about one-quarter the size of trilocular pores, sparsely scattered over entire dorsum. Setae moderately long and fine.

Type data. Holotype: adult female, right-hand specimen of 2 on slide (position indicated on label and ringed on coverslip), New Zealand, CO, Rocklands, beating *Cyathodes colensoi*, *Chionochloa rubra*, and *Anthoxanthum odoratus*, 4 December 1983, V.F. Eastop ("17679") (NZAC). **Paratypes**: 5 adult females on 4 slides, same data as holotype (BMNH, NZAC, USNM); 3 adult females on 2 slides, NN, Cobb, on *Chionochloa rubra*, 4 May 1972, J.A. de Boer ("878A") (NZAC).

Material examined. Type specimens only.
— / NN, CO.
Collected in May and December.
Taken from *Chionochloa rubra* (Poaceae).

Remarks. *L. eastopi* can be distinguished from the other two species of *Laminicoccus* known from New Zealand by having only two conical setae in each anal lobe cerarius, and by the presence of oral rim tubular ducts.

This species is named for Dr V.F. Eastop, who collected most of the type material as well as many other specimens used in this study.

Laminicoccus flandersi Williams

Figure 70

flandersi Williams, 1985: 190 (*Laminicoccus*).

Live females reddish brown, covered with a thick layer of powdery white wax extending into broad lateral filaments around entire body.

Body outline elongate to elongate-oval; length (mounted) 2.3–4.6 mm, width 1.0–2.1 mm. Legs elongate; hind trochanter + femur 0.36–0.45 mm long; hind tibia + tarsus 0.36–0.41 mm long; translucent pores not apparent on hind legs. Circulus hourglass-shaped, 0.23–0.34 mm wide. Ostioles distinct; lips each with 24–40 trilocular pores and 5–10 setae. Cerarii all on sclerotised areas, with concentrations of trilocular pores and a few simple pores; anal lobe cerarii each with 10–16 conical setae and 5–8 flagellate auxiliary setae; remaining cerarii each with 4–12 conical setae but without flagellate auxiliary setae.

Venter. Multilocular disc pores around vulva and in a single row across posterior edge of abdominal segment VI, totalling 20–40 on venter. Trilocular pores sparsely but evenly distributed. Oral rim tubular ducts absent. Oral collar tubular ducts in rows across median areas of abdominal segments V and VI and a few on margins of segments V–VII. Simple pores about half the size of trilocular pores, scattered over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores and tubular ducts absent. Trilocular pores distinctly larger than on venter, sparsely but evenly distributed. Simple pores minute, sparsely scattered over entire dorsum. Setae moderately short and fine.

Type data. Holotype: adult female alone on slide, Australia, New South Wales, Sydney Botanic Gardens, on *Howeia* sp. [Arecaceae], 10 November 1955, H.M. Brookes ("162/55") (ANIC). **Paratypes**: 7 adult females on separate slides, same data as holotype (BMNH, WARI).

Material examined. Type specimens, plus 6 nontype adult females from New Zealand (ANIC, BMNH, NZAC, WARI).
AK, WI / —.
Collected in February and March.
Taken from Kentia palm [*Gronophyllum* sp.] (Arecaceae).

Remarks. *L. flandersi* can be distinguished from the other two species of *Laminicoccus* known from New Zealand by its more numerous multilocular disc pores.

In Australia it has been recorded from *Gronophyllum* as well as *Howeia* (Williams 1985).

Maskellococcus new genus

Type-species *Dactylopius obtectus* Maskell, 1890.

(Named in honour of Mr W.M. Maskell, who described many of the species of New Zealand Pseudococcidae.)

Body small; outline distinctly turbinate at maturity.

Antennae 6- or 7-segmented. Legs small, stout; tarsal claws without denticles; translucent pores present on hind coxae and tibiae. Spiracles of normal pseudococcid form. Circuli absent. Both pairs of ostioles apparent. Cerarii numbering 1–4 pairs, all on abdomen; anal lobe cerarii each with 2–6 conical setae, a few flagellate auxiliary setae, and a small concentration of trilocular pores; remaining cerarii each with 1 or 2 conical setae but without associated trilocular pores. Anal lobe bars absent. Anal ring of normal pseudococcid form, but with relatively long setae — about 3× diameter of anal ring.

Multilocular disc pores absent or confined to venter. Quinquelocular pores absent. Trilocular pores present. Oral rim tubular ducts absent. Oral collar tubular ducts present on venter and dorsum. Simple pores sometimes apparent. Setae flagellate, moderately long and fine.

Remarks. *Maskellococcus* is characterised by the small, turbinate body form, dorsal oral collar ducts, and absence of oral rim tubular ducts. It is similar to *Turbinococcus* from the Caroline Islands, but differs in having dorsal tubular ducts; and to a Hawaiian genus, *Gallulacoccus*, but differs in lacking oral rim tubular ducts.

Two species are known, both living under bracts of *Nothofagus*. The genus is recorded only from New Zealand.

KEY TO SPECIES OF *MASKELLOCOCCUS*

01 Antennae 6- or 7-segmented; multilocular disc pores absent (Fig. 71) ... ***nothofagi***

— Antennae 8-segmented; multilocular disc pores present (Fig. 72) ... ***obtectus***

Maskellococcus nothofagi new species

Figure 71

Live females dark red, covered in a layer of powdery white wax.

Body outline distinctly turbinate, but with posterior abdominal segments sometimes curving away from midline; length (mounted) 1.1–1.7 mm, width 0.7–1.0 mm. Legs typical of genus; hind trochanter + femur 0.12–0.16 mm long; hind tibia + tarsus 0.12–0.16 mm long. Ostioles distinct; lips each with 2–10 trilocular pores and no more than 1 seta. Cerarii numbering 2–4 pairs; anal lobe cerarii each on a sclerotised area extending some way anteriad, with 4–6 conical setae, 4–6 short, fine auxiliary setae, and a few associated trilocular pores; remaining cerarii not on sclerotised areas, each with 1 or 2 conical setae but without auxiliary setae or associated trilocular pores.

Venter. Multilocular disc pores absent. Trilocular pores sparsely but evenly distributed. Oral collar tubular ducts slender, of 2 sizes, the smaller ducts in small numbers on abdominal segments V–VII, the larger ones sparsely in rows across abdominal segments III–VII and in marginal groups around entire venter. Simple pores about one-third the size of trilocular pores, sparsely scattered over entire venter. Setae typical of genus.

Dorsum. Trilocular pores and simple pores as on venter. Oral collar tubular ducts the same size as larger ducts on venter, in marginal groups of 1–3 on either side of abdominal segments II–VII. Setae typical of genus.

Type data. Holotype: adult female alone on slide, New Zealand, WD, Makaroa, under bracts of *Nothofagus menziesii*, 1 February 1983, J.M. Cox ("221" (NZAC). **Paratypes**: 2 adult females on separate slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens, plus 13 non-type adult females (BMNH, FRNZ, NZAC, USNM).

BP, GB / NN, WD.

Collected in February, March, September, and October.

Taken from *Nothofagus fusca* and *N. menziesii* (Fagaceae). Occurring under bracts.

Remarks. See Remarks under *M. obtectus*.

The specific name alludes to the identity of the host-plant genus.

Maskellococcus obtectus (Maskell) new combination

Figure 72

obtectus Maskell, 1890: 152 (*Dactylopius*). Fernald, 1903: 107 (*Pseudococcus*). Myers, 1922: 198 (*Pseudococcus*). Brittin, 1938: 337 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

Live females dark red, covered with white, powdery wax.

Body outline distinctly turbinate, sometimes with projecting anal lobes; length (mounted) 1.4–1.7 mm, width 0.7–1.0 mm. Antennae 8-segmented. Legs of normal form for genus; hind trochanter + femur 0.17–0.20 mm long; hind tibia + tarsus 0.19–0.21 mm long. Ostioles distinct; lips each with 2–4 trilocular pores and 0–2 setae. Cerarii on anal lobes only, not on sclerotised areas; each cerarius with 2

slender conical setae, 6–10 moderately short, fine auxiliary setae, and a few associated trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posteromedian edges of abdominal segments I–VI (although sparse or absent on segment III), and sometimes a few on thorax and on anterior edges and marginal areas of abdominal segments. Trilocular pores sparsely but evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts sparsely in rows across median areas of abdominal segments, the larger ones in rows across abdominal segments and in groups on median areas of thorax and margins of entire venter. Simple pores not apparent. Setae typical of genus.

Dorsum. Trilocular pores as on venter. Oral collar tubular ducts of same 2 sizes as on venter, the smaller ducts in groups of 1–4 on margins of abdominal segments IV–VI, the larger ones sparsely scattered over median areas of abdomen and margins of head and thorax. Simple pores not apparent. Setae typical of genus.

Type data. Maskell (1890) gives the collection data as "on *Fagus [Nothofagus] fusca*", "near Reefton [BR]". No original slides of this species have been located.

Material examined. 16 non-type adult females (BMNH, FRNZ, NZAC, USNM).

AK, GB, RI / NN, SD, BR.

Collected in January–March and December.

Taken from *Nothofagus fusca*, *N. solandri*, and *N. truncata* (Fagaceae). Occurring under bracts.

Remarks. As Maskell's original slides of *M. obtectus* have not been located, it was necessary to consult his original description in order to determine which of the two known species of *Maskellococcus* should bear this name. Maskell (1890) both described and illustrated *M. obtectus* as having eight-segmented antennae, and fortunately only one of the species answers this description. Maskell's subsequent material contains both species.

Genus *Nipaecoccus* Sulc

Nipaecoccus Sulc, 1945: 1. Type-species *Dactylopius nipae* Maskell, 1892, by original designation.

Body outline oval to spherical. Antennae 7- or 8-segmented. Legs well developed; tarsal claws without denticles; translucent pores usually apparent on hind legs. Spiracles of normal pseudococcid form. Ostioles somewhat reduced, the anterior pair sometimes not apparent. Circulus present or absent. Cerarii confined to posterior abdominal segments, numbering no more than 6 pairs; each cerarius with 2 conical or lanceolate setae; only anal lobe cerarii sometimes with a few flagellate auxiliary setae and associated trilocular pores. Anal lobe bars present or absent. Anal ring of normal pseudococcid form.

Multilocular disc pores confined to abdominal venter. Quinquelocular pores absent. Trilocular pores present. Oral rim tubular ducts absent. Oral collar tubular ducts confined to venter. Simple pores small, usually apparent on both venter and dorsum. Ventral setae flagellate on median areas, lanceolate marginally; dorsal setae lanceolate, some almost as large as cerarian setae.

Remarks. *Nipaecoccus* was erected to contain the so-called blue-black species with enlarged setae on the dorsum similar in size to cerarian setae, and with only two conical setae in each anal lobe cerarius. It is similar to *Ventrispina*, which also has enlarged dorsal setae, but differs in lacking these setae on the median areas of the venter.

Species from North America, the Oriental Region, the African continent, Mauritius, and Australia have been placed in *Nipaecoccus*, but they are probably not all congeneric with the type-species *Dactylopius nipae*. Only one species is known from New Zealand.

Nipaecoccus aurilanatus (Maskell)

Figure 73

aurilanatus Maskell, 1890: 151 (*Dactylopius*). Fernald, 1903: 97 (*Pseudococcus*). Ferris, 1950: 104 (*Nipaecoccus*). Lindinger, 1957: 550 (*Erium*). Williams, 1985: 231 (*Nipaecoccus*).

Live females deep purple, with tufts of golden wax down midline and around margins of dorsum.

Body outline broadly oval to spherical; anal lobes distinctly protruding; length (mounted) 1.6–3.8 mm, width 1.3–2.9 mm. Antennae 7- or 8-segmented. Legs normal for genus; hind trochanter + femur 0.21–0.26 mm long; hind tibia + tarsus 0.19–0.24 mm long; translucent pores present on hind coxae and tibiae. Both pairs of ostioles apparent; lips each with 3–6 trilocular pores and no more than 1 seta. Circulus horizontally oval, not divided by intersegmental line, 0.05–0.11 mm wide. Cerarii numbering 3–5 pairs; anal lobe cerarii on sclerotised areas, each with 2 slender conical setae, 3–5 flagellate auxiliary setae, and a few trilocular pores; remaining cerarii not on sclerotised areas, each with 2 large lanceolate setae but without auxiliary setae or associated trilocular pores. Anal lobe bars absent.

Venter. Multilocular disc pores present around vulva and in rows right across posterior edges of abdominal segments II–VI and anterior edges of

segments IV–VII. Trilocular pores generally evenly distributed, but very sparse or absent on median areas of thorax. Oral collar tubular ducts with indistinct collars, in rows across median areas of abdominal segments II–VII, moderately numerous around abdominal margins and numerous on median areas of thorax, but absent from margins of head and thorax. Simple pores about half the size of trilocular pores, scattered over entire surface. Setae typical of genus.

Dorsum. Trilocular pores generally moderately numerous and evenly distributed, but absent from 4 longitudinal stripes. Simple pores as on venter. Setae generally typical of genus, but with same disposition as trilocular pores.

Type data. Given by Maskell (1890) as "New Zealand, Auckland, on *Araucaria bidwillii* and *A. excelsa*". Two original slides have been located, labelled "*Dactylopius aurilanatus*, male, 1889, W.M.M." and "*Dactylopius aurilanatus*, larva, 1889, W.M.M." (NZAC). Neither slide is suitable for designation as lectotype. Williams (1985) designated in error a slide labelled "*Dactylopius aurilanatus*, early adult female, 1894, W.M.M." (NZAC). Despite the lack of adequate type material, Maskell's detailed description of the very distinctive appearance of the live females, together with the host data, leaves no doubt as to the identity of this species.

Material examined. Specimens listed above, plus 11 non-type adult females (BMNH, NZAC).

AK / —.

Collected in February, April, and May.

Taken from *Araucaria* sp., *A. bidwillii*, and *A. excelsa*, and Australian kauri tree [*Agathis* sp.] (Araucariaceae).

Remarks. *N. aurilanatus* is the only species of *Nipaecoccus* known from New Zealand. It was probably introduced from Australia, where it has several close relatives. It also occurs in the U.S.A.

Genus *Paracoccus* Ezzat & McConnell

Paracoccus Ezzat & McConnell, 1956: 37. Type-species *Pseudococcus burnerae* Brain, 1915, by original designation.

Body outline oval, rarely turbinate. Antennae 8-segmented. Legs well developed; tarsal claws without denticles; translucent pores usually present on hind coxae and tibiae. Spiracles of normal pseudococcid form. Circulus usually present, variable in size and shape from small and round to hour-glass-shaped. Both pairs of ostioles distinct. Cerarii numbering 1–18 pairs; each cerarius usually with only 2 conical setae, occasionally some with 3–6 conical setae; flagellate auxiliary setae present in anal lobe cerarii only. Anal lobe bars present. Anal ring of normal pseudococcid form.

Multilocular disc pores present or absent on both venter and dorsum. Quinquelocular pores absent. Trilocular pores numerous, generally evenly distributed. Oral rim tubular ducts present on venter or dorsum, or both. Oral collar tubular ducts usually present on venter; if present on dorsum, then not forming rows across segments. Simple pores usually apparent on both venter and dorsum, variable in size from minute to distinctly larger than trilocular pores. Setae long and fine on venter, variable on dorsum from long and fine to short and stout.

Remarks. Ezzat & McConnell (1956) limited this genus to species which have no more than 17 pairs of cerarii. Species with 18 pairs of cerarii, such as *zealandicus* Ezzat & McConnell, were placed in *Allococcus*. Using this criterion, two New Zealand species — *glaucus* Maskell and *zealandicus* — would be placed in *Paracoccus* and *Allococcus* respectively. However, these species are very difficult to separate, both having variable numbers of cerarii, and are obviously congeneric. Consequently, all the New Zealand species that have anal lobe bars and oral rim tubular ducts are here placed in *Paracoccus*. This genus can be distinugished from the similar *Chorizococcus*, *Spilococcus*, and *Vryburgia* by its possession of anal lobe bars, and from *Planococcus* and *Crisicoccus* by having oral rim tubular ducts.

KEY TO SPECIES OF *PARACOCCUS* KNOWN FROM NEW ZEALAND

01 Multilocular disc pores absent; circulus present (Fig. 95) ... ***nothofagicola***
— Multilocular disc pores present, at least on venter; circulus present or absent ... 02

02(01) Cerarii on thoracic and anterior abdominal segments each with 1–5 flagellate setae and 9–20 trilocular pores (Fig. 74) ... ***abnormalis***
— Cerarii on thoracic and anterior abdominal segments absent, or with 1–4 conical, lanceolate, or flagellate setae and 1–10 trilocular pores ... 03

03(02) Dorsum with numerous multilocular disc pores over entire surface (Fig. 94) ... ***multiductus***

— Dorsum with multilocular disc pores sparse and confined to margins ... 04

04(03) Oral rim tubular ducts absent from dorsum; dorsal setae short, stout, frequently almost lanceolate ... 05
— Oral rim tubular ducts present on dorsum; dorsal setae usually long and flagellate ... 11

05(04) Multilocular disc pores and slender oral collar tubular ducts numerous marginally around dorsum of thorax and abdomen (Fig. 87) ... ***drimydis***
— Multilocular disc pores and oral collar tubular ducts absent from dorsum ... 06

06(05) Circulus absent (Fig. 78) ... ***aspratilis***
— Circulus present ... 07

07(06) Most abdominal cerarii with 3–6 conical setae (Fig. 89) ... ***hebes***
— Most abdominal cerarii with 2 conical setae; rarely 1 or 2 cerarii with 3 or 4 conical setae ... 08

08(07) Circulus small, round or oval, 0.01–012 mm wide ... 09
— Circulus large, hourglass-shaped, 0.14–0.32 mm wide ... 10

09(08) Multilocular disc pores absent from abdominal segment V; simple pores less than half the size of trilocular pores (Fig. 76, 77) ... ***albatus***
— Multicolour disc pores present in a row across abdominal segment V; simple pores on dorsum slightly larger than trilocular pores (Fig. 75) ... ***acaenae***

10(08) Oral rim tubular ducts usually absent from venter of abdominal segment IX, if 1 or 2 present then cerarii numbering 7–11 pairs, only 1 or 2 pairs present on head, and penultimate pair on abdomen with conical setae much smaller than those of anal lobe cerarii; in life, body colour pale green or orange (Fig. 88) ... ***glaucus***
— Oral rim tubular ducts on venter of abdominal segment IX numbering 2–5; cerarii numbering 15–18 pairs, 3 or 4 pairs present on head, penultimate pair on abdomen with conical setae usually almost as large as those of anal lobe cerarii; in life, body colour dark purplish brown (Fig. 99) ... ***zealandicus***

Multilocular disc pores present on several dorsal segments as well as on venter (Fig. 80) ... ***canalis***
— Multilocular disc pores usually absent from dorsum; occasionally 1–3 pores on median areas of abdominal segment VII ... 12

12(11) Body outline turbinate; marginal setae on abdomen noticeably stout, long (Fig. 92) ... ***longicauda***
— Body outline oval; marginal setae on abdomen fine, of moderate length ... 13

13(12) Circulus present ... 14
— Circulus absent ... 23

14(13) Circulus small, round, 0.02–0.07 mm wide; oral collar tubular ducts present in marginal prothoracic groups (Fig. 96) ... ***parvicirculus***
— Circulus quadrate or hourglass-shaped, 0.05–0.17 mm wide; if 0.05–0.08 mm, then oral collar tubular ducts not present in prothoracic groups ... 15

15(14) Cerarii present on anal lobes only (Fig. 98) ... ***redactus***
— Cerarii numbering 3–15 pairs ... 16

16(15) Dorsal oral rim tubular ducts the same size as larger oral collar tubular ducts on venter (Fig. 100) ... ***podocarpi***
— Dorsal oral rim tubular ducts at least twice the size of larger oral collar tubular ducts on venter ... 17

17(16) Marginal multilocular disc pores numbering more than 11 ... 18
— Marginal multilocular disc pores numbering 0–6 ... 19

18(17) Multilocular disc pores on thorax numerous (Fig. 81) ... ***cavaticus***
— Multilocular disc pores on thorax numbering 0–5 (Fig. 85) ... ***deceptus***

19(17) Cerarii, including those on head, numbering 8–16 pairs ... 20
— Cerarii, including any on head, numbering 3–6 pairs ... 21

20(19) Oral collar tubular ducts usually absent from margins of prothorax; if present, then numbering only 1–3 ducts on either side (total for both sides 1–4 ducts) (Fig. 83) ... ***cryptus***
— Oral collar tubular ducts present in a marginal group of 5–30 ducts on

either side of prothorax (total for both sides 11–60 ducts) (Fig. 90) ... ***insolitus***

21(19) Multilocular disc pores on thoracic venter numbering 0–4 (Fig. 93) ... ***miro***
— Multilocular disc pores on thoracic venter numerous ... 22

22(21) Oral collar tubular ducts present in a marginal group on either side of prothorax (Fig. 82) ... ***coriariae***

— Oral collar tubular ducts absent from margins of prothorax (Fig. 84)... ***deboerae***

23(13) Multilocular disc pores absent from thorax, totalling no more than 40 over entire venter (Fig. 91) ... ***leptospermi***
— Multilocular disc pores numerous on thorax and abdomen ... 24

24(23) Oral rim tubular ducts on dorsum of abdomen confined to margins; oral collar tubular ducts absent from margins of prothorax (Fig. 79) ... ***butcherae***
— Oral rim tubular ducts on dorsum forming rows across abdominal segments; oral collar tubular ducts present in a marginal group on either side of prothorax (Fig. 86) ... ***definitus***

Paracoccus abnormalis new species

Figure 74

Appearance of live females not known.

Body outline oval; length (mounted) 1.8–2.4 mm, width 1.0–1.6 mm. Legs well developed; hind trochanter + femur 0.26–0.28 mm long; hind tibia + tarsus 0.28–0.30 mm long; translucent pores present on hind coxae only. Circulus apparently round, about 0.06 mm wide. Ostioles distinct; lips each with 15–20 trilocular pores and 2–4 setae. Cerarii apparently numbering 17 pairs, although some indistinct, all on lightly sclerotised areas; anal lobe cerarii each with 2 conical setae, 7–9 flagellate auxiliary setae, and a concentration of trilocular pores; remaining abdominal cerarii each with 2 conical setae which become more flagellate anteriad, a large group of trilocular pores, and sometimes 1 or 2 flagellate setae within this group; cephalic and thoracic cerarii each with 2–5 flagellate setae (rarely 1) and a large group of trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posterior edges of abdominal segments III–VIII and anterior edges of segments V–VII, and scattered over thorax and abdominal segments I and II. Trilocular pores evenly distributed. Oral rim tubular ducts very sparse, singly on margins of some thoracic segments, and sometimes a single duct on head. Oral collar tubular ducts in rows across median areas, in groups on margins of abdominal segments, and sparsely scattered over thorax. Simple pores slightly smaller than trilocular pores or the same size, moderately numerous over entire surface. Setae moderately long and fine.

Dorsum. Multilocular disc pores and oral collar tubular ducts absent. Oral rim tubular ducts absent or as on venter. Trilocular pores, simple pores, and setae as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, AK, Rangitoto Island, in moss (bulk sample 72/161), 4 June 1972, J.C. Watt ("77-221c J.M.C.") (NZAC). **Paratype**: adult female alone on slide, AK, Huia Dam, under stone with ants, 1 May 1981, C.F. Butcher ("81-127b") (BMNH).

Material examined. Type specimens only.

Remarks. *P. abnormalis* differs from all the other New Zealand species here placed in *Paracoccus* in the unusual nature of its cerarii, which have large concentrations of trilocular pores and sometimes appear to have flagellate auxiliary setae in the abdominal pairs.

The specific name — Latin, 'abnormal' — alludes to the unusual form of the cerarii.

Paracoccus acaenae new species

Figure 75

Appearance of live females not known.

Body rotund at maturity; length (mounted) 1.4–2.6 mm, width 1.0–2.3 mm. Legs of moderate size; hind trochanter + femur 0.22–0.33 mm long; hind tibia + tarsus 0.26–0.33 mm long; translucent pores present on hind coxae only. Circulus round, 0.01–0.02 mm wide. Ostioles distinct; lips each with 20–30 trilocular pores and 1–4 setae. Cerarii numbering 18 pairs; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 2–5 long, fine auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas; abdominal cerarii each with 2 conical setae and 8–16 trilocular pores; cephalic and thoracic cerarii each with 2–5 conical setae and 10–20 trilocular pores.

Venter. Multilocular disc pores present on median areas only, around vulva, and in rows across posterior edges of abdominal segments V and VI. Trilocular pores evenly distributed. Oral rim

tubular ducts small, scattered over median areas of head, thorax, and abdominal segments I–III, and in marginal groups on abdominal segments III–VII. Oral collar tubular ducts sparsely in rows across median areas of abdominal segments IV–VIII. Simple pores almost as large as trilocular pores, numerous over entire venter. Setae moderately long and stout.

Dorsum. Multilocular disc pores and tubular ducts absent. Trilocular pores evenly distributed. Simple pores slightly larger than trilocular pores, numerous over entire dorsum. Setae short, stout, sometimes almost lanceolate.

Type data. Holotype: adult female, upper specimen of 2 on slide (ringed on coverslip, and position shown on label), New Zealand, NN, Motueka, Stanley Brook, on *Acaena* sp., 2 January 1933, G. Brittin ("225") (NZAC). **Paratypes**: 12 adult females on 6 slides (including holotype slide), same data as holotype (BMNH, NZAC).

Material examined. Type series, plus 37 non-type adult females (BMNH, NZAC).

HB, RI / NN, BR.

Collected in January, February, May, August, and November.

Taken from roots of *Acaena* sp., *A. anserinifolia*, and *A. sanguisorba* (Rosaceae).

Remarks. *P. acaenae* can be distinguished from the other known New Zealand species of *Paracoccus* by the combination of 18 pairs of cerarii, a small, round circulus, and numerous large, simple pores.

Paracoccus albatus new species

Figures 76 and 77

Live females dark purplish brown, covered with powdery white wax extending into several short filaments at both ends of body.

Body outline oval; length (mounted) 1.7–3.5 mm, width 0.9–2.1 mm. Legs somewhat stout, epecially in small specimens; hind trochanter + femur 0.23–0.43 mm long; hind tibia + tarsus 0.24–0.45 mm long; translucent pores present on hind coxae and tibiae. Circulus small, usually round or oval, sometimes quadrate in larger specimens, 0.02–0.12 mm wide. Ostioles distinct; lips each with 5–20 trilocular pores and 1–5 setae. Cerarii numbering 18 pairs, often some of them indistinct; anal lobe cerarii on sclerotised areas, each with 2 conical setae (rarely 3 or 4), 3–7 moderately short, fine auxiliary setae, and a concentration of trilocular pores; remaining cerarii sometimes on small sclerotised areas; abdominal cerarii each with 2 conical setae (rarely 3 or 4) and 3–16 associated trilocular pores; cerarii on head and thorax each with 2–5 slender conical setae and 4–12 associated trilocular pores.

Venter. Multilocular disc pores present around vulva and sometimes in a row across posteromedian edge of abdominal segment VI. Triloculars pores evenly distributed. Oral rim tubular ducts slender, larger towards anterior of body, in marginal groups around entire venter; rims frequently indistinct; oral collar tubular ducts sparsely in rows across median areas of abdominal segments V–IX. Simple pores about half the size of trilocular pores, sparsely scattered over entire venter. Setae fine, moderately long.

Dorsum. Multilocular disc pores and tubular ducts absent. Trilocular pores generally evenly distributed, sometimes aggregated around bases of larger abdominal setae. Simple pores as on venter. Setae short, stout, those on median areas of abdominal segments VI and VII sometimes nearly as large as abdominal cerarian setae and with a few trilocular pores concentrated around their bases.

Type data. Holotype: adult female, right-hand specimen of 3 on slide (ringed on coverslip, and position shown on label), New Zealand, WD, Makoroa, under sooty mould on *Coprosma parviflora*, 2 February 1983, J.M. Cox ("231") (NZAC). **Paratypes**: 9 adult females on 3 slides (including holotype slide), same data as holotype (BMNH, NZAC); 35 adult females on 8 slides, SL, Catlins Forest Park, on twigs and under sooty mould on *Coprosma parviflora*, 30 Jan 1983, J.M. Cox ("216") (BMNH, NZAC, USNM).

Material examined. Type series, plus 51 non-type adult females (BMNH, NZAC, USNM).

— / NN, BR, WD, MC, SL / SI.

Collected in January–April and October–December.

Taken from *Cassinia* sp., *C. vauvilliersi*, and *Senecio reinoldii* (Asteraceae), *Coprosma* sp., *C. lucida*, *C. parviflora*, and *C. spathulata* (Rubiaceae), *Hoheria angustifolia*, *H. populnea*, *Plagianthus betulinus*, and *P. divaricatus* (Malvaceae), *Myrsine* sp. (Myrsinaceae), *Podocarpus nivalis* (Podocarpaceae), *Ripogonum scandens* (Smilacaceae), and *Rubus australis* (Rosaceae). Occurring on twigs and under sooty mould.

Remarks. *P. albatus* is very variable, particularly in the degree of aggregation of trilocular pores around the bases of dorsal setae. Some specimens, including the holotype, have no such aggregations,

while in others (Figure 77) they are very pronounced. *P. albatus* resembles *P. hebes* in its disposition of multilocular disc pores and tubular ducts, form of dorsal setae, and size and shape of circulus, but differs in having only two conical setae in most of the abdominal cerarii (*hebes* has from three to six in each). Both species are similar to *P. aspratilis*, which differs in lacking a circulus.

The specific name — Latin, 'clothed in white' — alludes to the powdery wax covering.

Paracoccus aspratilis new species

Figure 78

Live females dark purple, covered with a thin layer of powdery white wax.

Body outline elongate-oval to oval; length (mounted) 1.4–3.1 mm, width 0.9–2.4 mm. Legs somewhat stout; hind trochanter + femur 0.18–0.31 mm long; hind tibia + tarsus 0.17–0.31 mm long; translucent pores present on hind coxae and tibiae. Circulus absent. Ostioles distinct; lips each with 5–15 trilocular pores and 0–4 setae. Cerarii numbering 4–18 pairs; anal lobe cerarii on sclerotised areas, each with 2 stout, conical setae (occasionally 3 or 4), 3–7 moderately long, fine auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas; abdominal cerarii each with 2 conical setae (rarely 1 or 3) and 2–8 associated trilocular pores; cephalic and thoracic cerarii (if present) each with 1–5 slender conical setae and 2–10 associated trilocular pores.

Venter. Multilocular disc pores present on median areas only, around vulva, usually in rows across posterior edges of abdominal segments V and VI, and sometimes a few on segment IV. Trilocular pores evenly distributed. Tubular ducts of several forms: slender ducts in marginal groups around entire venter, more numerous towards anterior of body, and in small numbers on median areas of head and thorax; marginal ducts on head and thorax usually with distinct oral rims; remaining ducts with or without rims; oral collar tubular ducts small, stout, occasionally in rows across abdominal segments and scattered over median areas of thorax. Simple pores about one-third the size of trilocular pores, scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores and tubular ducts absent. Trilocular pores evenly distributed. Simple pores about half the size of trilocular pores, scattered over entire dorsum. Setae short, stout, frequently almost lanceolate, those on median areas of abdominal segments VI and VII sometimes almost as large as cerarian setae.

Type data. Holotype: adult female alone on slide, New Zealand, FD, Homer Tunnel, on small plant, 28 January 1983, J.M. Cox ("203") (NZAC). **Paratypes**: 6 adult females on 3 slides, NN, Mt Arthur, on *Hebe coarctata*, 3 Feb 1981, C.F. Butcher (BMNH, NZAC).

Material examined. Type specimens, plus 46 non-type adult females (BMNH, FRNZ, NZAC, USNM).

TK / NN, NC, WD, MK, OL, FD, SL.

Collected in January, February, April, May, and November.

Taken from *Coprosma* sp., *C. cheesemanii*, *C. parviflora*, *C. pseudocuneata*, and *C. serrulata* (Rubiaceae), *Hebe* sp., *H. coarctata*, and *H. propinqua* (Scrophulariaceae).

Remarks. *P. aspratilis* is very variable, and this may make it difficult to identify. The most useful characters for its recognition are the absence of a circulus, dorsal setae short and stout, frequently almost lanceolate, multilocular disc pores few in number, and slender tubular ducts numerous around entire margin of venter, at least some of them with visible oral rims. The apparent lack of oral rims on any tubular ducts in some specimens may cause them to be misidentified as *Crisicoccus*. Most of the tubular ducts in each type specimen have distinct oral rims. The numbers of cerarii and multilocular disc pores are also variable, smaller specimens generally having fewer of each. Small oral collar tubular ducts are absent from the abdominal venter of most specimens, but were observed in two large specimens. The number and form of the setae making up the cerarii are also variable, the type specimens having only two conical setae in each abdominal cerarius, while some other specimens have three or four setae in each. There is also considerable variation in the degree of stoutness of both cerarian and dorsal setae.

Despite this observed variation, all the material referred to above has been placed in *P. aspratilis*, although further investigation may indicate the existence of a species complex.

The specific name — Latin, 'rough' — alludes to the stout dorsal setae.

Paracoccus butcherae new species

Figure 79

Appearance of live females not known.

Body outline elongate-oval; length (mounted) 1.5–1.8 mm, width 0.7–0.8 mm. Legs of moderate size; hind trochanter + femur 0.26–0.29 mm long; hind tibia + tarsus 0.28–0.30 mm long; translucent pores

present on hind coxae and tibiae. Ostioles distinct; lips each with 10–25 trilocular pores and 2–5 setae. Circulus absent. Cerarii numbering 6 or 7 pairs, all on abdomen; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 6–8 long, fine auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 slender conical setae or stout flagellate setae and 5–10 associated trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posteromedian margins of abdominal segments III–VII and anteromedian margins of segments IV–VII, marginally in groups on segments V–VIII, and scattered over thorax. Trilocular pores evenly distributed. Oral rim tubular ducts absent. Oral collar tubular ducts of 2 sizes, occurring together in rows across median areas and margins of abdominal segments II–VIII, and sometimes also across margins of segment I. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts numbering 1 or 2 on either side of head, thoracic, and abdominal segments, and singly on midline of thoracic segments. Oral collar tubular ducts absent. Simple pores not apparent. Setae generally long and slightly stout, but those on median areas of abdominal segments VI and VII distinctly conical.

Type data. **Holotype**: adult female alone on slide, New Zealand, NN, Mt Arthur, on *Dracophyllum* sp., 4 February 1982, C.F. Butcher ("82-127b") (NZAC). **Paratypes**: 6 adult females on 3 slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens only.

Remarks. *P. butcherae* is similar to *P. definitus* and *P. leptospermi* in lacking a circulus and having oral rim tubular ducts on the dorsum. It differs from *P. leptospermi* in having multilocular disc pores on the thorax and anterior abdominal segments, and from *P. definitus* in lacking oral rim tubular ducts on the dorsomedian areas of the abdomen.

This species is named for Clare F. Butcher, who collected all the known specimens, and who kindly made available much of the material examined during this study.

Paracoccus canalis (Brittin) new combination

Figure 80

canalis Brittin, 1938: 343 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

zealandicus Brittin, 1938: 346 (*Trionymus*). de Boer, 1967b: 141 (*Spilococcus*). Wise, 1977: 102 (*Spilococcus*). **New synonymy.**

Live adult female "short ovate, dark-red turning purple on maceration in caustic potash" (Brittin 1938).

Body outline elongate oval to broadly oval; length (mounted) 1.4–3.9 mm, width 0.7–2.5 mm. Legs of moderate size; hind trochanter + femur 0.35–0.40 mm long; hind tibia + tarsus 0.37–0.43 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, 0.11–0.16 mm wide. Ostioles distinct; lips each with 20–35 trilocular pores and 4–6 setae. Cerarii numbering 7 pairs, all on abdomen; anal lobe cerarii on sclerotised areas, each with 2 slender conical setae, 5–10 long, fine auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 slender conical setae or stout flagellate setae and 6–10 associated trilocular pores.

Venter. Multilocular disc pores numerous over entire venter, in broad bands across abdominal segments. Trilocular pores evenly distributed. Oral rim tubular ducts in groups of 1–5 on either side of head, thoracic, and abdominal segments. Oral collar tubular ducts numerous over entire venter, in rows across abdominal segments. Simple pores about half the size of trilocular pores, scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores scattered over entire dorsum, variable in number, sometimes very sparse, sometimes forming rows across segments. Trilocular pores evenly distributed. Oral rim tubular ducts numerous over entire dorsum, in rows of up to 12 across body. Oral collar tubular ducts absent. Simple pores not apparent. Setae long, very fine.

Type data. *Trionymus canalis* Brittin. **Lectotype** (here designated): adult female, right-hand specimen of 2 on slide (position shown on label and on coverslip), New Zealand, BR, Maruia, on *Discaria*, under moss with ants, 11 December 1935, G. Brittin ("264") (NZAC). **Paralectotypes**: 4 adult females on 4 slides (including lectotype slide), same data as lectotype (NZAC).

Trionymus zealandicus Brittin. **Lectotype** (designated by de Boer 1967b): adult female alone on slide, New Zealand, WD, Otira, on unknown plant [not on slide; from published description], 30 December 1915, G. Brittin ("99") (NZAC).

Material examined. Type specimens listed above, plus 21 non-type adult females (BMNH, NZAC).

— / NN, BR, WD.

Collected in January, September, and December.

Taken from *Aristotelia serrata* (Elaeocarpaceae), *Discaria* sp. (Rhamnaceae), *Eucalyptus* sp. (Myrtaceae), *Fuchsia excorticata* (Onagraceae), and *Pseudopanax anomalus* (Araliaceae).

Remarks. *P. canalis* can be distinusihed from the other known New Zealand species of *Paracoccus* by having both multilocular disc pores and oral rim tubular ducts on the dorsum.

Paracoccus cavaticus new species

Figure 81

Live females purplish brown, covered with a thin layer of powdery white wax.

Body outline oval; length (mounted) 2.4–3.1 mm, width 1.2–1.8 mm. Legs of moderate size; hind trochanter + femur 0.28–0.37 mm long; hind tibia + tarsus 0.31–0.40 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, 0.08–0.15 mm wide. Ostioles distinct; lips each with 10–30 trilocular pores and 2–7 setae. Cerarii numbering 6–8 pairs, usually 1 pair on head; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 6–9 moderately long, fine auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas; abdominal cerarii each with 1 or 2 slender conical setae or stout flagellate setae and 5–10 trilocular pores; cephalic cerarii each with 3 stout flagellate setae and 8–12 associated trilocular pores.

Venter. Multilocular disc pores present around vulva, in broad rows across posteromedian edges of abdominal segments I–VII, in single rows across anteromedian edges of segments I–VII, in single rows across anteromedian edges of segments IV–VII, and numerous on median areas of thorax and margins of all abdominal segments. Trilocular pores evenly distributed. Oral rim tubular ducts numbering 1 or 2 on either side of thoracic and abdominal segments, and in groups of 4–6 adjacent to each anterior spiracle. Oral collar tubular ducts of 2 sizes, together in rows across median areas of abdominal segments II–VII, in marginal groups on segments II–IX, an occasional pore on segment I, and sometimes a few pores scattered over median areas of thorax. Simple pores about half the size of trilocular pores, sparsely scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores usually absent, but occasionally 1–3 on median areas of abdominal segment VII. Trilocular pores evenly distributed. Oral rim tubular ducts moderately numerous over entire dorsum, in rows of up to 10 across body. Oral collar tubular ducts absent. Simple pores and setae as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, MC, Christchurch, Riccarton Bush, in cracks on trunk of *Myrsine australis*, 10 February 1983, J.M. Cox ("258") (NZAC). **Paratypes**:2 adult females on separate slides, same data as holotype (BMNH, NZAC); 1 adult female alone on slide, SL, Catlins State Forest, under bark of *Fuchsia* sp., 29 Jan 1983, J.M. Cox ("211") (BMNH).

Material examined. Type specimens, plus 2 nontype adult females (BMNH, FRNZ, NZAC).

BP / MC, SL.

Collected in January and February.

Taken from *Fuchsia* sp. (Onagraceae), *Myrsine australis* (Myrsinaceae), and *Pittosporum colensoi* (Pittosporaceae).

Remarks. *P. cavaticus* is similar to *P. deceptus* in having marginal multilocular disc pores, but differs in having numerous multilocular disc pores on the thorax (*deceptus* never has more than five there).

Paracoccus coriariae (Brittin) new combination

Figure 82

coriariae Brittin, 1938: 345 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

Live females dark purplish brown, thinly covered with powdery white wax extending into 3 or 4 pairs of short caudal filaments.

Body outline oval to broadly oval; length (mounted) 3.6–5.0 mm, width 2.3–2.9 mm. Legs of moderate size; hind trochanter + femur 0.37–0.39 mm long; hind tibia + tarsus 0.39–0.41 mm long; translucent pores present on hind coxae and tibiae. Circulus large, quadrate or hourglass-shaped, 0.12–0.17 mm wide. Ostioles distinct; lips each with 25–40 trilocular pores and 2–5 setae. Cerarii numbering 3–5 pairs, all on abdomen; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 4–8 long, fine auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 slender conical setae; anterior pairs of cerarii with somewhat flagellate setae, and 4–8 associated trilocular pores.

Venter. Multilocular disc pores present on median areas only, around vulva, in rows across posterior edges of abdominal segments IV–VI and anterior edges of segments VI and VII, and in groups on thorax. Trilocular pores evenly distributed. Oral rim tubular ducts in groups of 1–3 adjacent to each spiracle. Oral collar tubular ducts of

2 sizes, the smaller ducts in rows across median areas of abdominal segments I–IX, the larger ones in rows across median areas of abdominal segments I–VIII, scattered over median areas of head and thorax, and in large marginal groups on thorax and abdomen. Simple pores about half the size of trilocular pores, sparsely scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts moderately numerous over entire dorsum, in rows of up to 9 across body. Oral collar tubular ducts absent. Simple pores and setae as on venter.

Type data. Location of type specimens not known. Type data given by Brittin (1938) as "New Zealand, Aramoho [Wanganui, WI], on roots of *Coriaria* sp.".

Brittin (1938) stated that the type slides of *Trionymus coriariae* were in the possession of Dr D. Miller, but these slides cannot now be located. Brittin gives a fairly detailed description which agrees well with specimens subsequently collected from the roots of *Coriaria arborea* at Kinleith (BP–TO) in size, body shape, number of cerarii, presence of a large group of translucent pores on each hind coxa, multilocular disc pores in rows across abdominal segments, and presence of large (i.e., oral rim) tubular ducts. It differs only in the number of conical setae in each of the anal lobe cerarii — three in Brittin's description and two in the Kinleith specimens. However, a group of three conical setae in an anal lobe cerarius is usually encountered only in aberrant specimens of species which otherwise normally have two conical setae in this position.

Material examined. 5 non-type adult females (BMNH, NZAC).

AK, BP–TO / —.

Taken in June.

Collected from *Avicennia resinifera* (Avicenniaceae), *Coriaria* sp., and *Coriaria arborea* (Coriariaceae).

Remarks. *P. coriariae* is similar to *P. deboerae* in its large, quadrate or hourglass-shaped circulus and multilocular disc pores on the thoracic venter, but differs in having numerous marginal oral collar tubular ducts (absent in *P. deboerae*).

Paracoccus cryptus new species

Figure 83

Live females orange with a purple median stripe, lightly covered with powdery white wax extending into several fine caudal filaments.

Body outline oval to broadly oval; length (mounted) 2.6–4.6 mm, width 1.3–2.6 mm. Legs of moderate size; hind trochanter + femur 0.34–0.48 mm long; hind tibia + tarsus 0.37–0.44 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, 0.10–0.18 mm wide. Ostioles distinct; lips each with 10–20 trilocular pores and 1–4 setae. Cerarii numbering 8–10 pairs, 2 pairs on head, remainder on posterior abdominal segments; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 7–10 fine, moderately long auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 or 3 setae which are conical in abdominal cerarii and flagellate in cephalic cerarii, and 6–11 associated trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posteromedian edges of abdominal segments V–VII and anteromedian edge of segment VII, and occasionally a single pore on one margin or both of segment VII. Trilocular pores evenly distributed. Oral rim tubular ducts singly on either side of most abdominal segments, and a few on margins of head and thorax. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows on median areas of abdominal segments IV–VII, the larger ones in rows on median areas of segments III–VI, in marginal groups on segments V–VIII, and sometimes a few on thoracic margins adjacent to anterior coxae. Simple pores about half the size of trilocular pores, scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts slightly larger than on venter, moderately numerous over entire dorsum, in rows of up to 7 across body. Oral collar tubular ducts absent. Simple pores and setae as on venter.

Type data. Holotype: adult female, right-hand specimen of 2 on slide (ringed on coverslip, and position shown on label), New Zealand, SL, Bluecliffs near Tuatapere, under bark of *Olearia avicenniaefolia*, 28 January 1983, J.M. Cox ("194") (NZAC). **Paratypes**: 7 adult females on 4 slides (including holotype slide), same data as holotype (BMNH, NZAC).

Material examined. Type specimens, plus 9 non-type adult females (BMNH, NZAC).

— / NN, BR, WD, SL.

Collected in January and February.

Taken from under bark of *Griselinia* sp. (Griseliniaceae), *Hebe* sp. (Scrophulariaceae), *Olearia* sp., *O. avicenniaefolia*, and *Senecio hectori* (Asteraceae).

Remarks. *P. cryptus* is similar to *P. insolitus* in having more than six pairs of cerarii, including some on the head and thorax, while having multilocular disc pores confined to the median areas of the abdominal venter. It can be distinguished by the presence of 0–3 oral collar tubular ducts adjacent to each anterior coxa (total for both sides 0–4 ducts), whereas *P. insolitus* has 5–30 ducts in each of these positions (total for both sides 11–60 ducts).

The specific name — Latin, 'concealed' — alludes to the subcortical habitat of the specimens examined.

Paracoccus deboerae new species

Figure 84

Appearance of live females not known.

Body outline broadly oval; length (mounted) 2.5–4.0 mm, width 1.5–2.5 mm. Legs of moderate size; hind trochanter + femur 0.28–0.38 mm long; hind tibia + tarsus 0.29–0.48 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, 0.10–0.16 mm wide. Ostioles distinct; lips each with 15–35 trilocular pores and 2–5 setae. Cerarii numbering 3–5 pairs, all on posterior abdominal segments; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 4–6 moderately long, fine auxiliary setae, and an associated concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 slender conical setae and 4–7 associated trilocular pores.

Venter. Multilocular disc pores present on median areas only, around vulva, in rows across posterior margins of abdominal segments IV–VII and anterior margin of segment VII, a few on segments II and III, and moderately numerous on thorax. Trilocular pores evenly distributed. Oral rim tubular ducts absent. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of abdominal segments IV–VII, the larger ones sparsely scattered over median areas of thorax and abdominal segments II and III and in marginal groups on abdominal segments I–VIII. Simple pores about half the size of trilocular pores, scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts moderately numerous over entire dorsum, in rows of up to 9 across body. Oral collar tubular ducts absent. Simple pores and setae as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, NN, Takaka Hill, on *Hoheria populnea*, 5 January 1968, J.A. de Boer ("321 ") (NZAC). **Paratypes**: 2 adult females on separate slides, AK, Huia, on *Clematis paniculata*, 3 Jul 1968, B.M. May ("898") (BMNH, NZAC); 1 adult female with 2 non-type immatures on slide, Punakaiki, BR, host not specified, 12 Sep 1972, V.F. Eastop ("22/77") (BMNH).

Material examined. Type specimens, plus 1 non-type adult female (BMNH, NZAC).

AK / NN, BR, SL.

Collected in January, February, July, and September.

Taken from *Clematis paniculata* (Ranunculaceae) and *Hoheria populnea* (Malvaceae), and by beating *Coprosma* and *Muehlenbeckia*.

Remarks. *P. deboerae* resembles *P. coriariae* and *P. parvicirculus* in having multilocular disc pores on the thoracic venter, but can be distinguished by its lack of marginal groups of oral collar tubular ducts on the prothorax.

This species is named for Miss J.A. de Boer, who collected the holotype and many other specimens included in this study.

Paracoccus deceptus new species

Figure 85

Live females brown, with 2 darker longitudinal lines, thinly covered with powdery white wax extending into several short lateral filaments around abdomen.

Body outline oval; length (mounted) 1.6–2.9 mm, width 0.9–1.6 mm. Legs of moderate size; hind trochanter + femur 0.28–0.32 mm long; hind tibia + tarsus 0.32–0.35 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, 0.09–0.14 mm wide. Ostioles distinct; lips each with 10–30 trilocular pores and 2–6 setae. Cerarii numbering 7–10 pairs, 2 or 3 pairs on head and thorax, the remainder on posterior abdominal segments; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 4–6 moderately long, fine auxiliary setae, and an associated concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 setae, slender conical in abdominal cerarii and stout flagellate in cephalic and thoracic cerarii, and 5–8 associated trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posteromedian edges of abdominal segments IV–VII and anteromedian edges of segments VI and VII, in marginal groups on segments IV–VIII, and an occasional pore on median areas of thorax. Trilocular pores evenly distributed. Oral rim tubular ducts singly on either side of most abdominal segments, in small groups adjacent to anterior spiracles, and an occasional

duct on head. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of abdominal segments III–VIII, the larger ones in rows across median areas of segments III–V and in marginal groups on segments III–VIII. Simple pores about half the size of trilocular pores, sparsely scattered over entire venter. Setae long, moderately fine.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts slightly larger than on venter, moderately numerous over entire dorsum, in rows of up to 7 across body. Oral collar tubular ducts absent. Simple pores and trilocular pores as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, BR, Reefton, on twigs of *Gaultheria rupestris*, 8 February 1983, J.M. Cox ("246") (NZAC). **Paratypes**: 1 adult female alone on slide, same data as holotype (BMNH).

Material examined. Type specimens, plus 3 non-type adult females (BMNH, NZAC).

— / NN, BR.

Collected in January, February, and July.

Taken from *Coprosma* sp. (Rubiaceae), *Fuchsia excorticata* (Onagraceae), and *Gaultheria rupestris* (Ericaceae).

Remarks. *P. deceptus* is similar to *P. podocarpi* and *P. cavaticus* in having multilocular disc pores on the margins of the abdominal venter but lacking them on the dorsum. It can be distinguished from *P. podocarpi* by the much greater size of its oral rim tubular ducts, and from *P. cavaticus* by its less numerous multilocular disc pores on the thorax.

The specific name — Latin, 'deceiving' — alludes to the close similarity of this species to *P. cavaticus*.

Paracoccus definitus new species

Figure 86

Appearance of live females not known.

Body outline elongate oval to oval; length (mounted) 2.7–3.1 mm, width 1.2–1.4 mm. Legs of moderate size; trochanter + femur 0.29–0.31 mm long; hind tibia + tarsus 0.33–0.35 mm long; translucent pores present on hind coxae and tibiae. Circulus absent. Ostioles distinct; lips each with 7–15 trilocular pores and 0–3 setae. Cerarii numbering 4 pairs, all on abdomen; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 4–6 moderately long, fine auxiliary setae, and a concentration of trilocular pores; remaining cerarii each with 2 conical setae and 7–10 trilocular pores, only the penultimate cerarii on small sclerotised areas.

Venter. Multilocular disc pores almost entirely confined to median areas (although sometimes a few on margins of abdominal segments VI and VII), around vulva, in rows across posteromedian edges of abdominal segments IV–VI and on anteromedian edges of segments VI and VII, and a few scattered over median areas of thorax and abdominal segments I–III. Trilocular pores evenly distributed. Oral rim tubular ducts absent. Oral collar tubular ducts of 2 sizes, both in rows across median areas of abdominal segments III–VII, the larger ducts also in marginal groups around entire venter. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts moderately numerous over entire dorsum, in rows of up to 6 across body. Oral collar tubular ducts absent. Simple pores and setae as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, NC–WD, Arthur's Pass, on *Dracophyllum* sp., 23 October 1967, J.A. de Boer ("257") (NZAC). **Paratypes**: 2 adult females on separate slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens only.

Remarks. *P. definitus* is similar to *P. parvicirculus* in its distribution of multilocular disc pores and oral collar tubular ducts, but it lacks a circulus and has fewer oral rim tubular ducts on the dorsum. It differs from the other three New Zealand species of *Paracococcus* which lack circuli — *P. aspratilis*, *P. butcherae*, and *P. leptospermi* — in having oral rim tubular ducts on the median areas of the dorsum.

The specific name alludes to its definite relationship with other members of this genus within New Zealand.

Paracoccus drimydis (Brittin) new combination

Figure 87

drimydis Brittin, 1938: 336 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

Live females green, thinly covered with fine white wax.

Body outline elongate-oval to broadly oval; length (mounted) 2.1–3.7 mm, width 1.3–2.5 mm. Legs of moderate size; hind trochanter + femur 0.28–0.37 mm long; hind tibia + tarsus 0.29–0.37 mm long; translucent pores present on hind coxae and tibiae. Circulus large, hourglass-shaped with an irregular outline, 0.22–0.36 mm wide. Ostioles distinct; lips

each with 12–25 trilocular pores and 3–5 setae, except anteriormost lips, which have 3–8 trilocular pores and no setae. Cerarii on sclerotised areas, distinct only on anal lobes, each with 2 slender conical setae, 1 or 2 short, fine auxiliary setae, and a concentration of trilocular pores; some indication on the head of aggregation of slightly stouter setae into incipient cerarii.

Venter. Multilocular disc pores present around vulva and in rows across posteromedian edges of abdominal segments V and VI. Trilocular pores evenly distributed. Tubular ducts of various forms and sizes; small oral collar tubular ducts in rows across abdominal segments IV–VII; larger oral collar tubular ducts in marginal groups on abdominal segments IV–VII; slender ducts, larger towards anterior of body and usually with distinct oral rims, numerous marginally on thorax and abdominal segments I–VI and on median areas of head, thorax, and abdominal segments I and II. Simple pores about half the size of trilocular pores, sparsely scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores numerous on median areas of abdominal segments V–VIII and in a submarginal band down either side of thorax and abdominal segments I–III. Trilocular pores evenly distributed. Oral rim tubular ducts absent. Oral collar tubular ducts of 2 forms, the small, stout ducts moderately numerous over median areas of abdominal segments VI–VIII and margins of segments VI–VIII, the small, slender ones in a marginal band down either side of thorax and abdominal segments I–VII. Simple pores as on venter. Setae short, stout, frequently almost lanceolate.

Type data. Lectotype (here designated): adult female alone on slide, New Zealand, MC, Riccarton Bush, on *Drimydis [Pseudowintera] colorata*, 2 December 1916, G. Brittin ("104") (NZAC).

Material examined. Lectotype, plus 37 non-type adult females (BMNH, NZAC).

— / SD, NN, BR, WD, MC.

Collected in January, February, November, and December.

Taken from *Gaultheria rupestris* (Ericaceae), *Hymenanthera obovata*, *Melicytus micranthus*, and *M. ramiflorus* (Violaceae), *Pseudowintera colorata* (Winteraceae), and *Weinmannia racemosa* (Cunoniaceae).

Remarks. *P. drimydis* can be distinguished from all other known New Zealand species of *Paracoccus* by its marginal bands of multilocular disc pores and the oral collar tubular ducts on the dorsum.

Paracoccus glaucus (Maskell) new combination

Figure 88

glaucus Maskell, 1879: 219 (*Dactylopius*). Maskell, 1884: 139 (*Dactylopius*). Maskell, 1887: 100 (*Dactylopius*). Fernald, 1903: 102 (*Pseudococcus*). Wise, 1977: 102 (*Pseudococcus*).

morrisoni Brittin, 1938: 338 (*Trionymus*). Williams & de Boer, 1973: 236 (*Paracoccus*). Wise, 1977: 102 (*Paracoccus*). **New synonymy**.

Live females pale green or orange, with a darker line down midline, lightly covered with powdery white wax extending into fine filaments at anterior and posterior ends of body.

Body outline oval to broadly oval; length (mounted) 1.2–2.9 mm, width 0.7–2.0 mm. Legs of moderate size; hind trochanter + femur 0.25–0.37 mm long; hind tibia + tarsus 0.25–0.38 mm long; translucent pores present on hind coxae and tibiae. Circulus very large, hourglass-shaped, 0.20–0.33 mm wide. Ostioles distinct; lips each with 6–13 trilocular pores and 1–4 setae. Cerarii numbering 5–15 pairs, at least 1 pair on head; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 4 or 5 slender auxiliary setae, a concentration of trilocular pores, and a few simple pores; cephalic cerarii numbering 1–3 distinct pairs, often on sclerotised areas, each cerarius with 2–4 conical setae, 3–10 trilocular pores, and 0–2 simple pores; remaining cerarii not on sclerotised areas, each with 1 or 2 conical setae, 2–7 trilocular pores, and 0–2 simple pores.

Venter. Multilocular disc pores present around vulva and in a row across posteromedian edge of abdominal segment VI. Trilocular pores evenly distributed. Oral collar tubular ducts sometimes of 2 forms; slender ducts in rows across median areas of abdominal segments IV–VII and sometimes also on segments VIII and IX; sometimes stouter ducts in marginal groups on posterior edges of segments VI and VII. Oral rim tubular ducts small, slender, larger towards anterior of body, numerous marginally around entire venter and on median areas of head, thorax, and abdominal segments I–IV, but usually absent from median areas of segments V–IX. Simple pores about one-third the size of trilocular pores, sparsely scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores and tubular ducts absent. Trilocular pores evenly distributed. Simple pores as on venter. Setae short, stout, frequently almost lanceolate.

Type data. *Dactylopius glaucus* Maskell. **Neotype** (here designated): adult female alone on slide, subsequently mounted from Maskell's dry material ("79") (NZAC).

Trionymus morrisoni Brittin. **Lectotype** (designated by Williams & de Boer 1973): adult female, left-hand specimen of 2 on slide, New Zealand, [NN], Motueka, on *Alectryon excelsum* [host data not on slide, from published data], 9 November 1937, G. Brittin ("314") (NZAC). **Paralectotype**: adult female on same slide as lectotype.

P. glaucus was first described in a paper read before the Philosophical Institute of Canterbury on 6 June 1878 (Maskell 1879). Maskell recorded specimens from *Pittosporum eugenioides* and *Rubus australis*, but there are only two slides labelled *Dactylopius glaucus* and dated prior to 6 June 1878 in Maskell's collection. These slides contain three immature, poorly prepared specimens whose host is indicated as being *Pittosporum*. The subsequent slides in Maskell's collection contain two separate species, *P. glaucus* and *Sarococcus comis*, which is apparently specific to *Nothofagus*. This *Nothofagus*-feeding species has frequently been misidentified as *P. glaucus*. In order to prevent confusion between these two species it has been necessary to designate a neotype of *Dactylopius glaucus*. None of the three immature specimens are suitable for this purpose as they would not allow distinction between *P. glaucus* and the very similar *P. zealandicus*.

Material examined. Type specimens listed above, plus 87 non-type adult females (BMNH, NZAC, USNM).

ND, AK, CL, WO, TO, RI, WI, WN / NN, BR, WD, SL.

Collected in January–August, November, and December.

Taken from *Alectryon excelsus* and *Dodonaea viscosa* (Sapindaceae), *Alseuosmia macrophylla* (Alseuosmiaceae), *Aristotelia serrata* (Elaeocarpaceae), *Avicennia resinifera* (Avicenniaceae), *Carpodetus serratus* (Escalloniaceae), *Citrus paradisi* (Rutaceae), *Coprosma australis*, *C. colensoi*, *C. crassifolia*, and *C. polymorpha* (Rubiaceae), *Hedycarya arborea* (Monimiaceae), *Hoheria* sp. (Malvaceae), *Lycopodium billardieri* (Lycopsida), *Macropiper excelsum* (Piperaceae), *Melicytus ramiflorus* (Violaceae), *Neomyrtus* sp. (Myrtaceae), *Phormium tenax* (Agavaceae), *Pittosporum* sp. (Pittosporaceae), *Pseudowintera colorata* (Winteraceae), *Ripogonum scandens* (Smilacaceae), *Rubus australis* (Rosaceae), *Schefflera digitata* (Araliaceae), *Vitex lucens* (Verbenaceae), and *Weinmannia racemosa* (Cunoniaceae). Occurring on undersides of leaves.

Remarks. See Remarks under *P. zealandicus*.

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Paracoccus hebes new species

Figure 89

Appearance of live females not known.

Body outline oval to broadly oval; length (mounted) 2.9–3.9 mm, width 2.0–2.9 mm. Legs of moderate size; hind trochanter + femur 0.32–0.34 mm long; hind tibia + tarsus 0.34–0.36 mm long; translucent pores present on hind coxae and tibiae. Circulus small, round, 0.04–0.09 mm wide. Ostioles distinct; lips each with 7–25 trilocular pores and 0–5 setae. Cerarii numbering 18 pairs; anal lobe cerarii on sclerotised areas, each with 2 large conical setae, 3–5 smaller conical or elongate-conical setae, and a concentration of trilocular pores; remaining cerarii sometimes on small sclerotised areas, each with 2–7 conical setae and 14–32 trilocular pores.

Venter. Multilocular disc pores present around vulva and in rows across posteromedian edges of abdominal segments V and VI. Trilocular pores evenly distributed. Tubular ducts slender, larger towards anterior of body, mostly with a distinct oral rim, in moderate numbers around entire margin of venter. Simple pores about half the size of trilocular pores, sparsely scattered over entire venter. Setae moderately long and fine on median areas, but moderately short and stout around margins.

Dorsum. Multilocular disc pores and tubular ducts absent. Trilocular pores generally evenly distributed, but sometimes aggregated around bases of larger setae. Simple pores about one-third the size of trilocular pores, sparsely scattered over entire dorsum. Setae short, stout, sometimes conical and almost as large as cerarian setae.

Type data. Holotype: adult female alone on slide, New Zealand, NN, Mt Arthur, on *Hebe coarctata*, 3 February 1981, C.F. Butcher (NZAC). **Paratypes**: 4 adult females on 3 slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens only.

Remarks. See Remarks under *P. albatus*.

The specific name alludes to the generic identity of the type host.

Paracoccus insolitus (Brittin) new combination

Figure 90

insolitus Brittin, 1938: 341 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).

Live females described by Brittin (1938) as being

"dark-red, covered with a thin white meal".

Body outline oval; length (mounted) 2.4–4.3 mm, width 1.3–2.4 mm. Legs of moderate size; hind trochanter + femur 0.35–0.45 mm long; hind tibia + tarsus 0.38–0.48 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, 0.11–0.16 mm wide. Ostioles distinct; lips each with 25–35 trilocular pores and 4–7 setae. Cerarii numbering 9–16 pairs, sometimes 1–3 pairs on head and thorax and remainder on abdominal segments; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 7–10 moderately long, fine auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 or 3 slender conical setae or stout flagellate setae and 8–15 associated trilocular pores.

Venter. Multilocular disc pores present on median areas only, around vulva, and in rows across posterior edges of abdominal segments III–VII and anterior edge of segment VII. Trilocular pores evenly distributed. Oral rim tubular ducts singly on either side of most abdominal segments. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of abdominal segments III–VII, the larger ones sparsely scattered over head and margins of mesothorax, and in marginal groups on either side of prothorax and abdominal segments I–VIII. Simple pores about half the size of trilocular pores, scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts singly next to each cerarius and on midline of abdominal segments II–V, and scattered over head and thorax. Oral collar tubular ducts absent. Simple pores and setae as on venter.

Type data. **Lectotype** here designated: adult female alone on slide, New Zealand, BR, Maruia, on unknown plant, 21 November 1935, G. Brittin ("258") (NZAC).

Material examined. Lectotype, plus 4 non-type adult females (BMNH, NZAC).

TO / NN, BR.

Collected in January, September, and November.

Taken from *Griselinia* sp. and *G. littoralis* (Cornaceae), and *Nothofagus solandri* (Fagaceae).

Remarks. *P. insolitus* is similar to *P. cryptus* in having more than five pairs of cerarii, including some on the head and thorax, and multilocular disc pores confined to the median areas of the abdominal venter. It can be distinguished by the presence of 5–30 oral collar tubular ducts adjacent to each anterior coxa (total for both sides 11–60 ducts) as against 0–3 ducts in each of these positions (total for both sides 0–4 ducts) in *P. cryptus*.

Paracoccus leptospermi new species

Figure 91

Live females brownish purple, thinly covered with powdery white wax.

Body outline oval to broadly oval; length (mounted) 1.8–2.5 mm, width 1.3–1.4 mm. Legs somewhat stout; hind trochanter + femur 0.11–0.23 mm long; hind tibia + tarsus 0.22–0.26 mm long; translucent pores present on hind coxae and tibiae. Circulus absent. Ostioles distinct; lips each with 4–12 trilocular pores and 1–3 setae. Cerarii numbering 3 or 4 pairs, all on abdomen; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 3–5 moderately short, fine auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 1 or 2 slender conical setae and 3–7 associated trilocular pores.

Venter. Multilocular disc pores present around vulva, in a row across posteromedian edge of abdominal segment VI and sometimes IV and V, and on anteromedian margin of segment VII, totalling 15–40 pores. Trilocular pores evenly distributed. Oral rim tubular ducts usually absent, but occasionally 1 or 2 on thoracic margins. Oral collar tubular ducts of 2 sizes, the smaller ducts sparsely scattered over median areas of abdominal segments IV–VII, the larger ones in small marginal groups on segments VI–VIII and sometimes V. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts singly on margins of some thoracic and abdominal segments. Oral collar tubular ducts absent. Simple pores and setae as on venter.

Type data. **Holotype**: adult female alone on slide, New Zealand, SL, Catlins State Forest, under bark of *Leptospermum scoparium*, 29 January 1983, J.M. Cox ("207") (NZAC). **Paratypes**: 8 adult females on separate slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens, plus 1 non-type adult female (BMNH, NZAC).

— / NN, SL.

Collected in January.

Taken from *Leptospermum scoparium* (Myrtaceae) only.

Remarks. *P. leptospermi* resembles *P. butcherae* and *P. definitus* in lacking a circulus but having oral rim tubular ducts on the dorsum. It can be distinguished readily by having no more than 40 multilocular disc pores, which are confined to abdominal segments IV–IX. *P. butcherae* and *P.*

definitus have numerous multilocular disc pores on the thorax as well as the abdomen.

The specific name alludes to the identity of the host plant.

Paracoccus longicauda new species

Figure 92

Live females reddish purple, covered with a heavy layer of fine white wax.

Body outline turbinate; length (mounted) 2.3–3.7 mm, width 1.3–2.5 mm. Legs of moderate size; hind trochanter + femur 0.22–0.32 mm long; hind tibia + tarsus 0.23–0.33 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, 0.05–0.10 mm wide. Ostioles distinct; lips each with 7–20 trilocular pores and 1–4 setae. Cerarii on anal lobes only, on lightly sclerotised areas, each with 2 conical setae, 4–6 long, fine auxiliary setae, and a concentration of trilocular pores.

Venter. Multilocular disc pores present around vulva and in rows across posteromedian areas of abdominal segments V and VI. Trilocular pores evenly distributed. Oral rim tubular ducts absent. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows aross median areas of abdominal segments III–VII, the larger ones in rows across median areas of segments III–V and in small groups on margins of all abdominal segments. Simple pores about half the size of trilocular pores, sparsely scattered over entire venter. Setae long, moderately stout.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts moderately numerous over entire dorsum, in rows of up to 6 across body. Oral collar tubular ducts in a marginal group on either side of abdominal segment VII. Simple pores as on venter. Setae long, somewhat stout, especially those on abdominal margins.

Type data. **Holotype**: adult female alone on slide, New Zealand, AK, Waitakere Range, Scenic Drive, under bark of *Podocarpus totara*, 15 January 1983, J.M. Cox ("134") (NZAC). **Paratypes**: 10 adult females on 5 slides, same data as holotype (BMNH, NZAC, USNM).

Material examined. Type series, plus 15 non-type adult females (BMNH, NZAC, USNM).

AK / —.

Collected in January and February.

Taken from *Phyllocladus trichomanoides* and *Podocarpus totara* (Podocarpaceae).

Remarks. *P. longicauda* can be distinguished from all other New Zealand species of *Paracoccus* by its turbinate body shape and long, stout dorsal setae.

The specific name — Latin, 'long tail' — alludes to the elongate shape of the posterior portion of the body.

Paracoccus miro (de Boer) new combination

Figure 93

miro de Boer, 1967b: 138 (*Chorizococcus*). Wise, 1977: 100 (*Chorizococcus*).

Live females purplish brown, thinly covered with powdery white wax.

Body outline oval to broadly oval; length (mounted) 1.7–3.2 mm, width 0.9–2.0 mm. Legs of moderate size; hind trochanter + femur 0.22–0.42 mm long; hind tibia + tarsus 0.20–0.46 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, 0.06–0.17 mm wide. Ostioles distinct; lips each with 12–30 trilocular pores and 2–5 setae. Cerarii numbering 5 or 6 pairs, 1 pair on head, the remainder on abdomen; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 6–9 moderately long, fine auxiliary setae, and a concentration of trilocular pores; remaining abdominal cerarii not on sclerotised areas, each with 1 or 2 conical setae and 4–16 associated trilocular pores; cephalic cerarii not on sclerotised areas, each with 2 or 3 stout, flagellate setae and 5–10 associated trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posteromedian edges of abdominal segments V–VIII or VI–VIII and anteromedian edge of segment VI, 0–6 on margins of abdominal segments VI and VII, and sometimes 1 or 2 on thorax. Trilocular pores evenly distributed. Oral rim tubular ducts singly on either side of most abdominal segments and head, and in a group of 2–6 adjacent to each anterior spiracle. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of abdominal segments VI–VIII, the larger ones in rows across median areas of segments III–VI and in marginal groups on segments IV–IX. Simple pores about half the size of trilocular pores, sparsely scattered over entire surface. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts moderately numerous over entire dorsum, in rows of up to 8 across body. Oral collar tubular ducts absent. Simple pores as on venter. Setae moderately long and fine.

Type data. Holotype: adult female, left-hand specimen of 2 on slide, New Zealand, NN, Aniseed Valley, on *Podocarpus ferrugineus*, 9 December 1965, D.B. Reed (NZAC). **Paratypes**: 4 adult females, same data as holotype (NZAC).

Material examined. Type specimens, plus 31 non-type adult females (BMNH, FRNZ, NZAC).

ND, AK, WO, TO, WN / NN, WD / SI.

Collected in January–April and July–December.

Taken from *Alectryon excelsus* (Sapindaceae), *Aristotelia fruticosa* (Elaeocarpaceae), *Carpodetus serratus* (Escalloniaceae), *Cyathodes fasciculata* (Epacridaceae), *Leptospermum ericoides*, *L. scoparium*, and *Metrosideros perforata* (Myrtaceae), *Podocarpus* sp., *P. totara*, *Prumnopitys ferruginea*, and *P. taxifolia* (Podocarpaceae).

Remarks. *P. miro* is characterised by its quadrate circulus, five or six pairs of cerarii, including one pair on the head, no more than two multilocular disc pores on the thoracic venter, and lack of a marginal group of oral collar tubular ducts adjacent to each anterior coxa. Specimens collected from *Leptospermum* are generally smaller and have fewer multilocular disc pores than those from other hosts, but otherwise appear to be typical *P. miro*.

Paracoccus multiductus new species

Figure 94

Appearance of live females not known.

Body outline oval; length (mounted) 2.0–4.1 mm, width 1.0–2.6 mm. Legs typical of genus; hind trochanter + femur 0.40–0.43 mm long; hind tibia + tarsus 0.38–0.41 mm long; translucent pores present on hind coxae only. Circulus small and horizontally oval, 0.09–0.14 mm wide. Ostioles distinct; lips each with 6–20 trilocular pores and 0–2 setae. Cerarii numbering 14–18 distinct pairs; anal lobe cerarii on large sclerotised areas, each with 2 conical setae, 6–8 flagellate auxiliary setae, and a concentration of trilocular pores; remaining cerarii except for penultimate pair not on sclerotised areas, each with 2 (abdomen) or 1–3 (head and thorax) conical setae and a concentration of trilocular pores, but without auxiliary setae.

Venter. Multilocular disc pores present around vulva, in rows across abdominal segments IV–VII, and a few on segment III. Trilocular pores numerous over entire surface. Oral rim tubular ducts moderately numerous on margins of head, thorax, and anterior abdominal segments. Oral collar tubular ducts of 2 sizes, the smaller ducts sparsely in rows across median areas of abdominal segments III–VII, the larger ones moderately numerous on median areas of head, thorax, and anterior abdominal segments and around margins of anterior abdominal segments. Simple pores about one-third the size of trilocular pores, sparsely distributed over entire surface. Setae moderately long and stout.

Dorsum. Multilocular disc pores sparse, confined to abdominal segments. Trilocular pores and simple pores as on venter. Oral collar tubular ducts the same size as larger ducts on venter, moderately numerous over entire dorsum, in rows across abdominal segments. Setae moderately short and stout, with slightly enlarged bases.

Type data. Holotype: adult female, left-hand specimen of 3 on slide (ringed on coverslip, and position shown on label), New Zealand, NN, Mt Arthur, about 3000 ft [900 m], on *Dracophyllum* sp., 4 February 1982, C.F. Butcher (NZAC). **Paratypes**: 11 adult females on 5 slides (including holotype slide), same data as holotype (BMNH, USNM).

Material examined. Type series, plus 7 non-type adult females (BMNH, NZAC).

— / NN, NC.

Collected in January, February, and November.

Taken from *Dracophylum* sp. and *D. traversii* (Epacridaceae).

Remarks. *P. multiductus* differs from all the other species of *Paracoccus* known from New Zealand in having numerous oral collar tubular ducts over the entire dorsum. *P. drimydis* also has dorsal oral collar tubular ducts, but these are confined to the margins.

The specific name — Latin 'many ducts' — alludes to the number of oral collar tubular ducts.

Paracoccus nothofagicola new species

Figure 95

Live females reddish purple, thinly covered with powdery white wax extending into a pair of stout caudal filaments and 1 or 2 shorter filaments at posterior end of body.

Body elongate-oval; length (mounted) 1.7–3.1 mm, width 0.9–2.0 mm. Legs frequently somewhat stout; hind trochanter + femur 0.32–0.40 mm long; hind tibia + tarsus 0.33–0.44 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate or hourglass-shaped, 0.085–0.190 mm wide. Ostioles distinct; lips each with 10–30 trilocular pores and 1–6 setae. Cerarii numbering 5 or 6 pairs, 1 pair on head, the remainder on posterior

abdominal segments; anal lobe cerarii on large sclerotised areas, each with 2 slender conical setae, 6–9 moderately long, fine auxiliary setae, a concentration of trilocular pores, and 0–3 simple pores; remaining abdominal cerarii sometimes on small sclerotised areas, each with 2 slender conical setae, 5–20 associated trilocular pores, and 0–2 simple pores; cephalic cerarii sometimes indistinct, not on sclerotised areas, each with 2 or 3 slender conical setae and 4–8 associated trilocular pores.

Venter. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts small, slender, in small numbers on median areas of head and thorax, sparsely in rows across abdominal segments and in groups of 1–7 ducts on either side of most body segments. Oral collar tubular ducts absent. Simple pores not apparent. Setae long, stout.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts in marginal groups of 1–4 around entire dorsum, and sparsely scattered over median areas of thorax and down midline of abdomen. Oral collar tubular ducts absent. Simple pores about one-third the size of trilocular pores, scattered over entire dorsum. Setae short, stout.

Type data. Holotype: adult female, left-hand specimen of 3 on slide (ringed on coverslip, and position shown on label), New Zealand, TO, on leaves and twigs of *Nothofagus* sp., 7 January 1983, J.M. Cox ("118") (NZAC). **Paratypes**: 15 adult females on 6 slides (including holotype slide), same data as holotype (BMNH, FRNZ, NZAC, USNM).

Material examined. Type series, plus 15 non-type adult females (BMNH, NZAC, FRNZ, USNM).

TO, WI / NN, NC, FD.

Collected in January–March and December.

Taken from *Nothofagus* sp., *N. solandri*, and *N. solandri* var. *cliffortioides* (Fagaceae).

Remarks. *P. nothofagicola* can be distinguished from the other known New Zealand species of *Paracoccus* by its lack of multilocular disc pores.

The specific name alludes to the affinity of this species for *Nothofagus*.

Paracoccus parvicirculus new species

Figure 96

Live females orange, covered with powdery white wax.

Body outline oval; length (mounted) 1.5–2.6 mm, width 1.0–1.9 mm. Legs of moderate size; hind trochanter + femur 0.28–0.36 mm long; hind tibia + tarsus 0.29–0.36 mm long; translucent pores present on hind coxae and tibiae. Circulus small, round or oval, 0.02–0.07 mm wide. Ostioles distinct; lips each with 25–40 trilocular pores and 4–6 setae. Cerarii numbering 7 or 8 pairs, all on abdomen; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 6–9 moderately long, fine auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 slender conical setae which become finer towards anterior of body, and 6-10 associated trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posteromedian edges of abdominal segments IV–VII and anteromedian edge of segment VII, and numbering 1–8 on median areas of thorax. Trilocular pores evenly distributed. Oral rim tubular ducts in groups of 1–3 on either side of most thoracic and abdominal segments, usually each with 1–3 associated simple pores. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across abdominal segments, the larger ones in marginal groups around entire venter and scattered over median area of thorax. Simple pores about half the size of trilocular pores, scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts moderately numerous over entire dorsum, in rows of up to 10 across body, each with 1–3 associated simple pores. Oral collar tubular ducts absent. Simple pores and setae as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, AK, Hunua Range, at base of *Morelotia affinis*, 22 February 1983, J.M. Cox ("285") (NZAC). **Paratypes**: 21 adult females on 11 slides, same data as holotype (BMNH, NZAC, USNM).

Material examined. Type species, plus 6 non-type adult females (BMNH, NZAC, USMN).

AK, WI / —.

Collected in February and June.

Taken from *Dactylanthus taylori* (Balanophoraceae) and *Morelotia affinis* (Cyperaceae).

Remarks. The combination of a small, round circulus — to which the trivial name alludes — and moderately long, fine dorsal setae distinguish *P. parvicirculus* from any other species of *Paracoccus* known from New Zealand.

Paracoccus podocarpi new species

Figure 97

Live females purplish red, covered with powdery white wax.

Body outline elongate-oval to broadly oval; length (mounted) 1.6–3.7 mm, width 0.8–2.2 mm. Legs of moderate size; hind trochanter + femur 0.23–0.34 mm long; hind tibia + tarsus 0.23–0.36 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, 0.06–0.15 mm wide. Ostioles distinct; lips each with 12–35 trilocular pores and 3–6 setae. Cerarii numbering 6–11 pairs, 1 or 2 pairs on head and thorax (these often indistinct), the remainder on posterior abdominal segments; anal lobe cerarii on sclerotised areas, each with 2 slender conical setae, 6–10 long, fine auxiliary setae, and a concentration of trilocular pores; remaining cerarii on small, lightly sclerotised areas, each with 2 or 3 setae, slender conical in abdominal cerarii and flagellate in cephalic and thoracic cerarii, and 4–7 trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posteromedian edges of abdominal segments IV–VII, and in small marginal groups on segments I–VIII. Trilocular pores evenly distributed. Oral rim tubular ducts small, singly on either side of most abdominal segments, in marginal groups of 2–7 on head and thorax, and a few on median areas of thorax. Oral collar tubular ducts of 2 sizes, the smaller ducts numerous on median areas of abdominal segments, the larger ones about the same size as oral rim tubular ducts, numerous on margins of abdomen and scattered over head and thorax. Simple pores about half the size of trilocular pores, sparsely scattered over entire venter. Setae long, moderately fine.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts the same size as on venter, moderately numerous over entire dorsum, in rows of up to 10 across body. Oral collar tubular ducts absent. Simple pores as on venter. Setae moderately short and stout.

Type data. Holotype: adult female, left-hand specimen of 2 on slide (ringed on coverslip and position shown on label), New Zealand, AK, Waitakere Range, Scenic Drive, under bark of *Podocarpus totara*, 15 January 1983, J.M. Cox ("134") (NZAC). **Paratypes**: 5 adult females on 3 slides (including holotype slide), same data as holotype (BMNH, NZAC).

Material examined. Type specimens, plus 7 nontype adult females (BMNH, NZAC).

AK / NN, BR.

Collected in January, November, and December.

Taken from *Lagrostrobos colensoi*, *Podocarpus* sp., and *P. totara* (Podocarpaceae).

Remarks. *P. podocarpi* is similar to *P. cavaticus* and *P. deceptus* in having multilocular disc pores on the margins of the abdominal venter, but lacking them on the dorsum. It can be distinguished by the smaller size of its oral rim tubular ducts, which are about the same size as the larger oral collar tubular ducts on the venter. In some specimens of *P. podocarpi* the rims of the oral rim tubular ducts are indistinct, allowing confusion with *Crisicoccus australis*.

The specific name alludes to the host family from which all known specimens have been taken.

Paracoccus redactus new species

Figure 98

Live females reddish purple, thinly covered with powdery white wax.

Body outline oval to broadly oval; length (mounted) 1.6–2.5 mm, width 0.9–1.4 mm. Legs of moderate size; hind trochanter + femur 0.28–0.31 mm long; hind tibia + tarsus 0.30–0.34 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, 0.11–0.15 mm wide. Ostioles distinct; lips each with 10–18 trilocular pores and 1–5 setae. Cerarii on anal lobes only, on sclerotised areas, each with 2 conical setae, 4–6 long, fine auxiliary setae, and a concentration of trilocular pores.

Venter. Multilocular disc pores present around vulva, in a row across posteromedian edge of abdominal segment VI, and occasionally a single pore on posteromedian edge of segment V. Trilocular pores evenly distributed. Oral rim tubular ducts moderately numerous on margins of thorax and abdomen. Oral collar tubular ducts small, sparsely in rows across median areas of abdominal segments IV–VII, and sometimes 1 or 2 larger ducts on margins of segment VII. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores evenly distributed. Oral rim tubular ducts sparsely scattered over entire dorsum. Oral collar tubular ducts absent. Simple pores and setae as on venter.

Type data. Holotype: adult female alone on slide, New Zealand, NN, Kaihoka Lakes, on *Podocarpus spicatus*, 27 December 1966, J.A. de Boer ("236") (NZAC). **Paratypes**: 4 adult females on 2 slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens, plus 8 non-type adult females (BMNH, NZAC).

— / NN, WD.

Collected in January and December.

Taken from *Prumnopitys ferruginea* and *P. taxifolia* (Podocarpaceae).

Remarks. The combination of oral rim tubular ducts on the dorsum, cerarii confined to anal lobes, and oval body shape distinguishes *P. redactus* from all other species of *Paracoccus* known from New Zealand.

The specific name — Latin, 'reduced' — alludes to the reduced numbers of cerarii.

Paracoccus zealandicus (Ezzat & McConnell) new combination

Figure 99

zealandicus Ezzat & McConnell, 1956: 21 (*Allococcus*). Wise, 1977: 100 (*Allococcus*).

Live females dark purplish brown, lightly covered with powdery white wax extending into several fine filaments at either end of body.

Body outline oval to broadly oval; length (mounted) 1.3–2.6 mm, width 0.7–1.7 mm. Legs of moderate size; hind trochanter + femur 0.22–0.33 mm long; hind tibia + tarsus 0.20–0.34 mm long; translucent pores present on hind coxae and tibiae. Circulus very large, hourglass-shaped, frequently distorted in outline, 0.14–0.29 mm wide. Ostioles distinct; lips each with 8–22 trilocular pores and 1–4 setae. Cerarii numbering 10–18 pairs; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 3–5 moderately long, fine auxiliary setae, a concentration of trilocular pores, and a few simple pores; cephalic cerarii numbering 3 or 4 pairs, frequently on sclerotised areas, each with 2–5 conical setae, 4–12 trilocular pores, and 0–2 simple pores; remaining cerarii usually not on sclerotised areas, each with 1–4 conical setae, 3–8 trilocular pores, and 0–2 simple pores.

Venter. Multilocular disc pores present around vulva, in a row across posteromedian edge of abdominal segment VI, and sometimes 1 or 2 on margins of segment VI or VII. Trilocular pores evenly distributed. Oral rim tubular ducts small, slender, larger towards anterior of body, numerous around margins of entire venter, in small numbers across median areas of abdominal segments II–IX, usually sparsely scattered over median areas of thorax. Oral collar tubular ducts generally slender, in small numbers across median areas of segments VI and VII and in marginal groups on segments VI–VIII, but sometimes stouter ducts in small marginal groups on posterior edges of abdominal segments VI and VII. Simple pores about one-third the size of trilocular pores, sparsely scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores and tubular ducts absent. Trilocular pores evenly distributed. Simple pores not apparent. Setae short, stout, frequently almost lanceolate.

Type data. Holotype: adult female, New Zealand, NN, Nelson, on *Leptospermum scoparium*, 6 June 1930, E.S. Gourlay (USNM). **Paratypes**: 2 adult females, same data as holotype (USNM).

Material examined Type specimens, plus 49 non-type adult females (BMNH, NZAC, USNM).

AK, CL, TO, BP / NN / SI.

Collected in January–March, August, November, and December.

Taken from *Avicennia resinifera* (Avicenniaceae), *Citrus* sp. (Rutaceae), *Cyathodes* sp. (Epacridaceae), *Leptospermum* sp. and *L. scoparium* (Myrtaceae), *Melicytus ramiflorus* (Violaceae), and *Nothofagus* sp. (Fagaceae).

Remarks. *P. zealandicus* is very similar to *P. glaucus*, from which it apparently differs in having more pairs of cerarii, fewer oral rim tubular ducts on the median areas of the thorax and anterior abdominal segments, and from two to five oral rim tubular ducts between the anal lobe bars (these ducts are generally absent from this position in *P. glaucus*). The two species are immediately recognisable in life, *P. zealandicus* having a dark purplish-brown body colour whereas that of *P. glaucus* is a pale, bright green, or sometimes, when collected from *Pseudowintera colorata*, a pale, bright orange. The morphological characters used here to separate the species were derived from a knowledge of the colour of many of the specimens in life. Further studies, particularly host-transfer experiments, may change this interpretation.

Genus *Paraferrisia* Williams & de Boer

Paraferrisia Williams & de Boer, 1973: 238. Type-species *Trionymus podocarpi* Brittin, 1938, by original designation and monotypy.

Body outline broadly oval. Antennae 8-segmented. Legs well developed; tarsal claws without denticles; translucent pores present on hind tibiae only. Spiracles of normal pseudococcid form. Circulus small, round, within margins of abdominal segment III.

Both pairs of ostioles distinct. Cerarii on anal lobes only, on sclerotised areas, each with 2–6 conical setae and an associated group of trilocular pores but without flagellate auxiliary setae. Anal lobe bars absent. Anal ring of normal pseudococcid form.

Multilocular disc pores present on venter only. Quinquelocular pores absent. Trilocular pores present. Large tubular ducts present on dorsum, each duct orifice surrounded by radiating lines on a sclerotised area devoid of setae. Oral rim and oral collar tubular ducts slender, on venter only. Simple pores not apparent. Setae flagellate, generally long and fine but those on dorsum of mesothorax, metathorax, and abdomen short and stout.

Remarks. The characteristic tubular ducts distinguish *Paraferrisia* from any other mealybug genus known from New Zealand. This monotypic genus is known only from New Zealand.

Paraferrisia podocarpi (Brittin)

Figure 100

podocarpi Brittin, 1938: 347 (*Trionymus*). Williams & de Boer, 1973: 238 (*Paraferrisia*). Wise, 1977: 101 (*Paraferrisia*).

Live females greyish green with a darker median stripe down posterior two-thirds of body, covered with a thin layer of powdery white wax but without visible lateral filaments. Ovisac white, elongate, up to 12 mm in length; female usually dropping off when ovisac complete.

Body outline broadly oval; length (mounted) 1.2–2.6 mm, width 0.7–1.6 mm. Legs as for genus; hind trochanter + femur 0.22–0.29 mm long; hind tibia + tarsus 0.26–0.35 mm long. Circulus as for genus, 25–40 μm wide. Ostioles distinct; lips each with 5–12 trilocular pores and 1–4 setae. Cerarii as for genus.

Venter. Multilocular disc pores in rows across posteromedian margins of abdominal segments III–VIII. Trilocular pores sparsely but evenly distributed. Oral rim tubular ducts in groups on median areas of thorax and abdominal segments I and II and on margins of abdominal segments I–VII. Oral collar tubular ducts in rows across median areas of abdominal segments III and IV and numerous on margins of segments II–VIII. Setae moderately long and fine.

Dorsum. Trilocular pores moderately numerous, evenly distributed. Tubular ducts of characteristic form for genus, numbering 1 or 2 on margins of some body segments and a few sometimes on median area of thorax. Setae on head and prothorax moderately long and fine, but short and stout over remainder of body.

Type data. Lectotype (designated by Williams & de Boer 1973): adult female alone on slide, New Zealand, NN, Motueka, on *Podocarpus dacrydioides*, 23 October 1932, G. Brittin ("135") (NZAC).

Material examined. Lectotype, plus 38 non-type adult females (BMNH, NZAC, USNM).

ND, AK, WO / NN, WD, SL.

Collected in January, February, and October.

Taken from *Dacrydium cupressinum* and *Dacrycarpus dacrydioides* (Podocarpaceae).

Remarks. The characteristic form of the large dorsal tubular ducts distinguishes *P. podocarpi* from any other known New Zealand species of mealybug. This is a common species on Podocarpaceae throughout New Zealand.

Genus *Phenacoccus* Cockerell

Phenacoccus Cockerell, 1893b: 318. Type-species *Pseudococcus aceris* Signoret, 1875, by subsequent designation (Fernald 1903, p. 89).

Paroudablis Cockerell, 1900: 87 (as subgenus of *Phenacoccus*). Type-species *Boisduvalia picae* Low, 1883, by subsequent designation (Fernald 1903, p. 890). Synonymised by Ferris (1950, p. 120).

Body outline oval. Antennae 9-segmented (rarely 8-segmented). Legs well developed; tarsal claws usually with denticles; translucent pores sometimes present on hind legs. Spiracles of normal pseudococcid form. Circuli absent or, if present, of various shapes and sizes. Both pairs of ostioles distinct. Cerarii numbering 8–18 pairs; each abdominal cerarius with 2 lanceolate setae; auxiliary setae in anal lobe cerarii only; cephalic and thoracic cerarii often with more than 2 lanceolate setae. Anal lobe bars usually absent. Anal ring of normal pseudococcid form.

Multilocular disc pores usually present on venter, present or absent on dorsum. Quinquelocular pores usually present on venter. Trilocular pores present. Oral rim tubular ducts absent. Oral collar tubular ducts usually present on both venter and dorsum. Simple pores sometimes apparent. Ventral setae flagellate; dorsal setae small, lanceolate.

Remarks. As with many pseudococcid genera, *Phenacoccus* at present probably contains many species that are not congeneric with the type-species. Williams (1985) placed several Australian species in *Phenacoccus* which required alteration of the concept of this genus to include species without quinquelocular pores but with anal lobe bars. *Phenacoccus* is largely Holarctic, but species from most parts of the world have been placed in this

genus. New Zealand has no indigenous species; the only recorded species, *P. graminicola*, is probably North American, and has also been recorded from Australia, Italy, and South Africa.

Phenacoccus graminicola Leonardi

Figure 101

graminicola Leonardi, 1908: 160 (*Phenacoccus*). Tranfaglia, 1976: 137 (*Phenacoccus*). Williams, 1985: 268 (*Phenacoccus*).

graminosus McKenzie, 1960: 717 (*Phenacoccus*). Wise, 1977: 101 (*Phenacoccus*). Synonymised by Tranfaglia (1976).

Live females pale orange, covered with a thin layer of white wax extending into 18 pairs of short lateral filaments.

Body outline elongate-oval; length (mounted) 1.4–3.5 mm, width 0.6–1.5 mm. Legs typical of genus: denticles present on tarsal claws; hind trochanter + femur 0.27–0.35 mm long; hind tibia + tarsus 0.34–0.43 mm long; hind tibiae with numerous translucent pores. Circulus within margins of abdominal segment III, irregular in outline, 0.07–0.15 mm wide. Both pairs of ostioles distinct; lips each with 4–15 trilocular pores and 0–4 setae. Cerarii numbering 18 pairs, not on sclerotised areas; anal lobe cerarii each with 2 conical setae, 3 or 4 lanceolate auxiliary setae, and a loose cluster of trilocular pores; remaining cerarii without auxiliary setae; abdominal cerarii each with 2 conical setae and 2–8 trilocular pores; cephalic and thoracic cerarii each with 2 or 3 conical setae and 2–6 associated trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posterior edges of abdominal segments III–VII and anterior margin of VII, and scattered in variable numbers over head, thorax, and anterior abdominal segments. Quinquelocular pores moderately numerous and evenly distributed over midregions of thorax and abdominal segments I–III, and in rows across anteromedian edges of segments IV–VI. Trilocular pores generally moderately numerous and evenly distributed, but absent from median areas of thorax and anterior abdominal segments. Oral collar tubular ducts in rows across abdominal segments III–VIII and sparsely scattered over thorax and anterior abdominal segments. Simple pores minute, scattered over entire surface. Setae moderately long, stout and flagellate over most of venter but small and lanceolate around margins of thorax.

Dorsum. Multilocular disc pores variable in number, in rows across abdominal segments, scattered over head and thorax. Trilocular pores moderately numerous and evenly distributed. Oral collar tubular ducts larger than on venter, sparse to moderately numerous, scattered over entire dorsum. Simple pores as on venter. Setae small, lanceolate.

Type data. *Phenacoccus graminicola* Leonardi. **Syntype** females: Italy, Cantanzaro Sala (Cantabria), on grasses (IEAN).

Phenacoccus graminosus McKenzie. **Holotype**: adult female, U.S.A., California, Berkeley, on *Lolium* sp. (UCDC).

Material examined. 23 non-type adult females from New Zealand (BMNH, NZAC).

HB / NN, CO.

Collected in January–March and October–December.

Taken from couch grass and prairie grass (Poaceae), apple [*Malus pumila*], and under bark of pear [*Pyrus communis*] (Rosaceae).

Remarks. *P. graminicola* is very variable in its numbers of multilocular disc pores and oral collar tubular ducts, but is readily identifiable as it is the only species of *Phenacoccus* known to occur in New Zealand.

Although known to feed on grasses, it is commonly found on fruit trees, especially apple, where it has the habit of settling around the stem ends of the fruits (van Geldermalsen 1962). It was initially recorded from New Zealand as *Phenacoccus* sp. (van Geldermalsen 1962), and later as *Phenacoccus graminosus* (Ward 1966).

Genus *Planococcus* Ferris

Planococcus Ferris, 1950: 164. Type-species *Dorthesia citri* Risso, 1813, by original designation.

Body outline oval to spherical. Antennae 8-segmented. Legs well developed; tarsal claws without denticles; translucent pores usually present on hind coxae and tibiae, rarely also on hind femora. Spiracles of normal pseudococcid form. Circulus usually present, usually quadrate. Both pairs of ostioles distinct. Cerarii numbering 18 pairs, some of them occasionally indistinct or absent; each cerarius usually with 2 conical setae; sometimes cephalic cerarii each with 3–5 conical setae and an associated group of trilocular pores; flagellate auxiliary setae in anal lobe cerarii only. Anal lobe bars distinct. Anal ring of normal pseudococcid form.

Multilocular disc pores present on venter, very rarely on dorsum. Quinquelocular pores absent. Trilocular pores present on both surfaces. Oral rim tubular ducts absent. Oral collar tubular ducts

present on venter, sometimes also on dorsum. Simple pores usually apparent. Setae flagellate.

Remarks. *Planococcus* is characterised by having 18 pairs of cerarii and distinct anal lobe bars, and by lacking oral rim tubular ducts. It is cosmopolitan in distribution, and three species have been recorded in New Zealand.

KEY TO SPECIES OF *PLANOCOCCUS* KNOWN FROM NEW ZEALAND

01 Multilocular disc pores present on dorsum (Fig. 103) ... ***dubius***
— Multilocular disc pores absent from dorsum ... 02

02(01) Cerarii on head and thorax distinct, each with 2 (rarely 3) stout conical setae (Fig. 102) ... ***citri***
— Cerarii on head and thorax somewhat indistinct, each with 3–5 slender conical setae (Fig. 104) ... ***mali***

Planococcus citri (Risso)

Figure 102

citri Risso, 1813: 416 (*Dorthesia*). Boisduval, 1867: 348 (*Coccus*). Signoret, 1875: 312 (*Dactylopius*). Fernald, 1903: 99 (*Pseudococcus*). Ferris, 1950: 165 (*Planococcus*).
phyllococcus Ashmead, 1879: 160 (*Lecanium*). Synonymised by Riley (1888).
destructor Comstock, 1881: 342 (*Dactylopius*). Synonymised by Penzig (1887).
calceolariae var. *minor* Maskell, 1897: 322 (*Dactylopius*). Synonymised by Morrison (1925).
citri var. *phenacocciformis* Brain, 1915: 116 (*Pseudococcus*). Synonymised by Ezzat & McConnell (1956).
citricus Ezzat & McConnell, 1956: 69 (*Planococcus*). Synonymised by Cox (1981).

Live females orange-pink, covered with powdery white wax except for a longitudinal stripe down midline, the wax extending into 18 pairs of short lateral filaments.

Body outline oval; length (mounted) 1.6–3.2 mm, width 1.0–2.0 mm. Legs typical of genus; hind trochanter + femur 0.22–0.35 mm long; hind tibia + tarsus 0.26–0.41 mm long; translucent pores present on hind coxae and tibiae. Circulus quadrate, divided by intersegmental line, 0.12–0.20 mm wide. Ostioles distinct; lips each with 6–30 trilocular pores and 1–4 setae. Cerarii distinct, usually with only 2 conical setae; occasionally 1 cerarius on head with 3 conical setae.

Venter. Multilocular disc pores present around vulva, in rows across posteromedian edges of abdominal segments III–VII and anteromedian edges of segments V–VII, in groups on margins of abdominal segments IV–VII, and sometimes a few scattered over head and thorax. Trilocular pores numerous, evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of abdominal segments III–VIII, the larger ones in marginal groups on most body segments and sparsely scattered over median area of thorax. Simple pores slightly smaller than trilocular pores, sparsely scattered over entire surface. Setae moderately long and stout.

Dorsum. Multilocular disc pores absent. Trilocular pores as on venter. Oral collar tubular ducts often absent, if present then larger than the larger ducts on venter, very sparse, singly on margins of some body segments and on median areas of thorax. Simple pores of various sizes, those larger than trilocular pores in groups on midline of abdominal segments II–VI, and those about half the size of trilocular pores sparsely scattered over entire surface. Setae of moderate stoutness and length.

Type data. *Dorthesia citri* Risso. **Syntype** females: France, Menton, on *Citrus* sp. (probably lost).
Lecanium phyllococcus Ashmead. Florida, on orange trees. (Status of type material not known.)
Dactylopius destructor Comstock. Florida, on orange trees. (Status of type material not known.)
Dactylopius calceolariae var. *minor* Maskell. **Syntype** females: Mauritius, on roots of "onion grass" (NZAC).
Pseudococcus citri var. *phenacocciformis* Brain. **Syntype** females: South Africa, Rosebank C[ape] P[rovince], on *Bouvardia* sp. (SANC).

Material examined. 3 non-type adult females from New Zealand, plus numerous specimens from around the world (BMNH, NZAC).
— / MC.
Collected in May.
Taken from *Coleus* sp. (Labiatae).

Remarks. *P. citri* is one of the major mealybug pests of glasshouse plants and fruit trees throughout the world. It has been found in New Zealand on only one occasion, in 1979, and does not appear to have established itself further. *P. citri* is very similar to *P. pacificus* Cox, which is frequently intercepted on produce imported into New Zealand from the South Pacific islands. Cox (1981) provides a key for the separation of these two species.

Planococcus dubius new species

Figure 103

Appearance of live females not known.

Body outline oval; length (mounted) 2.4–3.2 mm, width 1.5–1.8 mm. Legs typical of genus; hind trochanter + femur 0.32–0.39 mm long; hind tibia + tarsus 0.31–0.36 mm long; translucent pores present on hind coxae and tibiae. Circulus (if apparent) small, quadrate, 0.04–0.05 mm wide. Ostioles distinct; lips each with 8–22 trilocular pores and 0–2 setae. Cerarii numbering 12–17 distinct pairs; anal lobe cerarii on large sclerotised areas, each with 2 (rarely 3) conical setae, 4–6 flagellate auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 1 or 2 (abdomen) or 1–4 (head and thorax) conical setae, sometimes a single flagellate auxiliary seta, and all with a concentration of trilocular pores.

Venter. Multilocular disc pores and trilocular pores numerous over entire surface. Oral rim tubular ducts absent. Oral collar tubular ducts of 2 sizes, the smaller ducts sparsely in rows across median areas of abdominal segments IV–VII, the larger ones moderately numerous around margin of entire venter. Simple pores about half the size of trilocular pores, sparsely scattered over entire venter. Setae somewhat long and stout.

Dorsum. Multilocular disc pores and trilocular pores as on venter. Oral collar tubular ducts the same size as larger ducts on venter, sparse to moderately numerous over entire dorsum, in rows across most abdominal segments. Simple pores about one-quarter the size of trilocular pores, sparsely scattered over entire dorsum. Setae long, stout, with enlarged bases, almost conical on median areas of abdominal segment VII.

Type data. **Holotype**: adult female alone on slide, New Zealand, AK, Waitakere Range, on *Dracophyllum latifolium*, 16 November 1973, J.A. de Boer ("1106") (NZAC). **Paratypes**: 2 adult females on separate slides, same data as holotype (BMNH, NZAC); 1 adult female, GB, Lake Waikaremoana, at base of leaves of *Dracophyllum* sp., 4 Mar 1983, J.M. Cox (BMNH).

Material examined. Type specimens, plus 4 non-type adult females (BMNH, NZAC).

AK, GB / FD.

Collected in January, March, and November.

Taken from *Dracophyllum* sp. and *D. latifolium* (Epacridaceae). Occurring at bases of leaves.

Remarks. *P. dubius* has been placed in *Planococcus* rather than in *Crisicoccus* despite having fewer than 18 pairs of cerarii, because some specimens have three pairs of cerarii anterior to the eyes and, taken as a group, the type specimens show cerarii in all the 18 possible positions on the body.

This species is very variable in its numbers of cerarii and dorsal multilocular disc pores. Moreover, all the non-type specimens examined from Fiordland apparently lack circuli, and when more specimens have been collected and studied these may prove to be a different species. The type specimens all have circuli, numerous dorsal multilocular disc pores, and cerarii present on the head.

P. dubius can be distinguished from the other two species of *Planococcus* known from New Zealand by its numerous dorsal oral collar tubular ducts.

The specific name — Latin, 'uncertain' — alludes to the uncertain generic placement of this species.

Planococcus mali Ezzat & McConnell

Figure 104

mali Ezzat & McConnell, 1956: 93 (*Planococcus*). Wise, 1977: 101 (*Planococcus*). Williams, 1985: 274 (*Planococcus*).

Live females dark red, covered with powdery white wax extending into 12–18 short lateral filaments.

Body outline oval; length (mounted) 2.3–3.3 mm, width 1.2–2.0 mm. Legs typical of genus; hind trochanter + femur 0.26–0.38 mm long; hind tibia + tarsus 0.28–0.48 mm long. Circulus quadrate, usually divided by intersegmental line, 0.08–0.19 mm wide. Ostioles distinct; lips each with 4–15 trilocular pores and 0–3 setae. Cerarii numbering 18 pairs, although some cerarii on thorax and anterior abdominal segments occasionally very indistinct; anal lobe cerarii on small sclerotised areas, each with 2 conical setae, 2–4 flagellate auxiliary setae, and a small concentration of trilocular pores; cephalic and thoracic cerarii each with 1–5 slender conical setae or stout flagellate setae and a few associated trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posteromedian edges of abdominal segments IV–VII, and across anteromedian edge of segment VII, in groups of 1–3 on margins of posterior abdominal segments, and often scattered over median area of thorax. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of abdominal segments V–VII, the larger ones in rows across median areas of abdominal segments I–VI, in groups on margins of prothorax and abdominal segments II–IX, and scattered over median area of thorax. Simple pores minute. Setae moderately long and stout.

Dorsum. Multilocular disc pores and oral collar tubular ducts absent. Trilocular pores generally

evenly distributed, but sometimes aggregated around bases of enlarged setae on abdominal segment VII. Simple pores minute. Setae generally short and stout, but sometimes those on midline enlarged and almost conical.

Type data. **Holotype**: adult female, New Zealand, intercepted at Honolulu, on *Olearia chathamica*, 21 September 1937 (USNM). **Paratypes**: 1 adult female, same data as holotype; 1 adult female, Australia, Tasmania, intercepted at Buffalo, New York, on *Pyrus malus* [*Malus pumila*], 26 Jun 1946, Inman & Reeges; 1 adult female from same locality and host, intercepted at Boston, Massachusetts, 26–27 Jun 1946 (USNM).

Material examined. Type specimens, plus 24 nontype adult females (BMNH, NZAC, USNM).

AK, HB, RI / NN, MC, CO.

Collected in January–March, November, and December.

Taken from *Acacia* sp. (Mimosaceae), apple [*Malus pumila*] (Rosaceae), *Cyathodes juniperina* (Epacridaceae), *Nothofagus fusca* (Fagaceae), *Olearia chathamica* (Asteraceae), *Phlomis* sp. (Labiatae), *Pittosporum* sp. (Pittosporaceae), polyanthus [*Primula*] sp. (Primulaceae), *Ribes nigrum* (Grossulariaceae), and *Ulex* sp. (Fabaceae).

Remarks. *P. mali* is fairly common and widespread in New Zealand. It is found mainly on introduced plants, and sometimes causes damage to blackcurrant (*Ribes nigrum*). It occurs also in Australia. Within New Zealand it is probably most easily confused with *Paracoccus albatus*, but lacks the oral rim tubular ducts of that species.

Genus *Pseudococcus* Westwood

Pseudococcus Westwood, 1840: 118. Type-species *Dactylopius adonidum* (L.) in the sense of authors (= *Dactylopius longispinus* Targioni Tozzetti, 1867), by original designation.

Body outline elongate-oval to broadly oval. Antennae 8-segmented. Legs well developed; tarsal claws without denticles. Spiracles of normal pseudococcid form. Circulus usually present. Both pairs of ostioles usually distinct. Cerarii numbering 3–17 pairs; each cerarius with 2 conical setae and a few flagellate auxiliary setae; anal lobe cerarii and penultimate cerarii on large sclerotised areas. Anal lobe bars absent. Anal ring of normal pseudococcid form.

Multilocular disc pores usually present on venter, sometimes on dorsum. Quinquelocular pores absent. Trilocular pores present. Oral rim tubular ducts usually on both venter and dorsum. Oral collar tubular ducts usually on venter, rarely on dorsum. Simple pores usually apparent. Setae flagellate.

Remarks. The cosmopolitan genus *Pseudococcus* is similar to *Dysmicoccus*, differing only in its possession of oral rim tubular ducts. Of the six species recorded from New Zealand and here placed in *Pseudococcus*, three are widespread pest species, two are known also from Australia, where they have other close relatives, and the last is known only from New Zealand.

KEY TO SPECIES OF *PSEUDOCOCCUS* KNOWN FROM NEW ZEALAND

01 Multilocular disc pores absent (Fig. 111) ... ***zelandicus***
— Multilocular disc pores present ... 02

02(01) Dorsum with more than 2 oral rim tubular ducts adjacent to some cerarii (Fig. 108) ... ***longispinus***
— Dorsum with up to 2 oral rim tubular ducts adjacent to any cerarius ... 03

03(02) Margins of eyes with simple pores; head always with a dorsal oral rim tubular duct behind each frontal cerarius (Fig. 105) ... ***affinis***
— Margins of eyes without simple pores; head usually without oral rim tubular ducts ... 04

04(03) Legs generally small and stout (hind tibia + tarsus 0.28–0.43 mm long); some dorsal setae on median areas of posterior abdominal segments noticeably stout; oral rim tubular ducts often very sparse or even absent (a total of 0–31 ducts on body) (Fig. 109 and 110) ... ***similans***
— Legs usually elongate (hind tibia + tarsus 0.42–0.58 mm long); dorsal setae not noticeably stout; oral rim tubular ducts more numerous (a total of 21–55 ducts on body) ... 05

05(04) Head and thorax without oral collar tubular ducts; almost all dorsal setae without aggregations of trilocular pores around their bases (Fig. 106) ... ***calceolariae***
— Head and prothorax with ventral marginal groups of oral collar tubular ducts (a total of 14–45 ducts on head); many dorsal setae with aggregations of 1–3 trilocular pores around their bases (Fig. 107) ... ***hypergaeus***

Pseudococcus affinis (Maskell)

Figure 105

affinis Maskell, 1894: 90 (*Dactylopius*). Fernald, 1903: 97 (*Pseudococcus*). Miller *et al.*, 1984: 707 (*Pseudococcus*). Williams, 1985: 281 (*Pseudococcus*).
obscurus Essig, 1909: 43 (*Pseudococcus*). Synonymised with *D. affinis* by Miller *et al.* (1984).
capensis Brain, 1912: 182 (*Pseudococcus*). Synonymised with *D. affinis* by Miller *et al.* (1984).
longispinus var. *latipes* Green, 1917: 264 (*Pseudococcus*). Synonymised with *D. affinis* by Miller *et al.* (1984).
malacearum Ferris, 1950: 185 (*Pseudococcus*). Synonymised with *P. obscurus* by Wilkey & McKenzie (1961) and with *D. affinis* by Miller *et al.* (1984).
maritimus (Ehrhorn). Myers, 1922: 198 (*Pseudococcus*) [misidentification].

Live females greyish pink, covered with powdery white wax extending into 17 pairs of short lateral filaments.

Body outline oval; length 1.3–4.5 mm, width 0.6–2.4 mm. Eyes each with 1–4 simple pores about half the size of trilocular pores or the same size, on or near their margins. Legs well developed; hind trochanter + femur 0.25–0.43 mm long; hind tibia + tarsus 0.30–0.49 mm long; translucent pores present on hind femora and tibiae. Circulus quadrate, divided by intersegmental line, 0.07–0.17 mm wide. Ostioles distinct; lips each with 9–20 trilocular pores and 3–6 setae. Cerarii numbering 17 pairs, their form typical of genus.

Venter. Multilocular disc pores present around vulva, and in rows across posteromedian edges of abdominal segments IV–VII and anteromedian edges of segments V–VII. Trilocular pores moderately numerous and evenly distributed. Oral rim tubular ducts sometimes absent, but usually singly on margins of some thoracic and abdominal segments. Oral collar tubular ducts of 2 sizes, the smaller ducts in broad rows across median areas of abdominal segments, in marginal groups on most body segments, usually including the head, and scattered over median area of thorax, the larger ones singly on margins of some thoracic and abdominal segments. Simple pores about one-quarter the size of trilocular pores, sparsely scattered over entire venter. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores as on venter. Oral rim tubular ducts singly next to most cerarii, including frontal pair, singly on midline of most abdominal segments, and scattered over median area of thorax. Oral collar tubular ducts absent from median areas, extending around margins from venter on posterior abdominal segments. Simple pores minute, sparsely scattered over entire dorsum. Setae of moderate length and thickness.

Type data. *Dactylopius affinis* Maskell. **Syntype** females: Australia, New South Wales, on tubers of dahlia and potato (NZAC; see discussion by Miller *et al.* 1984).

Pseudococcus obscurus Essig. **Lectotype** (designated by Miller *et al.* 1984): adult female, U.S.A., California, on *Opuntia* sp. (CASF).

Pseudococcus capensis Brain. **Holotype**: adult female, South Africa, Rosebank, on *Phytolacca dioica* (USNM).

Pseudococcus longispinus var. *latipes* Green. **Lectotype** (designated by Miller *et al.* 1984): adult female, England, Surrey, Camberley, on *Fuchsia* sp. under glass (BMNH).

Pseudococcus malacearum Ferris. **Lectotype** (designated by Wilkey & McKenzie 1961): adult female, U.S.A., California (missing; see discussion by Miller *et al.* 1984).

Material examined. 12 non-type adult females from New Zealand (NZAC).

ND, AK, HB / NN, MC.

Collected in January–August, November, and December.

Taken from apple [*Malus pumila*] and pear [*Pyrus communis*] (Rosaceae), grapevine [*Vitis vinifera*] (Vitaceae), indoor cactus, *Poinsettia* sp. (Euphorbiaceae), *Polygonum convolvulus* (Polygonaceae), tree tomato [*Cyphomandra* sp.], and potato [*Solanum tuberosum*] (Solanaceae). Also recorded from *Prunus persica* and *P. domestica* (Rosaceae), *Rumex* sp. (Polygonaceae), *Asclepias physocarpa* (Asclepiadaceae), and *Mandevillea* (Apocynaceae) by Ward (1966); and from *Lycopersicum esculentum* (Solanaceae), *Daucus carota* (Apiaceae), *Dianthus* sp. (Caryophyllaceae), *Cynara scolymus* (Asteraceae), and *Laburnum* sp. (Fabaceae) by de Boer (1967a).

Remarks. *P. affinis* is almost certainly a North American species, and is probably most closely related to another from North America, *P. maritimus*. Miller *et al.* (1984) discuss their separation.

P. affinis is cosmopolitan, is found on a wide variety of plants, and is an important pest of glasshouse plants, fruit trees, and grapevines in many parts of the world. It was long misidentified as *P. maritimus*, and was first recorded from New Zealand under this name by Myers (1922). Cox (1977a) demonstrated that all records of *P. maritimus* from New Zealand are misidentifications, and that *P. maritimus* does not occur here. *P. affinis* is one of the commonest mealybug species in New Zealand, and at times has become a serious pest in orchards, especially in Hawkes Bay (Congdon & Morrison 1959, Ward 1966). Until recently it was known as *P. obscurus*.

Pseudococcus calceolariae (Maskell)

Citrophilus mealybug

Figure 106

calceolariae Maskell, 1879: 218 (*Dactylopius*). Fernald, 1903: 98 (*Pseudococcus*). Lindinger, 1935a: 122 (*Erium*). Williams & de Boer, 1973: 241 (*Pseudococcus*). Wise, 1977: 101 (*Pseudococcus*). Cox, 1977a: 165 (*Pseudococcus*).

fragilis Brain, 1912: 186 (*Pseudococcus*). de Boer, 1967a: 8 (*Pseudococcus*). Synonymised by Williams & de Boer (1973).

gahani Green, 1915: 179 (*Pseudococcus*). Synonymised with *D. calceolariae* by Williams & de Boer (1973).

citrophilus Clausen, 1915: 30–35 (*Pseudococcus*). Synonymised with *D. calceolariae* by Williams & de Boer (1973).

Live females dark purplish red, covered with powdery white wax extending into 17 pairs of short lateral filaments.

Body outline elongate-oval to oval; length (mounted) 2.2–4.8 mm, width 1.1–2.7 mm. Legs elongate; hind trochanter + femur 0.38–0.47 mm long; hind tibia + tarsus 0.42–0.53 mm long; translucent pores present on hind femora and tibiae. Circulus quadrate, divided by intersegmental line, 0.20–0.29 mm wide. Ostioles distinct; lips each with 16–40 trilocular pores and 4–8 setae. Cerarii numbering 17 pairs, their form typical of the genus.

Venter. Multilocular disc pores present around vulva, in broad rows across posteromedian edges of abdominal segments IV–VII, and a few usually scattered over median areas of head and thorax. Trilocular pores moderately numerous and evenly distributed. Oral rim tubular ducts singly or in pairs on margins of some thoracic and abdominal segments. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across abdominal segments III–VII, the larger ones in marginal groups on abdominal segments and scattered over median areas of thorax. Simple pores about one-third the size of trilocular pores, sparsely scattered over entire surface but not associated with margins of eyes. Setae moderately long and stout.

Dorsum. Multilocular disc pores absent. Trilocular pores and simple pores as on venter. Oral rim tubular ducts singly adjacent to most cerarii, but absent from head, and scattered over median areas of thorax and head. Oral collar tubular ducts absent. Simple pores as on venter. Setae of moderate length and thickness.

Type data. *Dactylopius calceolariae* Maskell. **Lectotype** (designated by Williams & de Boer 1973): adult female, New Zealand, on *Traversia* sp., June 1878, W.M. Maskell (NZAC).

Pseudococcus fragilis Brain. **Syntype** females: South Africa, Constantia, on oranges (SANC).

Pseudococcus gahani Green. **Lectotype** (designated by Williams 1985): adult female, England, London, on currant (BMNH).

Pseudococcus citrophilus Clausen. California, on citrus (type status not known).

Material examined. 33 non-type adult females from New Zealand (BMNH, NZAC).

AK, HB / NN.

Collected in January–June, August, November, and December.

Taken from *Traversia [Senecio]* sp. (Asteraceae), carrot [*Daucus carota*] (Apiaceae), strawberry [*Fragaria* sp.] and apple [*Malus pumila*] (Rosaceae), *Sophora* sp. and *S. microphylla* (Papilionaceae), grape [*Vitis vinifera*] (Vitaceae), walnut [*Juglans regia*] (Juglandaceae), *Dodonaea viscosa* (Sapindaceae), *Nerium oleander* (Apocynaceae), *Coprosma australis* (Rubiaceae), grapefruit and other *Citrus* sp. (Rutaceae), *Solanum* sp. (Solanaceae), *Gymnelaea lanceolata* (Oleaceae), and *Laburnum* sp. and peas [*Pisum sativum*] (Fabaceae). Occurring on the aerial parts of the host-plant.

Remarks. *P. calceolariae* is similar to *P. hypergaeus* and *P. similans* in lacking oral rim tubular ducts adjacent to the frontal cerarii, but may be distinguished by its lack of oral collar tubular ducts on the head and from *P. similans* by its more elongate legs. As previous records of *P. calceolariae* from New Zealand may be misidentifications of these other two species, the host records given by earlier workers are not listed above. Although originally described from New Zealand, *P. calceolariae* is probably of Australian origin.

This species is cosmopolitan, occurring on a wide variety of plants. It is a well known pest of citrus in many parts of the world, and in New Zealand is found frequently on citrus and apple trees, although some published records may be misidentifications of *P. similans*, which is similar in appearance.

Pseudococcus hypergaeus Williams

Figure 107

hypergaeus Williams, 1985: 315 (*Pseudococcus*)

Live females dark purplish red, covered with powdery white wax extending into 17 pairs of short lateral filaments.

Body outline oval to broadly oval; length (mounted) 2.8–4.7 mm, width 1.4–2.9 mm. Antennae 8-segmented. Legs elongate; hind trochanter + femur 0.41–0.48 mm long, hind tibia + tarsus 0.52–0.58 mm long; translucent pores present on hind

femora and tibiae. Circulus quadrate, divided by intersegmental line, 0.15–0.26 mm wide. Both pairs of ostioles distinct; lips each with 12–33 trilocular pores and 1–5 setae. Cerarii numbering 17 pairs, typical of genus.

Venter. Multilocular disc pores present in rows across posteromedian edges of abdominal segments IV–VIII and anteromedian edges of VI and VII, and an occasional pore on thorax. Trilocular pores moderately numerous and evenly distributed. Oral rim tubular ducts usually singly on some thoracic and abdominal segments, totalling 0–8. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of abdominal segments, the larger ones numerous marginally on abdomen, in large marginal groups on head and prothorax, and scattered over remainder of thorax. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores moderately numerous, generally evenly distributed, but sometimes slightly aggregated around bases of a few setae. Oral rim tubular ducts in rows of up to 10 across thoracic and abdominal segments, but usually absent from head. Oral collar tubular ducts absent. Simple pores not apparent. Setae moderately short and slender.

Type data. **Holotype**: adult female alone on slide, South Australia, Port Augusta, on *Avicennia* sp., October 1976, I. Thomas (ANIC). **Paratypes**: 5 adult females, same data as holotype (BMNH, WARI).

Material examined. Type specimens, plus 21 non-type adult females from New Zealand (ANIC, BMNH, NZAC, WARI).

AK, WO / NN.

Collected in January–March, October, and December.

Taken from wattle [*Acacia* sp.] and *A. decurrens* (Mimosaceae), gorse [*Ulex* sp.] and red clover [*Trifolium pratense*] (Fabaceae), *Grevillea robusta* and *Leucospermum* sp. (Proteaceae), *Haloragis erecta* (Haloragidaceae), *Plagianthus divaricatus* (Malvaceae), and *Solanum aviculare* (Solanaceae).

Remarks. *P. hypergaeus* is similar to *P. calceolariae* and *P. similans* in usually lacking oral rim tubular ducts on the head. It differs from *P. calceolariae* in its large marginal groups of oral collar tubular ducts on the head and prothorax, and from *P. similans* in its much more elongate legs.

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Pseudococcus longispinus (Targioni Tozzetti)

Figure 108

longispinus Targioni Tozzetti, 1867: 1–87 (*Dactylopius*). Fernald, 1903: 104 (*Pseudococcus*). De Lotto, 1965: 226 (*Pseudococcus*).

longifilis Comstock, 1881: 344 (*Dactylopius*). Synonymised by Berlese (1893).

adonidum (Linnaeus). Maskell, 1890: 150 (*Dactylopius*) [misidentification].

Live females greyish pink, covered with powdery white wax extending into 17 lateral pairs of long filaments, the posterior 2 pairs as long as the body.

Body outline elongate-oval to oval; length (mounted) 1.6–4.6 mm, width 0.7–2.5 mm. Legs elongate; hind trochanter + femur 0.38–0.46 mm long; hind tibia + tarsus 0.43–0.50 mm long; translucent pores present on hind tibiae only. Circulus quadrate, divided by intersegmental line, 0.16–0.27 mm wide. Ostioles distinct; lips each with 20–33 trilocular pores and 4–8 setae. Cerarii numbering 17 pairs, their form typical of genus.

Venter. Multilocular disc pores present around vulva only. Trilocular pores somewhat sparse but evenly distributed. Oral rim tubular ducts of 2 sizes, singly or together in groups of 2–6 on margins of thoracic and anterior abdominal segments. Oral collar tubular ducts of 2 sizes, the small ducts around vulva and in a row across posteromedian edge of abdominal segment VII, the larger ones in marginal groups on abdominal segments VI and VII. Simple pores minute, sparsely distributed over entire surface. Setae moderately long and stout.

Dorsum. Multilocular disc pores absent. Oral rim tubular ducts the same 2 sizes as on venter, together in groups of 2–5 adjacent to most cerarii, including frontal pair, and scattered over median areas of body. Trilocular pores, simple pores, and setae as on venter.

Type data. *Dactylopius longispinus* Targioni Tozzetti: ?Europe (type status not known).

Dactylopius longifilis Comstock: U.S.A. (type status not known).

Material examined. 15 non-type adult females from New Zealand (NZAC).

ND, AK, WO, HB / NN.

Collected in January–July and December.

Taken from apple [*Malus pumila*] and pear [*Pyrus communis*] (Rosaceae), *Citrus* sp. and *C. paradisi* (Rutaceae), *Cedrus atlantica* (Pinaceae), *Cyperus albostriatus* (Cyperaceae), dock [*Rumex* sp.] (Polygonaceae), grapevine [*Vitis vinifera*] (Vitaceae), *Sophora microphylla* (Papilionaceae), and maidenhair fern [*Adiantum* sp.] (Adiantaceae). Also recorded from *Ficus carica* (Moraceae), *Prunus*

domestica (Rosaceae), *Begonia* sp. (Begoniaceae), *Passiflora* sp. (Passifloraceae), *Psidium* sp. (Myrtaceae), and cineraria [*Senecio* sp.] (Asteraceae) by Miller (1934); from ivy [*Hedera helix*] (Araliaceae), *Hebe* sp. (Scrophulariaceae), and broom [*Cystisus* sp.] (Fabaceae) by Ward (1966); and from runner bean [*Phaseolus* sp.] (Fabaceae), *Cissus antartica* (Vitidaceae), and *Cyclamen* sp. (Primulaceae) by de Boer (1967a). Occurring on the aerial parts of the host plant.

Remarks. The dorsal groups of oral rim tubular ducts next to the cerarii distinguish *P. longispinus* from the other species of *Pseudococcus* known from New Zealand.

This cosmopolitan species occurs mainly in glasshouses in temperate climates, but is also found out-of-doors in the warmer parts of the world. It was first recorded in New Zealand by Maskell (1890), under the name *D. adonidum*, and many New Zealand records are under this specific name. A survey of orchards and vineyards by Cox (1977b) showed *P. longispinus* to be the predominant mealybug species on fruit trees and grapevines in the Auckland area, whereas Ward (1966) had shown another cosmpolitan species, *P. affinis*, to predominate in Hawkes Bay orchards, although *P. longispinus* was also present.

Pseudococcus similans (Lidgett)

Figures 109 and 110

similans Lidgett, 1898: 91 (*Dactylopius*). Lidgett, 1899: 54 (*Dactylopius*). Fernald, 1903: 109 (*Pseudococcus*). Williams, 1985: 327 (*Pseudoccoccus*).

Live females dark purplish red, covered with white, powdery wax extending into 17 pairs of short lateral filaments.

Body outline oval; length (mounted) 1.8–4.6 mm, width 0.9–2.9 mm. Antennae 6–8-segmented. Legs generally small and stout; hind trochanter + tibia 0.24–0.40 mm long; hind trochanter 0.28–0.43 mm long; translucent pores present on hind femora and tibiae. Circulus quadrate, divided by intersegmental line, 0.08–0.24 mm wide. Both pairs of ostioles distinct; lips each with 2–35 trilocular pores and 1–6 setae. Cerarii numbering 17 pairs, their form typical of genus.

Venter. Multilocular disc pores in rows across posteromedian edges of abdominal segments II–VIII and anteromedian edges of IV–VII, usually also scattered over head and thorax. Trilocular pores moderately numerous and evenly distributed. Oral rim tubular ducts usually absent, but sometimes 1 or 2 on margins of thoracic or anterior abdominal segments. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across abdominal segments, the larger ones numerous on margins of abdominal segments, scattered over median area of thorax and sometimes in small groups on margins of head and thoracic segments. Simple pores not apparent. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent, or 1–6 pores scattered over median areas of posterior abdominal segments. Trilocular pores moderately numerous, generally evenly distributed, but slightly aggregated around bases of larger setae. Oral rim tubular ducts variable in number, up to 31 scattered over dorsum, mainly on margins, but absent from head, and occasionally absent altogether. Oral collar tubular ducts absent. Simple pores not apparent. Setae moderately short, varying in thickness, mainly fine, but setae on median areas of posterior abdominal segments distinctly stout.

Type data. Given by Lidgett (1898) as "Australia, Victoria, Myrniong, on roots of *Daphne* sp."; no type material has been located.

Material examined. 85 non-type adult females from New Zealand and 10 non-type adult females from Australia (BMNH, NZAC, PANZ).

AK, WO, GB, HB / MC.

Collected in January, March, April, and October–December.

Taken from crowns and roots of *Cynara scolymus*, cineraria [*Senecio* sp.], and *Sonchus oleraceus* (Asteraceae), *Orobanche minor* (Orobanchaceae), *Plantago coronopus* (Plantaginaceae), *Rumex* sp. (Polygonaceae), clover [*Trifolium* sp.], white clover [*Trifolium repens*], lucerne [*Medicago sativa*], and broad bean [*Vicia faba*] (Fabaceae), and *Solanum tuberosum* (Solanaceae), and from aerial parts of *Citrus* sp. (Rutaceae), apple [*Malus pumila*], and pear [*Pyrus communis*] (Rosaceae).

Remarks. *P. similans* is similar to *P. calceolariae* and *P. hypergaeus* in lacking oral rim tubular ducts on the head. It can be distinguished by its smaller, stouter legs and fewer oral rim tubular ducts. The populations collected from different parts of New Zealand are apparently constant in all but one character. Specimens from Auckland (AK) and Hamilton (WO) have few oral rim tubular ducts (a total of 0–14 on body; Figure 109), whereas those from Napier (HB) and Christchurch (MC) have more (totalling 13–19 and 15–31 respectively; Figure 110). The Australian material examined by Williams (1985) resembles the Auckland material except for a single specimen collected from New South Wales on *Melilotus officinalis* (Fabaceae), which is closer to the New Zealand material from

Christchurch. It is possible that the specimens with higher numbers of oral rim tubular ducts are a different species, but at the moment I can find no satisfactory way of separating them.

Pseudococcus zelandicus new species

Figure 111

Appearance of live females not known.

Body outline elongate-oval; length (mounted) 1.6–2.7 mm, width 0.8–1.4 mm. Antennae 8-segmented. Legs well developed; hind trochanter + femur 0.23–0.35 mm long; hind tibia + tarsus 0.26–0.37 mm long; translucent pores not apparent. Circulus small, round, 0.01–0.04 mm wide. Both pairs of ostioles apparent; lips of anterior pair each with 5–10 trilocular pores and 0–4 setae, these of posterior pair each with about 20 trilocular pores and 4–6 setae. Cerarii numbering 3–7 pairs, 2 pairs usually on head, remainder on posterior abdominal segments, their form typical of genus.

Venter. Multilocular disc pores absent. Trilocular pores moderately numerous, evenly distributed. Oral rim tubular ducts in groups of 2–7 on margins of most body segments. Oral collar tubular ducts sparsely in a row across median area of abdominal segment VII and sometimes VI. Simple pores minute, sparsely scattered over entire surface. Setae moderately long, very fine.

Dorsum. Multilocular disc pores and oral collar tubular ducts absent. Trilocular pores as on venter. Oral rim tubular ducts in rows of 3–9 across abdominal segments and scattered over head and thorax. Simple pores as on venter. Setae short, fine.

Type data. Holotype: adult female (left-hand specimen of 2 on slide), New Zealand, TO, Minginui State Forest, Otupaka Clearing (1st flat), in litter (bulk sample no. 77/87), 28 July 1977, J.S. Dugdale (NZAC). **Paratypes**: 11 adult females on 5 slides (including holotype slide), same data as holotype (BMNH, NZAC).

Material examined. Type series, plus 10 non-type adult females (BMNH, NZAC).

TO / NN, KA, BR, CO.

Collected in January, July, and November.

Taken from *Astelia cockaynei* (Liliaceae), *Microlaena* sp., *M. avenacea*, and *Poa laevis* (Poaceae), swards, and litter.

Remarks. *P. zelandicus* is unusual for *Pseudococcus* in having only 3–7 pairs of cerarii and lacking multilocular disc pores. However, the nature of the cerarii places it in this genus.

One specimen (CO, Rock and Piller Range, swards, 13 Nov 1969, J. McBurney) differs from the others examined in lacking cerarii on the head and having fewer oral rim tubular ducts, but is otherwise very similar, and so has been included in *P. zealandicus*.

The specific name alludes to the country of origin.

Genus *Rastrococcus* Ferris

Rastrococcus Ferris, 1954: 55. Type-species *Phenacoccus iceryoides* Green, 1908, by original designation.

Body outline broadly oval. Antennae 9-segmented. Legs long, slender, sometimes angled outwards between tibia and tarsus; denticles usually present on tarsal claws; translucent pores not apparent on hind legs. Spiracles of normal pseudococcid form. Circulus usually present, round or oval, towards posterior edge of abdominal segment III. Ostioles absent, or represented by posterior pair only. Cerarii numbering 13–34 pairs, usually on sclerotised areas; each cerarius with numerous truncate setae and a concentration of trilocular pores, but without flagellate setae. Anal lobe bars not apparent. Anal ring of normal pseudococcid form.

Multilocular disc pores present on venter only. Quinquelocular pores usually present on venter but never on dorsum. Trilocular pores frequently appearing heavily sclerotised. Oral rim tubular ducts absent. Oral collar tubular ducts present or absent on both venter and dorsum. Simple pores usually apparent. Setae flagellate on venter but lanceolate on dorsum.

Remarks. Only one species of *Rastrococcus*, the indigenous *R. asteliae*, is known from New Zealand. The genus is known also from the Oriental Region and Australia.

Rastrococcus asteliae (Maskell) new combination

Figure 112

asteliae Maskell, 1884: 139 (*Pseudococcus*). Maskell, 1887: 102 (*Pseudococcus*). Cockerell, 1893b: 318 (*Phenacoccus*). Cockerell, 1896: 325 (*Phenacoccus*). Wise, 1977: 101 (*Phenacoccus*).

Live females described by Maskell (1884) as "yellowish brown, covered with a not very abundant white cotton".

Body outline broadly oval; length (mounted) 1.8–2.2 mm, width 1.0–1.1 mm. Legs typical of genus, angled outwards between tibia and tarsus; hind trochanter + femur 0.35–0.48 mm long; hind tibia +

tarsus 0.30–0.50 mm long; tarsal claws without denticles. Circulus oval, 0.04–0.06 mm wide. Posterior pair of ostioles distinct; lips each with 1–3 trilocular pores, but without setae. Cerarii numbering 16 pairs; each cerarius with 5–12 truncate setae, a concentration of trilocular pores, and a few minute simple pores.

Venter. Multilocular disc pores scattered in moderate numbers over marginal and submarginal areas of abdominal segments II–VIII. Quinquelocular pores sparsely scattered over entire venter. Trilocular pores large, sparsely scattered over most of venter but absent from median areas of head and thorax. Oral collar tubular ducts absent. Simple pores not apparent. Setae flagellate, moderately long and fine.

Dorsum. Trilocular pores the same form and size as on venter, sparsely but evenly distributed. Oral collar tubular ducts absent. Simple pores not apparent. Setae lanceolate, short, fine.

Type data. Given by Maskell (1884) as "On a species of *Astelia* sent to me by the Rev. Mr. Colenso, from the forests of Hawkes's Bay". **Lectotype** (here designated): adult female alone on slide, labelled "*Pseudococcus asteliae*, from *Astelia*, adult female, May 1883, W.M.M." (NZAC). **Paralectotypes**: 1 adult female alone on slide, labelled with same data as lectotype (CMNZ); 1 slide labelled "*Pseudococcus asteliae*, from *Astelia*, antenna and foot of female, May 1883, W.M.M." (CMNZ).

Material examined. Type specimens listed above, plus 9 non-type adult females (BMNH, NZAC, PANZ).

AK, HB, WN / —.

Collected in April, May, and November.

Taken from *Astelia* sp., *A. fragrans*, and *A. trinervia* (Liliaceae).

Remarks. The angled legs and truncate cerarian setae distinguish *R. asteliae* from the other species of mealybug known from New Zealand.

Renicaula new genus

Type-species *Pseudantonina junci* de Boer, 1968.

(The name *Renicaula* — Latin *renes*, meaning 'kidneys', and *caula*, 'opening' — refers to the kidney-shaped anal ring.)

Elongate to rotund Pseudococcidae with 4–7-segmented antennae. Integument frequently somewhat nodulose along segmental margins; posterior segments sometimes partially sclerotised at maturity. Legs small, stout, often slightly distorted; tarsal claws without denticles; hind coxae distinctly enlarged, beset with translucent pores which extend on to surrounding integument. Circuli (if present) small, round, numbering 1–4. Spiracles heavily sclerotised, usually with several trilocular pores enclosed within this sclerotisation. Anterior ostioles absent; posterior pair sometimes apparent, without trilocular pores or setae. Cerarii numbering 0–3 pairs; each cerarius with 2–8 conical setae and sometimes a few associated trilocular pores, without flagellate auxiliary setae, sometimes on a sclerotised area. Anal lobe bars absent. Anal ring of unusual form for Pseudococcidae, kidney-shaped and with setae shorter than width of ring.

Multilocular disc pores absent. Trilocular pores sparse on mid-regions of both venter and dorsum, more numerous marginally. Quinquelocular pores absent. Oral rim tubular ducts absent. Oral collar tubular ducts absent or, if present, then with orifices slightly larger than trilocular pores, about twice as long as their own diameter; collar extending about halfway up duct. Simple pores smaller than trilocular pores, present on both venter and dorsum. Setae flagellate, those on dorsum generally short and fine.

Remarks. The combination of a kidney-shaped anal ring, sclerotised spiracles, and absence of multilocular disc pores distinguishes *Renicaula* from any other genus of mealybug known from New Zealand. It is similar to *Balanococcus* in having somewhat distorted and enlarged hind coxae beset with translucent pores and similar-appearing oral collar tubular ducts, and to *Asaphococcus* in its reduced legs, sclerotised spiracles, and sparsely distributed trilocular pores.

The genus is erected for four species known only from New Zealand.

KEY TO SPECIES OF *RENICAULA*

01 Circuli numbering 1–5 ... 02
— Circuli absent ... 03

02(01) Circulus single; tubular ducts absent (Fig. 113) ... ***chionochloae***
— Circuli numbering 2–5; tubular ducts present on margins of posterior abdominal segment (Fig. 114) ... ***junci***

03(01) Oral collar tubular ducts absent (Fig. 115) ... ***pauca***
— Oral collar tubular ducts present on both dorsum and venter (Fig. 116) ... ***raouliae***

Renicaula chionochloae (de Boer) new combination

Figure 113

chionochloae de Boer, 1968: 334 (*Antoninoides*). Wise, 1977: 100 (*Antoninoides*).

Live females described by de Boer (1968) as "medium brown, some thick waxy covering laterally, no evidence of lateral or anal filaments, sometimes with a long, white tube, formed by the pores of the anal ring".

Body outline elongate to broadly oval; length (mounted) 1.5–4.5 mm, width 0.6–3.0 mm; posterior segments frequently partially sclerotised in mature specimens. Antennae 6-segmented. Legs normal for genus; hind coxae only slightly enlarged; hind trochanter + femur 0.07–0.12 mm long; hind tibia + tarsus 0.06–0.12 mm long. Circulus single, 0.01–0.12 mm wide. Posterior pair of ostioles apparent. Cerarii numbering 2–4 pairs; anal lobe cerarii on sclerotised areas, each with 2–6 conical setae and a few trilocular pores; remaining cerarii sometimes on small sclerotised areas, each with 2–6 conical setae but without trilocular pores. Anal ring typical of genus, but with numerous cells.

Venter. Trilocular pores sparse on median abdominal areas, more numerous elsewhere. Oral collar tubular ducts absent. Simple pores about half the size of trilocular pores, scattered over entire venter. Setae moderately long and fine on median areas, shorter and stouter towards margins.

Dorsum. Trilocular pores more numerous marginally than on median areas. Oral collar tubular ducts absent. Simple pores as on venter. Setae short, moderately stout.

Type data. **Holotype**: adult female alone on slide, New Zealand, KA, Puhipuhi Valley, on *Chionochloa flavescens*, 12 October 1966, J.A. de Boer ("170") (NZAC). **Paratypes**: 8 adult females, same data as holotype (NZAC).

Material examined. Type specimens, plus 13 non-type adult females (BMNH, NZAC).

TO, TK / NN, KA, MC.

Collected in January–April and August.

Taken from *Chionochloa* sp., *C. australis*, *C. flavescens*, and *C. rubra* (Poaceae). Occurring in leaf sheaths.

Remarks. The single circulus and absence of tubular ducts together distinguish *R. chionochloae* from the other known species of *Renicaula*.

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Renicaula junci (de Boer) new combination

Figure 114

junci de Boer, 1968: (*Pseudantonina*). Wise, 1977: 101 (*Pseudantonina*).

Live females described by de Boer (1968) as "brown purple, covered laterally with white wax plates, no evidence of lateral or anal filaments".

Body outline elongate-oval; length (mounted) 2.2–3.7 mm, width 1.2–2.0 mm. Posterior segments partially sclerotised in mature specimens. Antennae 6-segmented. Legs very small, somewhat distorted; hind trochanter + femur 0.09–0.12 mm long, hind tibia + tarsus 0.08–0.11 mm long; hind coxae with translucent pores extending a considerable distance on to surrounding integument. Spiracles heavily sclerotised. Circuli numbering 4 or 5, between abdominal segments II–III and V–VI or VI–VII, each 0.01–0.05 mm wide. Ostioles not apparent. Cerarii numbering 1 or 2 pairs, not on sclerotised areas; each cerarius with 1 or 2 conical setae, but without an associated group of trilocular pores.

Venter. Trilocular pores very sparse on median areas, more numerous marginally. Oral collar tubular ducts in very small numbers on margins of posterior abdominal segments. Simple pores about half the size of trilocular pores, sparsely scattered. Setae moderately short and stout.

Dorsum. As for venter.

Type data. **Holotype**: adult female alone on slide, New Zealand, MB, Molesworth, on *Juncus* sp., 18 August 1966, J.A. de Boer ("130") (NZAC). **Paratypes**: 5 adult females, same data as holotype (NZAC).

Material examined. Type specimens only.

Remarks. Its multiple circuli distinguish *R. junci* from the other known species of *Renicaula*.

Renicaula pauca new species

Figure 115

Live females dark purple, lightly covered with fine white wax.

Body outline broadly oval; length (mounted) 1.5–1.8 mm, width 1.0–1.4 mm; integument sclerotised in mature specimens. Antennae 6- or 7-segmented. Legs normal for genus; hind trochanter + femur 0.07–0.12 mm long; hind tibia + tarsus 0.07–0.10 mm long. Spiracles somewhat less sclerotised than in congeners. Circuli absent. Posterior pair of

ostioles apparent. Cerarii numbering 1 or 2 pairs, not on sclerotised areas; each cerarius with 1 or 2 conical setae, but without associated trilocular pores. Anal ring ventral, its form typical of genus, but with few cells.

Venter. Trilocular pores very sparse over median areas but more numerous marginally, those adjacent to spiracles smaller than the others. Tubular ducts absent. Simple pores minute, sparse, scattered over entire venter. Setae moderately short and fine.

Dorsum. Trilocular pores evenly distributed. Oral collar tubular ducts absent. Simple pores minute, scattered over entire dorsum. Setae very short and fine.

Type data. **Holotype**: adult female alone on slide, New Zealand, WD, Franz Josef Glacier, Rangers' Headquarters, under bark of *Olearia* sp., 5 February 1983, J.M. Cox ("239") (NZAC). **Paratypes**: 12 adult females on 11 slides, same data as holotype (BMNH, NZAC, USNM).

Material examined. Type series, plus 10 non-type adult females (BMNH, FRNZ, NZAC, USNM).

AK, WI / WD.

Collected in February, March, May, and September.

Taken from *Olearia* sp., *O. furfuracea*, *O. solandri*, and *Pomaderris phylicifolia* (Asteraceae). Occurring under bark.

Remarks. The absence of both circuli and tubular ducts distinguishes *R. pauca* from the other described members of this genus.

A single specimen in NZAC from Fiordland National Park (litter "72/272", 11 Dec 1972, A.C. Eyles) resembles *R. pauca* in most of the above characters, but differs in having more pairs of cerarii, anal lobe cerarii on sclerotised areas, much larger appendages, and many more trilocular pores.

The specific name — Latin, 'few' — alludes to the paucity of cells in the anal ring.

Renicaula raouliae (de Boer) new combination

Figure 116

raouliae de Boer, 1968: 333 (*Pseudantonina*). Wise, 1977: 101 (*Pseudantonina*).

Live females described by de Boer (1968) as "medium brown, some waxy covering laterally, no evidence of lateral or anal filaments".

Body outline broadly oval to spherical; length (mounted) 0.9–1.1 mm, width 0.7–0.8 mm. Legs very short, somewhat distorted; hind trochanter + femur about 0.03 mm long; hind tibia + tarsus about 0.02 mm long. Spiracles heavily sclerotised. Circuli absent. Ostioles not apparent. Cerarii absent.

Venter. Trilocular pores absent from median areas, numerous marginally on thorax and in small numbers on margins of head and abdomen. Oral collar tubular ducts sparsely scattered over most of venter, but absent from marginal areas of thorax. Simple pores about half the size of trilocular pores, sparsely scattered over entire venter. Setae fine, moderately long.

Dorsum. Trilocular pores in small numbers on marginal areas of thorax only. Oral collar tubular ducts evenly distributed over entire dorsum. Simple pores about half the size of trilocular pores, sparsely scattered over entire dorsum. Setae generally very short and fine but somewhat longer and stouter on abdominal segments VII and VIII.

Type data. **Holotype**: adult female alone on slide, New Zealand, MB, Ward's Pass, on *Raoulia australis*, 16 August 1966, J.A. de Boer ("135") (NZAC). **Paratypes**: 3 adult females, same data as holotype (NZAC).

Material examined. Type specimens only.

Remarks. The presence of oral collar tubular ducts over the entire body distinguishes *R. raouliae* from the other known species of *Renicaula*.

Genus *Rhizoecus* Künckel d'Herculais

Rhizoecus Künckel d'Herculais, 1878: 163. Type-species *Rhizoecus falcifer* Künckel d'Herculais, 1878, by monotypy.

Ripersiella Tinsley *in* Cockerell, 1899: 278. Type-species *Ripersia rumicis* Maskell, 1892, by subsequent designation of Cockerell (1901). Synonymised by Hambleton (1974).

Morrisonella Hambleton, 1946a: 16 (preoccupied). Type-species *Morrisonella poensis* Hambleton, 1946a, by original designation. Synonymised by Ferris (1953).

Neorhizoecus Hambleton, 1946a: 40. Type-species *Rhizoecus coffeae* Laing, 1925, by original designation. Synonymised by Lindinger (1957, p. 550).

Coccidella Hambleton, 1946b: 177 (new name for *Morrisonella* Hambleton). Synonymised by Ferris (1953).

Body outline elongate to oval. A small sclerotised area, here referred to as a 'cephalic plate', sometimes on venter just above clypeus. Antennae 5- or 6-segmented, strongly geniculate, set close together at apex of head. Legs well developed; tarsal claws without denticles; hind legs without translucent pores. Spiracles of normal pseudococcid form. Cir-

culi (if present) small, round, truncate or conical, with flaveolate oral surfaces. Both pairs of ostioles distinct; edges of lips usually heavily sclerotised, but numbers of pores and setae in each lip not discernible. Cerarii absent. Anal lobes usually with several long flagellate setae, these sometimes on sclerotised areas. Anal lobe bars absent. Anal ring with few cells, their numbers variable and generally characteristic of species; anal ring setae fairly short relative to diameter of ring.

Multilocular disc pores present or absent on both surfaces. Quinquelocular pores absent. Trilocular pores generally moderately numerous and evenly distributed. Oral rim tubular ducts absent. Oral collar tubular ducts usually present on both surfaces. Bitubular or tritubular ducts present. Simple pores not apparent. Setae flagellate.

Live females are typically translucent white, covered with amorphous creamy white wax.

Remarks. *Rhizoecus* is a very distinctive and cosmopolitan genus of small, white, root-feeding mealybugs. Most of the species known from New Zealand apparently feed mainly on grass roots, but two cosmopolitan pests of a wide variety of plants, *R. dianthi* and *R. falcifer*, have been introduced into New Zealand. Two grass-feeding species, *R. californicus* and *R. graminis*, appear to be of North American origin, and a third, *R. rumicis*, is known from both New Zealand and Australia. A further three species — *R. deboerae*, *R. oliveri*, and *R. puhiensis* — are very similar to each other, and are known only from New Zealand.

KEY TO SPECIES OF *RHIZOECUS* KNOWN FROM NEW ZEALAND

01 Bitubular ducts present ... 02
— Tritubular ducts present ... 05

02(01) Multilocular disc pores on venter and dorsum of head and thorax (Fig. 124) ... ***rumicis***
— Multilocular disc pores not on venter or dorsum of head or thorax ... 03

03(02) Abdominal segment VII without bitubular ducts; body with a total of 2–39 of these ducts; circulus usually truncate (Fig. 118) ... ***deboerae***
— Abdominal segment VII with bitubular ducts on margins of venter; body with a total of 46–117 of these ducts; circulus usually conical ... 04

04(03) Abdominal venter with bitubular ducts on median areas; body with a total of 90–117 of these ducts (Fig. 122) ... ***oliveri***
— Abdominal venter without bitubular ducts on median areas; body with a total of 46–72 of these ducts (Fig. 123) ... ***puhiensis***

05(01) Multilocular disc pores not on dorsum; circulus absent; dorsal tritubular ducts in rows of up to 3 across abdominal segments (Fig. 117) ... ***californicus***
— Multilocular disc pores present on dorsum ... 06

06(05) Antennae 5-segmented; anal lobes each with 6 long setae; dorsal tritubular ducts in rows of up to 11 across abdominal segments (Fig. 120) ... ***falcifer***
— Antennae 6-segmented; anal lobes each with 3 long setae; dorsal tritubular ducts in rows of no more than 3 across abdominal segments (Fig. 121) ... ***graminis***

Rhizoecus californicus Ferris

Figure 117

californicus Ferris, 1953: 434 (*Rhizoecus*). Wise, 1977: 102 (*Rhizoecus*). Cox, 1978: 624 (*Rhizoecus*).
plantaginis Hambleton, 1974: 152 (*Rhizoecus*). Synonymised by Cox (1978).

Appearance of live female typical of genus.

Body outline oval; length (mounted) 0.7–1.7 mm, width 0.3–1.0 mm. Antennae 5-segmented. Cephalic plate distinct. Legs typical of genus; digitules slightly dilated, extending beyond claw; hind trochanter + femur 0.10–0.12 mm long; hind tibia + tarsus 0.11–0.13 mm long. Circulus small, truncate, its oral surface reticulate; width of base less than 0.01 mm. Anal lobes slightly protruding, each with 3 elongate setae on a small sclerotised area. Anal ring with 14–18 elongate-oval outer cells containing spicules; inner ring with 10–16 large, irregular cells lacking spicules; anal ring setae almost twice as long as diameter of ring.

Venter. Multilocular disc pores present around vulva and in a row across posterior edge of abdominal segment VI, totalling 30–51. Trilocular pores moderately numerous. Oral collar tubular ducts singly on margins of most abdominal segments, and a few on median areas of abdomen. Tritubular ducts moderately numerous over entire venter, totalling 61–90. Setae short, fine.

Dorsum. Multilocular disc pores absent. Trilocular pores moderately numerous. Oral collar

tubular ducts the same size as on venter, sparsely scattered over entire dorsum. Tritubular ducts slightly larger than on venter, numerous over entire dorsum. Setae short, fine.

Type data. *Rhizoecus californicus* Ferris. **Holotype**: adult female, U.S.A., California, from soil (UCDC).

Rhizoecus plantaginis Hambleton. **Holotype**: adult female alone on slide, New Zealand, NN, Nelson, Ruby Bay, on roots of *Plantago media*, 29 September 1966, J.A. de Boer (NZAC). **Paratypes**: 8 adult females, same data as holotype (BMNH, NZAC, USNM).

Material examined. Holotype of *Rhizoecus plantaginis*, plus 212 non-type adult females from New Zealand (BMNH, NZAC).

ND, AK, WO, HB, WA, WN / NN.

Collected in January and June–November.

Taken from roots of *Dichondra repens* (Convolvulaceae), *Festuca rubra*, *Holcus lanatus*, and *Lolium perenne* (Poaceae), *Juncus* sp. (Juncaceae), blue lupin [*Lupinus angustifolius*] (Fabaceae), *Plantago media* (Plantaginaceae), *Salicornia australis*, *Sonchus* sp., and smooth hawkbit [*Hypochaeris glabra*] (Asteraceae), *Suaeda novae-zelandiae* (Chenopodiaceae), strawberry [*Fragaria* sp.] (Rosaceae), in soil around nikau [*Rhopalostylis sapida*] (Palmae), and in pasture soil.

Remarks. The presence of a circulus distinguishes *R. californicus* from the other three species of *Rhizoecus* with tritubular ducts known from New Zealand.

Rhizoecus deboerae Hambleton

Figure 118

deboerae Hambleton, 1974: 149 (*Rhizoecus*). Matile-Ferrero, 1976: 303 (*Ripersiella*). Wise, 1977: 102 (*Rhizoecus*). Cox, 1978: 624 (*Rhizoecus*).

Appearance of live female typical of genus.

Body outline elongate-oval; length (mounted) 1.7–2.0 mm, width 0.9–1.1 mm. Antennae 6-segmented. Cephalic plate usually distinct. Legs typical of genus; digitules slightly dilated, extending beyond claw; hind trochanter + femur 0.11–0.13 mm long; hind tibia + tarsus 0.12–0.15 mm long. Circulus small, truncate; width of base about 0.01 mm. Anal lobes not protruding, each with 3 elongate setae on a small sclerotised area. Anal ring with 16 elongate outer cells containing spicules; inner ring with 12 large, irregular cells; anal ring setae not quite twice as long as diameter of ring.

Venter. Multilocular disc pores present around vulva and in rows across posterior edges of abdominal segments V–VII, totalling 62–128. Trilocular pores somewhat sparse. Oral collar tubular ducts singly on margins of most body segments. Bitubular ducts singly on margins of some abdominal segments (not segment VIII), and usually adjacent to each spiracular aperture, totalling 1–13. Setae short, fine.

Dorsum. Multilocular disc pores in rows across posterior edges of abdominal segments V–VII, totalling 13–35. Trilocular pores moderately numerous. Oral collar tubular ducts the same size as on venter, very sparsely scattered over entire dorsum. Bitubular ducts the same size as on venter, singly on margins of most body segments and sometimes on midline of some abdominal segments, totalling 18–30. Setae short, fine.

Type data. Holotype: adult female alone on slide, New Zealand, NN, Nelson, Sandy Bay, on *Microlaena avenaceae*, 24 October 1966, J.A. de Boer ("186") (NZAC). **Paratypes**: 8 adult females, same data as holotype (BMNH, NZAC, USNM).

Material examined. Holotype and 4 paratypes, plus 25 non-type adult females (BMNH, NZAC).

TO / NN, MB.

Collected in May, August, and October.

Taken from roots of *Microlaena avenacea* (Poaceae), roots of Spaniard [*Aciphylla* sp.] (Apiaceae), and pasture soil.

Remarks. *R. deboerae* is similar to the other two indigenous species of *Rhizoecus* in having bitubular ducts and lacking multilocular disc pores on head and thorax. It differs in lacking bitubular ducts on abdominal segment VII, and in having relatively few of these ducts over the whole body.

Rhizoecus dianthi Green

Figure 119

dianthi Green, 1926: 175 (*Rhizoecus*). Hambleton, 1946a: 23 (*Morrisonella*). Hambleton, 1946b: 177 (*Coccidella*). Williams & Nakahara, 1980: 336 (*Rhizoecus*).

pritchardi McKenzie, 1960: 749 (*Rhizoecus*). Cox, 1978: 635 (*Rhizoecus*). Synonymised by Williams & Nakahara (1980).

Appearance of live female typical of genus.

Body outline elongate-oval; length (mounted) 1.6–2.0 mm, width 0.8–1.1 mm. Antennae 6-segmented. Cephalic plate not apparent. Legs typical of genus; digitules stout, not dilated apically, extending about halfway up claw; hind trochanter + femur 0.13–0.18 mm long; hind tibia + tarsus

0.14–0.17 mm long. Circulus absent. Anal lobes slightly protruding, each with 3 elongate setae not on sclerotised areas. Anal ring with 12 elongate-oval outer cells containing spicules; inner ring with 10 large, irregular cells lacking spicules; anal ring setae slightly longer than diameter of ring.

Venter. Multilocular disc pores present around vulva, and sometimes a few on posterior edges of abdominal segments V and VI, totalling 11–17. Trilocular pores moderately numerous. Oral collar tubular ducts absent. Tritubular ducts singly on margins of some body segments, and a few on median areas of abdomen, totalling 4–8. Setae moderately short and fine.

Dorsum. Multilocular disc pores and oral collar tubular ducts absent. Trilocular pores moderately numerous. Tritubular ducts slightly larger than on venter, sparsely scattered over entire dorsum, totalling 23–28. Setae short, fine.

Type data. *Rhizoecus dianthi* Green. **Lectotype** (designated by Williams & Nakahara 1980): adult female with 3 others on slide (ringed on coverslip), England, Wisley, Royal Horticultural Society Gardens, from roots of *Dianthus* sp. under glass, G. Fox-Wilson ("BM 1940-180") (BMNH). **Paralectotypes**: 3 adult females on same slide as lectotype.

Rhizoecus pritchardi McKenzie. **Holotype**: adult female, U.S.A., California, Colma, on *Adiantum* sp. (UCDC).

Material examined. Lectotype and 3 paralectotypes of *R. dianthi*, plus 28 non-type adult females from New Zealand and several from England (BMNH, NZAC).

BP / —.

Collected in August.

Taken from roots of *Saintpaulia ionantha* (Gesneriaceae).

Remarks. *R. dianthi* can be distinguished from the other species of *Rhizoecus* with tritubular ducts known from New Zealand by lacking a circulus, having five-segmented antennae, and having the multilocular disc pores confined to the venter of posterior abdominal segments. It was first recorded from New Zealand by Cox (1978; as *R. pritchardi*) on roots of *Saintpaulia ionantha*, and has apparently not been found here since. In England it is a pest of a wide variety of greenhouse plants.

Rhizoecus falcifer Künckel d'Herculais

Figure 120

falcifer Künckel d'Herculais, 1878: 164 (*Rhizoecus*). De Boer, 1967a: 8 (*Rhizoecus*). Hambleton, 1974: 150 (*Rhizoecus*). Wise, 1977: 102 (*Rhizoecus*). Cox, 1978: 625 (*Rhizoecus*).

terrestris Newstead, 1895: 213 (*Ripersia*). Fernald, 1903: 114 (*Rhizoecus*). Synonymised by Lindinger (1935b).

africanus Brain, 1915: 89 (*Rhizoecus*). Synonymised by Hambleton (1946a).

decoratus Green, 1926: 177 (*Rhizoecus*). Synonymised by Hambleton (1946a).

moruliferus Green, 1933: 52 (*Rhizoecus*). Synonymised by Williams (1961).

Appearance of live female typical of genus.

Body outline elongate-oval; length (mounted) 1.9–4.3 mm, width 0.6–2.0 mm. Antennae 5-segmented. Cephalic plate distinct. Legs typical of genus; digitules short, setose, extending almost to half length of claws; hind trochanter + femur about 0.23 mm long; hind tibia + tarsus about 0.24 mm long. Circulus absent. Anal lobes protruding, each with 6 elongate setae not on a sclerotised area. Anal ring with 10–12 elongate outer cells, most containing spicules; inner ring with 8 larger, elongate cells lacking spicules; anal ring setae about 1.5× as long as diameter of ring.

Venter. Multilocular disc pores around vulva and in rows across posterior edges of abdominal segments II–VII. Trilocular pores moderately numerous. Oral collar tubular ducts sparsely scattered over entire venter. Tritubular ducts in rows across median areas of abdominal segments II–VII, and in groups of 2–5 on margins of most thoracic and abdominal segments. Setae short, fine.

Dorsum. Multilocular disc pores in rows across posterior edges of abdominal segments I–V, and numerous on head and thorax. Trilocular pores moderately numerous. Oral collar tubular ducts the same size as on venter, very sparsely scattered over entire dorsum. Tritubular ducts slightly larger than on venter, numerous over entire dorsum, in rows of up to 11 across abdominal segments, totalling more than 100. Setae short, fine.

Type data. *Rhizoecus falcifer* Künckel d'Herculais. **Syntype** females (probably lost): France, Paris, in greenhouses, on roots of *Seaforthia [Ptychosperma] elegans*.

Ripersia terrestris Newstead. **Lectotype** (designated by Williams 1985): adult female, England, London, on roots of *Stephanotis* under glass (BMNH).

Rhizoecus africanus Brain. **Syntype** females: South Africa, Capetown, on roots of flowering plants (SANC; see De Lotto 1958).

Rhizoecus decoratus Green. **Lectotype** (designated by Williams 1985): adult female, England, Yorkshire, Eastringham, on roots of *Abutilon* sp. under glass (BMNH).

Rhizoecus moruliferus Green. **Lectotype** (designated by Williams 1985): adult female, Surinam, on roots of *Coffea liberica* (BMNH).

Material examined. Lectotypes of *Ripersia terrestris*, *Rhizoecus decoratus*, and *R. moruliferus*, plus 35 non-type adult females from New Zealand (BMNH, NZAC, PANZ).

ND, AK / NN.

Collected in January, March, May, September, November, and December.

Taken from roots of *Hibiscus* sp. (Malvaceae), *Luculia grandifolia* (Rubiaceae), passionfruit [*Passiflora edulis*] (Passifloraceae), *Capsicum annuum*, tomato [*Lycopersicum esculentum*], and potato [*Solanum tuberosum*] (Solanaceae).

Remarks. *R. falcifer* differs from the other species of *Rhizoecus* known from New Zealand in having six long setae on each anal lobe, and in its numerous multilocular disc pores and tritubular ducts on both surfaces of the body. This cosmopolitan mealybug was first recorded from New Zealand by de Boer (1967a).

Rhizoecus graminis (Hambleton)

Figure 121

graminis Hambleton, 1946a: 29 (*Morrisonella*). Ferris, 1953: 446 (*Rhizoecus*). Cox, 1978: 634 (*Rhizoecus*).
perprocerus De Lotto, 1961: 228 (*Rhizoecus*). Hambleton, 1974: 150 (*Rhizoecus*). Wise, 1977: 102 (*Rhizoecus*). Synonymised by Cox (1978).

Appearance of live female typical of genus.

Body outline elongate-oval; length (mounted) 1.0–2.2 mm, width 0.4–1.1 mm. Antennae 6-segmented. Cephalic plate distinct. Legs typical of genus; digitules short, setose, extending to almost half length of claws; hind trochanter + femur 0.12–0.15 mm long; hind tibia + tarsus 0.14–0.17 mm long. Circulus absent. Anal lobes weakly protruding, each with 3 elongate setae on a small sclerotised area. Anal ring with 12–14 elongate outer cells containing spicules; inner ring with 8–12 elongate, irregular cells lacking spicules; anal ring setae about 1.5× as long as diameter of ring.

Venter. Multilocular disc pores moderately numerous over entire venter. Trilocular pores somewhat sparse. Oral collar tubular ducts sparsely scattered over thorax and abdomen. Tritubular ducts of 2 sizes, the smaller ducts singly on submedian areas of most abdominal segments, the larger ones singly on margins of most body segments, totalling 27–28. Setae short, fine.

Dorsum. Multilocular disc pores in rows across posterior edges of abdominal segments I–VI, and scattered in moderate numbers over head and thorax. Trilocular pores moderately numerous. Oral collar tubular ducts the same size as on venter, sparsely scattered over entire dorsum. Tritubular ducts slightly larger than on venter, singly on margins and midline of most body segments (not segment VII), totalling 18–23. Setae short, fine.

Type data. *Morrisonella graminis* Hambleton. **Holotype**: adult female, U.S.A., California, Oakland, on roots of bent grass (USNM).

Rhizoecus perprocerus De Lotto. **Holotype**: adult female, South Africa, Hexrivier (BMNH).

Material examined. 6 paratypes of *R. graminis* and holotype of *R. perprocerus*, plus 135 non-type adult females from New Zealand (BMNH, PANZ, NZAC, USNM).

ND, AK, WO, BP, GB, HB, RI, WI, WN / NN.

Collected in May–December.

Taken from roots of *Agrostis tenuis*, *Festuca rubra*, and ryegrass [*Lolium perenne*] (Poaceae), Mercury Bay weed [*Dichondra repens*] (Convolvulaceae), and pasture soil.

Remarks. *R. graminis* was first recorded from New Zealand by Hambleton (1974), as *R. perprocerus*. It can be distinguished from the other species with tritubular ducts known from New Zealand by its combination of numerous multilocular disc pores over both surfaces of the body and six-segmented antennae.

Rhizoecus oliveri Cox

Figure 122

oliveri Cox, 1978: 635 (*Rhizoecus*).

Appearance of live female typical of genus.

Body outline elongate-oval; length (mounted) 1.1–2.0 mm, width 0.5–1.4 mm. Antennae 6-segmented. Cephalic plate distinct. Legs typical of genus; digitules slightly dilated, extending beyond claw; hind trochanter + femur 0.12–0.15 mm long; hind tibia + tarsus 0.12–0.15 mm long. Circulus small, truncate; width of base 0.01–0.03 mm. Anal lobes not protruding, each with 3 elongate setae on a small sclerotised area. Anal ring with 10–12 elongate-oval outer cells containing spicules; inner ring with 10–12 large, irregular cells lacking spicules; anal ring setae not quite twice as long as diameter of ring.

Venter. Multilocular disc pores present around vulva and in rows across posterior edges of abdominal segments IV–VII, totalling 54–102. Trilocular pores moderately numerous. Oral collar

tubular ducts singly on margins of most body segments and on submedian areas of most abdominal segments. Bitubular ducts singly or in pairs on margins of most body segments, including abdominal segment VIII, and singly on submedian areas of some thoracic and abdominal segments, totalling 33–48. Setae short, fine.

Dorsum. Multilocular disc pores in rows across posterior edge of abdominal segment VII and sometimes IV and V, totalling 6–22. Trilocular pores moderately numerous. Oral collar tubular ducts the same size as on venter, sparsely scattered over entire dorsum. Bitubular ducts the same size as on venter, moderately numerous over entire dorsum, totalling 52–77. Setae short, fine.

Type data. **Holotype**: adult female alone on slide, New Zealand, WO, Raglan, in pasture soil, 24 July 1977, H.A. Oliver (NZAC). **Paratypes**: 22 adult females, same data as holotype (BMNH, NZAC, USNM).

Material examined. Type series, plus 67 non-type adult females (BMNH, NZAC, USNM).

ND, AK, WO, HB / —.

Collected in July–November.

Taken from roots of *Festuca rubra* and unidentified grasses (Poaceae), and pasture soil.

Remarks. *R. oliveri* is similar to another indigenous species, *R. puhiensis*, but differs in having more bitubular ducts which are present also on the median areas of the venter, and in having only 10–12 cells in the outer anal ring.

Rhizoecus puhiensis Hambleton

Figure 123

puhiensis Hambleton, 1974: 154 (*Rhizoecus*). Matile-Ferrero, 1976: 303 (*Ripersiella*). Wise, 1977: 102 (*Rhizoecus*). Cox, 1978: 636 (*Rhizoecus*).

Appearance of live female typical of genus.

Body outline elongate-oval; length (mounted) 1.0–1.9 mm, width 0.5–1.1 mm. Antennae 6-segmented. Cephalic plate usually distinct. Legs typical of genus; digitules slightly dilated, extending beyond claw; hind trochanter + femur about 0.12 mm long; hind tibia + tarsus about 0.13 mm long. Circulus small, conical; width of base less than 0.01 mm. Anal lobes not protruding, each with 3 elongate setae on a small, slightly sclerotised area. Anal ring with 14 elongate-oval outer cells containing spicules; inner ring with 10–12 large, irregular cells lacking spicules; anal ring setae not quite twice as long as diameter of ring.

Venter. Multilocular disc pores present around vulva and in rows across posterior edges of abdominal segments V–VII or IV–VII, totalling 64–124. Trilocular pores moderately numerous. Oral collar tubular ducts singly on margins of most thoracic and abdominal segments. Bitubular ducts singly or in pairs on margins of most body segments, including abdominal segment VIII, totalling 16–21. Setae short, fine.

Dorsum. Multilocular disc pores sparsely in rows across posterior edge of abdominal segment VII and sometimes IV and V, totalling 5–30. Trilocular pores moderately numerous. Oral collar tubular ducts the same size as on venter, sparsely scattered over entire dorsum. Bitubular ducts the same size as on venter, moderately numerous over entire dorsum, totalling 31–45. Setae short, fine.

Type data. **Holotype**: adult female alone on slide, New Zealand, MB, Puhi Peaks, 2500 ft [750 m], on ?*Dactylis glomerata*, 12 October 1966, J.A. de Boer (NZAC). **Paratypes**: 3 adult females, same data as holotype (NZAC).

Material examined. Holotype and 4 paratypes, plus 10 non-type adult females (BMNH, NZAC).

CL, TO / NN, MB, BR.

Collected in August–November.

Taken from ?*Dactylis glomerata* and *Chionochloa rubra* (Poaceae), and pasture soil.

Remarks. See Remarks under *R. oliveri*.

Rhizoecus rumicis (Maskell)

Figure 124

rumicis Maskell, 1892: 37 (*Ripersia*). Tinsley *in* Cockerell, 1899: 278 (*Ripersiella*). Cockerell, 1901: 165 (*Ripersiella*). Fernald, 1903: 115 (*Ripersiella*). Myers, 1922: 198 (*Ripersiella*). Lindinger, 1935b: 143 (*Rhizoecus*). de Boer, 1967a: 9 (*Ripersiella*). Williams & de Boer, 1973: 241 (*Ripersiella*). Hambleton, 1974: 156 (*Rhizoecus*). Wise, 1977: 102 (*Rhizoecus*). Cox, 1978: 636 (*Rhizoecus*).

Appearance of live female typical of genus.

Body outline oval, with anterior apex slightly tapered; length (mounted) 1.6–2.3 mm, width 0.8–1.7 mm. Antennae 6-segmented, set close together. Cephalic plate distinct. Legs typical of genus; digitules slightly dilated, extending beyond claw; hind trochanter + femur 0.08–0.11 mm long; hind tibia + tarsus 0.08–0.11 mm long. Circulus small, conical; width of base less than 0.01 mm. Anal lobes not protruding, each with 3 elongate setae on a small sclerotised area. Anal ring with 10–12 elongate-oval outer cells containing spicules; inner ring with 12

large, irregular cells lacking spicules; anal ring setae not quite twice as long as diameter of ring.

Venter. Multilocular disc pores moderately numerous over entire surface. Trilocular pores moderately numerous. Oral collar tubular ducts singly on margins of most segments and on submedian areas of some abdominal segments. Bitubular ducts absent. Setae short, fine.

Dorsum. Multilocular disc pores and trilocular pores as on venter. Oral collar tubular ducts the same size as on venter, sparsely scattered over posterior abdominal segments. Bitubular ducts very small and sparse, on margins of some body segments and sometimes on midline of thorax, totalling 11–21. Setae short, fine.

Type data. Given by Maskell (1892) as "In New Zealand, underground, amongst roots of *Rumex acetosella* (garden sorrel): my specimens are from the Reefton district, sent by Mr. Raithby". **Lectotype** (designated by Hambleton 1974) from a subsequent slide (NZAC).

Material examined. Lectotype, plus 130 non-type adult females (BMNH, NZAC, USNM).

ND, AK, WO, TO, TK, HB, WI, WN / NN, SD, MB, BR, MC, DN.

Collected in March–November.

Taken from *Agrostis tenuis*, *Cortaderia fulvida*, *Festuca rubra*, ryegrass [*Lolium perenne*], and marram grass [*Ammophila arenaria*] (Poaceae), *Rumex* sp. and garden sorrel [*Rumex acetosella*] (Polygonaceae), *Cotula* sp. (Asteraceae), *Lepidothamnus laxifolius* (Podocarpaceae), and pasture soil.

Remarks. *R. rumicis* can be distinguished from the other known New Zealand species of *Rhizoecus* by its body shape, the sparsity and smallness of its bitubular ducts, and the presence of multilocular disc pores on the head and thorax. It is also found in Australia.

Genus *Sarococcus* Williams & de Boer

Sarococcus Williams & de Boer, 1973: 244. Type-species *Ripersia fagi* Maskell, 1891, by original designation.

Body outline broadly oval, often irregular. Antennae 6–8-segmented. Legs well developed; tarsal claws without denticles; translucent pores usually present on hind legs. Spiracles of normal pseudococcid form. Circulus sometimes large and irregular in outline. Posterior ostioles distinct, but anterior pair not apparent. Cerarii numbering 2–17 pairs; anal lobe cerarii on sclerotised areas, each with 6–30 conical setae and a concentration of trilocular pores; remaining cerarii sometimes on sclerotised areas, each with 2–20 conical setae and a concentration of trilocular pores. Anal lobe bars present. Anal ring of normal pseudococcid form.

Multilocular disc pores few, generally restricted to mid-ventral areas of posterior abdominal segments. Quinquelocular pores absent. Trilocular pores on dorsum sometimes distinctly larger than those on venter. Oral rim tubular ducts absent. Oral collar tubular ducts slender, on venter only, sparse on median areas of abdominal segments but numerous on head or thorax, or both; larger tubular ducts — sometimes with appearance of oral rim tubular ducts, as collar tends to push out surrounding integument — sometimes on margins of venter. Simple pores minute, scattered over entire body. Setae flagellate, generally moderately long and fine on venter but short and stout on dorsum.

Remarks. *Saracoccus* was erected by Williams & de Boer (1973) to contain a single species, *S. fagi*. Their concept of the genus has been expanded here to contain three new species which also feed on *Nothofagus*. All are known only from New Zealand.

KEY TO SPECIES OF *SAROCOCCUS*

01 Cerarii numbering 2 pairs, on abdomen only; antennae 6- or 7-segmented (Fig. 127) ... ***fagi***
— Cerarii numbering 13–17 pairs, on head, thorax, and abdomen; antennae 8-segmented ... 02

02(01) Circulus hourglass-shaped; oral collar tubular ducts of 2 sizes, the larger ducts present on margins of abdominal segments (Fig. 125) ... ***comis***
— Circulus round or oval; oral collar tubular ducts of 1 size only, not on margins of abdominal segments ... 03

03(02) Cerarii not on protuberances; conical setae extending on to integument around cerarii; anal lobe cerarii each with 25–30 conical setae (Fig. 126) ... ***deplanatus***
— Cerarii situated on protuberances, giving a scalloped outline to body; conical setae confined to these protuberances; anal lobe cerarii each with 8–10 conical setae (Figure 128)... ***undatus***

Sarococcus comis new species

Figure 125

Live females orange when immature but green when adult, covered with a very thin powdering of white wax, attached to leaf by a lateral fringe of glassy-appearing wax filaments. Eggs laid into cavity under body.

Body outline broadly oval; length (mounted) 1.6–2.5 mm, width 1.0–1.9 mm. Antennae 8-segmented. Legs somewhat stout; hind trochanter + femur 0.25–0.45 mm long; hind tibia + tarsus 0.25–0.47 mm long; translucent pores present on hind coxae only. Circulus hourglass-shaped, 0.19–0.32 mm wide. Both pairs of ostioles distinct; lips each with 10–22 trilocular pores and 1–6 setae. Cerarii numbering 13–17 pairs; anal lobe cerarii each with 25–30 slender, conical setae and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2–8 conical setae and an associated group of trilocular pores.

Venter. Multilocular disc pores present around vulva, in a row across posteromedian edge of abdominal segment VI and usually also V, and an occasional pore on margins of abdomen. Trilocular pores sparsely but evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts sparsely in rows across median areas of abdominal segments V–VII and moderately numerous submarginally over entire venter, except on abdominal segment VI–IX, the larger ones frequently appearing to have oral rims, on margins of entire venter except abdominal segments VIII and IX. Setae moderately long and fine.

Dorsum. Trilocular pores slightly larger than on venter, sparsely but evenly distributed. Setae generally short and stout, but somewhat conical on margins of body.

Type data. Holotype: adult female, left-hand specimen of 4 on slide (position shown on label), New Zealand, GB, Lake Waikaremoana, on leaves of *Nothofagus menziesii*, 3 March 1983, J.M. Cox ("317") (NZAC). **Paratypes**: 8 adult females on 3 slides (incuding holotype slide), same data as holotype (BMNH, NZAC, USNM).

Material examined. Type specimens, plus 23 non-type adult females (BMNH, FRNZ, NZAC, USNM).

BP, GB / NN, BR.

Collected in February–April, August, and December.

Taken from *Nothofagus fusca*, *N. menziesii*, and *N. solandri* (Fagaceae).

Remarks. *S. comis* can be distinguished from the other known species of *Sarococcus* by its 13–17 pairs of cerarii which are not on protuberances, hourglass-shaped circulus, and oral collar tubular ducts of two sizes, both present on median areas but neither on the median thoracic venter. The colour of the live females has apparently caused confusion with another green species, *Paracoccus glaucus*. The record of *Dactylopius glaucus* from *Nothofagus* given by de Boer (1967a) is a misidentification of *Sarococcus comis*, and the comment by Williams & de Boer (1973) that *Dactylopius glaucus* probably belonged in *Sarococcus* was probably also based on this misconception.

The specific name — Latin, 'pleasing' — alludes to the attractive form and colour of the live females.

Sarococcus deplanatus new species

Figure 126

Live females green, covered with a very thin powdering of white wax, and with a lateral fringe of fine, glassy-appearing wax filaments.

Body outline oval; length (mounted) 2.7–3.2 mm, width 1.5–2.0 mm. Antennae 8-segmented. Legs somewhat elongate; hind trochanter + femur 0.38–0.44 mm long; hind tibia + tarsus 0.41–0.46 mm long; translucent pores present on hind coxae only. Circulus oval, 0.11–0.14 mm wide. Both pairs of ostioles distinct; lips each with 4–15 trilocular pores and 0–3 setae. Cerarii numbering 17 pairs; each cerarius on a sclerotised area not protruding noticeably beyond body outline, with 10–30 slender conical setae and an associated group of trilocular pores.

Venter. Multilocular disc pores usually absent, but occasionally 1 or 2 present around vulva. Trilocular pores sparsely but evenly distributed. Oral collar tubular ducts in rows across median areas of abdominal segments IV–VI, and numerous on median areas of thorax between 1st and 2nd pairs of coxae. Setae moderately long and fine over most of venter, but almost conical on marginal areas, especially those on head and thorax.

Dorsum. Trilocular pores slightly larger than on venter, sparsely but evenly distributed. Setae short and moderately stout over most of dorsum, but almost conical on margins; setae between and adjacent to cerarii — especially on head and thorax — almost as large as cerarian setae.

Type data. Holotype: adult female alone on slide, New Zealand, MB, Jollies Pass near Hanmer Springs, beating *Nothofagus*, 20 January 1976, A.R. Ferguson (NZAC). **Paratypes**: 7 adult females on 5 slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens, plus 9 non-type adult females (BMNH, FRNZ, NZAC).

TO, RI, WN / NN, MB, NC, OL.

Collected in January, February, October, and December.

Taken from *Nothofagus* sp. and *N. solandri* (Fagaceae). Occurring on the undersides of leaves and on twigs.

Remarks. *S. deplanatus* can be distinguished from the other known species of *Sarococcus* by its 17 pairs of cerarii not protruding beyond the body outline, and by having conical setae similar in size to cerarian setae between and adjacent to the cerarii.

The specific name — Latin, 'flattened' — alludes to the form of the live females.

Sarococcus fagi (Maskell)

Figure 127

fagi Maskell, 1891: 24 (*Ripersia*). Maskell, 1894: 46 (*Ripersia*). Cockerell, 1896: 324 (*Ripersia*). Fernald, 1903: 116 (*Ripersia*). Myers, 1922: 198 (*Ripersia*). Brittin, 1938: 333 (*Trionymus*). Williams & de Boer, 1973: 244 (*Sarococcus*). Wise, 1977: 102 (*Saroccoccus*). Deitz & Tocker, 1980: 53 (*Sarococcus*).

Live females "subglobular, dark-red or brown in colour, with 4 separate pencils of wax at posterior end of body, sometimes amalgamating in a mass" Maskell (1891).

Body outline broadly oval, constricted between prothorax and mesothorax; length (mounted) 1.3–2.8 mm, width 1.1–2.1 mm. Antennae 6- or 7-segmented. Legs somewhat stout; hind trochanter + femur 0.20–0.22 mm long; hind tibia + tarsus 0.19–0.22 mm long; translucent pores present on hind coxae and tibiae. Circulus large, hourglass-shaped, 0.22–0.25 mm wide. Both pairs of ostioles distinct; lips each with 4–20 trilocular pores and 0–3 setae. Cerarii numbering 2 pairs, all on sclerotised areas and with concentrations of trilocular pores; anal lobe cerarii each with 25–30 slender conical setae; remaining cerarii each with 10–12 slender conical setae.

Venter. Multilocular disc pores confined to median areas, around vulva and in rows across posterior edges of abdominal segments VI and sometimes V. Trilocular pores sparsely but evenly distributed. Oral collar tubular ducts of 2 sizes, the smaller ducts sparsely in rows across median areas of abdominal segments V–VII, the larger ones moderately numberous around margins of entire venter except abdominal segments VIII and IX, but absent from median areas of thorax and abdomen. Setae moderately long and fine.

Dorsum. Trilocular pores slightly larger than on venter, sparsely but evenly distributed. Setae short, moderately stout.

Type data. Given by Maskell (1891) as "In New Zealand, on *Fagus [Nothofagus] menziesii*, Reefton district [BR]". **Lectotype** (designated by Deitz & Tocker 1980): adult female alone on slide, labelled in Maskell's handwriting "*Ripersia fagi*, adult female, July 1890, W.M.M." (NZAC).

Material examined. Lectotype, plus 12 non-type adult females (BMNH, FRNZ, NZAC).

TO, BP / BR, FD.

Collected in February and June.

Taken from *Nothofagus fusca* and *N. menziesii* (Fagaceae).

Remarks. *S. fagi* can be distinguished from the other known species of *Sarococcus* by having only two pairs of cerarii.

Sarococcus undatus new species

Figure 128

Live female green, with a darker line down midline of body, very thinly covered with powdery white wax extending into a lateral fringe of fine filaments around entire body.

Body outline roughly oval, but with a wavy edge; length (mounted) 1.6–3.6 mm, width 1.0–2.3 mm. Antennae 8-segmented. Legs moderately elongate; hind trochanter + femur 0.31–0.35 mm long; hind tibia + tarsus 0.28–0.31 mm long; translucent pores sometimes present on hind coxae and tibiae. Circulus round or oval, 0.09–0.15 mm wide. Ostioles represented by posterior pair only; lips each with 8–16 trilocular pores and 1–4 setae. Cerarii numbering 16 pairs, all on protruding sclerotised areas; anal lobel cerarii each with 6–8 slender, conical setae and a concentration of trilocular pores; remaining cerarii each with 2–8 slender conical setae and a few associated trilocular pores.

Venter. Multilocular disc pores absent, or a total of 1–3 pores occurring on median areas of abdominal segments VI and VII. Trilocular pores sparsely but evenly distributed. Oral collar tubular ducts present in sparse rows across median areas of abdominal segments V and VI, and numerous on median areas of thorax. Setae moderately long and fine.

Dorsum. Trilocular pores larger than on venter, generally sparsely but evenly distributed, but slightly aggregated on median areas of thorax. Setae short, stout.

Type data. **Holotype**: adult female alone on slide, New Zealand, FD, Lake Hauroko, on leaf of *Nothofagus solandri*, 27 January 1983, J.M. Cox ("182") (NZAC). **Paratypes**: 4 adult females together on slide, NC–WD, Arthur's Pass, on *Nothofagus solandri* var. *cliffortioides*, 9 Feb 1983, J.M. Cox ("251") (BMNH); 1 adult female alone on slide, NN, Wairoa Gorge, on *Nothofagus solandri*, 7 Dec 1966, J.A. de Boer ("222") (NZAC).

Material examined. Type specimens, plus 15 non-type adult females and 1 immature female (BMNH, NZAC, USNM).

AK / NN, NC, MC, FD. The AK record is based on an immature specimen.

Collected in January–March and December.

Taken from *Nothofagus* sp., *N. menziesii*, *N. solandri*, and *N. solandri* var. *cliffortioides* (Fagaceae).

Remarks. *S. undatus* is easily recognised by its characteristic form of cerarii, which protrude, giving a scalloped outline to slide-mounted specimens.

The specific name — Latin, 'wavy' — alludes to the characteristic outline of the body.

Genus *Spilococcus* Ferris

Spilococcus Ferris, 1950: 219. Type species *Dactylopius gutierreziae* Cockerell, 1896, by original designation.

Body outline oval to broadly oval. Antennae 7- or 8-segmented. Legs well developed; tarsal claws sometimes with denticles. Spiracles of normal pseudococcid form. Circulus present or absent. Both pairs of ostioles distinct. Cerarii numbering 6–17 pairs; each cerarius usually with 2 conical setae; flagellate auxiliary setae in anal lobe cerarii only. Anal lobe bars absent. Anal ring of normal pseudococcid form.

Multilocular disc pores usually present on venter, rarely on dorsum. Quinquelocular pores absent. Trilocular pores present. Oral rim tubular ducts present. Oral collar tubular ducts present on venter, usually absent from dorsum. Simple pores usually apparent. Setae flagellate.

Remarks. *Spilococcus* is very close to *Chorizococcus*, differing only in having more pairs of cerarii. It is superficially similar to *Paracoccus*, but lacks anal lobe bars; and to *Vryburgia*, but lacks dorsal rows or groups of oral collar tubular ducts. The type-species and its closest relatives are Nearctic, but species from most parts of the world have been placed in this genus. One American species, *S. leucopogi*, is known from New Zealand and one indigenous new species, *S. geoffreyi*, is here placed in this genus.

KEY TO SPECIES OF *SPILOCOCCUS* KNOWN FROM NEW ZEALAND

01 Multilocular disc pores present on dorsum (Fig. 129) ... ***geoffreyi***

— Multilocular disc pores absent from dorsum (Fig. 130) ... ***leucopogi***

Spilococcus geoffreyi new species

Figure 129

Appearance of live females not known.

Body outline broadly oval; length (mounted) 2.8–4.5 mm, width 1.8–3.3 mm. Legs typical of genus; tarsal claws without denticles; hind trochanter + femur 0.24–0.26 mm long; hind tibia + tarsus 0.26–0.28 mm long; translucent pores present on hind coxae and tibiae. Circulus absent. Ostioles distinct; lips each with 14–20 trilocular pores and 2–4 setae except for anteriormost pairs, which have 8–12 trilocular pores and lack setae. Cerarii numbering 8 pairs; anal lobe cerarii on sclerotised areas, each with 2 stout conical setae, 10–15 flagellate auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 large and 0–3 smaller conical setae and a small group of associated trilocular pores.

Venter. Multilocular disc pores numerous over entire surface. Trilocular pores moderately numerous and evenly distributed. Oral rim tubular ducts in groups of 2–6 on margins of thoracic and abdominal segments. Oral collar tubular ducts numerous over entire surface. Simple pores minute, sparsely distributed over entire surface. Setae moderately long and fine.

Dorsum. Multilocular disc pores as on venter. Trilocular pores generally evenly distributed, but aggregated around bases of enlarged setae on abdominal segment VII. Oral rim tubular ducts numerous over entire dorsum, in rows of up to 9 across body segments. Simple pores as on venter. Setae generally moderately long and fine, but somewhat stouter on posterior abdominal segments, and a group of 3 stout conical setae on midline of abdominal segment VII.

Type data. **Holotype**: adult female alone on slide, New Zealand, AK, Hunua Range, on roots of *Olearia rani*, 26 September 1977, G.J. Cox (NZAC). **Paratypes**: 3 adult females on separate slides, same data as holotype (BMNH, NZAC).

Material examined. Type specimens only.

Remarks. The combination of numerous multilocular disc pores and oral rim tubular ducts on the dorsum and the small group of stout conical setae on the midline of abdominal segment VII distinguishes *S. geoffreyi* from any other species of mealybug known from New Zealand. It is superficially similar to *Paracoccus canalis*, which also has multilocular disc pores and oral rim tubular ducts on the dorsum, but *S. geoffreyi* definitely lacks anal lobe bars, whereas *P. canalis* lacks the conical setae mentioned above.

This species is named for my husband, who collected the type specimens.

Spilococcus leucopogi (Brittin) new combination

Figure 130

leucopogi Brittin, 1938: 345 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).
mammillariae (Bouché). Brittin, 1938: 346 (*Trionymus*) [misidentification].
cactearum McKenzie, 1960: 757 (*Spilococcus*). Wise, 1977: 102 (*Spilococcus*). **New synonymy**.

Appearance of live females not known.

Body outline oval; length (mounted) 2.2–2.4 mm, width 1.2–1.5 mm. Legs well developed; tarsal claws with denticles; hind trochanter + femur 0.21–0.27 mm long; hind tibia + tarsus 0.24–0.30 mm long; translucent pores present on hind coxae and in a small, compact group in middle of each hind tibia. Circulus oval, 0.09–0.14 mm wide. Both pairs of ostioles distinct; lips each with 15–20 trilocular pores and 3–5 setae. Cerarii numbering 8–13 pairs, many indistinct, usually some on head and thorax; anal lobe cerarii on small, slightly sclerotised areas, each with 2 conical setae, 2 or 3 flagellate auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 conical setae and 1–5 associated trilocular pores.

Venter. Multilocular pores present around vulva, in rows across posteromedian edges of abdominal segments III–VII or IV–VII and anteromedian edges of VI and VII. Trilocular pores moderately numerous and evenly distributed. Oral rim tubular ducts singly or in pairs on margins of head and most thoracic and abdominal segments, and a few scattered over median areas of thorax. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of abdominal segments V–IX, the larger ones in rows across abdominal segments II–VII and in marginal groups on segments III–VIII. Simple pores minute, sparsely scattered over entire surface. Setae moderately long and fine.

Dorsum. Multilocular disc pores absent. Trilocular pores and simple pores as on venter. Oral rim tubular ducts moderately numerous over entire dorsum, in rows of up to 9 across abdominal segments. Oral collar tubular ducts extending around from venter on margins of abdominal segments III–VII. Setae short, moderately fine.

Type data. *Trionymus leucopogi* Brittin. **Lectotype** (here designated): adult female alone on slide, New Zealand, CL, Waihi, on *Leucopogon [Cyathodes] fasciculata*, 28 May 1934, R.P.B. (NZAC).

Spilococcus cactearum McKenzie. **Holotype**: adult female, U.S.A, California, Berkeley, on *Homalocephala texensis* (UCDC).

Material examined. Lectotype of *Trionymus leucopogi*, plus 4 non-type adult females from New Zealand and several specimens from Europe and the U.S.A. (BMNH, NZAC).

CL, BP / NN.

Collected in March, May, and November.

Taken from *Cyathodes fasciculata* (Epacridaceae), *Neoporteria crassispina*, and other Cactaceae.

Remarks. The small, compact group of translucent pores on the middle of each hind tibia is very distinctive, and is not known in any other species of mealybug in New Zealand. It is, however, characteristic of a group of closely related species of *Chorizococcus* and *Spilococcus* found in North America.

The collection data for the lectotype are atypical of this normally cactus-feeding species. It was recorded from New Zealand by Brittin (1938) from cactus as *Trionymus mammillariae* in the very paper in which he described *Trionymus leucopogi* as new, and its occurrence on *Cyathodes* seems unlikely. However, the lectotype of *T. leucopogi* appears to be conspecific with *Spilococcus cactearum*, and it is this lectotype that is illustrated in Figure 130.

Genus *Ventrispina* Williams

Ventrispina Williams, 1985: 377. Type-species *Ventrispina lathetica* Williams, 1985, by original designation.

Body outline broadly oval; anal lobes sometimes moderately protruding. Antennae 6–8-segmented. Legs well developed; denticle on tarsal claw present or absent; translucent pores sometimes present on hind coxae. Spiracles of normal pseudococcid form. Ostioles represented by at least the posterior pair.

Circuli absent. Cerarii numbering 6–18 distinguishable pairs; cerarian setae conical or lanceolate, with raised setal bases; anal lobe cerarii with 2–12 setae and sometimes a few flagellate setae; remaining cerarii with 1–5 setae; all cerarii with associated trilocular pores around bases of setae and sometimes on sclerotised areas. Anal lobe bars absent. Anal ring of normal pseudococcid form.

Multilocular disc pores absent, or confined to area around vulva and sometimes also median area of abdominal segments V and VI. Quinquelocular pores absent. Trilocular pores moderately numerous, generally evenly distributed over entire body but sometimes aggregated around bases of larger dorsal setae. Oral rim tubular ducts present or absent. Oral collar tubular ducts on venter only. Simple pores minute, about one-third the size of trilocular pores, sparsely scattered over entire body. Dorsal setae lanceolate, on enlarged bases, varying in size, the largest about the same size as cerarian setae. Ventral setae of 2 forms: flagellate setae on median areas; and lanceolate setae on enlarged bases, about the same size as the smaller dorsal setae, on margins and amongst the flagellate setae on median areas.

Remarks. Williams (1985) erected *Ventrispina* to contain three blue-black Australian species found in leaf litter. These are characterised by having lanceolate dorsal setae, many almost as large as cerarian setae, and some ventromedian setae almost lanceolate. *Ventrispina* is similar to *Nipaecoccus*, another blue-black genus with large, lanceolate dorsal setae, but differs in having these setae also on the mid-ventral areas. Three New Zealand species appear to belong in *Ventrispina*, although two of them have oral rim tubular ducts.

KEY TO SPECIES OF *VENTRISPINA* KNOWN FROM NEW ZEALAND

01 Oral rim tubular ducts absent (Fig. 132) ... ***dugdalei***
— Oral rim tubular ducts present ... 02

02(01) Dorsal setae aggregated into groups, with trilocular pores clustered around their bases (Fig. 131) ... ***crebrispina***
— Dorsal setae not aggregated; trilocular pores not closely associated with their bases (Fig. 133) ... ***otagoensis***

—⊛—

Ventrispina crebrispina new species

Figure 131

Appearance of live females not known, but body colour of specimens preserved in alcohol dark purplish red.

Body outline oval; anal lobes not protruding; length 2.1–3.5 mm, width 1.3–2.1 mm. Antennae 8-segmented. Legs well developed; tarsal claws without denticles; hind trochanter + femur 0.39–0.44 mm long; hind tibia + tarsus 0.44–0.48 mm long; translucent pores present on hind coxae only. Both pairs of ostioles distinct; lips each with 20–25 trilocular pores and 3 or 4 setae, except anteriormost lips, which have 7–12 trilocular pores and no setae. Cerarii numbering 16 or 17 pairs, although some of these sometimes indistinct; only anal lobe cerarii on sclerotised areas; each cerarius with 3–9 large, lanceolate setae and numerous trilocular pores.

Venter. Multilocular disc pores present around vulva, in a row across posteromedian edge of abdominal segment VI, and an occasional pore on segment V. Trilocular pores evenly distributed. Oral rim tubular ducts in marginal groups of 2–5 on most body segments. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of abdominal segments, the larger ones in marginal groups on abdominal segments IV–VIII and a few scattered over median areas of thorax. Simple pores about one-third the size of trilocular pores, scattered over entire surface. Setae of various forms and sizes: long, moderately stout, flagellate setae on median areas; small, lanceolate setae in small numbers on median areas, more numerous marginally.

Dorsum. Trilocular pores aggregated around bases of larger setae. Oral rim tubular ducts singly on margins of most body segments and a few sometimes on median areas of thorax. Simple pores as on venter. Setae typical of genus, aggregated into groups over entire dorsum.

Type data. Holotype: adult female alone on slide, New Zealand, FD, western Olivine Range, Tempest Spur, 1463 m, litter from swards (bulk sample 75/87), 29 January 1975, J.S. Dugdale ("13") (NZAC). **Paratypes**: 2 adult females on separate slides, same data as holotype (BMNH, NZAC); 2 adult females on same slide, FD, type locality, moss and lichens, *Poa* swards, and *Pygmea* mats (bulk sample 75/56), 31 Jan 1975, J.S. Dugdale ("4") (NZAC).

Material examined. Type specimens only.

Remarks. The aggregations of large lanceolate setae distinguish *V. crebrispina* from any other

known New Zealand species of mealybug.

The specific name — Latin, 'densely spined' — alludes to the characteristic form of the dorsal setae.

Ventrispina dugdalei new species

Figure 132

Appearance of live females not known, but specimens preserved in alcohol dark purplish red.

Body outline broadly oval; anal lobes not protruding; length (mounted) 2.7–3.3 mm, width 1.5–2.2 mm. Antennae 8-segmented, rarely 7-segmented. Legs well developed; tarsal claws without denticles; hind trochanter + femur 0.29–0.38 mm long; hind tibia + tarsus 0.29–0.38 mm long; translucent pores present on hind coxae and tibiae. Both pairs of ostioles apparent; lips each with 12–30 trilocular pores and 2–5 setae, except anteriormost lips, which have 4–8 trilocular pores and no setae. Cerarii numbering about 17 indistinct pairs; anal lobe cerarii on sclerotised areas, each with 4–9 large, lanceolate setae and numerous trilocular pores; remaining cerarii not on sclerotised areas, each with 2 or 3 large, lanceolate setae and a few associated trilocular pores.

Venter. Multilocular disc pores in small numbers around vulva and in a single row across posteromedian edge of abdominal segment VI. Trilocular pores evenly distributed. Oral rim tubular ducts absent. Oral collar tubular ducts in small marginal groups on abdominal segments V–VII. Simple pores about one-third the size of trilocular pores, scattered over entire surface. Setae of various forms and sizes; long and short flagellate setae on median areas only; small lanceolate setae over entire venter, more numerous marginally.

Dorsum. Trilocular pores slightly aggregated around bases of larger setae. Oral rim tubular ducts absent. Simple pores as on venter. Setae typical of genus, evenly distributed.

Type data. Holotype: adult female alone on slide, New Zealand, CO, Old Woman Range, 1389 m, *Celmisia haasti* sward (bulk sample 74/94), 20 November 1974, J.S. Dugdale ("1") (NZAC). **Paratypes**: 5 adult females on 4 slides, same data as holotype (BMNH, NZAC); 1 adult female alone on slide, CO, type locality, litter (bulk sample 74/107), 20 Nov 1974, J.S Dugdale ("77-364a J.M.C.") (NZAC); 2 adult females together on slide, NN, Mt Domett, 125 m, litter (bulk sample 71/167), G. Kuschel ("77-340e J.M.C.") (NZAC).

Material examined. Type specimens only.
— / NN, CO.
Collected in November.
Taken from swards and litter.

Remarks. *V. dugdalei* is the only New Zealand species of *Ventrispina* lacking oral rim tubular ducts.

This species has been named for Mr J.S. Dugdale, who collected most of the type material of this species, as well as much of the other material used in this study.

Ventrispina otagoensis (Brittin) new combination

Figure 133

otagoensis Brittin, 1938: 335 (*Trionymus*). Wise, 1977: 103 (*Trionymus*).
campbellensis Beardsley, 1964: 246 (*Nipaecoccus*). **New synonymy**.

Appearance of live females not known, but specimens preserved in alcohol dark purplish red.

Body outline oval to broadly oval; anal lobes slightly protruding; length (mounted) 1.5–3.5 mm, width 0.8–2.5 mm. Antennae 6-segmented, rarely 7-segmented. Legs well developed; tarsal claws without denticles; hind trochanter + femur 0.23–0.29 mm long; hind tibia + tarsus 0.24-0.28 mm long; translucent pores present on hind coxae and tibiae. Both pairs of ostioles distinct; lips each with 1–8 trilocular pores and 0–4 setae. Cerarii numbering 6–8 pairs, all at posterior end of body; anal lobe cerarii on sclerotised areas, each with 4–8 conical setae, sometimes a single flagellate seta, and several trilocular pores; remaining cerarii not on sclerotised areas, each with 1–3 large, lanceolate setae and an associated group of trilocular pores.

Venter. Multilocular disc pores in a row across abdominal segment VIII and sometimes across segments VI and VII. Trilocular pores evenly distributed. Oral rim tubular ducts singly on margins of most body segments. Oral collar tubular ducts few, on submargins of abdominal segment VII only. Simple pores about one-quarter the size of trilocular pores, scattered over entire surface. Setae of various forms and sizes: moderately long and stout flagellate setae on median areas; small, slender lanceolate setae sparse on median areas, but stouter and more numerous marginally.

Dorsum. Trilocular pores evenly distributed. Oral rim tubular ducts singly on margins of some body segments, and usually singly on midline of thoracic and anterior abdominal segments. Simple pores as on venter. Setae typical of genus, evenly distributed.

Type data. *Trionymus otagoensis*. **Lectotype** (here designated): adult female alone on slide, New Zealand, DN, Oamaru, on *Poa*, 3 October 1913,

G. Brittin ("309") (NZAC).

Nipaecoccus campbellensis. **Holotype**: adult female, upper left specimen of 4 on slide (position indicated on label), New Zealand, Campbell Island, Beeman Camp beach, 2–50 m, moss and weeds, Berlese funnel, 12–17 December 1961, J.L. Gressitt (NZAC). **Paratypes**: 3 adult specimens on same slide as holotype; 21 specimens on 8 slides, all Campbell Island.

Material examined. Lectotype of *Trionymus otagoensis* and holotype and 3 paratypes of *Nipaecoccus campbellensis*, plus 31 non-type adult females (BMNH, NZAC).

— / NN, SD, KA, CO, DN / Campbell I.

Collected in May, August, and October–December.

Taken from roots of *Acaena sanguisorba* (Rosaceae), *Poa* sp., *P. kirkii*, and grasses (Poaceae), and mosses.

Remarks. *V. otagoensis* is similar to *V. crebrispina* in having oral rim tubular ducts, but differs in having its dorsal setae evenly distributed.

Genus *Vryburgia* De Lotto

Vryburgia De Lotto, 1967: 21. Type-species *Pseudococcus bechuanae* Brain, 1912, by original designation.

Body outline elongate to broadly oval. Antennae 6–8-segmented. Legs well developed; tarsal claws sometimes with denticles. Spiracles of normal pseudococcid form. Circulus present or absent. Both pairs of ostioles distinct. Cerarii numbering 2–5 pairs; each cerarius with 2 conical setae. Anal lobe bars absent. Anal ring of normal pseudococcid form.

Multilocular disc pores present on venter, sometimes on dorsum. Quinquelocular pores absent. Trilocular pores present. Oral rim tubular ducts present. Oral collar tubular ducts on both venter and dorsum; dorsal ducts in rows across body segments, or in groups on abdomen and/or head and thorax. Simple pores sometimes apparent. Setae flagellate.

Remarks. *Vryburgia* was erected by De Lotto (1967) to contain a number of rather different-appearing species. The above description has been restricted to those which, like the type-species, have oral rim tubular ducts. *Vryburgia* is most similar to *Chorizococcus*, but differs in its dorsal rows or groups of oral collar tubular ducts, which are absent in *Chorizococcus*.

This genus is best represented in the Ethiopian Region, but one species, *V. lounsburyi*, also occurs in Europe, the U.S.A., Australia, and New Zealand.

Vryburgia lounsburyi (Brain)

Figure 134

lounsburyi Brain, 1912: 179 (*Pseudococcus*). Ferris *in* Zimmerman, 1948: 261 (*Trionymus*). Williams, 1962: 19 (*Chorizococcus*). De Lotto, 1967: 22 (*Vryburgia*). Wise, 1977: 100 (*Chorizococcus*).

peregrinus Green, 1925: 40 (*Pseudococcus (Trionymus)*). McKenzie, 1960: 701 (*Chorizococcus*). Synonymised by Williams (1962).

microporus McKenzie, 1960: 699 (*Chorizococcus*). Synonymised by McKenzie (1964).

Live females dark red, covered with a thin layer of powdery white wax extending into several short filaments at posterior end of body.

Body outline elongate to elongate-oval; length (mounted) 2.2–2.9 mm, width 0.9–1.4 mm. Legs well developed; tarsal claws without denticles; hind trochanter + femur 0.26–0.34 mm long; hind tibia + tarsus 0.30–0.34 mm long; translucent pores present on hind femora and tibiae. Circulus absent. Both pairs of ostioles distinct; lips each with 15–20 trilocular pores and 4–7 setae. Cerarii numbering 2 pairs; anal lobe cerarii on sclerotised areas, each with 2 conical setae, 7–9 flagellate auxiliary setae, and a concentration of trilocular pores; remaining cerarii not on sclerotised areas, each with 2 conical setae and a few associated flagellate setae and trilocular pores.

Venter. Multilocular disc pores present around vulva, in rows across posteromedian edges of abdominal segments IV–VII and anteromedian edge of VII, and scattered over median areas of thorax. Trilocular pores moderately numerous and evenly distributed. Oral rim tubular ducts in groups of 1–6 on margins of most thoracic and abdominal segments. Oral collar tubular ducts of 2 sizes, the smaller ducts in rows across median areas of abdominal segments II–VII and a few on median areas of thorax, the larger ones numerous on median areas of abdominal segments V–VII and in large marginal groups on most body segments. Simple pores minute, sparsely scattered over entire surface. Setae moderately long and stout.

Dorsum. Multilocular disc pores absent. Oral rim tubular ducts in rows of up to 16 across most body segments, but absent from abdominal segment VIII. Oral collar tubular ducts the same 2 sizes as on venter; smaller ducts sparsely in rows across some abdominal segments; larger ducts moderately numerous to numerous on abdominal segments III–VII, moderately numerous on margins of most other body segments, absent from abdominal segment VIII. Trilocular pores, simple pores, and setae as on venter.

Type data. *Pseudococcus lounsburyi* Brain. **Syn-**

type females: South Africa, Kenilworth, on *Agapanthus umbellatus* (BMNH, SANC, USNM).

Pseudococcus (Trionymus) peregrinus Green. **Lectotype** (designated by Williams 1985): adult female, England, Exbury, near Southhampton, on roots of *Nerine fluxuosa* (BMNH).

Chorizococcus microporus McKenzie. **Holotype**: adult female, U.S.A., California, in quarantine at Honolulu, on succulent plant (USNM).

Material examined. One syntype of *Pseudococcus lounsburyi*, lectotype and paralectotype of *Pseudococcus peregrinus*, plus 4 non-type adult females from New Zealand and several from Europe.

— / MC.

Collected in October.

Taken from roots of bulbs.

Remarks. *V. lounsburyi* is the only species of *Vryburgia* known from New Zealand. It was first recorded here by de Boer (1967a).

NOMEN DUBIUM

Trionymus assimilis Brittin, 1938: 334. Wise, 1977: 103.

Type data. Given by Brittin (1938) as: New Zealand, Christchurch, on *Poa* sp., 15 June 1916, "type slides in own collection, No. 27".

Remarks. Brittin's description mentions white wax, elongate-oval body, six-segmented antennae, four pairs of cerarii, multilocular disc pores ("large disc pores") in transverse rows on abdomen, and the sparse presence of both large and small tubular ducts. If the colour of the wax had been golden this material could have been identified as *Chryseococcus arecae* with some certainty, but the white wax excludes this possibility. The six-segmented antennae exclude it from *Paracoccus* but suggest that it may belong in *Ventrispina*, although it apparently has more multilocular disc pores than any of the species in this genus described here.

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APPENDIX: Checklist of host-plant taxa and the mealybugs recorded from them

Acacia sp.
Planococcus mali
Acacia decurrens (Wendl.) Willd.
Pseudococcus hypergaeus
Acaena sp.
Balanococcus cockaynei
Paracoccus acaenae
Acaena anserinifolia (J.R. & G. Forst.) Druce
Paracoccus acaenae
Acaena sanguisorbae Vahl.
Paracoccus acaenae
Ventrispina otagoensis
Aciphylla sp.
Balanococcus cockaynei
Rhizoecus deboerae
Aciphylla monroi Hook. f.
Balanococcus cockaynei
Aciphylla subflabellata W.R.B. Oliver
Balanococcus cockaynei
Adiantum sp.
Pseudococcus longispinus
Agathis sp.
Nipaecoccus aurilanatus
Agrostis canina L.
Balanococcus poae
Agrostis capillaris L.
Rhizoecus graminis
Rhizoecus rumicis
Agrostis tenuis; see *A. capillaris*
Alectryon excelsus Gaertn.
Paracoccus glaucus
Paracoccus miro
Alseuosmia macrophylla A. Cunn.
Dysmicoccus viticis
Paracoccus glaucus
Alsophila tricolor; see *Cyathea dealbata*
Ammophila arenaria (L.) Link
Balanococcus danthoniae
Rhizoecus rumicis
Anisotome aromatica Hook. f.
Balanococcus cockaynei
Anisotome imbricata (Hook. f.) Ckn.
Balanococcus cockaynei
Anthoxanthum odoratum L.
Chryseococcus arecae
Aquilegia sp.
Chryseococcus arecae
Aristotelia fructicosa Hook. f.
Paracoccus miro
Aristotelia serrata (J.R. & G. Forst.) W.R.B.Oliver
Paracoccus canalis
Paracoccus glaucus
Arthropodium sp.
Dysmicoccus ambiguus
Araucaria sp.
Nipaecoccus aurilanatus
Araucaria bidwillii Hook.
Nipaecoccus aurilanatus
Araucaria excelsa R.Br.
Nipaecoccus aurilanatus
Asclepias physocarpa (E.Mey.) Schlecht.
Pseudococcus affinis
Astelia sp.
Asteliacoccus zelandigena
Laminicoccus asteliae
Rastrococcus asteliae
Astelia cockaynei Cheesem.
Asteliacoccus zelandigena
Pseudococcus zelandicus
Astelia fragrans Col.
Rastrococcus asteliae
Astelia trinervia Kirk
Laminicoccus asteliae
Rastrococcus asteliae
Auricula sp.
Chryseococcus arecae
Avicennia resinifera Forst. f.
Dysmicoccus ambiguus
Dysmicoccus viticis
Paracoccus coriariae
Paracoccus glaucus
Paracoccus zealandicus

Begonia sp.
Pseudococcus longispinus
Brachyglottis sp.
Dysmicoccus ambiguus
Bromus unioloides; see *B. willdenowii*
Bromus willdenowii Kunth
Eurycoccus antiscius

Capsicum annuum L.
Rhizoecus falcifer
Carex sp.
Balanococcus acerbus
Balanococcus poae
Carex flaviformis Nelmes
Balanococcus acerbus
Balanococcus conglobatus
Carpodetus serratus J.R. & G. Forst.
Paracoccus glaucus
Paracoccus miro
Cassinia sp.
Paracoccus albatus
Cassinia vauvilliersii (Homb. & Jacq.) Hook. f.
Paracoccus albatus
Cedrus atlantica (Endl.) Arn.
Pseudococcus longispinus
Celmisia sp.
Ferrisicoccus celmisicola
Celmisia armstrongii Petrie
Balanococcus conglobatus
Celmisia coriacea (Forst. f.) Hook. f.
Ferrisicoccus celmisicola

Celmisia dallii Buchan.
Ferrisicoccus celmisicola
Celmisia discolor Hook. f.
Balanococcus aberrans
Celmisia incana Hook. f.
Balanococcus aberrans
Celmisia sessiliflora Hook. f.
Balanococcus aberrans
Celmisia spectabilis Hook. f.
Balanococcus celmisiae
Ferrisicoccus celmisicola
Celmisia spectabilis var. *spectabilis*
Balanococcus celmisiae
Chionochloa sp.
Balanococcus danthoniae
Renicaula chionochloae
Chionochloa australis (Buchan.) Zotov
Acrochordonus chionochloae
Acrochordonus curtatus
Renicaula chionochloae
Chionochloa conspicua (Forst. f.) Zotov
Balanococcus danthoniae
Chionochloa flavescens Zotov
Balanococcus danthoniae
Balanococcus poae
Renicaula chionochloae
Chionochloa macra Zotov
Acrochordonus chionochloae
Balanococcus danthoniae
Chionochloa pallens Zotov
Balanococcus danthoniae
Balanococcus poae
Chionochloa rubra Zotov
Acrochordonus chionochloae
Balanococcus acerbus
Balanococcus danthoniae
Laminicoccus eastopi
Renicaula chionochloae
Rhizoecus puhiensis
Cissus antarctica Vent.
Pseudococcus longispinus
Citrus sp.
Paracoccus zealandicus
Pseudococcus calceolariae
Pseudococcus longispinus
Pseudococcus similans
Citrus paradisi Macf. (?*Citrus* sp. – N.Z. grapefruit)
Paracoccus glaucus
Pseudococcus calceolariae
Pseudococcus longispinus
Clematis paniculata Gmel.
Paracoccus deboerae
Coleus sp.
Planococcus citri
Collospermum sp.
Laminicoccus asteliae
Colobanthus sp.
Chryseococcus longispinus
Coprosma sp.
Dysmicoccus ambiguus
Dysmicoccus viticis
Paracoccus albatus
Paracoccus aspratilis
Paracoccus deceptus
Coprosma australis (A.Rich.) Robinson
Dysmicoccus ambiguus
Dysmicoccus viticis
Paracoccus glaucus
Pseudococcus calceolariae
Coprosma cheesemanii W.R.B. Oliver
Dysmicoccus arcanus
Paracoccus aspratilis
Coprosma colensoi Hook. f.
Paracoccus glaucus
Coprosma crassifolia Col.
Paracoccus glaucus
Coprosma lucida J.R. & G. Forst.
Paracoccus albatus
Coprosma parviflora Hook. f.
Paracoccus aspratilis
Paracoccus albatus
Paracoccus aspratilis
Coprosma polymorpha W.R.B. Oliver
Paracoccus glaucus
Coprosma pseudocuneata W.R.B. Oliver
Paracoccus aspratilis
Coprosma serrulata Hook. f. ex Buchan.
Paracoccus aspratilis
Coprosma spathulata A. Cunn.
Paracoccus albatus
Cordyline sp.
Balanococcus cordylinidis
Cordyline australis (Forst. f.) Endl.
Balanococcus cordylinidis
Coriaria sp.
Paracoccus coriariae
Coriaria arborea Lindsay
Paracoccus coriariae
Cortaderia sp.
Balanococcus cortaderiae
Cortaderia fulvida (Buchan.) Zotov
Balanococcus cortaderiae
Rhizoecus rumicis
Cotula sp.
Rhizoecus rumicis
Croton sp.
Planococcus citri
Cyathea dealbata (Forst. f.) Swartz
Chryseococcus arecae
Eurycoccus antiscius
Cyathodes sp.
Cyphonococcus alpinus
Paracoccus zealandicus
Cyathodes fasciculata (Forst. f.) Allan
Asaphococcus amissus
Paracoccus miro
Spilococcus leucopogi
Cyathodes juniperina (J.R. & G. Forst.)
Planococcus mali
Cyclamen sp.
Pseudococcus longispinus
Cynara scolymus L.
Pseudococcus affinis
Pseudococcus similans
Cyphomandra sp.
Pseudococcus affinis
Cyperus albostriatus Schrader
Pseudococcus longispinus
Cyperus ustulatus A. Rich.
Balanococcus botulus
Cytisus sp.
Pseudococcus longispinus

Dacrycarpus dacrydioides (Rich.) de Laubenfels
Paraferrisia podocarpi
Dacrydium colensoi; see *Lagrostrobos colensoi*
Dacrydium cupressinum Lamb.
Paraferrisia podocarpi
Dacrydium laxifolium; see *Lepidothamnus laxifolius*
Dactylanthus taylori Hook. f.
Paracoccus parvicirculus
Dactylis glomerata L.
Balanococcus danthoniae
Balanococcus poae
Eurycoccus antiscius
Rhizoecus puhiensis
Danthonia sp.
Balanococcus conglobatus
Balanococcus danthoniae
Daucus carota L.
Pseudococcus affinis
Pseudococcus calceolariae
Dendrobium sp.
Chryseococcus arecae
Dianthus sp.
Pseudococcus affinis
Dichondra repens J.R. & G. Forst.
Rhizoecus californicus
Rhizoecus graminis
Discaria sp.
Paracoccus canalis
Dodonaea viscosa Jacquin.
Paracoccus glaucus
Pseudococcus calceolariae
Dracophyllum sp.
Agastococcus zelandiensis
Balanococcus mayae
Crisicoccus indigenus
Paracoccus butcherae
Paracoccus definitus
Paracoccus multiductus
Planococcus dubius
Dracophyllum filifolium Hook. f.
Crisicoccus indigenus
Dracophyllum latifolium A. Cunn.
Planococcus dubius
Dracophyllum longifolium (J.R. & G. Forst.) R. Br.
Balanococcus dracophylli
Crisicoccus indigenus
Dracophyllum recurvum Hook. f.
Crisicoccus indigenus
Dracophyllum sinclairii Cheesem.
Balanococcus mayae
Dracophyllum traversii Hook. f.
Paracoccus multiductus

Entelea arborescens R.Br.
Dysmicoccus ambiguus
Eucalyptus sp.
Paracoccus canalis
Eucalyptus delegatensis R.T. Baker
Chorizococcus oreophilus

Festuca sp.
Balanococcus conglobatus
Festuca rubra L.
Balanococcus conglobatus
Rhizoecus californicus
Rhizoecus graminis
Rhizoecus oliveri
Ficus carica L.
Pseudococcus longispinus
Ficus minima [= *F. pumila* L. var. *minima*]
Planococcus citri
Fragaria sp.
Rhizoecus californicus
Pseudococcus calceolariae
Fuchsia sp.
Paracoccus cavaticus
Fuchsia excorticata (J.R. & G. Forst.) Linn.f.
Paracoccus canalis
Paracoccus deceptus

Gahnia lacera (A.Rich.) Steud.
Balanococcus gahniicola
Gahnia setifolia (A.Rich.) Hook. f.
Balanococcus gahniicola
Gaultheria depressa Hook. f.
Balanococcus poae
Gaultheria rupestris (Linn. f.) D. Don
Paracoccus deceptus
Paracoccus drimydis
Gramineae; see Poaceae
Grevillea robusta Cunningh.
Pseudococcus hypergaeus
Griselinia sp.
Paracoccus cryptus
Paracoccus insolitus
Griselinia littoralis Raoul
Paracoccus insolitus
Gronophyllum sp.
Laminicoccus flandersi
Gymnelaea lanceolata; see *Nestegis lanceolata*
Haloragis erecta (Banks ex Murr.) Eichl.
Pseudococcus hypergaeus
Hebe sp.
Cyphonococcus alpinus
Cyphonococcus furvus
Dysmicoccus ambiguus
Paracoccus aspratilis
Paracoccus cryptus
Pseudococcus longispinus
Hebe brachysiphon Summerhayes
Cyphonococcus alpinus
Hebe canterburiensis (J.B. Armst.) L.B. Moore
Cyphonococcus furvus
Hebe coarctata (Cheesem.) Ckn. & Allan
Paracoccus aspratilis
Paracoccus hebes
Hebe darwiniana (Col.) Ckn.
Cyphonococcus alpinus
Hebe elliptica (Forst. f.) Pennell
Cyphococcus furvus
Hebe pauciramosa (Ckn. & Allan) L.B. Moore var. *masonae* L.B. Moore
Cyphonococcus furvus
Hebe propinqua (Cheesem.) Ckn. & Allan
Paracoccus aspratilis
Hebe stricta (Benth.) L.B. Moore
Cyphonococcus alpinus
Hedera helix L.
Pseudococcus longispinus
Hedycarya arborea J.R. & G. Forst.
Dysmicoccus ambiguus
Dysmicoccus viticis
Paracoccus glaucus
Hibiscus sp.
Rhizoecus falcifer
Hierochloe redolens (Vahl) R. & S.
Balanococcus danthoniae
Hoheria sp.
Paracoccus glaucus
Hoheria angustifolia Raoul
Paracoccus albatus
Hoheria populnea A. Cunn.
Paracoccus albatus
Paracoccus deboerae
Holcus sp.
Balanococcus poae
Holcus lanatus L.
Balanococcus danthoniae
Balanococcus poae
Rhizoecus californicus
Hymenanthera obovata Kirk.
Paracoccus drimydis
Hypochaeris glabra L.
Rhizoecus californicus

Juglans regia L.
Pseudococcus calceolariae
Juncus sp.
Balanococcus nelsonensis
Renicaula junci
Rhizoecus californicus
Juncus acutus L.
Balanococcus wisei
Juncus gregiflorus L.A.S. Johnson
Balanococcus nelsonensis
Juncus maritimus Lam.
Balanococcus nelsonensis
Juncus maritimus var. *australiensis* Buchenau
Balanococcus nelsonensis

Laburnum sp.
Pseudococcus affinis
Pseudococcus calceolariae
Lagrostrobos colensoi (Hook.) Quinn
Paracoccus podocarpi
Laurelia novae-zelandiae A. Cunn.
Dysmicoccus viticis
Lepidothamnus laxifolius (Hook. f.) Quinn
Rhizoecus rumicis
Leptospermum sp.
Crisicoccus tokaanuensis
Dysmicoccus viticis
Paracoccus zealandicus
Leptospermum ericoides A. Rich.
Paracoccus miro
Leptospermum scoparium J.R. & G. Forst.
Crisicoccus tokaanuensis
Paracoccus leptospermi
Paracoccus miro
Paracoccus zealandicus
Leucospermum sp.
Pseudococcus hypergaeus
Lolium perenne L.
Balanococcus poae
Chorizococcus oreophilus
Eurycoccus antiscius
Rhizoecus californicus
Rhizoecus graminis
Loranthus sp.
Dysmicoccus viticis
Luculia grandifolia Ghose
Rhizoecus falcifer
Lupinus angustifolius L.
Rhizoecus californicus
Lycopodium billardieri Spring
Paracoccus glaucus
Lycopersicon esculentum Mill.
Pseudococcus affinis
Rhizoecus falcifer

Macropiper excelsum (Forst. f.) Miq.
Dysmicoccus viticis
Paracoccus glaucus
Malus domestica Borkh.
Phenacoccus graminicola
Pseudococcus affinis
Pseudococcus calceolariae
Pseudococcus longispinus
Pseudococcus similans
Malus pumila: see *M. domestica*
Mandevillea sp.
Pseudococcus affinis
Mariscus sp.
Balanococcus botulus
Medicago sativa L.
Pseudococcus similans
Melicytus micranthus Hook. f.
Paracoccus drimydis
Melicytus ramiflorus J.R. & G. Forst.
Paracoccus drimydis
Paracoccus glaucus
Paracoccus zealandicus
Meryta sp.
Dysmicoccus ambiguus
Meryta sinclairii (Hook. f.) Seem.
Dysmicoccus ambiguus
Metrosideros excelsa Sol. ex Gaertn.
Dysmicoccus ambiguus

Metrosideros perforata (J.R. & G. Forst.) A. Rich.
Paracoccus miro
Microlaena sp.
Pseudococcus zelandicus
Microlaena avenacea Willd. ex Schult. & Schult. [= *Ehrharta diplax* F. v. Muell.]
Pseudococcus zelandicus
Rhizoecus deboerae
Morelotia affinis (Brong.) Blake
Paracoccus parvicirculus
Myoporum laetum Forst. f.
Dysmicoccus ambiguus
Myrsine sp.
Paracoccus albatus
Myrsine australis (A. Rich.) Allan
Balanococcus agnostus
Paracoccus cavaticus

Neomyrtus sp.
Paracoccus glaucus
Neoporteria crassispina Ritt.
Spilococcus leucopogi
Nerium oleander L.
Pseudococcus calceolariae
Nestegis lanceolata (Hook. f.) L. Johnson
Crisicoccus comatus
Nothofagus sp.
Crocydococcus cottieri
Cyphonococcus iceryoides
Paracoccus nothofagicola
Paracoccus zealandicus
Sarococcus deplanatus
Sarococcus undatus
Nothofagus fusca (Hook. f.) Oerst.
Cyphonococcus iceryoides
Maskellococcus nothofagi
Maskellococcus obtectus
Planococcus mali
Sarococcus comis
Sarococcus fagi
Nothofagus menziesii (Hook. f.) Oerst.
Crocydococcus cottieri
Cyphonococcus iceryoides
Maskellicoccus nothofagi
Sarococcus comis
Sarococcus fagi
Sarococcus undatus
Nothofagus solandri (Hook. f.) Oerst.
Crocydococcus cottieri
Cyphonococcus iceryoides
Maskellococcus obtectus
Paracoccus insolitus
Paracoccus nothofagicola
Sarococcus comis
Sarococcus deplanatus
Sarococcus undatus
Nothofagus solandri var. *cliffortioides* (Hook. f.) Poole
Cyphonococcus iceryoides
Paracoccus nothofagicola
Sarococcus undatus
Nothofagus truncata (Col.) Ckn.
Maskellococcus obtectus
Notodanthonia sp.
Balanococcus notodanthoniae

Olearia sp.
Paracoccus cryptus
Renicaula pauca
Olearia avicenniaefolia (Raoul) Hook. f.
Paracoccus cryptus
Olearia chathamica Kirk
Planococcus mali
Olearia colensoi Hook. f.
Crisicoccus australis
Olearia furfuracea (A. Rich.) Hook. f.
Renicaula pauca
Olearia rani (A.Cunn.) Druce
Spilococcus geoffreyi
Olearia solandri Hook. f.
Renicaula pauca
Oreobolus sp.
Balanococcus conglobatus
Oreobolus pectinatus Hook. f.
Balanococcus conglobatus
Dysmicoccus formicicola
Orobanche minor Sm.
Pseudococcus similans

Passiflora sp.
Pseudococcus longispinus
Passiflora edulis Sims
Rhizoecus falcifer

Phlomis sp.
Planococcus mali
Phormium sp.
Balanococcus diminutus
Phormium colensoi; see *P. cookianum*
Phormium cookianum Le Jolis
Balanococcus diminutus
Phormium tenax J.R. & G. Forst.
Balanococcus diminutus
Paracoccus glaucus
Phyllocladus sp.
Asaphococcus montanus
Phyllocladus alpinus Hook. f.
Asaphococcus montanus
Phyllocladus trichomanoides Don
Paracoccus longicauda
Pisum sativum L.
Pseudococcus calceolariae
Pittosporum sp.
Asaphococcus agninus
Paracoccus glaucus
Planococcus mali
Pittosporum colensoi Hook. f.
Paracoccus cavaticus
Plagianthus betulinus A. Cunn.
Paracoccus albatus
Plagianthus divaricatus J.R. & G. Forst.
Paracoccus albatus
Pseudococcus hypergaeus
Plantago coronopus L.
Pseudococcus similans
Plantago media L.
Rhizoecus californicus
Poa sp.
Aurosicoccus longispinus
Balanococcus poae
Ventrispina otagoensis
Poa kirkii Buchan.
Ventrispina otagoensis
Poa laevis of authors (New Zealand)
Pseudococcus zelandicus
Poaceae
Chryseococcus arecae
Dysmicoccus arcanus
Podocarpus sp.
Paracoccus miro
Paracoccus podocarpi
Podocarpus dacrydioides; see *Dacrycarpus dacrydioides*
Podocarpus ferrugineus; see *Prumnopitys ferruginea*
Podocarpus nivalis Hook.
Paracoccus albatus
Podocarpus spicatus; see *Prumnopitys taxifolia*
Podocarpus totara G. Benn. ex Don
Asaphococcus amissus
Paracoccus longicauda
Paracoccus miro
Paracoccus podocarpi
Poinsettia sp.
Pseudococcus affinis
Polygonum convolvulus L.
Pseudococcus affinis
Pomaderris phylicifolia Link
Renicaula pauca
Primula sp.
Chryseococcus arecae
Planococcus mali
Prumnopitys ferruginea (D.Don) de Laubenfels
Paracoccus miro
Paracoccus redactus
Prumnopitys taxifolia (Sol. ex D.Don) de Laubenfels
Paracoccus miro
Paracoccus redactus
Prunus domestica L.
Pseudococcus affinis
Pseudococcus longispinus
Prunus persica (L.) Batsch
Pseudococcus affinis
Pseudopanax anomalus (Hook.) Philipson
Paracoccus canalis
Pseudopanax simplex (Forst. f.) Philipson
Balanococcus agnostus
Pseudowintera colorata (Raoul) Dandy
Paracoccus drimydis
Paracoccus glaucus
Psidium sp.
Pseudococcus longispinus
Puccinellia fasciculata (Torr.) Bickn.
Balanococcus poae

Puccinellia vesiculata; see *P. fasciculata*
Pyrus communis L.
Phenacoccus graminicola
Pseudococcus affinis
Pseudococcus calceolariae
Pseudococcus longispinus
Pseudococcus similans

Raoulia sp.
Chryseococcus arecae
Balanococcus contextus
Dysmicoccus arcanus
Raoulia australis Hook. f.
Renicaula raouliae
Raoulia glabra Hook. f.
Balanococcus contextus
Rhopalostylis sapida Wendl. & Drude
Chryseococcus arecae
Ribes nigrum L.
Planococcus mali
Ripogonum scandens J.R. & G. Forst.
Paracoccus albatus
Paracoccus glaucus
Rubus australis Forst. f.
Paracoccus albatus
Paracoccus glaucus
Rumex sp.
Pseudococcus affinis
Pseudococcus longispinus
Pseudococcus similans
Rhizoecus rumicis
Rumex acetosella L.
Rhizoecus rumicis

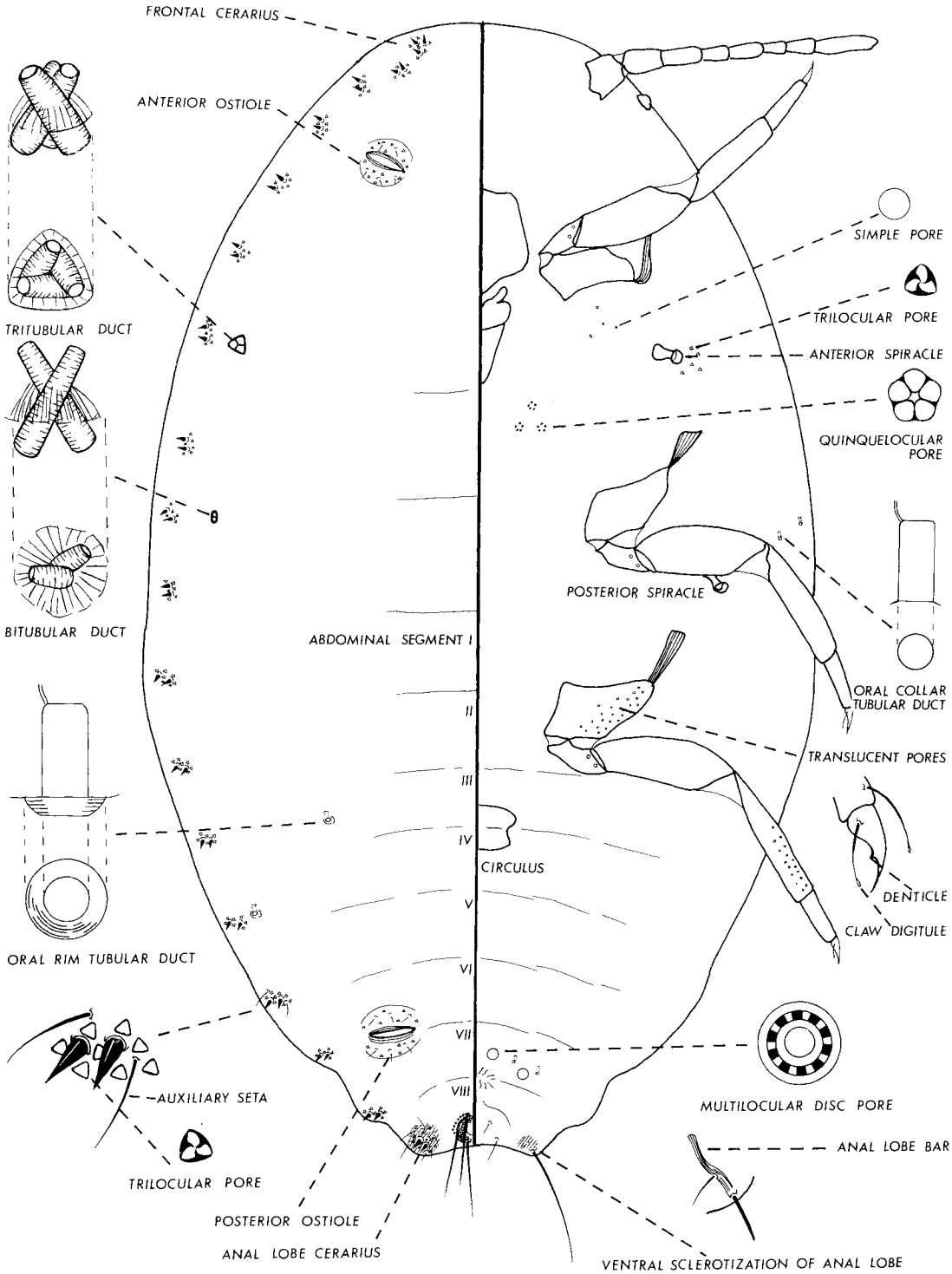
Saintpaulia ionantha H. Wendl.
Rhizoecus dianthi
Salicornia australis; see *Sarcocornia quinqueflorae*
Samolus repens (J.R. & G. Forst.) Pers.
Balanococcus contextus
Sarcocornia quinqueflorae (Bunge ex Ung.-Sternb.) Scott
Rhizoecus californicus
Schefflera digitata J.R. &. G. Forst.
Paracoccus glaucus
Scirpus aucklandicus (Hook. f.) Boeck.
Balanococcus sexaspinus
Senecio sp.
Crisicoccus australis
Pseudococcus calceolariae
Pseudococcus longispinus
Pseudococcus similans
Senecio hectori Buchan.
Dysmicoccus viticis
Paracoccus cryptus
Senecio jacobaea Endl.
Balanococcus conglobatus
Paracoccus albatus
Solanum sp.
Pseudococcus calceolariae
Solanum aviculare Forst. f.
Pseudococcus hypergaeus
Solanum laciniatum Ait.
Dysmicoccus ambiguus
Solanum tuberosum L.
Pseudococcus affinis
Pseudococcus similans
Rhizoecus falcifer
Sonchus sp.
Rhizoecus californicus
Sonchus oleraceus L.
Pseudococcus similans

Sophora sp.
Pseudococcus calceolariae
Sophora microphylla Ait.
Pseudococcus calceolariae
Pseudococcus longispinus
Spinifex hirsutus; see *S. sericeus*
Spinifex sericeus R.Br.
Balanococcus danthoniae
Suaeda novae-zelandiae Allan
Rhizoecus californicus

Trifolium sp.
Pseudococcus similans
Trifolium pratense L.
Pseudococcus hypergaeus
Trifolium repens L.
Pseudococcus similans

Ulex sp.
Planococcus mali
Pseudococcus hypergaeus
Uncinia sp.
Balanococcus conglobatus
Vicia faba L.
Pseudococcus similans
Vitex lucens T. Kirk.
Dysmicoccus ambiguus
Dysmicoccus viticis
Paracoccus glaucus
Vitis vinifera L.
Pseudococcus affinis
Pseudococcus calceolariae
Pseudococcus longispinus

Weinmannia racemosa Linn. f.
Paracoccus drimydis
Paracoccus glaucus


FRONTAL CERARIUS
ANTERIOR OSTIOLE
TRITUBULAR DUCT
BITUBULAR DUCT
ORAL RIM TUBULAR DUCT
AUXILIARY SETA
TRILOCULAR PORE
POSTERIOR OSTIOLE
ANAL LOBE CERARIUS
ABDOMINAL SEGMENT I
II
III
IV
V
VI
VII
VIII
CIRCULUS
SIMPLE PORE
TRILOCULAR PORE
ANTERIOR SPIRACLE
QUINQUELOCULAR PORE
POSTERIOR SPIRACLE
ORAL COLLAR TUBULAR DUCT
TRANSLUCENT PORES
DENTICLE
CLAW DIGITULE
MULTILOCULAR DISC PORE
ANAL LOBE BAR
VENTRAL SCLEROTIZATION OF ANAL LOBE

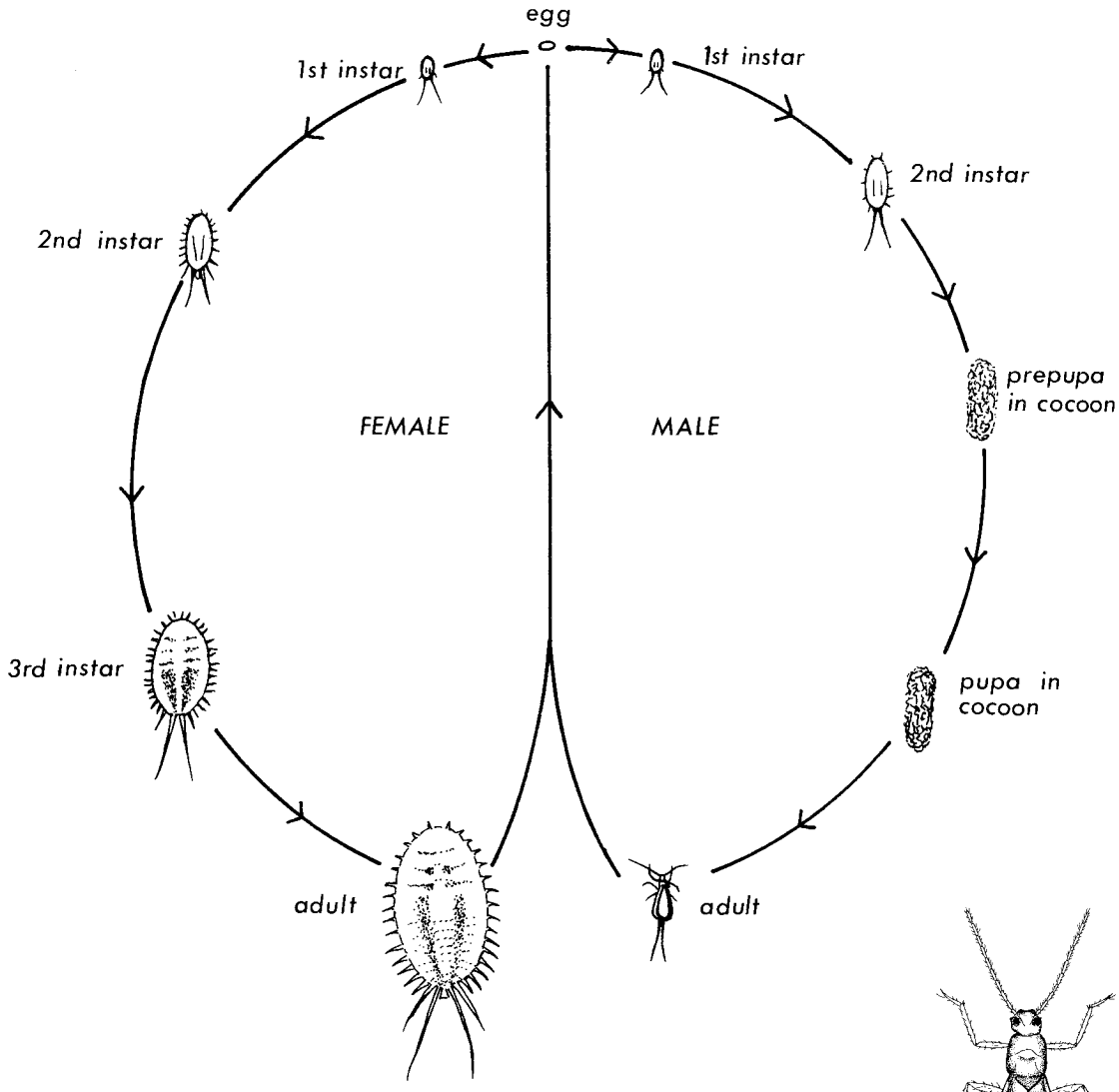


Figure 1 Typical pseudococcid life cycle.

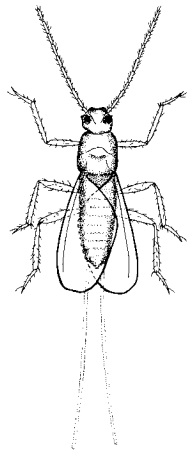
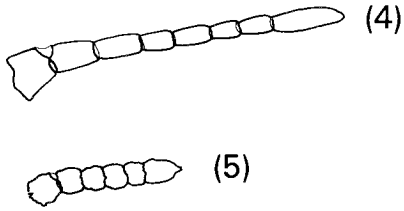
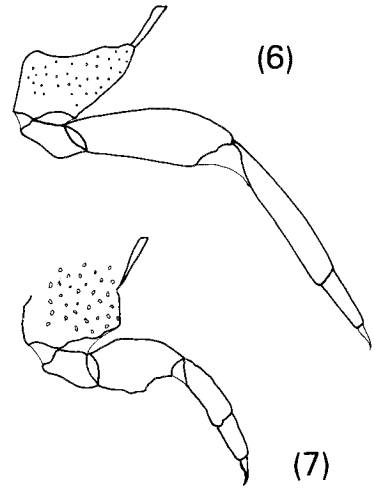


Figure 3 Typical male mealybug.

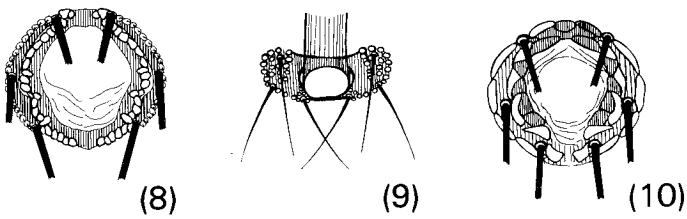
Figure 2 *(opposite page)* Schematic diagram of typical female mealybug.



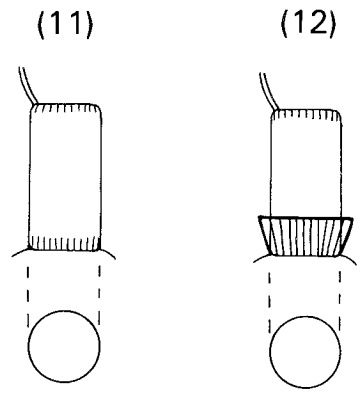
Figures 4 and 5 Pseudococcid antennae: (4) typical form; (5) reduced form.



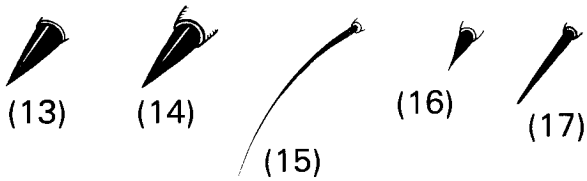
Figures 6 and 7 Pseudococcid hind legs: (6) typical form; (7) reduced form.



Figures 8–10 Pseudococcid anal rings: (8) typical form; (9) *Renicaula junci*; (10) *Rhizoecus oliveri*.

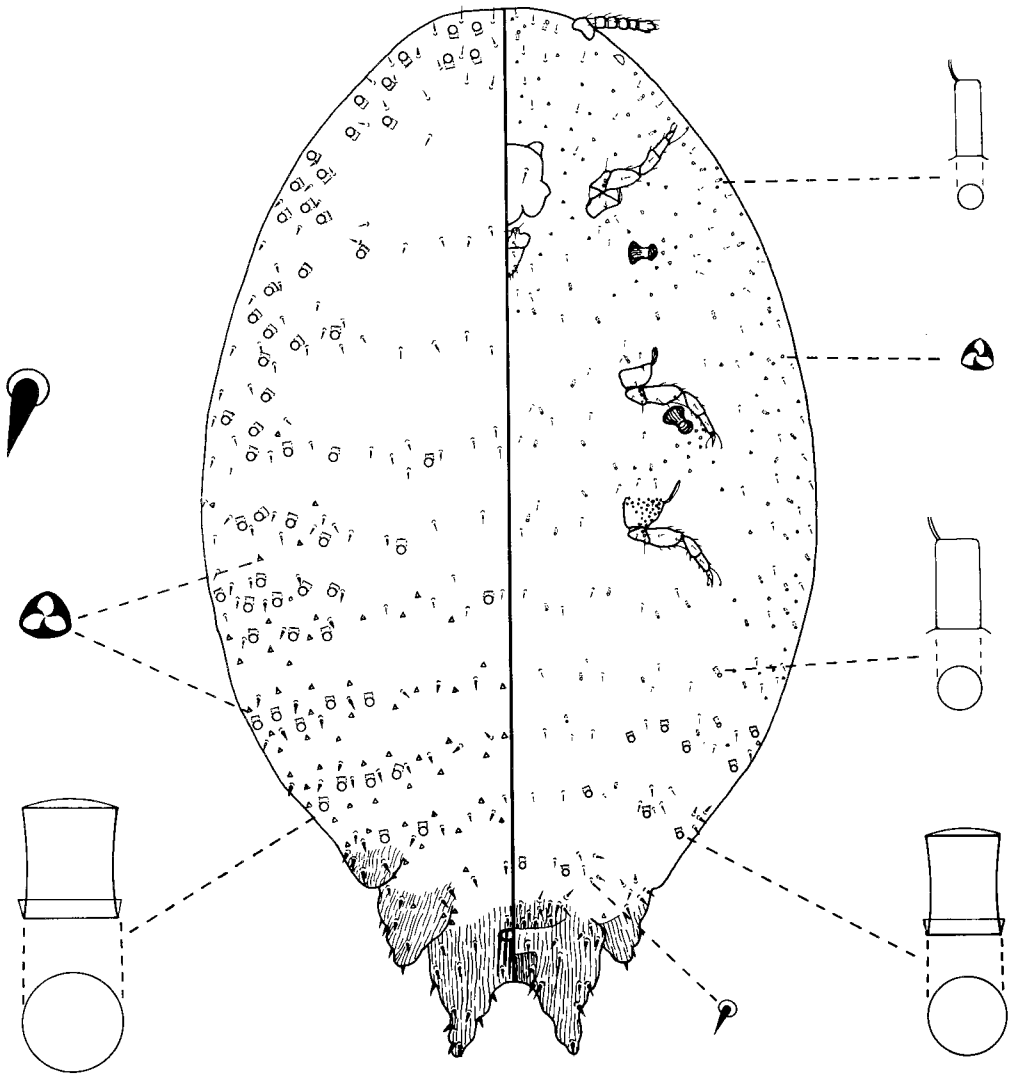


Figures 11 and 12 Oral collar tubular ducts: (11) without sclerotised collar; (12) with flange-shaped sclerotised collar.

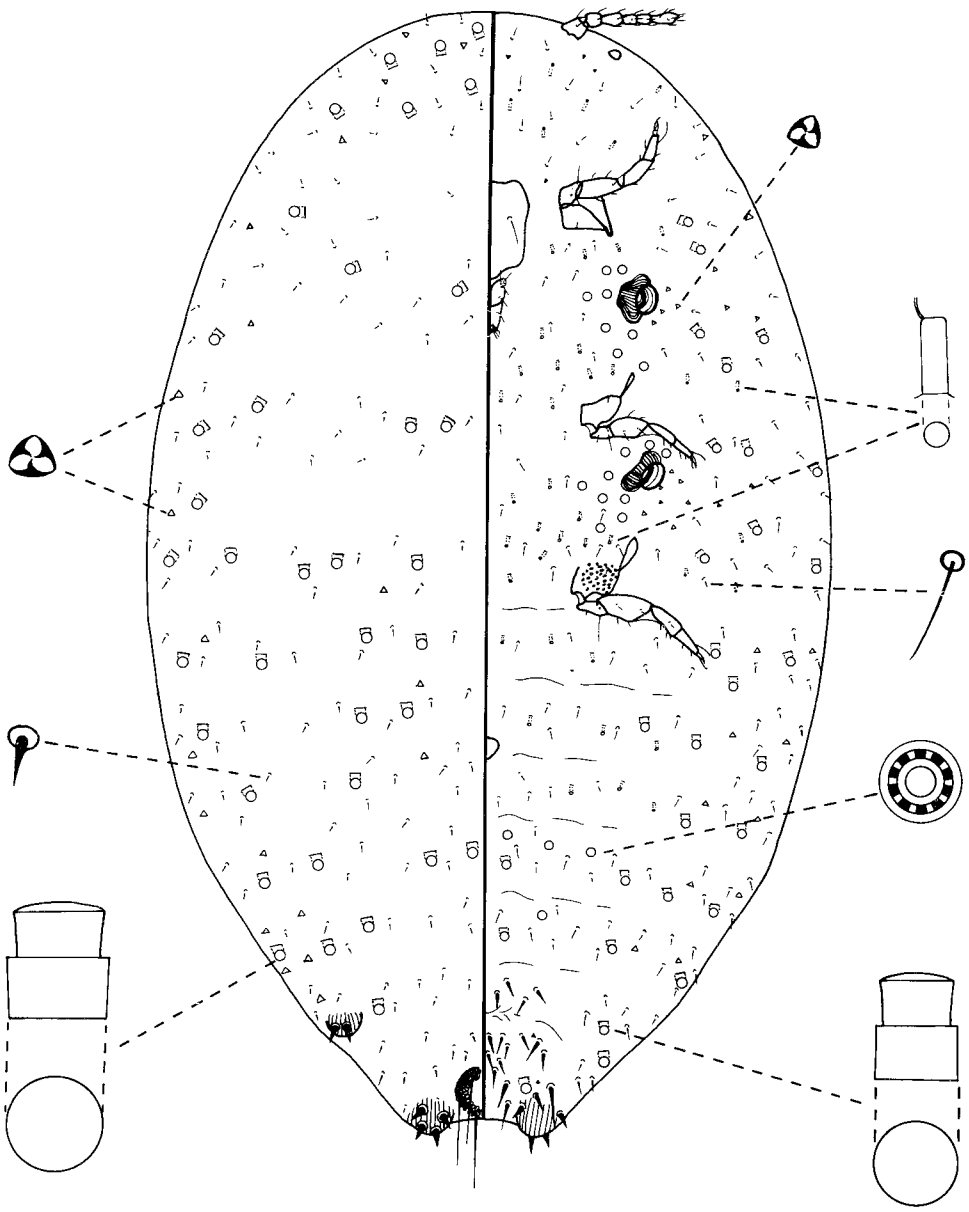


Figures 13–17 Setae: (13) conical; (14) conical, on enlarged base; (15) flagellate; (16) lanceolate; (17) spine-like.

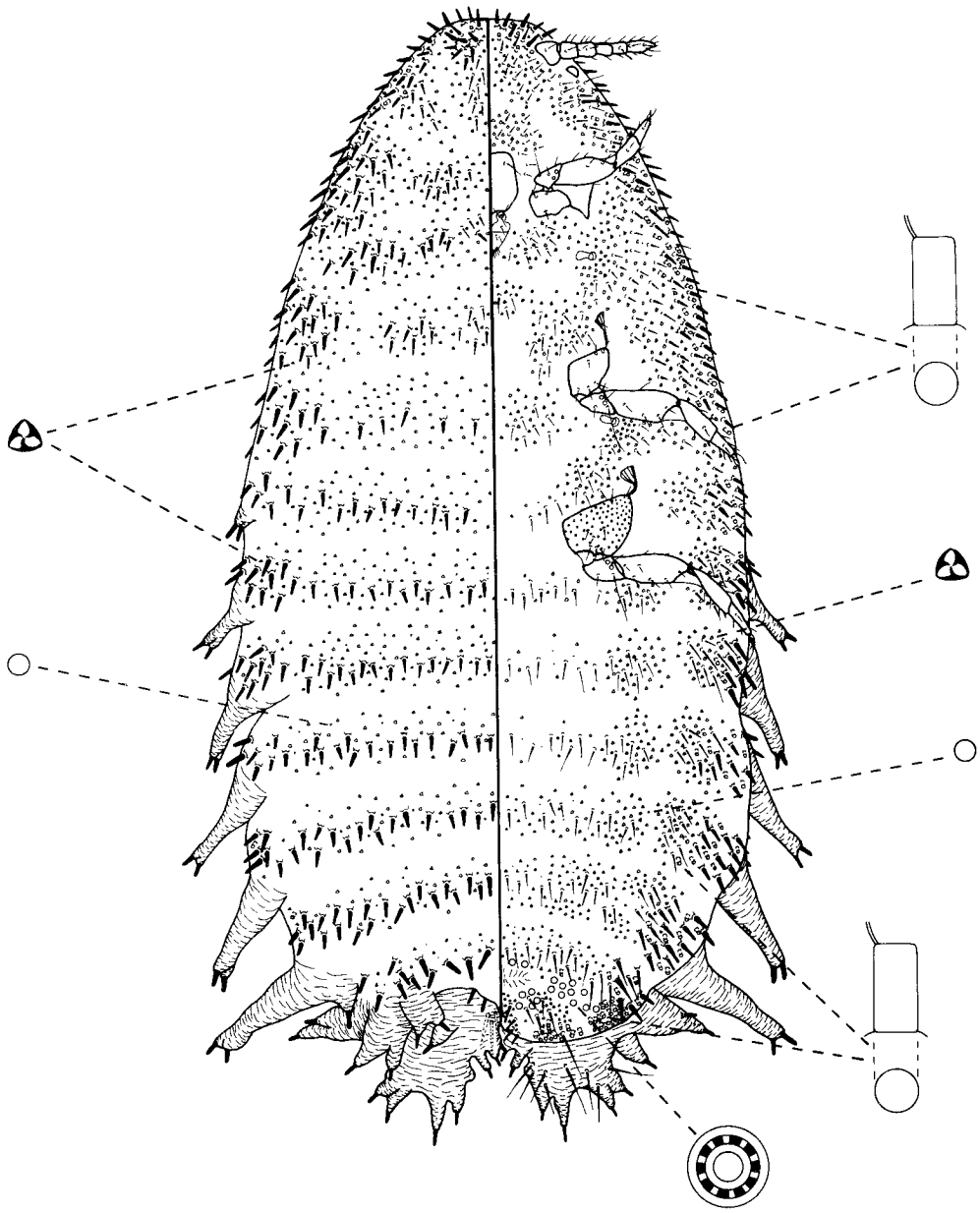
Figures 18–134 Schematic illustrations of dorsal/ventral aspects of New Zealand mealybugs, with details of surface structures.



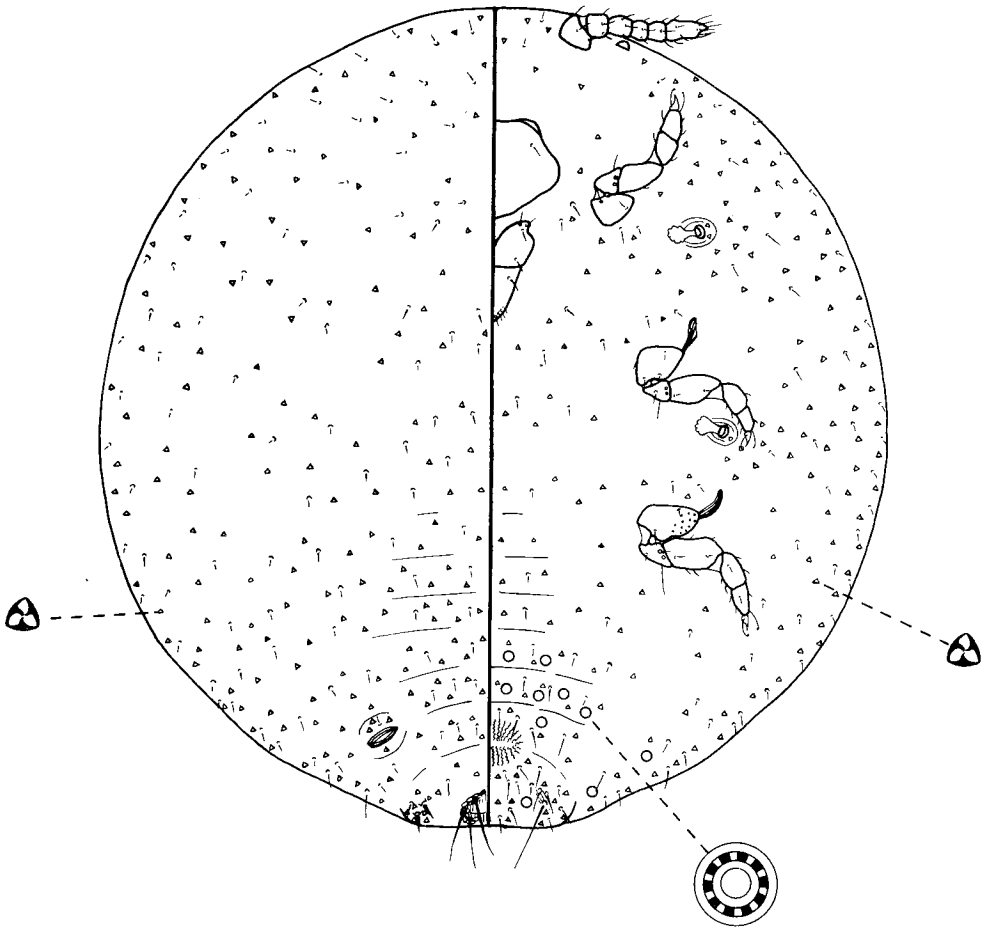
(18) *Acrochordonus chionochloae*



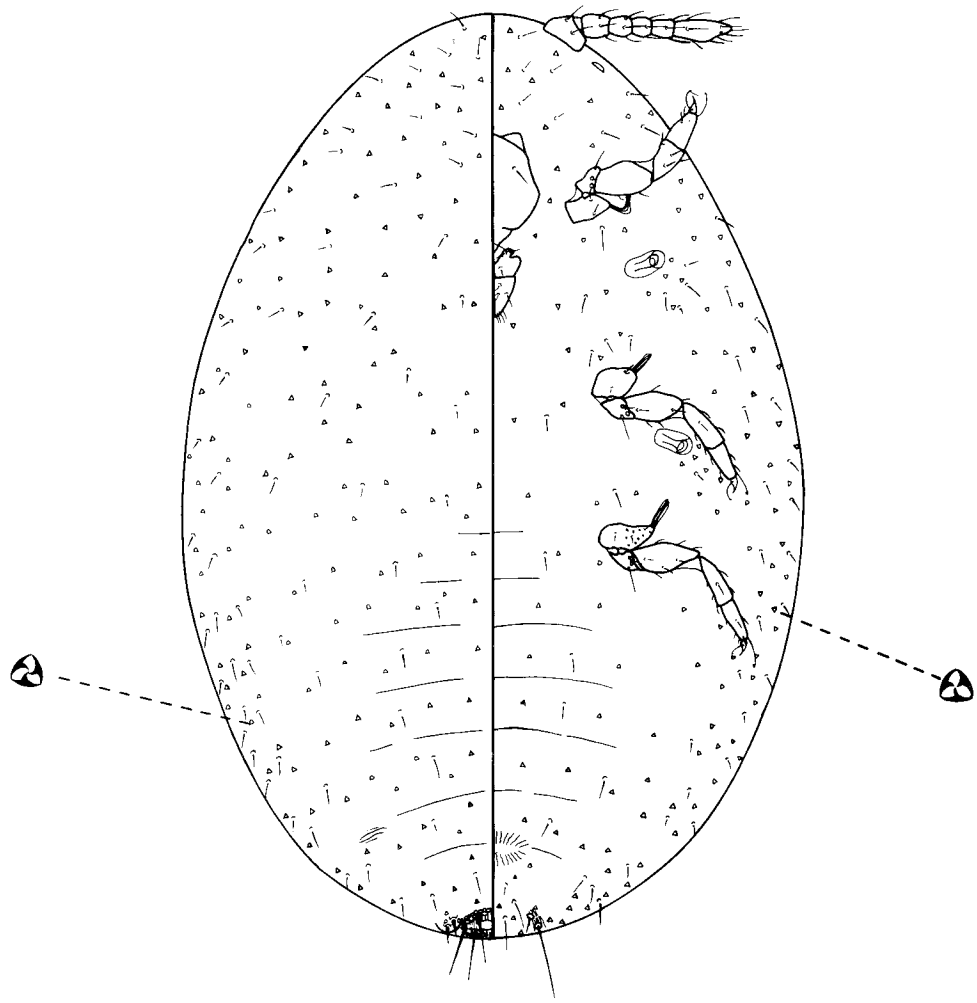
(19) *Acrochordonus curtatus*



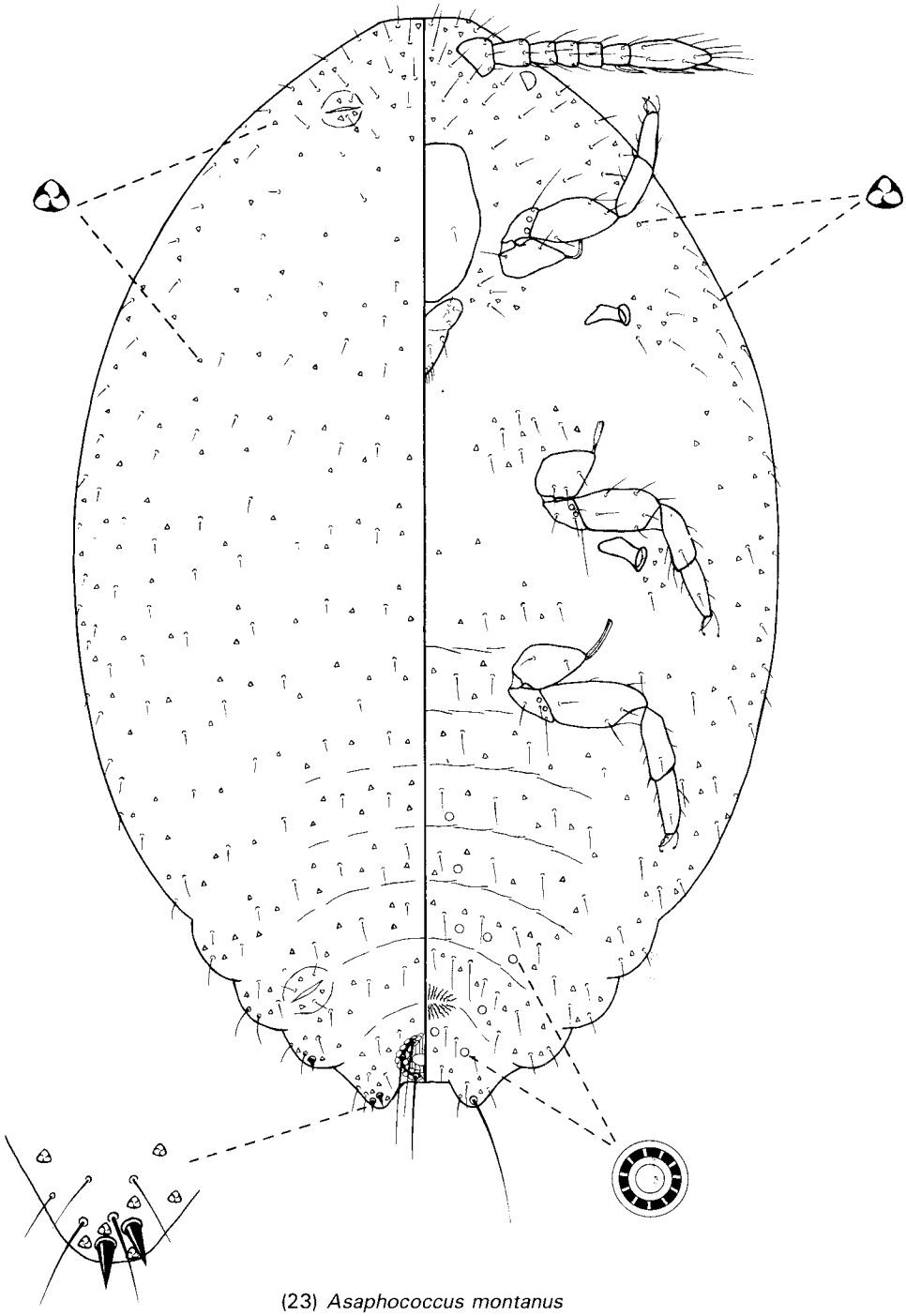
(20) *Agastococcus zelandiensis*



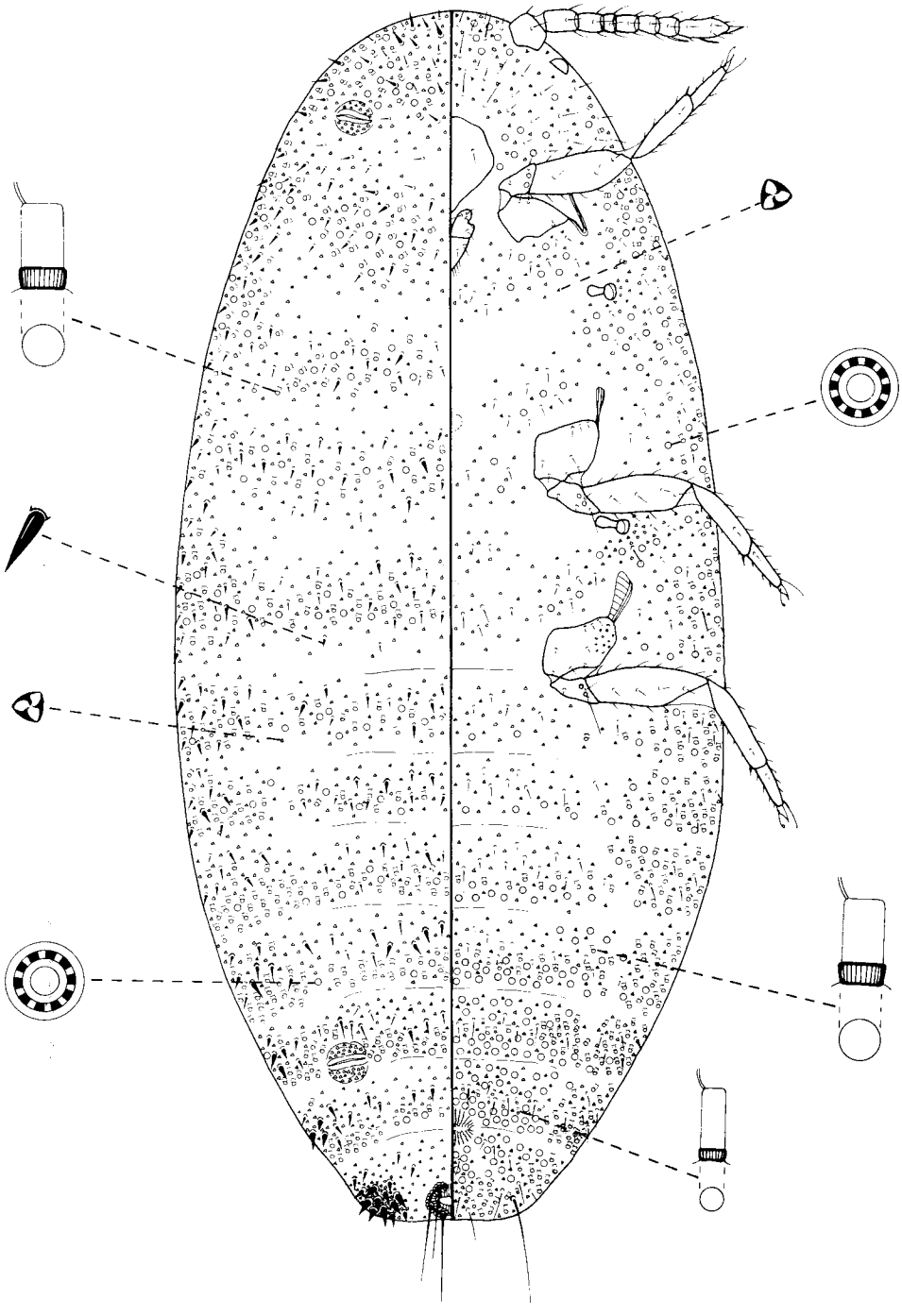
(21) *Asaphococcus agninus*



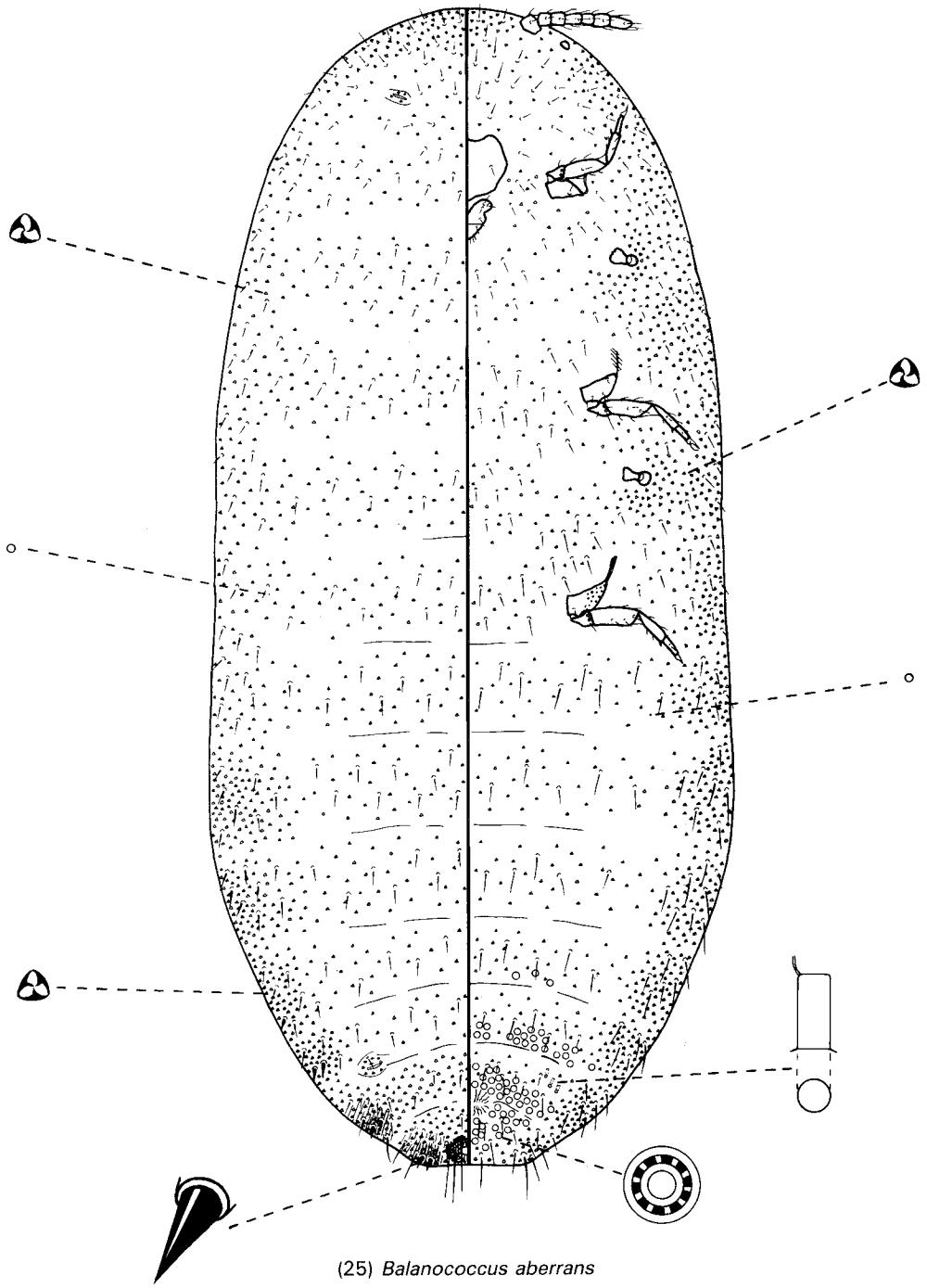
(22) *Asaphococcus amissus*



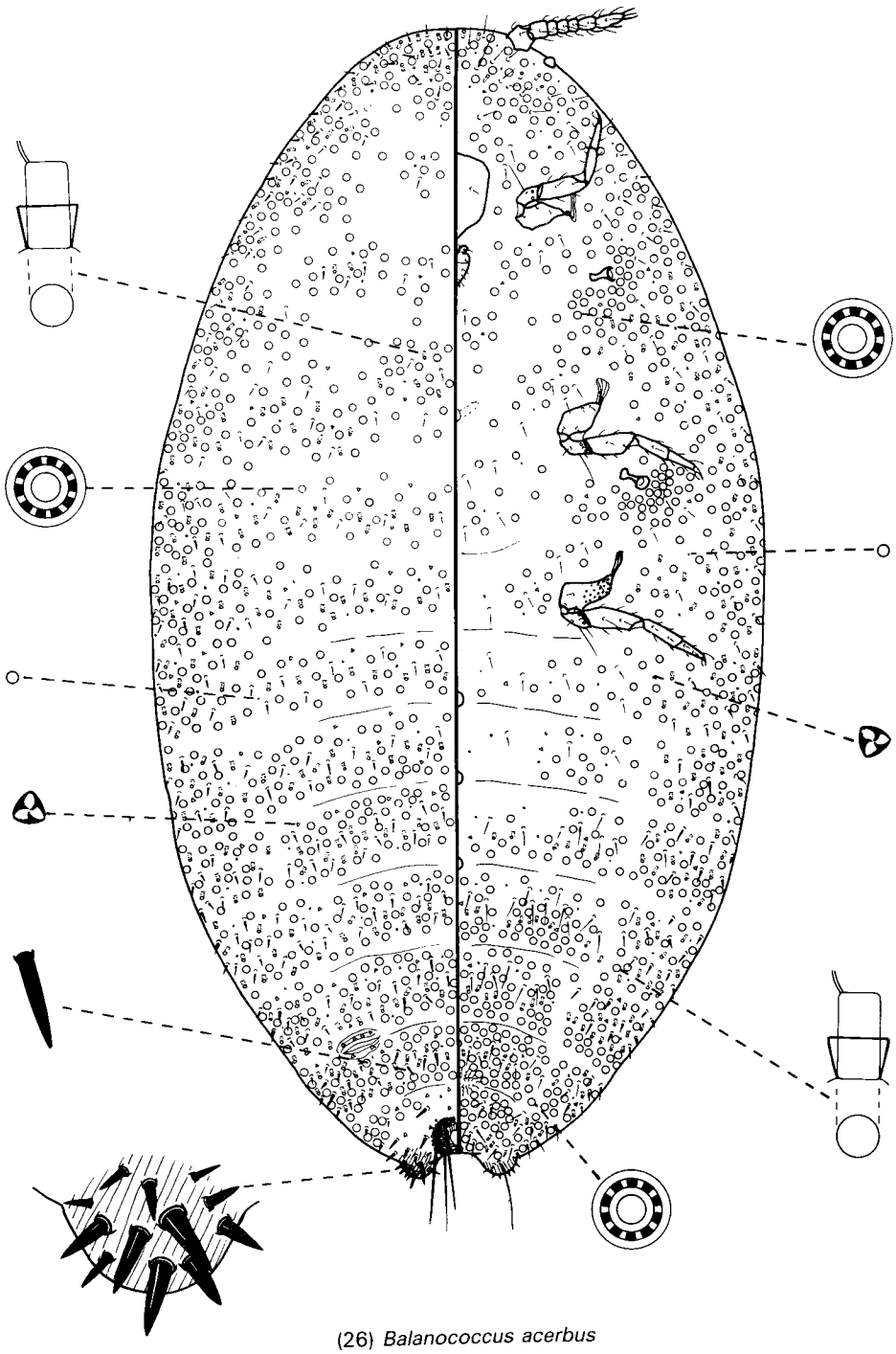
(23) *Asaphococcus montanus*



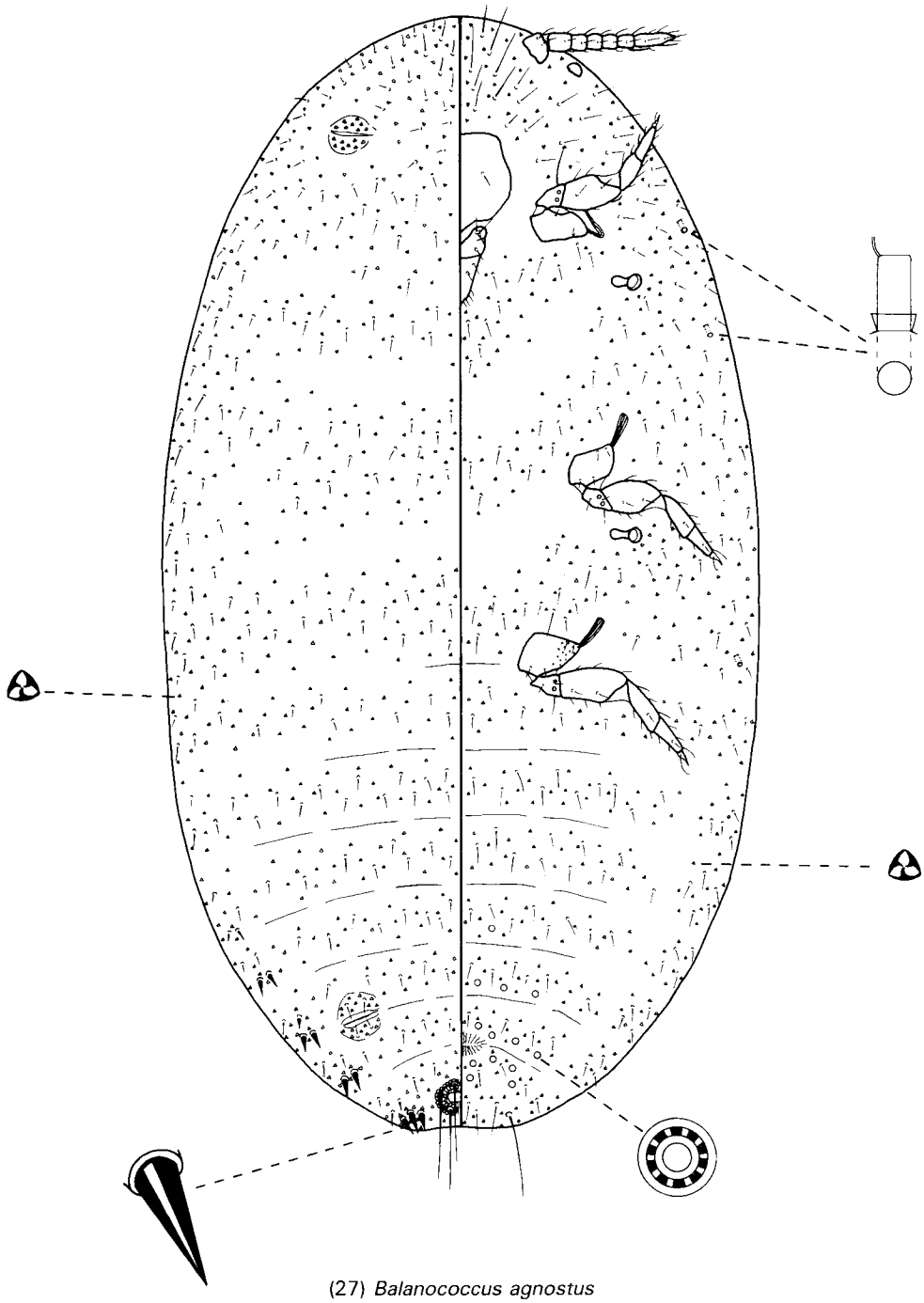
(24) *Asteliacoccus zelandigena*



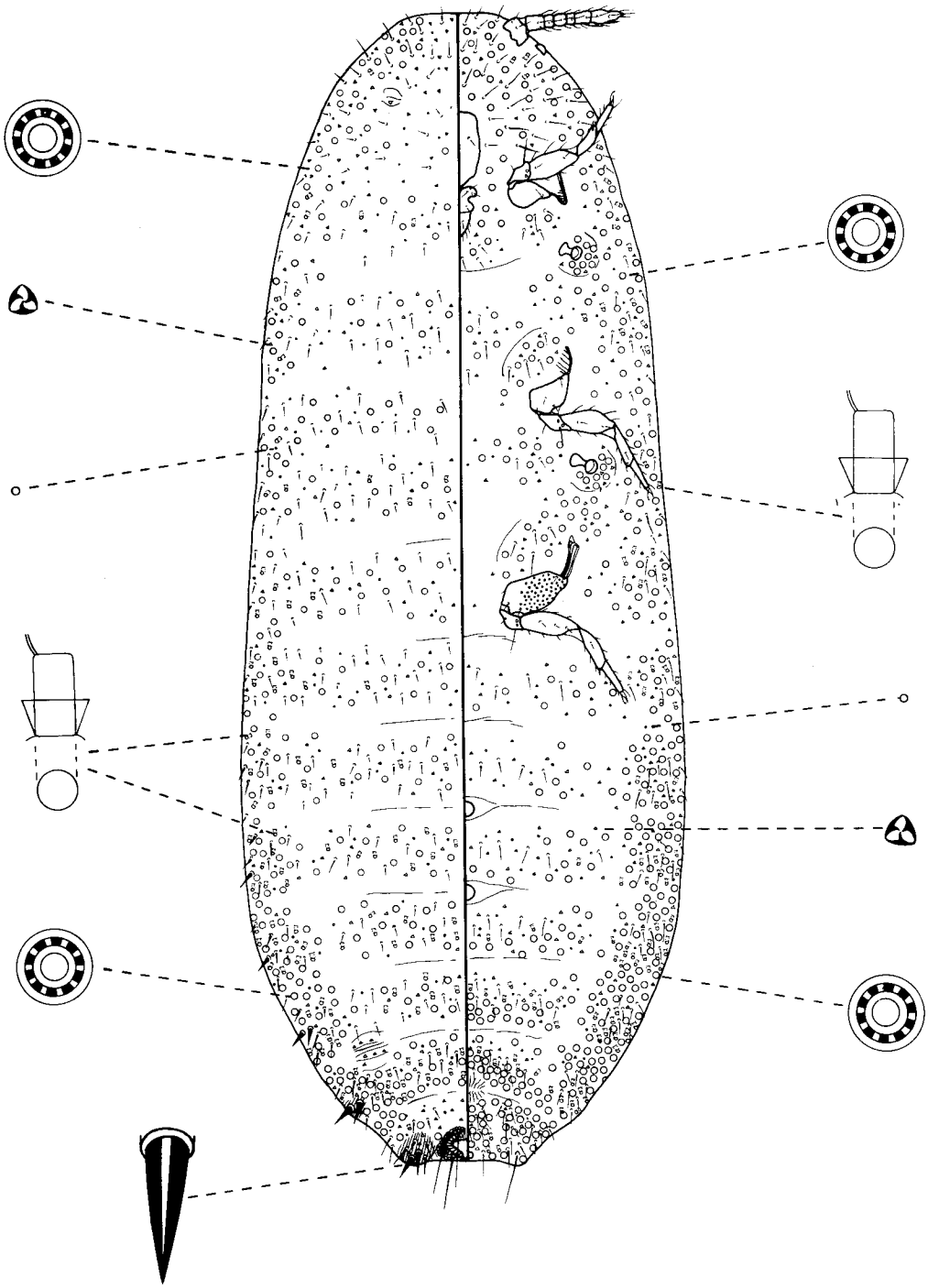
(25) *Balanococcus aberrans*



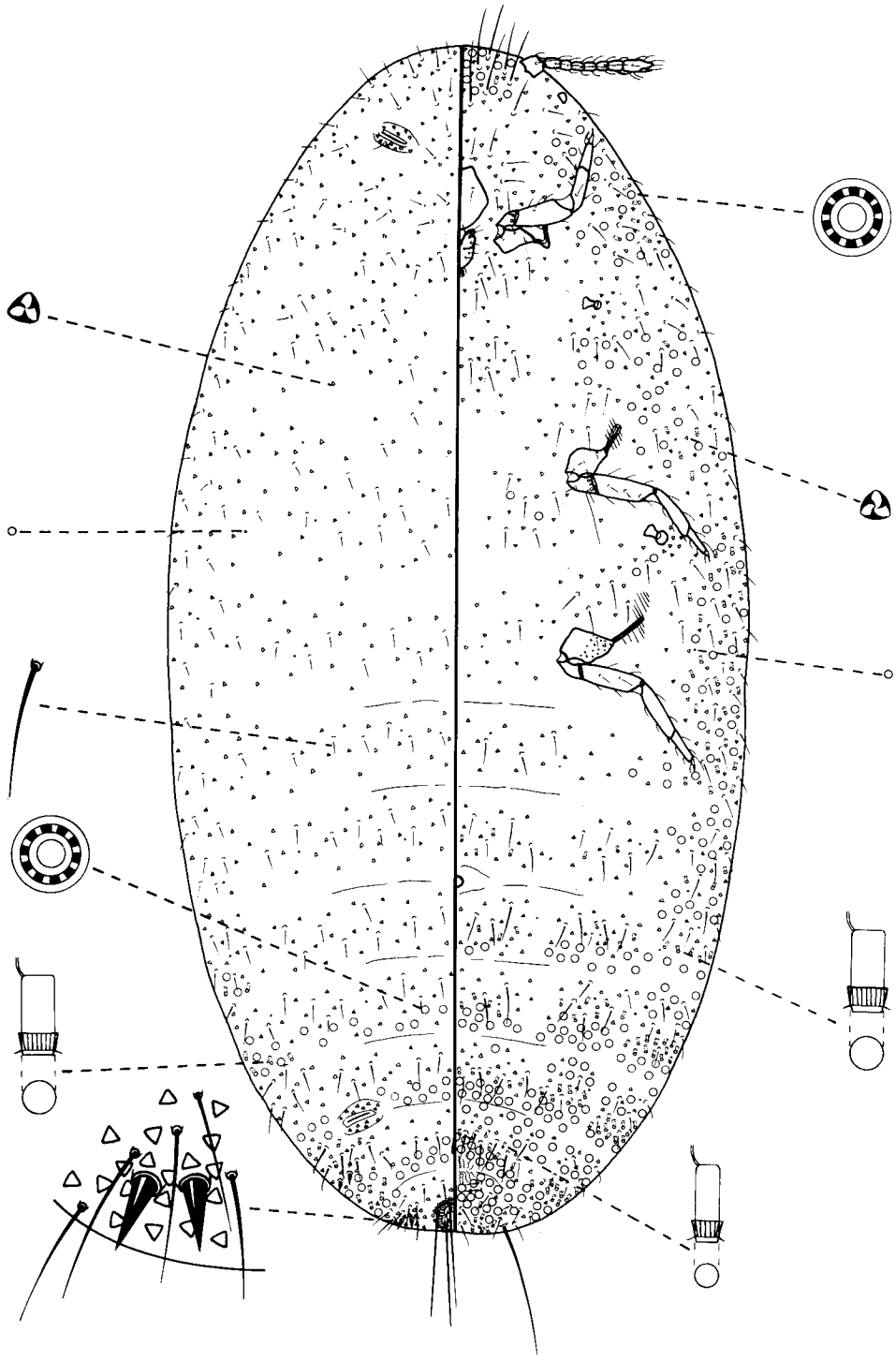
(26) *Balanococcus acerbus*



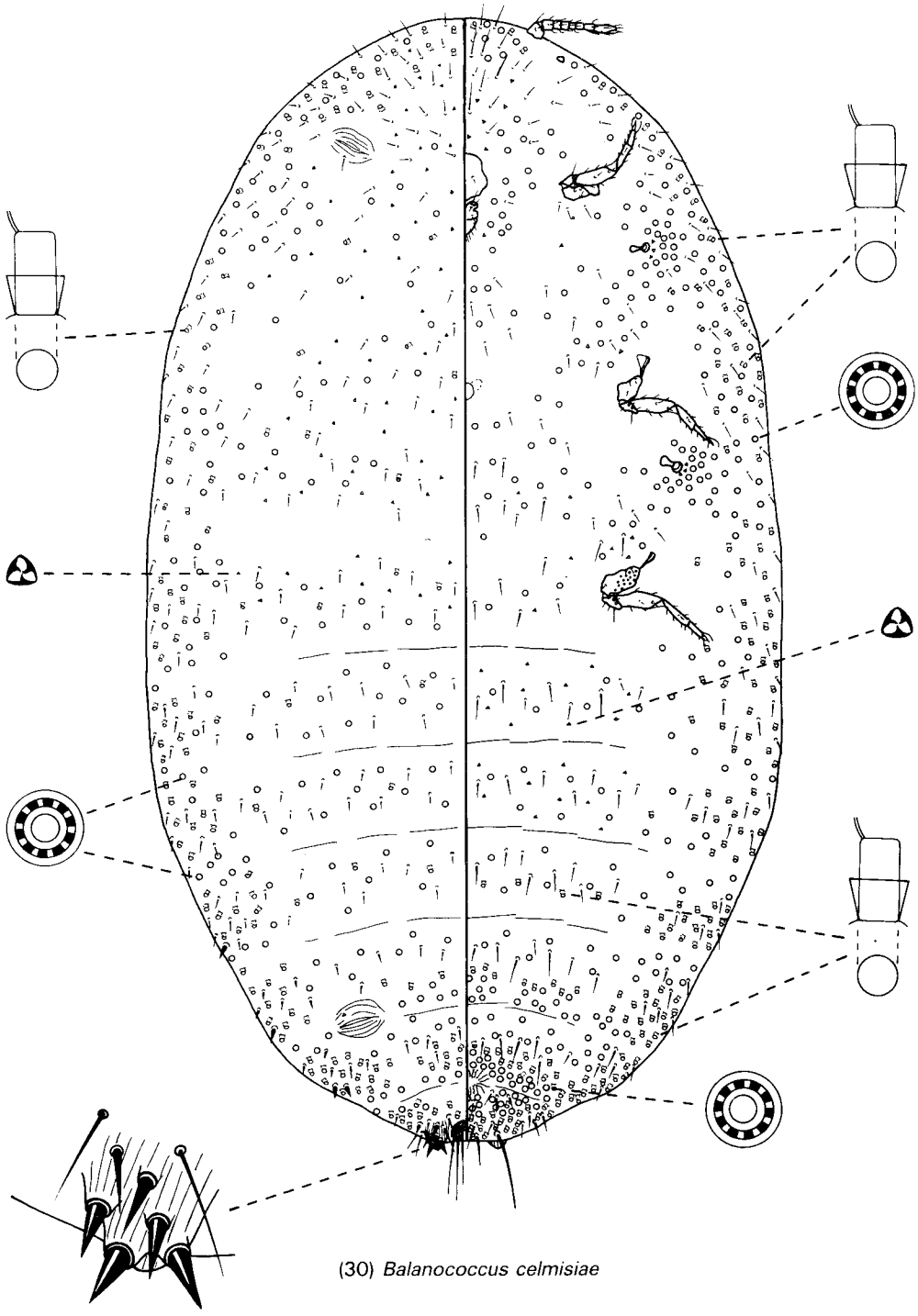
(27) *Balanococcus agnostus*



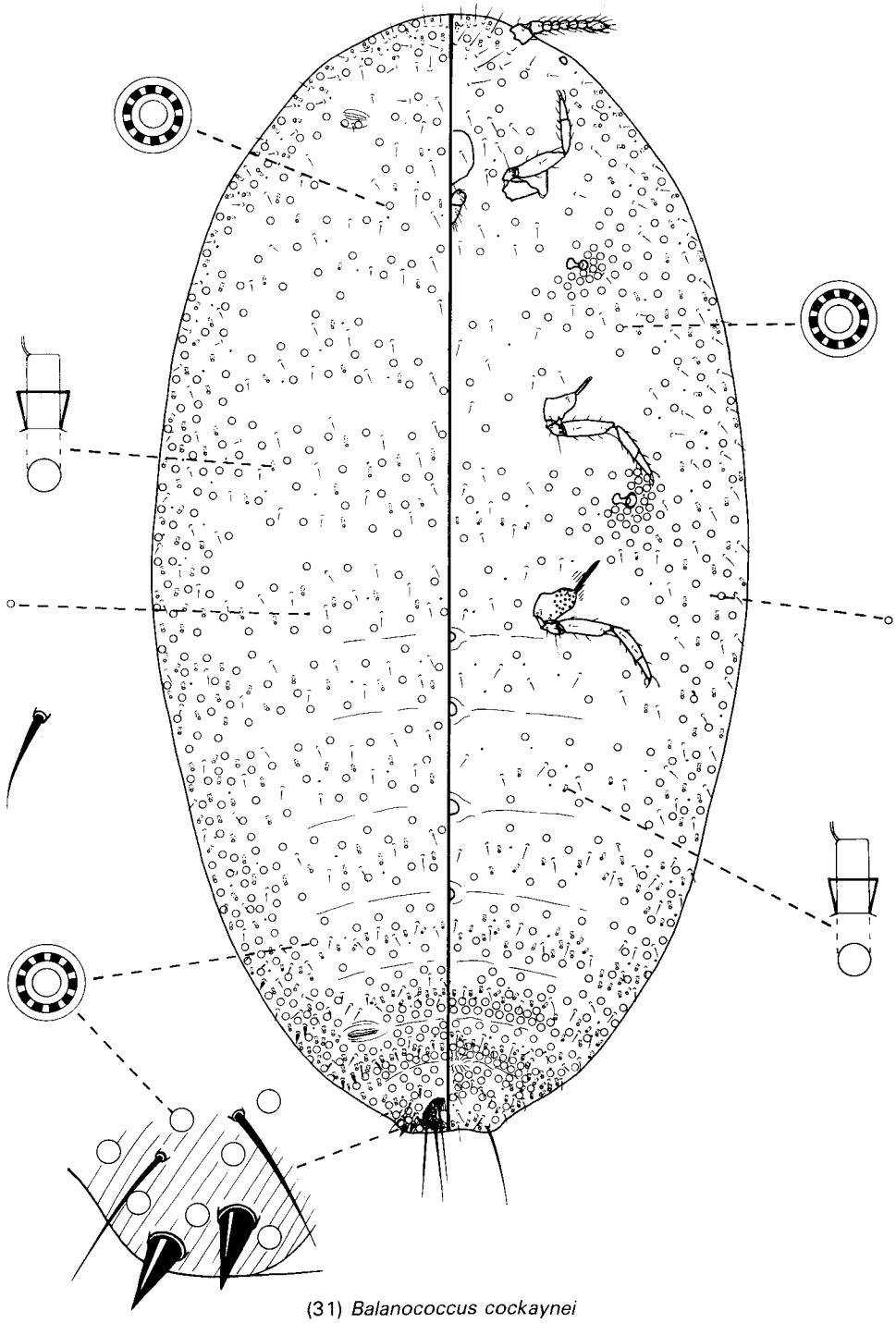
(28) *Balanococcus alpigenus*



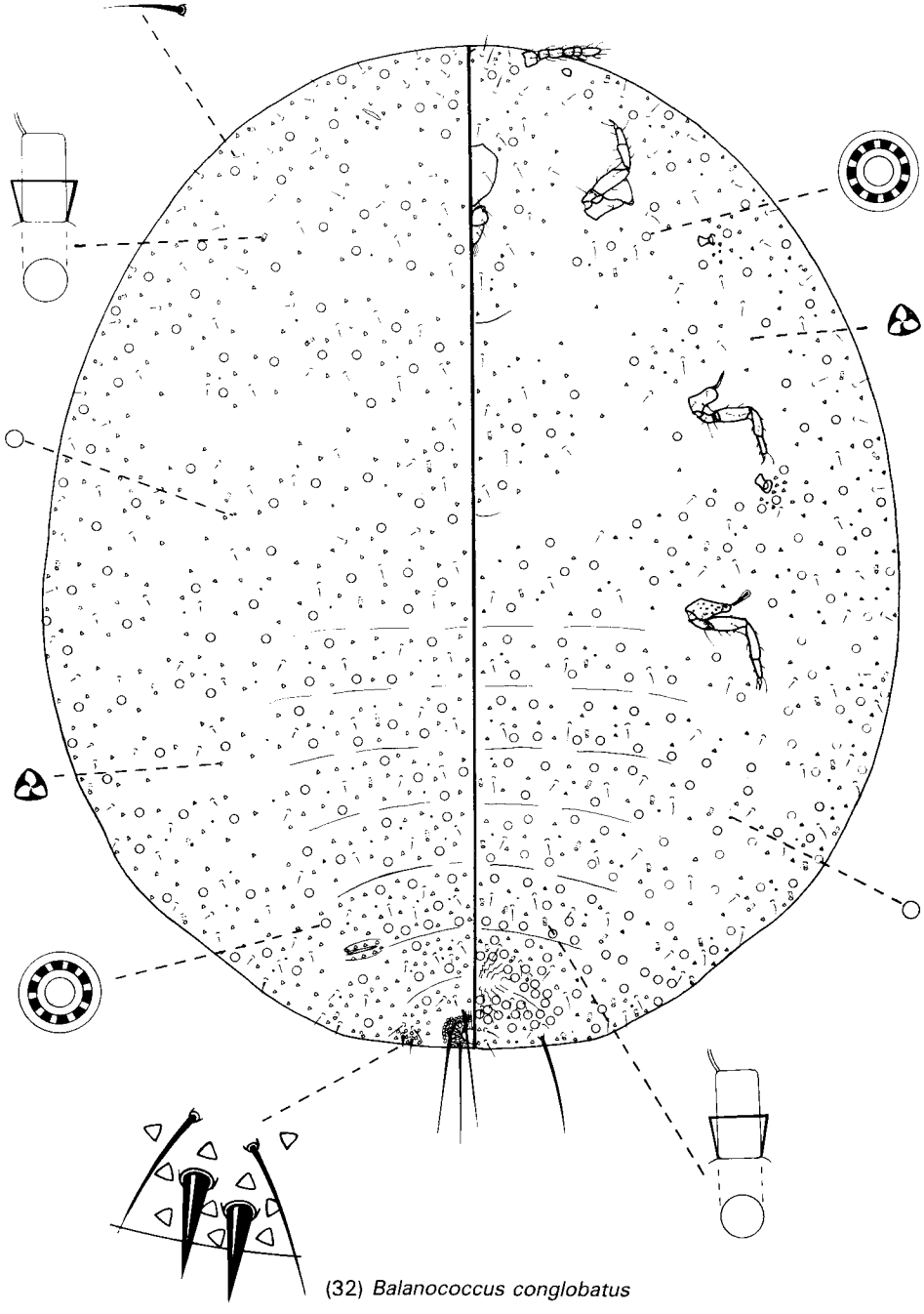
(29) *Balanococcus botulus*



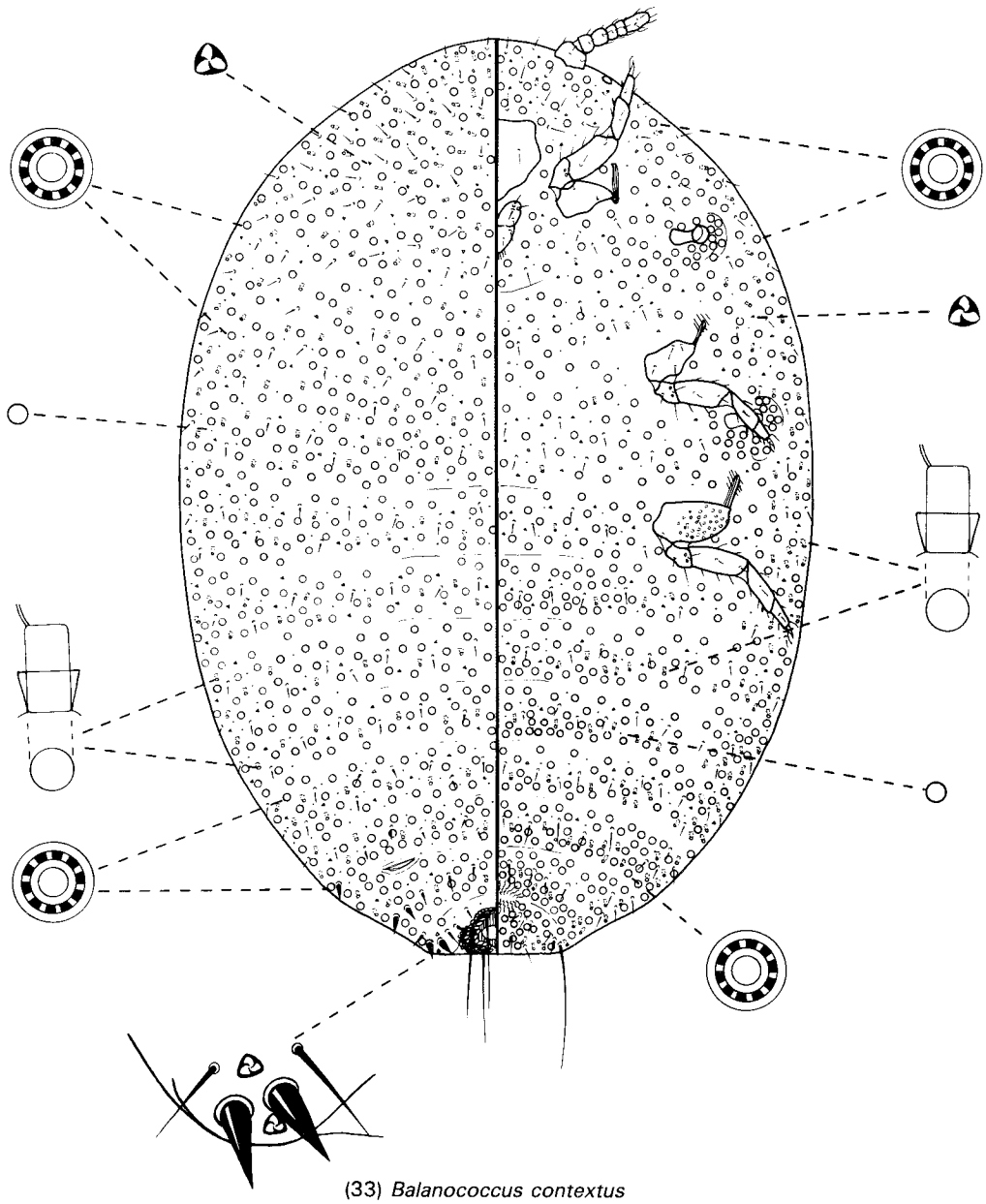
(30) *Balanococcus celmisiae*



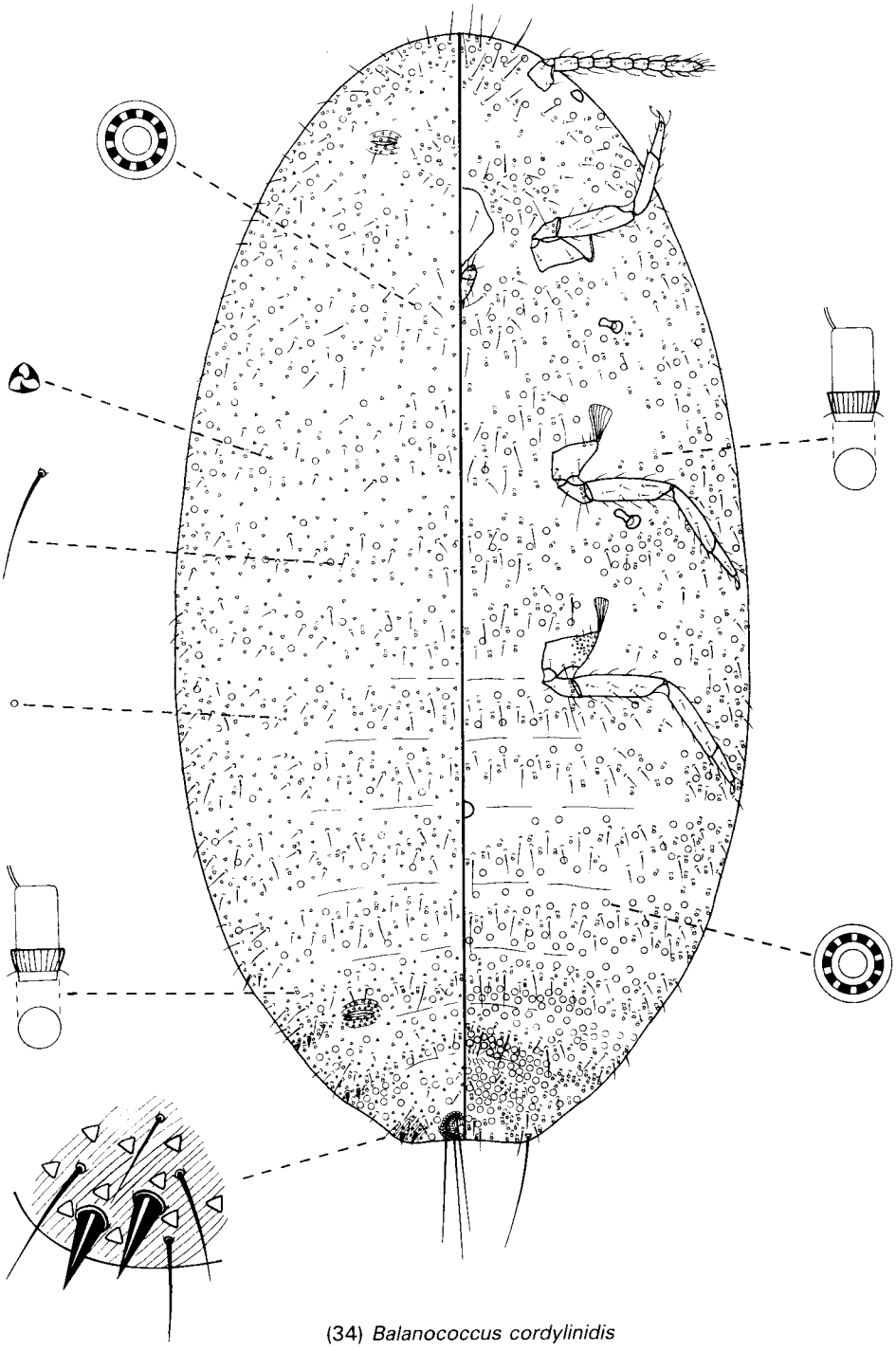
(31) *Balanococcus cockaynei*



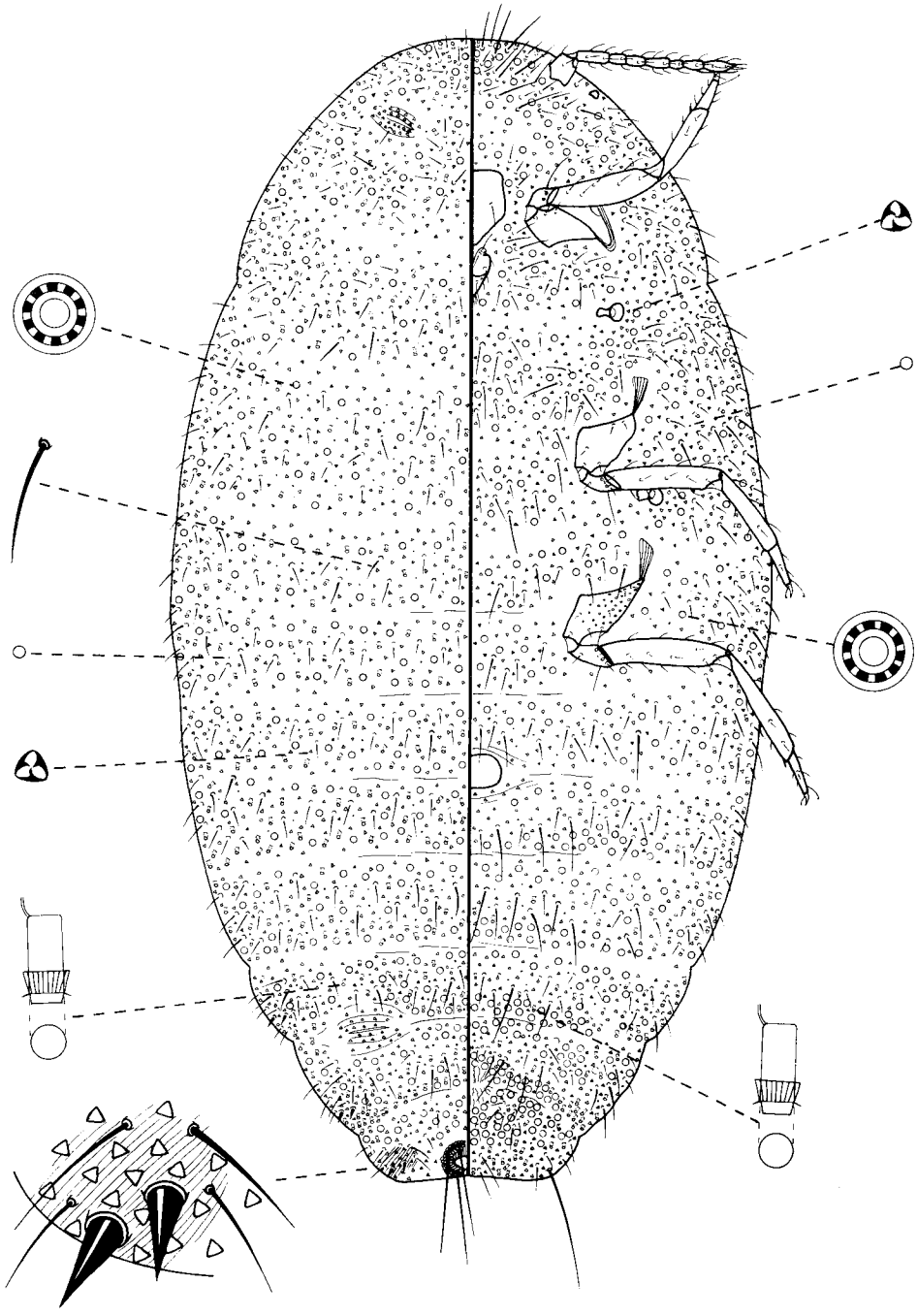
(32) *Balanococcus conglobatus*



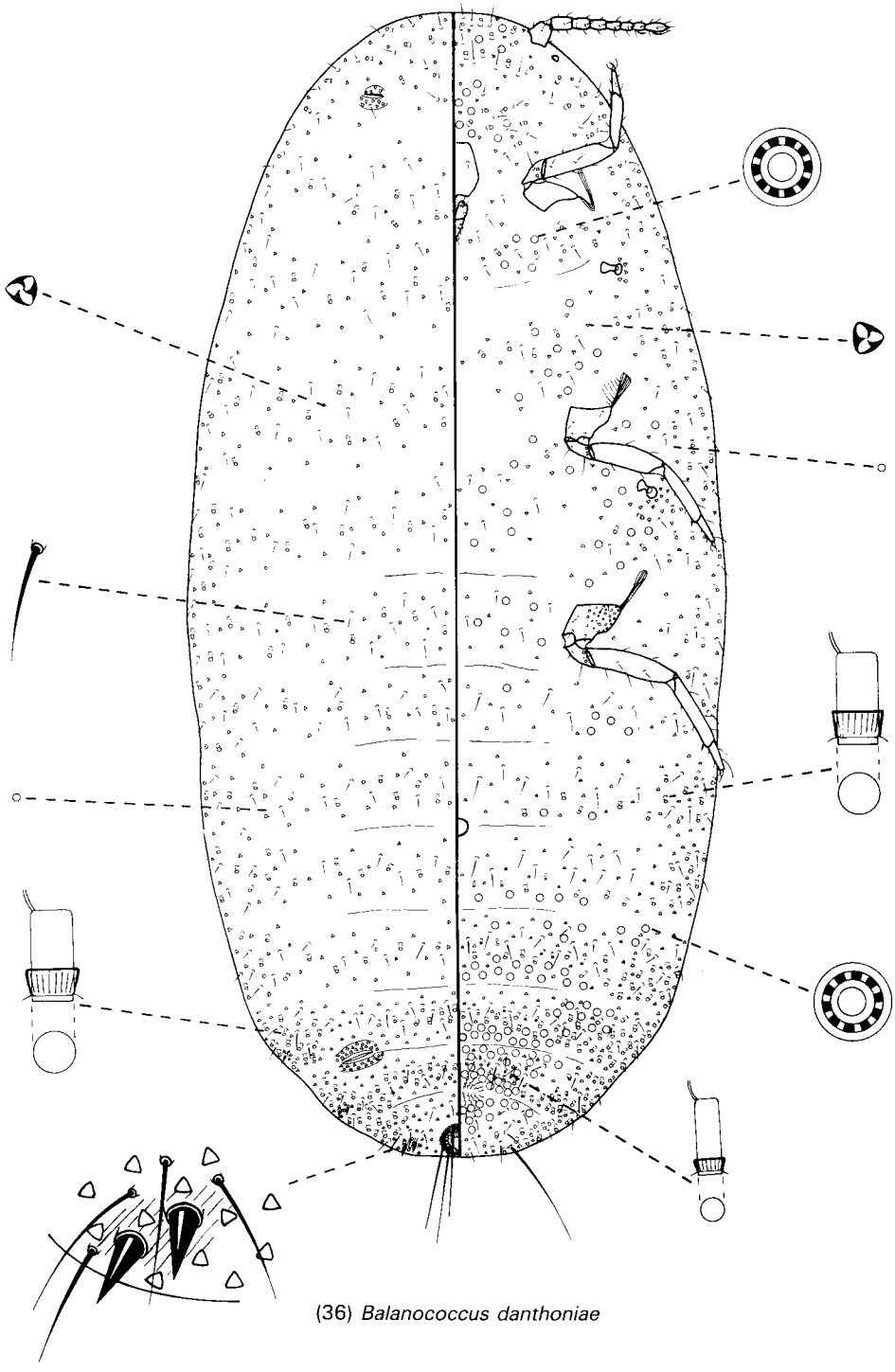
(33) *Balanococcus contextus*



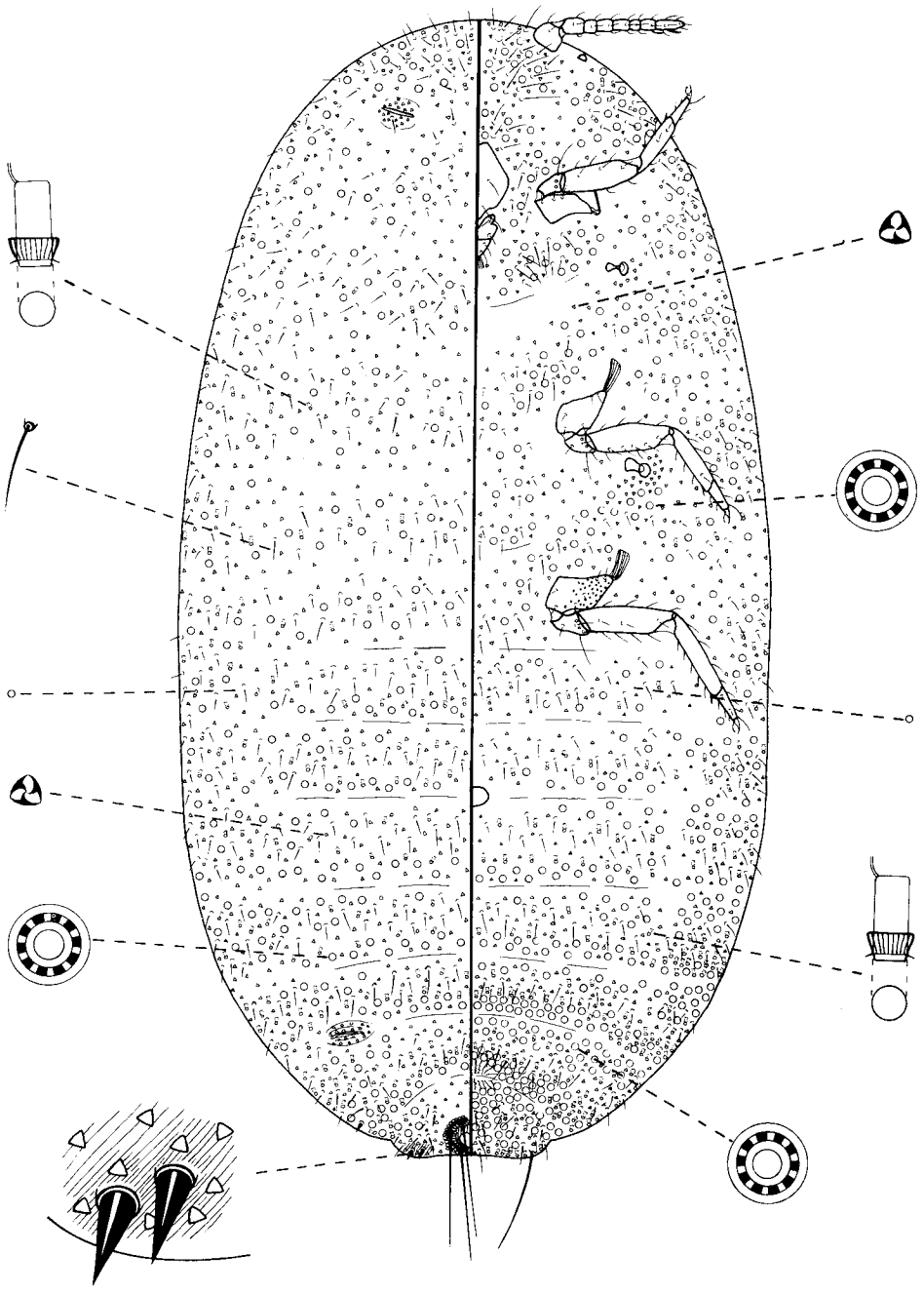
(34) *Balanococcus cordylinidis*



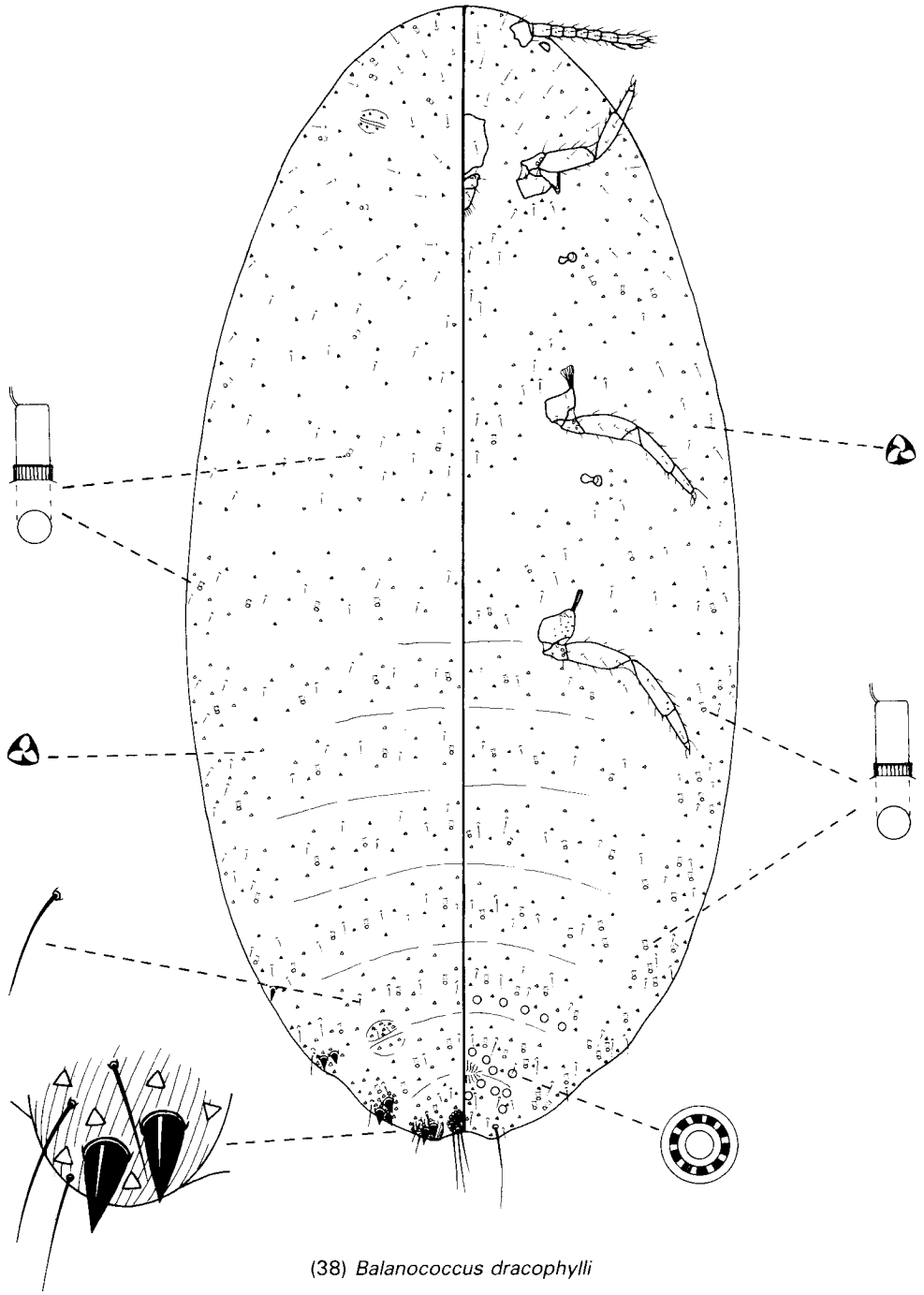
(35) *Balanococcus cortaderiae*



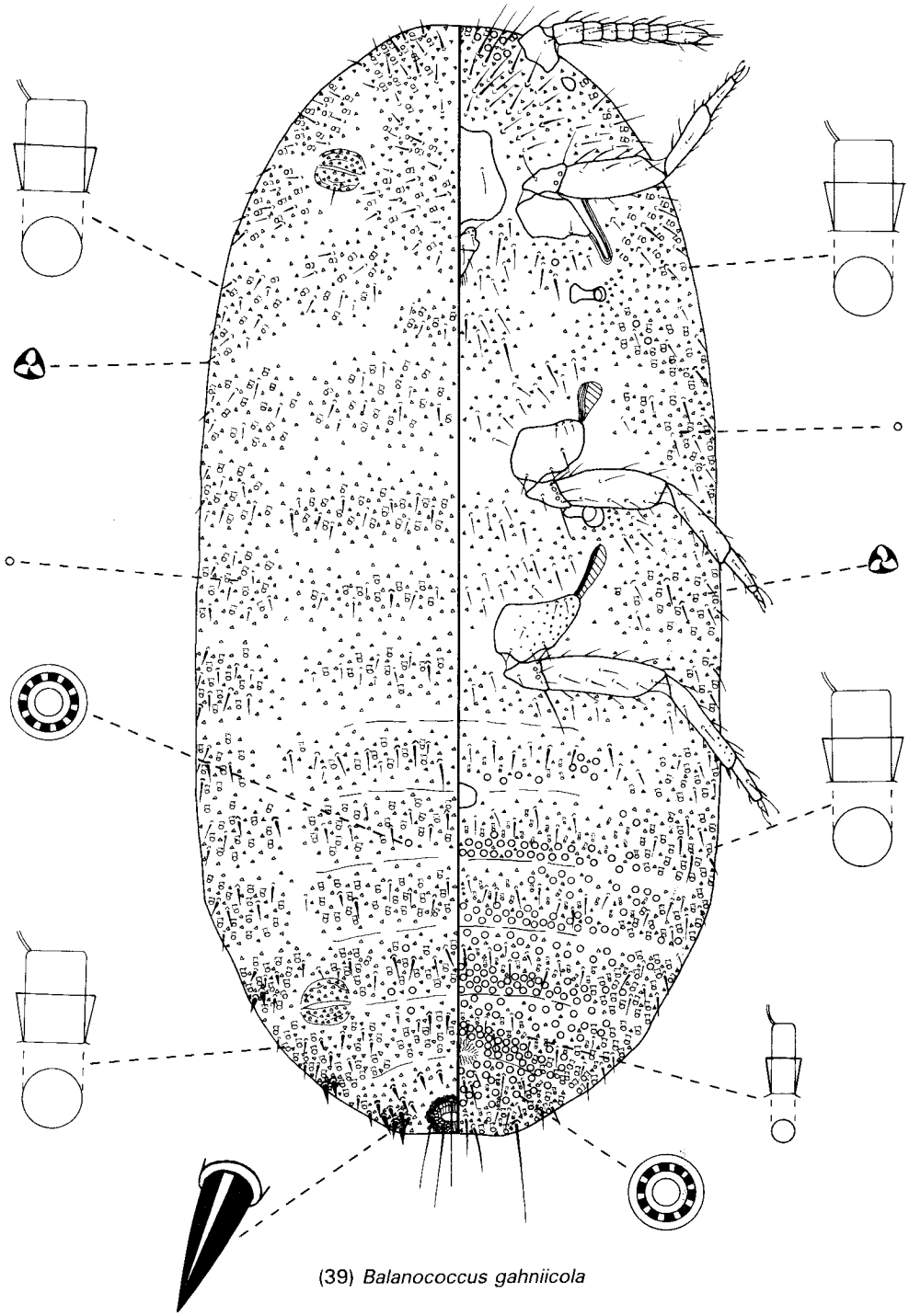
(36) *Balanococcus danthoniae*



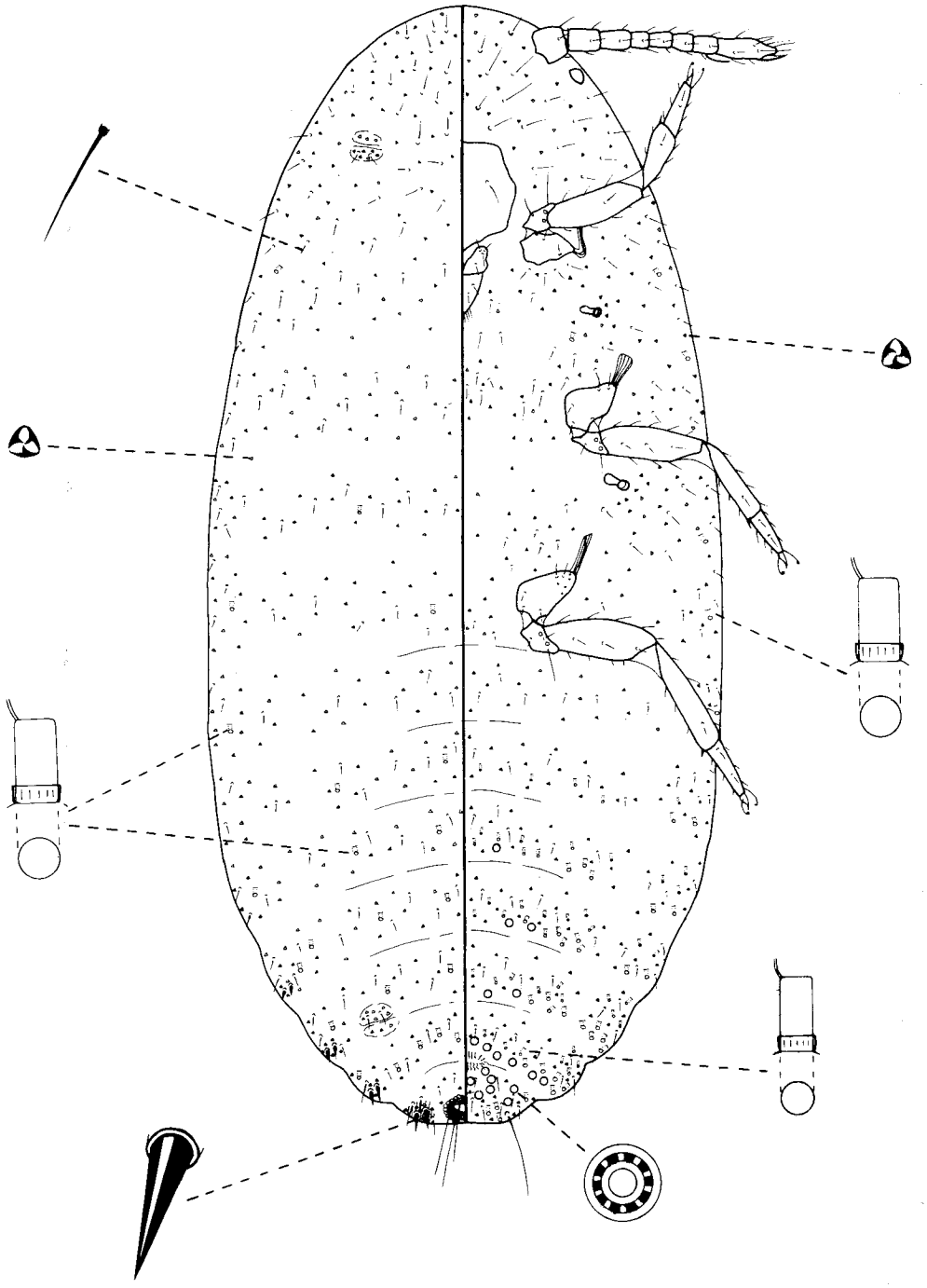
(37) *Balanococcus diminutus*



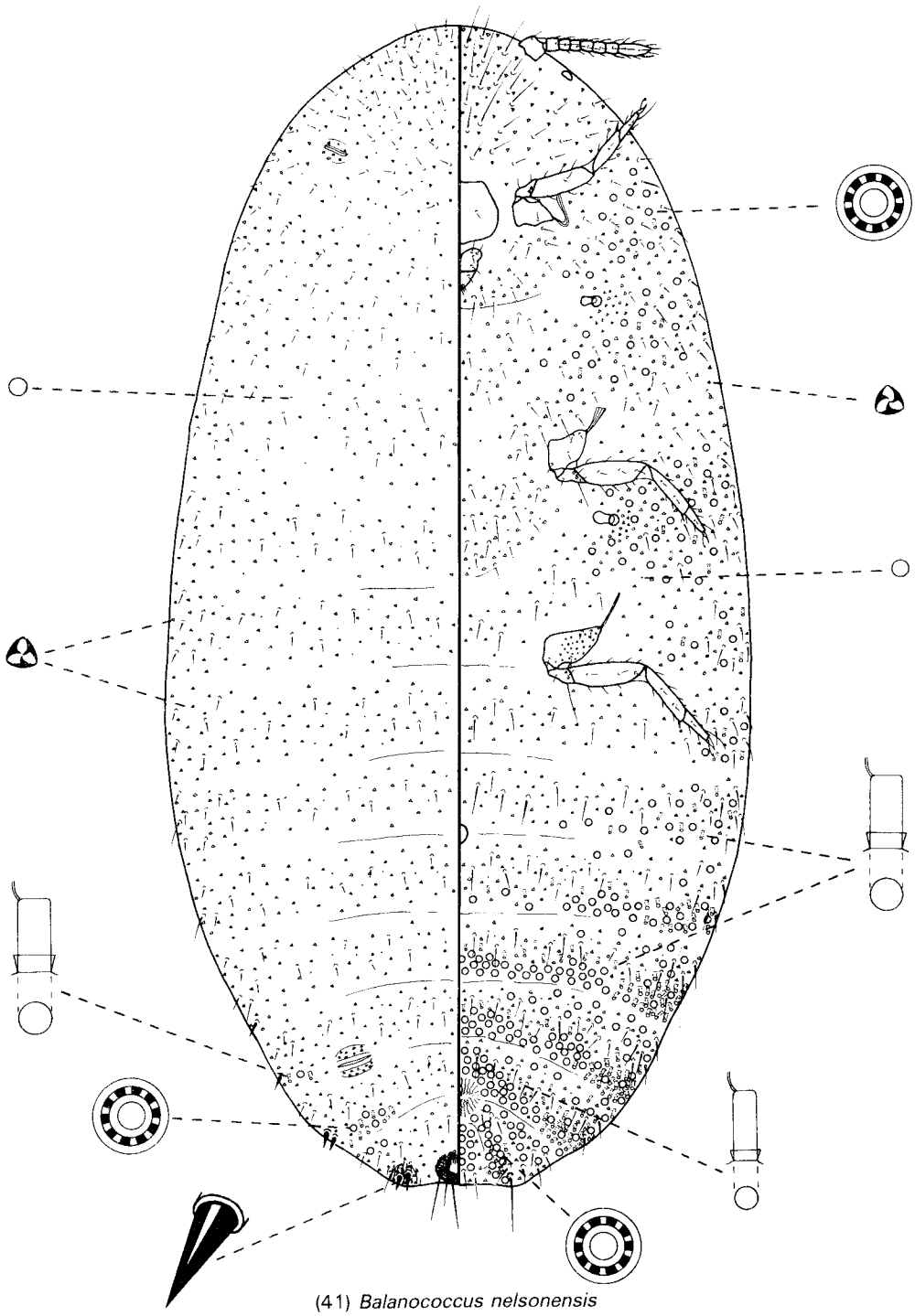
(38) *Balanococcus dracophylli*



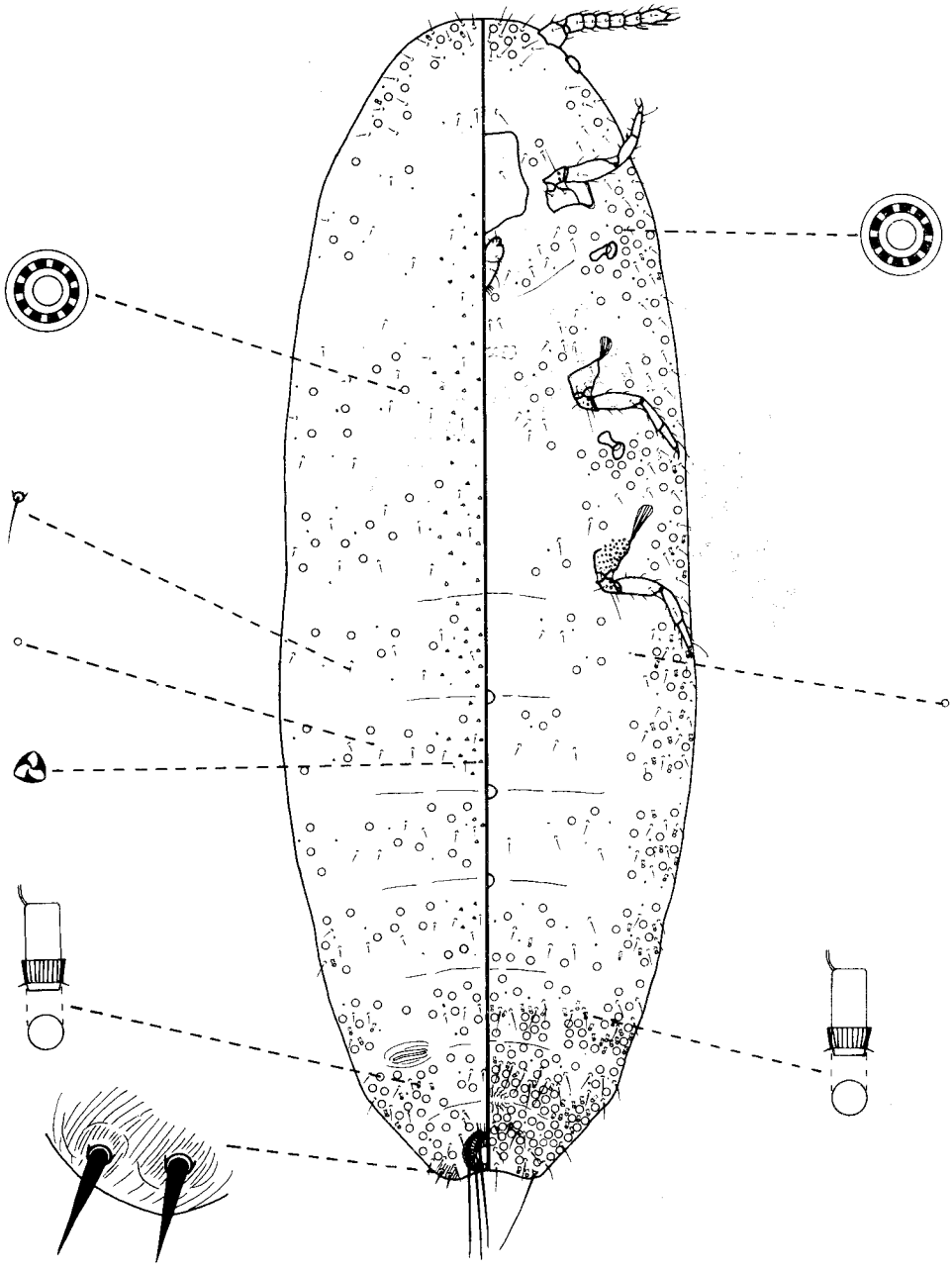
(39) *Balanococcus gahniicola*



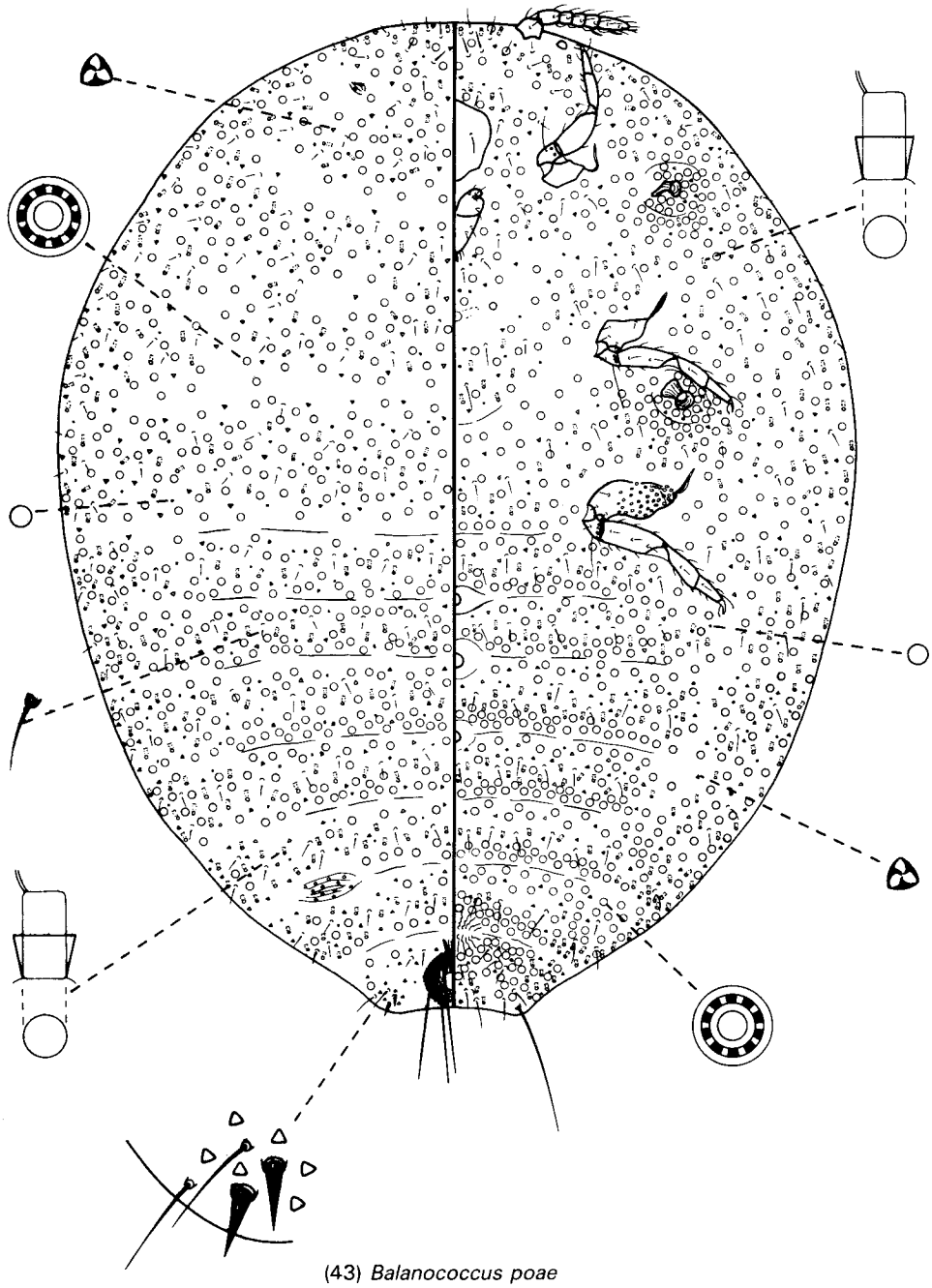
(40) *Balanococcus mayae*



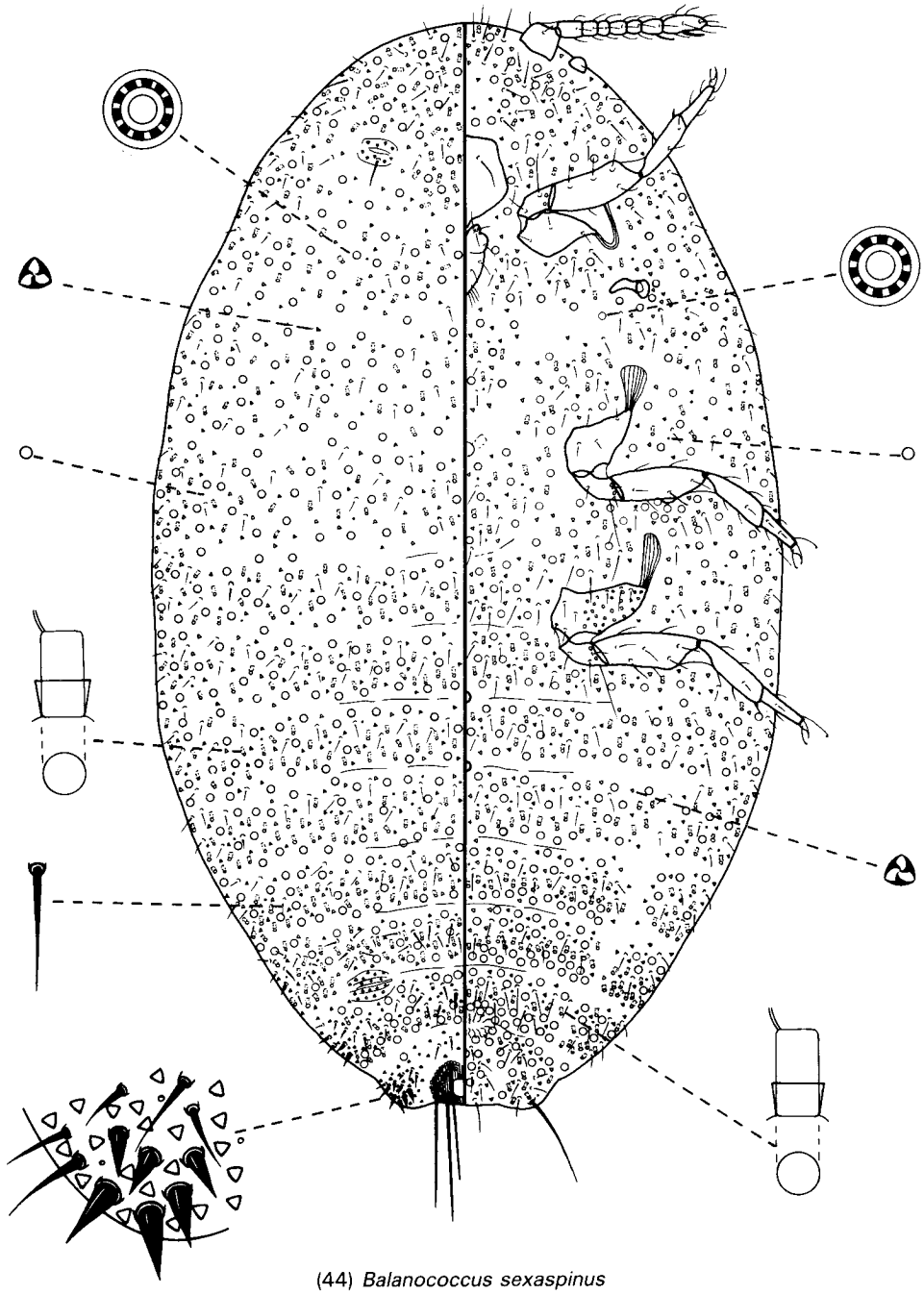
(41) *Balanococcus nelsonensis*



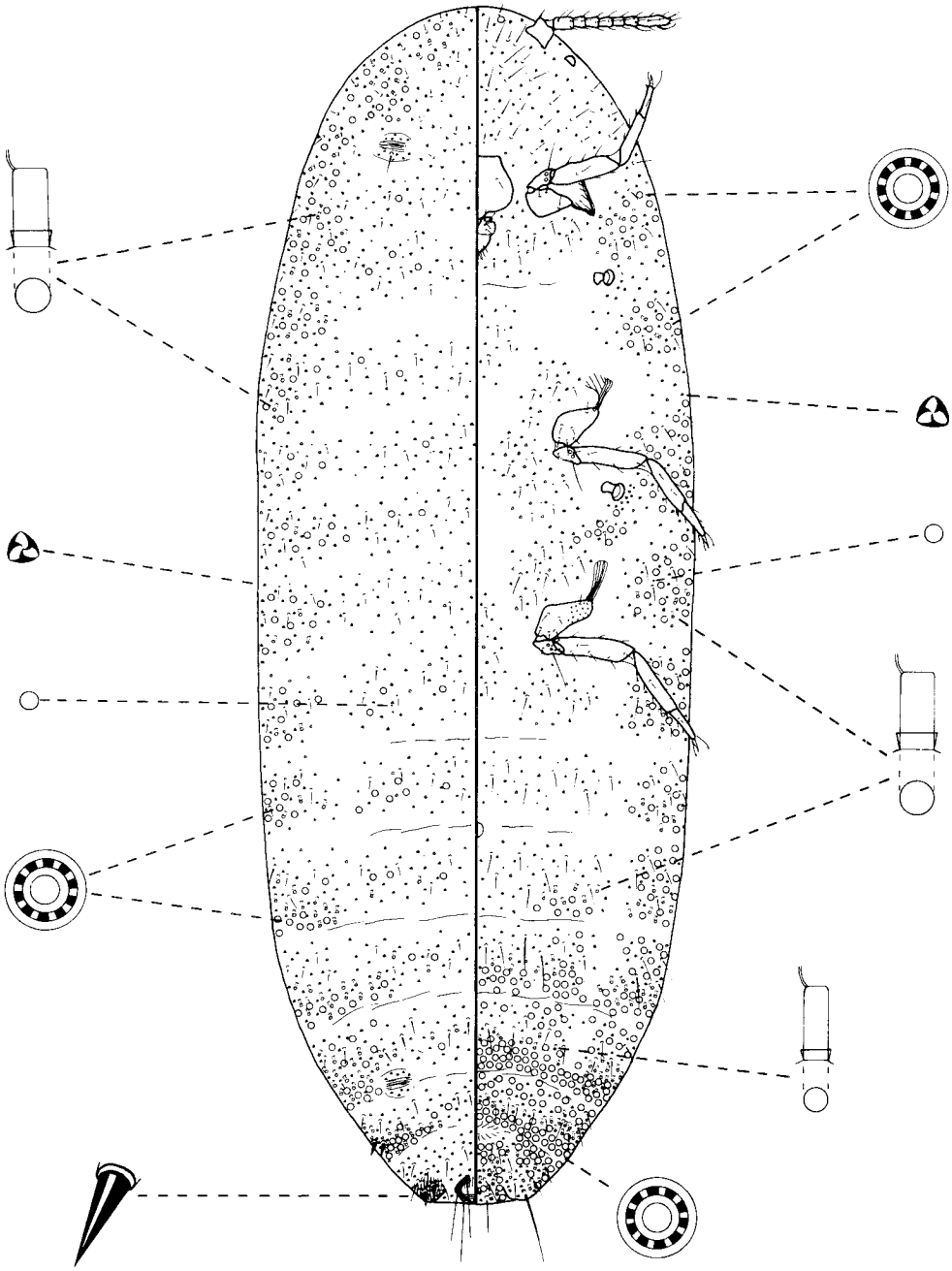
(42) *Balanococcus notodanthoniae*



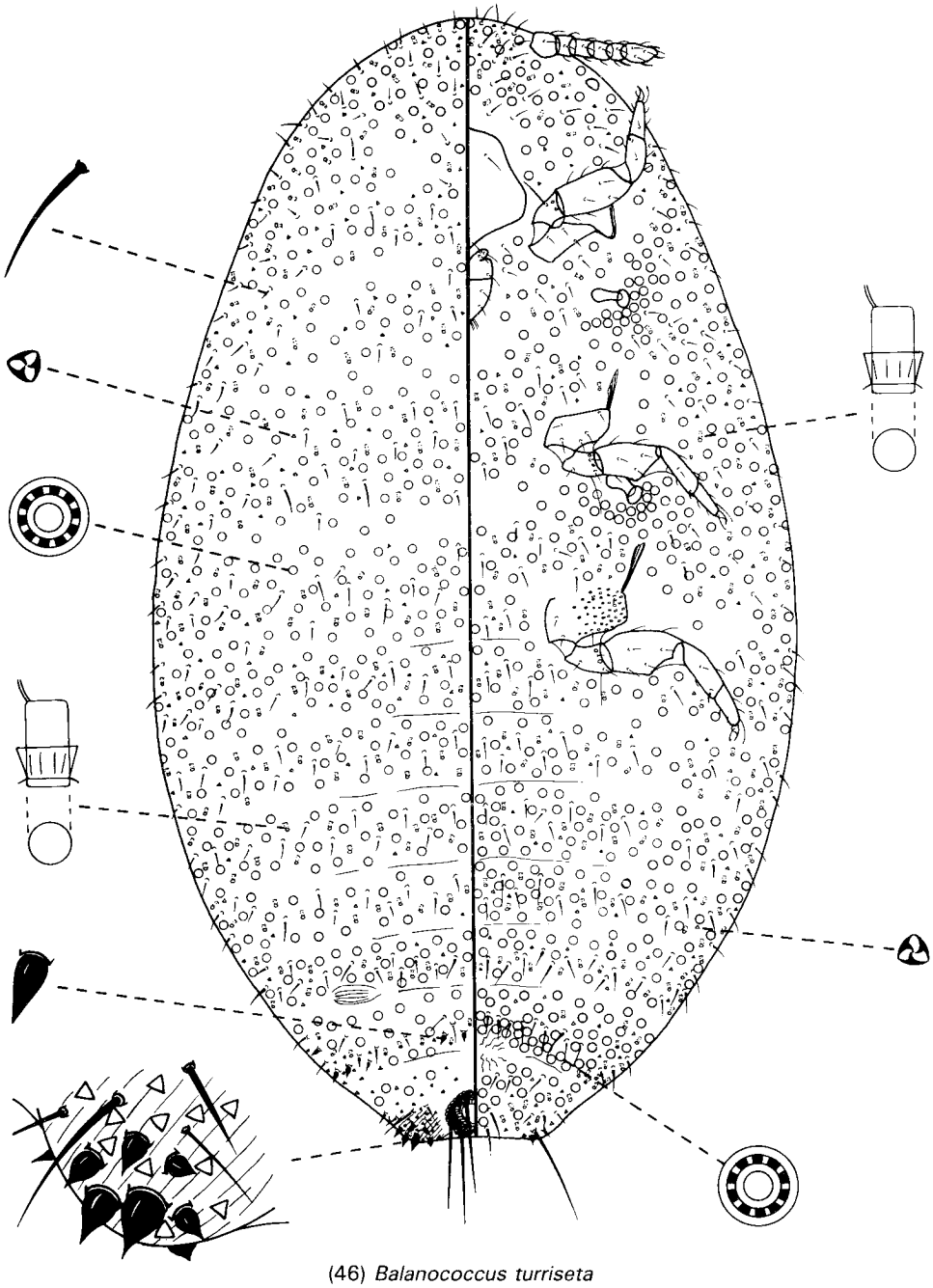
(43) *Balanococcus poae*



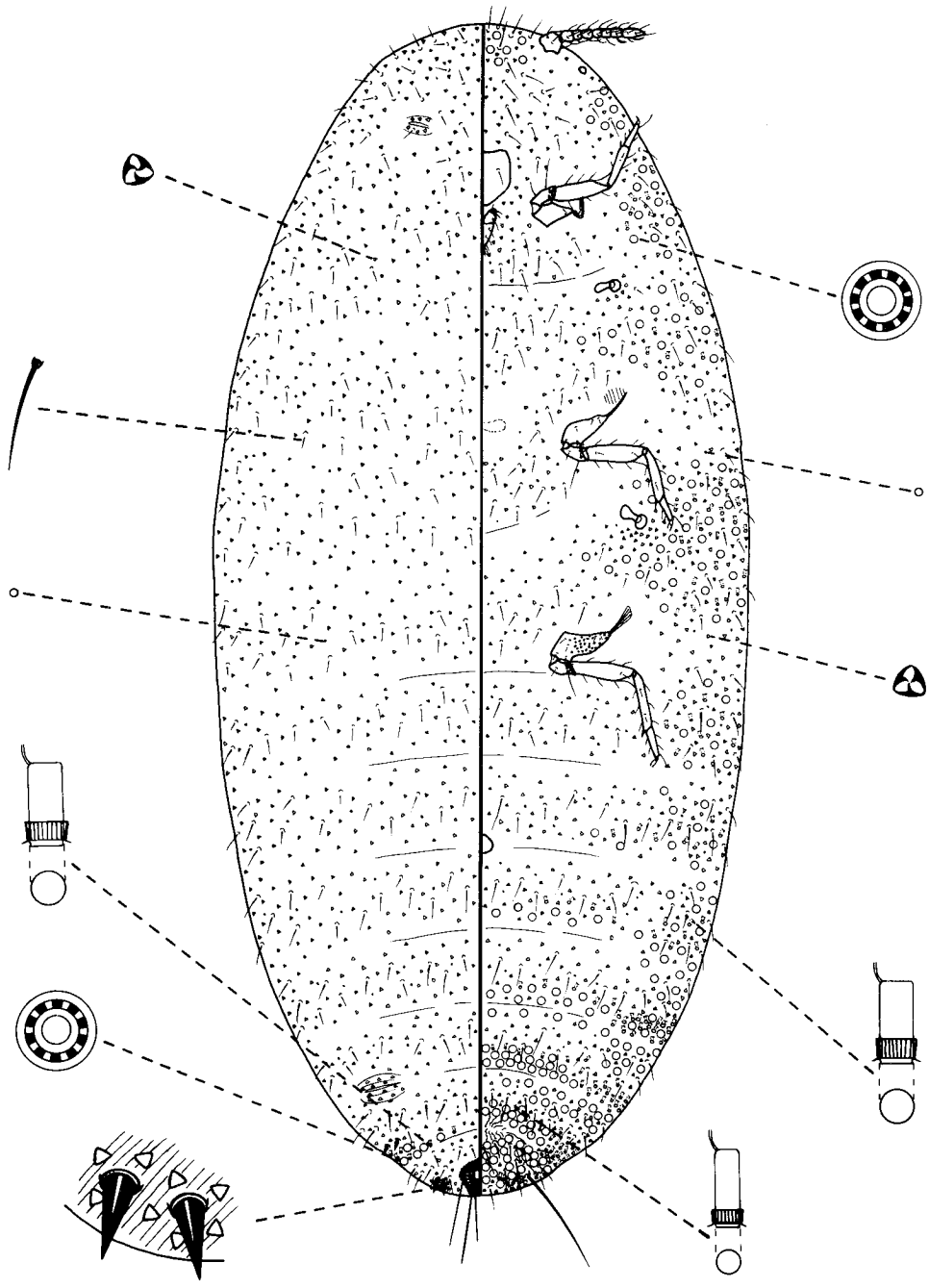
(44) *Balanococcus sexaspinus*



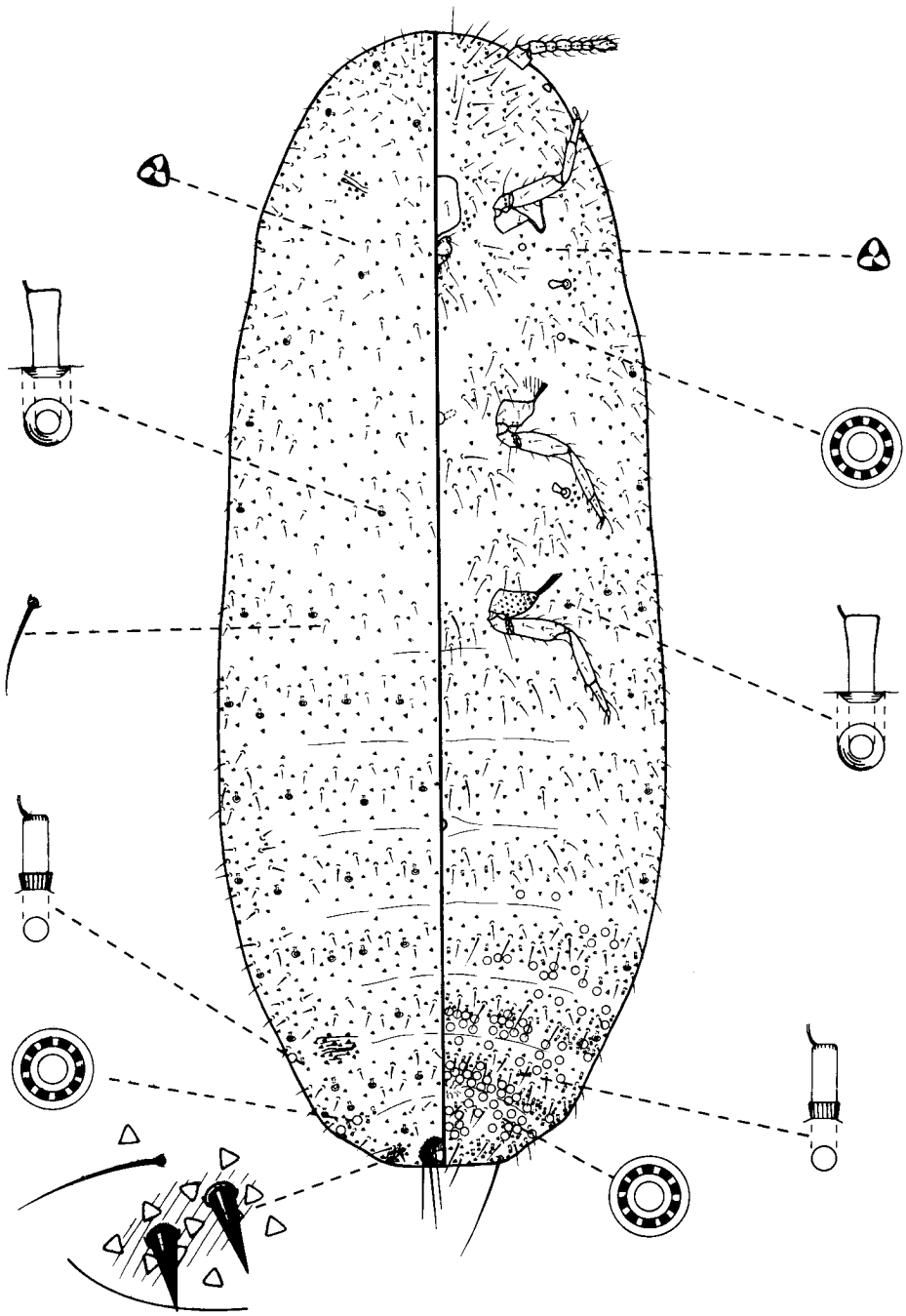
(45) *Balanococcus tunakinensis*



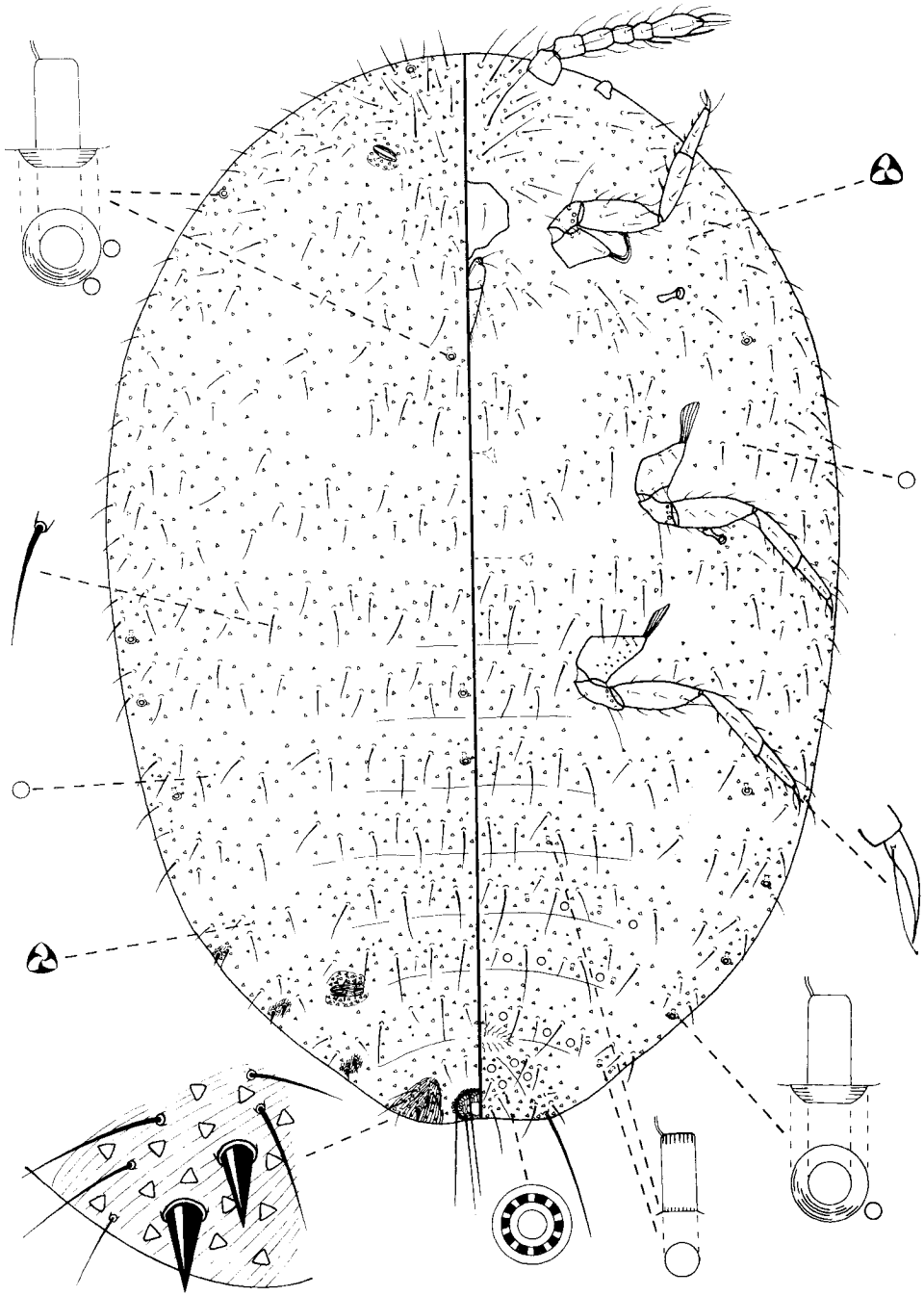
(46) *Balanococcus turriseta*



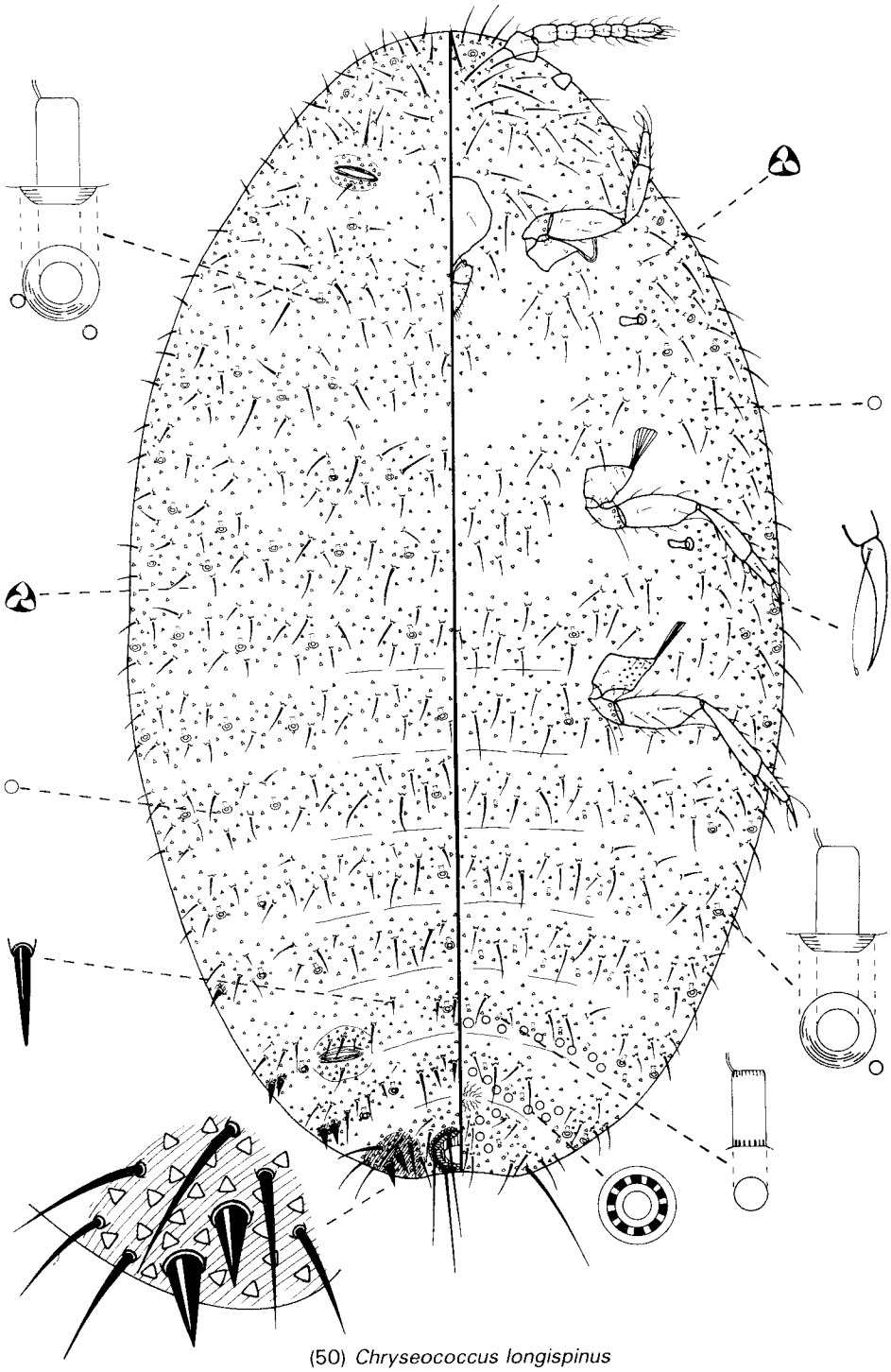
(47) *Balanococcus wisei*



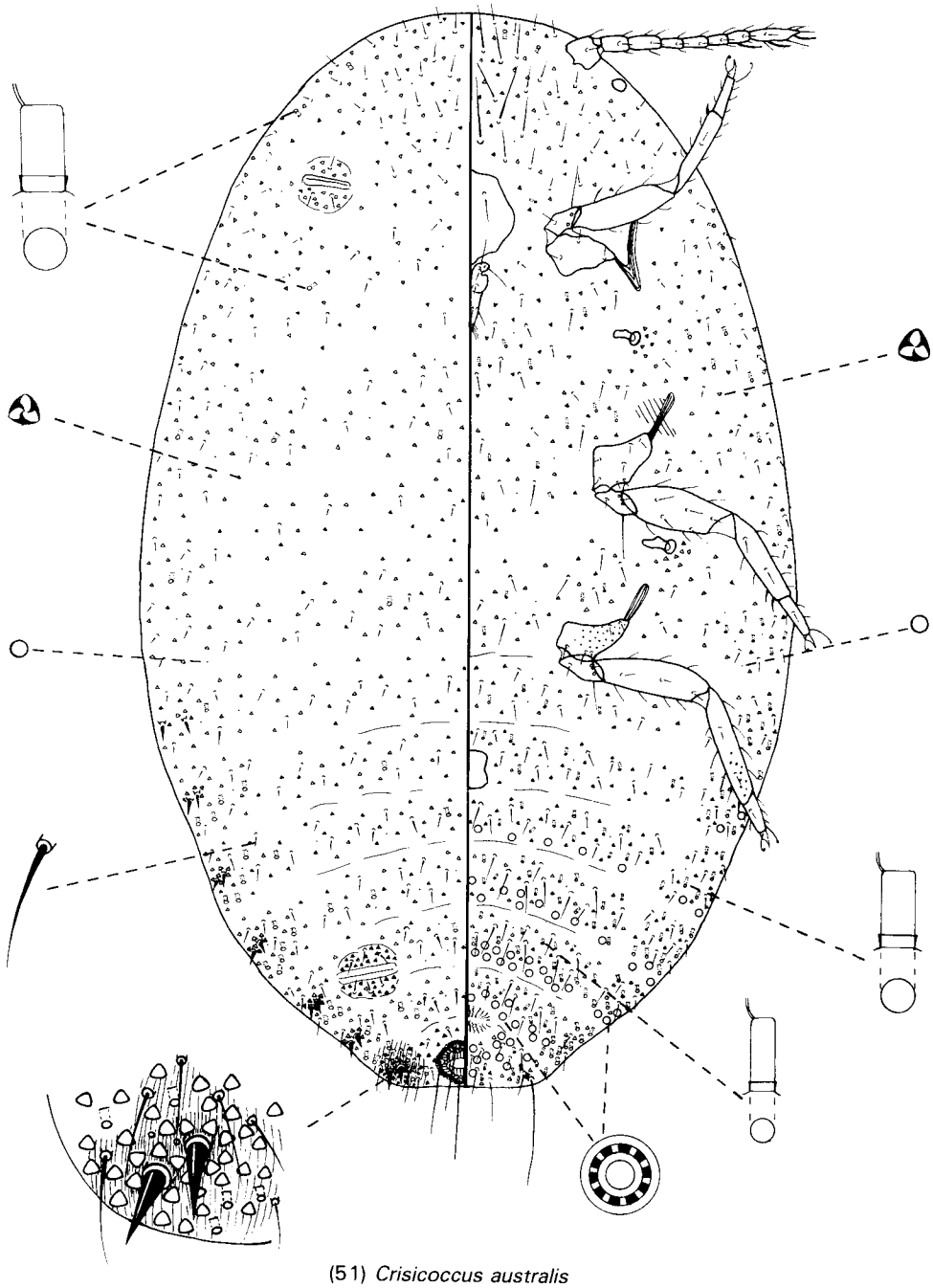
(48) *Chorizococcus oreophilus*



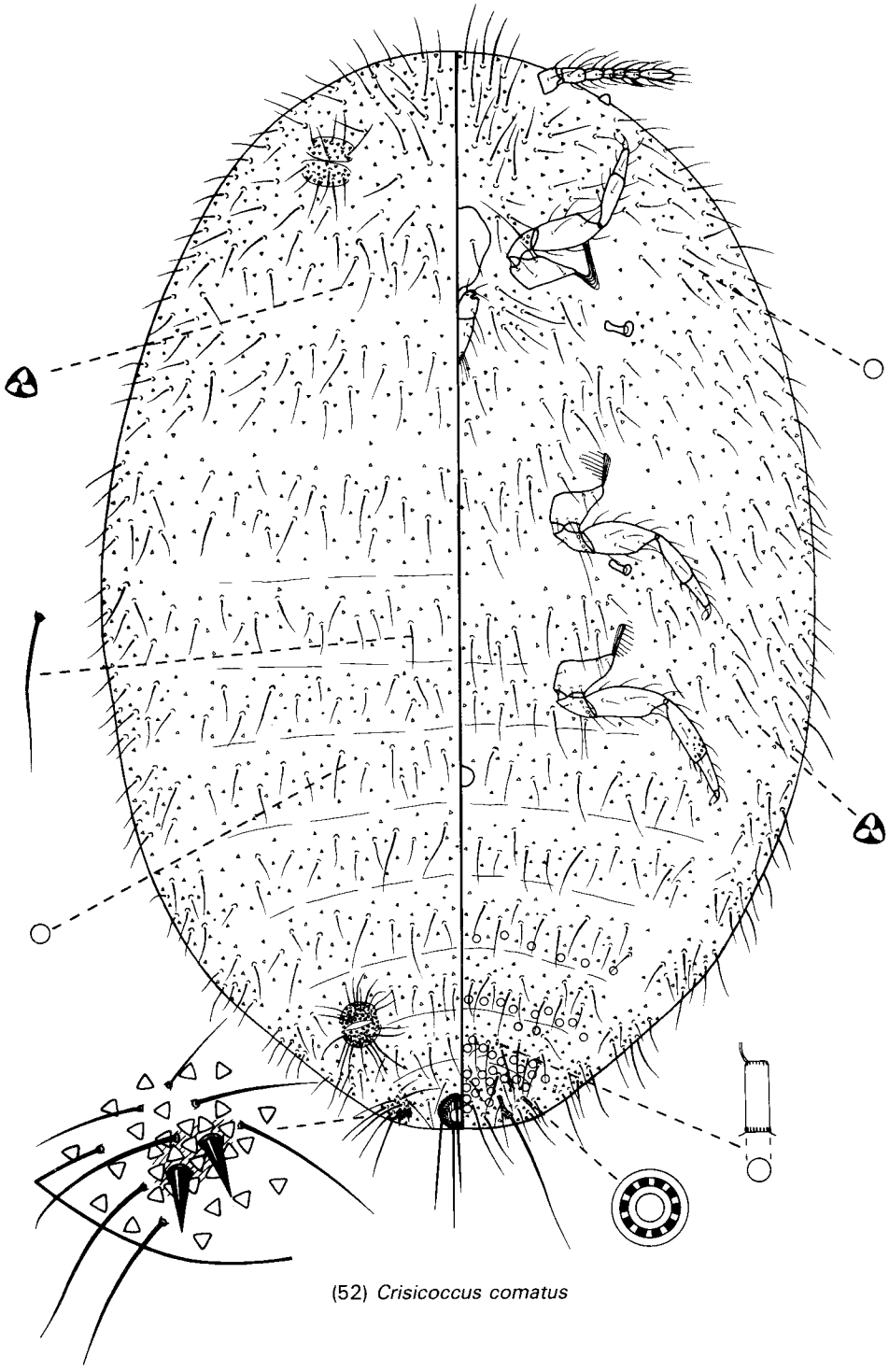
(49) *Chryseococcus arecae*



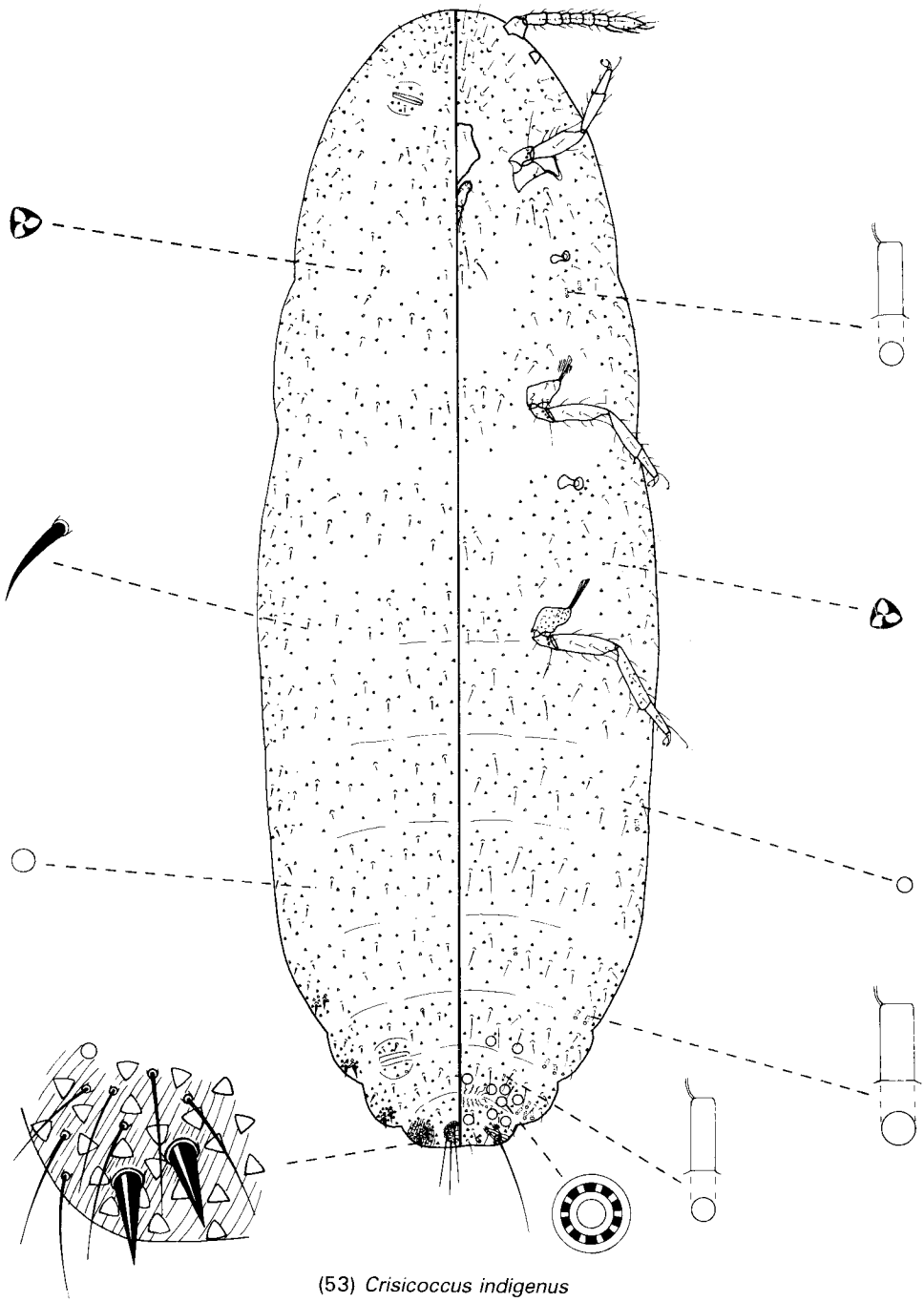
(50) *Chryseococcus longispinus*



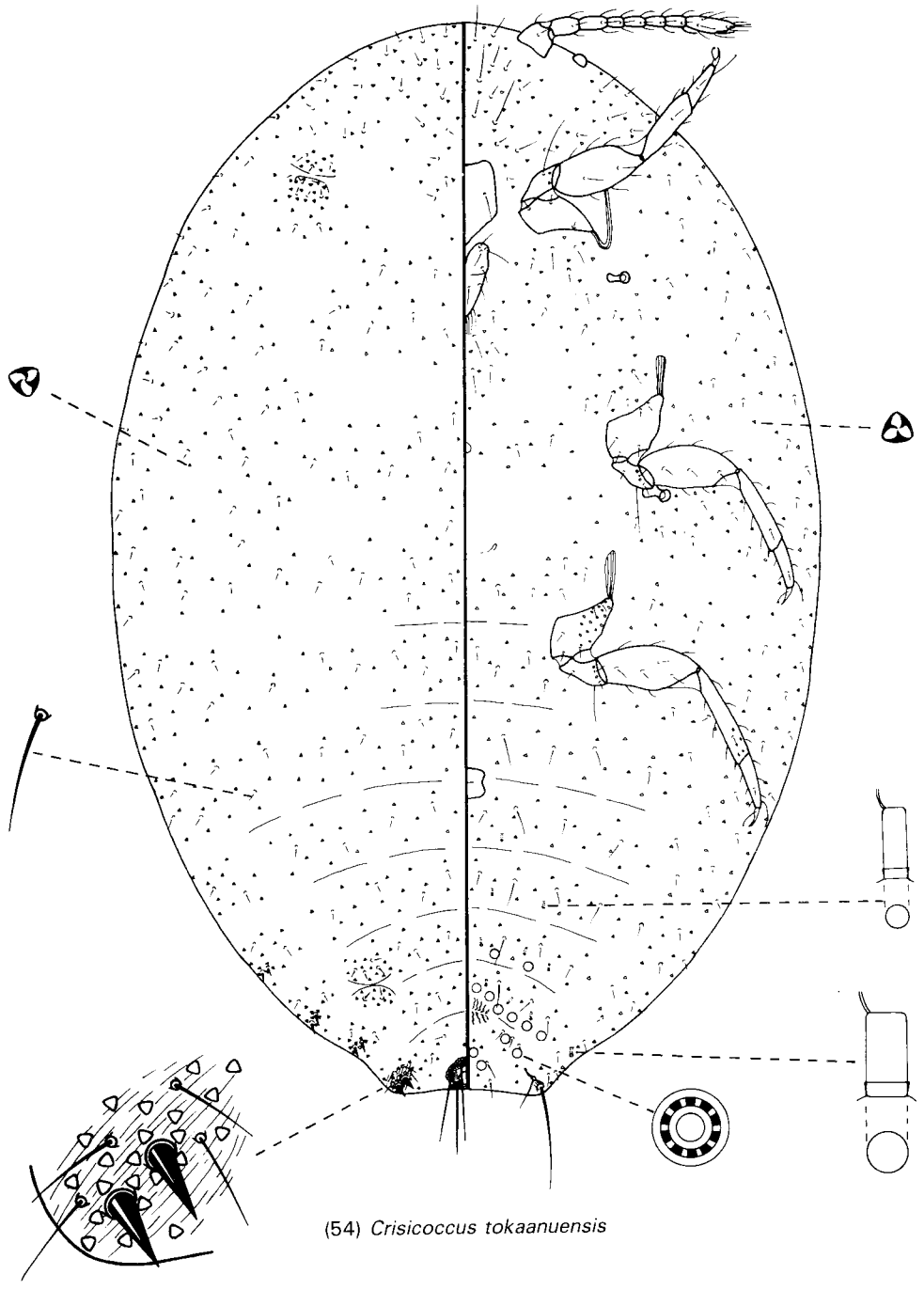
(51) *Crisicoccus australis*



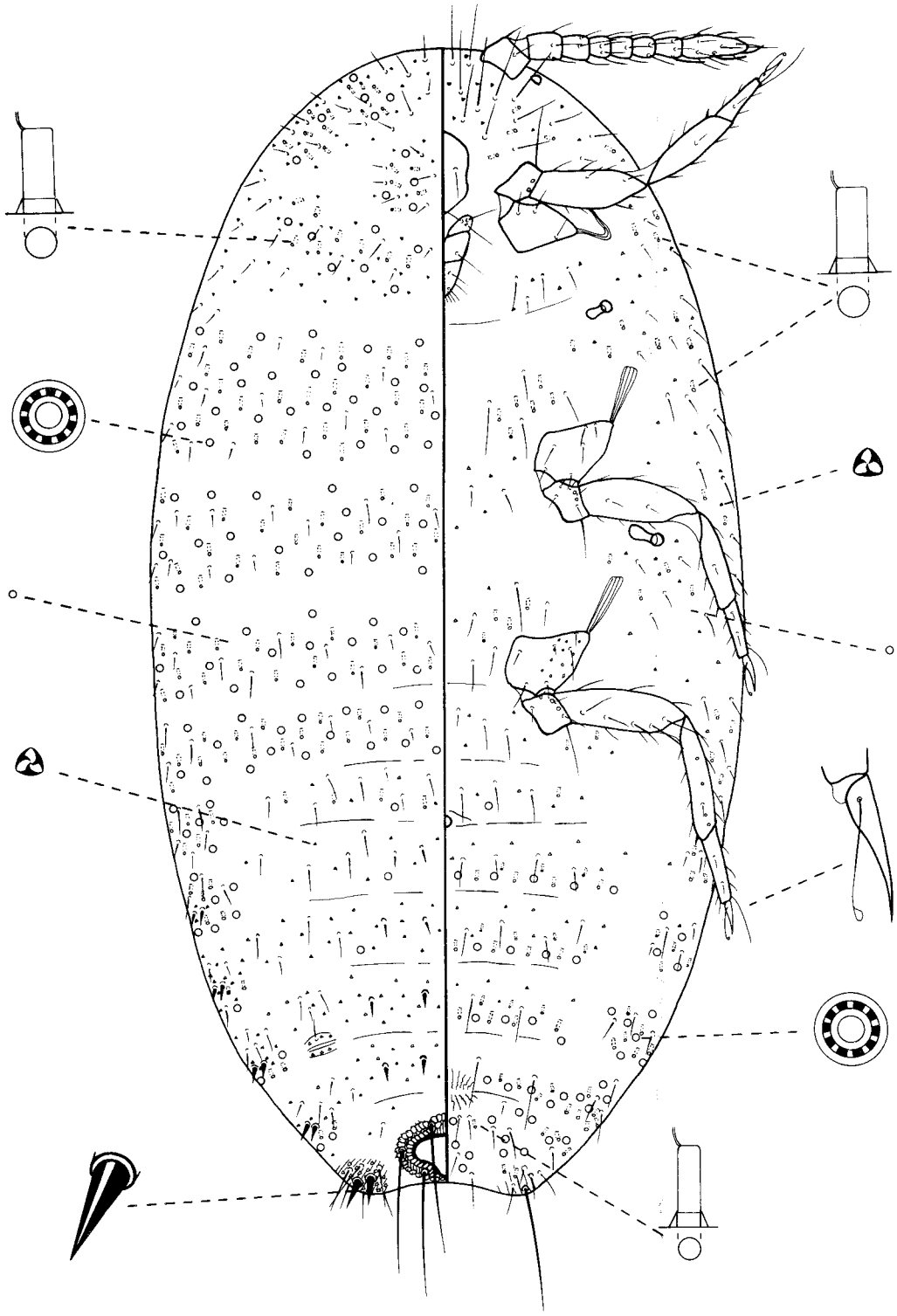
(52) *Crisicoccus comatus*



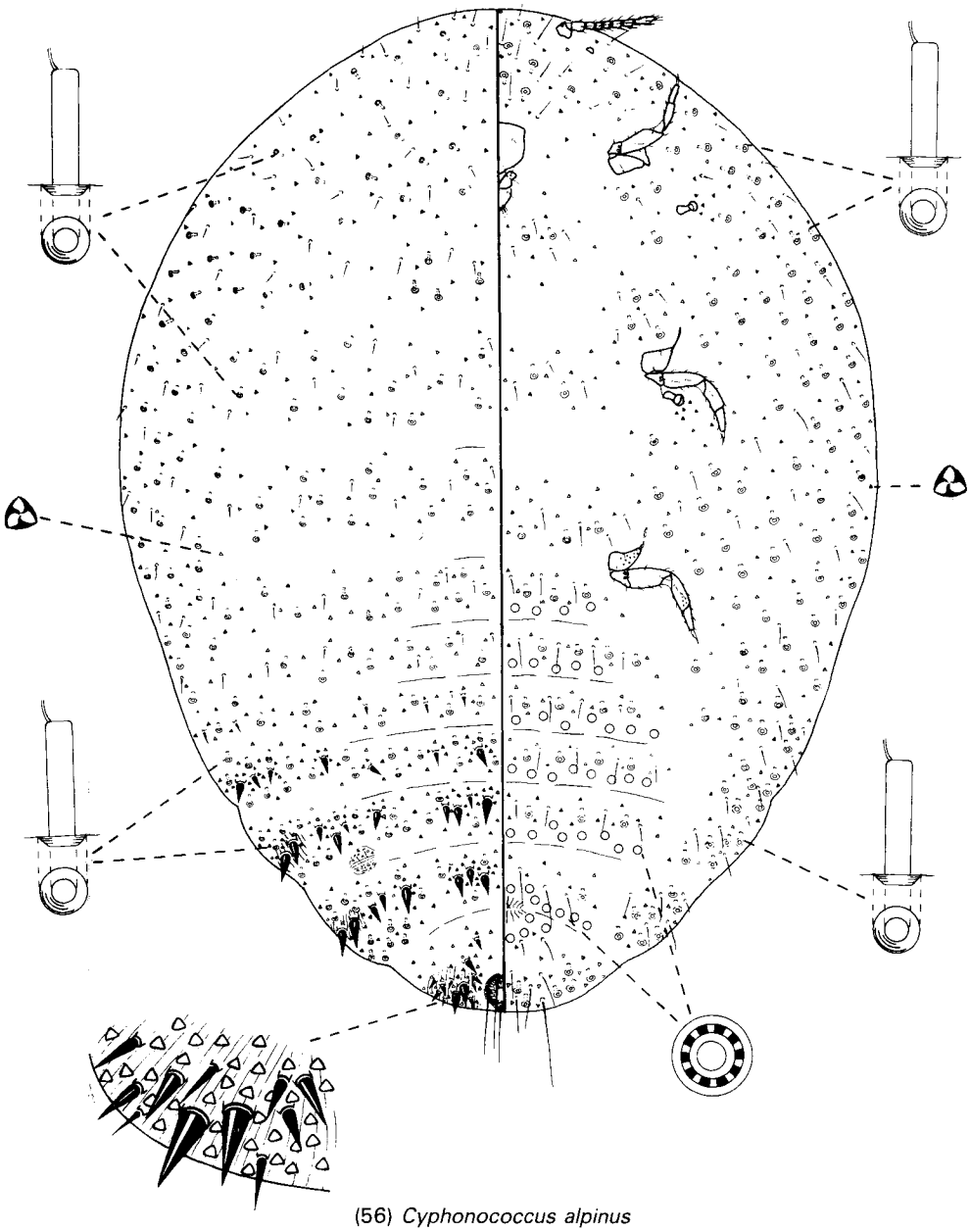
(53) *Crisicoccus indigenus*



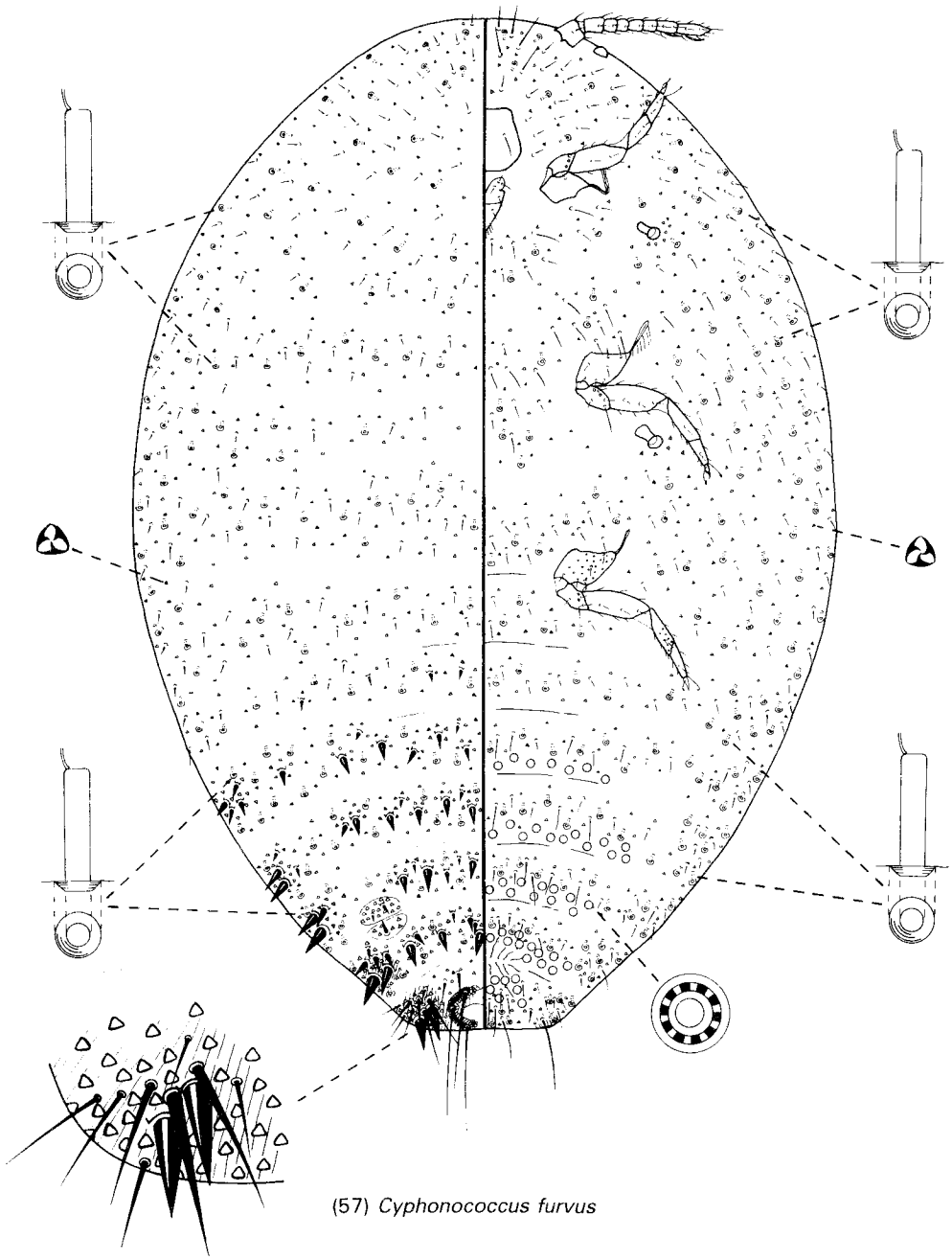
(54) *Crisicoccus tokaanuensis*



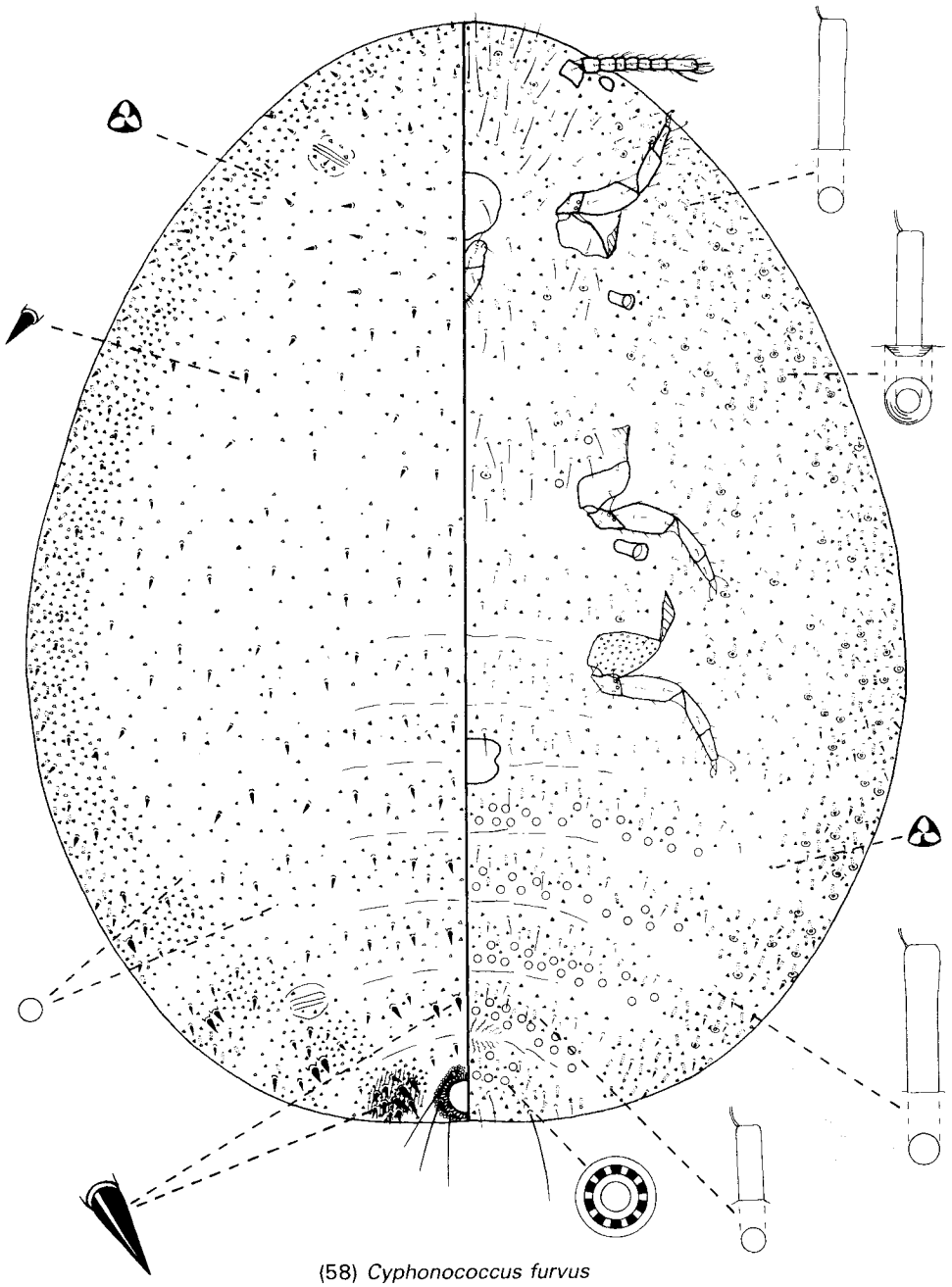
(55) *Crocydococcus cottieri*



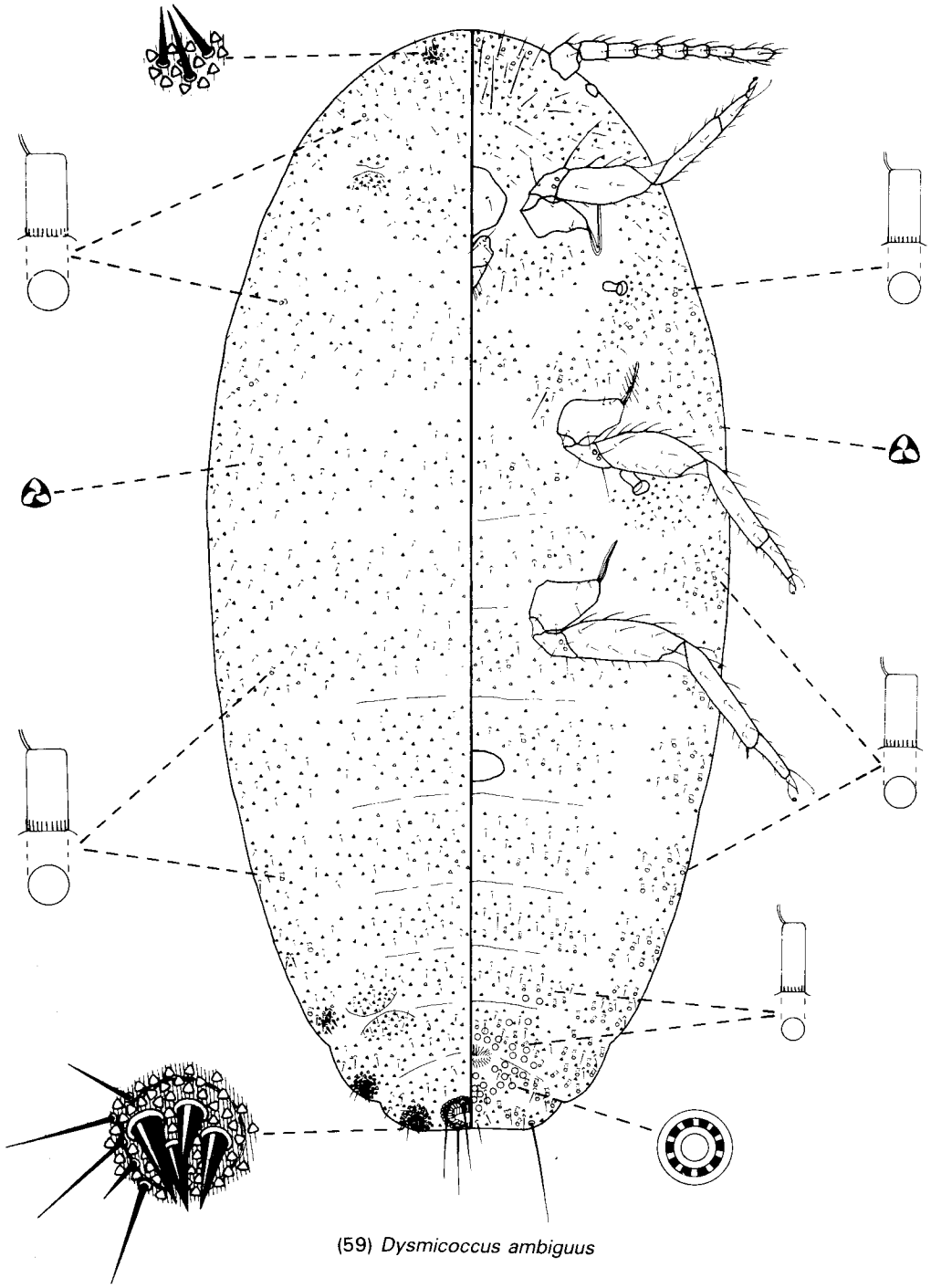
(56) *Cyphonococcus alpinus*



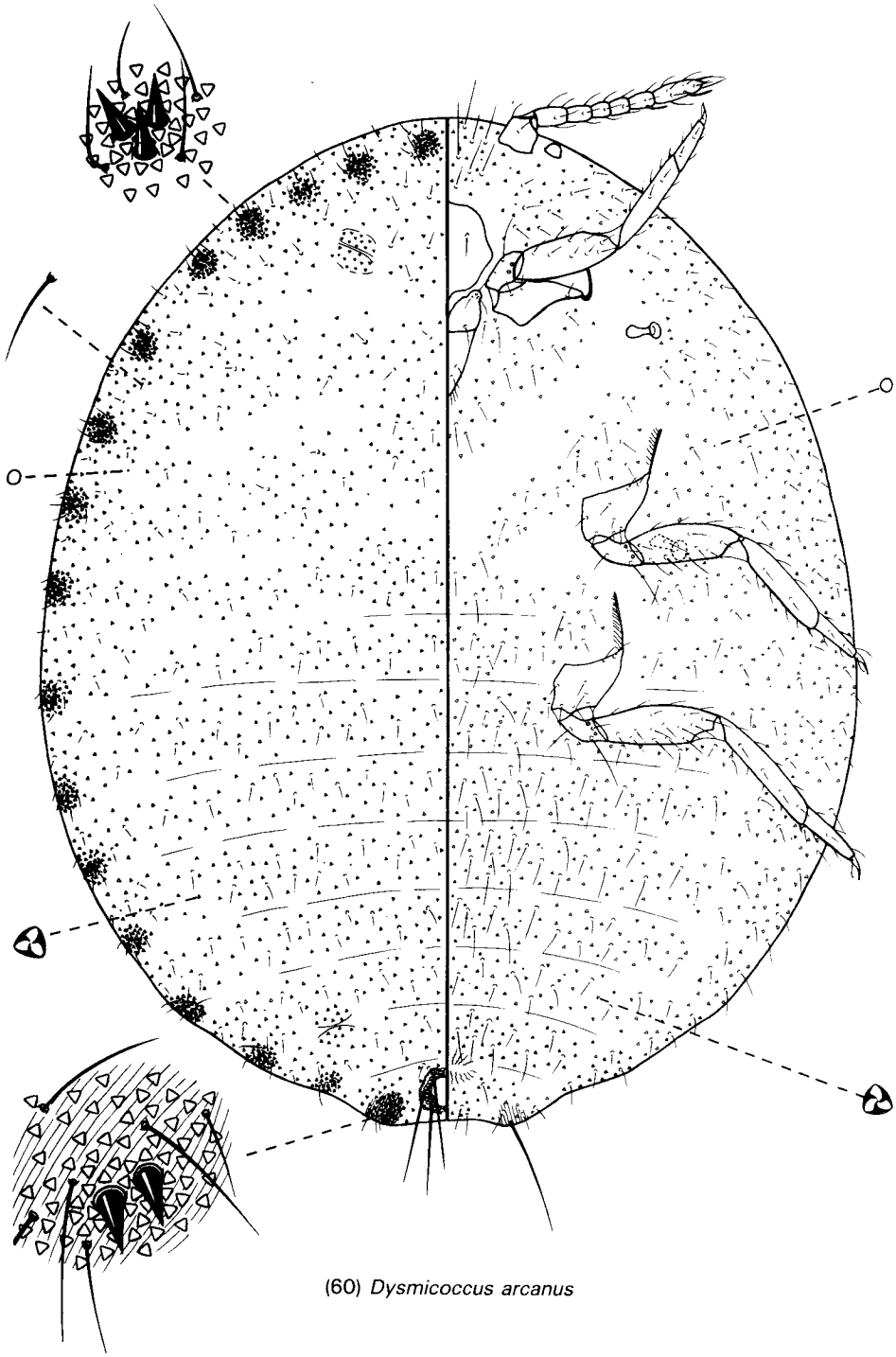
(57) *Cyphonococcus furvus*



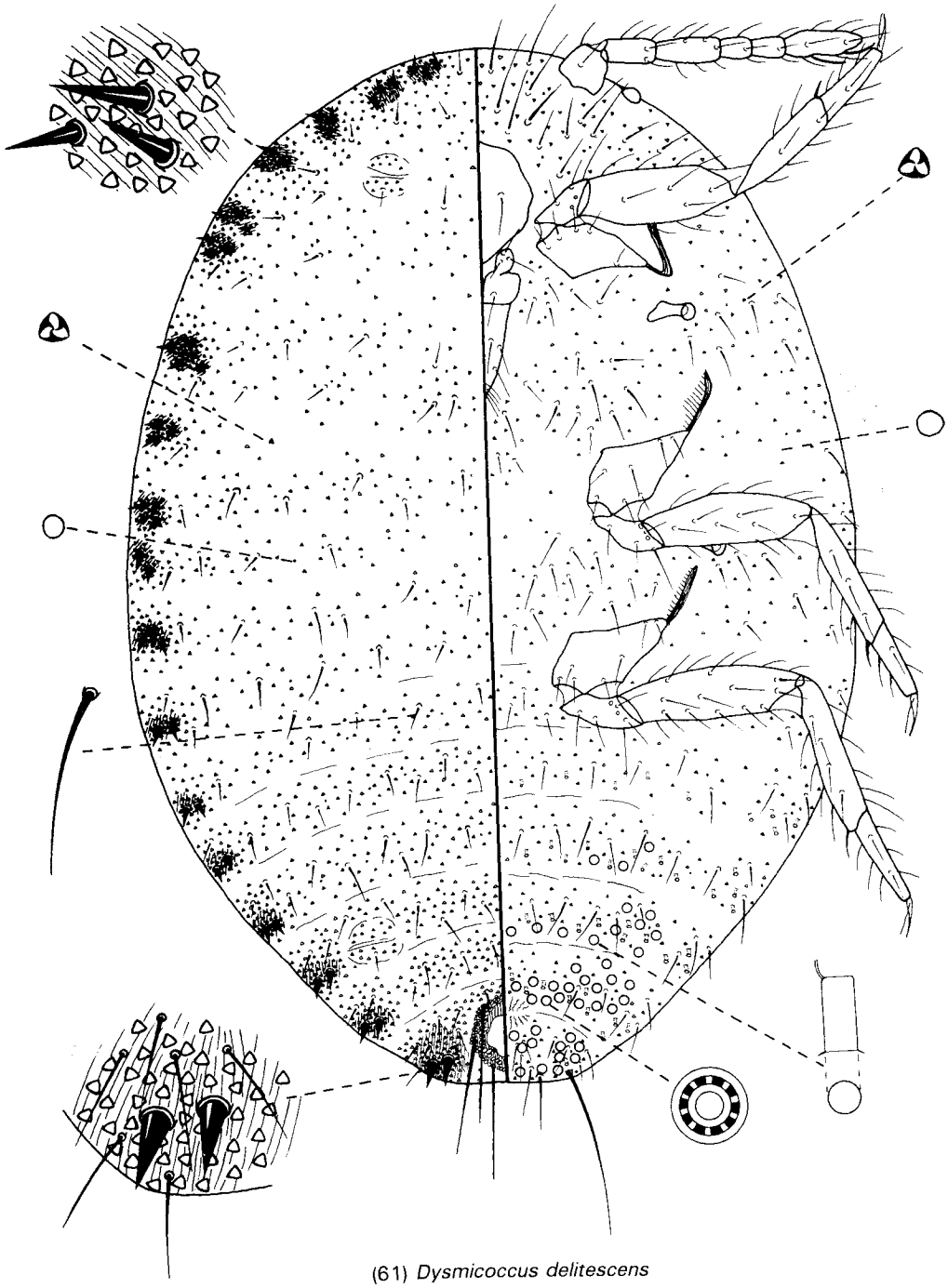
(58) *Cyphonococcus furvus*



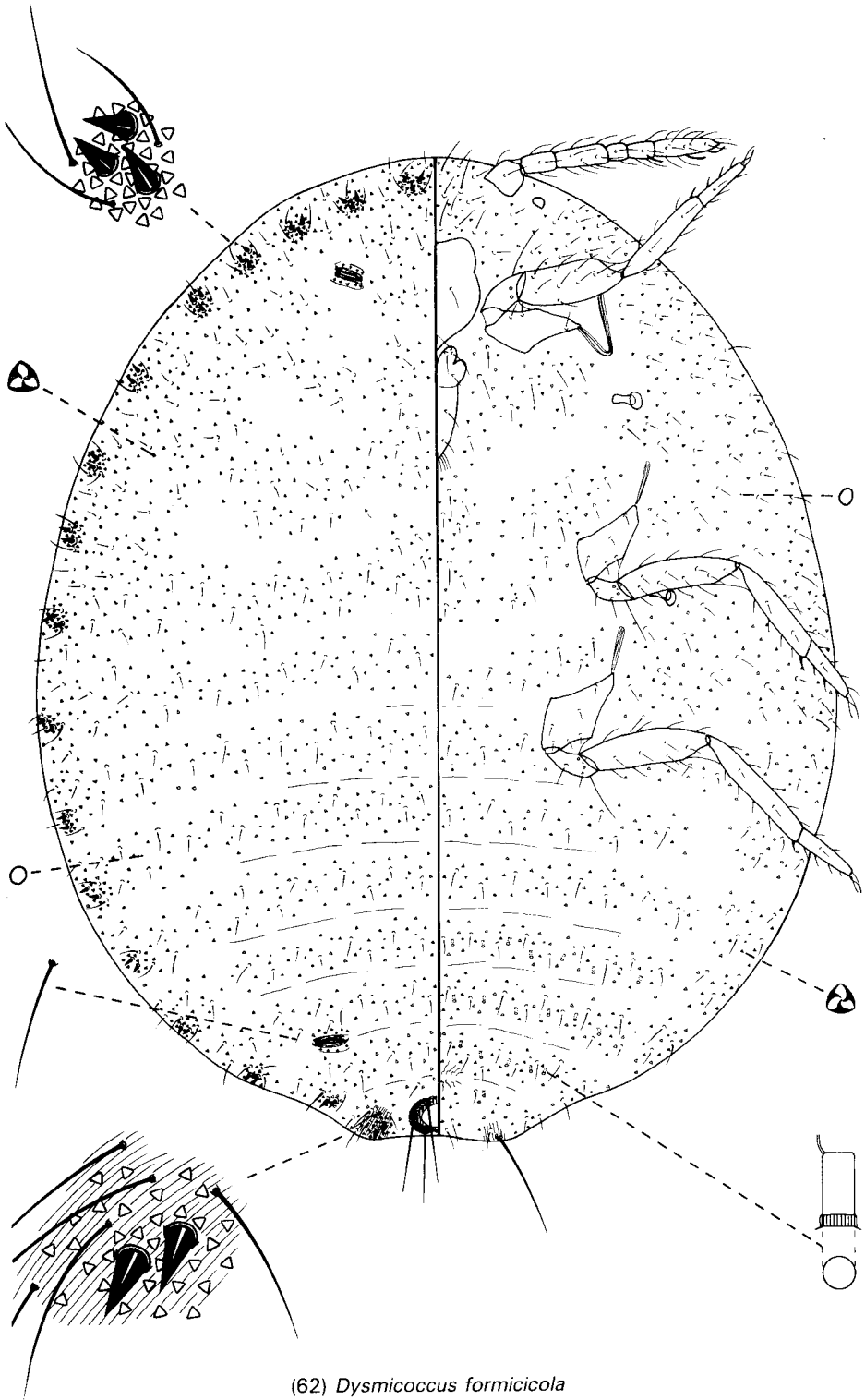
(59) *Dysmicoccus ambiguus*



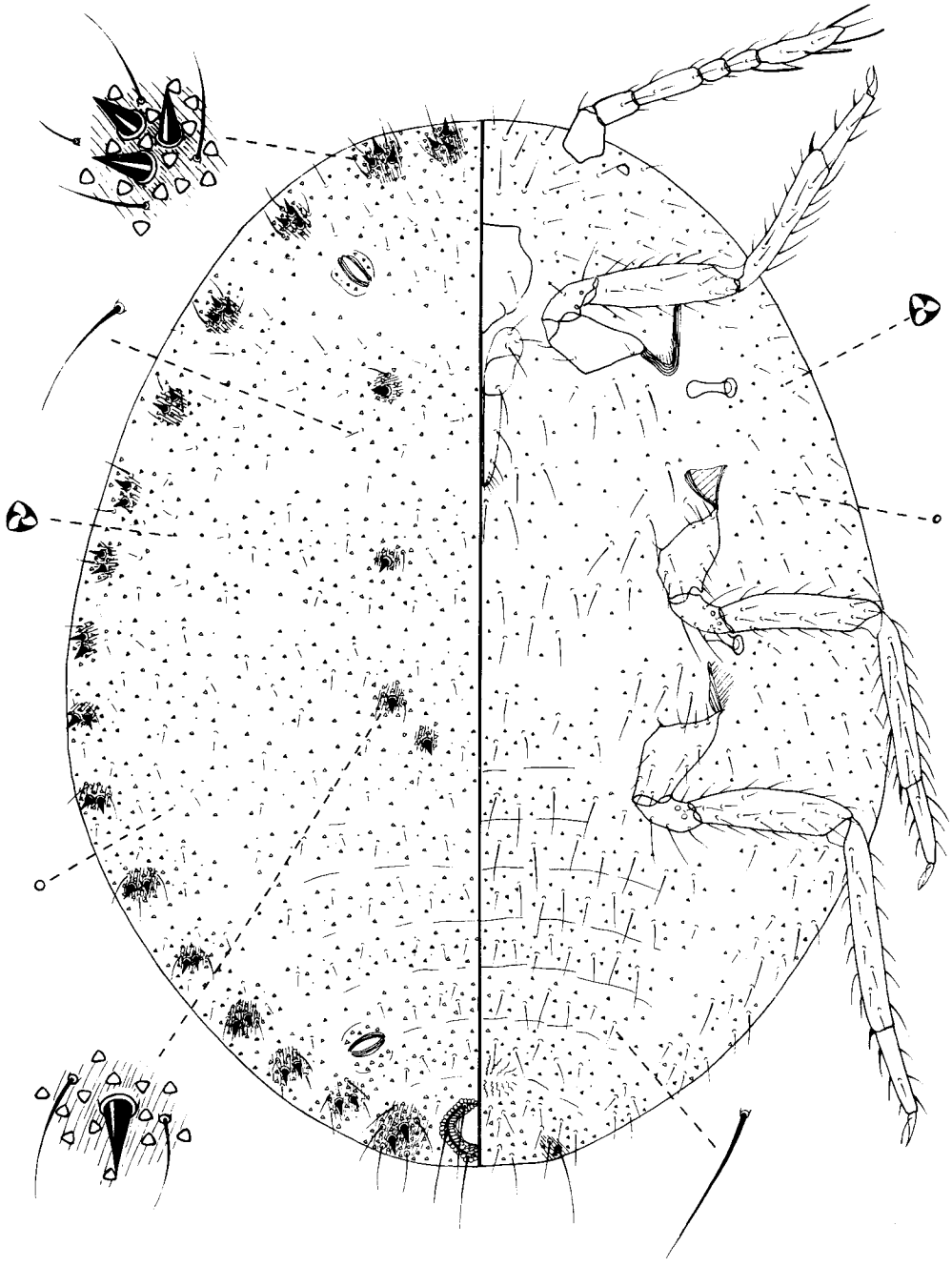
(60) *Dysmicoccus arcanus*



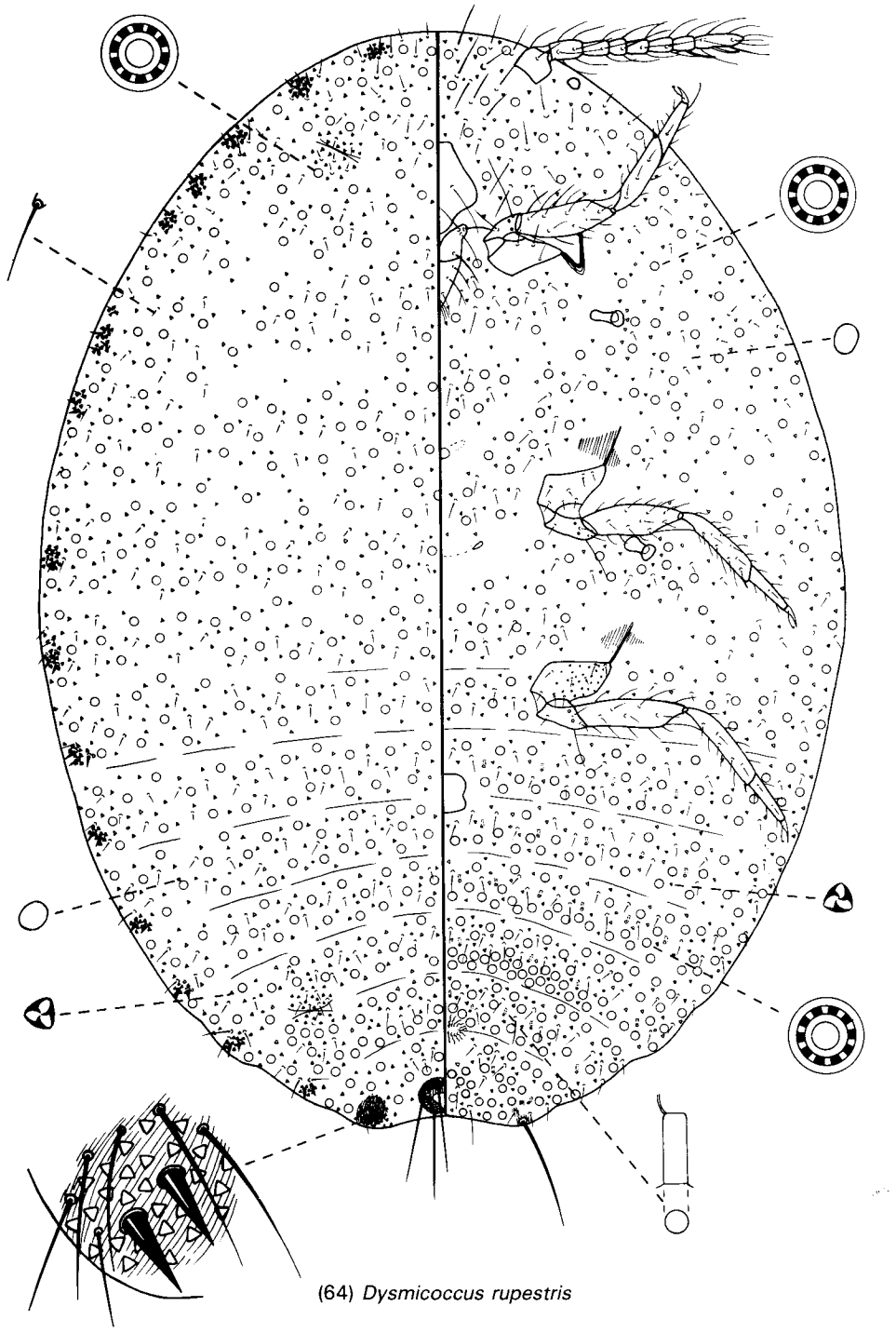
(61) *Dysmicoccus delitescens*



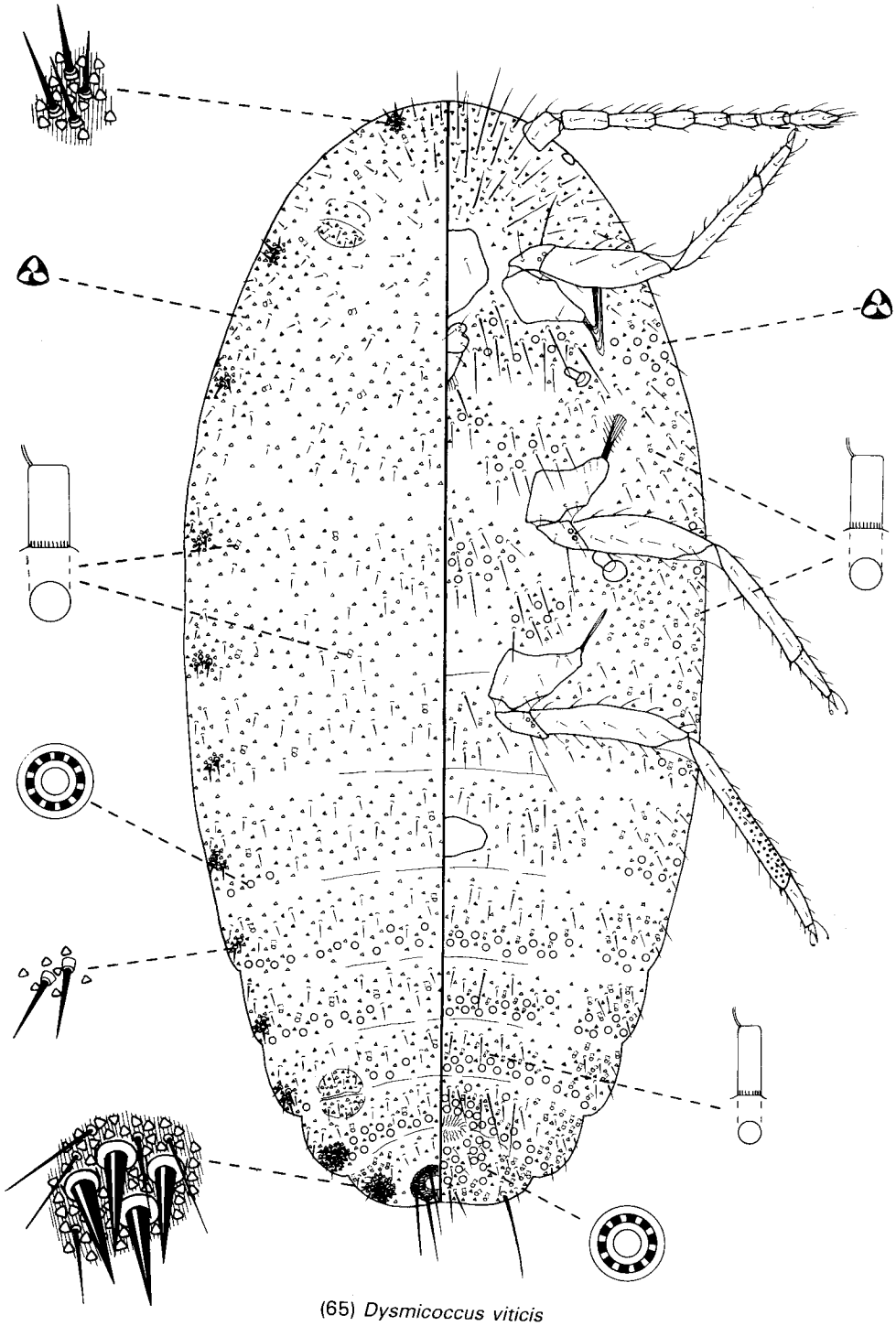
(62) *Dysmicoccus formicicola*



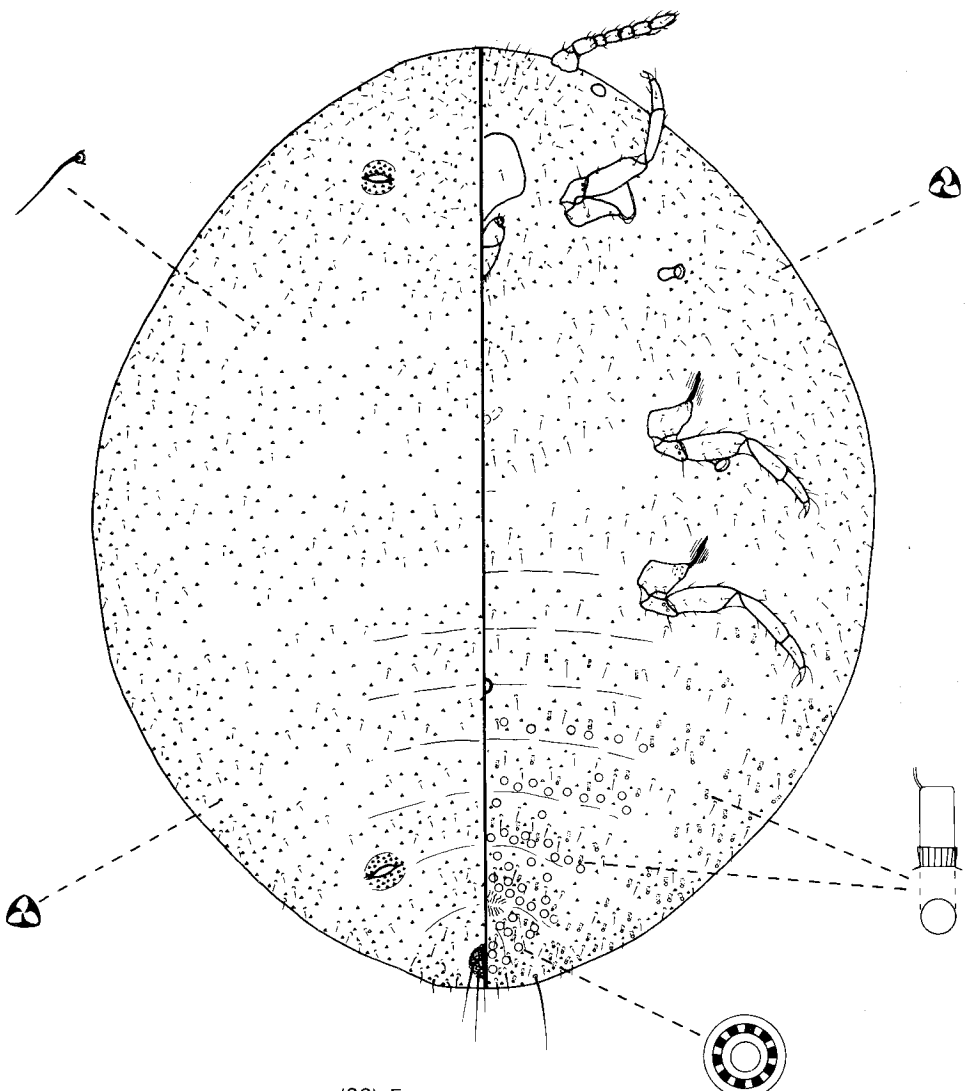
(63) *Dysmicoccus ornatus*



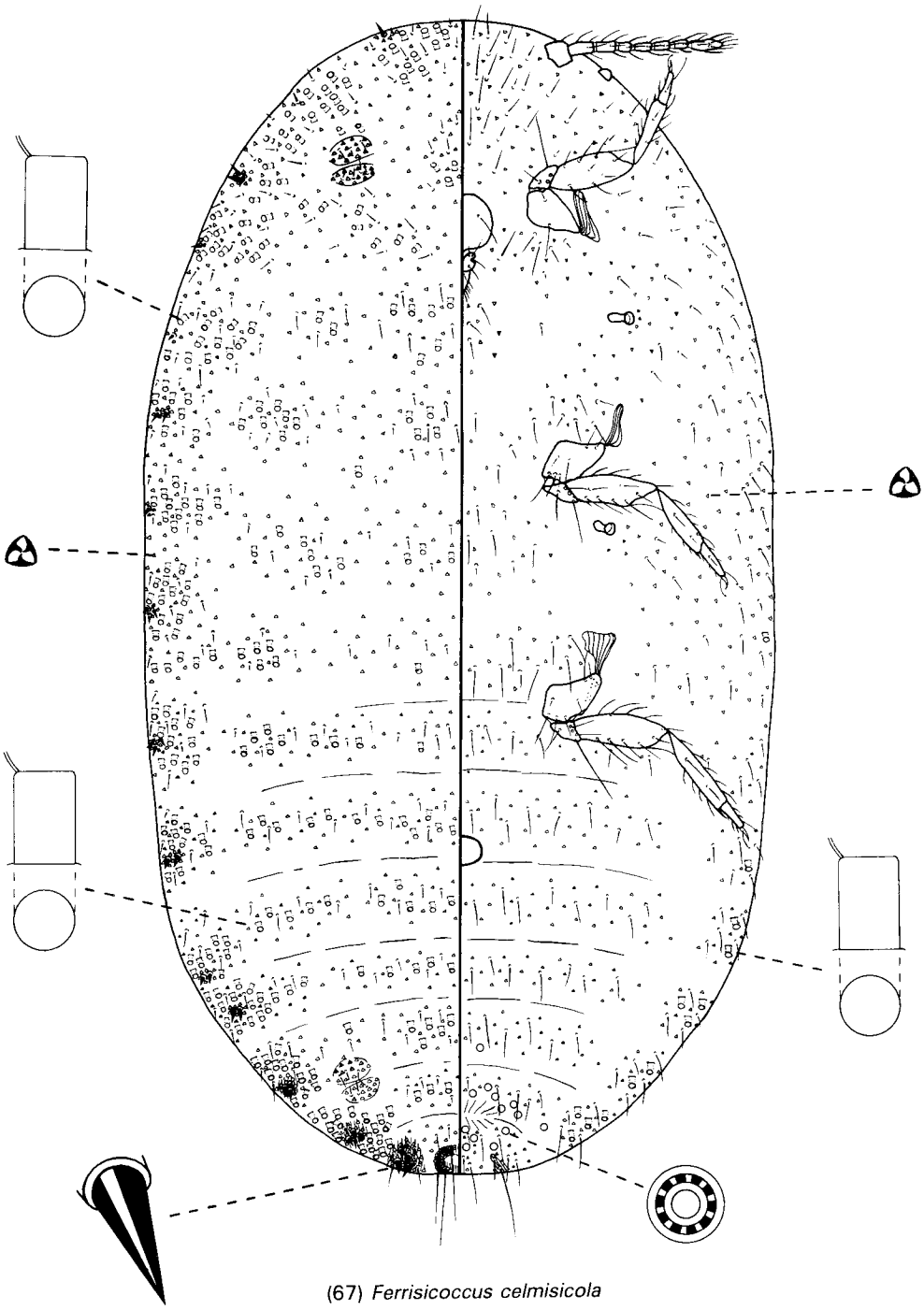
(64) *Dysmicoccus rupestris*



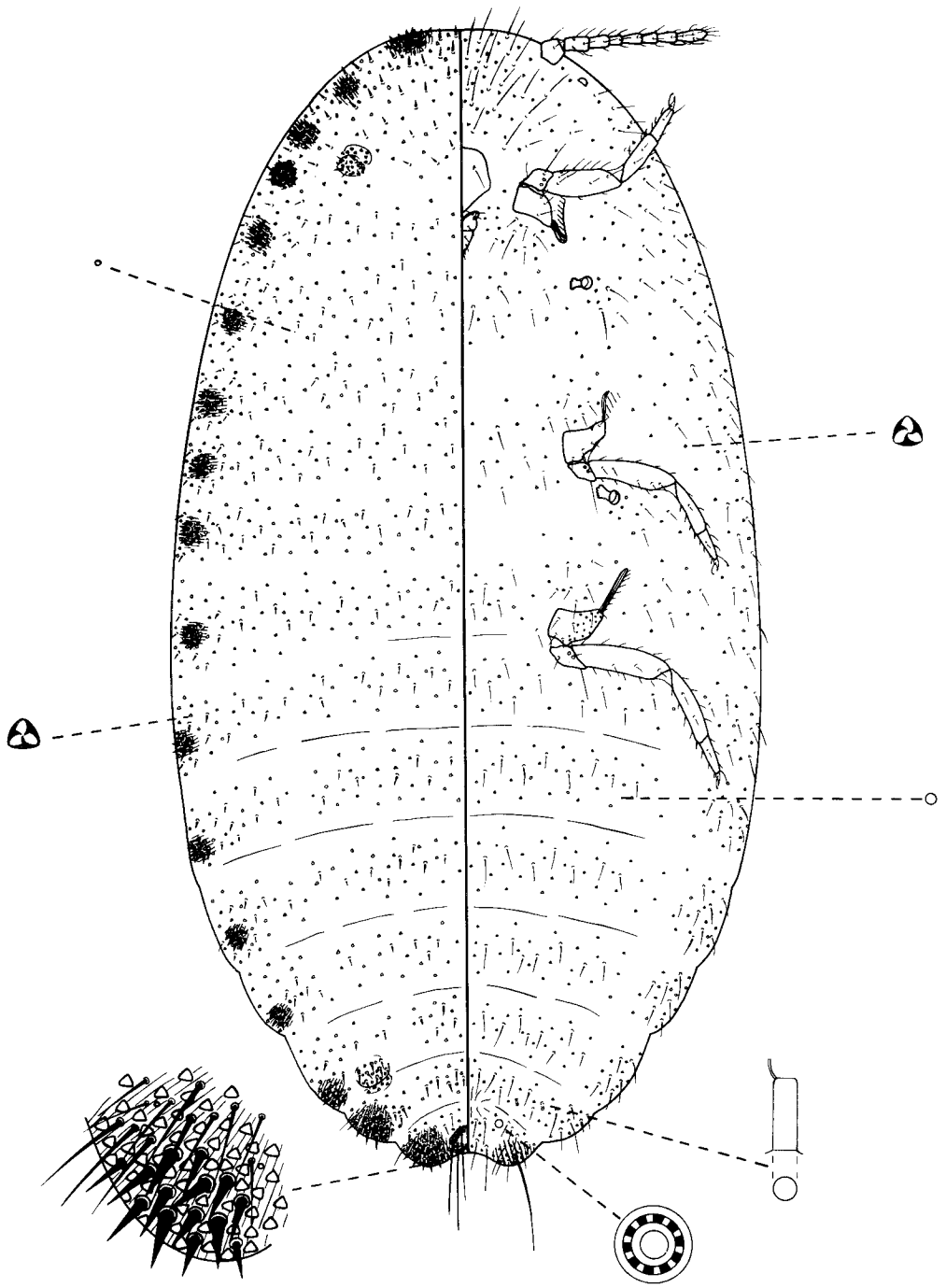
(65) *Dysmicoccus viticis*



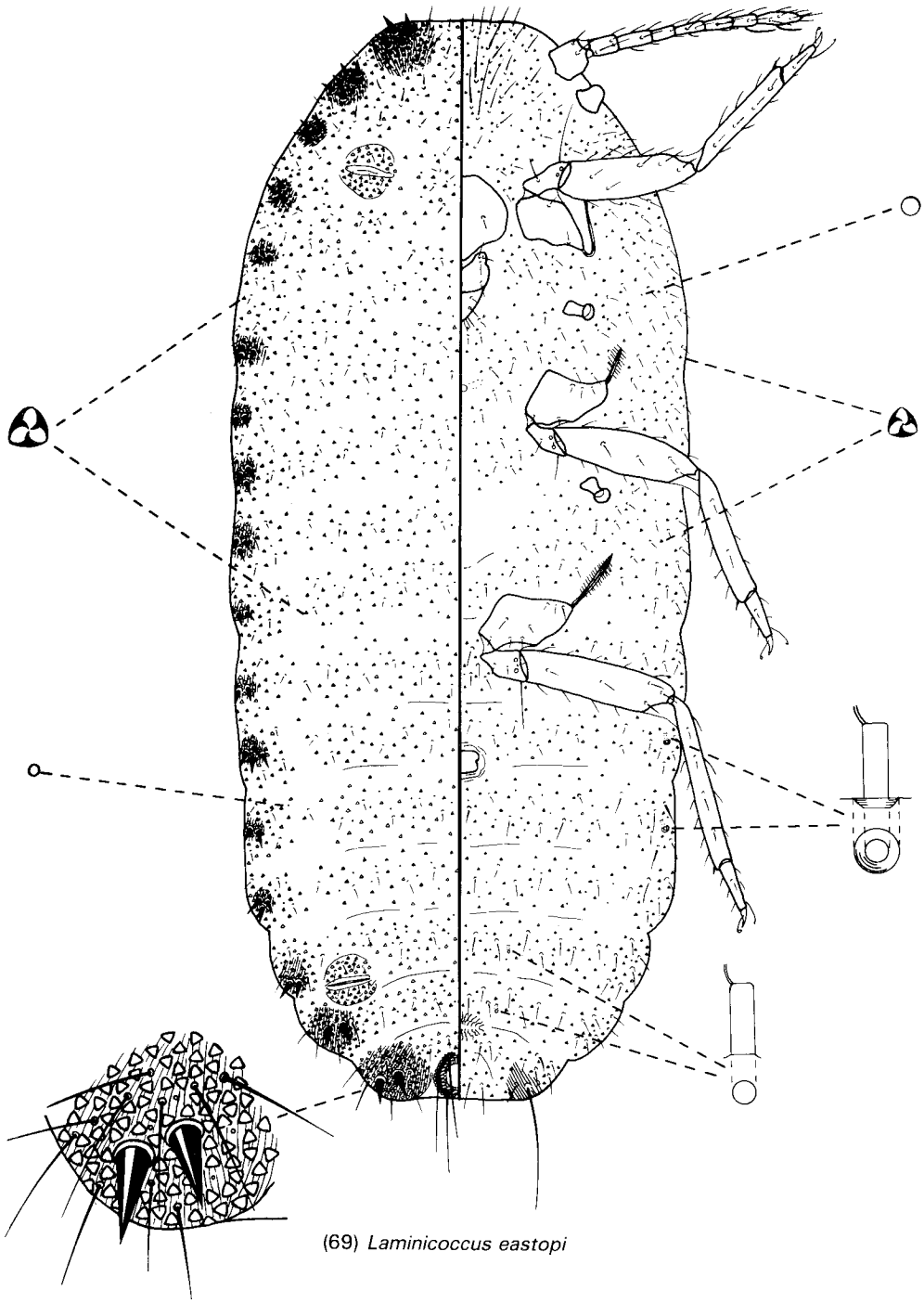
(66) *Eurycoccus antiscius*



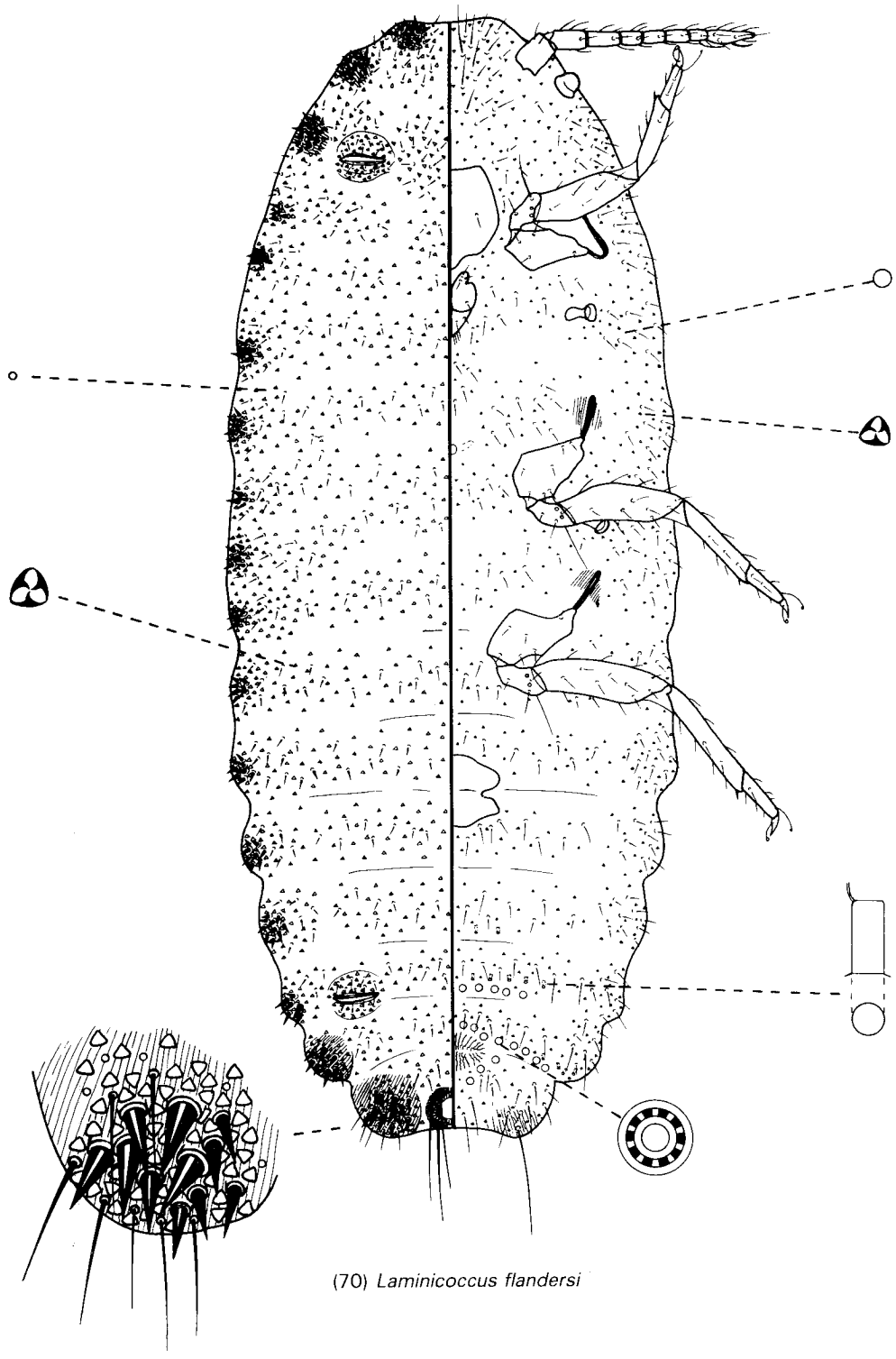
(67) *Ferrisicoccus celmisicola*



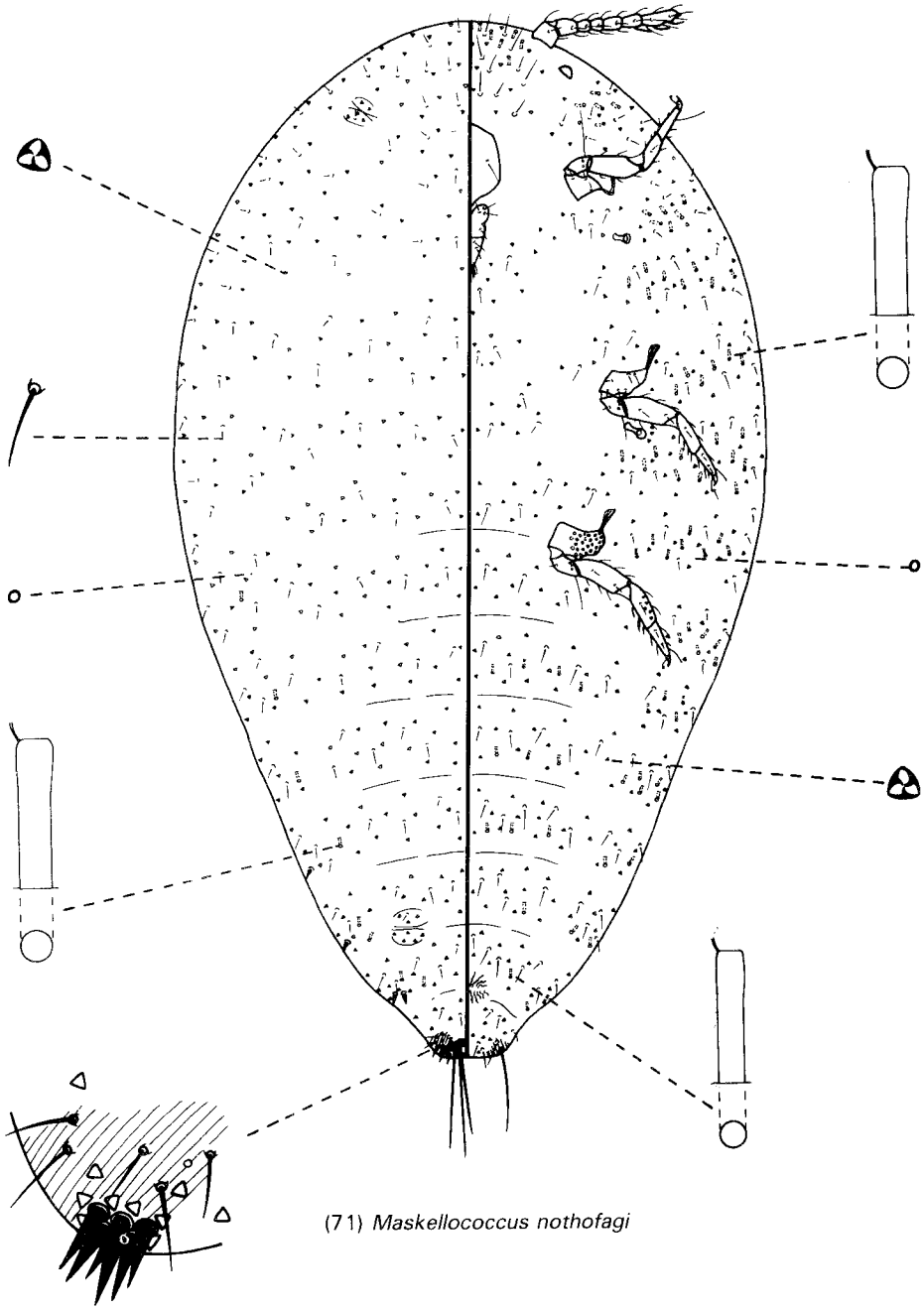
(68) *Laminicoccus asteliae*



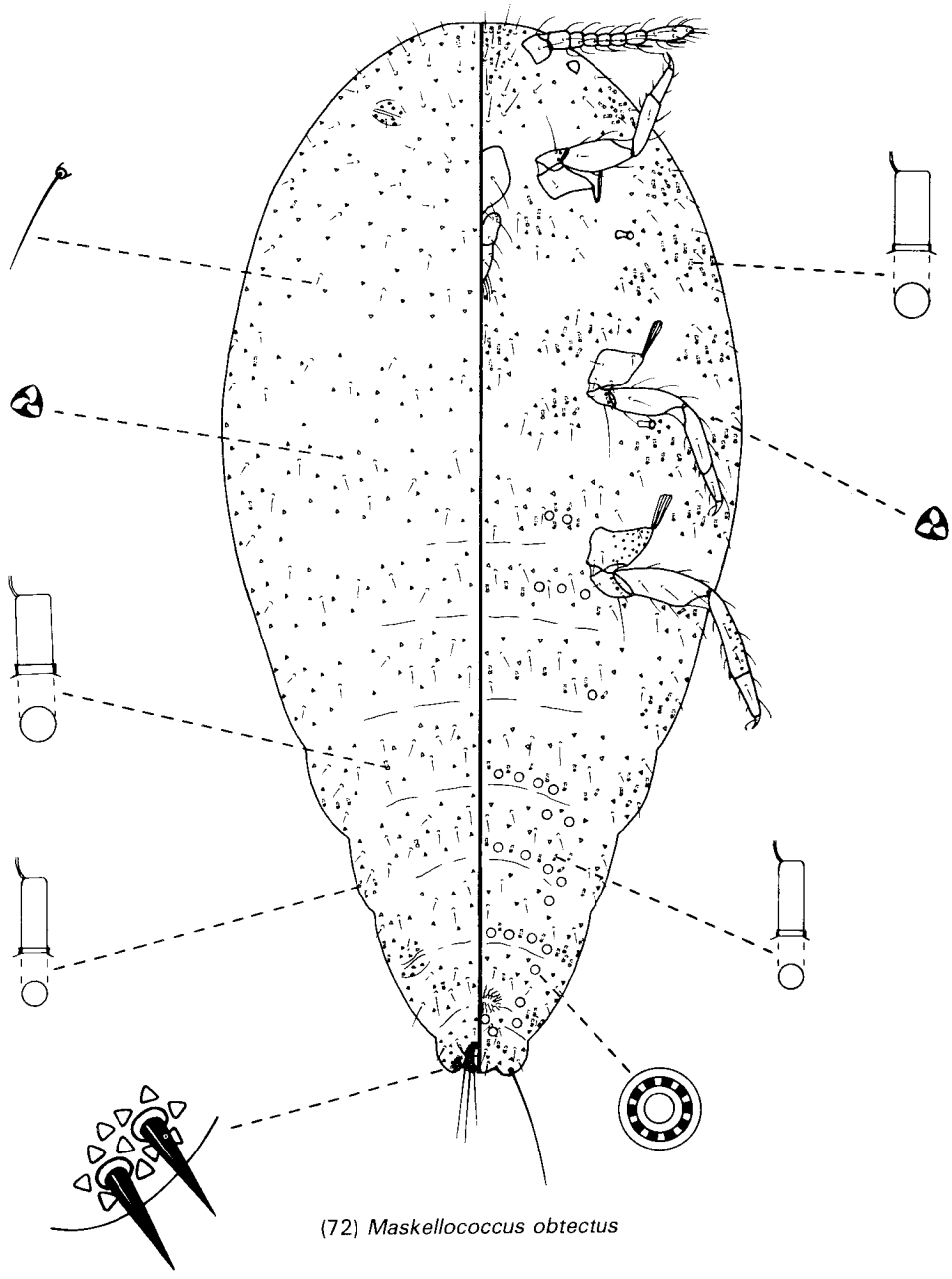
(69) *Laminicoccus eastopi*



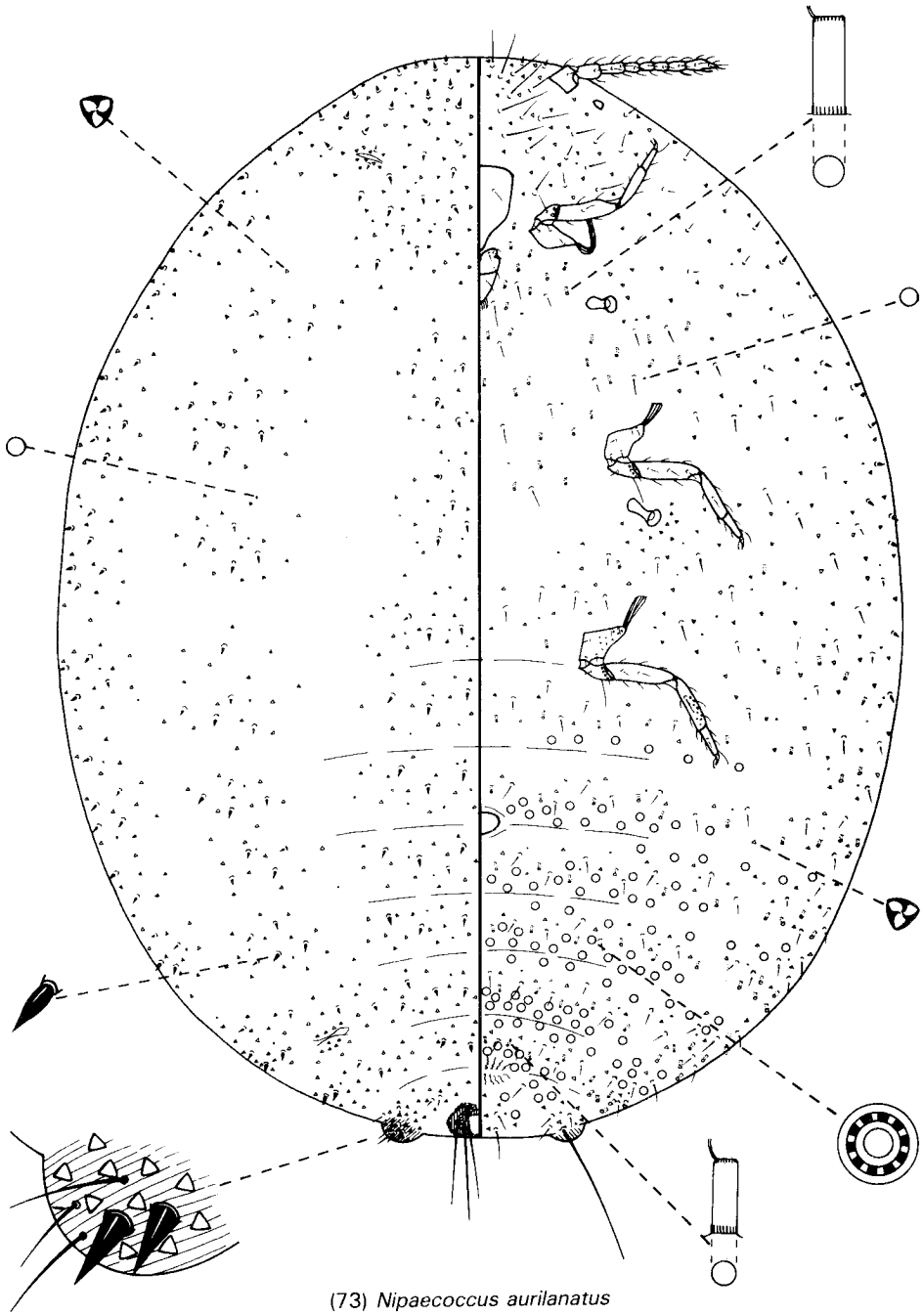
(70) *Laminicoccus flandersi*



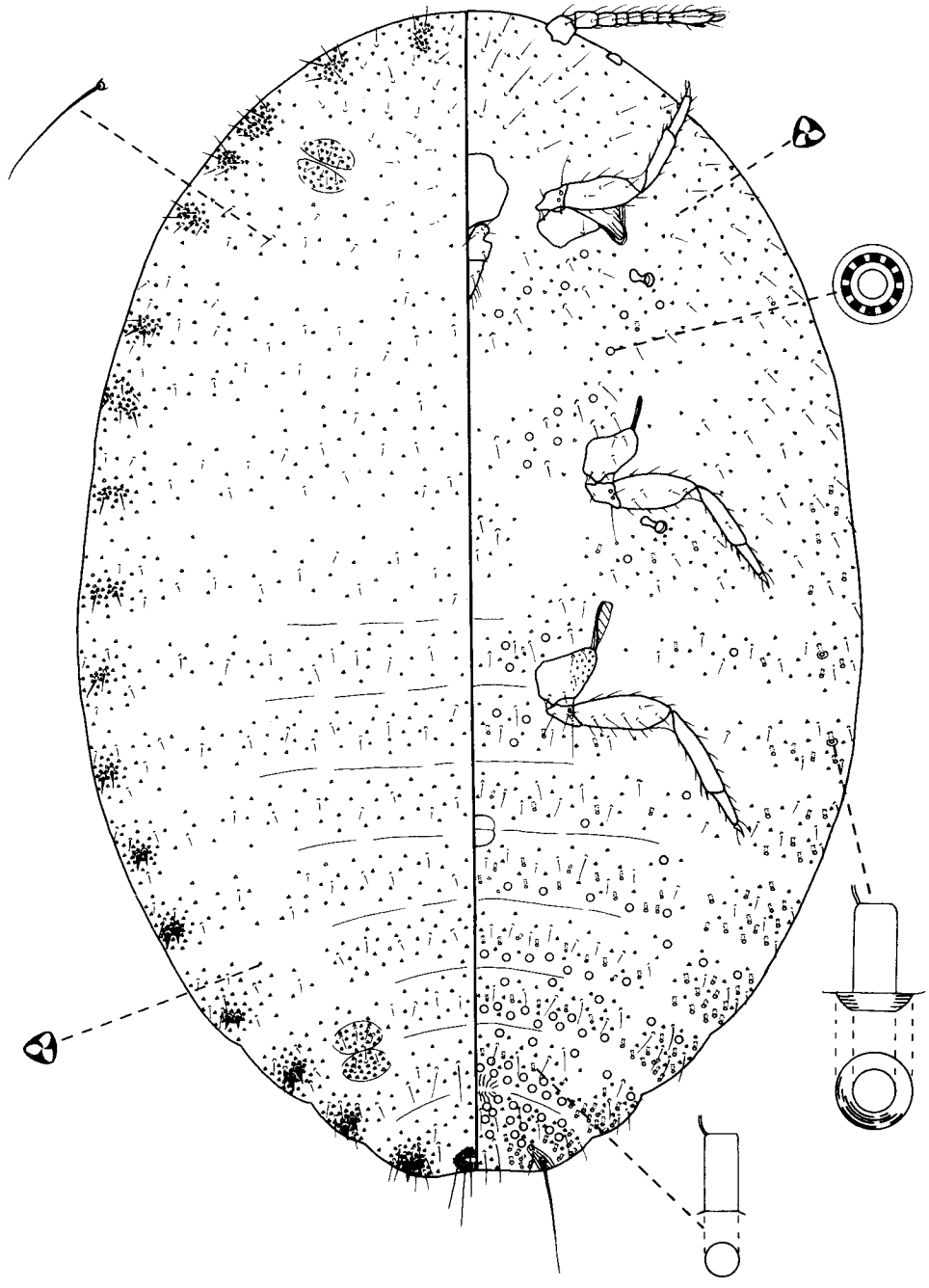
(71) *Maskellococcus nothofagi*



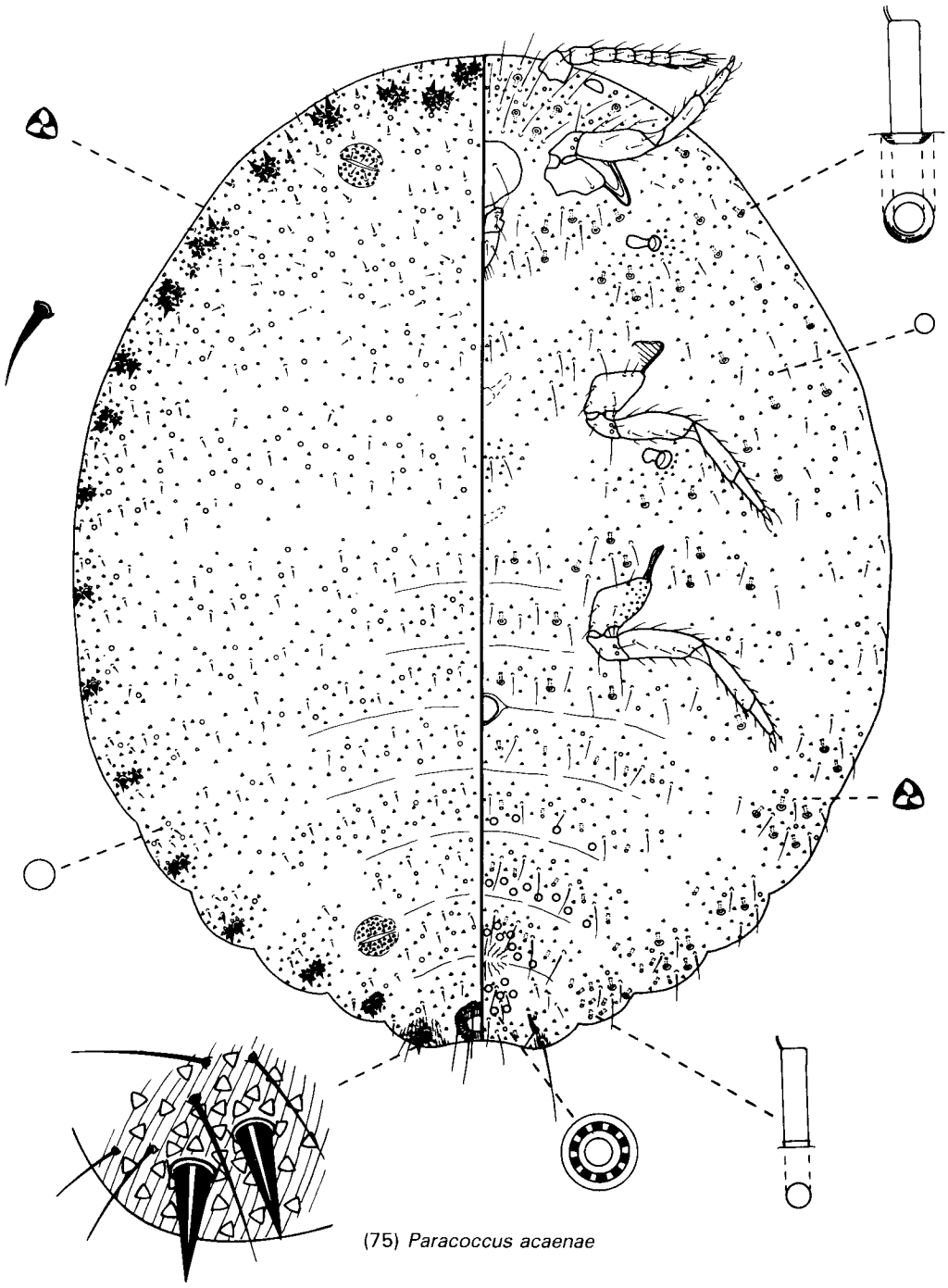
(72) *Maskellococcus obtectus*



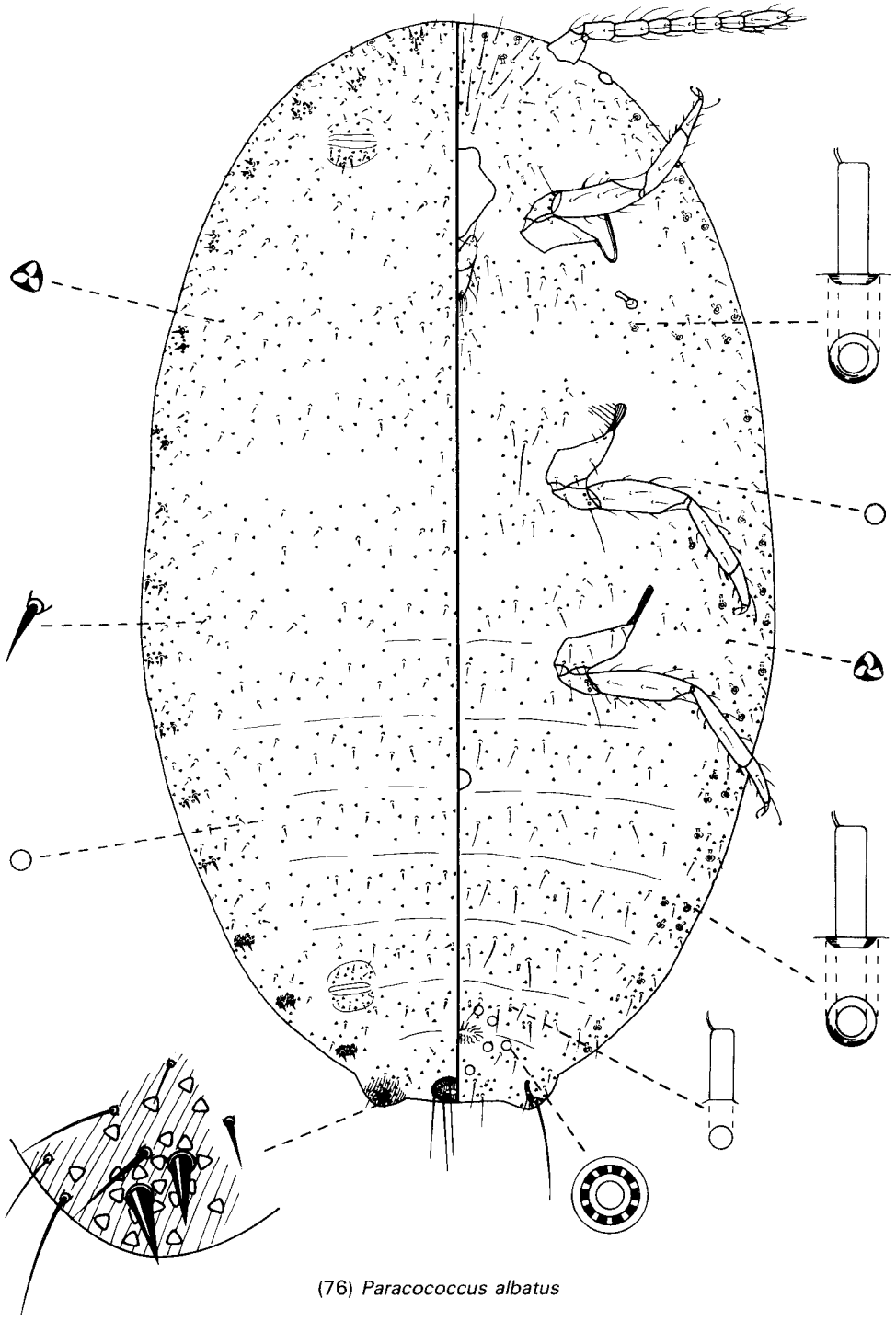
(73) *Nipaecoccus aurilanatus*



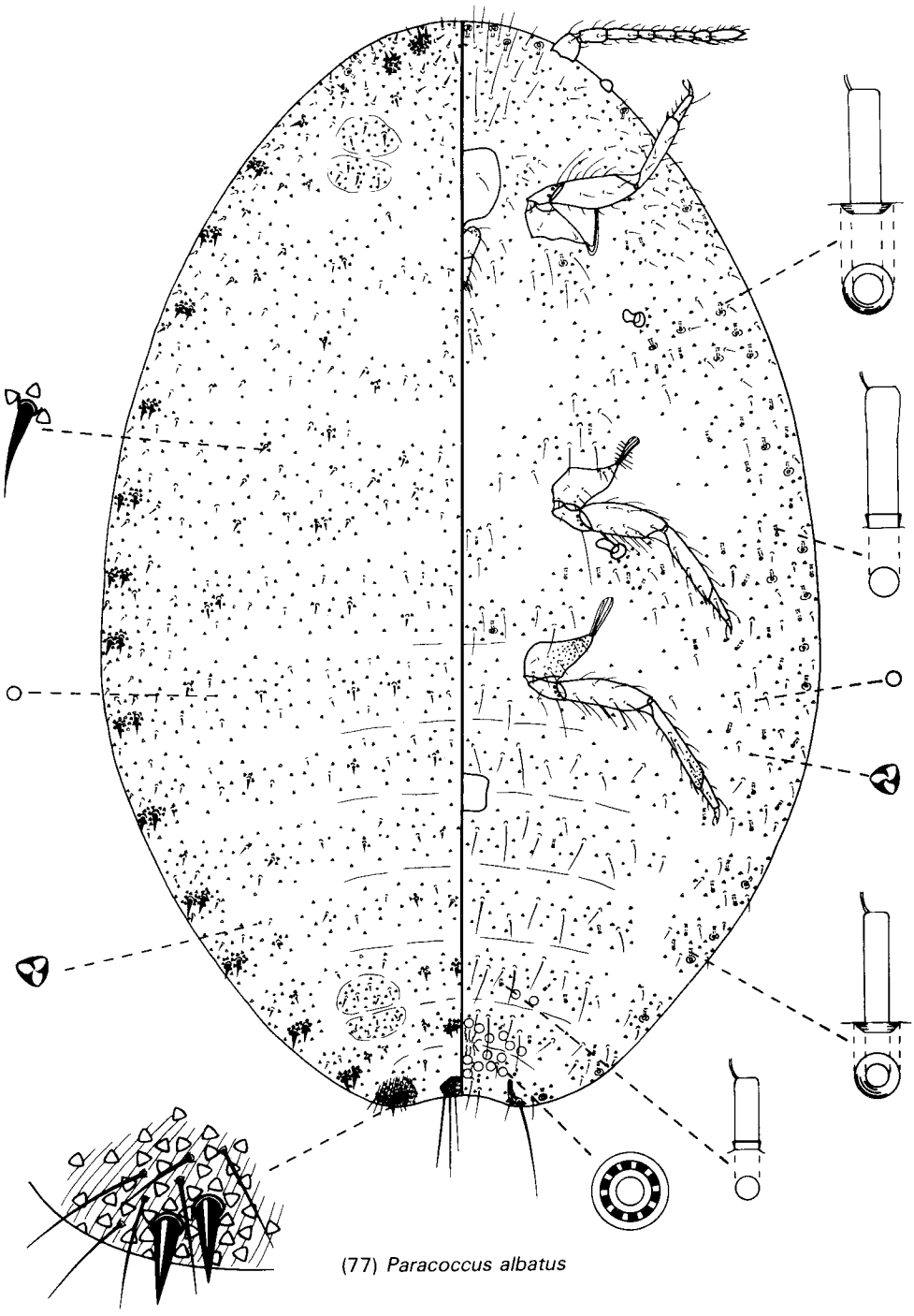
(74) *Paracoccus abnormalis*



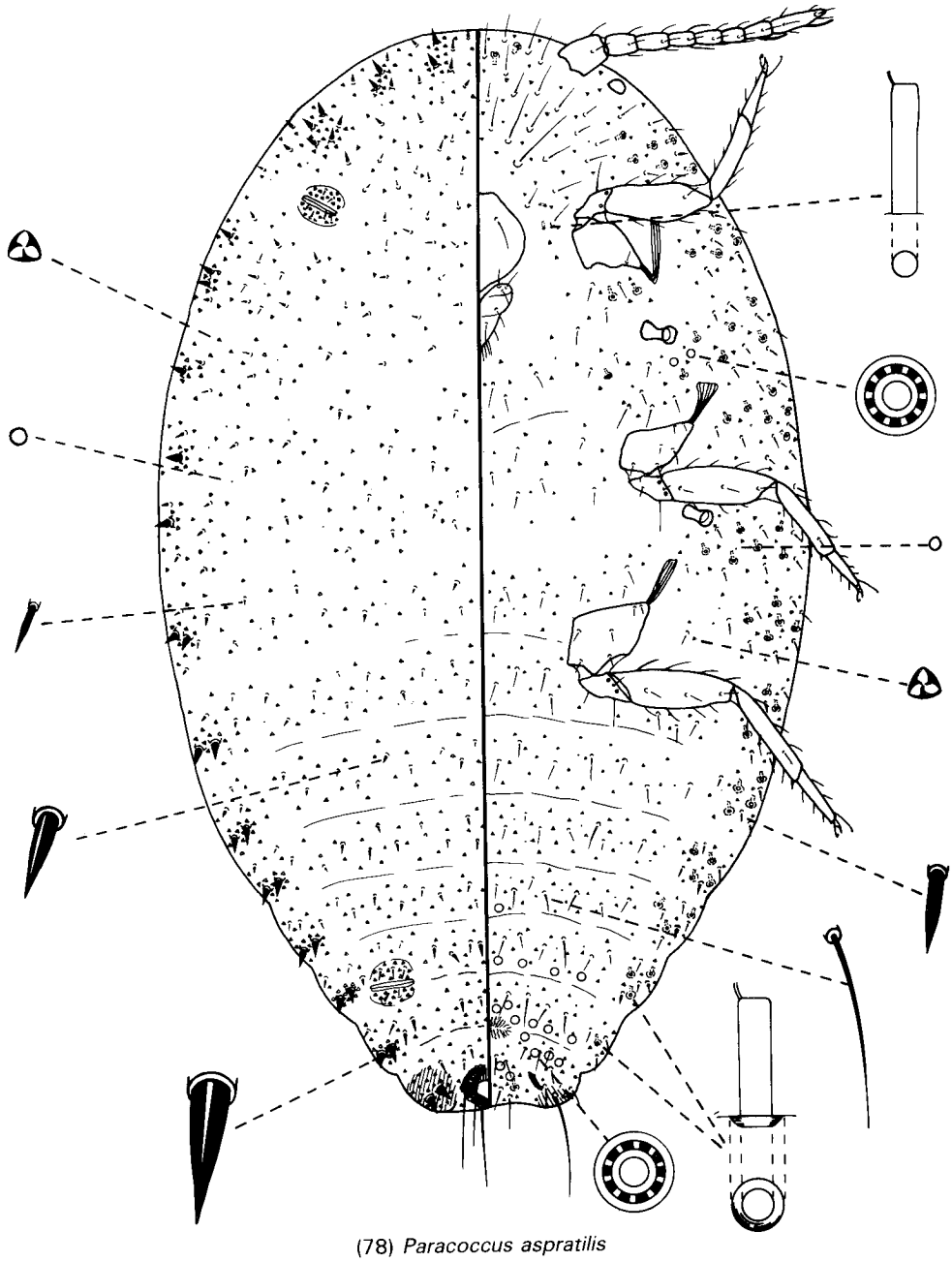
(75) *Paracoccus acaenae*



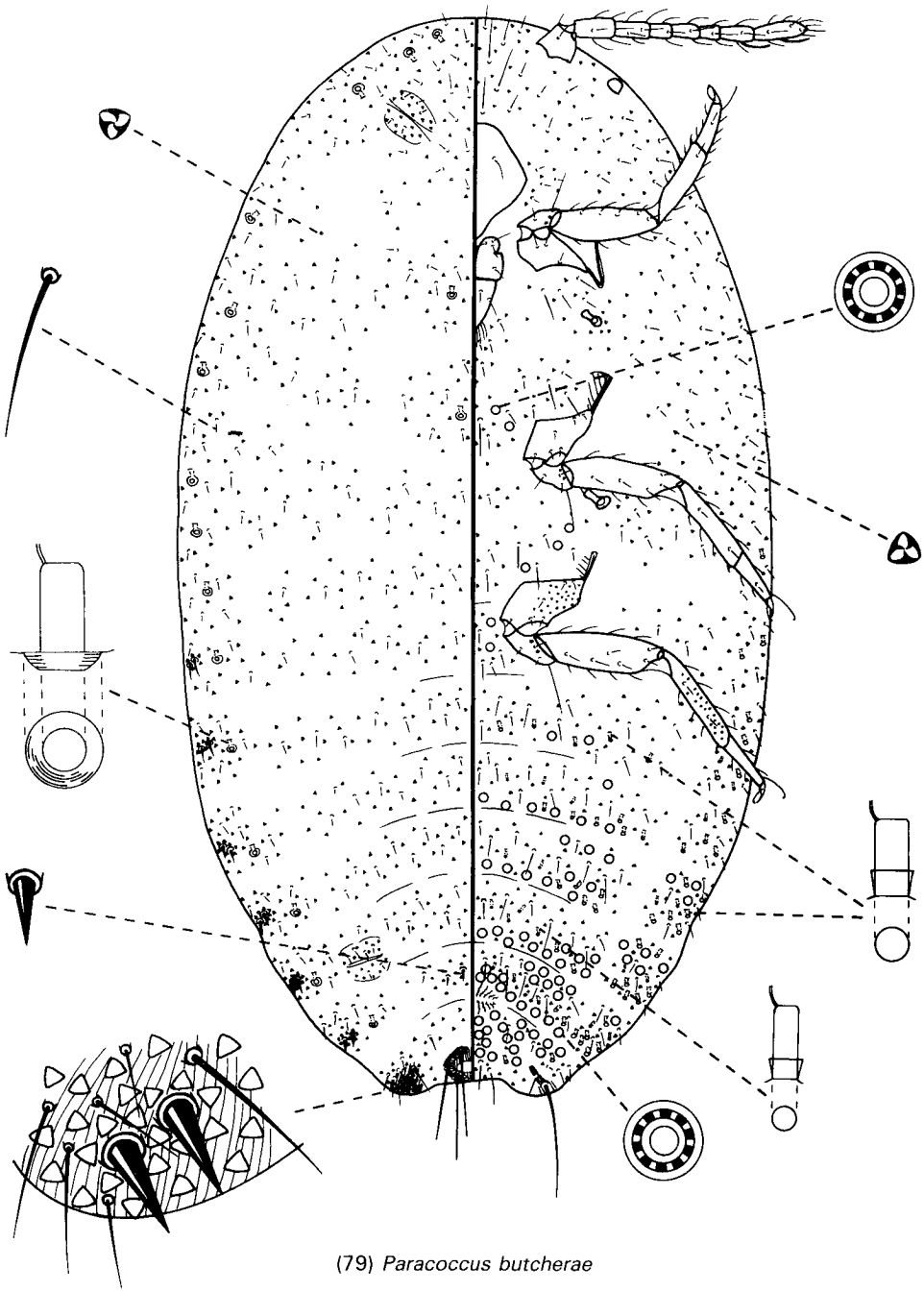
(76) *Paracococcus albatus*



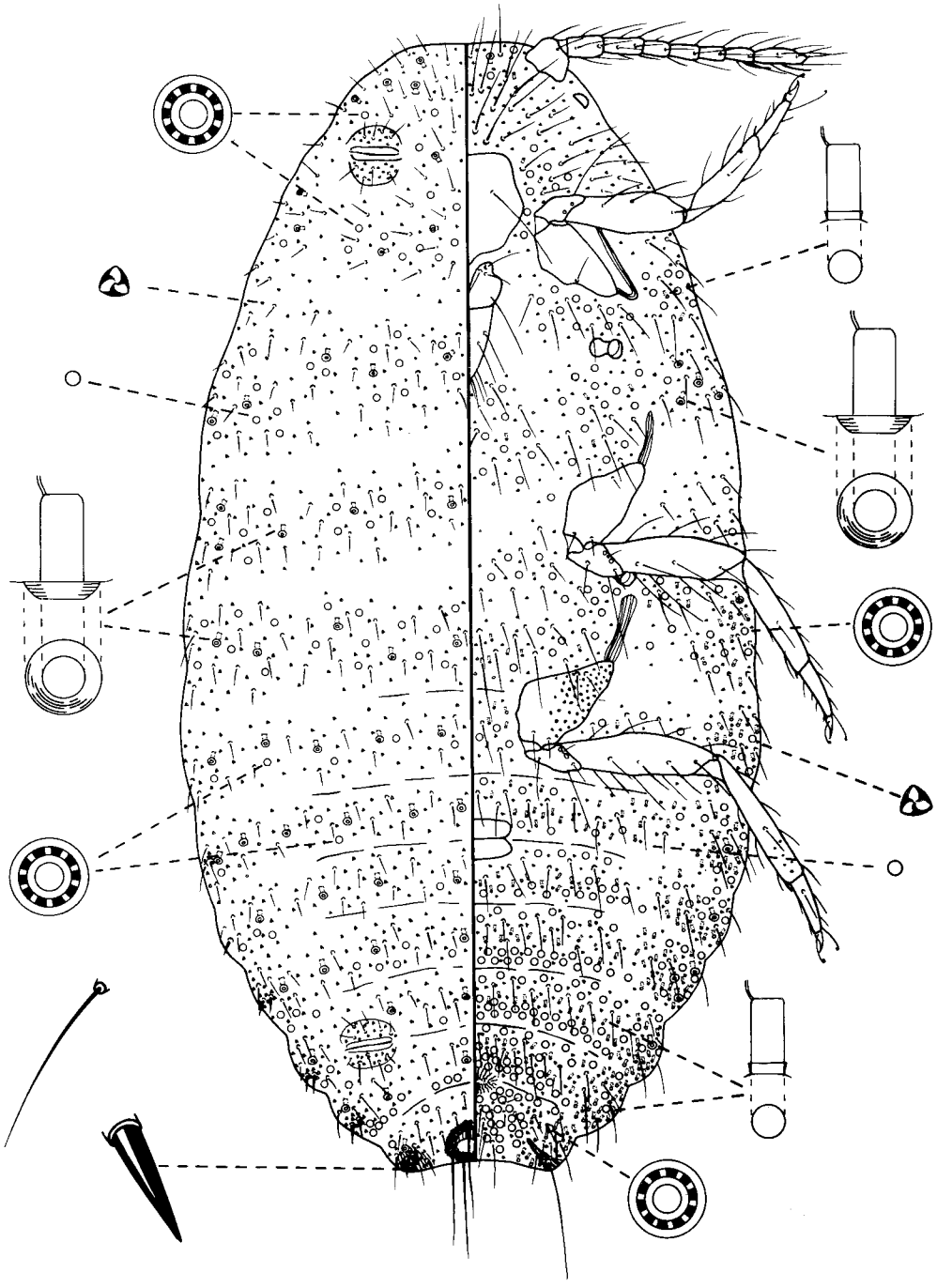
(77) *Paracoccus albatus*



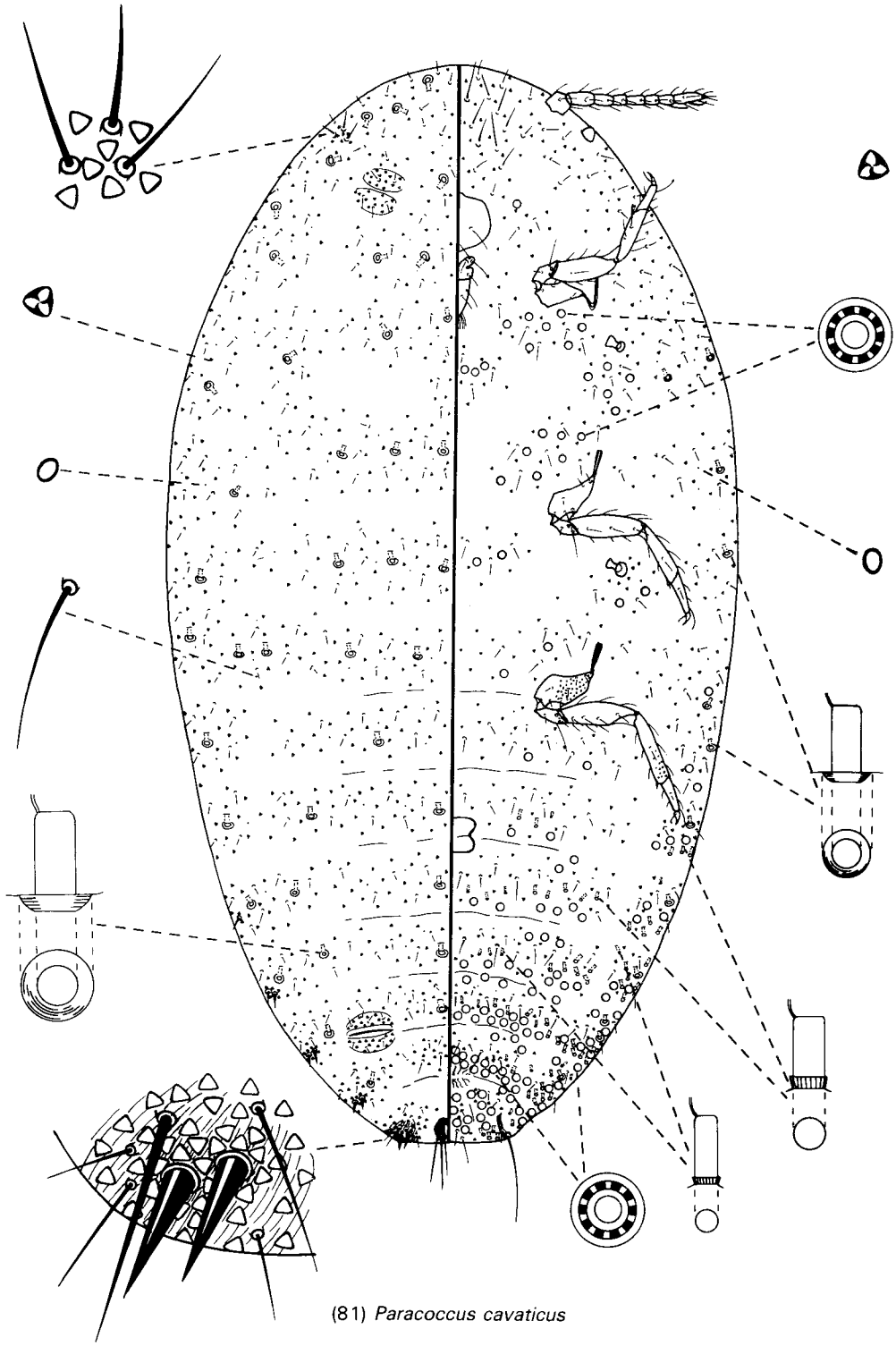
(78) *Paracoccus aspratilis*



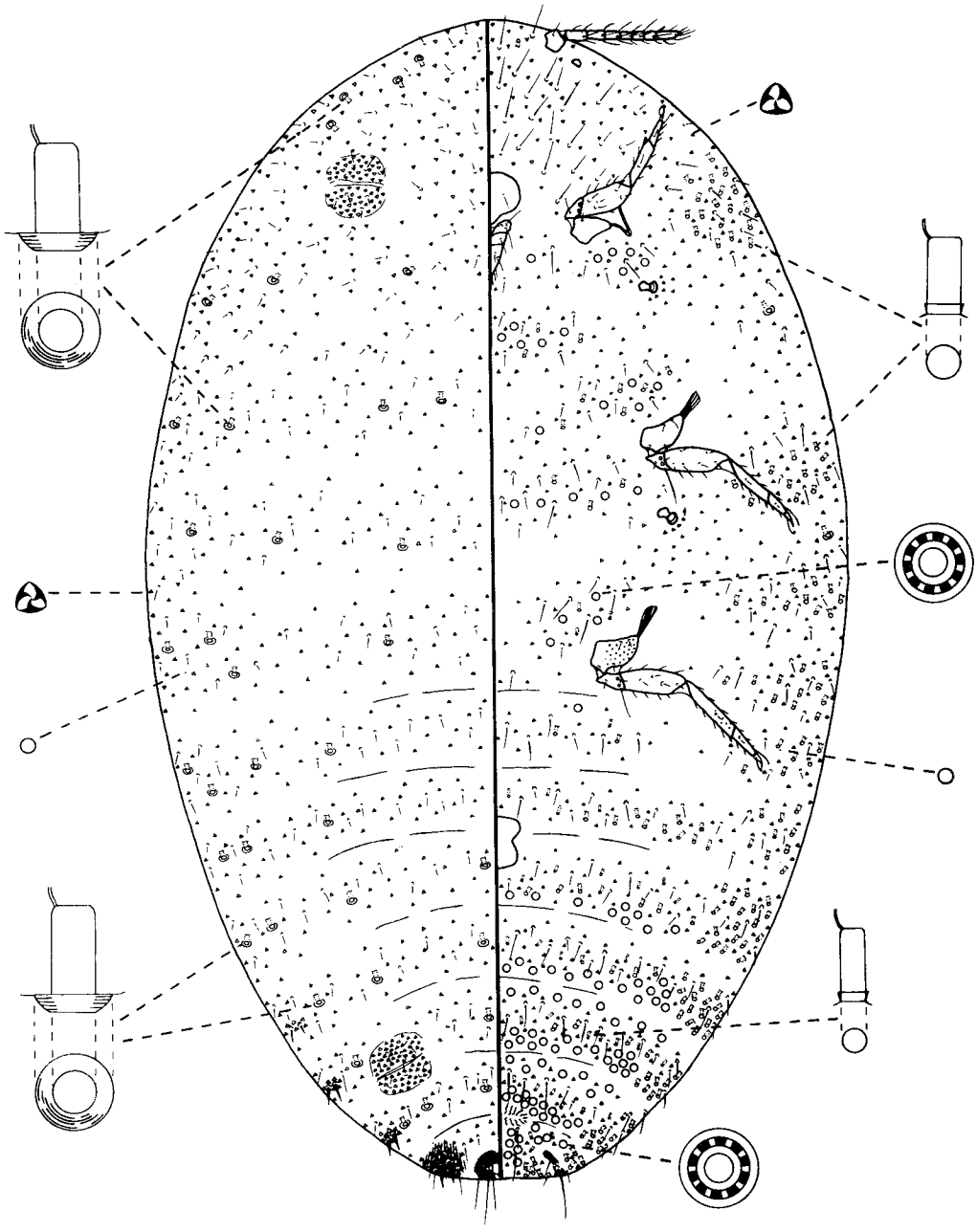
(79) *Paracoccus butcherae*



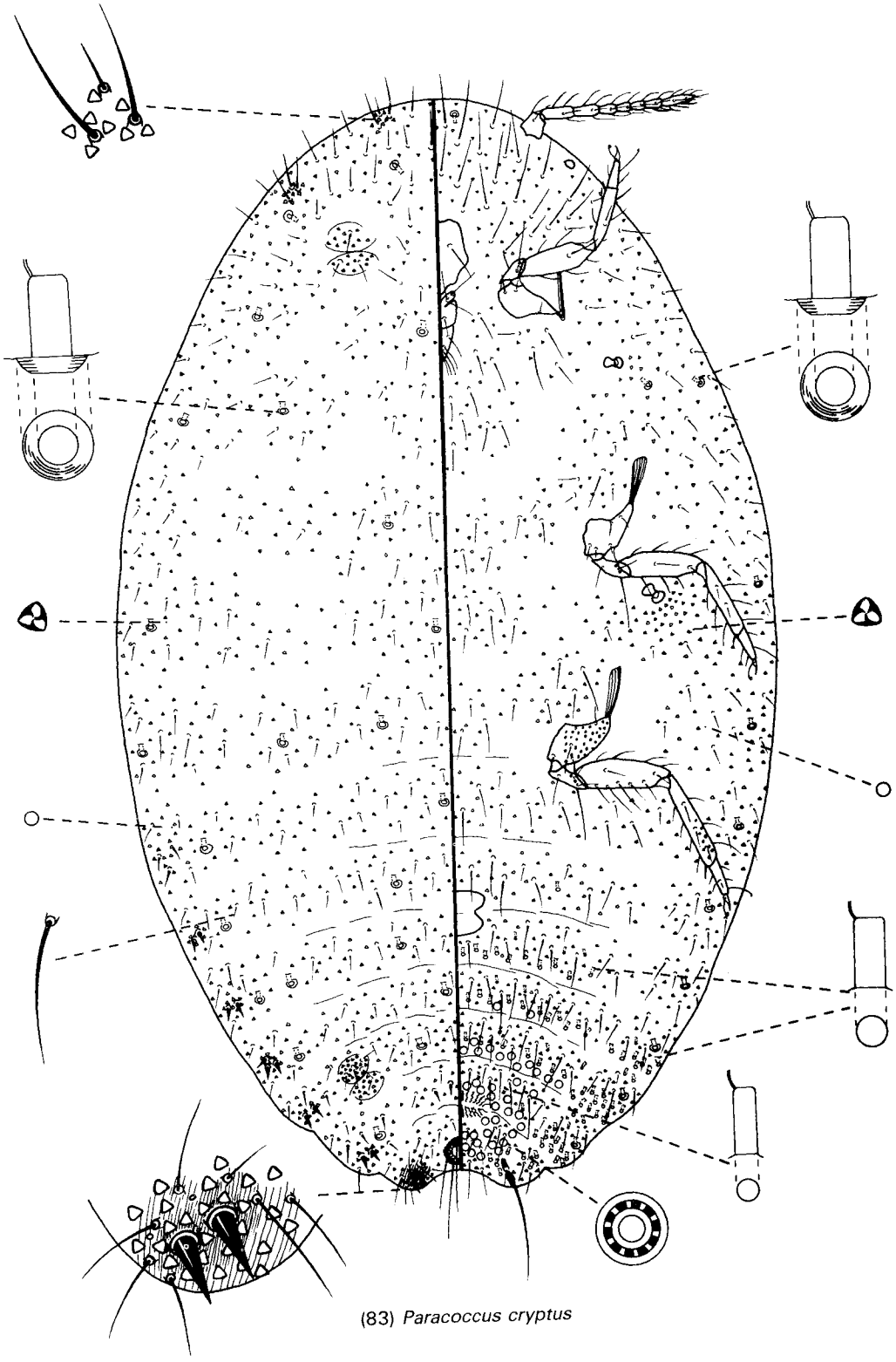
(80) *Paracoccus canalis*



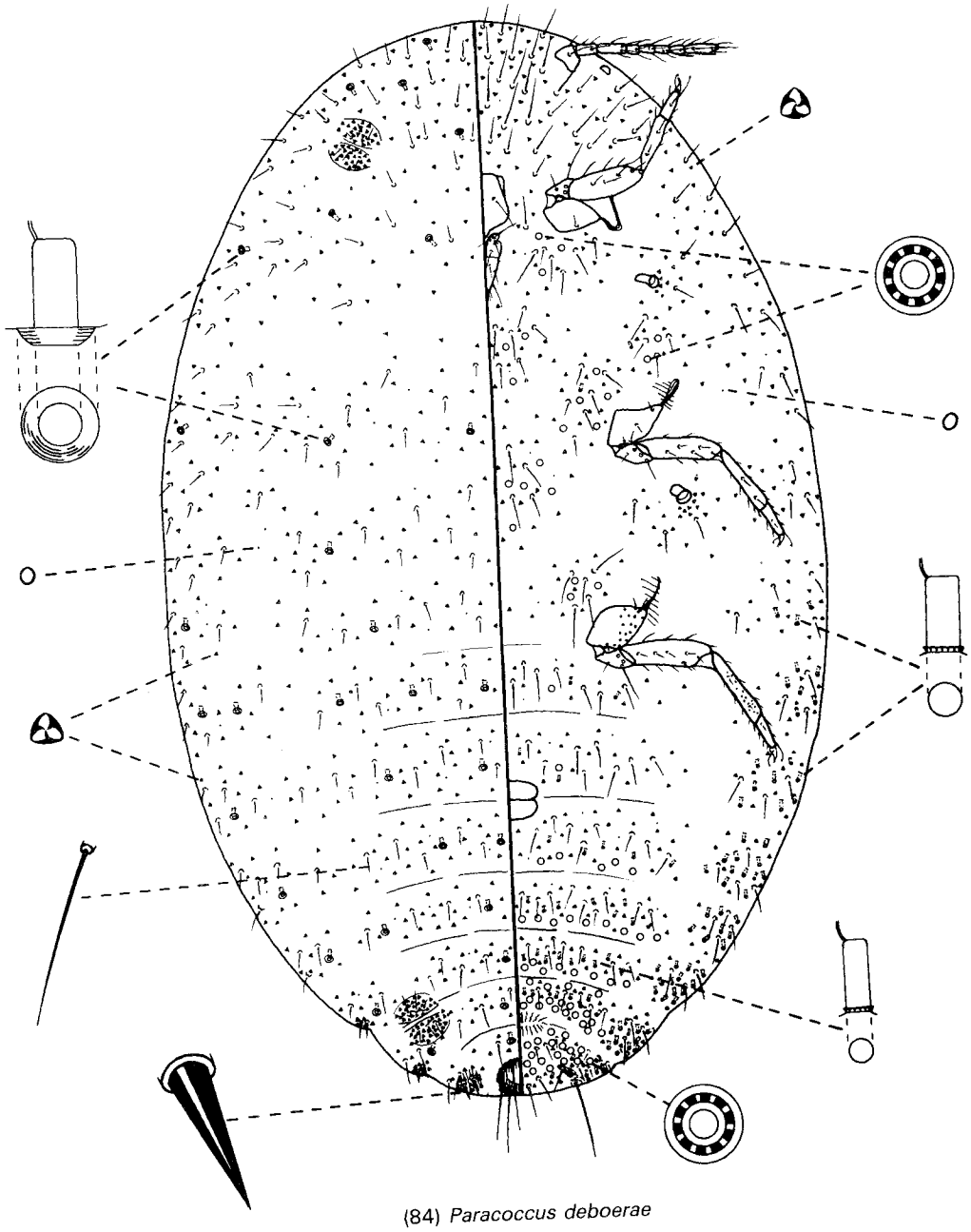
(81) *Paracoccus cavaticus*



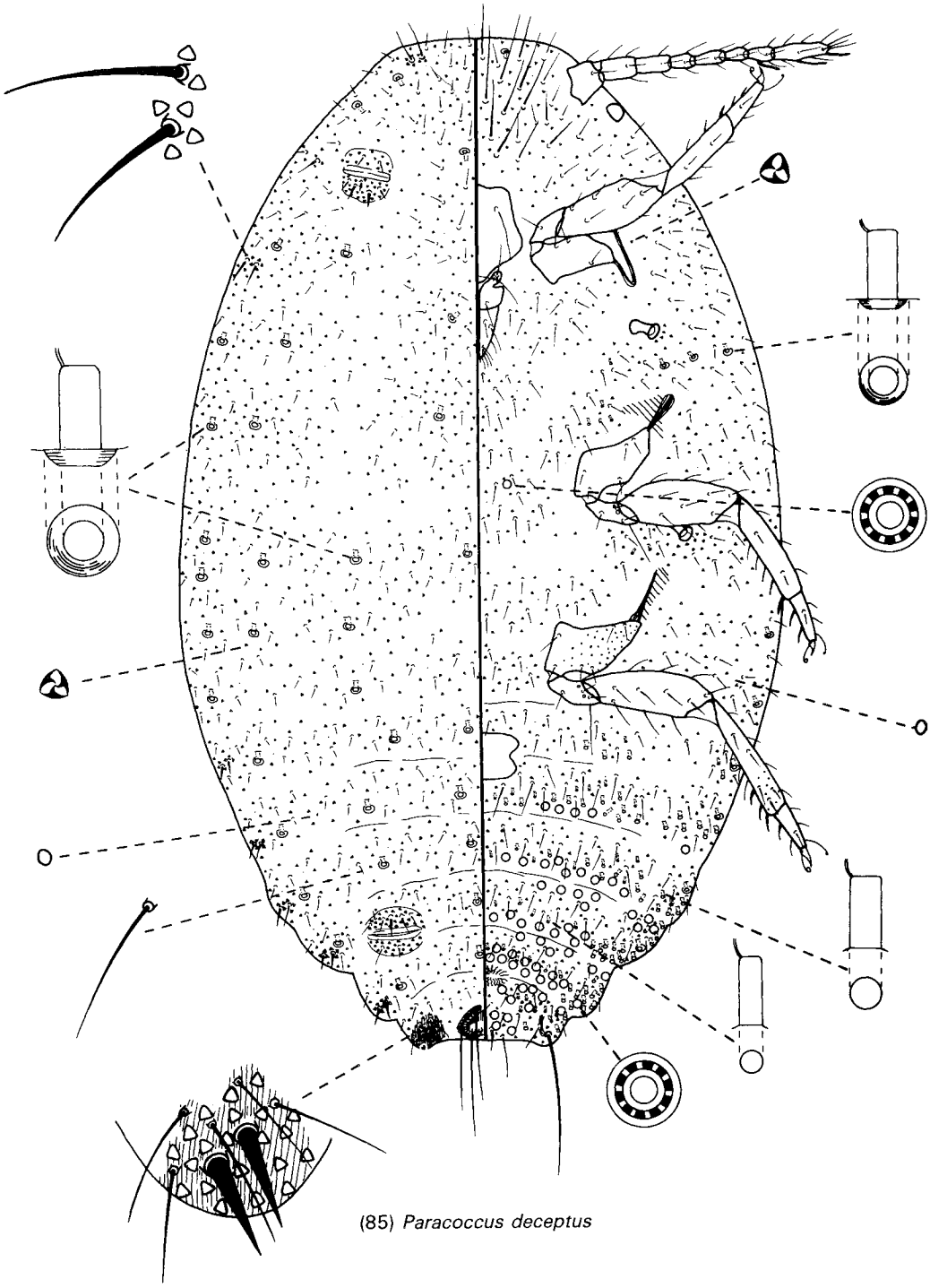
(82) *Paracoccus coriariae*



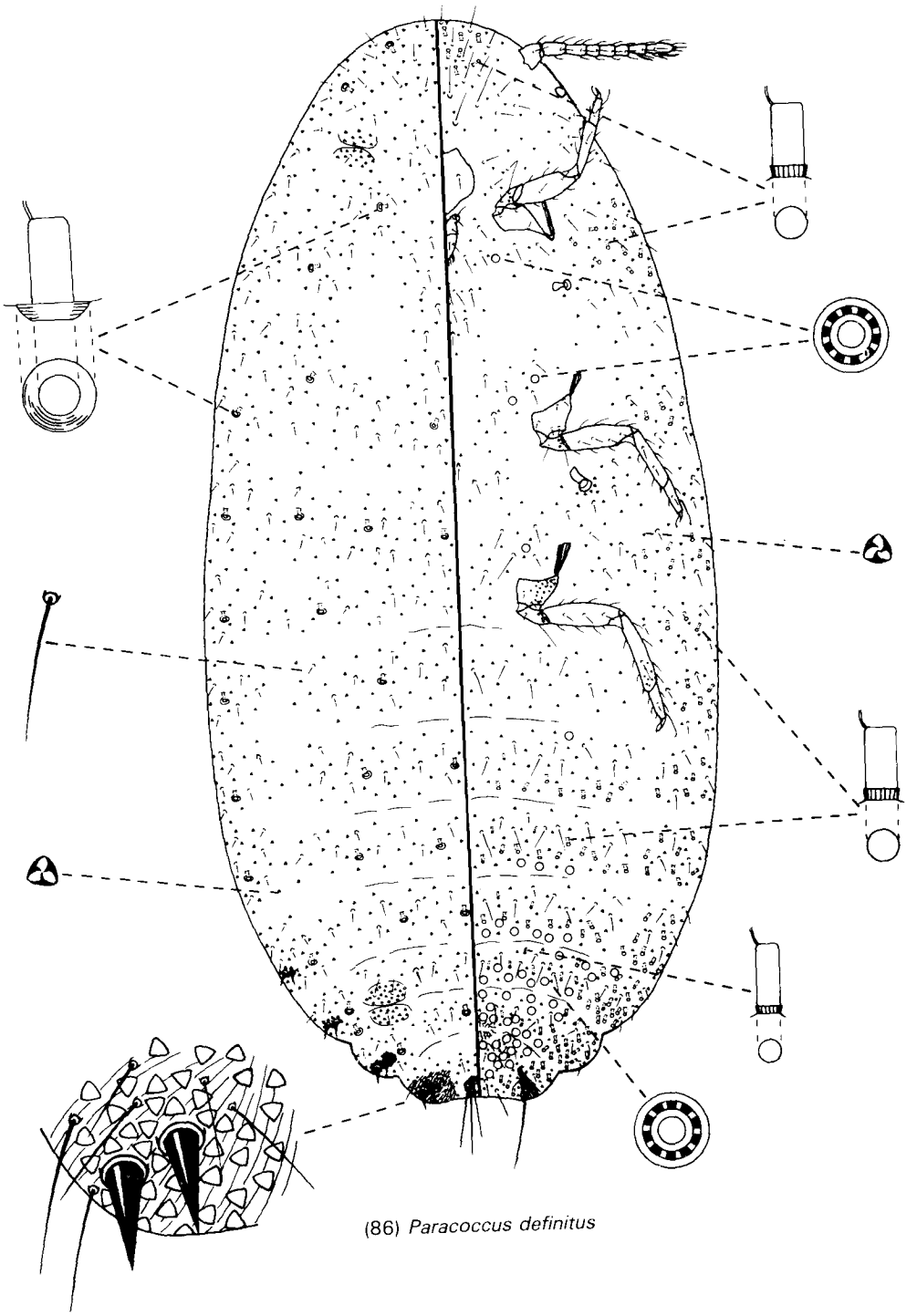
(83) *Paracoccus cryptus*



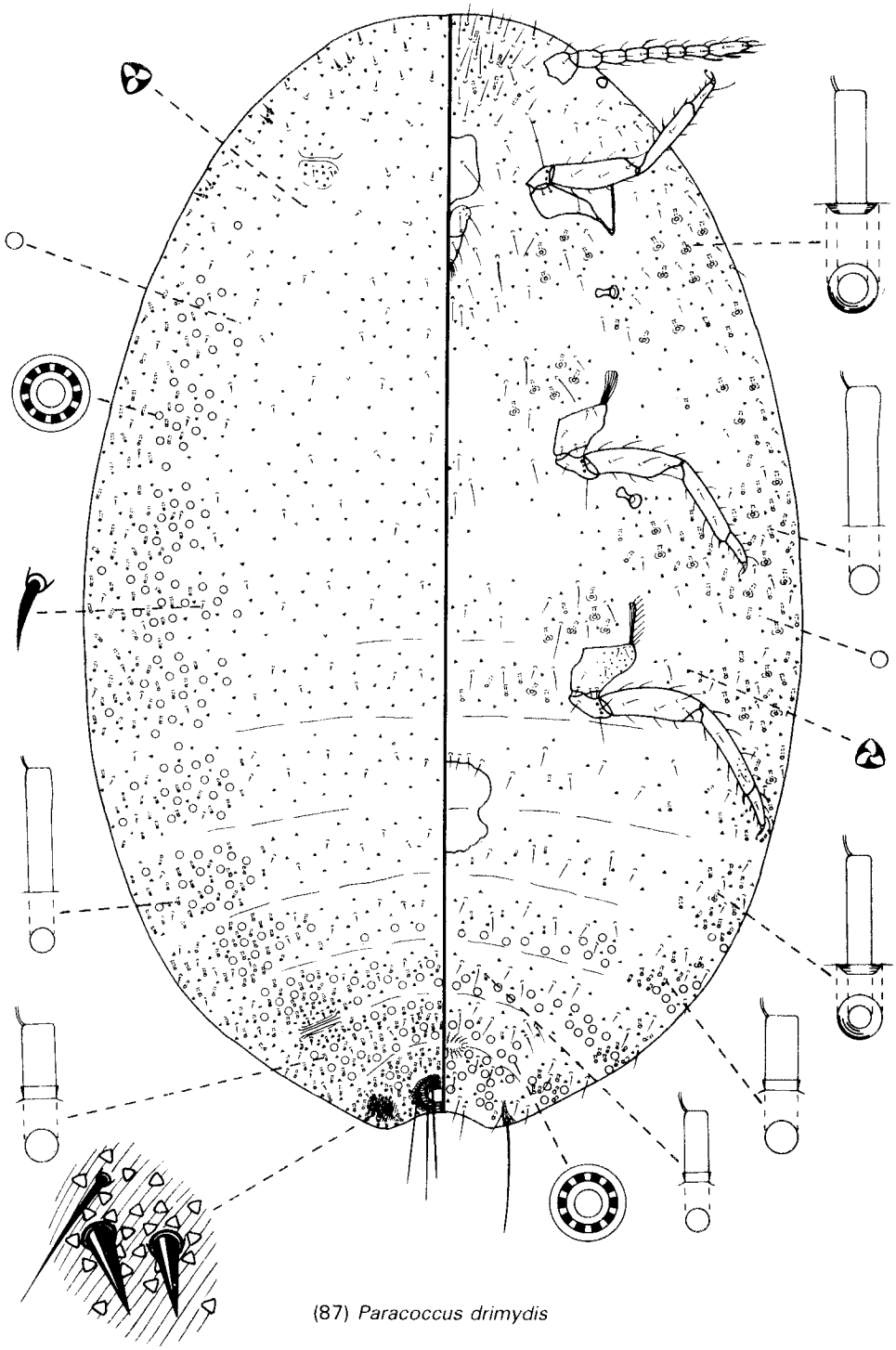
(84) *Paracoccus deboerae*



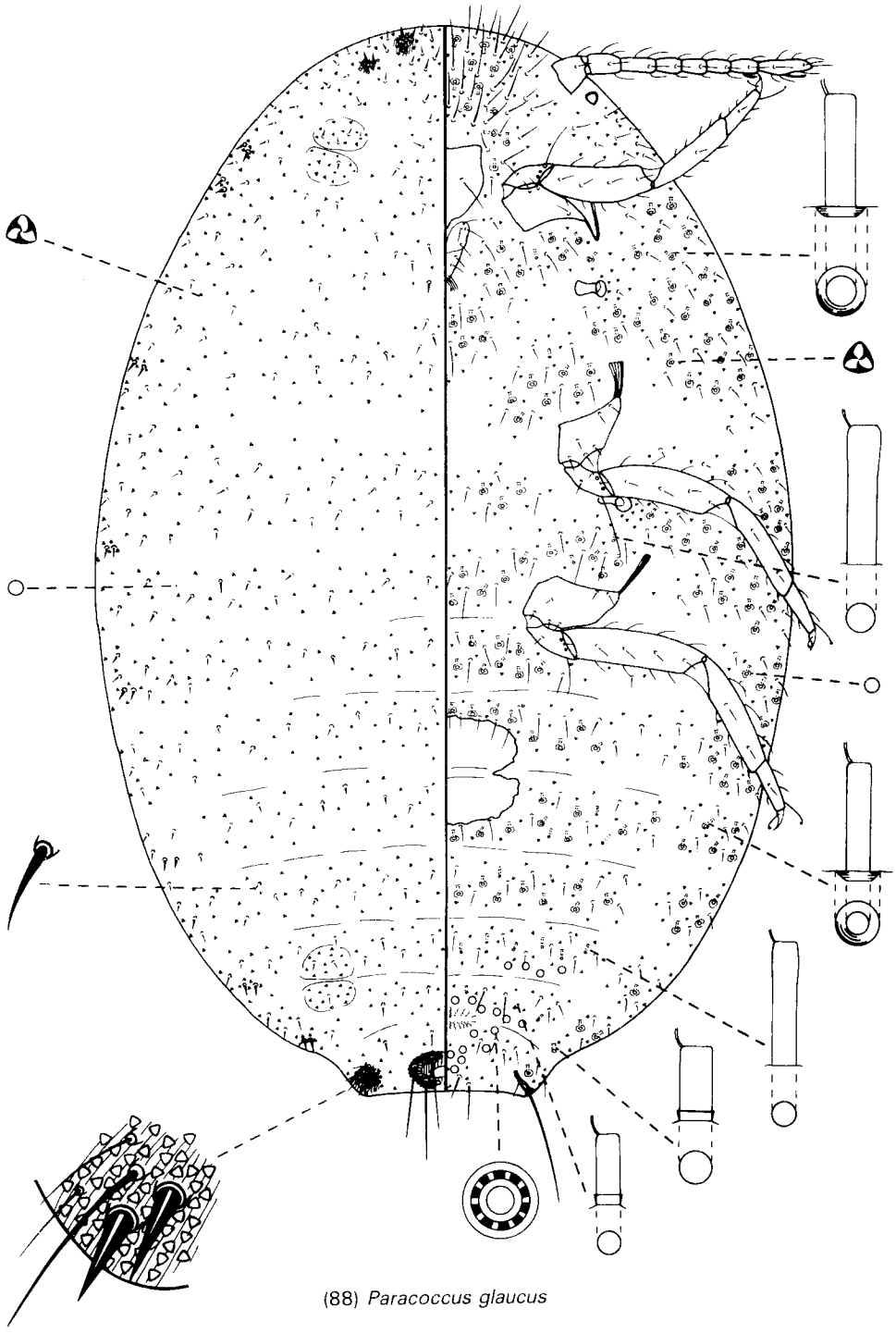
(85) *Paracoccus deceptus*



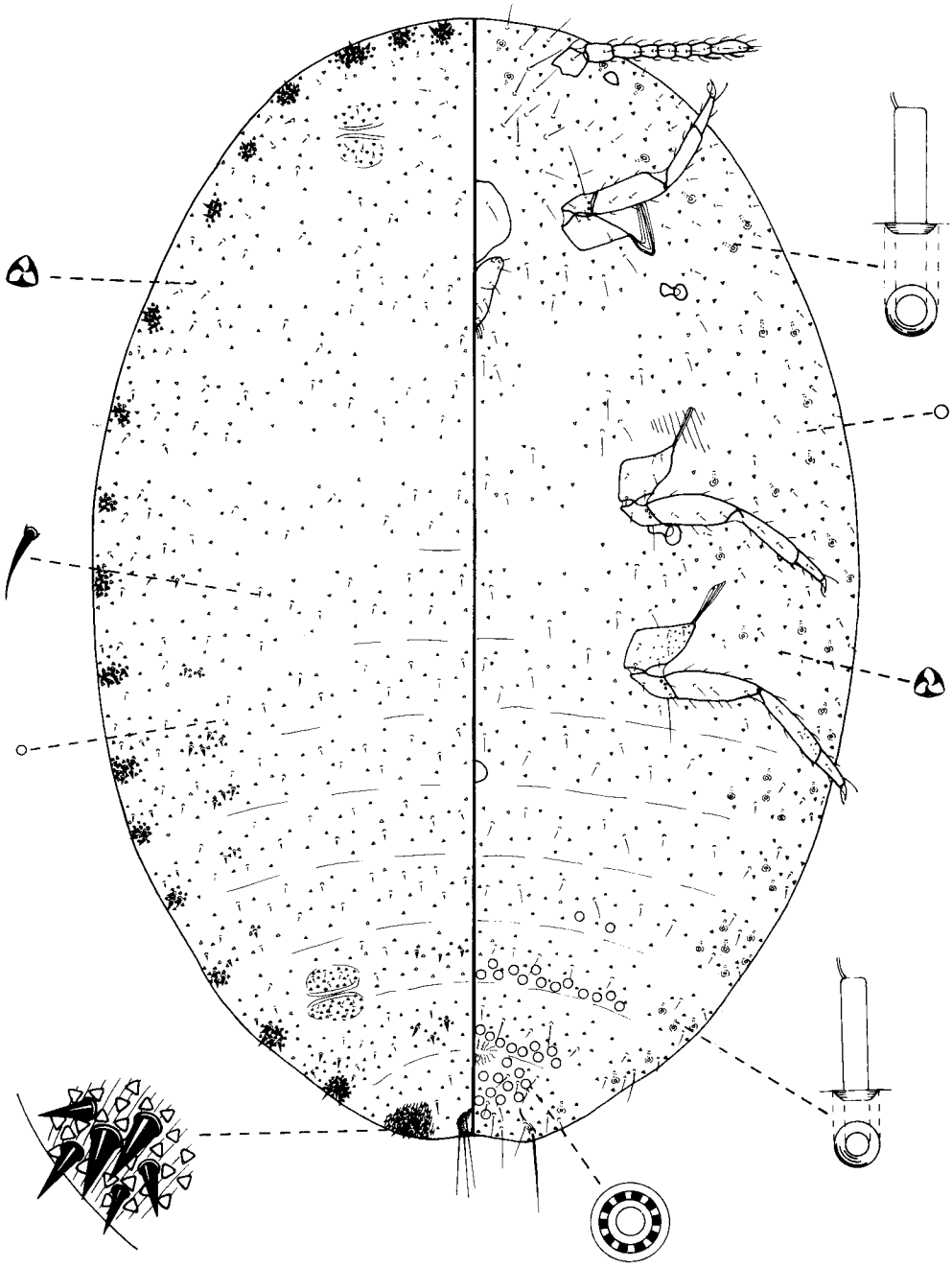
(86) *Paracoccus definitus*



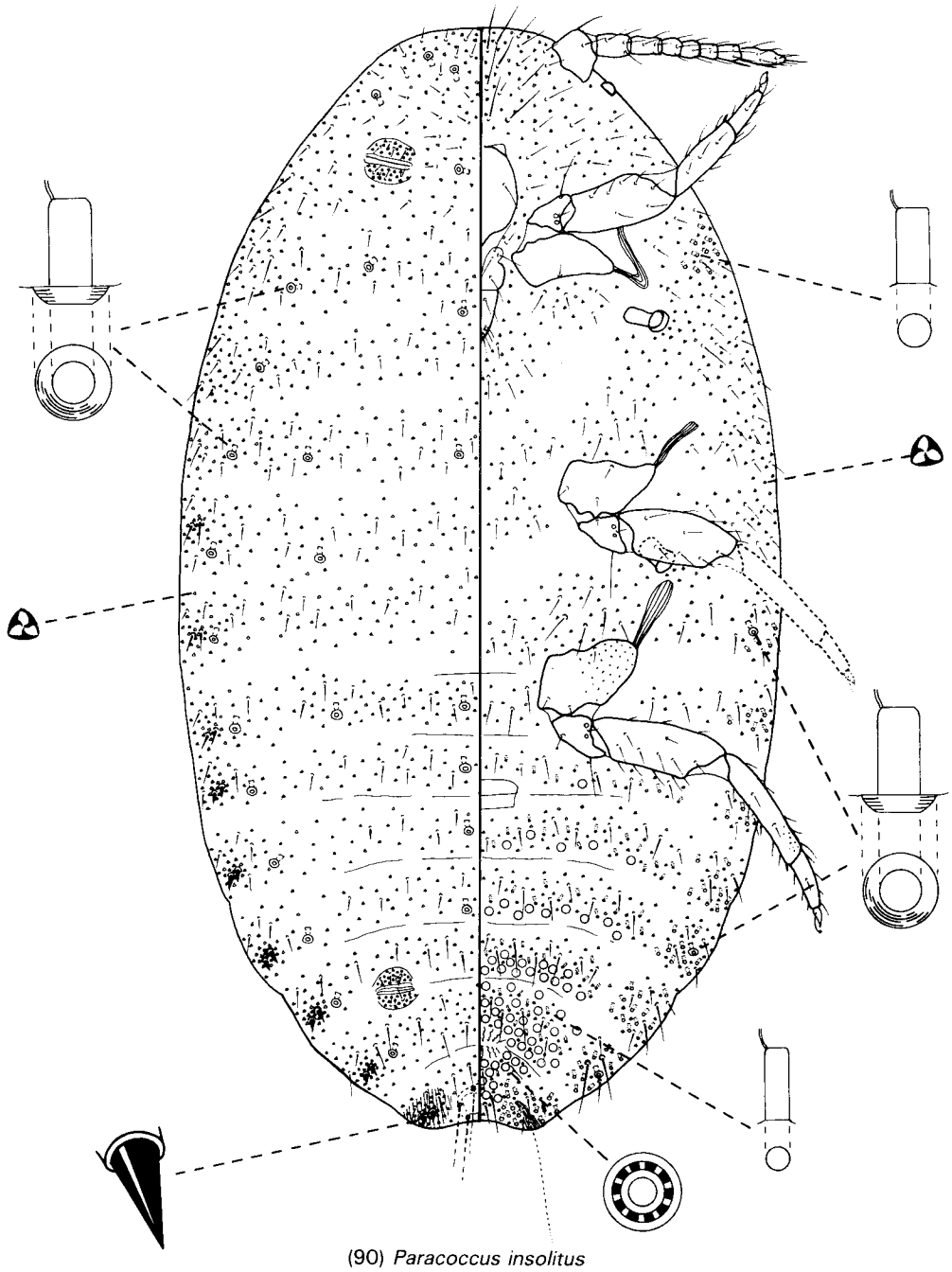
(87) *Paracoccus drimydis*



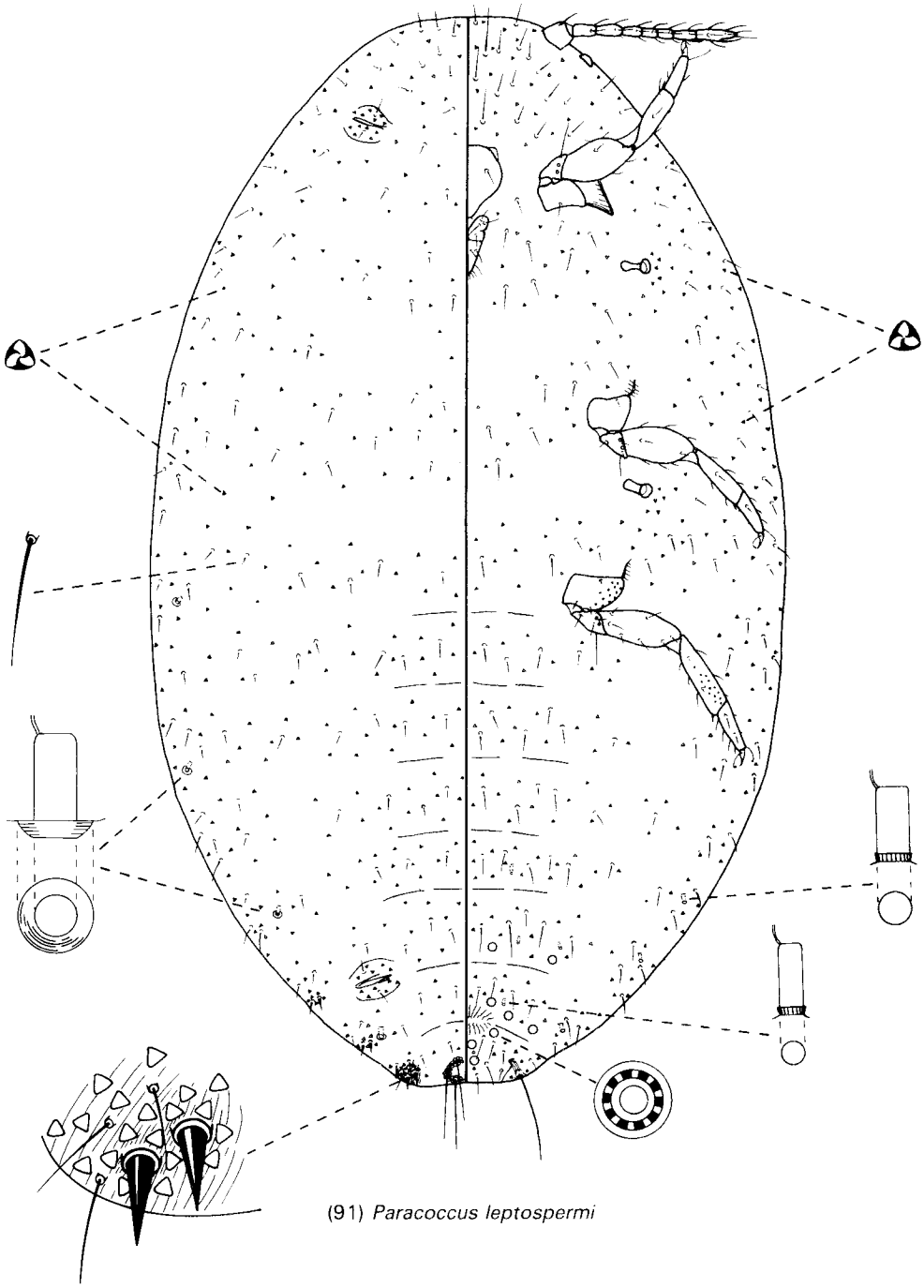
(88) *Paracoccus glaucus*



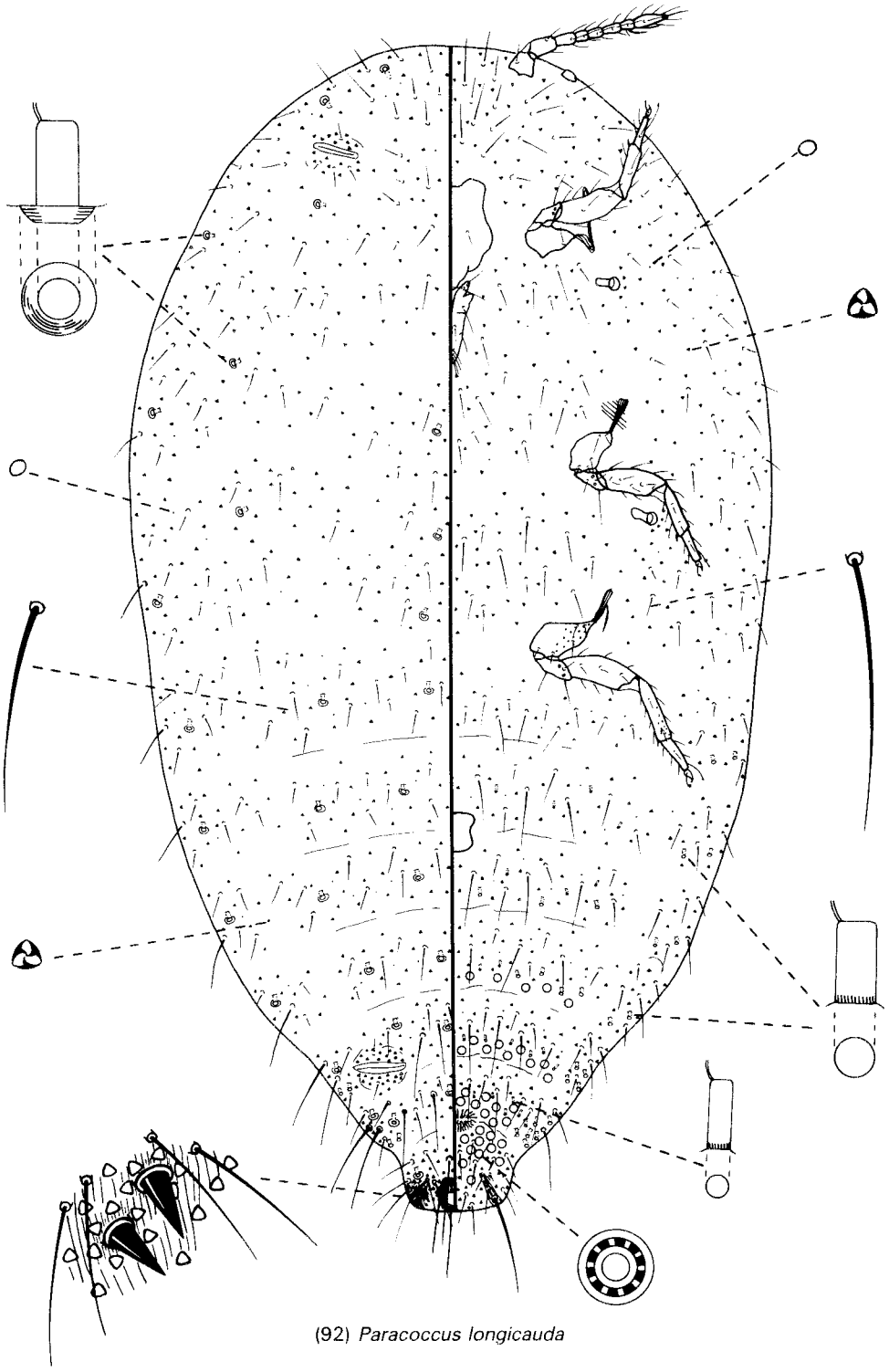
(89) *Paracoccus hebes*



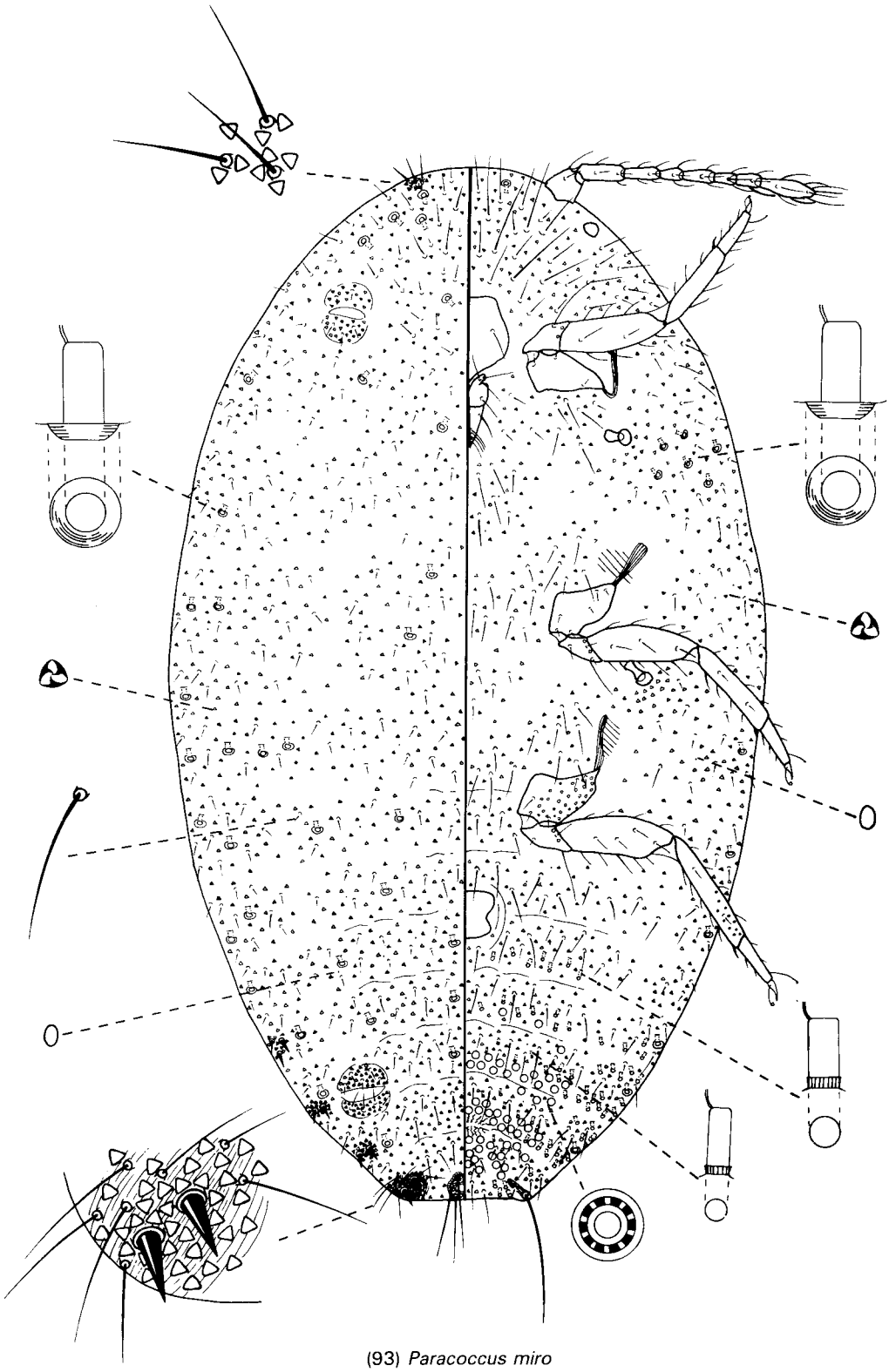
(90) *Paracoccus insolitus*



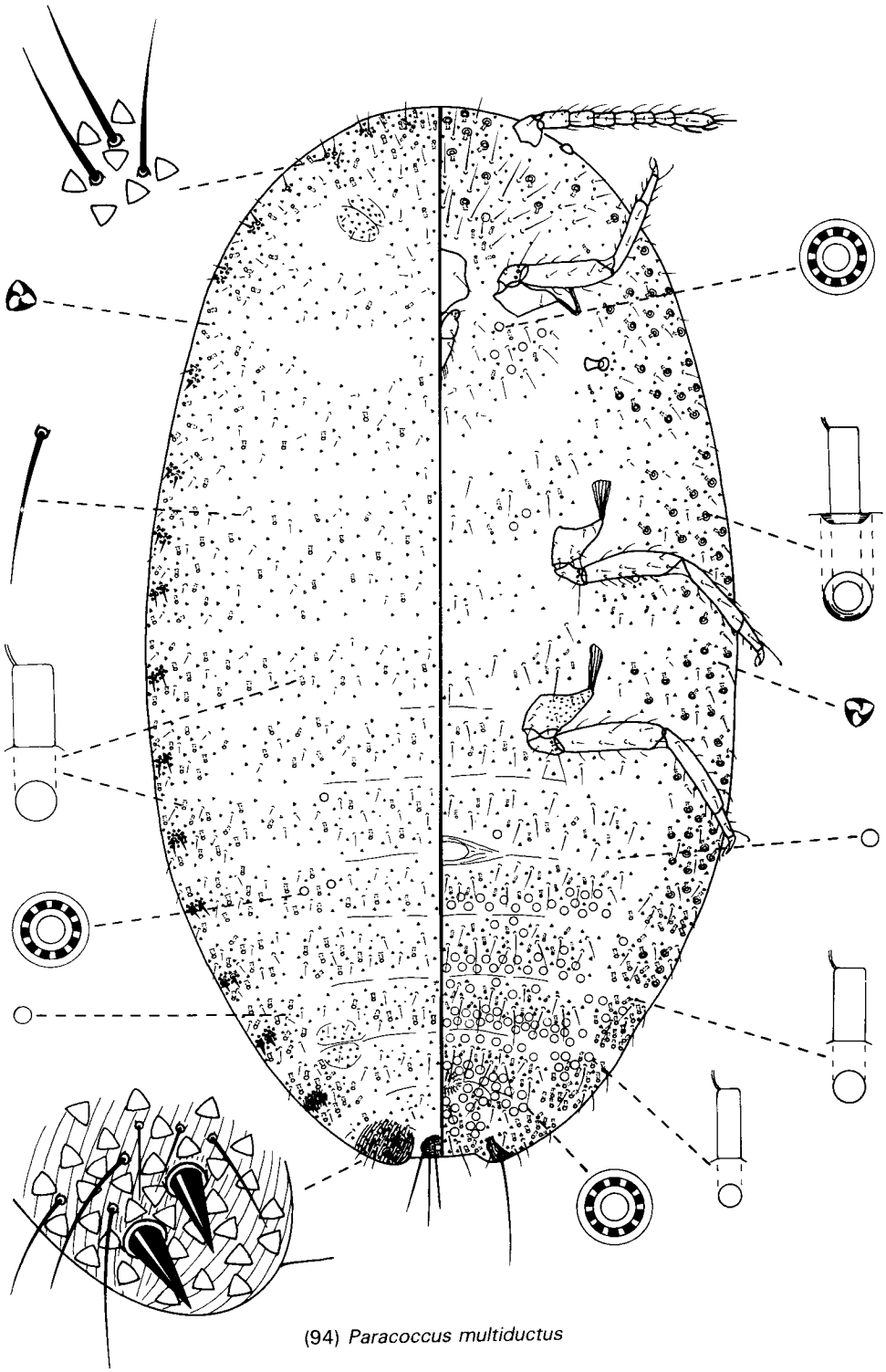
(91) *Paracoccus leptospermi*



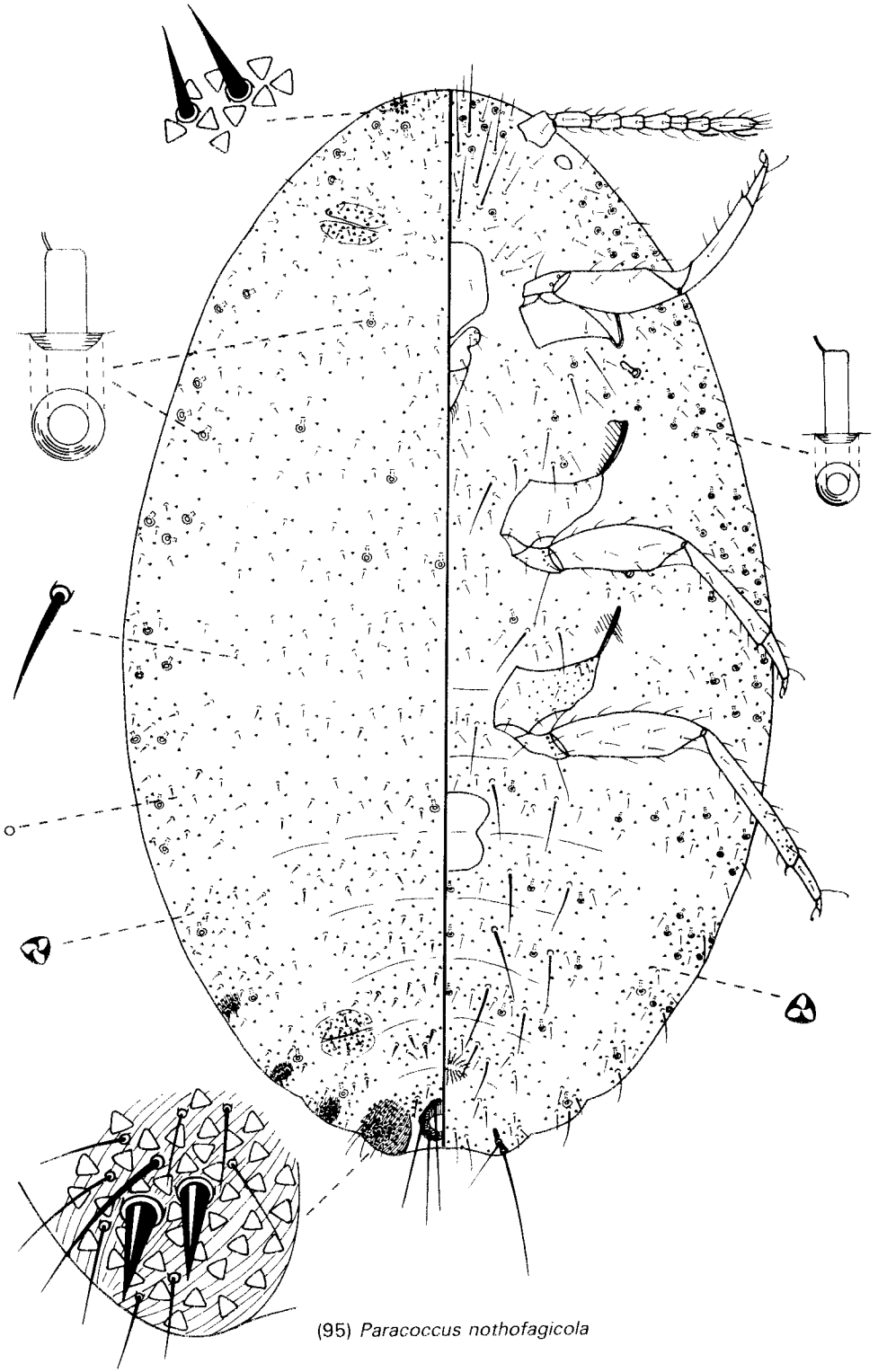
(92) *Paracoccus longicauda*



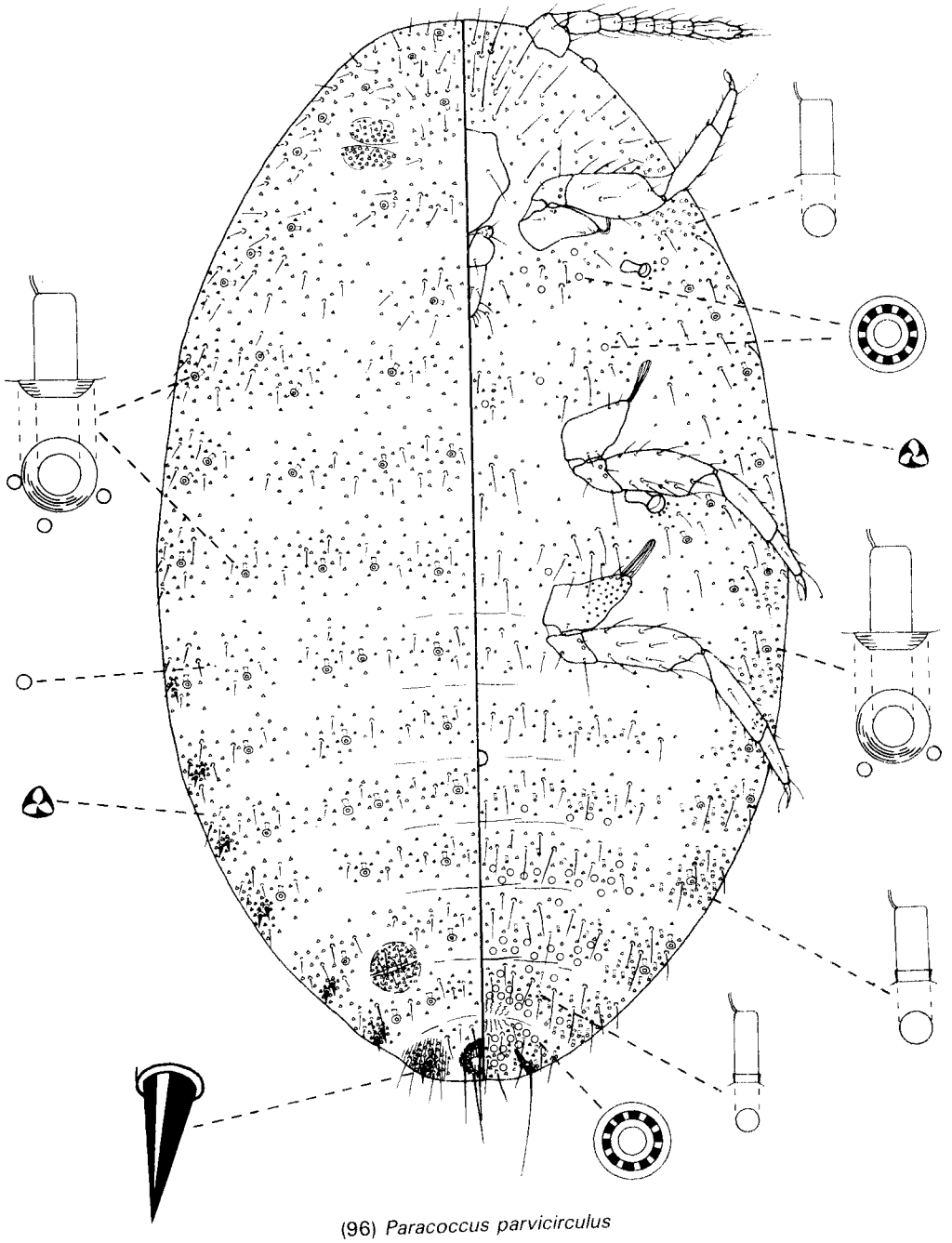
(93) *Paracoccus miro*



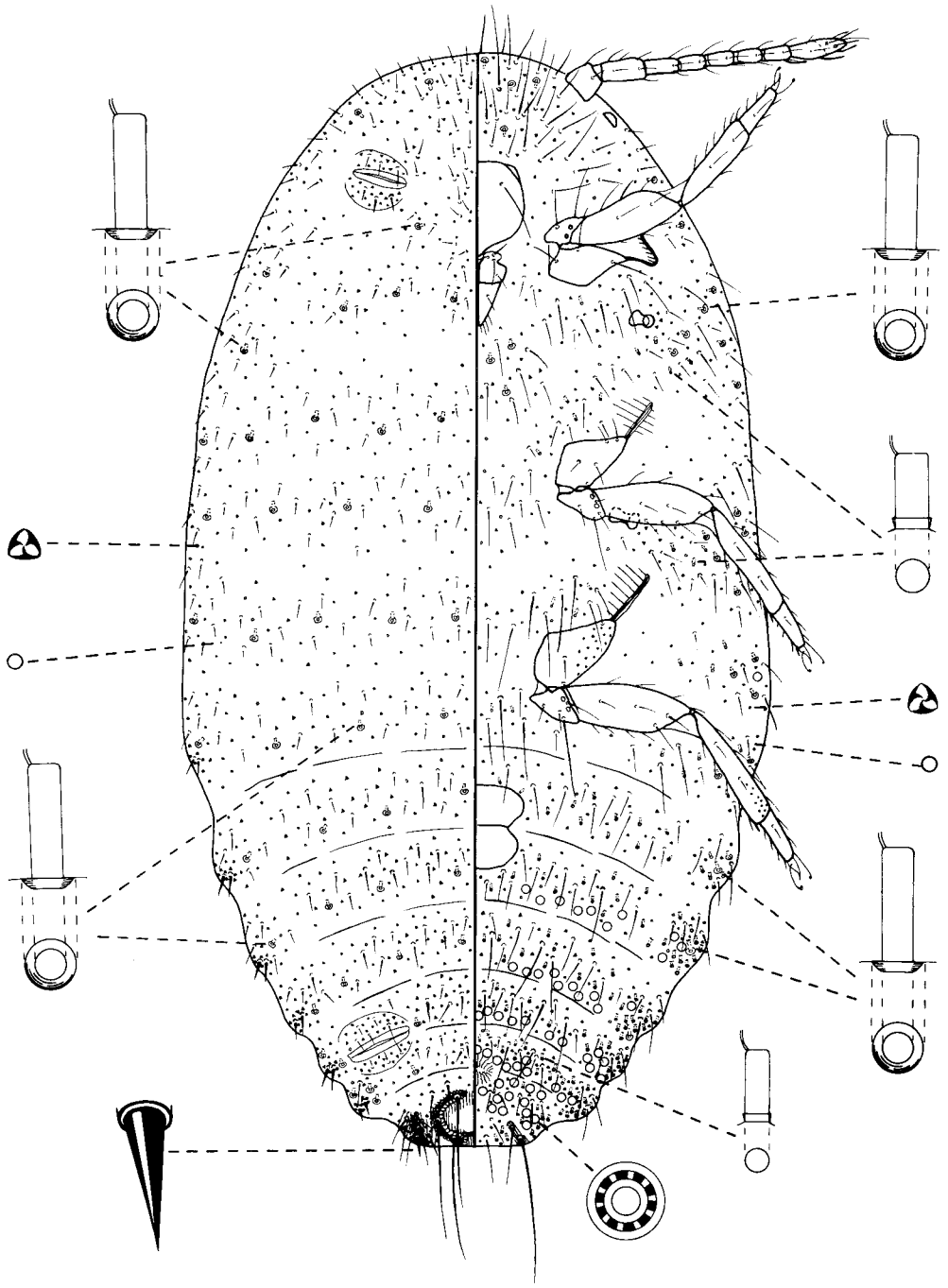
(94) *Paracoccus multiductus*



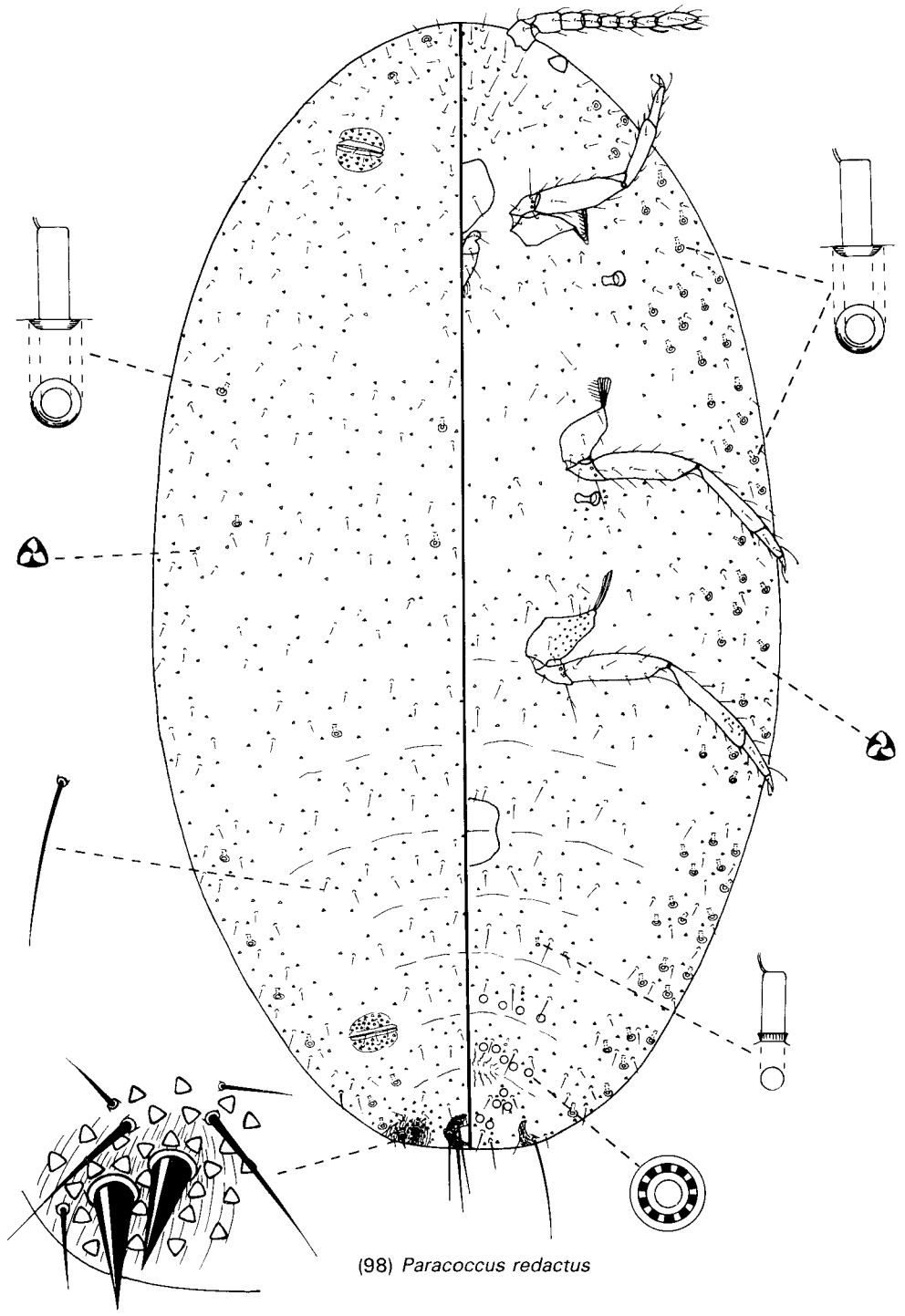
(95) *Paracoccus nothofagicola*



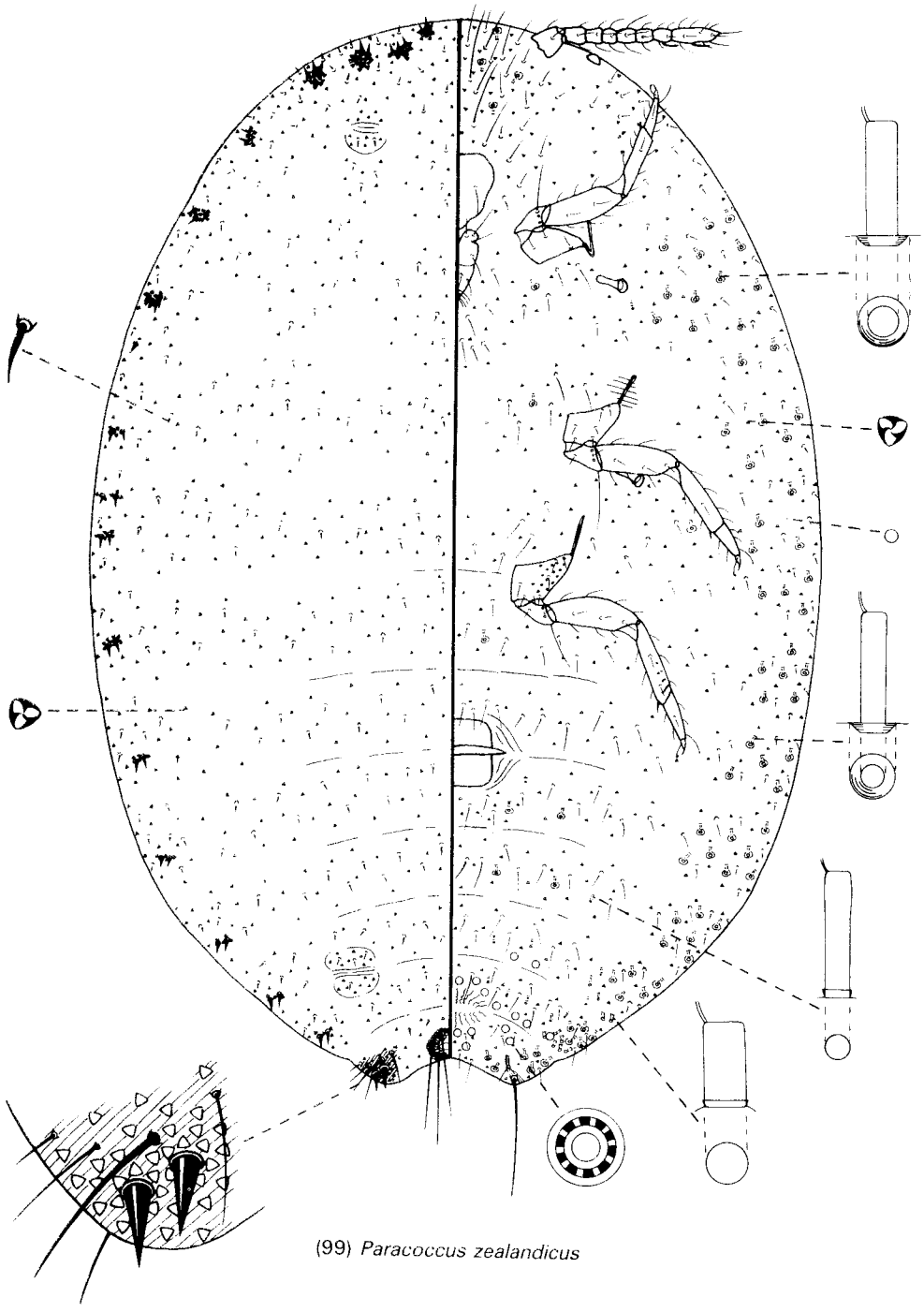
(96) *Paracoccus parvicirculus*



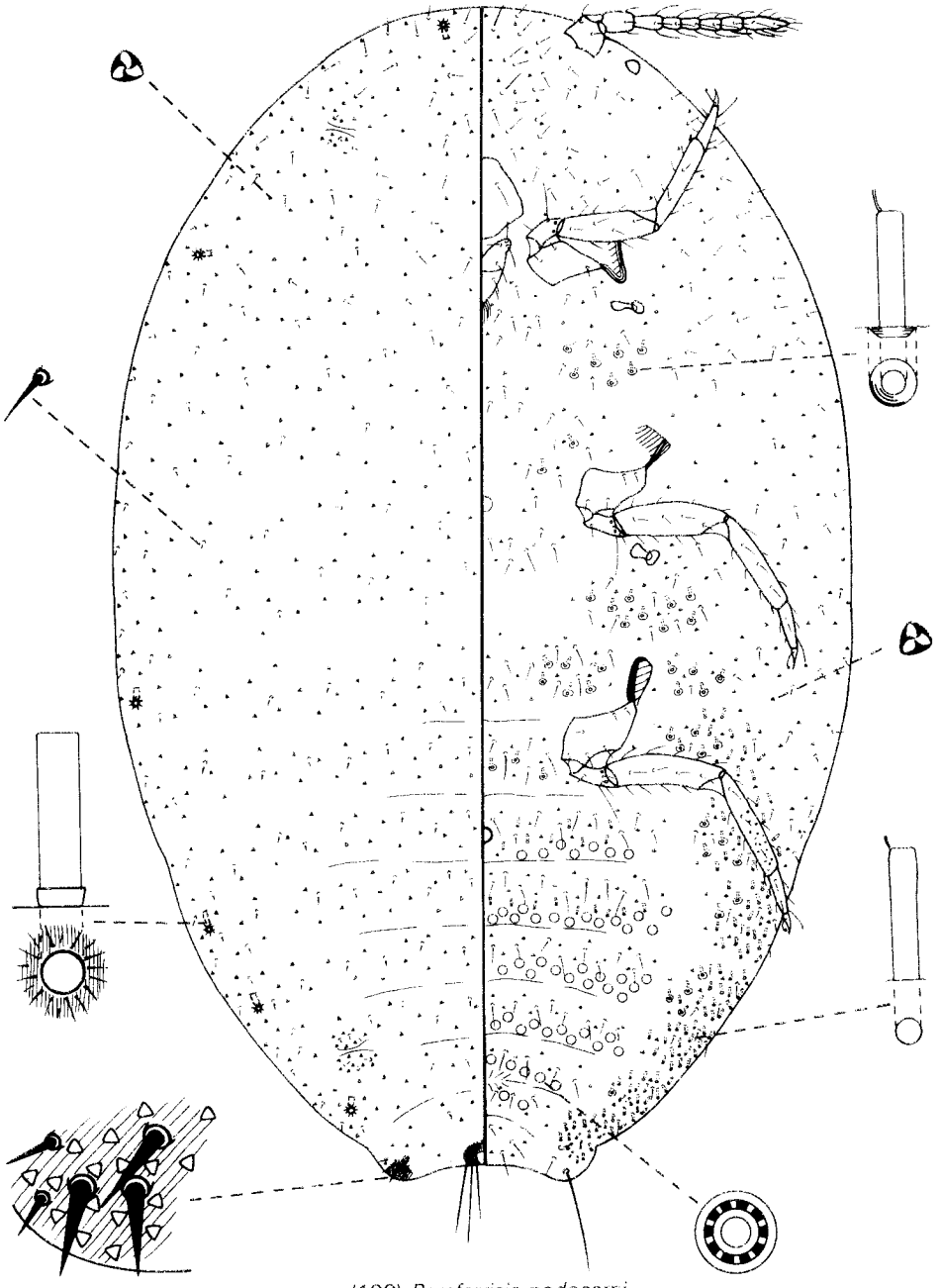
(97) *Paracoccus podocarpi*



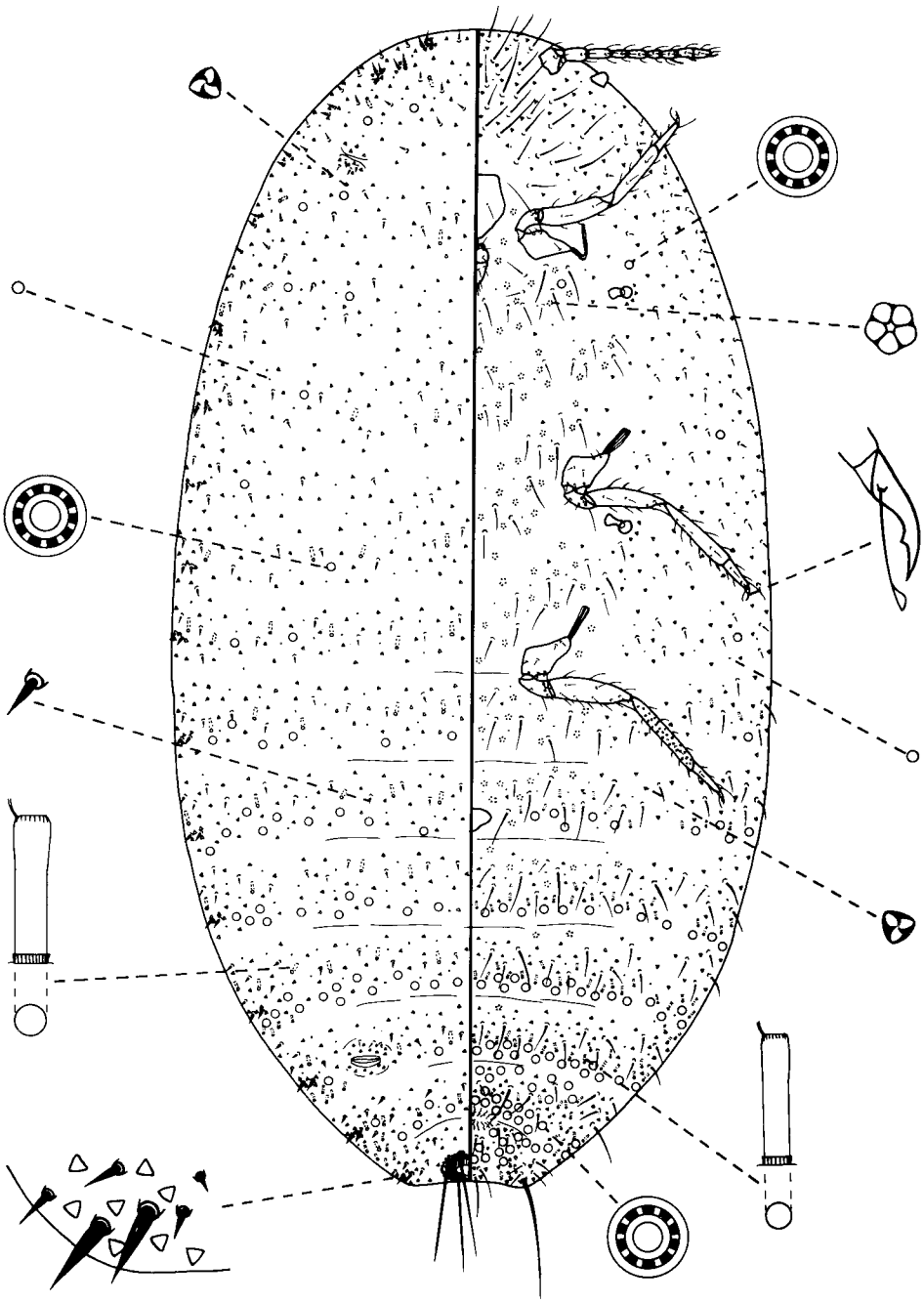
(98) *Paracoccus redactus*



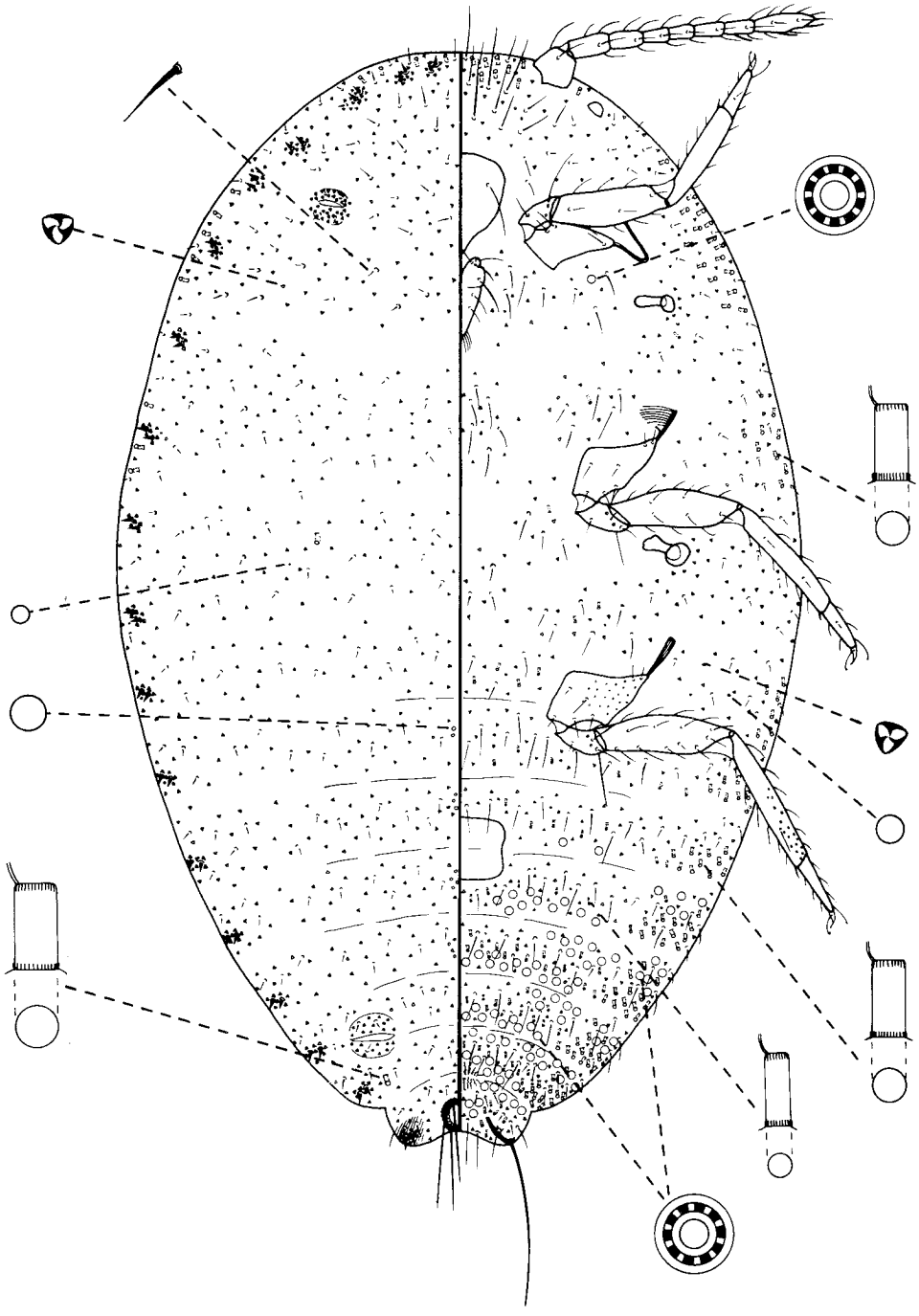
(99) *Paracoccus zealandicus*



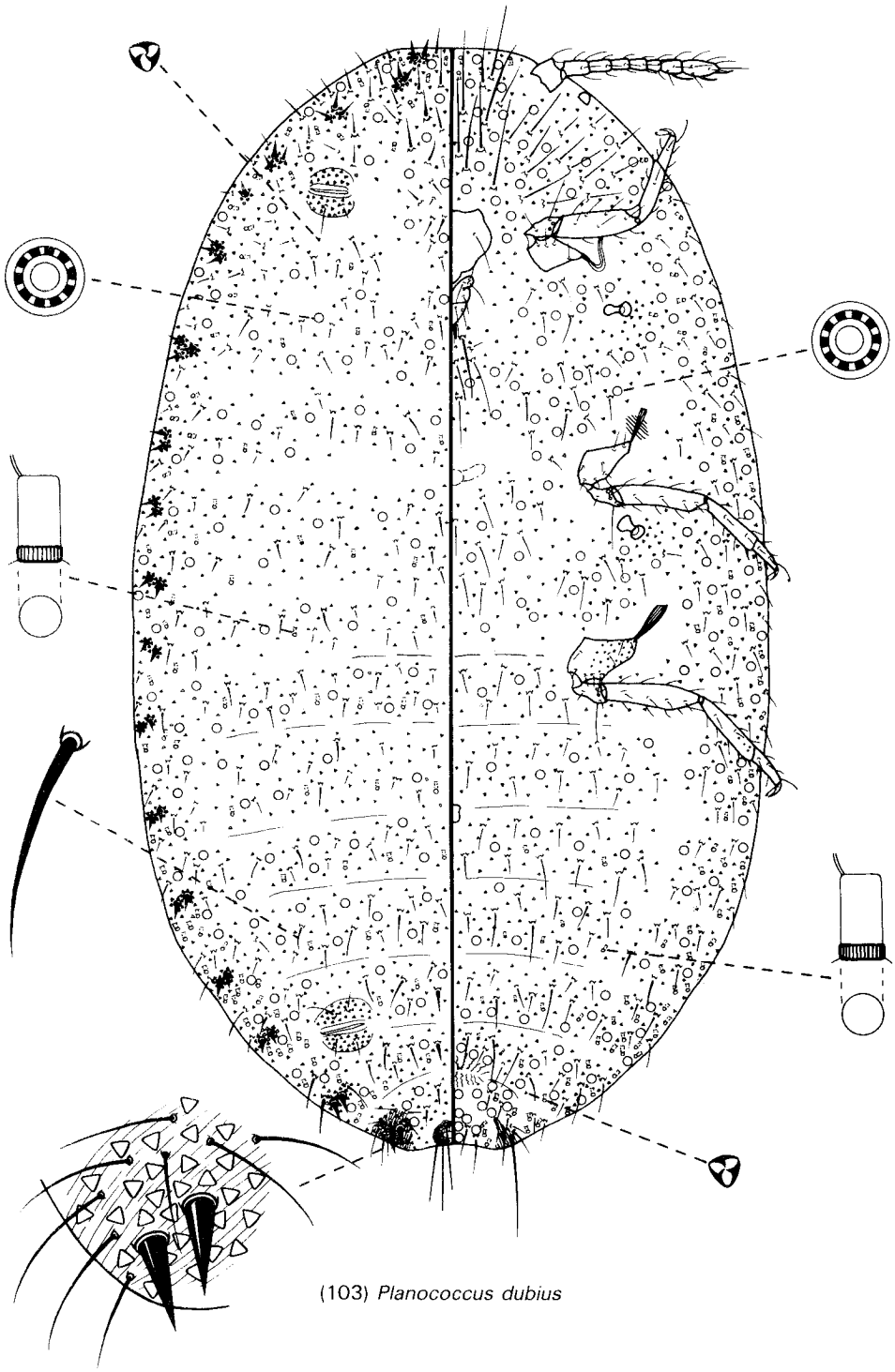
(100) *Paraferrisia podocarpi*



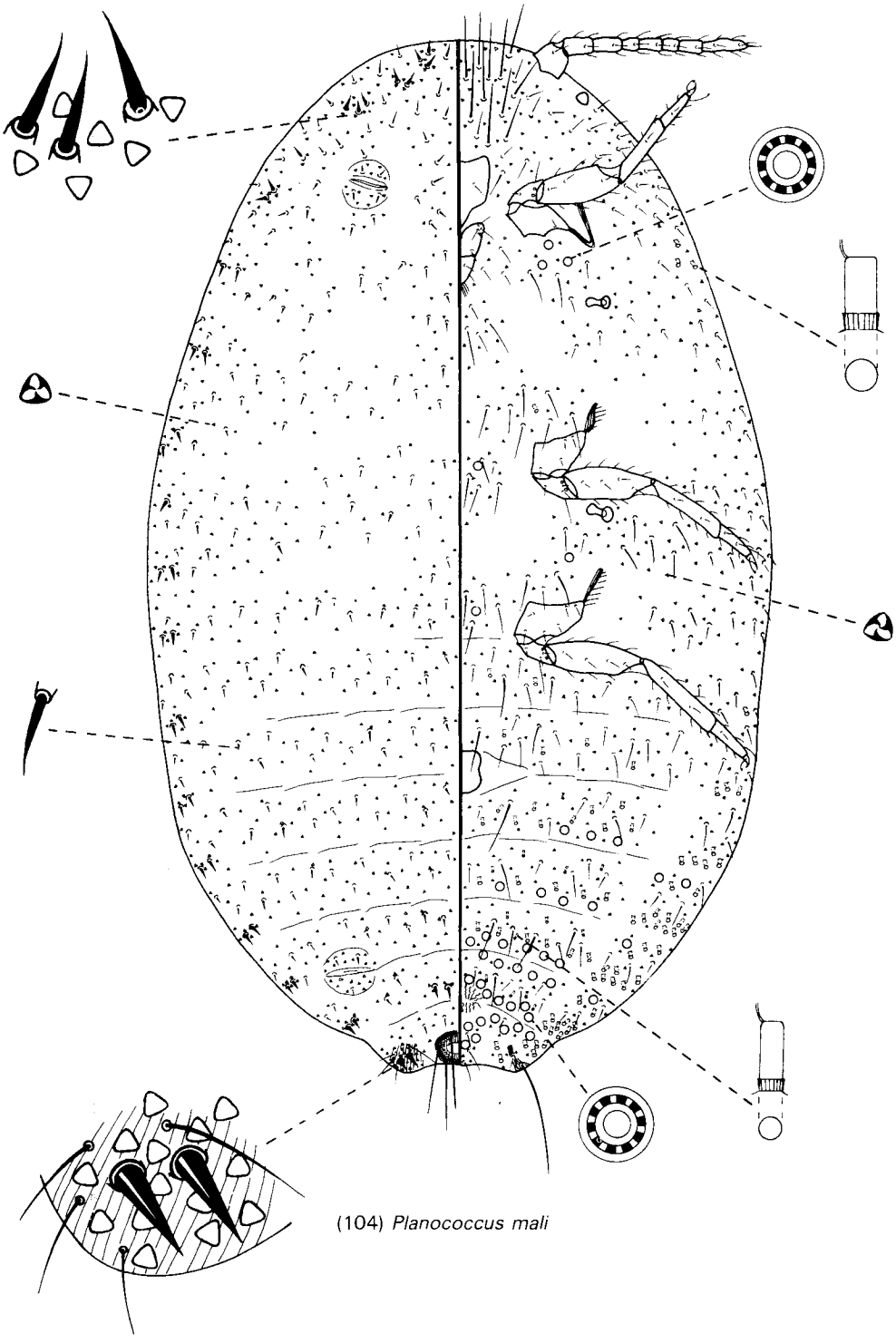
(101) *Phenacoccus graminicola*



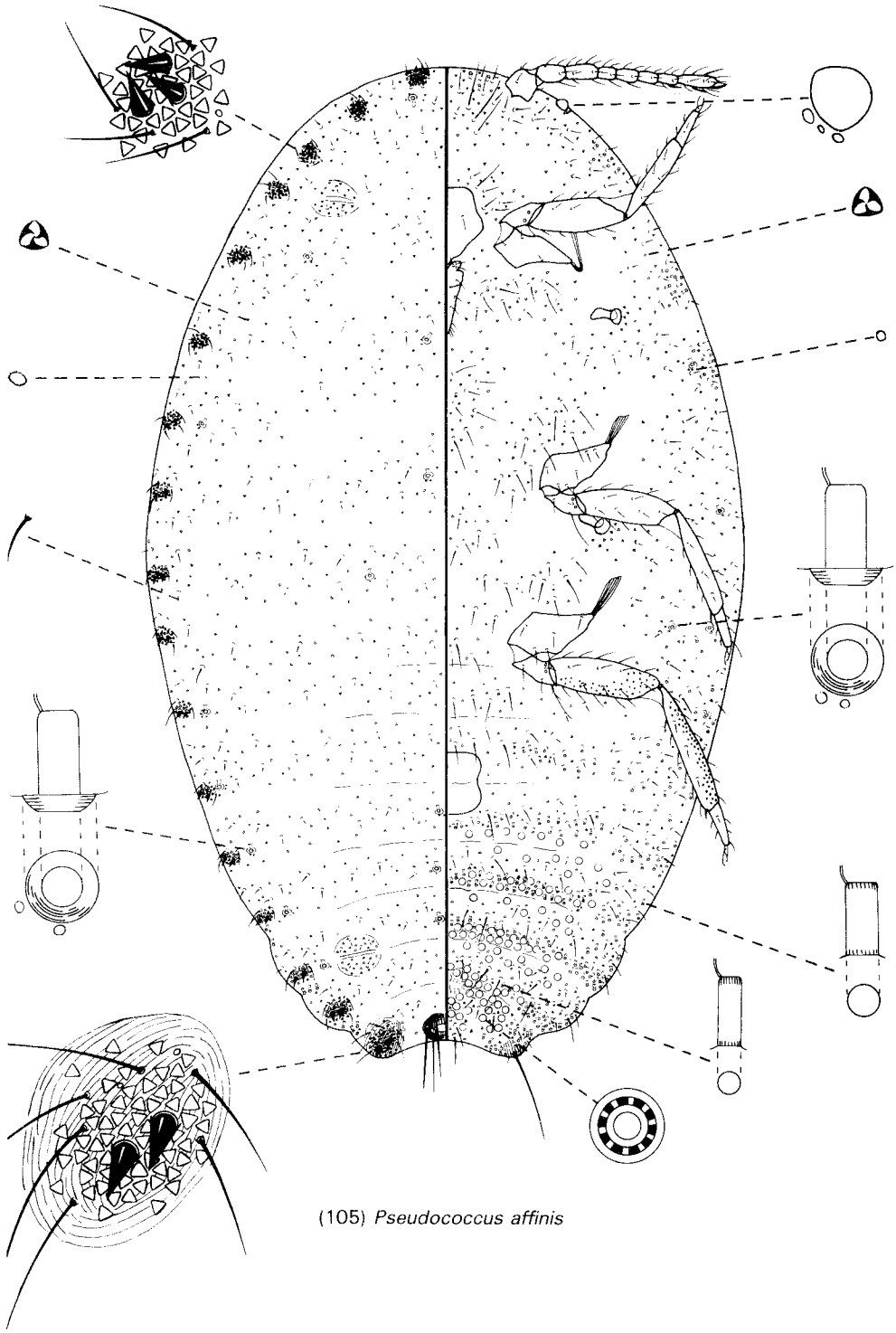
(102) *Planococcus citri*



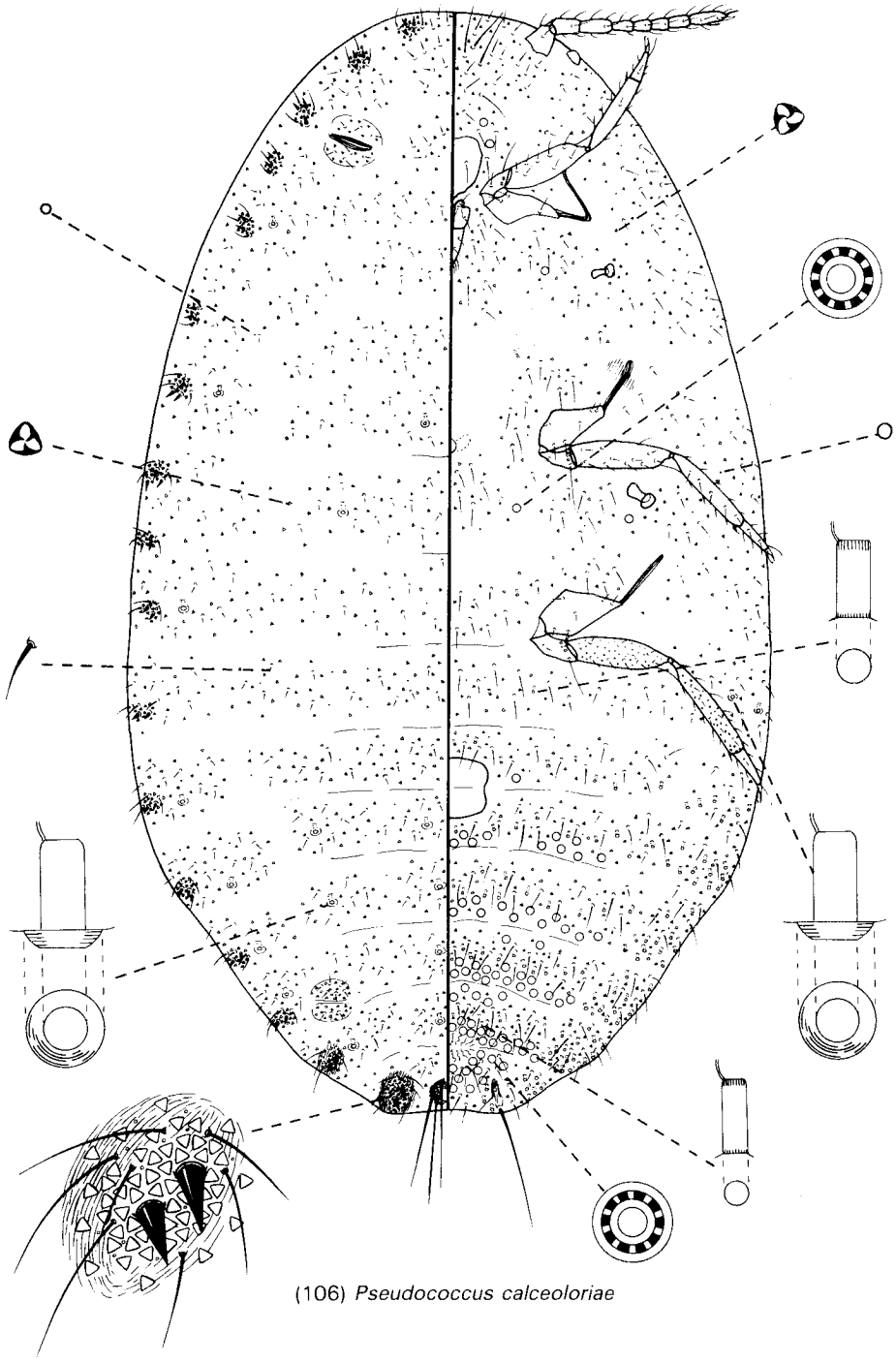
(103) *Planococcus dubius*



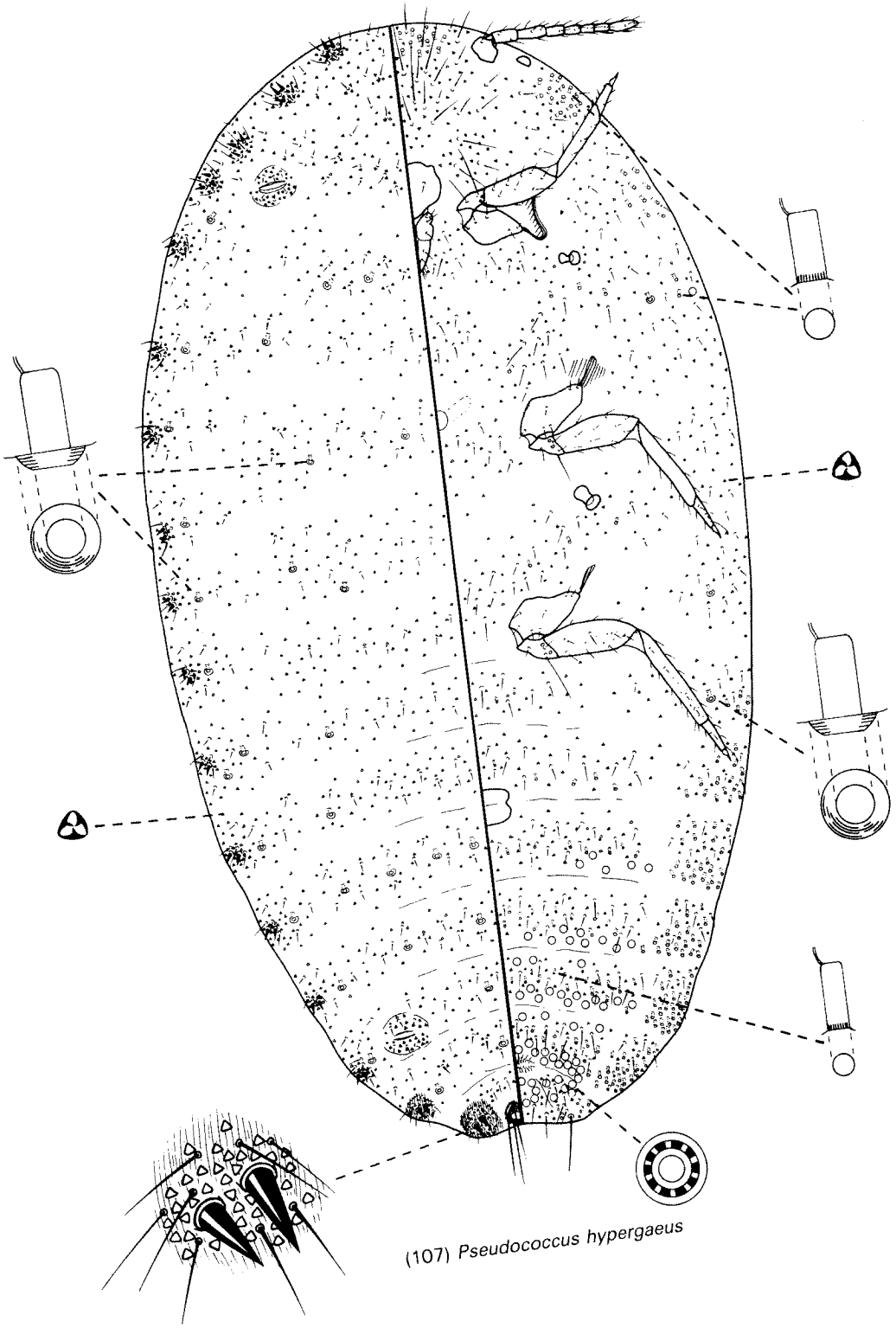
(104) *Planococcus mali*



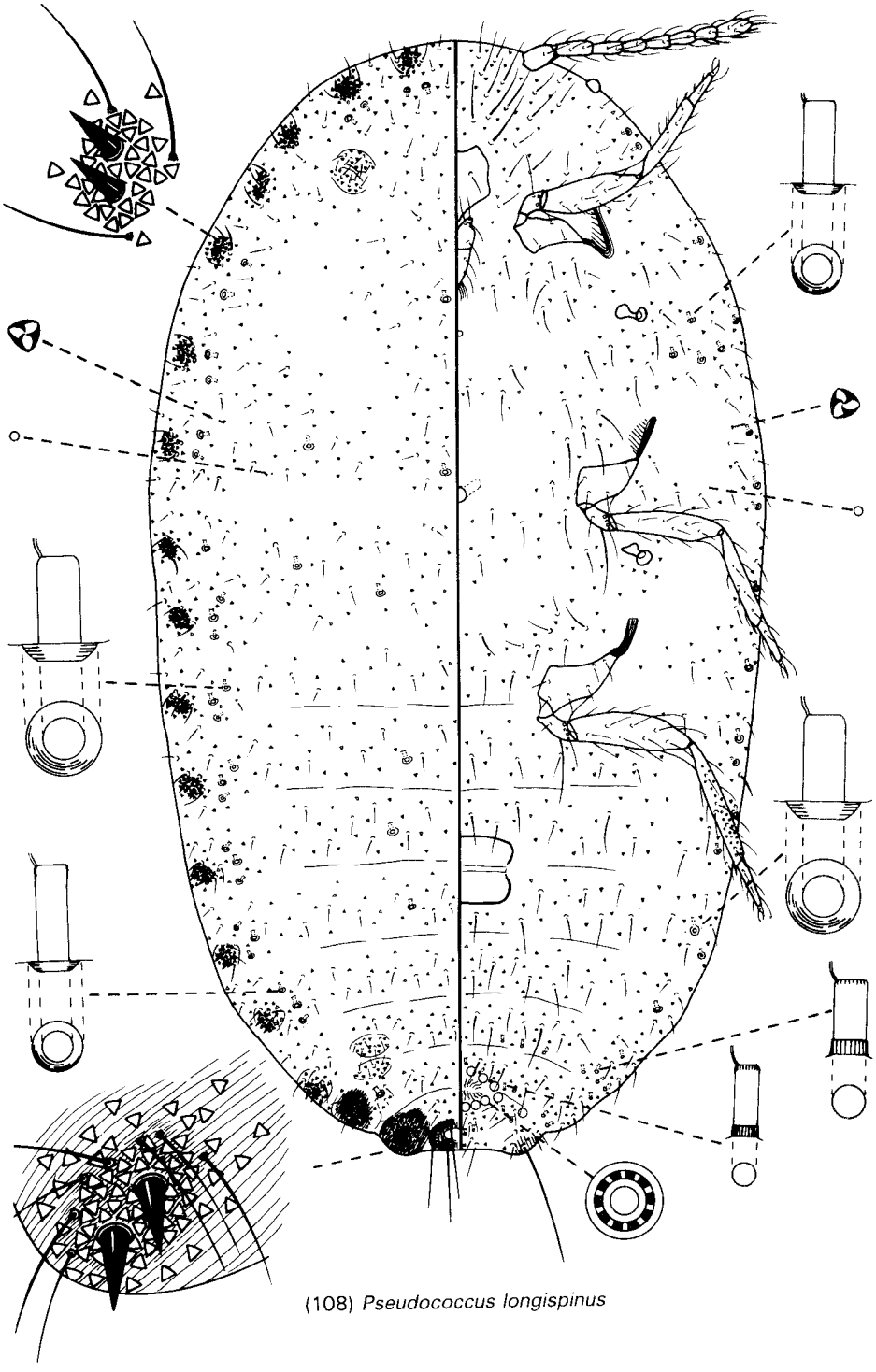
(105) *Pseudococcus affinis*



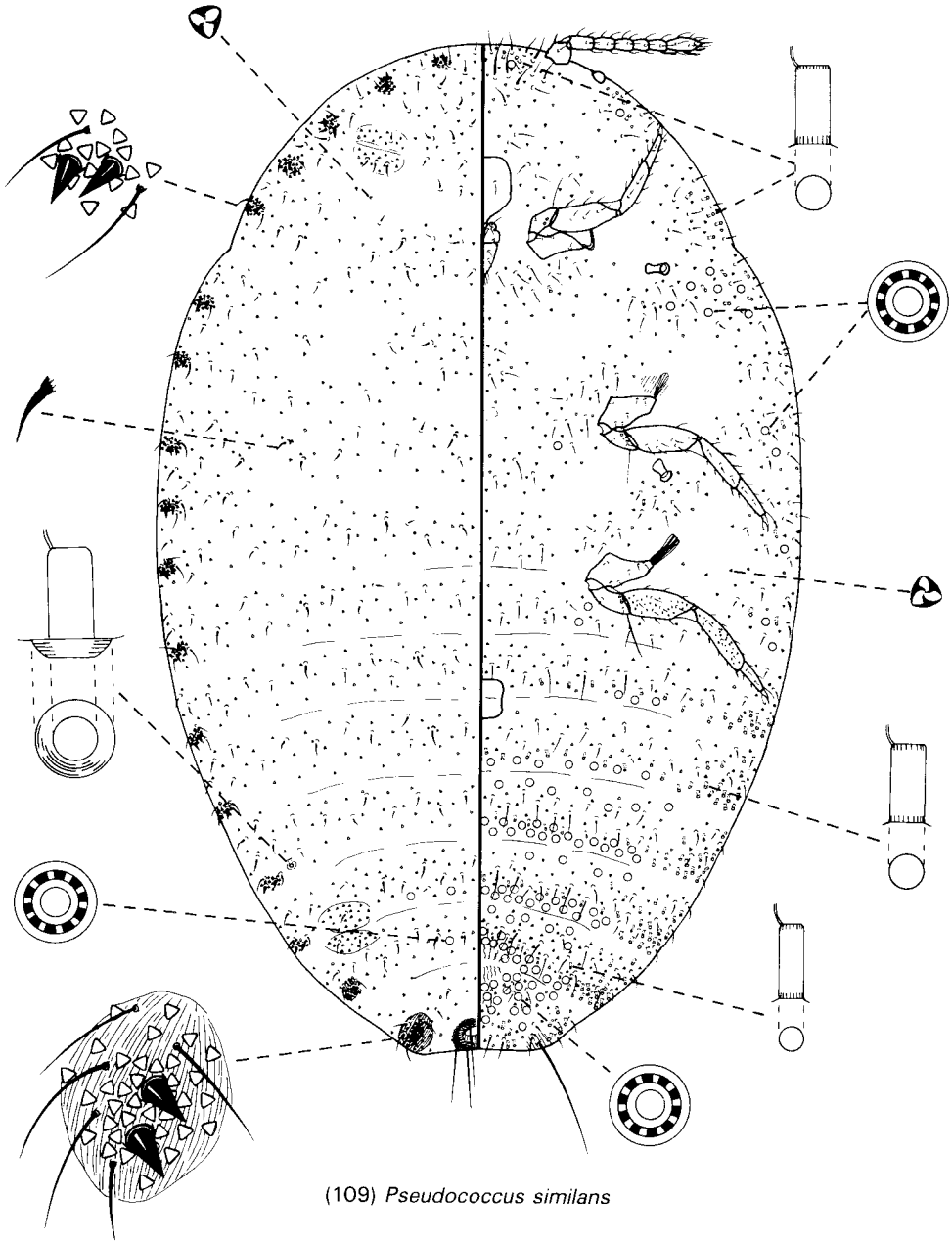
(106) *Pseudococcus calceoloriae*



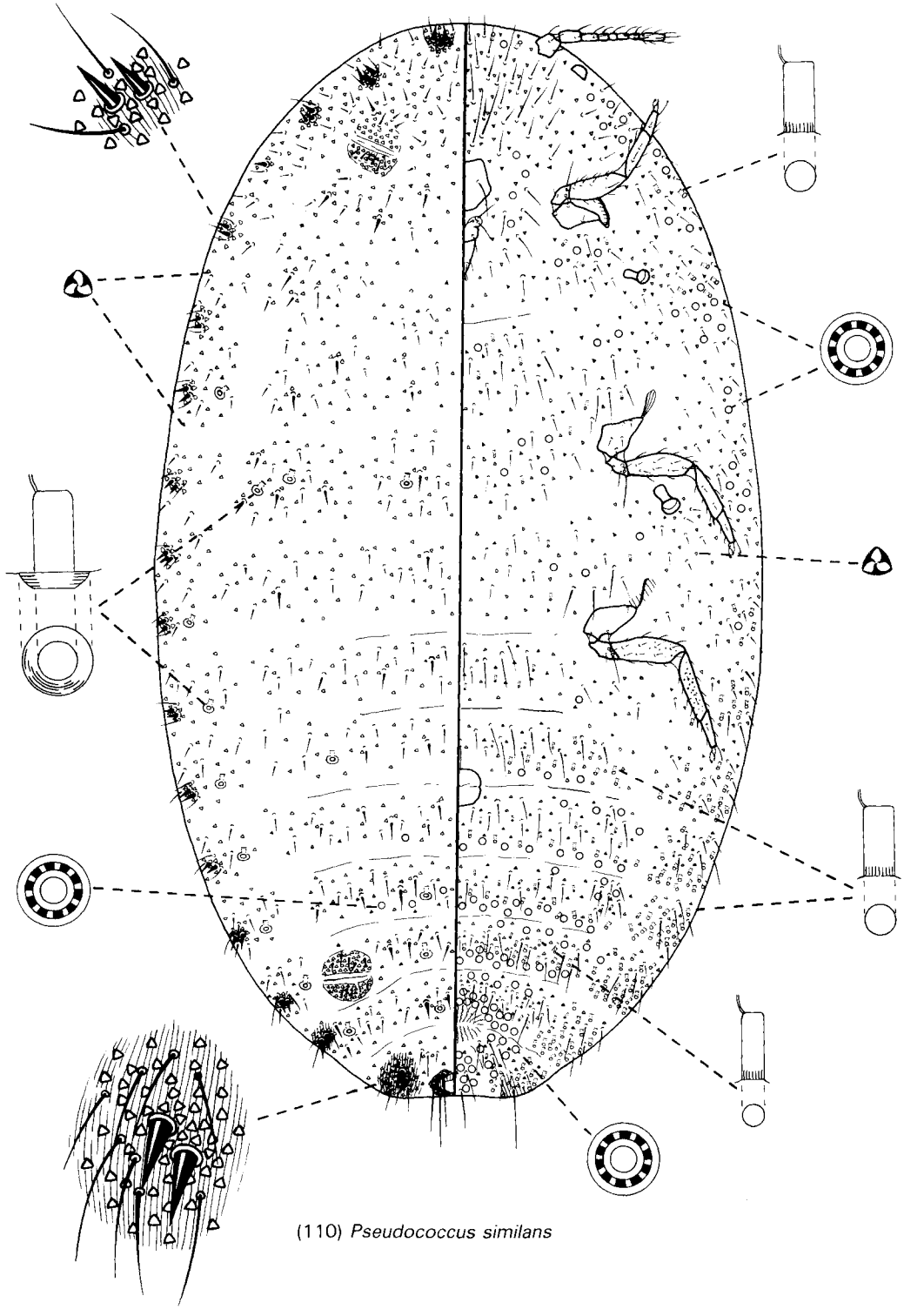
(107) *Pseudococcus hypergaeus*



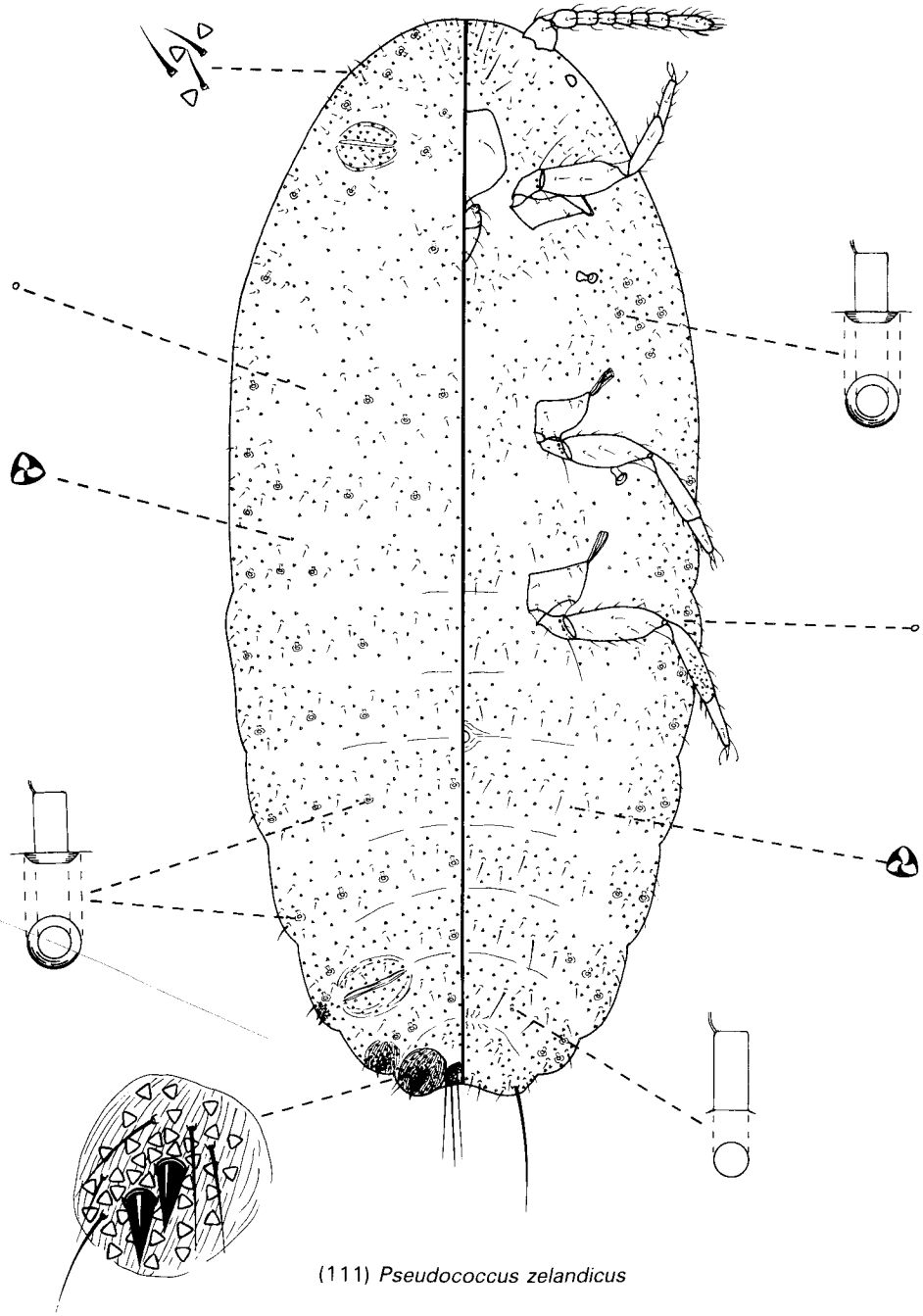
(108) *Pseudococcus longispinus*



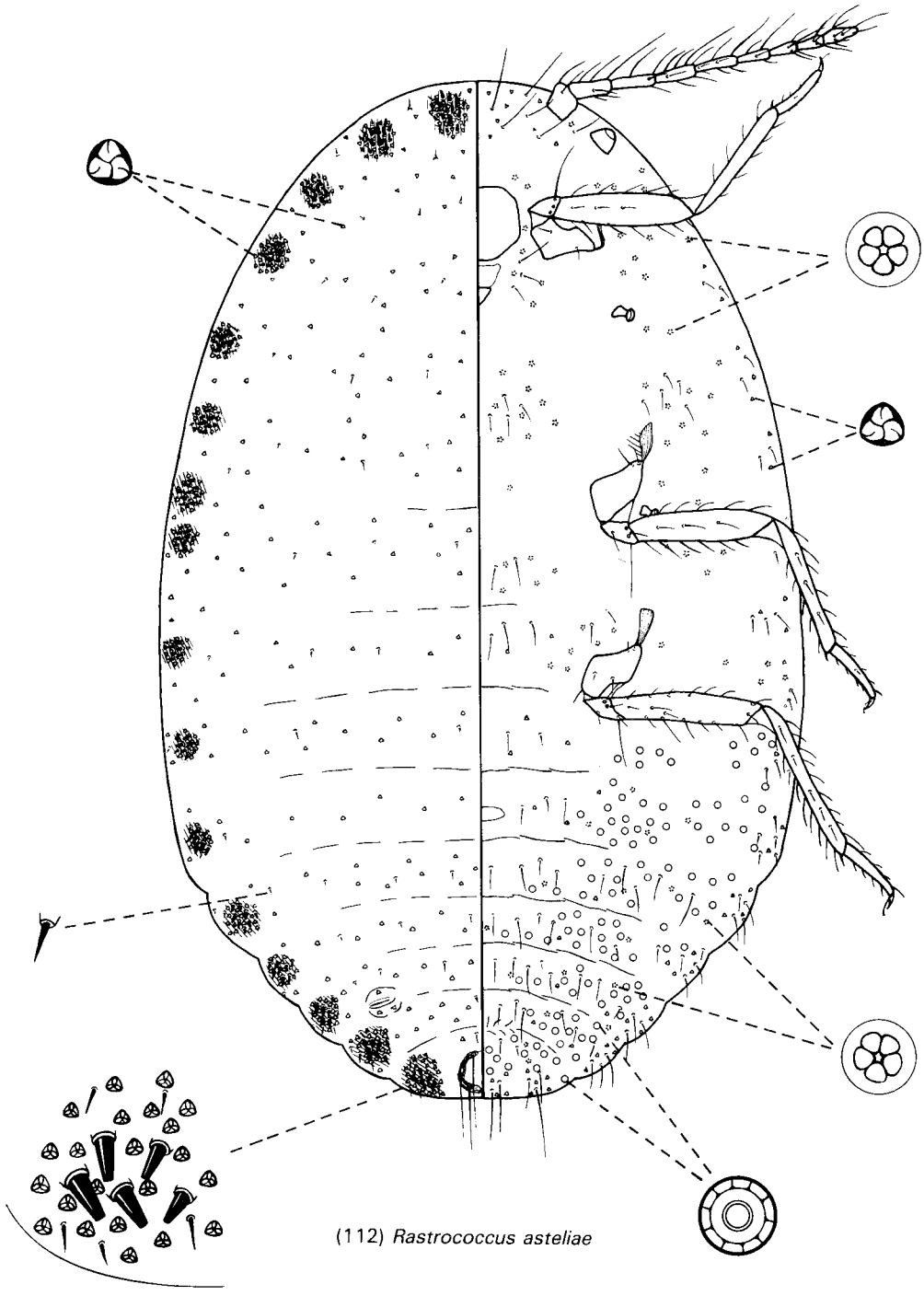
(109) *Pseudococcus similans*



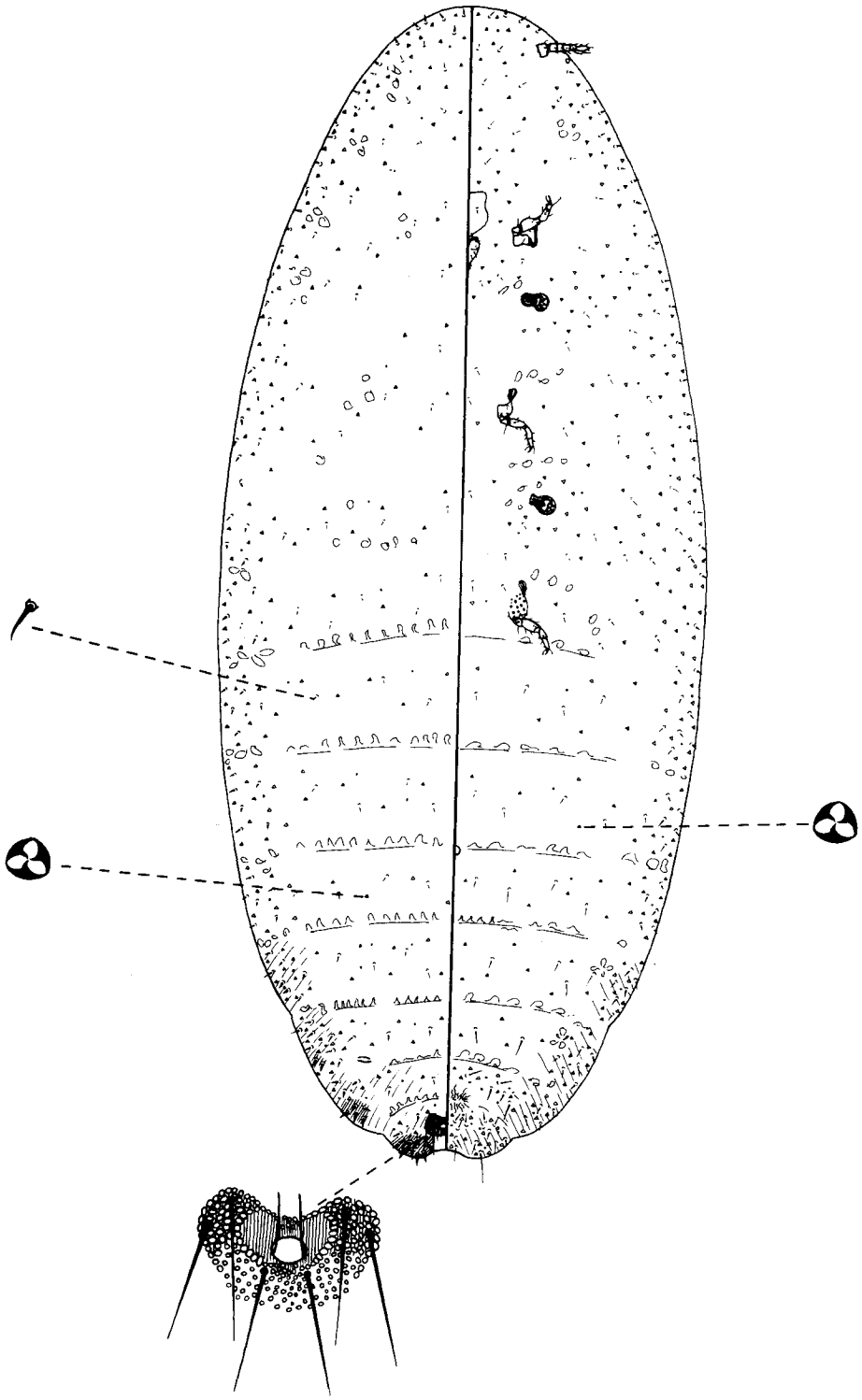
(110) *Pseudococcus similans*



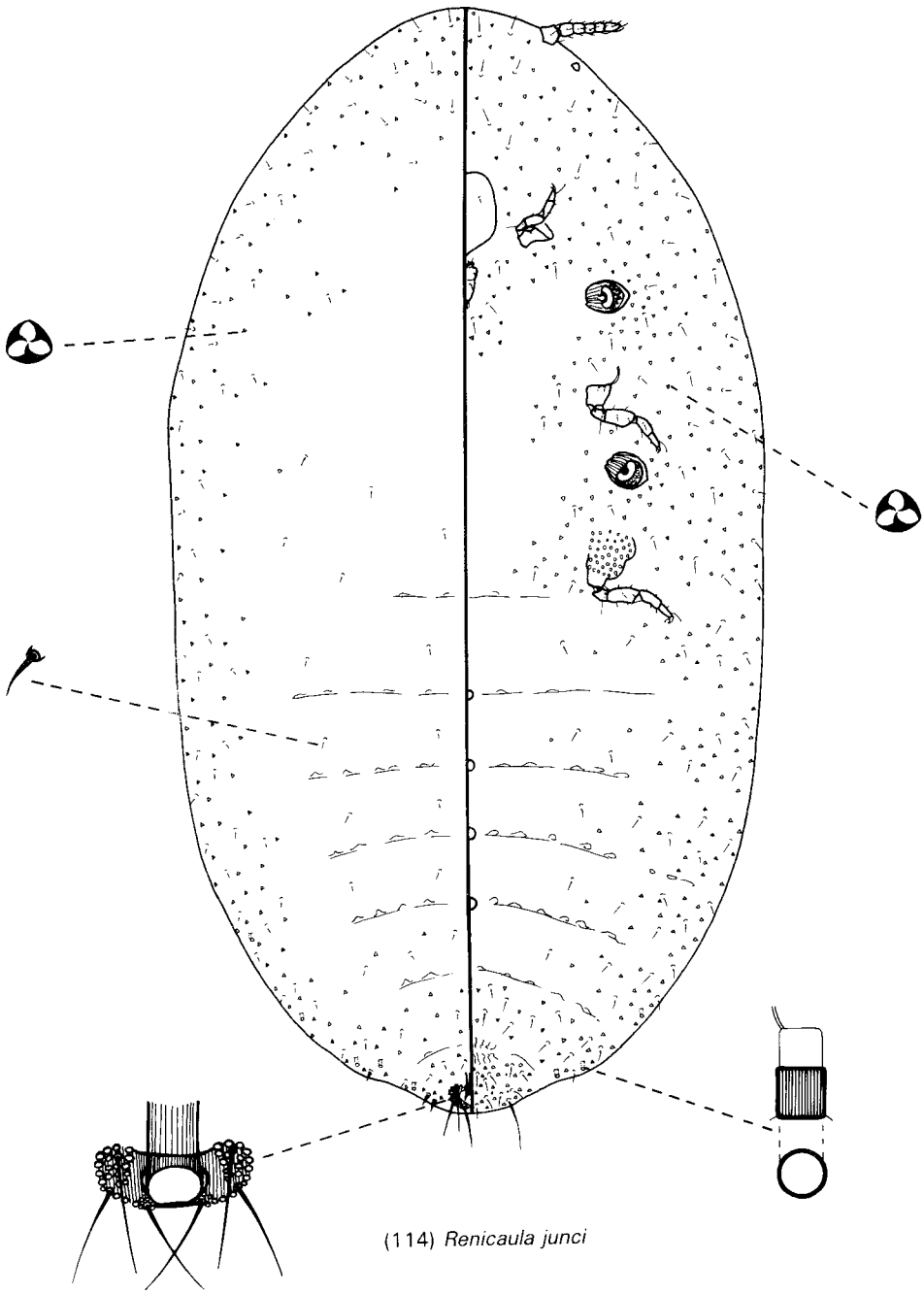
(111) *Pseudococcus zelandicus*



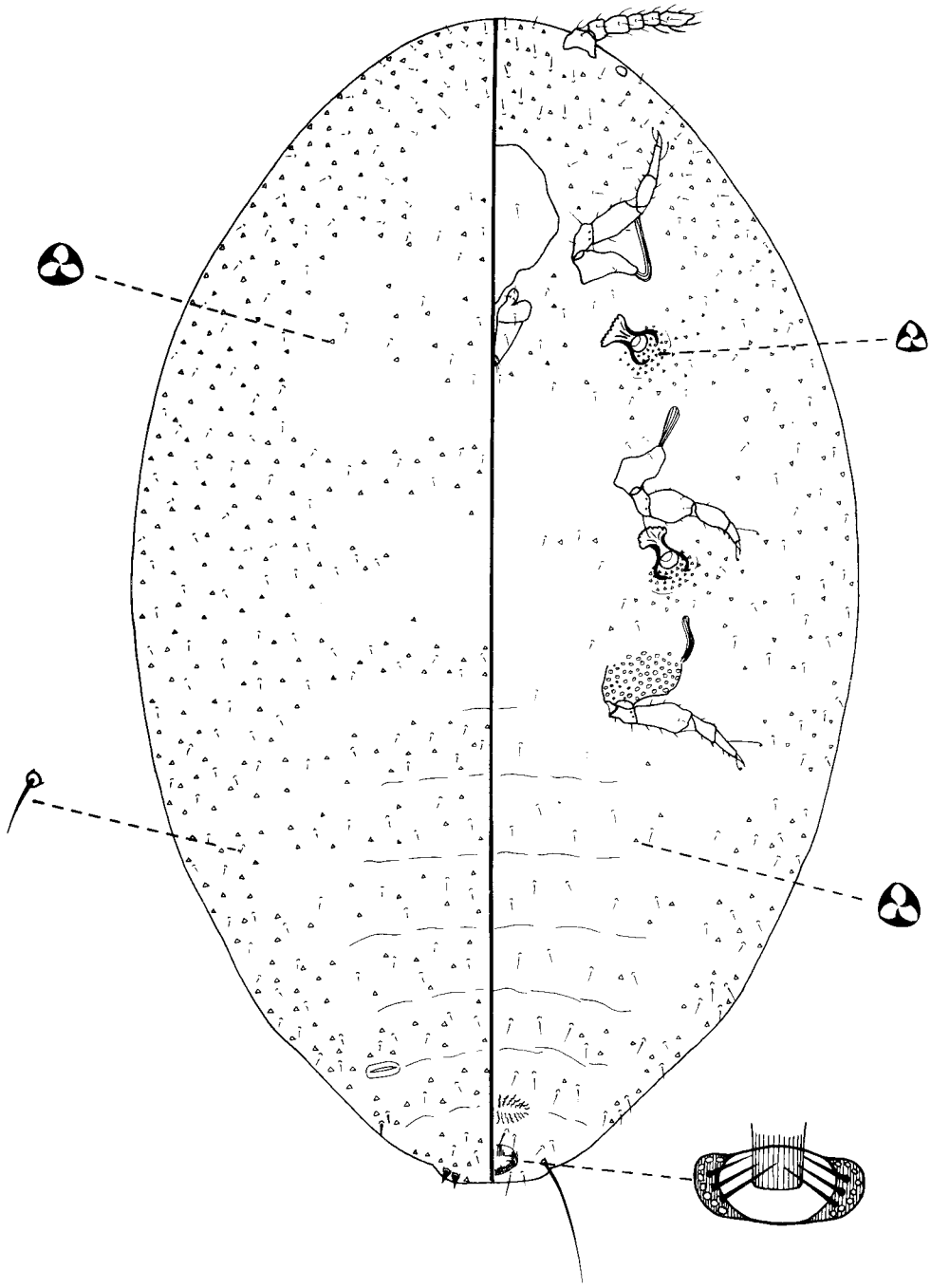
(112) *Rastrococcus asteliae*



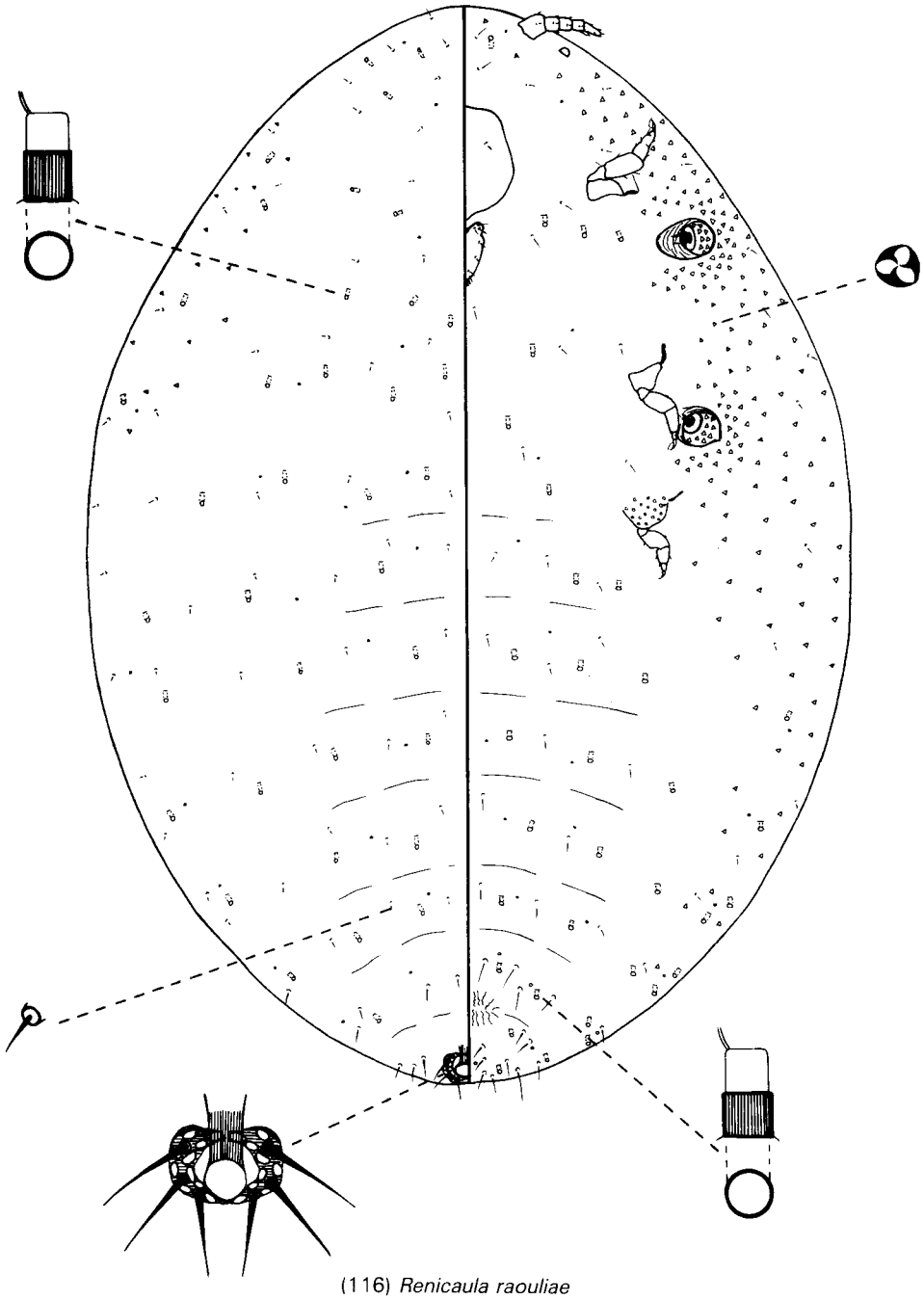
(113) *Renicaula chionochloae*



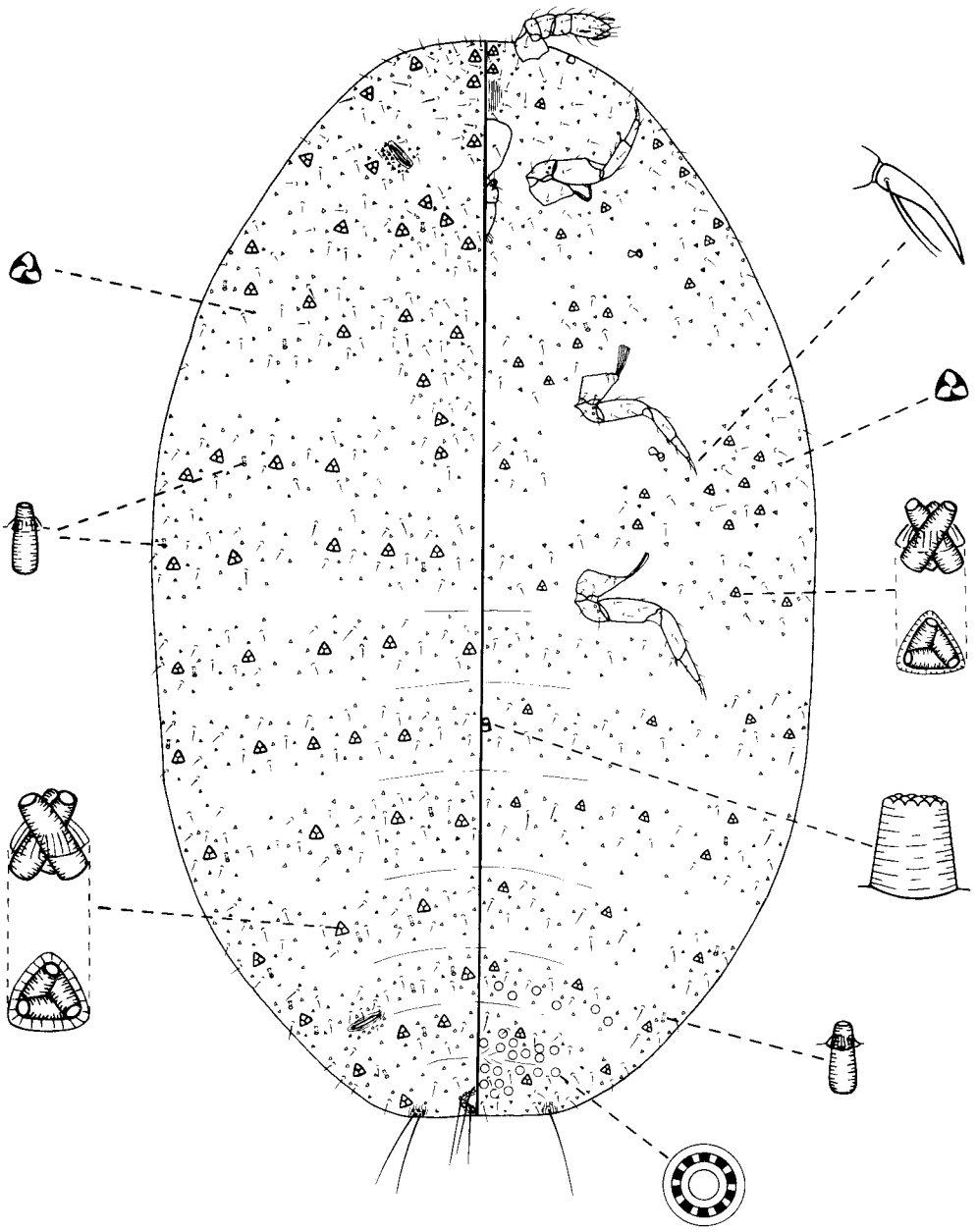
(114) *Renicaula junci*



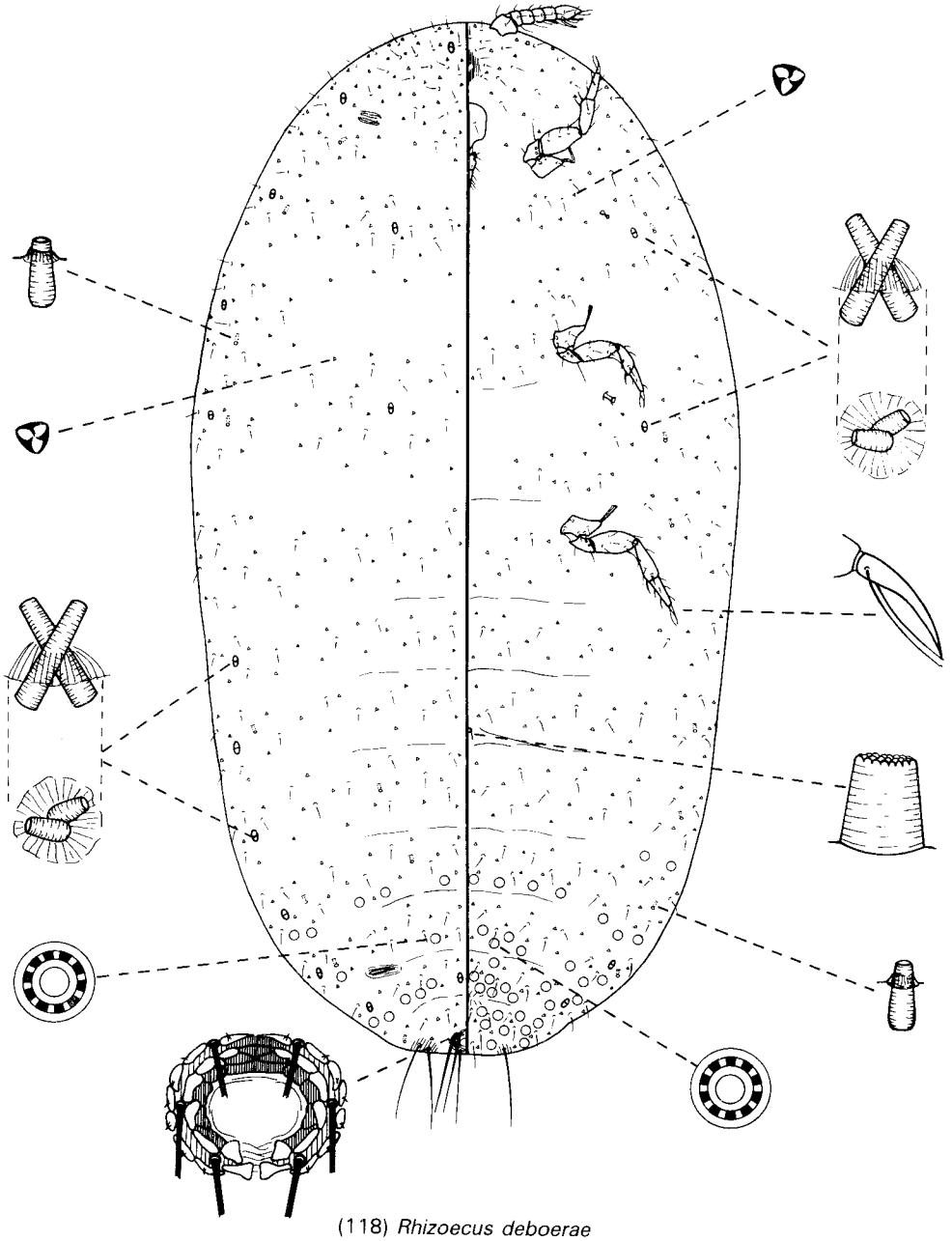
(115) *Renicaula pauca*



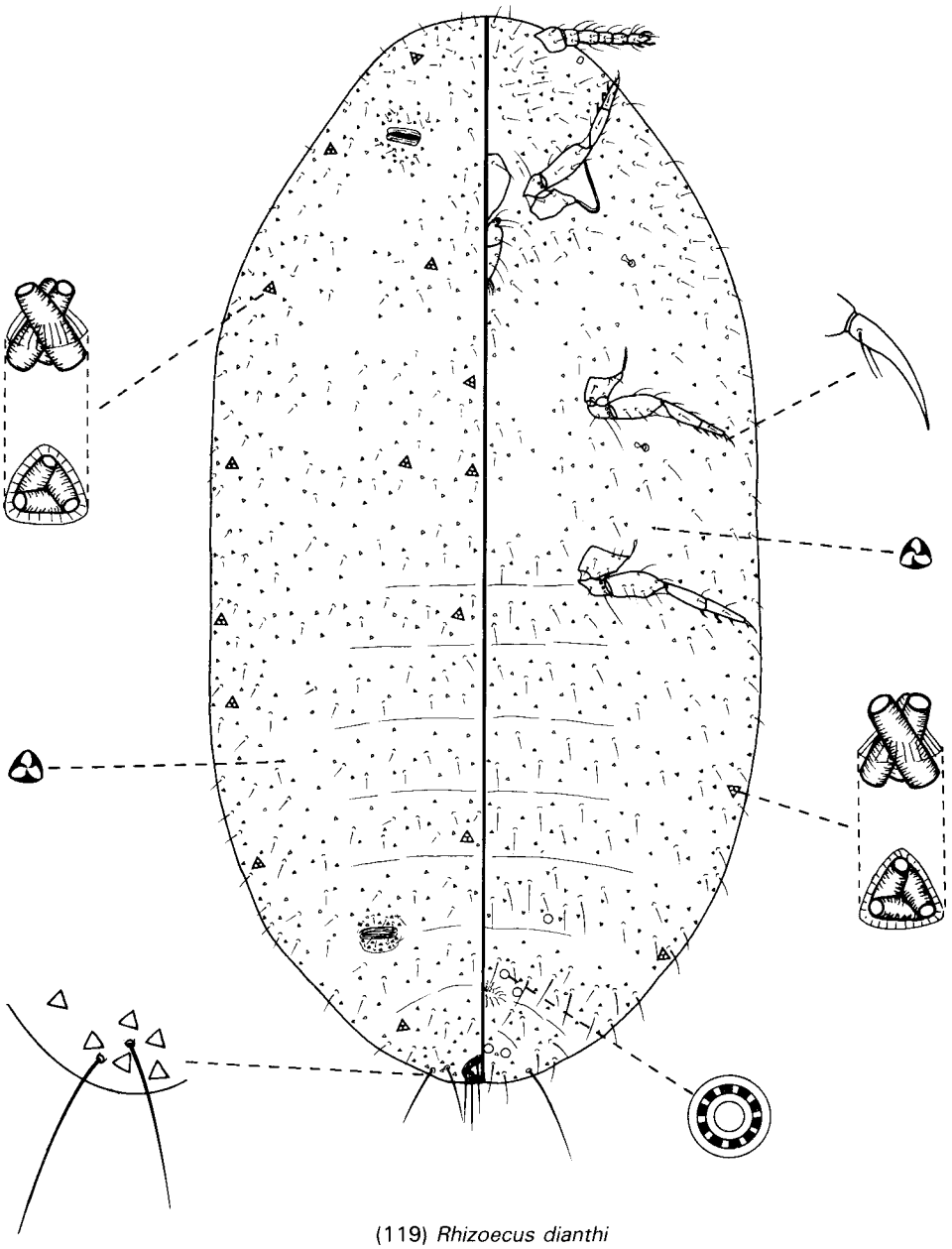
(116) *Renicaula raouliae*



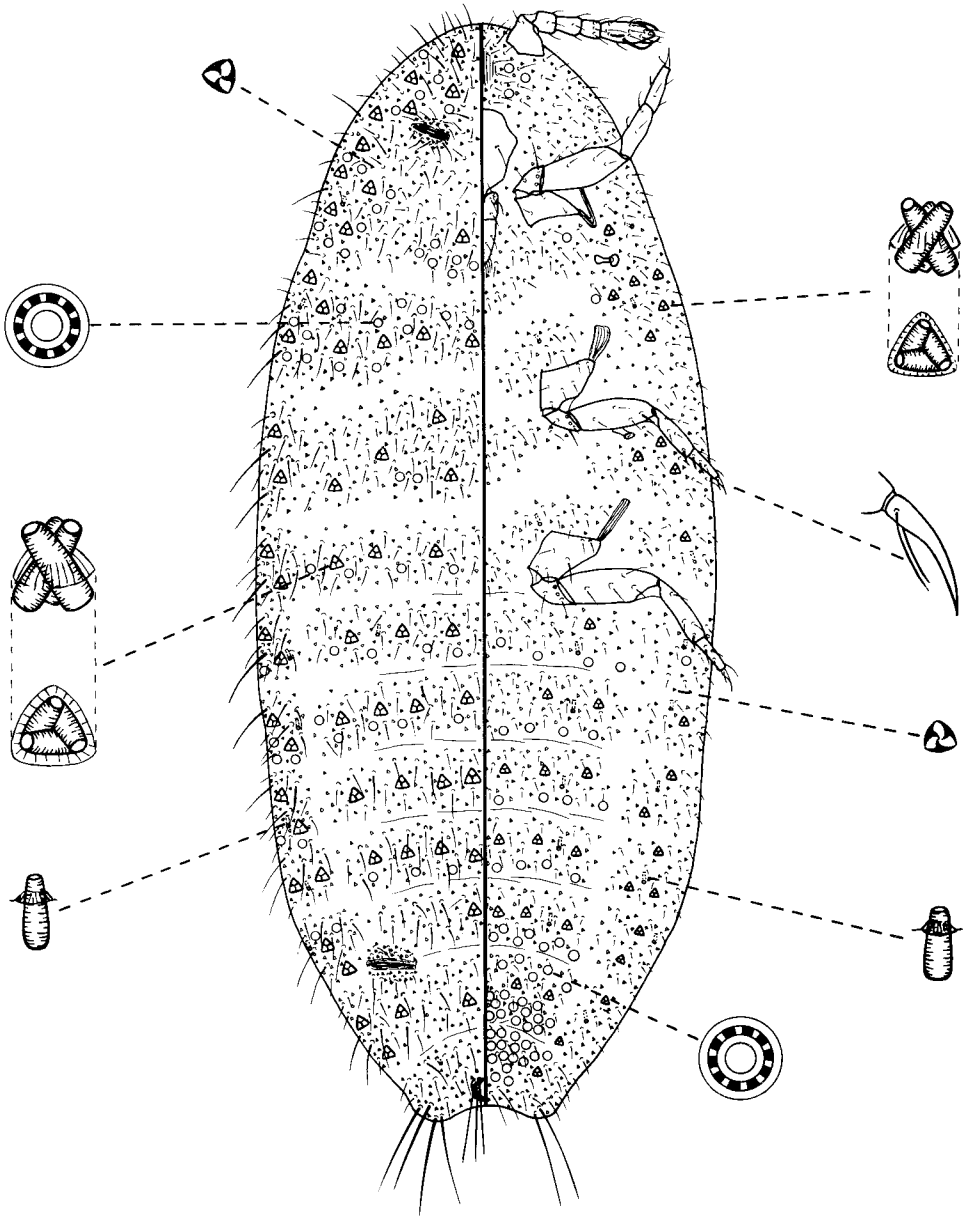
(117) *Rhizoecus californicus*



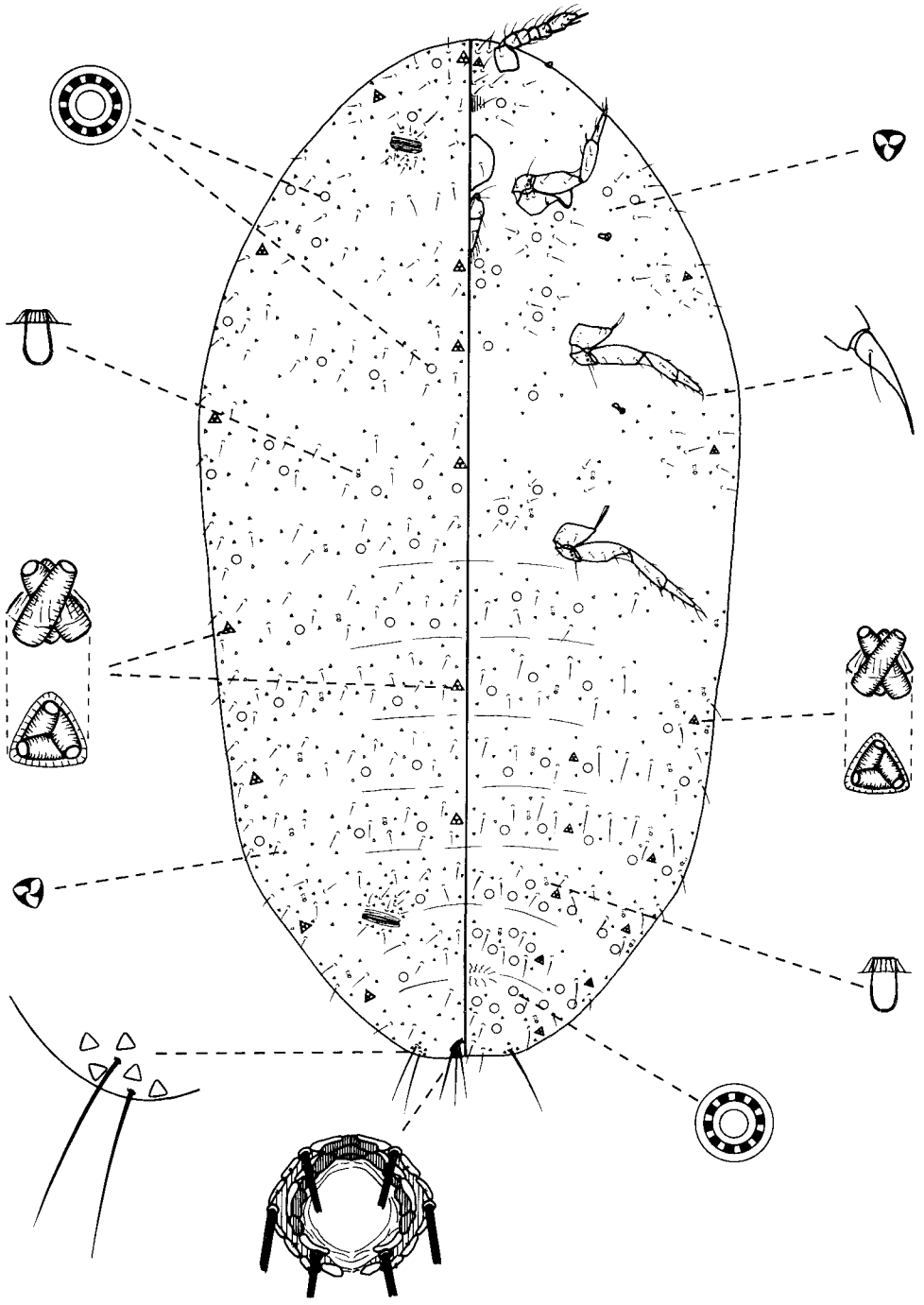
(118) *Rhizoecus deboerae*



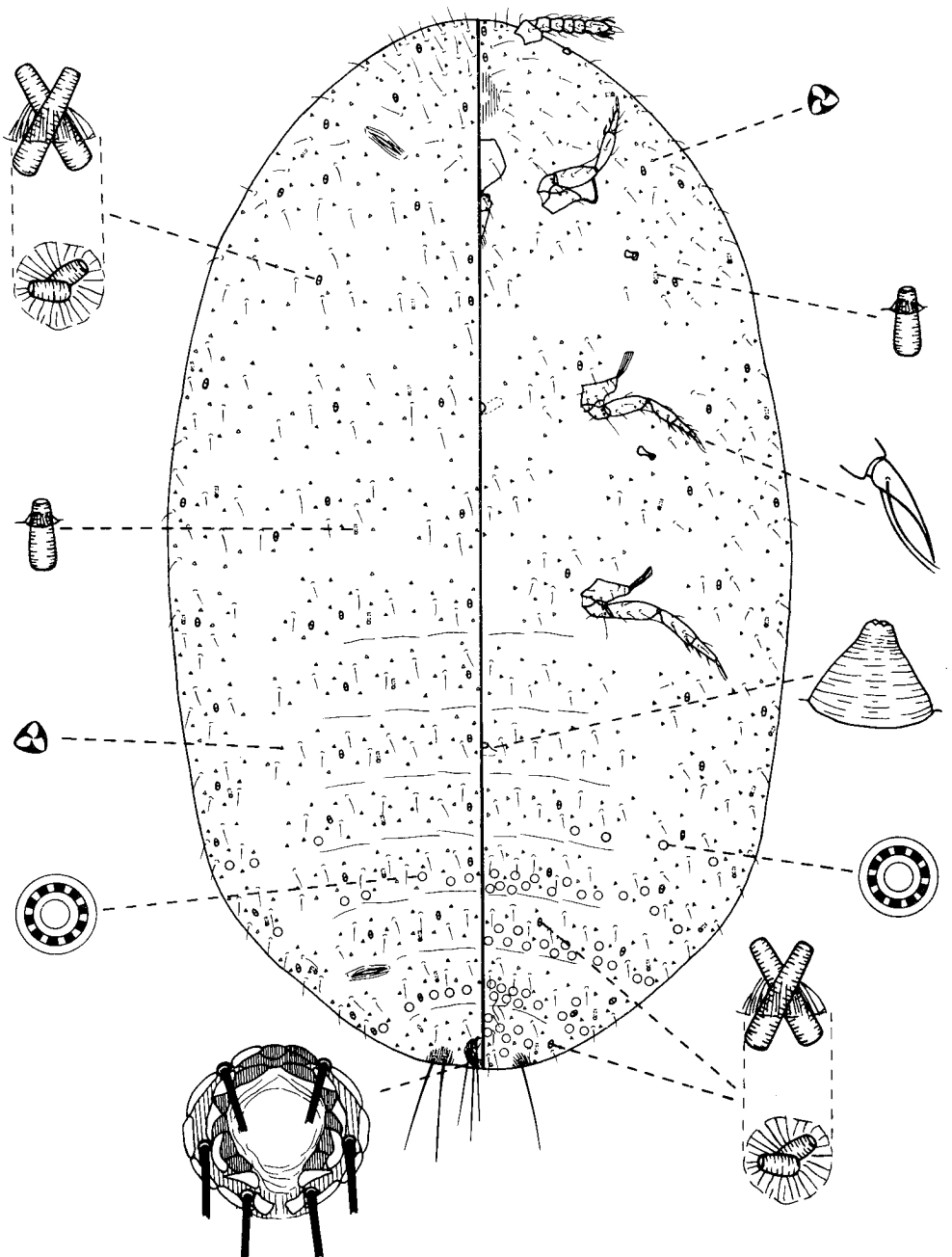
(119) *Rhizoecus dianthi*



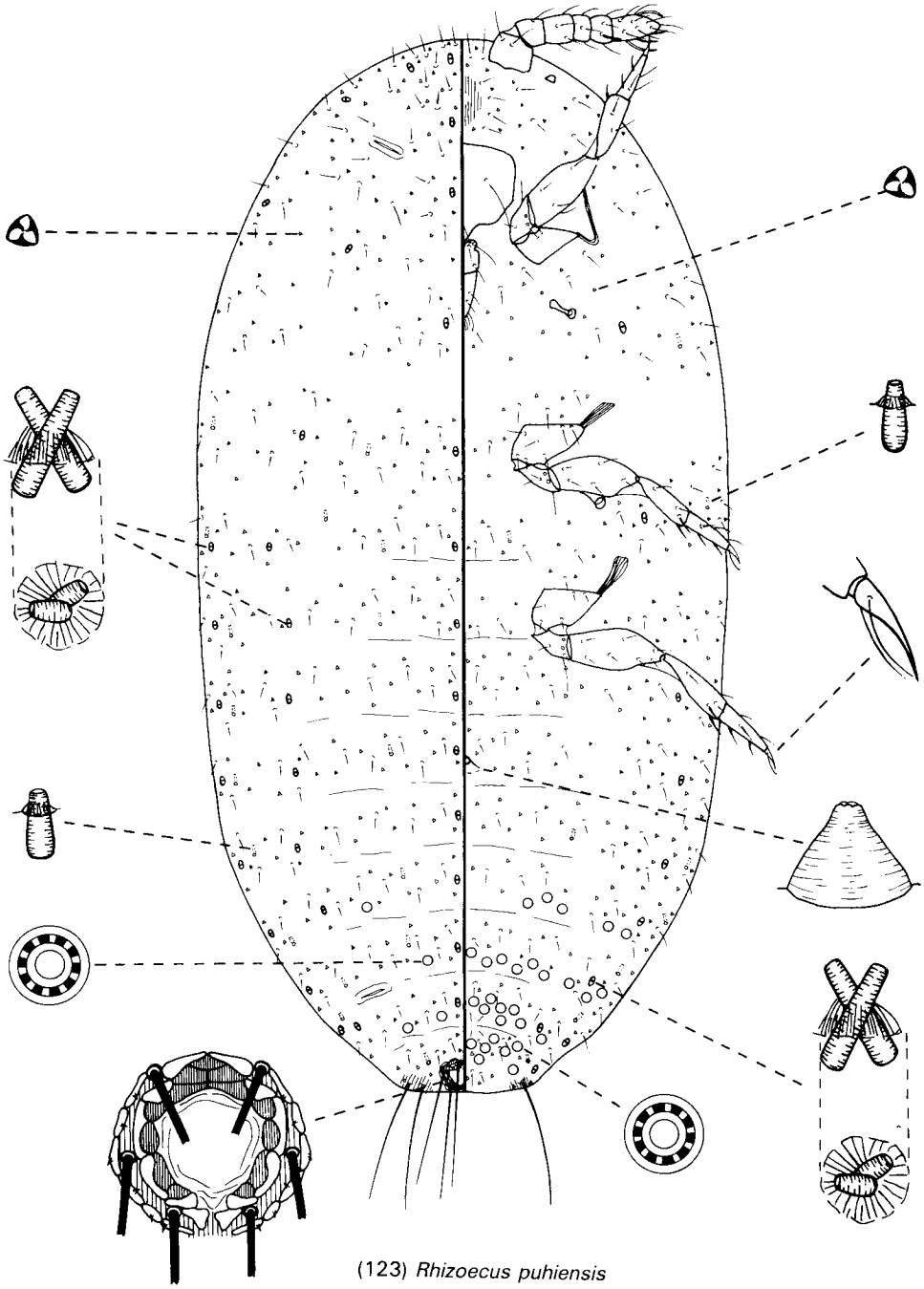
(120) *Rhizoecus falcifer*



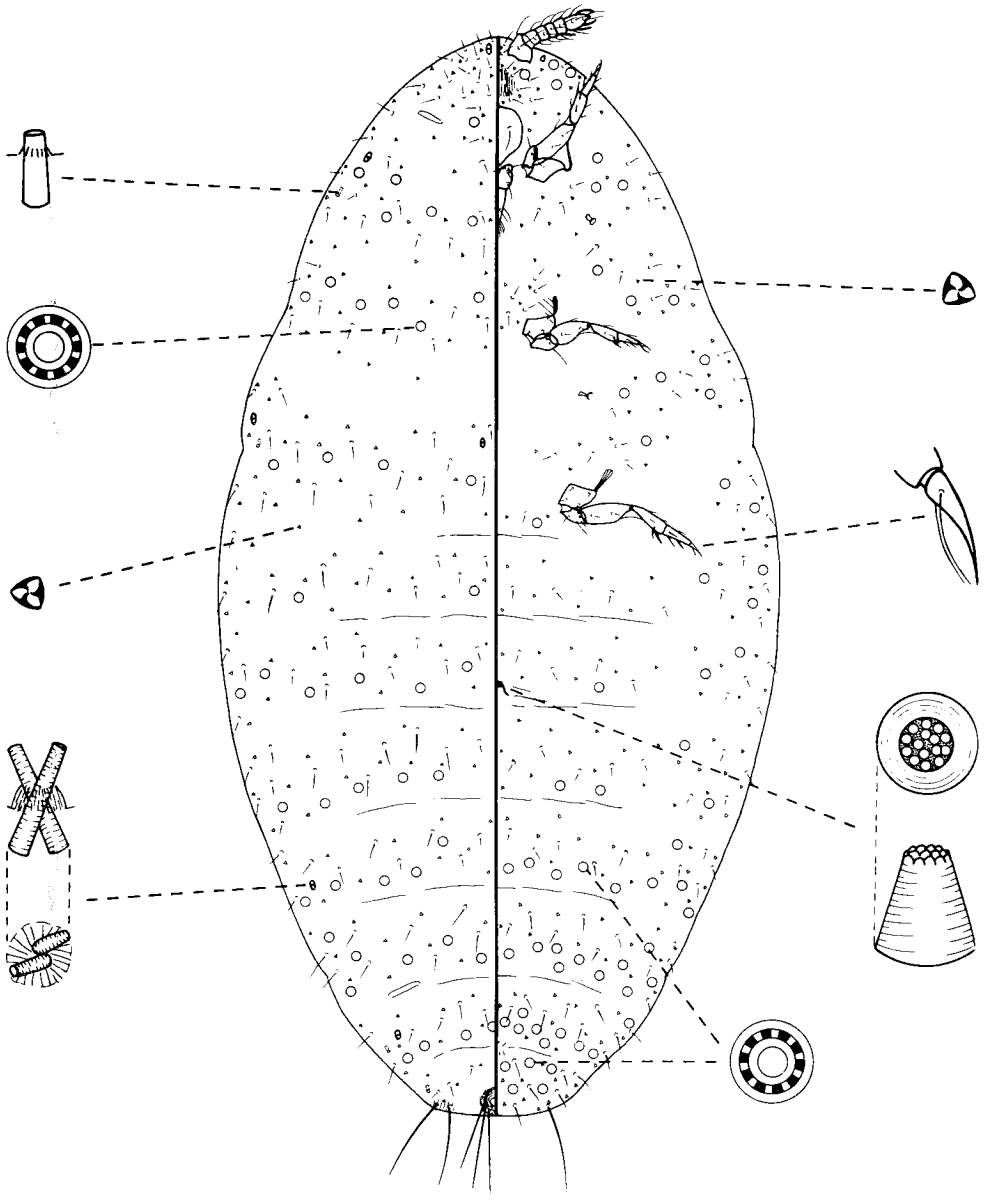
(121) *Rhizoecus graminis*



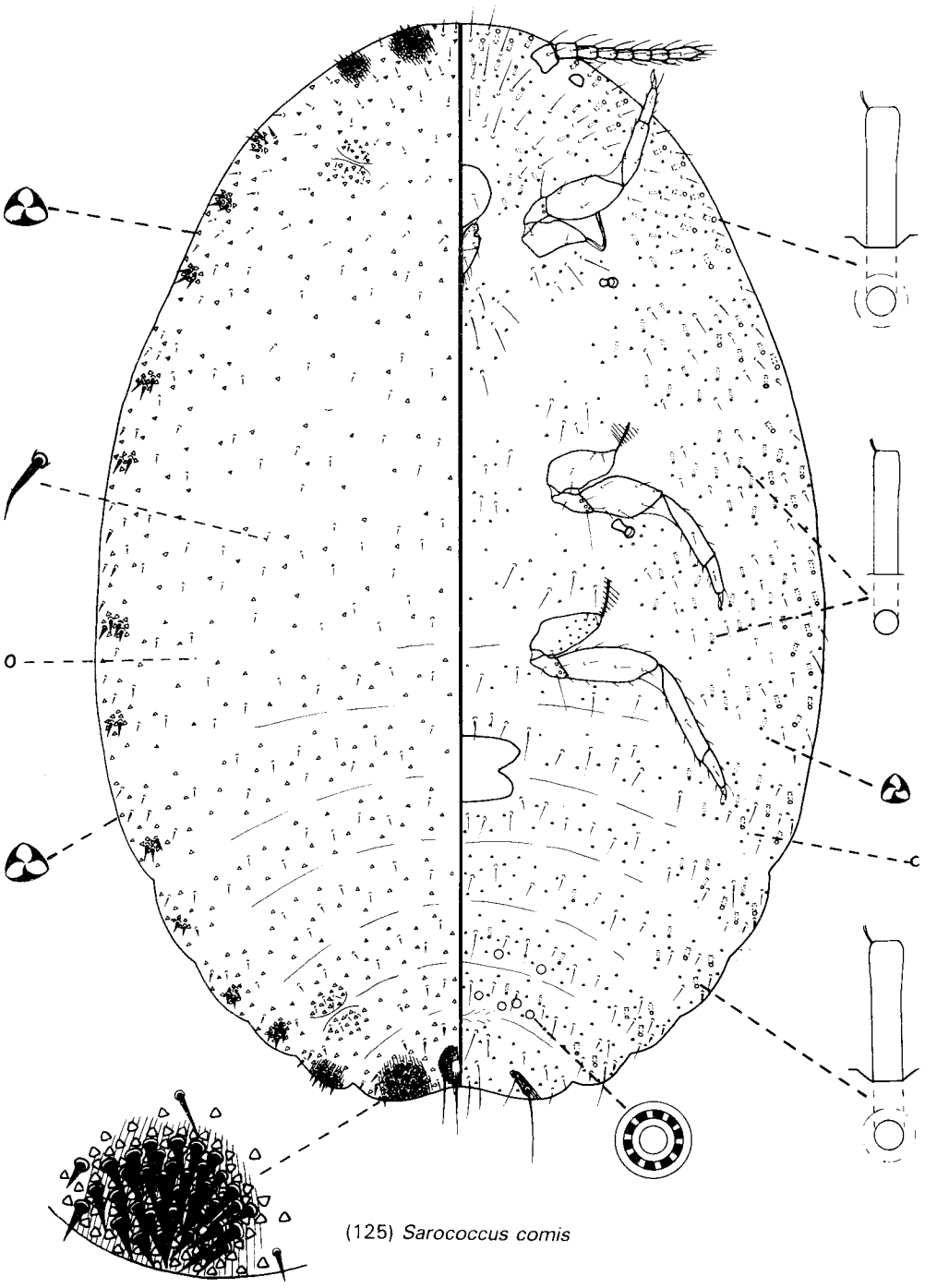
(122) *Rhizoecus oliveri*



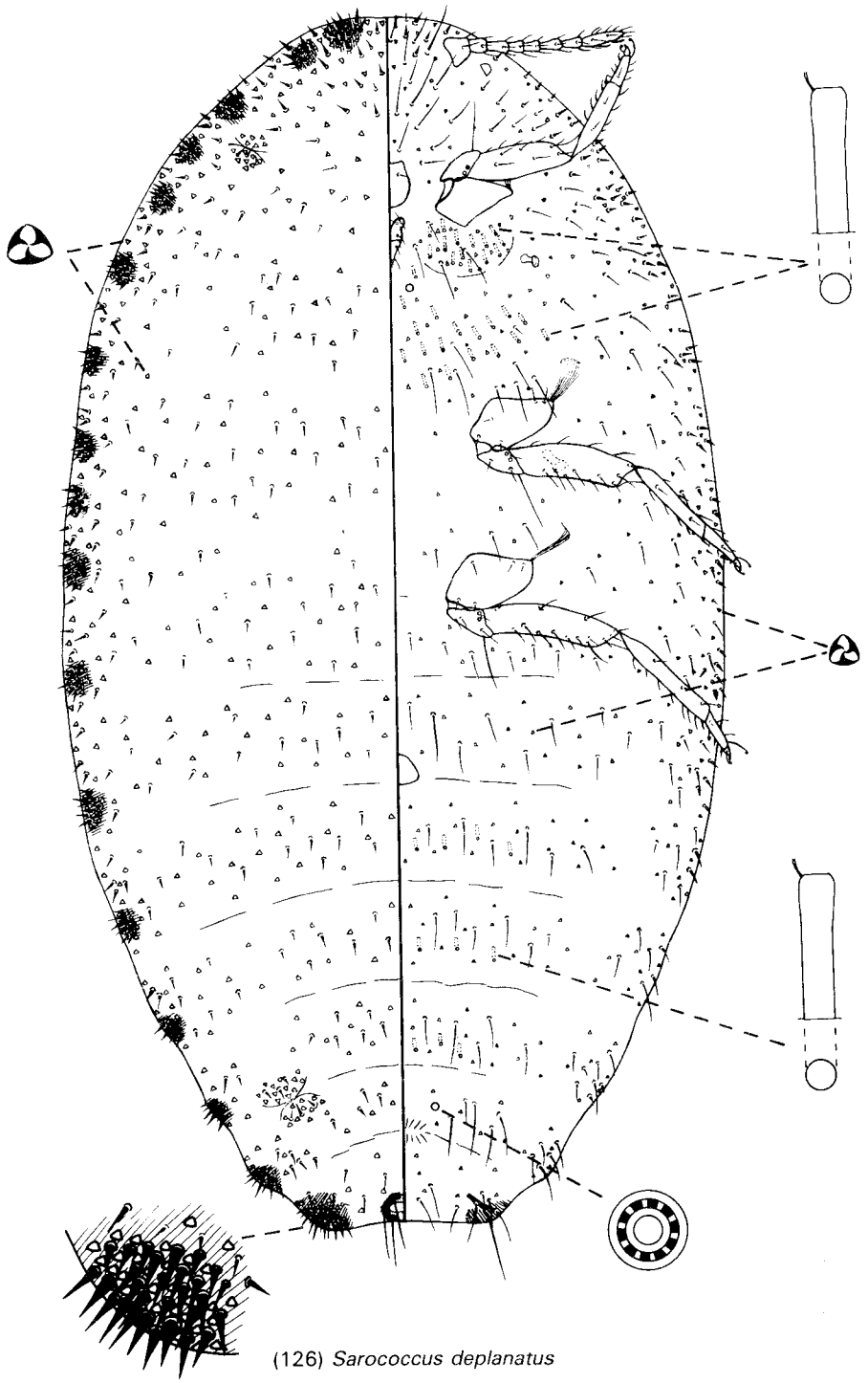
(123) *Rhizoecus puhiensis*



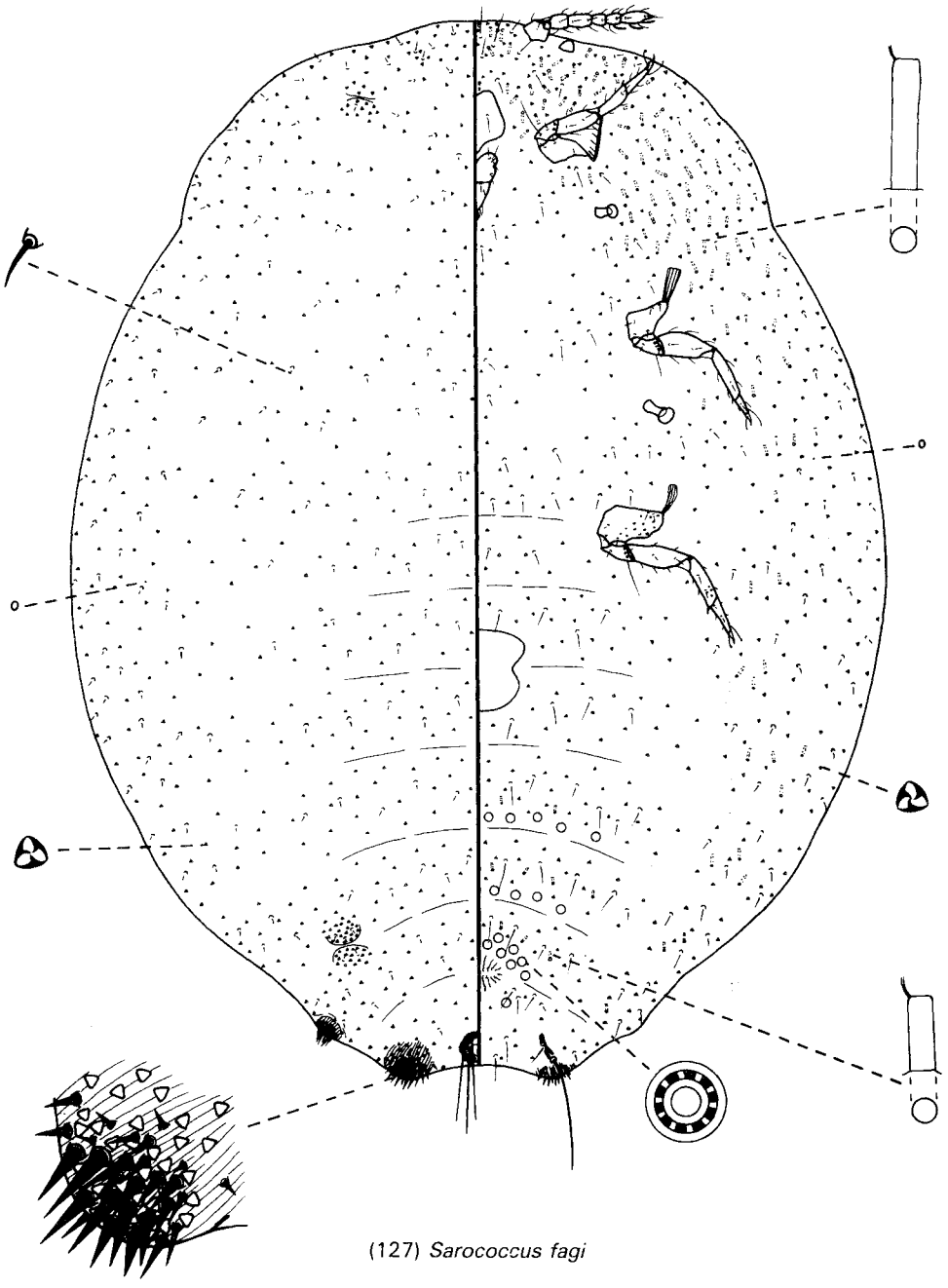
(124) *Rhizoecus rumicis*



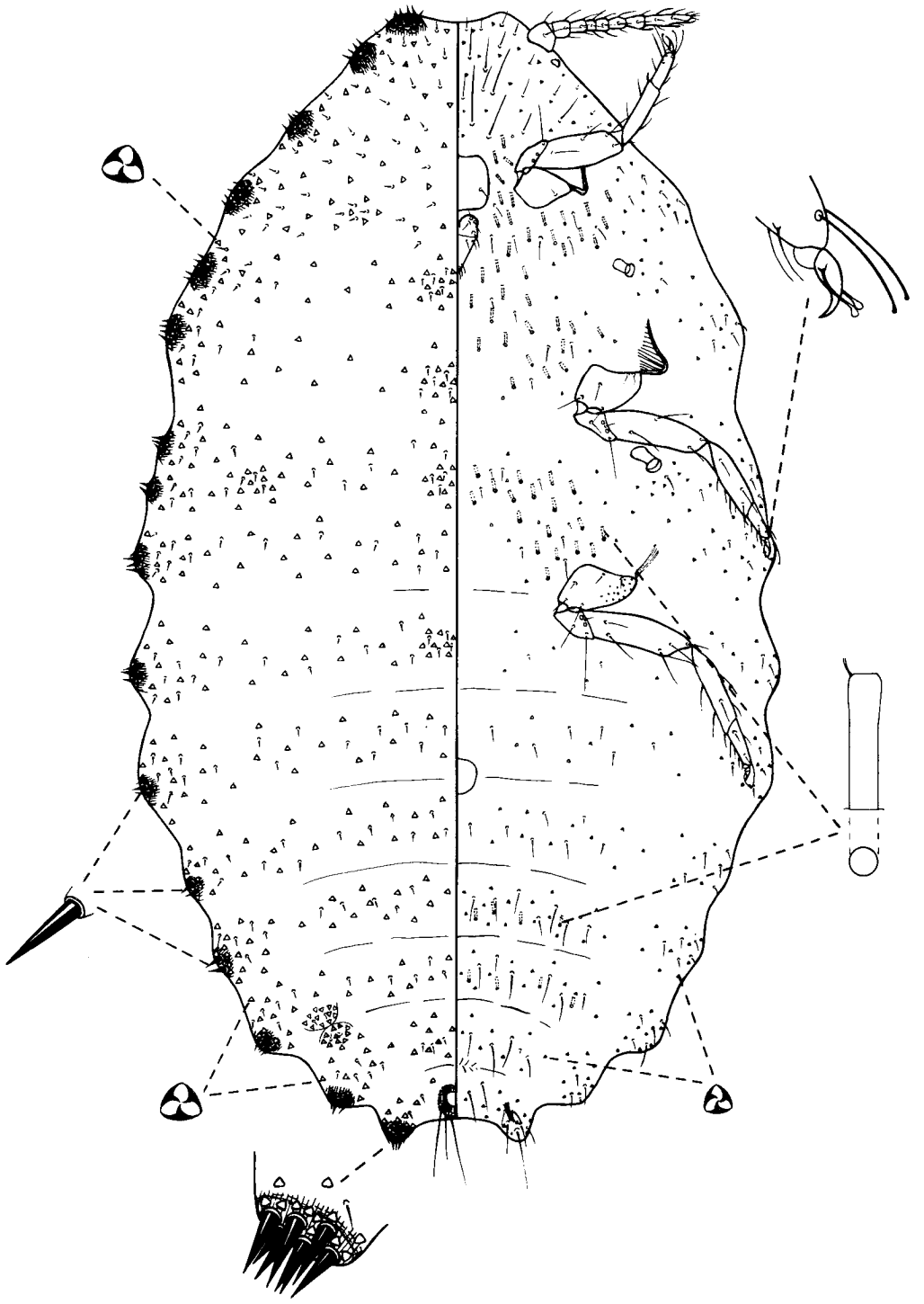
(125) *Sarococcus comis*



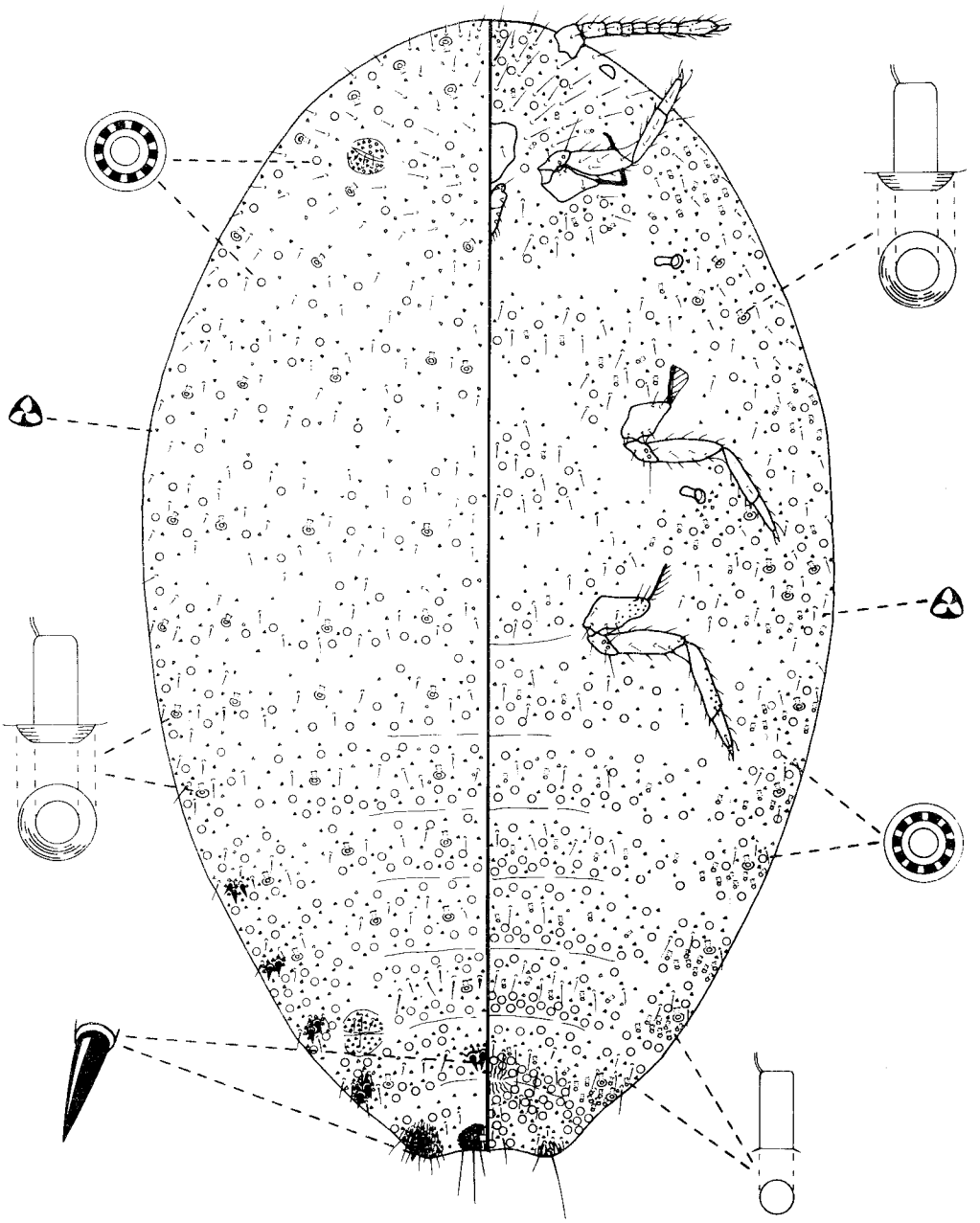
(126) *Sarococcus deplanatus*



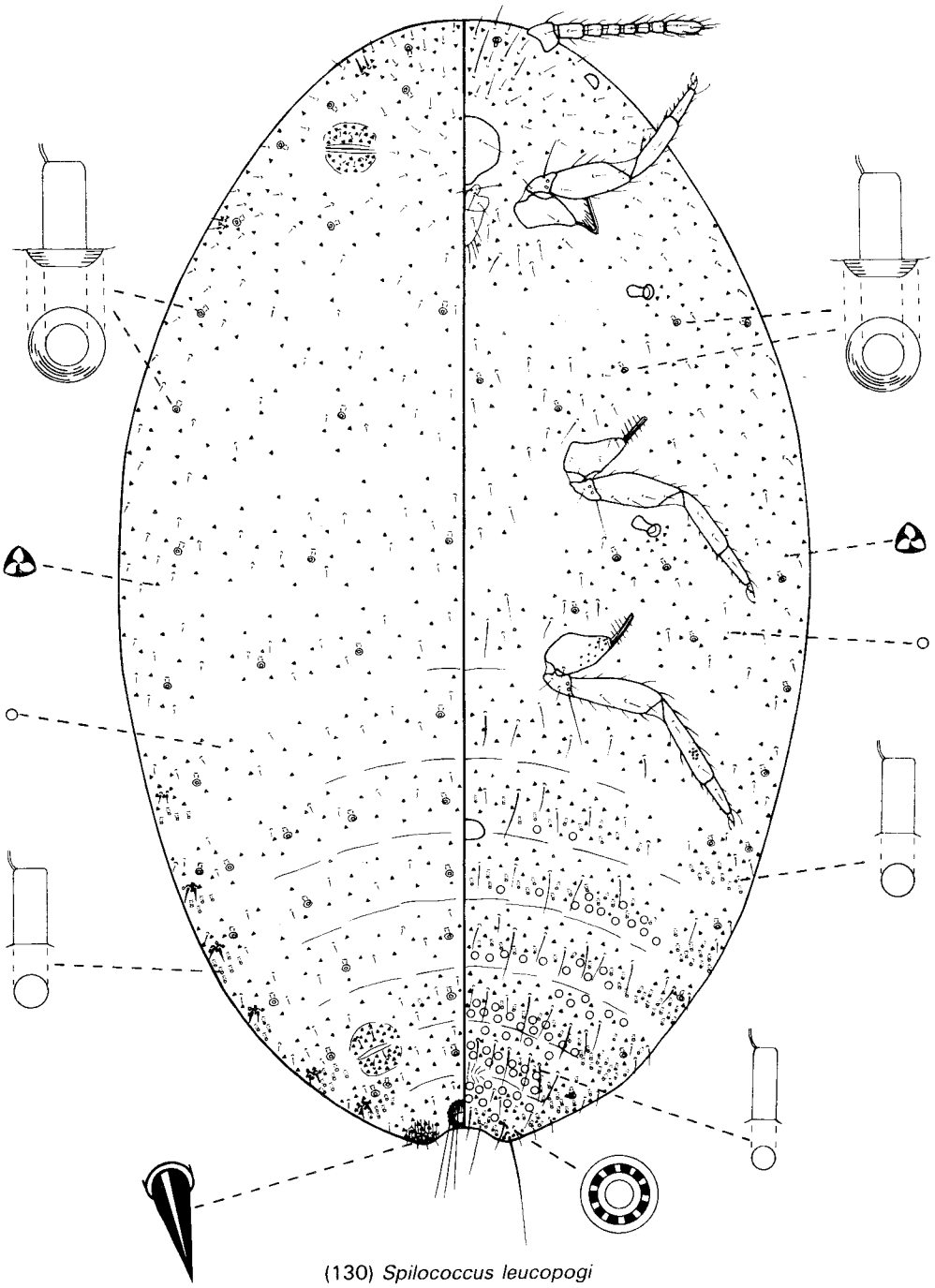
(127) *Sarococcus fagi*



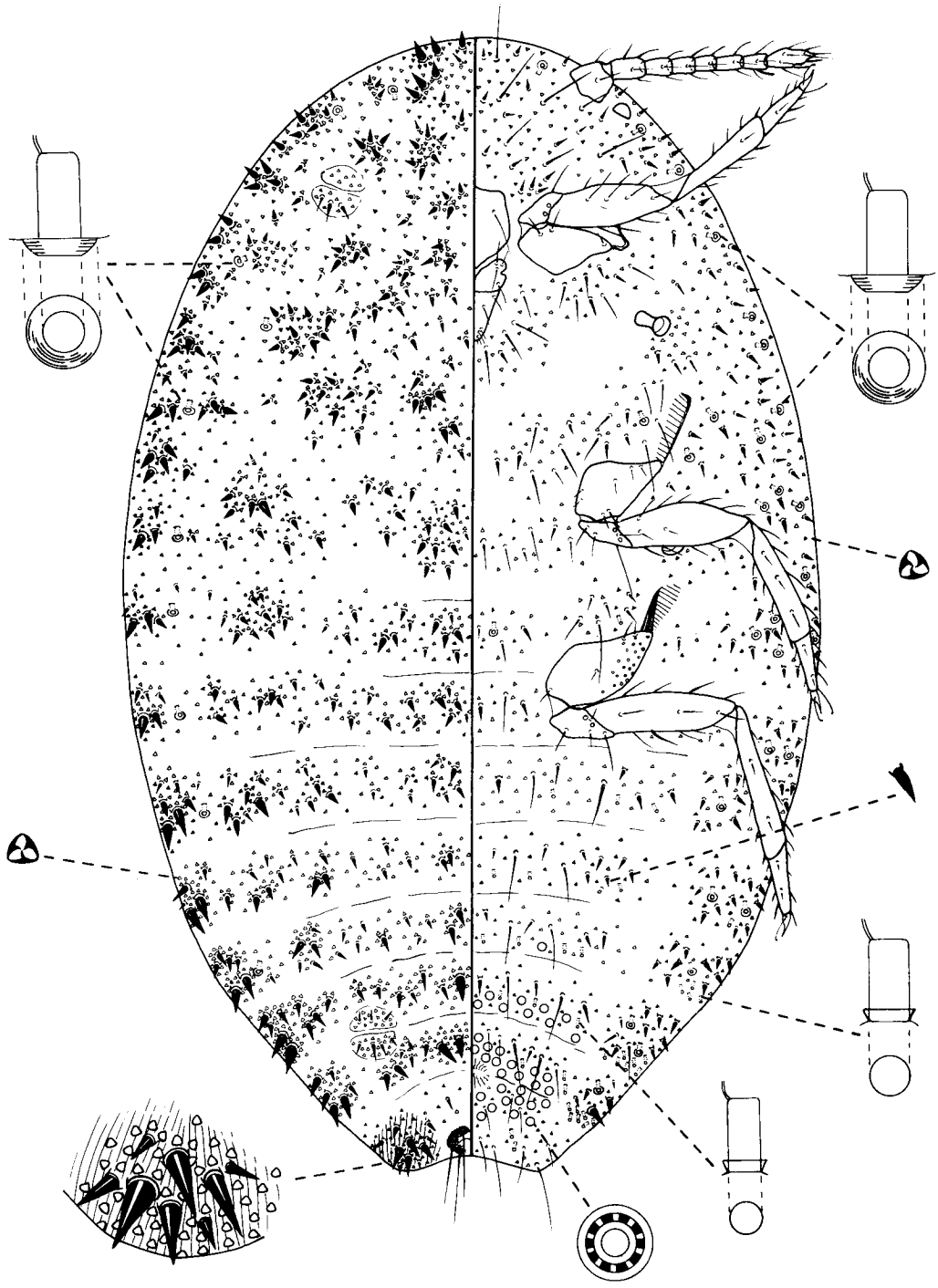
(128) *Sarococcus undatus*



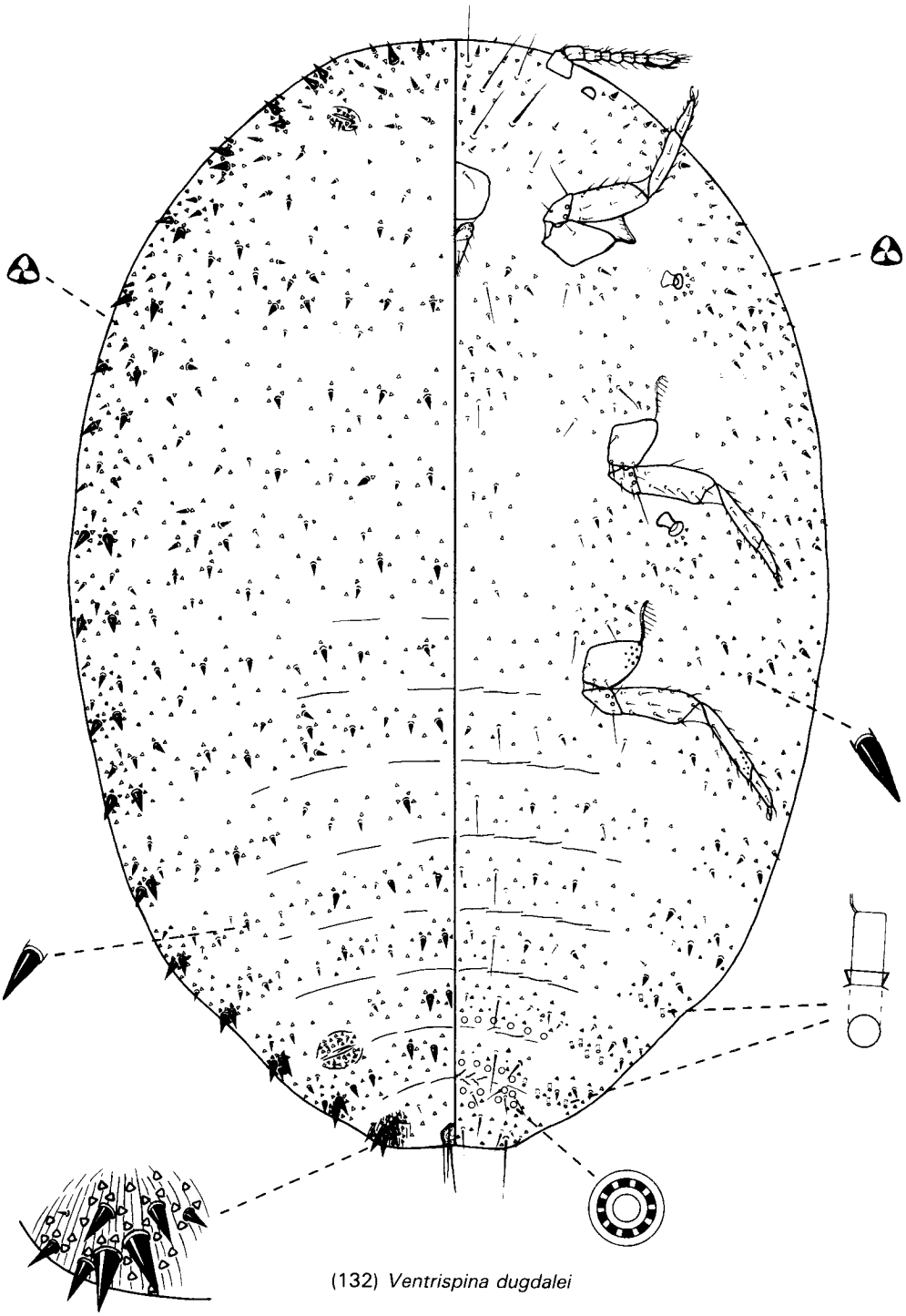
(129) *Spilococcus geoffreyi*



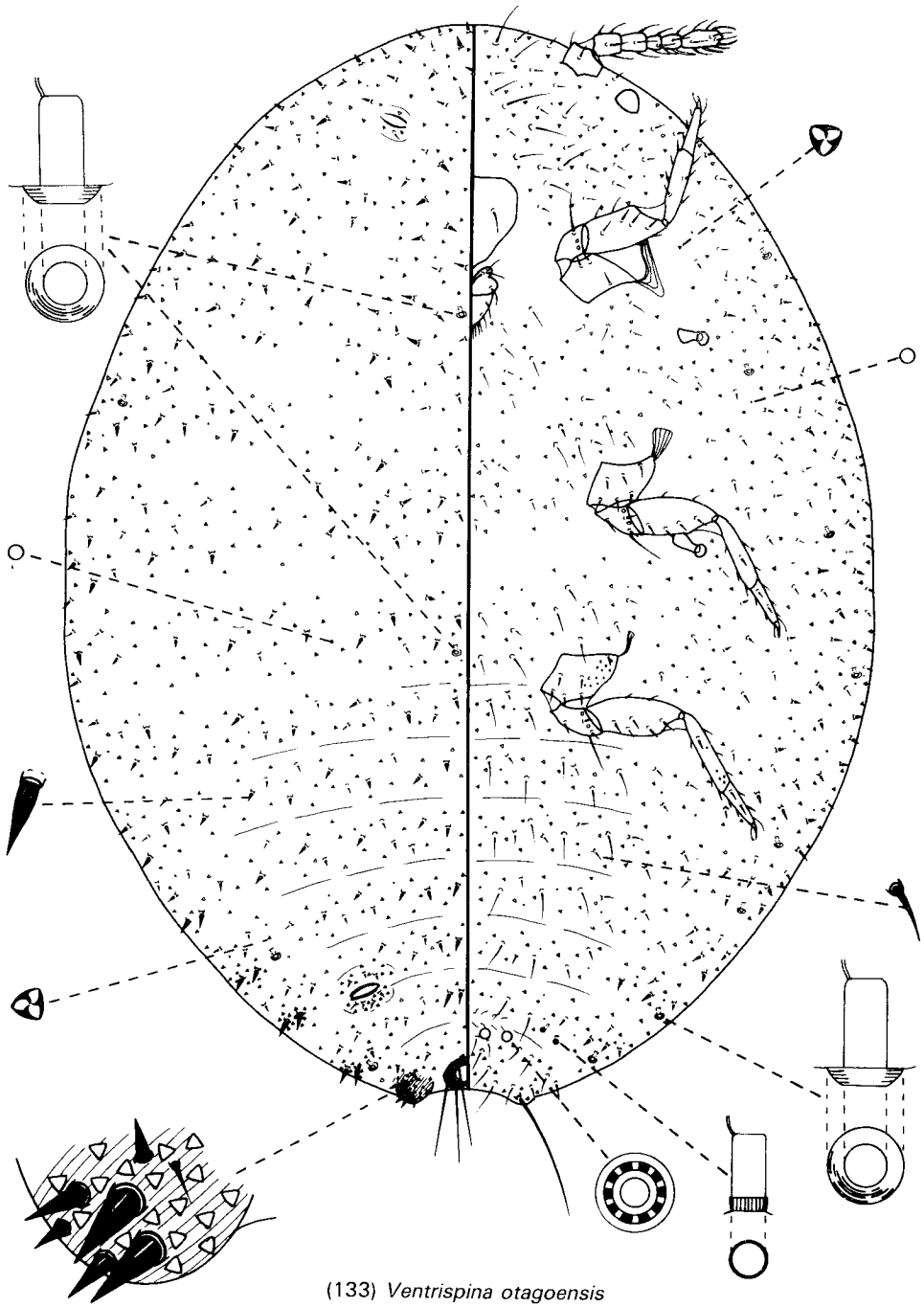
(130) *Spilococcus leucopogi*



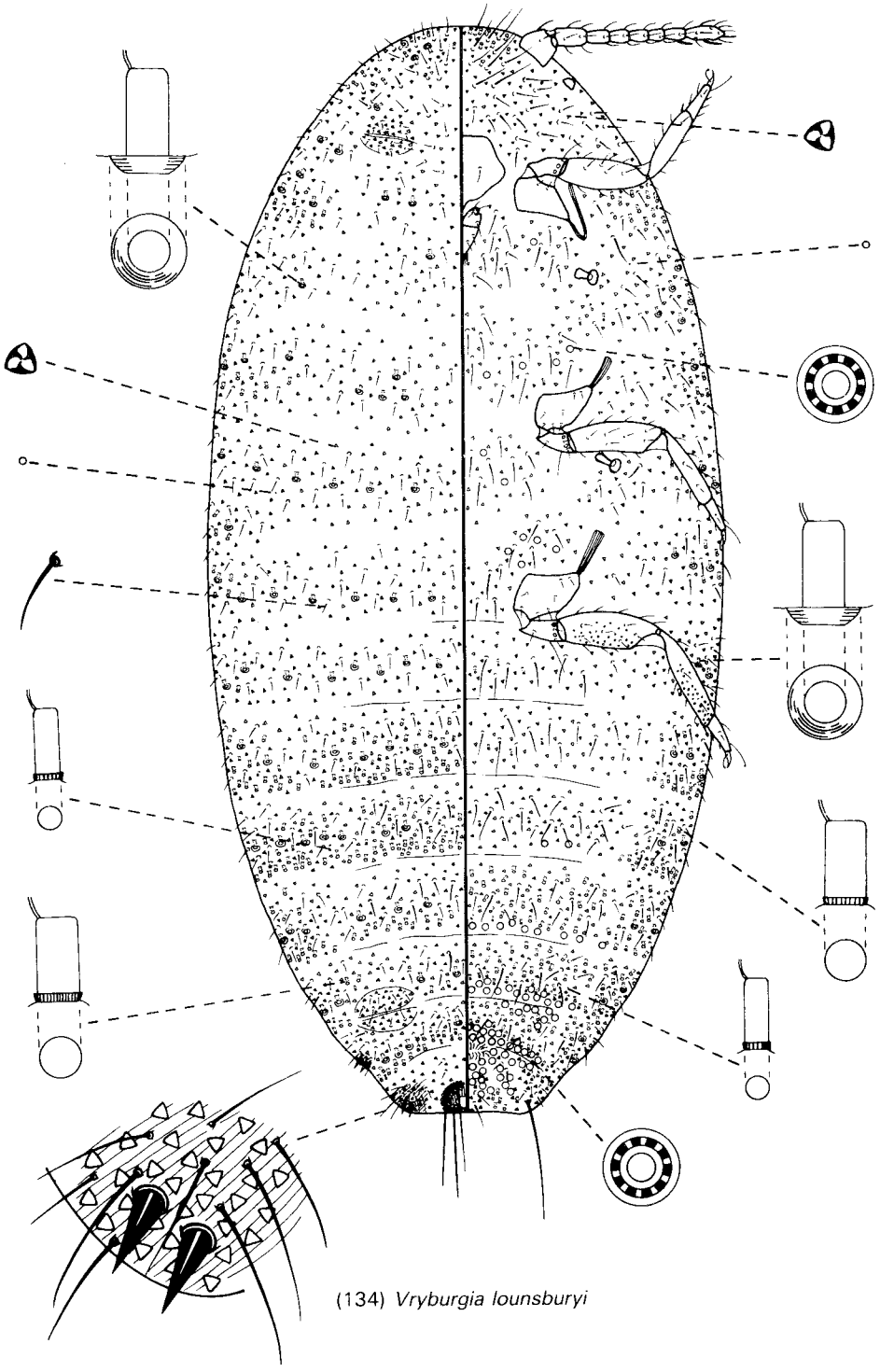
(131) *Ventrispina crebrispina*



(132) *Ventrispina dugdalei*



(133) *Ventrispina otagoensis*

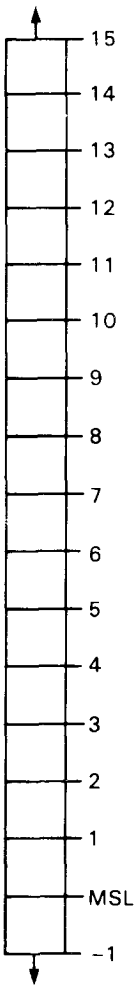


(134) *Vryburgia lounsburyi*

TAXONOMIC INDEX

All nominal taxa covered in the text are indexed, regardless of their current status in taxonomy. Because genera and species are treated in alphabetical order, their descriptions and illustrations are easily found. Hence, only those page numbers on which taxa are mentioned out of context are listed; plus, in italic type for ease of pick-up, pages on which descriptions of taxa begin.

TAXON :



ALTITUDINAL DISTRIBUTION

(MSL, mean sea level) The range of altitude for each scale division may be set according to need, but should be in metric units.

OFFSHORE ISLANDS

- Kermadecs ☐
- Three Kings ☐
- Chathams ☐
- Snares ☐
- Bounty ☐
- Antipodes ☐
- Aucklands ☐
- Campbell ☐

This base-map is used in the *Fauna of N.Z.* for recording the distribution of collection localities. The small grid divisions are 10 minutes of arc by latitude and longitude.

DISTRIBUTION IN TIME

Suggested subdivisions: (A, adult; E, egg; J, juvenile; L,larva; P, pupa)

or

V. R. Ward, Government Printer, Wellington, New Zealand—1987

61597E—87PT

Fauna of New Zealand

Number 11

Pseudococcidae

(Insecta: Hemiptera)

J. M. Cox

Fauna of New Zealand

This series of refereed occasional publications has been established with two major objectives: to encourage those with expert knowledge of elements in the New Zealand fauna to publish concise yet comprehensive accounts; and to provide a means of identification accessible to the non-specialist. It will deal with non-marine invertebrates, since the vertebrates are well documented, and marine forms are covered by the series *Marine Fauna of New Zealand*.

Contributors should discuss their intentions with an appropriate member of the *Fauna* Advisory Group or with the Series Editor before commencing work (for names and addresses, see page ii). All necessary guidance will be given.

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CHECKLIST OF TAXA

INTRODUCTION

KEY TO TAXA

DESCRIPTIONS

ILLUSTRATIONS

IN PRINT

No. 1 Terebrantia (Insecta: Thysanoptera), by Laurence A. Mound & Annette K. Walker. ISBN 0-477-06687-9. Published 23 December 1982. Price NZ$8.50 + 0.85 (OS 2.20).

No. 2 Osoriinae (Insecta: Coleoptera: Staphylinidae), by H. Pauline McColl. ISBN 0-477-06688-7. Published 23 December 1982. Second impression May 1983. Price NZ$8.50 + 0.85 (OS 2.20).

No. 3 Anthribidae (Insecta: Coleoptera), by B. A. Holloway. ISBN 0-477-06703-4. Published 23 December 1982. Second impression February 1985. Price NZ$10.00 + 1.35 (OS 3.50).

No. 4 Eriophyoidea except Eriophyinae (Arachnida: Acari), by D. C. M. Manson. ISBN 0-477-06745-X. Published 12 November 1984. Price NZ$10.50 + 0.85 (OS 2.20).

No. 5 Eriophyinae (Arachnida: Acari: Eriophyoidea), by D. C. M. Manson. ISBN 0-477-06746-8. Published 14 November 1984. Price NZ$9.00 + 0.85 (2.20).

No. 6 Hydraenidae (Insecta: Coleoptera), by R. G. Ordish. ISBN 0-477-06747-6. Published 12 November 1984. Price NZ$7.50 + 0.85 (OS 2.20).

No. 7 Cryptostigmata (Arachnida: Acari) – a concise review, by M. Luxton. ISBN 0-477-06762-X. Published 8 December 1985. Price NZ$14.50 + 0.85 (OS 2.20).

No. 8 Calliphoridae (Insecta: Diptera), by James P. Dear. ISBN 0-477-06764-6. Published 24 February 1986. Price NZ$14.00 + 0.85 (OS 2.20).

No. 9 Protura (Insecta), by S. L. Tuxen. ISBN 0-477-06765-4. Published 24 February 1986. Price NZ$12.00 + 0.55 (OS 1.20).

No. 10 Tubulifera (Insecta: Thysanoptera), by Laurence A. Mound & Annette K. Walker. ISBN 0-477-06784-0. Published 22 September 1986. Price NZ$29.50 + 0.85 (OS 3.00).

No. 11 Pseudococcidae (Insecta: Hemiptera), by J. M. Cox. ISBN 0-477-06791-3. Publication date and price to be announced.

IN PREPARATION (and scheduled for early publication)

Arachnida Ixodidae, by G. W. Ramsay.

Crustacea Harpacticoida, by M. H. Lewis. Talitridae, by K. W. Duncan.

Insecta Carabid subfamilies, by P. M. Johns. Key to families of Coleoptera, by J. C. Watt. Staphylinid subfamilies, by P. M. Hammond. Pentatomidae, by C. F. Butcher. Psylloidea, by P.J. Dale. Ambositrinae, by I. Naumann. Apoidea, by B. J. Donovan. Chalcidoidea (part), by J. S. Noyes & E. W. Valentine. Pompilidae, by A. C. Harris. Catalogue of Lepidoptera types, by J. S. Dugdale. Nepticulidae, by C. Wilkinson & H. Donner. Neuroptera, by K. A. J. Wise.

Mollusca Introduced Pulmonata, by G. M. Barker. Punctidae, by F. M. Climo.

Onychophora, by H. Ruhberg.

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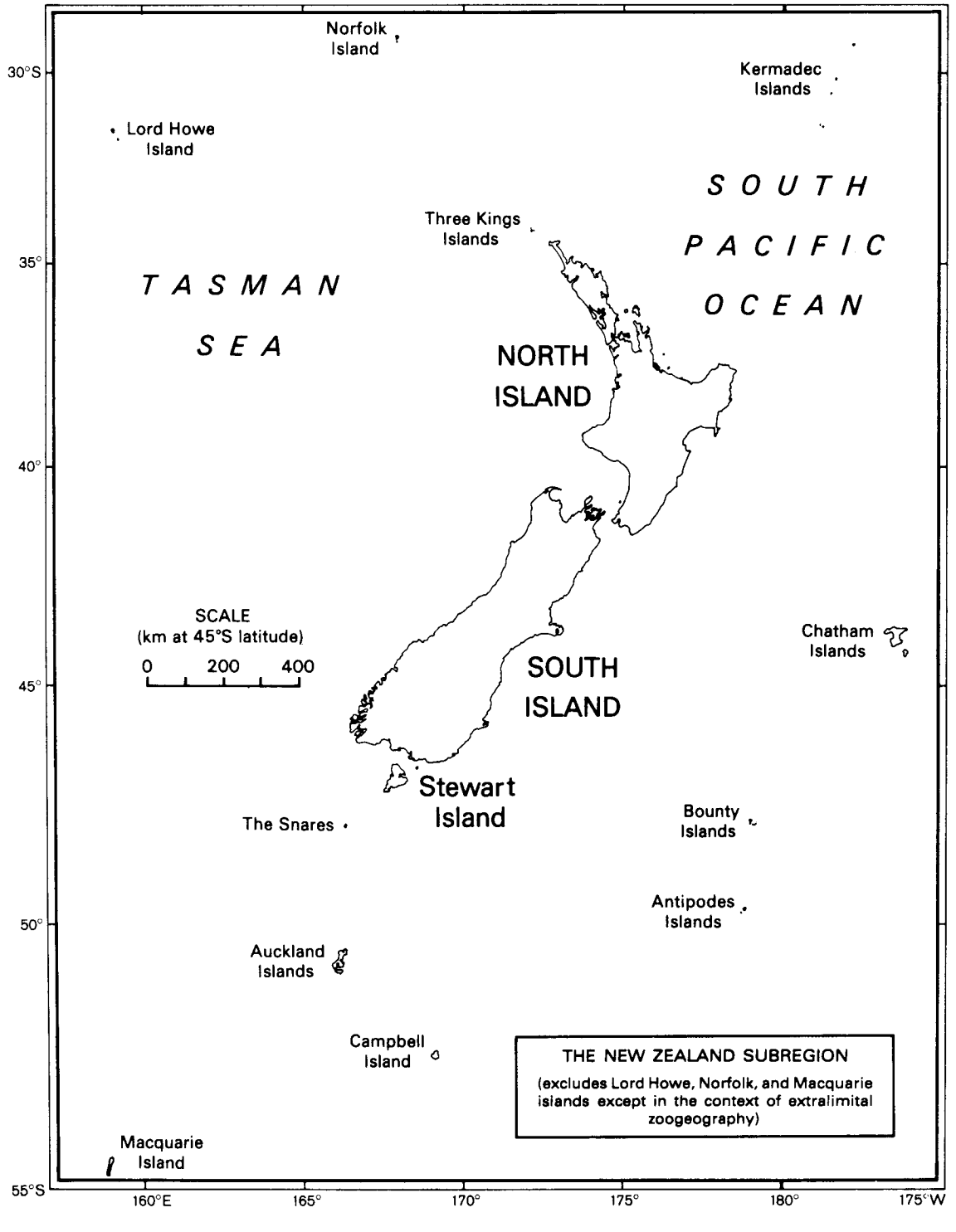

Norfolk Island
Kermadec Islands
Lord Howe Island
SOUTH PACIFIC OCEAN
Three Kings Islands
TASMAN SEA
NORTH ISLAND
SCALE
(km at 45°S latitude)
0 200 400
SOUTH ISLAND
Chatham Islands
Stewart Island
The Snares
Bounty Islands
Antipodes Islands
Auckland Islands
Campbell Island
Macquarie Island
30°S
35°
40°
45°
50°
55°S
160°E
165°
170°
175°
180°
175°W
THE NEW ZEALAND SUBREGION
(excludes Lord Howe, Norfolk, and Macquarie islands except in the context of extralimital zoogeography)

AK – Auckland

BP – Bay of Plenty

CL – Coromandel

GB – Gisborne

HB – Hawke's Bay

ND – Northland

RI – Rangitikei

TK – Taranaki

TO – Taupo

WA – Wairarapa

WI – Wanganui

WN – Wellington

WO – Waikato

FD – Fiordland

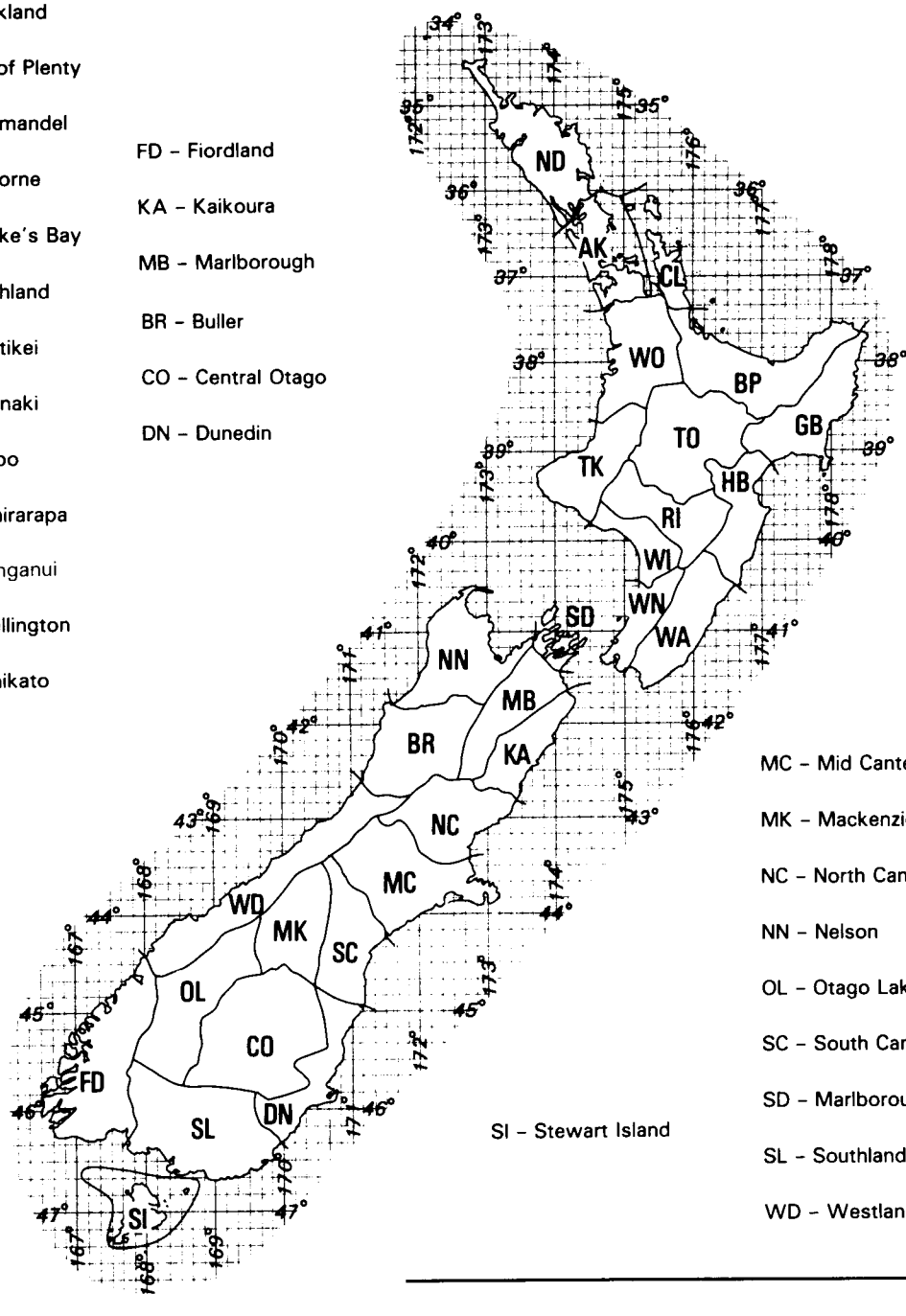
KA – Kaikoura

MB – Marlborough

BR – Buller

CO – Central Otago

DN – Dunedin



MC – Mid Canterbury

MK – Mackenzie

NC – North Canterbury

NN – Nelson

OL – Otago Lakes

SC – South Canterbury

SD – Marlborough Sounds

SL – Southland

WD – Westland

SI – Stewart Island

Area codes and boundaries proposed by Crosby *et al.* (1976) for use with specimen locality data

Cox, J. M.. 1987: Pseudococcidae (Insecta: Hemiptera). *Fauna of New Zealand 11,* 232 pp.

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