Memoirs of Museum Victoria 57(2): 241–250 (1999) 31 July 1999
https://doi.org/10.24199/j.mmv.1999.57.12

A NEW GENUS OF SUBCORTICAL COCCOIDS (HEMIPTERA: COCCOIDEA: ERIOCOCCIDAE) ON *EUCALYPTUS*

P. J. GULLAN

Division of Botany and Zoology, The Australian National University
Canberra, A.C.T. 0200, Australia
(Penny.Gullan@anu.edu.au)

Abstract

Gullan, P.J., 1999. A new genus of subcortical coccoids (Hemiptera: Coccoidea: Eriococcidae) on *Eucalyptus*. *Memoirs of Museum Victoria* 57: 241–250.

A new genus of Eriococcidae (Hemiptera: Coccoidea), *Subcorticoccus* gen. nov., is described for three new species of scale insects collected under eucalypt bark in southeastern Australia. *S. beardsleyi* sp. nov. occurs on *Eucalyptus macrorhyncha* near Melbourne, Victoria, whereas both *S. huonamnis* sp. nov. and *S. murrindindi* sp. nov. feed on *E. regnans* in Tasmania and Victoria, respectively. The adult females of all three species and the first-instar nymph of *S. beardsleyi* are described and illustrated. *Subcorticoccus* appears to be morphologically most similar to the Australian genus *Phacelococcus* Miller.

Introduction

The Eriococcidae are a speciose family of scale insects with major radiations in North and South America (e.g., Miller and Gonzalez, 1975; Miller and McKenzie, 1967; Miller and Miller, 1992), New Zealand (Hoy, 1962) and Australia (e.g., Froggatt, 1921; Hoy, 1963; Gullan, 1984). Except for the gall-inducing taxa, Australia's eriococcids have been poorly studied since the pioneering work of Froggatt (1921). It is thus not surprising that current taxonomic and cladistic studies of the Australian Eriococcidae are revealing a number of new taxa. In particular, one undescribed taxon exhibits unique morphology which appears most similar to that of *Phacelococcus* Miller. This taxon is represented by three undescribed species all of which were collected under *Eucalyptus* bark in southeastern Australia.

The adult females of these three new species differ from those of the speciose and cosmopolitan genus *Eriococcus* Targioni-Tozzetti and related genera in lacking anal lobes, enlarged dorsal setae, differentiated marginal setae and microtubular ducts, and in possessing a ventral, noncellular anal ring. They resemble *Phacelococcus* (Miller, 1970; Gullan and Strong, 1997) in possessing clusters of quinquelocular pores on the ventral abdomen and in having very small legs but differ in lacking anal lobes and microtubular ducts, and in having ventral frontal lobes, a mediolongitudinal band of microtrichia on the anterior dorsum and a single pair of anal ring setae on a simple anal ring. *Phacelococcus* and the undescribed species also share the habit of living under the bark of their eucalypt hosts. All of these species have been collected only rarely probably because of their cryptic habit and yet they may form an important dietary component for a number of other arboreal animals including mammals (Gullan and Strong, 1997) and arthropods. Since no observations are available on live specimens of the new species it is not known whether nymphs and adult females produce honeydew. The biology of these eriococcids warrants further study.

This paper erects a new genus, *Subcorticoccus*, for these three new species collected under eucalypt bark in southeastern Australia. The adult females of *S. beardsleyi* sp. nov., *S. huonamnis* sp. nov. and *S. murrindindi* sp. nov. and the first-instar nymph of *S. beardsleyi* are described and illustrated. The terminology and the slide-mounting and illustrative techniques employed are the same as those in Gullan and Strong (1997) except that the antennal sensilla are named according to Koteja (1980) and Le Rü et al. (1995). Thus trichoid sensilla are equivalent to the antennal hair-like setae mentioned in most other coccoid descriptions and the different types

of pegs have been variously called 'fleshy setae' or 'antennal bristles' by most previous authors; the antennal basiconic and coeloconic sensilla (which can be difficult to distinguish) and the campaniform sensillum usually are not mentioned in descriptions of coecoids.

Material is deposited in The Australian National Insect Collection, CSIRO Entomology, Canberra ACT, 2601, Australia (ANIC); The Natural History Museum, London SW7 5BD, UK (BMNH); Bernice P. Bishop Museum, Honolulu, Hawaii, USA (BPBM); and Museum Victoria, Melbourne, Victoria, Australia (NMV).

Subcorticoccus gen. nov.

Type species. Subcorticoccus murrindindi sp. nov.

Description. Adult female with abdomen tapering to rounded apex; derm membranous with rugulose microsculpturing, especially obvious marginally, and distinctive, mediolongitudinal band of microtrichia on dorsum of head and anterior thorax and much shorter band or indistinct cluster of microtrichia ventrally between antennae; pair of eyespots on body margin; antennae 6–7 (rarely 5) segmented, segments II to apical one subequal in length; 0–4 trichoid sensilla per antennal segment, lengths and distribution on segments variable but apical segment always with 2–4 sensilla, 20–35 µm long, and segment IV (or V if 7 segments) always lacking trichoid sensilla; pegs 5–25 µm long on antennal segments IV–VI (V–VII if 7 segments), distributed as follows: 1 on IV (or V), 1 on V (or VI), usually 3 on VI (or VII); usually 2 either basiconic or coeloconic sensilla, 5–12 µm long, only on apical segment (VI or VII); pair of oval, slightly raised, frontal lobes with rugulose surface, posteromedial to antennae; labium conical, width equal or greater than length, segmentation not apparent, segments possibly fused; legs reduced, less than 160 µm long; digitules of tarsi and claws capitate; tarsal claws with or without small dentiele near apex; anal lobes completely lacking, their position indicated by pair of apical seta, one on each side of abdominal apex; anal ring ventral, simple, noncellular, usually with one flagellate anal ring seta (7–18 µm long) laterally on each side of ring and pair of flagellate suranal seta (8–20 µm long) just outside ring; dorsal setae short (4–16 µm long) and flagellate, in segmental rows, enlarged setae absent; ventral setae flagellate, longest (13–33 µm) near vulva; remainder similar in length to dorsal setae; differentiated marginal setae absent; slender macrotubular ducts, 10–16 µm long, 1–2 µm wide, present on dorsum and venter, scattered in bands across segments and in clusters on body margin, each duct with delicate inner filament (= ductule) with terminal knob barely distinguishable; microtubular ducts absent; multilocular pores mostly quinquelocular, very occasionally trilocular especially near spiracles, 3–6 µm in diameter, distributed in bands on ventral posterior abdomen and sometimes also scattered on margins of body, small clusters at opening of spiracles; bilocular pores absent.

Etymology. The genus name is descriptive of the under-bark habit of the species (*sub*, meaning under, Latin; *corticis*, meaning bark, Latin).

Comments. Adult females of *Subcorticoccus* can be distinguished from those of other Australian genera of Eriococcidae by the combination of a tapered abdomen, a mediolongitudinal band of microtrichia on the head and anterior thorax, a pair of oval frontal lobes, very small legs relative to the size of the body, a ventral and noncellular anal ring, all body setae flagellate and mostly less than 15 µm long, very slender macrotubular ducts distributed over both dorsum and venter, ventral bands of clustered quinquelocular pores on the posterior abdomen and sometimes scattered quinquelocular pores on the body margin, and the absence of anal lobes and microtubular ducts.

First-instar nymphs and a single prepupal male are known only for *S. beardsleyi* sp. nov. The male nymph is too poorly preserved to describe adequately.

Key to adult females of *Subcorticoccus*

1. Antennae usually 7 (rarely 6) segmented; legs of typical form but reduced in size; quinquelocular pores densely scattered around margins of entire body... ..... *S. murrindindi* sp. nov.

— Antennae usually 6 (rarely 5) segmented; legs highly reduced so that combined femur, tibia, tarsus and claw resembles an elongate cone; quinquelocular pores either absent from margins of body or sparsely scattered on abdominal margins 2

2. Quinquelocular pores sometimes present on margins of body, at least on abdomen, in dense bands ventrally on last 4 abdominal segments (V–VIII) plus a few pores on IV ..... *S. hnonamnis* sp. nov.
— Quinquelocular pores absent from margins of abdomen, in sparse bands ventrally on last 4 abdominal segments (V–VIII) only ..... *S. beardsleyi* sp. nov.

Subcorticoccus beardsleyi sp. nov.

Figures 1–2

Type material. Holotype: adult female (1.6 mm long, largest of 3 females on slide), Victoria, near Heathcote, 15 Mar 1972, ex *Eucalyptus macrorhyncha,* under twig bark, J.W. Beardsley (ANIC)

Paratypes: 17 adult females (11 slides), 1 prepupal male (on slide with 2 adult females) and 4 first-instar nymphs (each on slide with 1 or 2 adult females), same data as holotype (2 slides in ANIC, 8 slides in BPBM, 1 slide in NMV T-17318).

Description of adult female (measurements based on 10 slide-mounted specimens) (Fig. 1). Body 1.1–1.7 mm long, 0.6–1.0 mm wide; segmentation distinct only on posterior half of abdomen. Eyespots 10–15 μm wide. Antennae (Fig. 1a) 43–70 μm long, with 6 (rarely 5) segments. Frontal lobes irregularly oval, each 30–80 μm long, 25–50 μm wide. Labium 50–70 μm long, 60–70 μm wide across base. Clypeolabral shield 120–170 μm long, 105–140 μm maximum width. Spiracles (Fig. 1e): mesothoracic 35–56 μm long, 14–25 μm wide; metathoracic 39–60 μm long, 14–27 μm wide. Legs (Figs 1b,d) 45–65 μm long, with segments highly reduced; tarsal digitules 8–20 μm long; claw digitules 8–15 μm long; claw denticle not discernible. Apical setae 20–40 μm long; anal ring (Fig. 1g) 14–20 μm in diameter with 1 pair of anal ring setae 8–10 μm long; suranal setae (Fig. 1g) 8–10 μm long.

Dorsum with mediolongitudinal band of microtrichia (Fig. 1h) on head and anterior thorax 140–260 μm long, widest (25–33 μm) posteriorly; flagellate setae, 4–10 μm long, sparsely distributed across all segments, longest on posterior abdominal segments; macrotubular ducts (Fig. 1e) 10–16 (mostly 13) μm long, 1–2 μm wide, scattered across all segments; quinquelocular pores absent.

Venter usually with a few microtrichia in indistinct cluster between antennae; flagellate setae 3–12 μm long, sparsely distributed across all segments, a pair of longer setae (13–18 μm) near vulva; macrotubular ducts (Fig. 1e) 10–14 (mostly 13) μm long, 1–2 μm wide, scattered across all segments; quinquelocular pores about 5 μm in diameter (Fig. 1f) in sparse bands on abdominal segments V to VIII, absent from margins of body, a small cluster of 3–8 pores (mostly quinquelocular, rarely trilocular) (Fig. 1e), each 3–4 μm in diameter, at opening of each spiracle and a few in each spiracular furrow.

Description of first-instar nymph (measurements based on 4 slide-mounted specimens) (Fig. 2). Body 0.32–0.41 mm long, 0.11–0.14 mm wide; segmentation indistinct; microtrichia absent. Eyespots 7–8 μm wide. Antennae 75–80 μm long, with 6 segments; trichoid sensilla 8–30 μm long, distributed as follows: 3 on I, 2 on II, 2 on III, 0 on IV, 2 on V, 3 on VI; pegs 4–13 μm long, distributed as follows: 1 on IV, 1 on V, 3 on VI; 3–4 basiconic or coeloconic sensilla, 5–6 μm long, on VI; a single campaniform sensillum on apical part of II. Labium conical, segmentation not apparent, 35–43 μm long, 30–34 μm wide across base. Clypeolabral shield 75–90 μm long, 42–50 μm maximum width. Spiracles about 10 μm long, 5–7 μm wide. Legs of typical form; tarsal digitules capitate (Fig. 2b), 15–25 μm long; claw digitules capitate, 10–15 μm long; each claw with small denticle near apex. Anal lobes absent; apical setae 52–60 μm long; anal tube, about 10 μm long, with simple, ventral anal opening about 3 μm in diameter without setae; suranal setae flagellate, about 6–7 μm long.

Dorsum with short cone-like setae, 1–2 μm high and 1–2 μm wide with a base 2.0–3.5 μm in diameter (Fig. 2e), distributed in a transverse row of 6 setae per abdominal segment, segmentally arranged on thorax, scattered on head, with setae of adjacent body segments lining up to form 3 pairs of longitudinal rows: 1 medial, 1 submedial and 1 submarginal, with submarginal setae largest especially on abdomen; macrotubular ducts, microtubular ducts and quinquelocular pores absent.

Venter with flagellate setae 3–7 μm long, 3 pairs on head near antennae, 1 seta near base of each fore leg, and abdominal setae distributed in transverse rows of 6 setae on each segment with setae of adjacent segments lining up to form 3 pairs of longitudinal rows; macrotubular ducts and microtubular ducts absent; a single trilocular pore (Fig. 2a), 3 μm in diameter, adjacent to each spiracle.

Etymology. This species is named in honour of Professor Jack Beardsley who collected all known

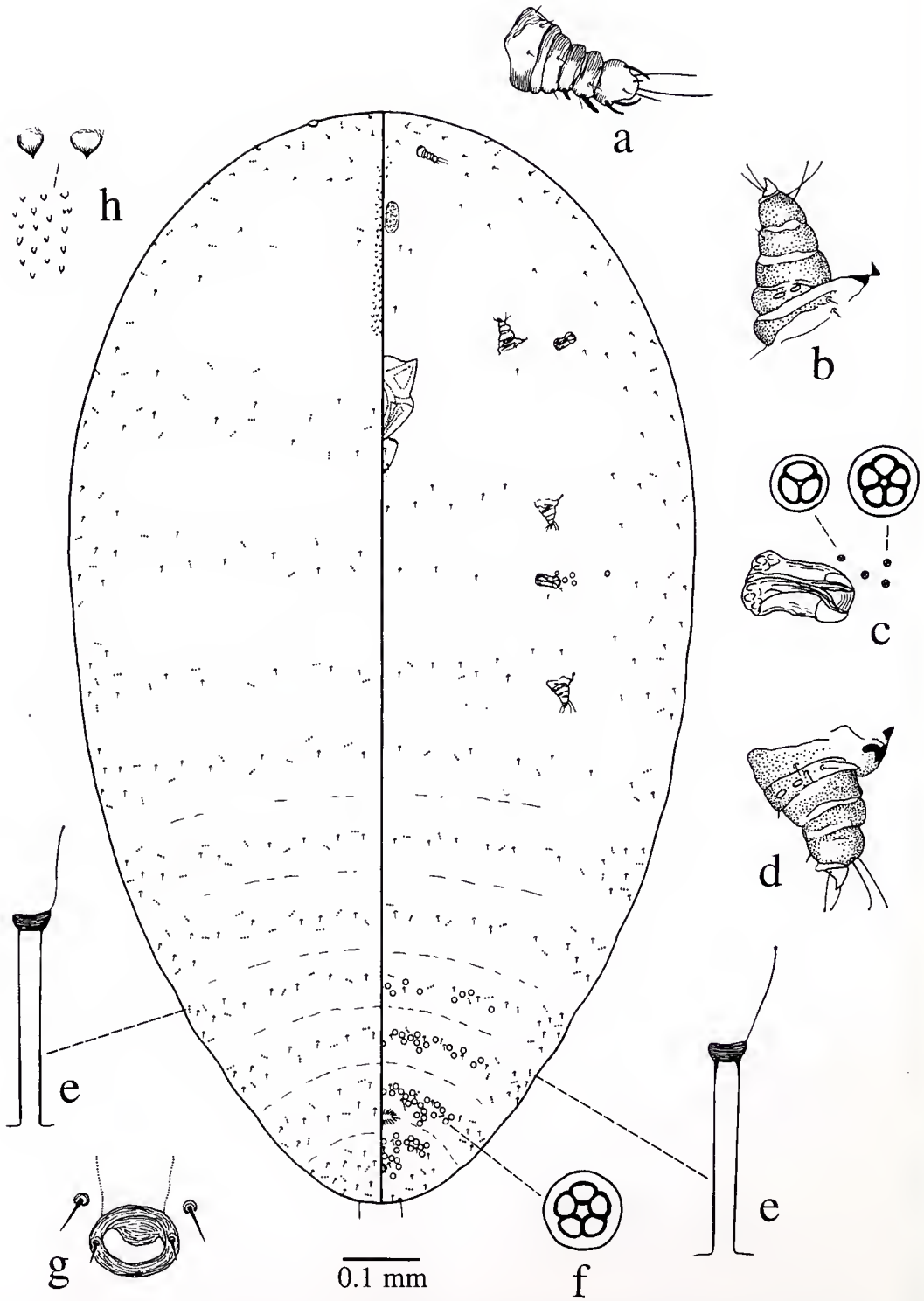

Figure 1. Adult female of *Subcorticoccus beardsleyi* sp. nov. Enlargements show: a, antenna; b, fore leg; c, metathoracic spiracle and associated pores; d, hind leg; e, macrotubular duct; f, abdominal quinquelocular pore; g, anal ring with suranal setae lateral to ring (NB. all of these structures are ventral); h, microtrichia from dorsal band on head and anterior thorax.

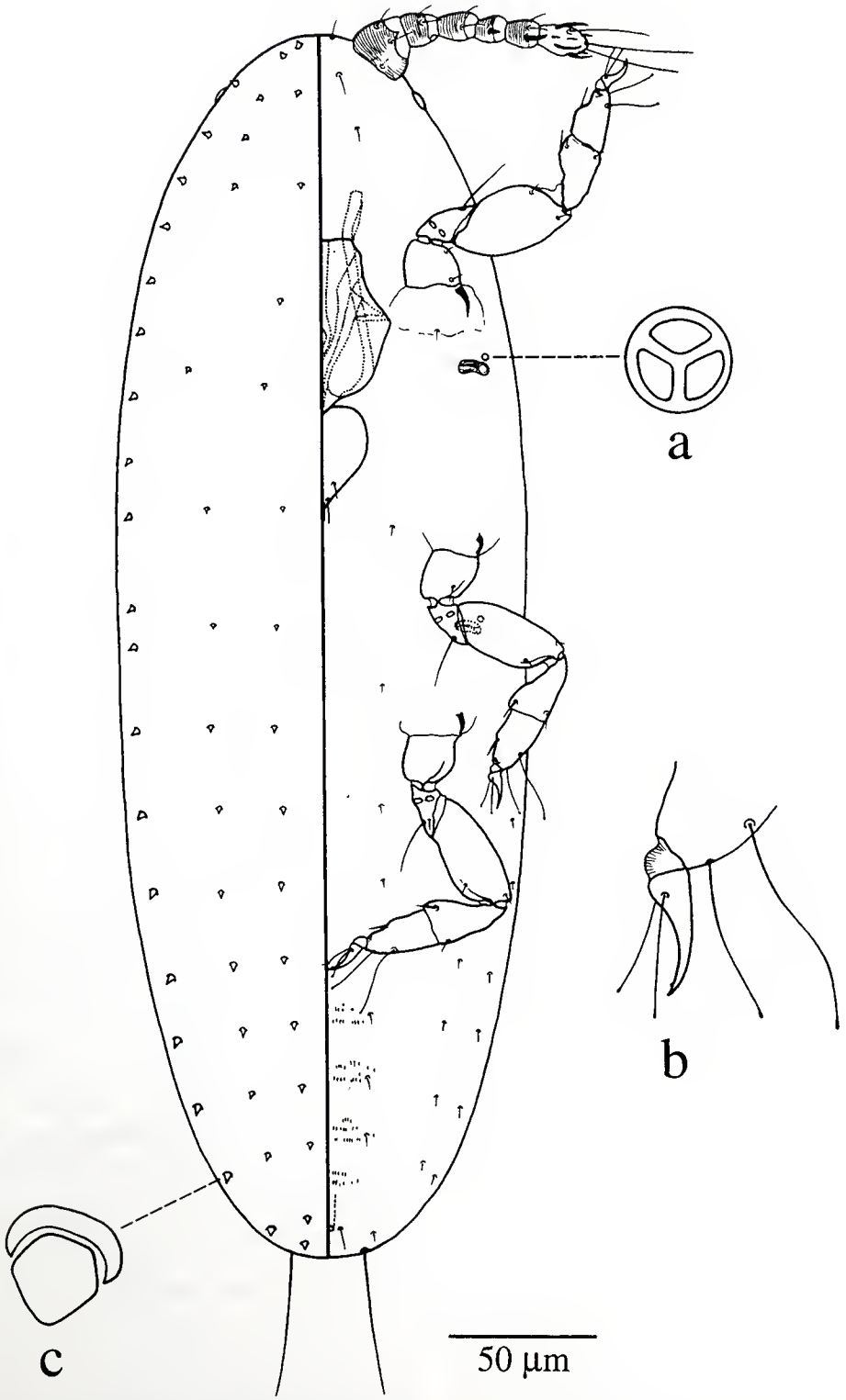

Figure 2. First-instar nymph of *Subcorticoccus beardsleyi* sp. nov. Enlargements show: a, trilocular pore; b, midleg claw and tarsal apex; c, dorsal seta.

specimens of this species and many other Australian eriococcids.

Subcorticoccus huonamnis sp. nov.

Figure 3

Type material. Holotype: adult female (3.4 mm long), Tasmania, Huon River near Judbury, 24 Oct 1978, ex *Eucalyptus regnans*, under bark, D.J. Williams (ANIC).

Paratypes: 28 adult females (9 slides), same data as holotype (2 slides in ANIC, 7 slides in BMNH).

Description of adult female (measurements based on 10 slide-mounted specimens). Body 1.2–3.9 mm long, 1.1–2.7 mm wide; segmentation indistinct except on posterior abdomen. Eyespots 25–35 µm wide. Antennae (Fig. 3a) 60–95 µm long, with 6 (rarely 5) segments. Frontal lobes each 70–130 µm long, 40–90 µm wide. Labium 60–85 mm long, 70–100 mm wide across base. Clypeolabral shield 140–230 µm long, 125–200 µm maximum width. Spiracles (Fig. 3c): mesothoracic 42–58 µm long, 20–30 µm wide; metathoracic 45–70 µm long, 23–30 µm wide. Legs (Figs 3b,d) 70–120 µm long, with segments reduced and coxa mostly membranous; tarsal digitules 20–32 µm long; claw digitules 15–25 µm long; claw with small denticle discernible near apex on some specimens. Apical setae 30–50 µm long; anal ring (Fig. 3g) 23–29 mm in diameter, with 0–1 pair of anal ring setae, 10–18 µm long; suranal setae (Fig. 3g) 10–12 µm long.

Dorsum with mediolongitudinal band of microtrichia (Fig. 3h) on head and anterior thorax 280–600 µm long, widest (40–100 µm) in posterior two-thirds; flagellate setae, 5–10 µm long, sparsely distributed across all segments, longest on posterior abdominal segments; macrotubular ducts (Fig. 3e) 10–15 µm long, 1.5–2.0 µm wide, scattered across all segments; quinquelocular pores absent.

Venter with microtrichia in short, mediolongitudinal cluster 60–100 µm long, 25–38 µm wide, between antennae; flagellate setae 5–12 µm long, sparsely distributed across all segments, one pair of longer setae (15–23 µm) near vulva; macrotubular ducts (Fig. 3e) 10–15 µm long, 1.5–2.0 µm wide, scattered across all segments; quinquelocular pores 4–5 µm in diameter sometimes present on margins of body, at least on abdomen, larger pores about 5–6 µm in diameter (Fig. 3f) in dense bands on abdominal segments V to VIII, a few scattered or clustered on IV, plus a loose cluster of 13–25 pores (Fig. 3c), each 3–5 µm in diameter, at opening of each spiracle and a few in each spiracular furrow.

Etymology. After the type locality on the Huon River, Tasmania, and *amnis*, meaning river, Latin.

Subcorticoccus murrindindi sp. nov.

Figure 4

Type material. Holotype: adult female (3.5 mm long), Victoria, c. 10.5 km NE of Toolangi, near Murrindindi River, off Murrindindi Road, 31 Oct 1978, ex *Eucalyptus regnans*, under bark, P.J. Gullan and A. Smith (ANIC).

Paratypes: 8 adult females, same data as holotype (4 slides in ANIC, 2 slides in BPBM, 2 slides in BMNH).

Description of adult female (measurements based on 7 slide-mounted specimens). Body 3.4–3.9 mm long, 2.1–2.4 mm wide; segmentation distinct, at least on abdomen. Eyespots 27–35 µm wide. Antennae (Fig. 4a) 85–125 µm long, with 7 (rarely 6) segments. Frontal lobes oval, each 65–155 µm long, 50–65 µm wide. Labium 70–85 mm long, 100–110 µm wide across base. Clypeolabral shield 150–170 µm long, 140–160 µm maximum width. Spiracles (Fig. 4c): mesothoracic 55–72 µm long, 30–35 µm wide; metathoracic 60–75 µm long, 30–35 µm wide. Legs (Figs 4b, d) of typical form but small, 112–160 µm long, tibia and tarsus of each leg fused, tibia + tarsus about equal in length to femur of each leg; tarsal digitules 20–35 µm long; claw digitules 13–20 µm long; claw sometimes with a barely discernible denticle. Apical setae 35–40 µm long; anal ring (Fig. 4g) 27–33 µm in diameter, with 1 pair of anal ring setae 7–13 µm long; suranal setae (Fig. 4g) 12–20 µm long.

Dorsum with mediolongitudinal band of microtrichia (Fig. 4h) on head and anterior thorax, 600–800 µm long, widest (100–130 µm) for posterior half to two-thirds; flagellate setae, 5–16 µm long, sparsely distributed across all segments, longest on posterior abdominal segments; macrotubular ducts (Fig. 4e) 12–15 µm long, 1.0–1.5 mm wide, scattered across all segments; quinquelocular pores 4–5 µm in diameter on margins of body (Fig. 4e).

Venter with microtrichia in indistinct, mediolongitudinal cluster about 50 µm long, 25–30 µm wide, between antennae; flagellate setae 7–22 µm long, sparsely distributed across all segments, a pair of longer setae (30–33 µm) near vulva; macrotubular ducts (Fig. 4e) 12–15 µm long, 1.0–1.5 µm wide, scattered across all segments; quinquelocular pores 4–5 µm in diameter (Fig. 4c) densely scattered on margins of body, larger pores about 5–6 µm in diameter (Fig. 4f) in dense

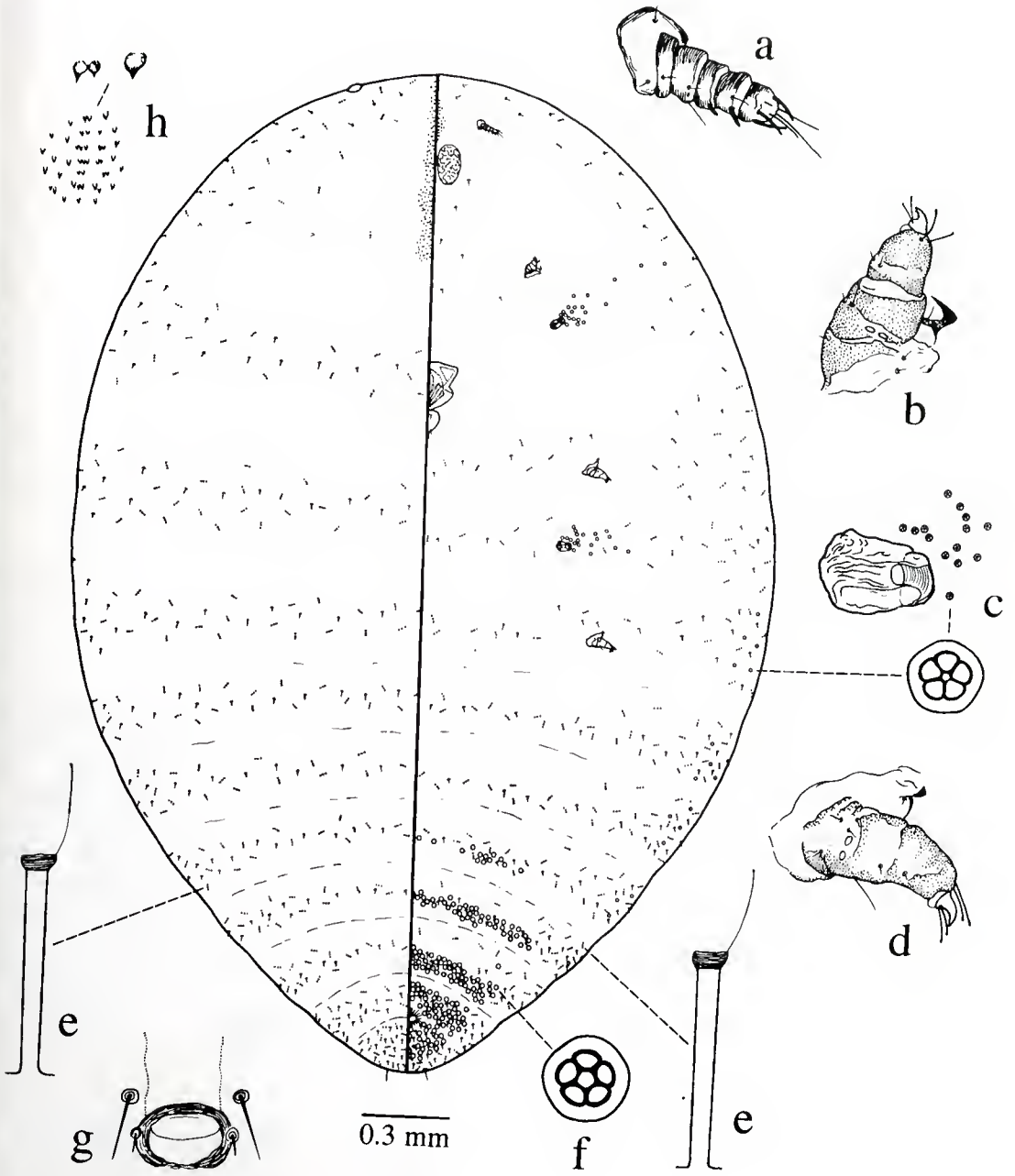

Figure 3. Adult female of *Subcorticoccus huonamnis* sp. nov. Enlargements as for caption of Fig. 1 except that, in c, the enlarged quinquelocular pore represents both pores near the spiracle and on the body margin.

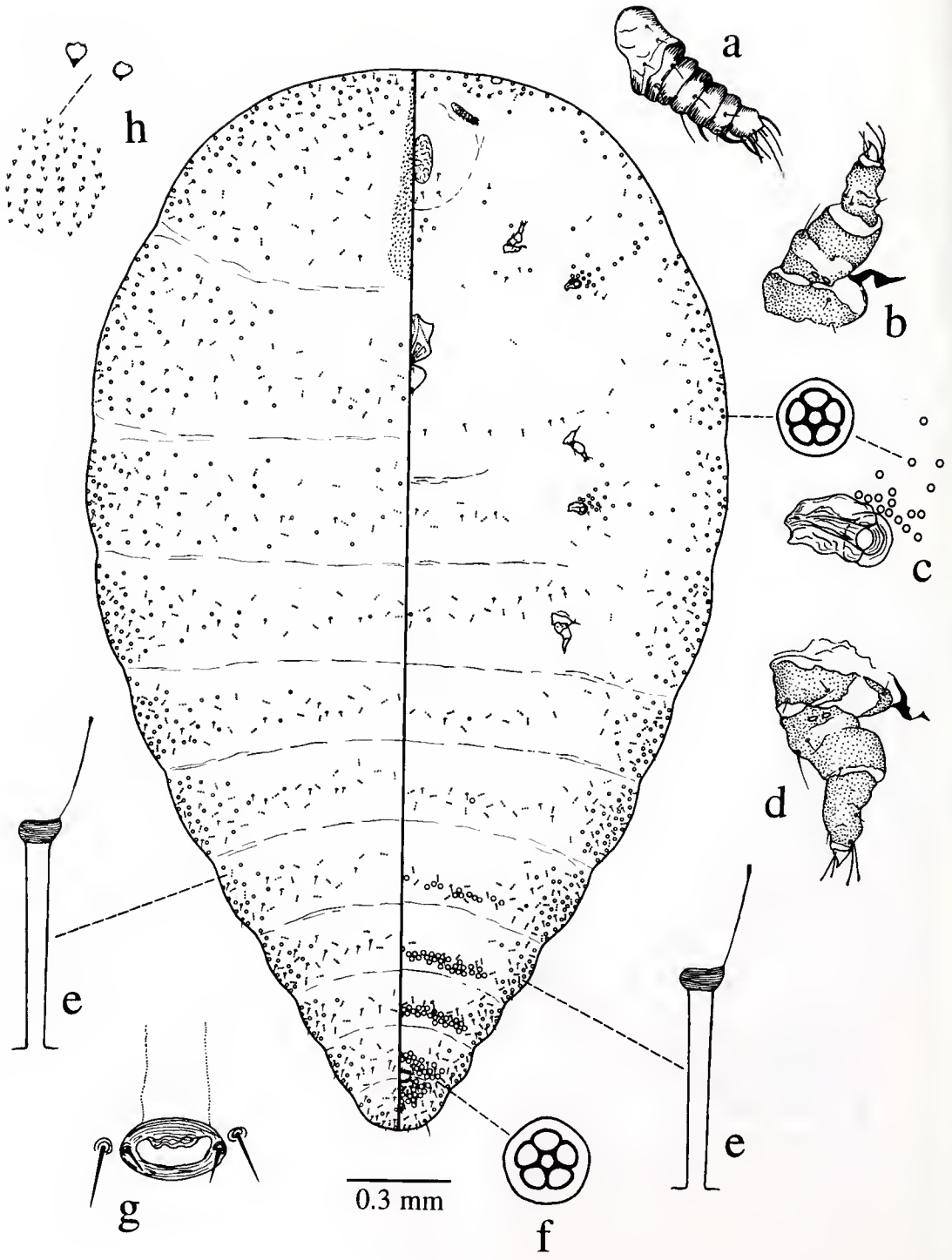

Figure 4. Adult female of *Subcorticoccus murrindindi* sp. nov. Enlargements as for caption of Fig. 1 except that, in c, the enlarged quinquelocular pore represents both pores near the spiracle and on the body margin.

bands on abdominal segments IV to VIII, a loose cluster of 15–25 pores, each 4–5 μm in diameter, at opening of each spiracle and in an irregular row in each spiracular furrow.

Etymology. For the type locality near Toolangi, Victoria, a noun in apposition.

Comments. These eriococcids were collected from under pieces of decorticating bark on their host trees. A single adult female from *Eucalyptus acmenioides* in Brisbane (A.R. Brimblecombe No. SC2207, 18.iv.1948, ANIC via H.M. Brookes) is similar to the specimens from Murrindindi Road but is only one third the body size and differs in the shape of the claws, which are distinctly hooked with a small denticle near the apex, and the shape of the frontal lobes. This female probably represents a fourth species, but its description must await the collection of further specimens.

Discussion

In addition to *Subcorticoccus* and *Phacelococcus* several other Australian eriococcid genera also have species with stationary females that live in or under eucalypt bark. The coccids are either tightly fitted into crevices or in blister galls as in *Floracoccus* Beardsley, *Ourococcus* Fuller and *Sphaerococcopsis* Cockerell (Fuller, 1899; Beardsley, 1974a, b), are under bark on twigs as in a few species of *Lachnodius* Maskell (J.W. Beardsley, pers. comm.), in resinous secretion as in *Olliffia* Fuller (P.J. Gullan, unpubl. data), or in bark crevices under felted tests as in a few species of *Eriococcus* (Froggatt, 1921). Outside Australia, some eriococcid genera, including *Capulinia* Signoret, *Cryptococcus* Douglas, *Ovaticoccus* Kloet and *Xerococcus* Ferris, have one or more species that either live under bark or in bark crevices (D.R. Miller, pers. comm.). Some of these taxa, particularly species of *Ovaticoccus* (Miller and McKenzie, 1967), display some similarity to *Subcorticoccus,* for example in possessing a reduced anal ring and small legs. The morphological reductions that accompany many bark-dwelling eriococcids make it difficult to estimate their phylogenetic relationships using cuticular features; it is hoped that their relationships may be more accurately estimated by future cladistic analysis of molecular data.

Acknowledgments

Gordon Nishida and Jon Martin kindly arranged the loan of specimens from the Bishop Museum and the Natural History Museum, respectively. The financial support of the Australian Biological Resources Study (ABRS) is gratefully acknowledged. Thanks to Peter Cranston and Dug Miller for helpful comments on the manuscript and to Robert Hoare for advice on the Latin used to form the new names. The Zoology Department of the University of Western Australia generously provided laboratory space while this paper was written, and Alan Muir at the Division of Botany and Zoology kindly made the stencil that was used to draw the tiny circles on the figures.

References

Beardsley, J.W. Jr, 1974a. A new genus of Coccoidea from Australian *Eucalyptus* (Homoptera). *Proceedings of the Hawaiian Entomological Society* 21: 325–328.

Beardsley, J.W. Jr, 1974b. A review of the genus *Sphaerococcopsis* Cockerell, with descriptions of two new species (Homoptera: Coccoidea). *Proceedings of the Hawaiian Entomological Society* 21: 329–342.

Froggatt, W.W., 1921. A descriptive catalogue of the scale insects ("Coccidae") of Australia. Part II. *Science Bulletin, Department of Agriculture, New South Wales* 18: 1–159.

Fuller, C., 1899. Notes and descriptions of some species of Western Australian Coccidae. *Transactions of the Entomological Society of London* 1899 (part IV): 435–473.

Gullan, P.J. and Strong, K.L., 1997. Scale insects under eucalypt bark: a revision of the Australian genus *Phacelococcus* Miller (Hemiptera: Coccoidea: Eriococcidae). *Australian Journal of Entomology* 36: 229–240.

Gullan, P.J., 1984. A revision of the gall-forming coccoid genus *Apiomorpha* Rübsaaman (Homoptera: Eriococcidae: Apiomorphinae). *Australian Journal of Zoology, Supplementary Series* 97: 1–203.

Hoy, J.M., 1962. Eriococcidae (Homoptera: Coccoidea) of New Zealand. *Bulletin of the New Zealand Department of Scientific and Industrial Research* 146: 1–219.

Koteja, J., 1980. Campaniform, basiconic, coeloconic, and intersegmental sensilla on the antennae in the Coccinea (Homoptera). *Acta Biologica Cracoviensia, Series Zoologia* 22: 73–88.

Le Rü, B., Renard, S., Allo, M-R., Le Lannic, J. and Rolland, J.P., 1995. Antennal sensilla and their possible functions in the host-plant selection behaviour of *Phenacoccus manihoti* (Matile-Ferrero) (Homoptera: Pseudococcidae). *International Journal of Insect Morphology and Embryology* 24: 375–389.

Miller, D. R., 1970. A new genus and species of scale insect from Tasmania (Homoptera: Eriococcidae). *Journal of the Australian Entomological Society* 9: 157–159.

Miller, D.R. and Gonzalez, R.H., 1975. A taxonomic analysis of the Eriococcidae of Chile. *Revista Chilena de Entomologia* 9: 131–163.

Miller, D.R. and McKenzie, H.L., 1967. A systematic study of *Ovaticoccus* Kloet and its relatives, with a key to North American genera of Eriococcidae (Homoptera: Coccoidea: Eriococcidae). *Hilgardia* 38: 471–539.

Miller, D.R. and Miller, G.L., 1992. Systematic analysis of *Acanthococcus* (Homoptera: Coccoidea: Eriococcidae) in the Western United States. *Transactions of the American Entomological Society* 118: 1–106.