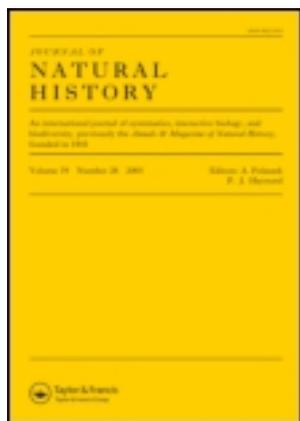


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An account of the mealybug genus *Paraputo* Laing (Hemiptera: Coccoidea: Pseudococcidae) in the Pacific region

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Abstract

The mealybug genus *Paraputo* is discussed from the Pacific region and three new species, *P. aracearum* sp. nov., *P. chimbuensis* sp. nov., and *P. guadalcanalae* sp. nov., are described and illustrated. They are discussed with two species, *P. kukumi* Williams and *P. leveri* (Green), already known from the area. Most of the species are found on economic plants and one of the mealybugs, *P. leveri*, has been recorded as possibly invasive. A key to adult females is provided.

Keywords: *Key to species, mealybugs, new species, Pacific region, Paraputo, Pseudococcidae*

Introduction

Over 150 species of Pseudococcidae are known to occur in the Pacific region north of New Zealand, based on the published works by Zimmerman (1948) for Hawaii, Beardsley (1966) for Micronesia in its broad sense, Williams and Watson (1988) for the tropical South Pacific region, Ben-Dov (1994) in a catalogue of world species, and on a few shorter papers published recently. Despite the small size of some of the islands, there is remarkable endemism and about 100 species have not been found in other regions so far. Almost 30 species recorded from the Pacific region, either endemic or otherwise, have been listed as invasive species that are pests or a threat to US agriculture (Miller et al. 2002).

The genus *Paraputo* Laing, is known to occur in the New World, southern Asia, China, and the Pacific region (Ben-Dov 1994) and, in an account of the mealybugs of southern Asia, Williams (2004) redefined the genus and discussed 44 species, commenting that the species show wide variation of characters. Only two species have been recorded so far from the entire Pacific region (*P. kukumi* and *P. leveri*), although Williams (2004) also recorded *P. leveri* from Java, Sabah, and Thailand. *P. leveri* often feeds on roots, sometimes causing damage, and appears to be extending its range. It is one of the invasive species listed by Miller et al. (2002) mentioned above and has been intercepted in the USA at port inspection. *P. kukumi* is also extending its range in the Pacific area and, already one of the new species, *P. aracearum*, has been intercepted on two occasions at ports in the USA.

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Without adequate inspection services, these insects can easily be introduced accidentally on plant material.

Three additional species possessing the characteristics of *Paraputo* have been found in the Pacific region, mostly on economic plants, and are discussed herein, thus expanding our concepts of the genus. The description and illustration of the third-instar female of *P. kukumi* are also included to show that the cerarii can be counted without difficulty in this instar but appear to form a continuous row in the adult female when they are not so easily recognizable. A key to all five species, based on the characters of the adult female, is now provided.

Methods

Descriptions are based on slide-mounted specimens. The specimens were prepared using the methods of Williams and Granara de Willink (1992) and Watson and Chandler (1999), and terminology follows that of Williams (2004). Each figure shows the entire insect with the dorsum on the left and the venter depicted on the right. Enlargements of some important characters are shown on each side of each illustration.

The abbreviations of depositories used in the text are: BMNH, The Natural History Museum, London, UK; USNM, The United States National Museum of Natural History (slide collections housed at USDA, Beltsville, Maryland, USA).

Paraputo aracearum sp. nov. (Figure 1)

Description

Appearance in life not recorded. Body of adult female on microscope slide, broadly oval, 2.00–3.15 mm long, 1.50–2.90 mm wide. Anal lobes well developed, each ventral surface with an apical seta 165–170 µm long, and a small sclerotized area. Antennae each 270–350 µm long, usually with six segments. Legs well developed; hind trochanter+femur 270–300 µm long, hind tibia+tarsus 200–260 µm long; claw stout, 40–45 µm long. Ratio of lengths of hind tibia+tarsus to hind trochanter+femur 0.76–0.83. Ratio of lengths of hind tibia to tarsus 1.10–1.50. Translucent pores present on anterior and posterior surfaces of hind coxa only. Labium 260–310 µm long, longer than clypeolabral shield. Circulus about 80 µm long, 90 µm wide, weakly sclerotized, divided by intersegmental line. Ostioles present, well developed, with inner edges of lips sclerotized, each lip bearing a few setae and trilocular pores. Anal ring 110–115 µm long, 100–105 µm wide, with six setae, each about 70 µm long. Cerarii numbering 18 pairs. Anal lobe cerarii each with about 10 slender conical setae, largest each about 30 µm long, 5 µm wide at base, one or two flagellate setae and a compact group of trilocular pores, all on a membranous area. Anterior cerarii on posterior abdominal segments similar to anal lobe pair, becoming smaller anteriorly; on thorax, each often reduced to a pair of conical setae and a few trilocular pores; on head conical setae accompanied by stiff flagellate setae.

Dorsal surface with numerous flagellate setae present, noticeably long, 40–75 µm in length, longest setae flanking anal ring; all setae giving surface a shaggy appearance. Multilocular disc pores absent. Trilocular pores evenly distributed, numerous. Discoidal pores, each smaller than a trilocular pore, scattered.

Ventral surface with flagellate setae similar to those on dorsum. Multilocular disc pores, each about 7.5 µm in diameter, present posterior to vulva and in more or less double rows

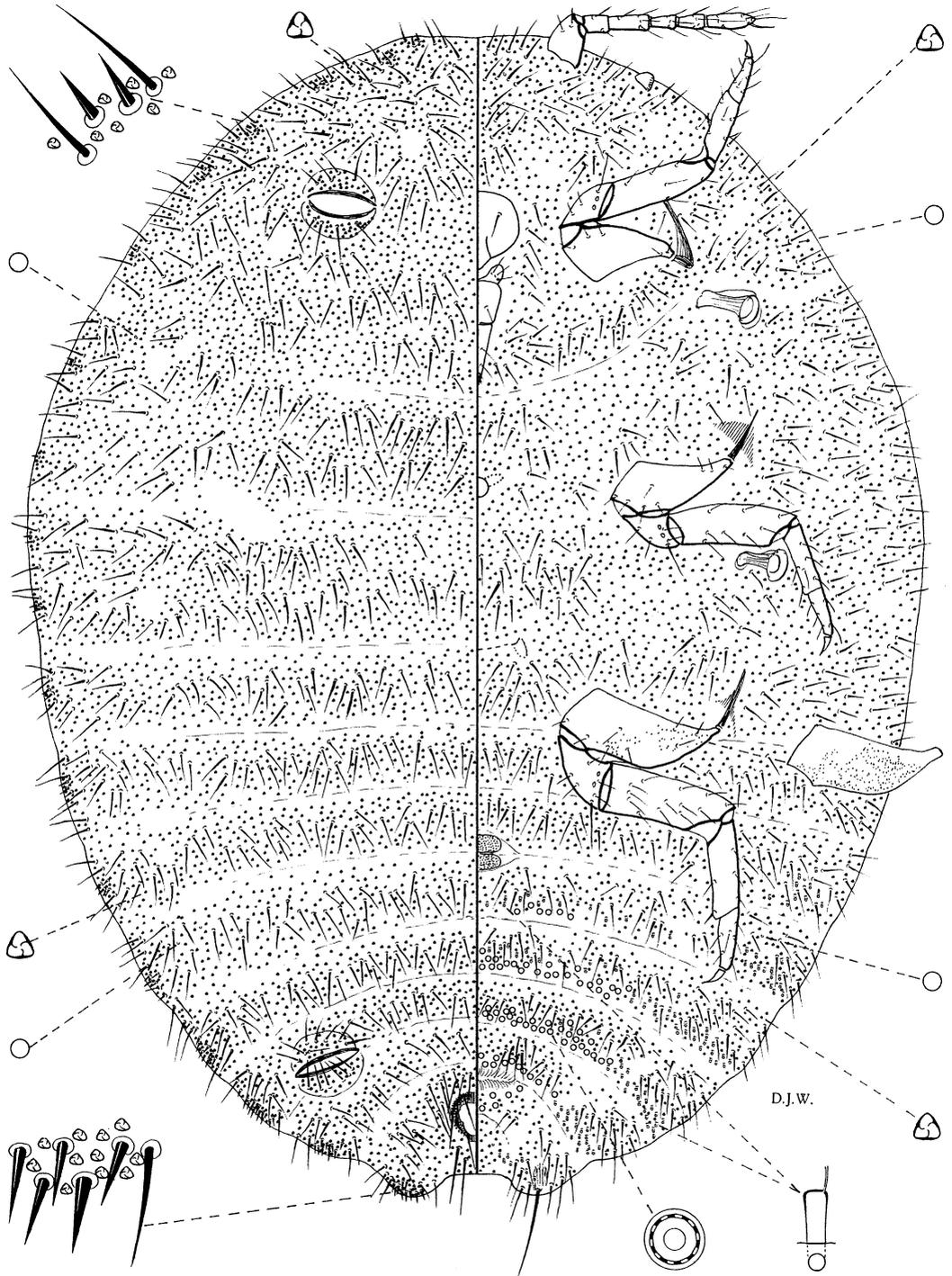


Figure 1. *Paraputo aracearum* sp. nov., adult female.

at medial posterior edges of abdominal segments V–VII, a few also present medially on abdominal segment IV. Trilocular pores evenly distributed, numerous. Discoidal pores same as on dorsum, scattered. Oral collar tubular ducts all about same size, each narrower than a trilocular pore, distributed across abdominal segments IV–VI and present in marginal groups on abdominal segments III–VII and on inner edges of anal lobes.

Material examined

Holotype: adult ♀, Fiji, Taveuni, on corm of taro, 20 August 2004 (coll. J. Narayan) (BMNH). Paratypes: Fiji, same data as holotype, four adult ♀♀, four third-instar ♀♀, one second-instar ♀ (BMNH). Intercepted at USA, California, Long Beach, on *Colocasia esculenta* (Araceae), 15 August 1994 (coll. H. Canales), one adult ♀, one third-instar ♀ (USNM). Intercepted at USA, California, Los Angeles, on *Colocasia* sp., 13 May 1996 (coll. G. Timmons), one adult ♀, one third-instar ♀ (USNM).

Etymology

The name is based on the botanical family name Araceae and is used in the genitive plural.

Comments

This species is almost identical to *P. leverii* but all the dorsal setae of the adult females are noticeably longer, 40–75 µm long, whereas in *P. leverii* the dorsal setae are 17.5–25.0 µm long. Furthermore, the translucent pores in the adult females of *P. aracearum* are present only on the hind coxae, whereas there are also translucent pores on the hind femora and tibiae in *P. leverii*. The holotype is mounted on the same slide as three paratypes and is clearly marked and mapped on the left label.

***Paraputo chimbuensis* sp. nov.**

(Figure 2)

Description

Appearance in life not recorded. Body of adult female on microscope slide, broadly oval, almost circular; 2.8 mm long, 2.5 mm wide. Anal lobes moderately developed, ventral surface of each lobe with an apical seta 185–190 µm long and a triangular sclerotized area occupying most of lobe. Antennae each 500–510 µm long, with eight segments. Legs well developed; hind trochanter+femur 390–400 µm long, hind tibia+tarsus 370–380 µm long; claw stout, 50–55 µm long. Ratio of lengths of hind tibia+tarsus to hind trochanter+femur 0.94–0.95. Ratio of lengths of hind tibia to tarsus 1.84–1.92. Translucent pores absent from hind coxa, present on posterior surfaces of hind femur and hind tibia. Labium 260–270 µm long, slightly longer than clypeolabral shield. Circulus about 120 µm long, 190–200 µm wide, distinctly divided by intersegmental line. Ostioles present, well developed, inner edges of lips sclerotized, each lip with concentrations of setae and trilocular pores. Anal ring 90–95 µm in diameter, bearing 26–30 setae, six setae situated in normal positions, each about 85 µm long, others 60–65 µm long. Cerarii probably numbering 18 pairs. Anal lobe cerarii each with about nine conical setae of different sizes, largest each about 30 µm

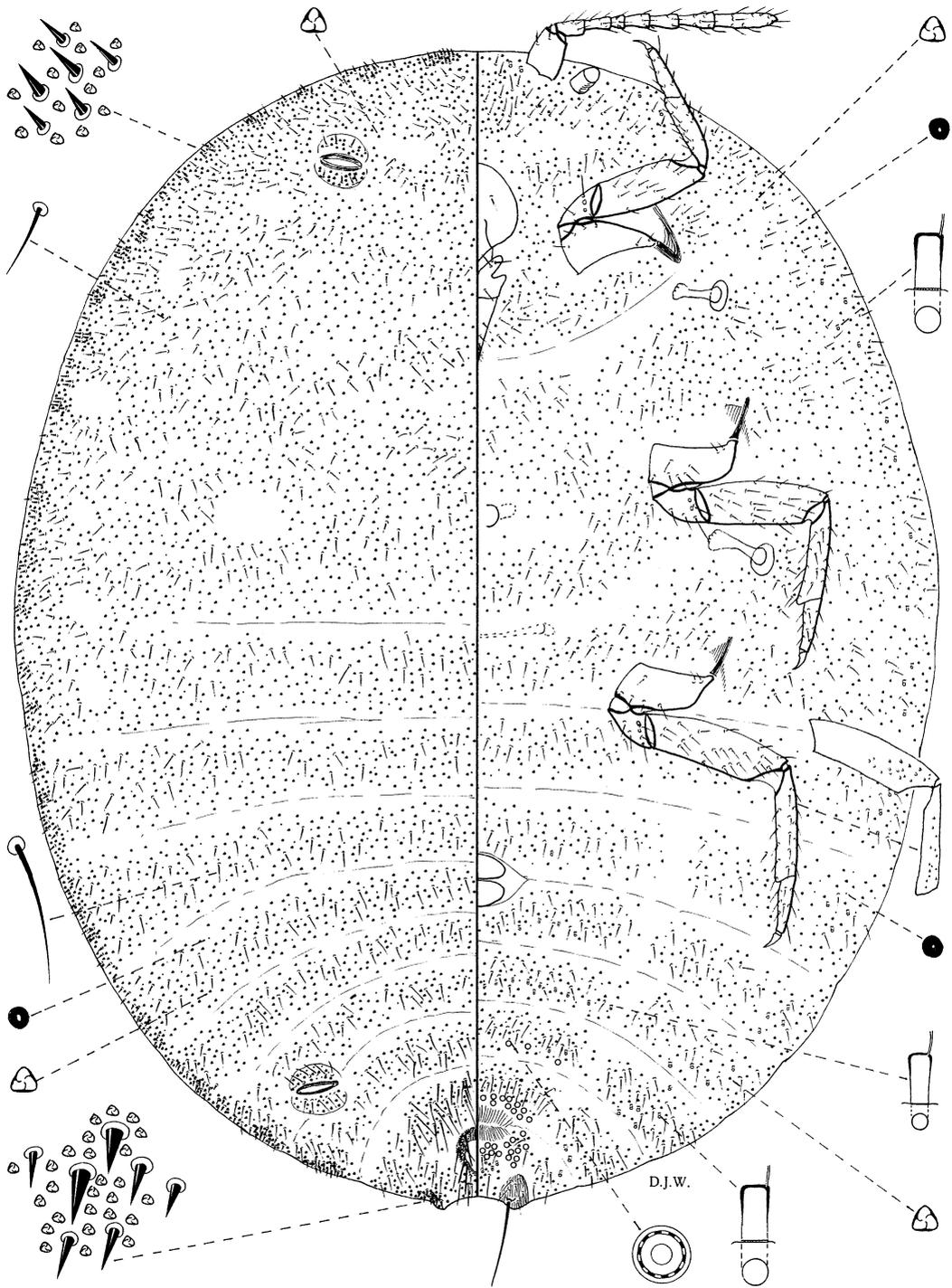


Figure 2. *Paraputo chimuensis* sp. nov., adult female.

long, 6.25 μm wide at base, with a concentration of trilocular pores, on a membranous area. Anterior cerarii similar but each cerarius with anterior and posterior groups of conical setae and trilocular pores so that cerarii appear as a continuous row.

Dorsal surface with numerous flagellate setae present, mostly 30–60 μm long, except for long setae 50–75 μm long, concentrated medially on abdominal segment VIII and straddling anal ring. Multilocular disc pores absent. Trilocular pores abundant, evenly dispersed. Discoidal pores, each smaller than a trilocular pore and with a thick sclerotized rim, scattered.

Ventral surface with slender flagellate setae. Multilocular disc pores, each about 7.5 μm in diameter, present medially posterior to vulva and on abdominal segments VI and VII. Trilocular pores evenly distributed, not as numerous as those on dorsum. Discoidal pores same as on dorsum, scattered. Oral collar tubular ducts present, of two sizes. A small type of duct, narrower than a trilocular pore and about as long as diameter of a multilocular disc pore, situated across medial areas of abdominal segments IV and V and submedially on abdominal segment VI, a group also present posterior to vulva between anal lobes, and one or two present on abdominal segment III. A larger type of duct, about as wide as a trilocular pore, present in small marginal groups on abdominal segments and extending anteriorly around body margins to area between antennae.

Material examined

Holotype: adult ♀, Papua New Guinea, Chimbu Province, Karimui, on rhizomes and inside stems of *Elettaria cardamomum* (cardamon) (Zingiberaceae), 22 October 1982 (coll. B. M. Thistleton) (BMNH). Paratype: Papua New Guinea, same data as holotype, one adult ♀ (the left specimen on the same slide as the holotype and clearly marked and mapped on the right label) (BMNH).

Etymology

The name is based on the locality “Chimbu” with the Latin suffix “-ensis” indicating origin.

Comments

In possessing 18 pairs of cerarii but the cerarii appearing as a continuous row with the addition of anterior and posterior groups of conical setae and trilocular pores to each cerarius, and in possessing short dorsal setae, *P. chimbuensis* is related to *P. danzigae* Williams described from Sabah. *P. chimbuensis* differs from *P. danzigae* in possessing ventral oral collar tubular ducts around the entire margin but in *P. danzigae*, there are groups of oral collar tubular ducts on the posterior abdominal segments only. Moreover, there are numerous translucent pores on the hind coxae in *P. danzigae* and they are lacking on the hind femora and tibiae. In *P. chimbuensis*, they are absent on the hind coxae and are present on the hind femora and tibiae. In the key to species of *Paraputo* of southern Asia presented by Williams (2004), *P. chimbuensis* keys to *P. glycosmis* Williams but the cerarii of *P. glycosmis* are distinct and do not appear as a continuous row. Also there are noticeable long dorsal setae, many 200 μm long, in *P. glycosmis*, whereas in *P. chimbuensis* they are mostly only 30–60 μm long.

Paraputo guadalcanalae sp. nov.

(Figure 3)

Description

Appearance in life not recorded. Body of adult female on microscope slide, broadly oval, membranous, 3.00 mm long, 2.85 mm wide, widest at about abdominal segment III. Anal lobes poorly developed, each ventral surface with an apical seta about 165 μm long, and an almost quadrate sclerotized area. Antennae each about 430 μm long, with six segments, third segment longest. Legs well developed, short for size of body; hind trochanter+femur about 370 μm long, hind tibia+tarsus 330 μm long; claw stout, about 50 μm long. Tarsal digitules pointed. Hind coxae noticeably larger than anterior coxae. Ratio of lengths of hind tibia+tarsus to hind trochanter+femur 0.89. Ratio of lengths of hind tibia to tarsus 1.75. Translucent pores present on anterior and posterior surfaces of hind coxa only. Labium about 240 μm long, 170 μm wide, longer than clypeolabral shield. Circulus about 200 μm long, 225 μm wide, gently notched at each side and with faint division. Ostioles present, well developed; inner edges of lips sclerotized and each lip with three or four flagellate setae and numerous trilocular pores. Anal ring about 115 μm long, distorted slightly on one side in available specimen, situated about three times its length from apex of abdomen; with two rows of pores and about 11 pairs of setae, three pairs of setae in normal positions longer than others, each about 80 μm long, others about 40 μm long. Cerarii numbering nine pairs including frontal pair. Anal lobe cerarii each with about nine conical setae of different sizes, two larger than others, each 20 μm long, 5 μm wide at base, with a group of trilocular pores on a membranous area. Anterior cerarii on abdomen similar to anal lobe pair as far forward as abdominal segment V (C_{15-17}), becoming smaller anteriorly with fewer setae and trilocular pores as far forward as cerarii on abdominal segment I (C_{11}). Frontal cerarii each with about seven conical setae.

Dorsal surface with numerous, long flagellate setae present, 50–80 μm long; some noticeably longer setae, mostly 125 μm long, present on each side of anal ring and a few setae, each about 40 μm long, situated anterior to anal ring. Multilocular disc pores absent. Trilocular pores numerous, evenly distributed. Discoidal pores, each a little smaller than a trilocular pore and with wide sclerotized rim, scattered.

Ventral surface with slender flagellate setae, similar in length to those on dorsum. Multilocular disc pores absent. Trilocular pores not as numerous as those on dorsum, evenly dispersed. Discoidal pores, same as on dorsum, scattered. Oral collar tubular ducts, each narrower than a trilocular pore, present medially near posterior edges of abdominal segments V and VI and in small marginal groups between abdominal segments VI and VII and segments VII and VIII.

Material examined

Holotype: adult ♀, Solomon Islands, Guadalcanal, Tina Lulu, on unknown plant, 19 March 1955 (coll. E. S. Brown) (BMNH). Paratypes: Solomon Islands, same data as holotype, three third-instar ♀♀ (one enclosing adult ♀) (BMNH).

Etymology

The name is based on the locality “Guadalcanal” with the Latin genitive indicating “of” or “from”.

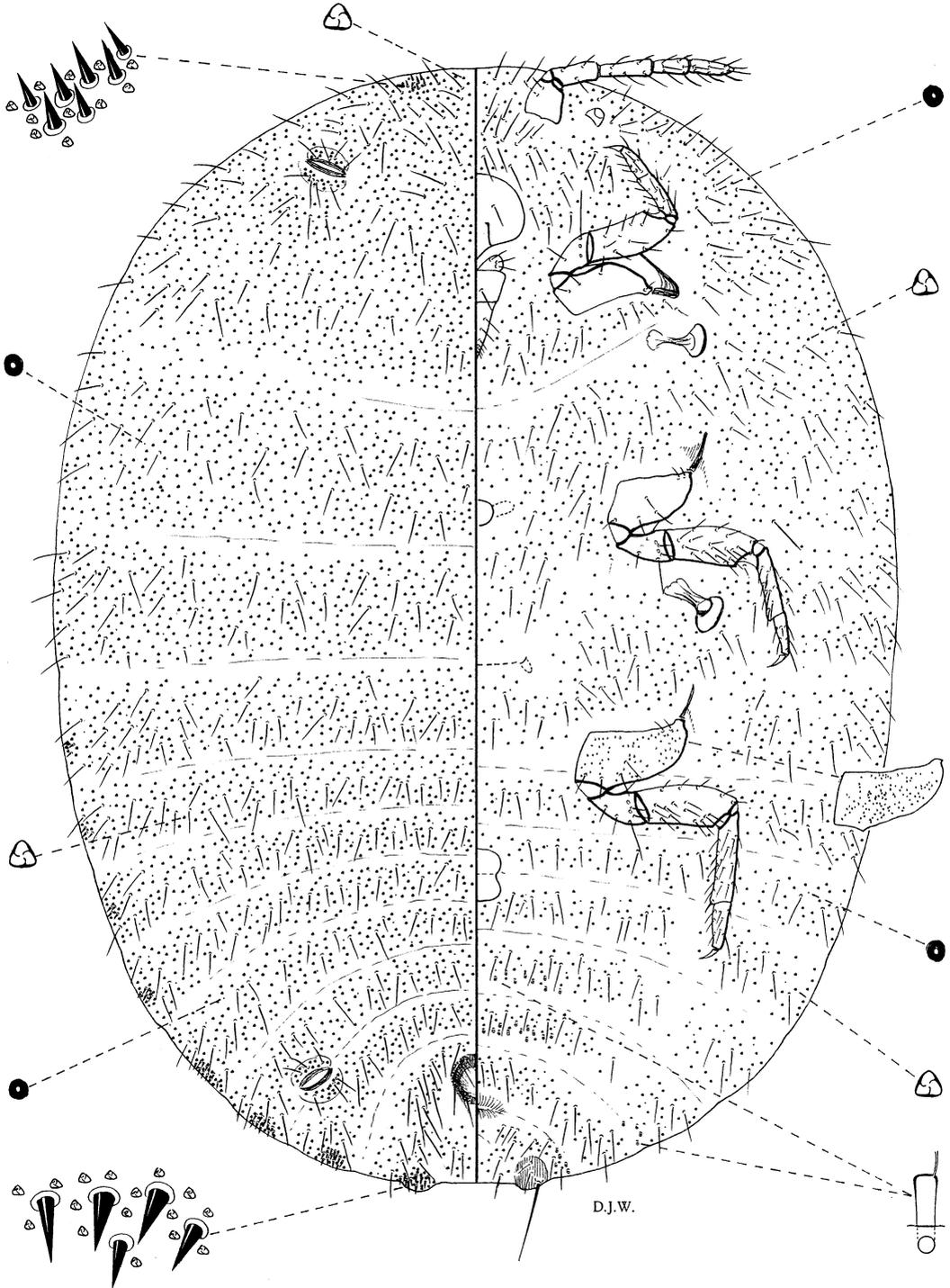


Figure 3. *Paraputo guadalcanalae* sp. nov., adult female.

Comments

This is an unusual species of *Paraputo* in lacking multilocular disc pores entirely on the venter and in possessing only nine pairs of cerarii. There is a single frontal pair of cerarii and the other eight pairs occur on the abdomen. *P. guadalcanalae* is probably related to *P. szemaoensis* (Borchsenius) described from China by Borchsenius (1960), a species with only abdominal cerarii but lacking the frontal pair. Besides, *P. szemaoensis* possesses ventral multilocular disc pores but these are absent in *P. guadalcanalae*. Both species possess numerous anal ring setae.

The type species of *Paraputo*, *P. ritchiei* Laing, an African species described by Laing (1929) and discussed by Ferris (1955) (= *Ripersia anomala* Newstead), also lacks cerarii on the thorax, as in *P. guadalcanalae*, but differs in possessing two pairs of cerarii on the head and multilocular disc pores on the venter.

***Paraputo kukumi* Williams**

(Figures 4, 5)

Paraputo kukumi Williams 1960, p 419; Williams and Watson 1988, p 151; Tang 1992, p 308; Ben-Dov 1994, p 284. Lectotype adult ♀, Solomon Islands, Guadalcanal, Kukum, on *Cocos nucifera*, designated by Williams and Watson 1988, p 151.

Cataenococcus kukumi (Williams), Matile-Ferrero 1978, p 52.

Description

Body of adult female (Figure 4) on microscope slide, broadly oval, 1.85–2.40 mm long, 1.45–2.50 mm wide. Anal lobes poorly developed, ventral surface of each lobe with a small sclerotized area, occasionally barely perceptible, and an apical seta 70–125 µm long, sometimes difficult to distinguish from surrounding setae. Antennae each 300–360 µm long, usually with six segments. Legs well developed; hind trochanter+femur 260–300 µm long, hind tibia+tarsus 210–250 µm long; claw stout, 50–55 µm long. Ratio of lengths of hind tibia+tarsus to hind trochanter+femur 0.70–0.92. Ratio of lengths of hind tibia to tarsus 1.08–2.33. Translucent pores present on anterior and posterior surfaces of hind coxa and on posterior surface of hind tibia. Tarsal digitules pointed. Labium 250–280 µm long, 160–180 µm wide, about same length as clypeolabral shield. Circulus 90–95 µm wide, with faint intersegmental line. Ostioles present, well developed, with inner edges of lips sclerotized, each lip with concentrations of setae and trilocular pores. Anal ring 100 µm long, 80–90 µm wide, usually with six setae, each 80–100 µm long, and sometimes accompanied by as many as two shorter setae. Cerarii numbering 17 basic pairs. Anal lobe cerarii each with numerous conical setae of different sizes occupying most of lobe margin, usually two setae longer than others, longest setae each 20 µm long, 5 µm wide at base, accompanied by numerous trilocular pores on a membranous area. Anterior cerarii similar to anal lobe pair, sometimes with long flagellate setae in addition and with anterior and posterior groups of conical setae; trilocular pores present in a band around entire margin so that cerarii appear as a continuous row.

Dorsal surface with long flagellate setae present, mostly about 70 µm long except for setae flanking anal ring where longest 90 µm long. Multilocular disc pores absent. Trilocular pores fairly numerous, evenly distributed. Discoidal pores minute, about same size as a single loculus of a trilocular pore.

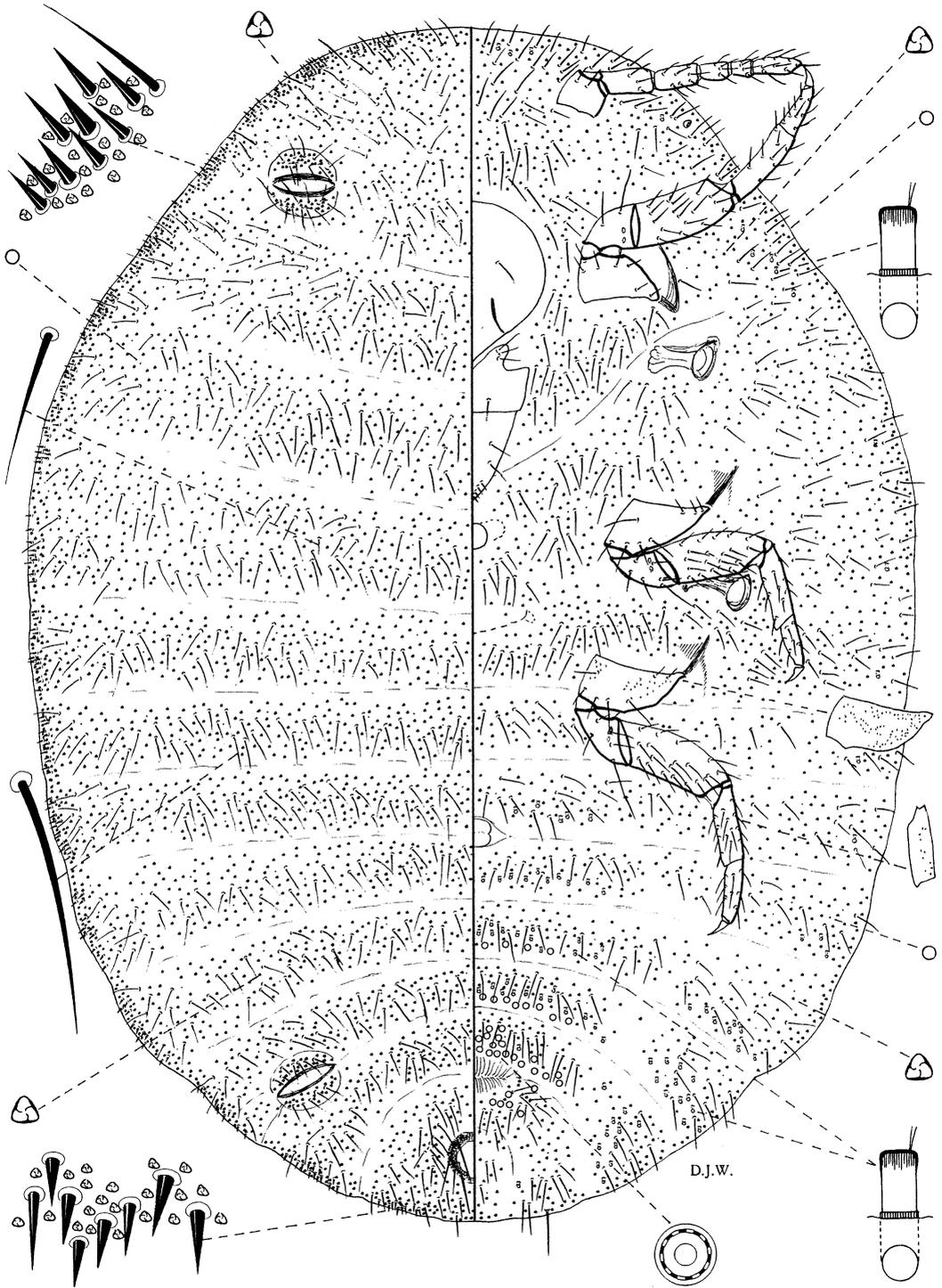


Figure 4. *Paraputo kukumi* Williams, adult female.

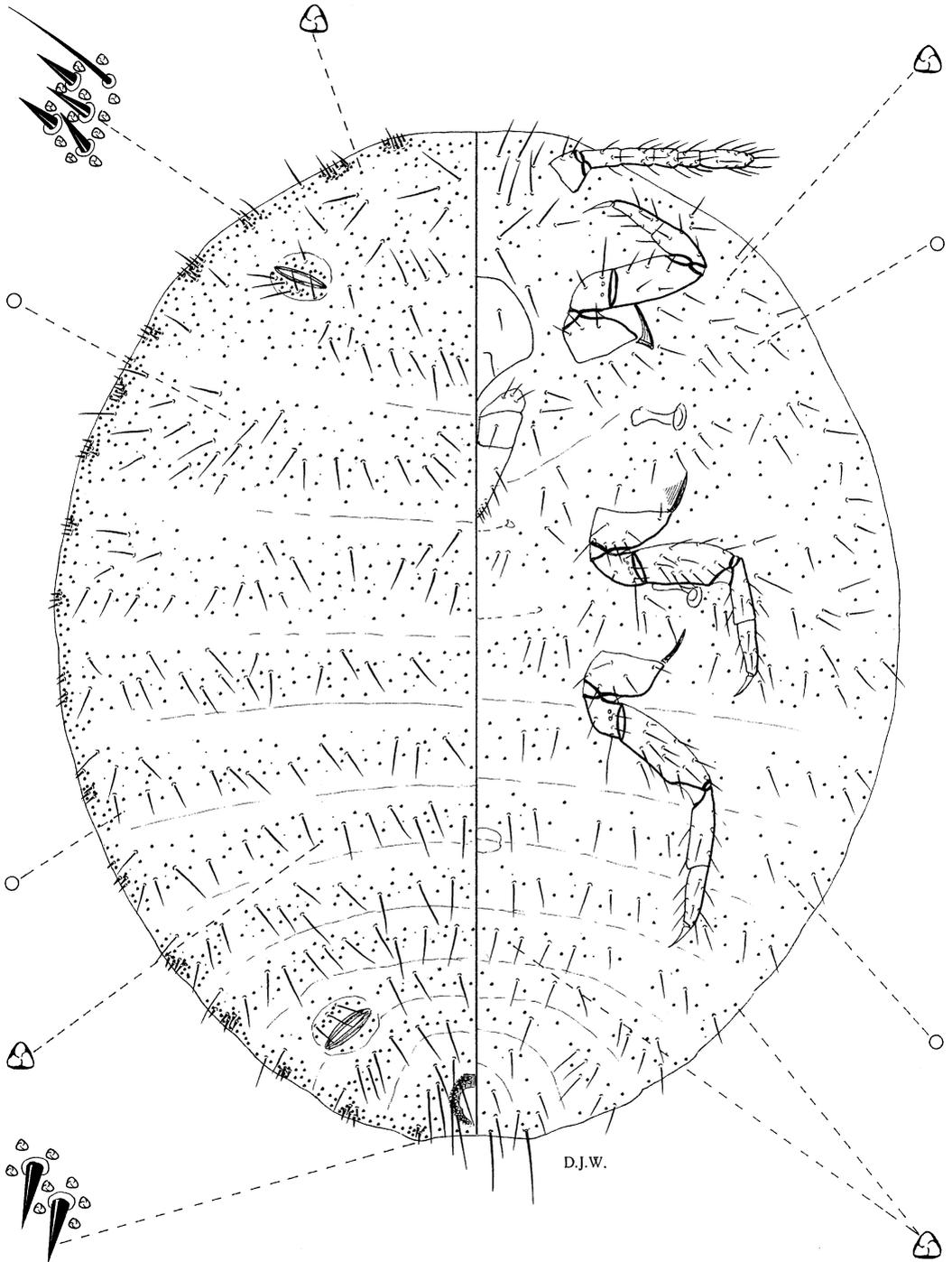


Figure 5. *Paraputo kukumi* Williams, third-instar female.

Ventral surface with similar setae present to those on dorsum. Multilocular disc pores, each about 7.5 µm in diameter, situated posterior to vulva, in single medial rows at posterior edges of abdominal segments V and VI and in double row at posterior edge of abdominal segment VII. Trilocular pores evenly distributed. Discoidal pores, same as those on dorsum, scattered. Oral collar tubular ducts, each conspicuously wider than a trilocular pore, about 7.5 µm long, 5 µm wide, present across medial areas of abdominal segments III–VI and sparse on abdominal segment VII; present also in marginal groups on abdominal segments II–VII and sparsely distributed around anterior margins of body to area between antennae; one or two ducts sometimes present also between anal lobes.

Third-instar female (Figure 5)

Body on microscope slide, 1.12–1.30 mm long, 0.85–1.05 mm wide. Anal lobes poorly developed, each ventral surface with an apical seta 95 µm long. Antennae each 270–300 µm long, with six segments. Legs well developed; hind trochanter+femur 200–300 µm long, hind tibia+tarsus 200–210 µm long; claw about 40 µm long. Ratio of lengths of hind tibia+tarsus to hind trochanter+femur 0.86–1.00. Ratio of lengths of hind tibia to tarsus 0.90–1.00. Translucent pores absent. Labium about 180 µm long. Circulus 60–95 µm wide. Ostioles well developed, each lip with a few setae and trilocular pores; posterior lip of each posterior pair usually without setae. Anal ring about 75 µm long, 62 µm wide, with six setae, each about 65 µm long. Cerarii numbering 17 distinct pairs. Anal lobe cerarii each with two or three conical setae, each about 20 µm long, 5 µm wide at base, and a few trilocular pores. Anterior cerarii each with multiple conical setae, some cerarii on head and thorax with additional flagellate setae.

Dorsal surface with slender flagellate setae present, 40–65 µm long; setae flanking anal ring 90–105 µm long. Trilocular pores evenly distributed. Discoidal pores minute, sparse.

Ventral surface with slender flagellate setae. Multilocular disc pores and oral collar tubular ducts absent. Trilocular pores evenly distributed.

Material examined

Fiji, Taveuni, on coconut, *Cocos nucifera* (Arecaceae), 18 July 1957 (coll. J. S. Pillai) (BMNH).

Solomon Islands, Guadalcanal, Kukum, on aerial shoot of *C. nucifera*, 14 August 1948 (coll. B.A. O'Connor); Santa Cruz Group, Reef Island, on roots of *C. nucifera*, March 1984 (BMNH).

Comments

This species was described originally from the Solomon Islands on the roots and aerial shoots of coconut. The present record from Fiji, also on coconut, suggests that *P. kukumi* is extending its range. No damage has been reported so far. The large oral collar tubular ducts on the venter of the adult female, all noticeably wider than the trilocular pores, distinguish this species from all others in the Pacific region. Although the numbers of cerarii in the adult female are sometimes difficult to determine because there are additional anterior and posterior groups of conical setae and trilocular pores to each cerarius, the exact number of 17 pairs can be determined more easily in the immature instars as shown in the third-instar female (Figure 5).

Paraputo leveri (Green)

(Figure 6)

Pseudococcus leveri Green 1934, p 473. Lectotype adult ♀, Solomon Islands (BMNH), designated by Williams and Watson 1988, p 153.

Paraputo leveri (Green), Williams 1960, p 421; Beardsley 1966, p 430; Williams and Watson 1988, p 153; Tang 1992, p 309; Ben-Dov 1994, p 284; Williams 2004, p 530.

Cataenococcus leveri (Green), Matile-Ferrero 1978, p 52; Williams and Butcher 1987, p 91; Williams 1987, p 2.

Description

Body of adult female broadly oval. Antennae six-segmented, rarely seven-segmented. Legs well developed, with translucent pores on anterior and posterior surfaces of each hind coxa and others present on posterior surfaces of each hind femur and tibia. Cerarii numbering 18 distinct pairs, each cerarius with multiple slender conical setae, cerarii on thorax and anterior abdominal segments usually with fewer conical setae; sometimes, in any cerarius, one or two conical setae replaced by slender setae. Anal ring situated 1.0–1.5 times its length from apex of abdomen, bearing six setae. Obanal and cisanal setae stout, situated posterior to anal ring. Dorsal setae short and stiff, often curved, 17.5–25 µm long, except for longer setae 75–85 µm flanking anal ring. Multilocular disc pores present on venter only posterior to vulva and medially across posterior edges of abdominal segments V–VII in single to double rows. Oral collar tubular ducts present on venter, of two main sizes. A small type of duct, distributed medially on abdominal segments IV–VII. A slightly larger type of duct, present in marginal groups on abdominal segments IV–VII and posterior to vulva. A small sclerotized patch present on venter of each anal lobe. Circulus divided by intersegmental line.

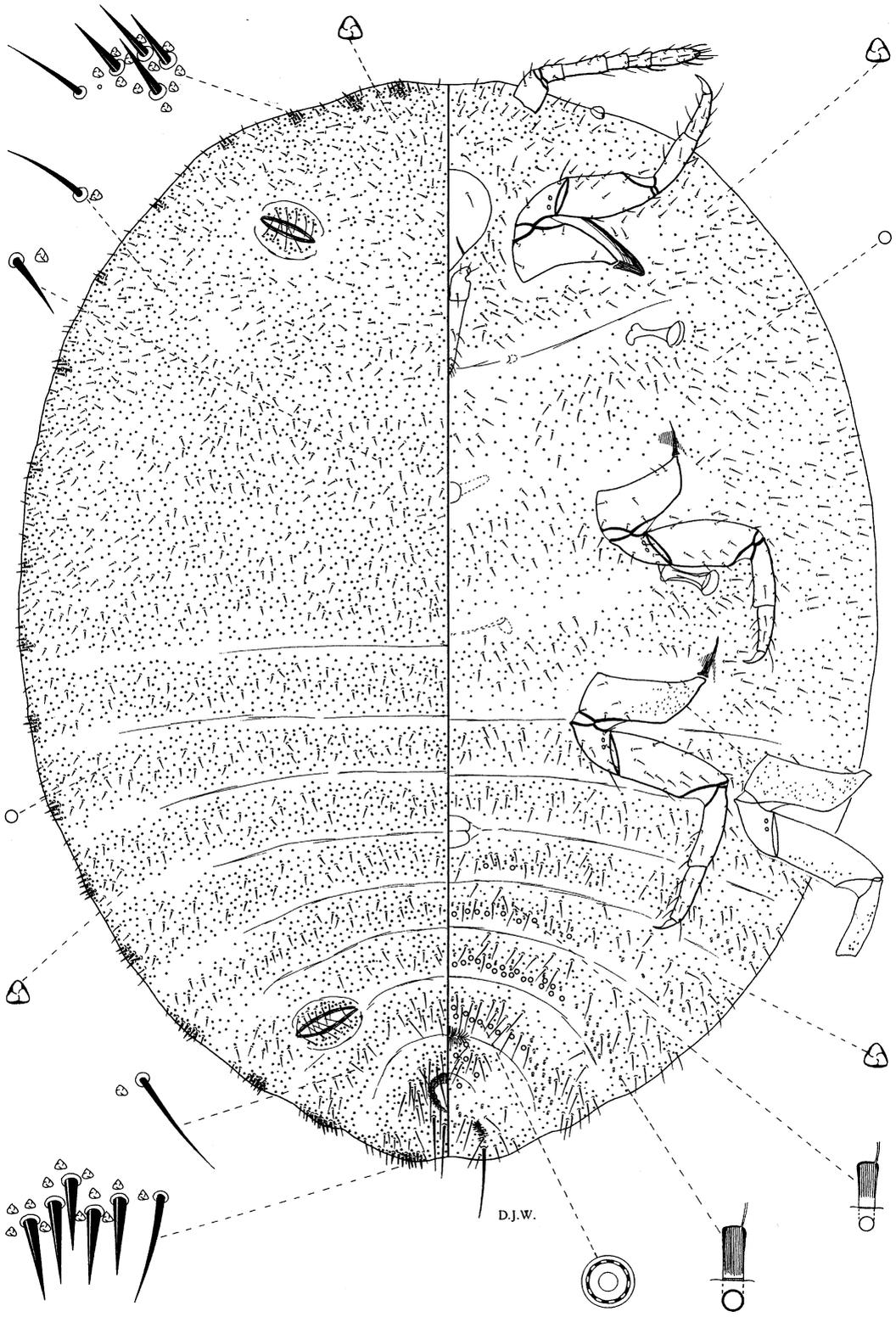
Material examined

American Samoa, intercepted at Hawaii, Honolulu, on stem of *Bischofia javanica* ('O'a tree) (Euphorbiaceae), 31 March 1977 (coll. Tenney) (USNM).

Fiji, Viti Levu, Naivacula, on *Bischofia javanica* (Euphorbiaceae), 23 November 1957 (coll. B. A. O'Connor) (BMNH); Nausori, on *B. javanica*, 4 December 1957 (coll. B. A. O'Connor) (BMNH).

Papua New Guinea, Morobe Province, Mumeng, on *Coffea arabica* (Rubiaceae), 12 July 1960 (coll. A. Catley); Watut River, on roots of *C. arabica*, 2 July 1963, attended by ant *Pheidole megacephala* (coll. J. J. H. Szent-Ivany, B. J. Kebbey); Milne Bay Province, Inanianene Village, on roots of *C. canephora*, September 1959 (coll. K. S. Cole) (all BMNH).

Solomon Islands, no locality, on *Cocos nucifera* (Arecaceae), January 1932 (coll. R. A. Lever); Russell Is, Fai Ami, on roots of *C. nucifera*, 9 November 1955; Ngella, Votilau, on roots of *C. nucifera*, 10 November 1956; Guadalcanal, Kukum, on *C. nucifera*, 14 August 1948 (coll. B. A. O'Connor), 4 October 1956 (coll. E. S. Brown); Tenaru, on roots of *C. nucifera*, 31 July 1954; Rua Vatu, on roots of *C. nucifera*, 19 November 1954; Malaita, Baunani, on roots of *C. nucifera*, 10 November 1954; Rendova, on *Ficus* sp. (Moraceae), 8 October 1954; San Cristobal, Ugi, Three Sisters, Boroni, April 1955, on *C. nucifera*, Waimamura, on *C. nucifera*, *Inocarpus edulis* (Fabaceae), April 1955, Kira Kira, on *Ficus* sp., 20 August 1956 (all BMNH).



Tonga, Tongatapu group, Tongatapu, Nukunuka, 23 May 1975, on bark of *Bischofia javanica* (coll. W. C. Pierce) (BMNH).

Vanuatu, Malekula, near Mae, on *Ficus* sp., 25 November 1983 (coll. P. A. Maddison) (BMNH); Tanna, Lenakel, on *Ficus* sp., 12 March 1980 (coll. N. L. H. Krauss) (BMNH); no locality, on *Balanophora* sp. (Balanophoraceae), 7 June 1971 (coll. K. E. Lee) (BMNH).

Western Samoa, intercepted at Hawaii, Honolulu, on *Colocasia esculenta* (Araceae), 16 July 1984 (coll. Onizuka, Kagawa) (USNM). Upolu, Apia, under bark of tree, February 1955 (coll. N. L. H. Krauss) (USNM).

Comments

Paraputo leverii is now a widespread species in the Pacific region and it has been recorded also from Java, Sabah, and Thailand by Williams (2004). In Papua New Guinea, as discussed by Williams (1987), it causes damage to coffee roots (reported earlier by Szent-Ivany and Stevens 1966). Beardsley (1966) recorded *P. leverii* from Tobi in the Caroline Islands (now Republic of Palau) when it was collected on an injured coconut trunk.

Williams and Watson (1988) discussed this species from the tropical South Pacific region and new records herein indicate that it is present also in American Samoa and Western Samoa. This mealybug is often found on roots and may be carried accidentally on plant material. It is a possible invasive species.

Key to adult females of *Paraputo* of the Pacific region

1. Multilocular disc pores absent. Cerarii numbering nine pairs only, including frontal pair *guadalcanalae* sp. nov.
- Multilocular disc pores present. Cerarii numbering 17 or 18 pairs 2
2. Oral collar tubular ducts on venter noticeably wider than trilocular pores. Cerarii numbering 17 pairs *kukumii* Williams
- Oral collar tubular ducts on venter no wider than trilocular pores, usually much narrower. Cerarii numbering 18 pairs 3
3. Cerarii distinct and easily distinguishable, each mostly lacking additional anterior and posterior groups of conical setae and trilocular pores 4
- Cerarii appearing as a continuous row, each cerarius with anterior and posterior groups of conical setae and trilocular pores *chimbuensis* sp. nov.
4. Dorsal setae mostly short and stiff, 17.5–25.0 µm long. Translucent pores present on each hind femur and tibia. *leverii* (Green)
- Dorsal setae mostly noticeably longer and flagellate, 40–75 µm long. Translucent pores absent from each hind femur and tibia *aracearum* sp. nov.

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