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The systematic position of *Psylla phorodendri* Tuthill with comments on the New World genus *Freysuila* Aleman (Hemiptera, Psylloidea, Aphalaroidinae)

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The North American *Psylla phorodendri* Tuthill is transferred to the New World genus *Freysuila* as *Freysuila phorodendri*, comb. n. Adult and larval characters are described and illustrated. A key to adults and fifth instar larvae of the three species assigned to *Freysuila* is provided. *F. phorodendri* is known from Arizona and California and develops on mistletoes of the genus *Phoradendron* (Viscaceae). The other known *Freysuila* spp., *F. dugesii* and *F. caesalpiniae*, are associated with caesalpinioid Fabaceae and occur in Mexico and Peru/Ecuador respectively.

Keywords: Psylloidea, *Freysuila*, taxonomy, *Phoradendron*, North America.

INTRODUCTION

Psylla phorodendrae (sic) was described by Tuthill (1939) on the basis of material collected on mistletoes of the genus *Phoradendron* (Viscaceae) in Arizona and California. The description is brief and lacks illustrations. Tuthill (1943) emended the name to *Psylla phoradendri* and reproduced almost the same description adding sketches of the male and female terminalia as well as the forewing. Hodkinson (1988) correctly emended the name to *phorodendri* and transferred the taxon to *Cacopsylla*.

The examination of material of *Psylla phorodendri* consisting of types and specimens recently collected in California showed that the species is not a member of *Cacopsylla* (subfamily Psyllinae) but belongs to the genus *Freysuila* (subfamily Aphalaroidinae). *Freysuila* comprises so far *F. dugesii* Aleman from Mexico (and introduced into Florida) and *F. caesalpiniae* (Tuthill) from Peru and Ecuador. Both species are associated with caesalpinioid Fabaceae. Here we formally transfer *Psylla phorodendri* to *Freysuila*, redescribe the adult and the last instar larva, and provide a key to the three known species of *Freysuila*.

MATERIAL AND METHODS

The following material was examined:

Freysuila caesalpiniae (Tuthill, 1959): Ecuador: SW, Sogoranga, 10.iii.1991, Caesalpinioidae, Muddiman leg., many larvae (BMNH; NHMB). – Peru: Lomas de Lachay, 28.ix.1958, L.D. Tuthill leg., 2 ♂♂, 3 ♀♀, paratypes of *Aremica (Indana) caesalpiniae* (USNM).

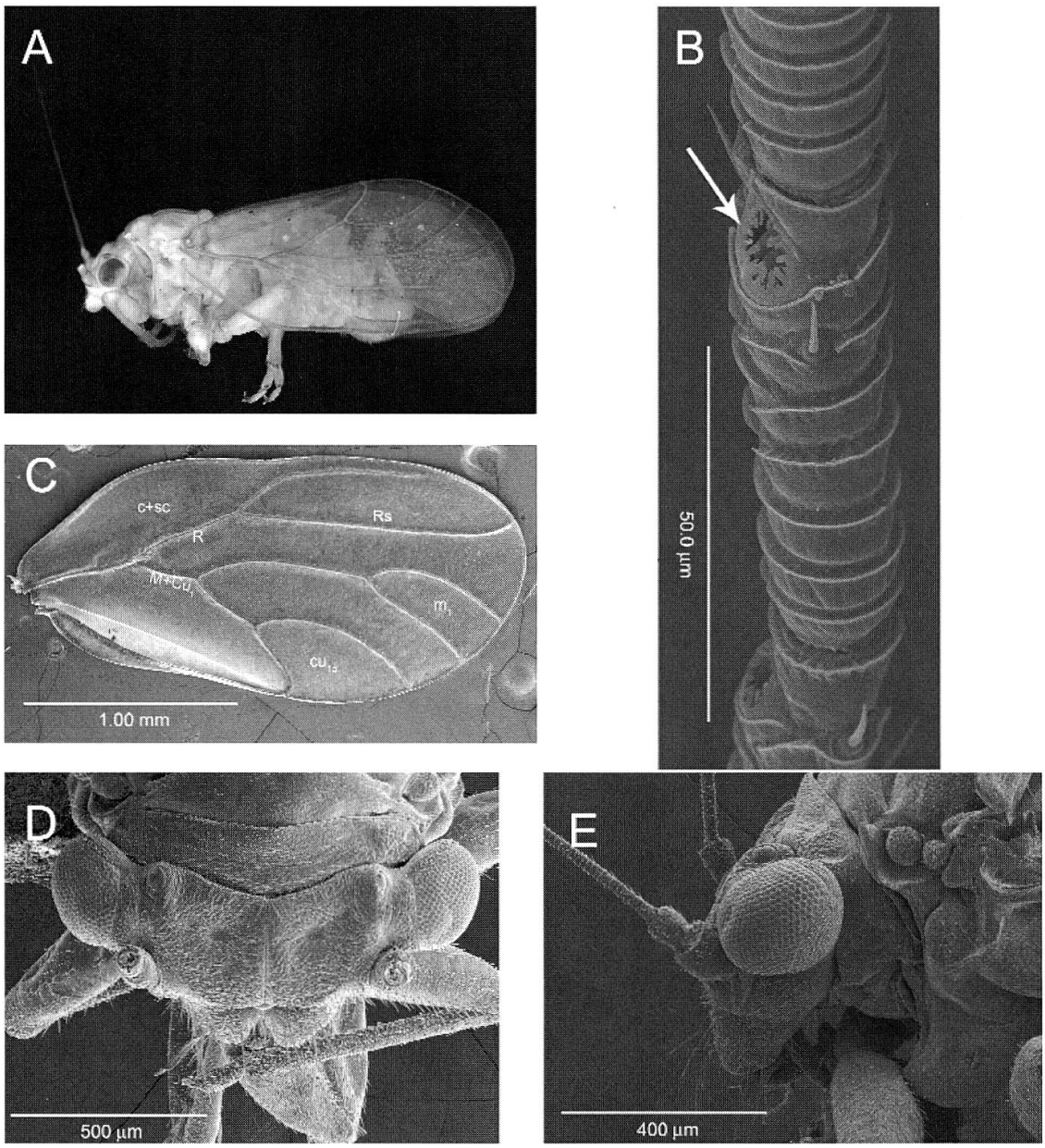

Fig. 1. *Freysuila phorodendri* (Tuthill, 1939). – A. Male adult in lateral view. B. Antennal segment 6 with rhinarium (arrow). C. Forewing. D. Head, in dorsal view. E. Head and parts of thorax, in lateral view.

Freysuila dugesii Aleman, 1887: USA: Florida, Broward County, Hollywood, 11.vii.1995, *Haematoxylon campechianum*, K. Vanyo leg., 2 ♀♀, 2 larvae (NHMB); same but 3.x.1995, 3 ♂♂.

Freysuila phorodendri (Tuthill, 1939): USA: California, Los Angeles County, May, A. Koebele leg., 2 ♂♂, 2 ♀♀, 4 larvae, paratypes of *Psylla phorodendri* (USNM); California, San Bernardino County, Oak Glen, 27.viii.1941, on mistletoe on oak, D.D. Jensen leg., 1 larva (USNM); California, Riverside County, 2 miles North of Idyllwild on Route 243, San Bernardino National Forest, 1717 m, 33.75° N 116.72° W, 20.v.2004, *Phoradendron villosum* (Nutt.) Nutt. (Viscaceae), D.

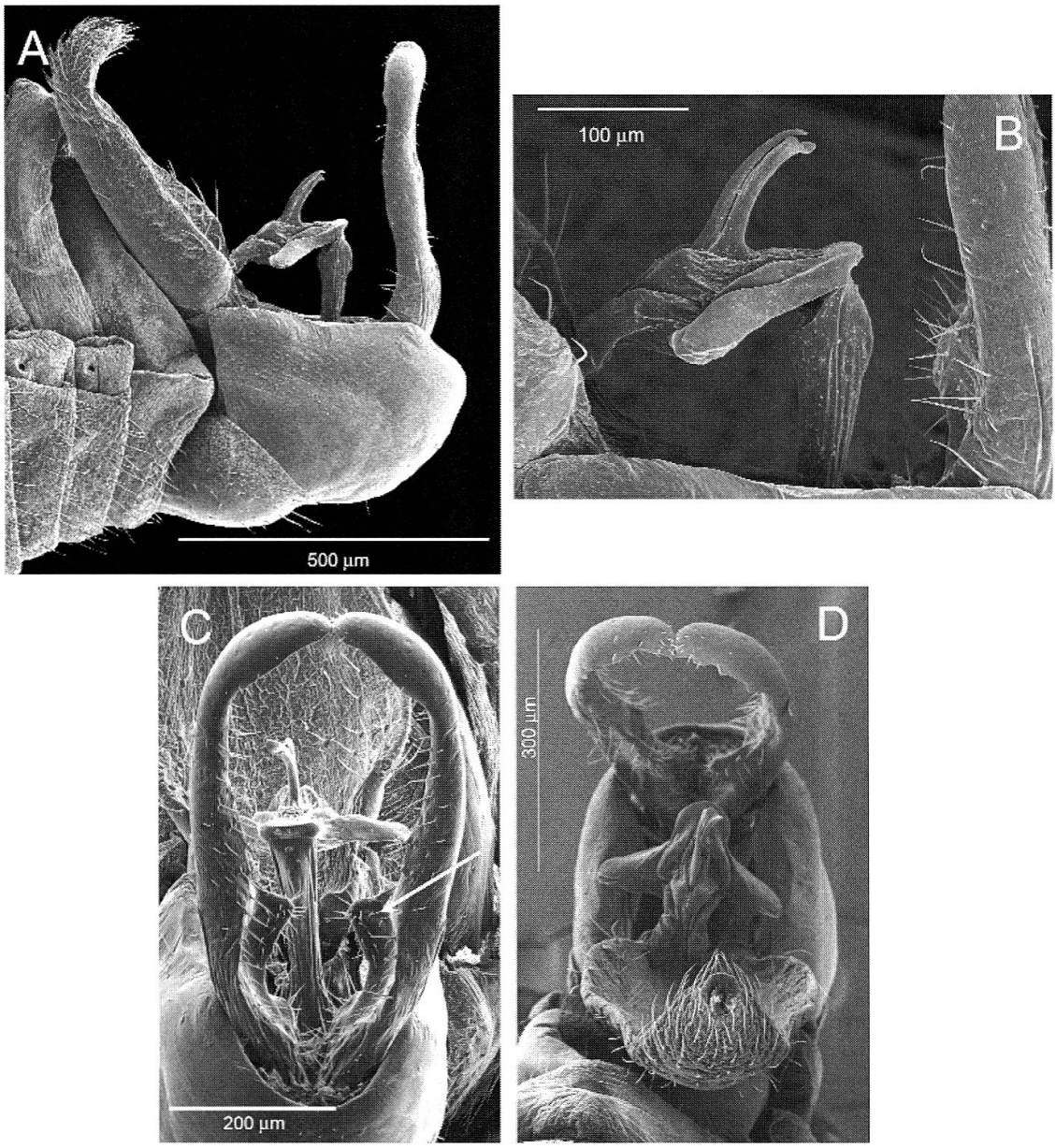

Fig. 2. *Freysuila phorodendri* (Tuthill, 1939). – A. Male terminalia, in lateral view. B. Distal portion of aedeagus. C. Male terminalia, in rear view (arrow indicates inner basal lobe). D. Male terminalia, in dorsal view.

Wyniger leg., PBI_CAL04_L10, 14 ♂♂, 9 ♀♀, 1 larval skin (AMNH; NHMB); California, Kern County, South of Tehachapi on Water Canyon Road, 1445 m, 35.10° N 118.49° W, 21.v.2004, mistletoe on *Quercus john-tuckeri* Nixon & Muller, D. Wyniger leg., PBI_CAL04_L19, 2 ♂♂, 3 ♀♀ (AMNH).

Abbreviations: AMNH – American Museum of Natural History, New York; BMNH – Natural History Museum, London; NHMB – Naturhistorisches Museum Basel; USNM – National Museum of Natural History, Washington, D. C. (psylloid collection deposited in the USDA, Beltsville, MD).

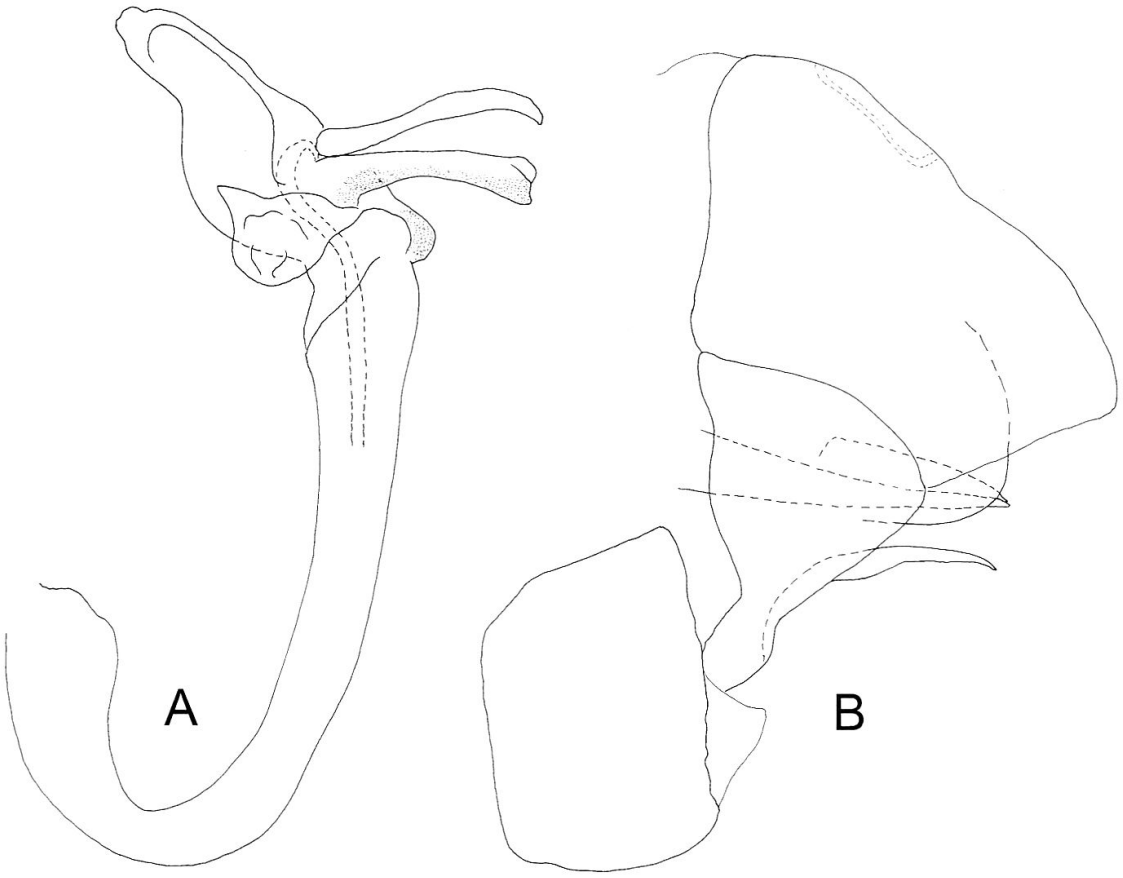

Fig. 3. *Freysuila phorodendri* (Tuthill, 1939). – A. Aedeagus. B. Female terminalia, in lateral view (setosity not shown).

TAXONOMY

Freysuila phorodendri (Tuthill), new combination (Figures 1–5)

Psylla phorodendrae Tuthill, 1939: 186; Holotype ♀, USA: Arizona, Huachuca Mountains, 18 July 1938, from mistletoe on oak (R.H. Beamer) (Snow Collection, University of Kansas), not examined.

Psylla phoradendri; Tuthill, 1943: 500; unjustified emendation, ICZN, 1999, article 32.

Psylla phorodendri; Hodkinson, 1988: 1192.

Description: Adult (Fig. 1A). Coloration. Yellow to ochreous, genal processes slightly lighter. Eyes olive-grey, ocelli red. Antennal segments 1 and 2 ochreous, flagellum brown getting darker towards apex. Tip of rostrum black. Mesoscutum with four brown or grey longitudinal stripes. Forewing semitransparent; cell c+sc dirty whitish, remainder yellowish basally, ochreous apically. Hindwing whitish. Legs and abdomen straw-coloured, terminalia ochreous.

Structure. Head, in lateral view, inclined in a 45° angle to longitudinal body axis (Fig. 1E), in dorsal view about as wide as or slightly wider than mesoscutum and distinctly wider than pronotum (Fig. 1D). Eyes subglobular, relatively small and weakly stalked. Vertex subtrapezoidal, lacking macroscopic setosity, weakly

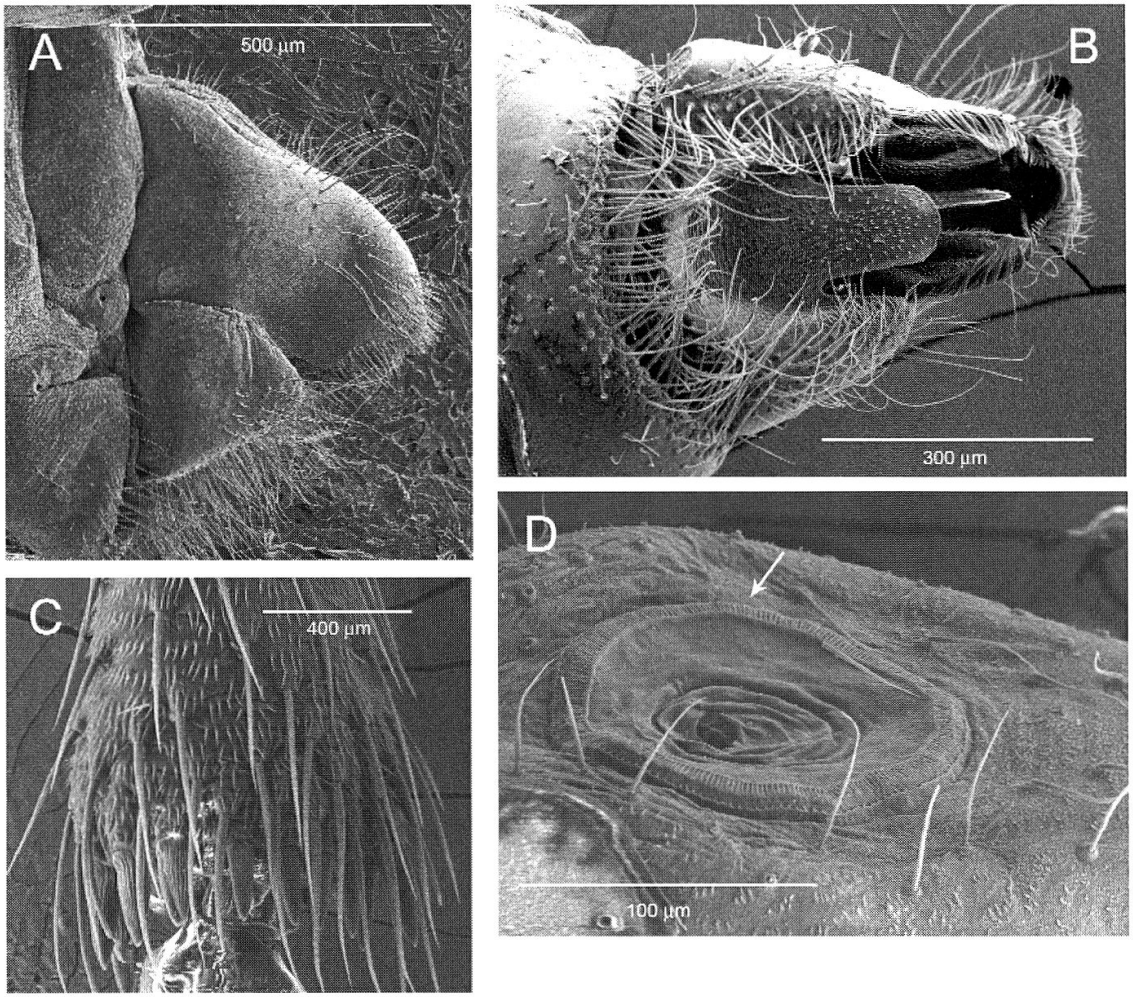

Fig. 4. *Freysuila phorodendri* (Tuthill, 1939). – A. Female terminalia, in lateral view. B. Female terminalia, in ventral view. C. Apex of metatibia. D. Female circumanal ring (arrow).

shiny, foveae weakly indented. Ocelli small. Genal processes short, less than half vertex length, conical, subacute apically; covered in sparse, short setosity. Antenna 10-segmented, about 1.5 times head width; bearing each a subapical rhinarium on segments 4, 6, 8 and 9 which is covered by a wreath of spines (Fig. 1B). Terminal antennal setae subequal in length, shorter than antennal segment 10. Clypeus flat, triangular in outline; rostrum short. Thorax weakly arched dorsally, lacking macroscopic setosity, shiny. Pronotum ribbon-shaped, weakly curved cephalad in the middle; propleurites moderately broad, episternum smaller than epimeron, suture with both dorsal branches developed. Forewing (Fig. 1C) oval, semitransparent; costal break present; cell c+sc large, vein C+Sc strongly curved; pterostigma well-developed, tapering towards the apex; vein Rs almost straight except for apex which is curved towards fore margin; vein M+Cu_1 about half as long as vein R; radular areas not marked; surface spinules fine, developed in all cells, densely and irregularly spaced. Hindwing membranous, almost as long as forewing; costal setae grouped, vein M+Cu not developed. Meracanthus of metatibia horn-shaped, metatibia without basal spine, with a posteriorly open crown of 9–10 evenly spaced, strongly sclerotized apical spurs (Fig. 4C). Metabasitarsus with 2 sclerotized spurs. Terminalia as in figs 2–4. Male proctiger slender, almost straight (Fig. 2A). Subgenital plate elon-

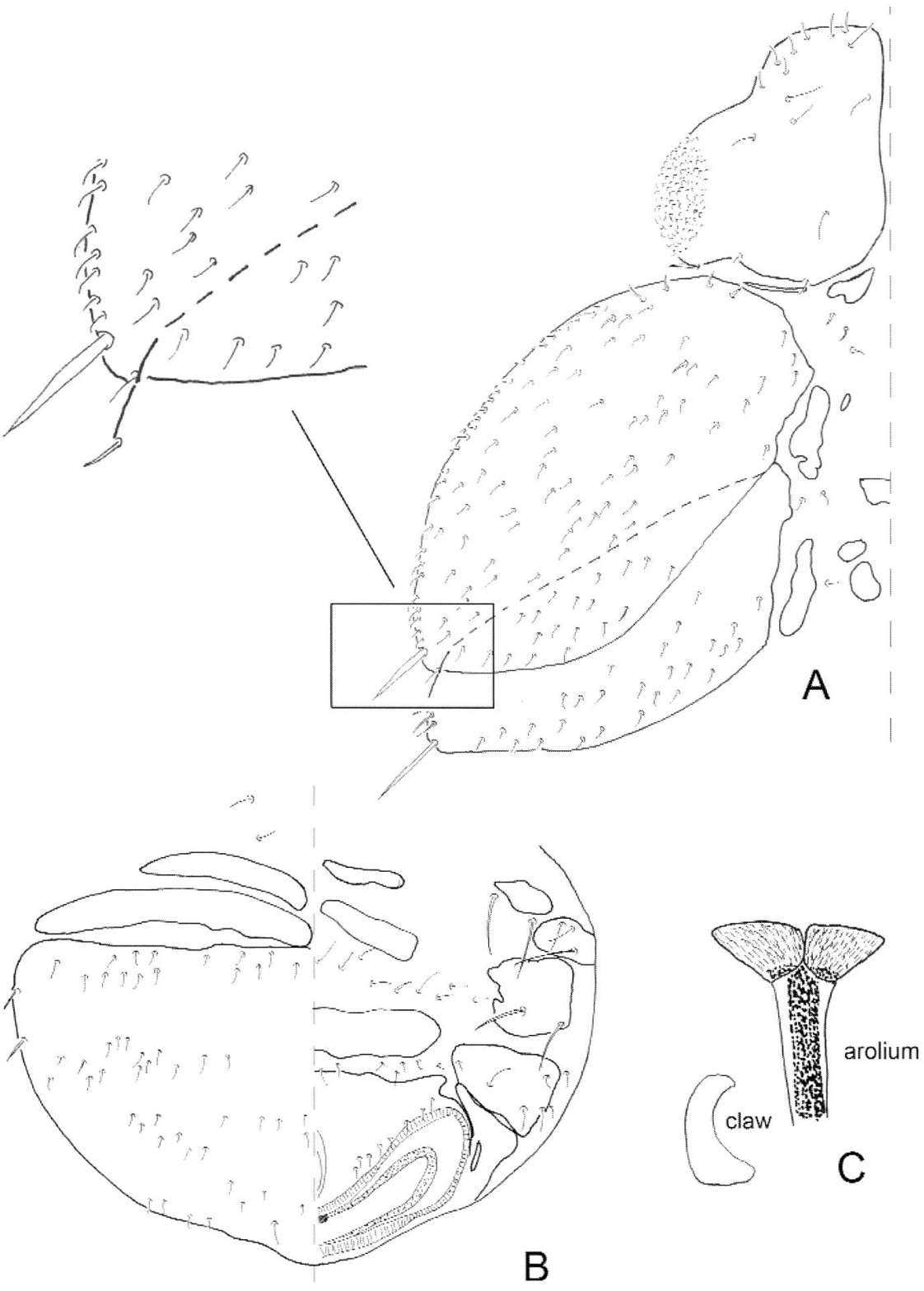

Fig. 5. *Freysuila phorodendri* (Tuthill, 1939), fifth instar larva. – A. Head and thorax, including wing pads, dorsal view (left side only). B. Caudal plate; left dorsal view, right ventral view. C. Tarsal arolium and claw.

gate (Fig. 2A). Paramere very long and thin, straight in lateral view (Fig. 2A), bearing a large inner lobe in basal fifth (Fig. 2C, arrow), apex sclerotized, curved mesally (Fig. 2D). Basal portion of aedeagus narrowly curved, apical portion very short, complex, bearing two lateral wings and a sclerotized dorsal projection; sclerotized end tube of ductus ejaculatorius very long, weakly curved (Figs 2B, D, 3A). Female terminalia short (Figs 3B, 4A). Fourth visible abdominal sternite covered in long dense setae (Fig. 4B). Proctiger cuneate, subacute apically; circumanal ring short, almost circular with an outer row of small, and an inner row of long pores (Fig. 4D). Subgenital plate indented medially with a weakly sclerotized apical projection (Figs 3B, 4B); covered in dense long setae (Fig. 4A, B). Lateral valvula broadly rounded, dorsal valvula cuneate, ventral valvula straight, pointed apically (Fig. 3B).

Fifth instar larva (Fig. 5). Coloration. Sclerites brown. Antenna 8-segmented. Forewing pad large, costal margin curved, apex angled; margin and dorsal surface bearing short stiff setae, apex with a single long normal seta; with a few long dark marginal pointed setae. Hindwing pad broad, apex subacute; margin and dorsal surface bearing stiff short setae, apex with one long simple seta. Tarsal arolium with long petiole, longer than claws. Caudal plate indistinctly angular posteriorly, covered in rows of stiff short setae. Abdominal margin with a few long simple setae. Circumanal ring large, slightly angular, in ventral position near the hind margin; outer ring consisting of a single row of pores.

Distribution: USA: Arizona, California.

Host plants: *Phoradendron villosum* (Nutt.) Nutt., *Phoradendron tomentosum* (DC.) Oliv. and '*Phorodendron pubescens*' (see Tuthill 1939) (Viscaceae).

KEY TO FREYSUILA SPECIES

1 **Adult**: body colour yellow; total length > 3.0 mm. Vertex flat anteriorly. Genal processes contiguous medially. Paramere longer than ♂ proctiger. **Larva**: antenna 8-segmented. Head, thorax, wing pads and abdomen without conspicuous black dorsal capitate setae. On *Phoradendron* ..... ***F. phorodendri***

— **Adult**: body colour with more or less extended dark brown areas; total length ≤ 3.0 mm. Vertex bearing raised tubercles anteriorly. Genal processes widely separated medially. Paramere as long as or shorter than ♂ proctiger. **Larva**: antenna 9-segmented; head, thorax, wing pads and abdomen bearing conspicuous black dorsal capitate setae. On Fabaceae 2

2 **Adult**: total body length < 2.5 mm. Metapostnotum forming a conspicuous pointed tubercle. Forewing relatively narrow in apical third; cell cu_{1a} small. Paramere strongly curved back apically. ♀ proctiger relatively long. **Larva**: antenna, fore and mid legs without conspicuous black capitate setae. Circumanal ring large, width > 0.4 caudal plate width. On *Haematoxylum* ..... ***F. dugesii***

— **Adult**: total body length > 2.5 mm. Metapostnotum forming inconspicuous flattened tubercle. Forewing relatively wide in apical third; cell cu_{1a} large. Paramere weakly curved back apically. ♀ proctiger relatively short. **Larva**: antenna, fore and mid legs bearing conspicuous black capitate setae. Circumanal ring small, width < 0.2 caudal plate width. On *Caesalpinia* ..... ***F. caesalpiniae***

DISCUSSION

F. phorodendri is a member of *Freysuila* based on the presence of following characters. Adults: The antennal rhinaria are covered in a wreath of spines (Fig. 1B). The cells m_1 and cu_{1a} of the forewing (Fig. 1C) are relatively long. The apical sclerotized spurs of the metatibia form an open crown (Fig. 4C). The female subgenital plate (Figs 3B, 4A, B) is relatively short and bears a median lamellar process which is, in ventral view, surrounded by long setae. Larvae: The wing pads and the caudal plate bear long setae.

The complex aedeagus and the median process of the female subgenital plate are typical for many members of the Aphalaroidinae (Burckhardt 1987). In larvae, the presence of tarsal arolia bearing a long petiole in combination with the absence of sectasetae and extra pore fields on the caudal plate characterize the Aphalaroidinae.

The diversity of host plant taxa within the subfamily Aphalaroidinae is surprisingly high for Psylloidea where often higher taxonomic units are restricted to a single plant taxon (Burckhardt 2005). Burckhardt (2005) suggested that the Fabaceae may be the original host association of Aphalaroidinae from where other plant taxa have been colonized. It is likely that this is also the case in *Freysuila*. So far *F. phorodendri* is the only known member of Aphalaroidinae associated with Viscaceae.

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REFERENCES

Burckhardt, D. 1987. Jumping plant lice (Homoptera: Psylloidea) of the temperate Neotropical region: Part 1. Psyllidae (subfamilies Aphalarinae, Rhinocolinae and Aphalaroidinae). — Zoological Journal of the Linnean Society 89: 299–392.

Burckhardt, D. 2005. *Ehrendorferiana*, a new genus of neotropical jumping plant lice (Insecta: Hemiptera: Psylloidea) associated with conifers (Cupressaceae). — Organisms, Diversity & Evolution 5, Electronical Supplement 12: 1–10.

Hodkinson, I.D. 1988. The Nearctic Psylloidea (Insecta: Homoptera): an annotated check list. —Journal of Natural History 22: 1179–1243.

Tuthill, L.D. 1939. New species of Psyllidae from the Western United States. — Iowa State College Journal of Science 13: 181–186.

Tuthill, L.D. 1943. The Psyllids of America North of Mexico (Psyllidae: Homoptera) (Subfamilies Psyllinae and Triozinae). — Iowa State College Journal of Science 17: 443–660.

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