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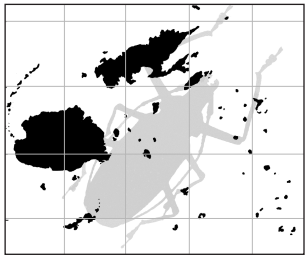
FIJI ARTHROPODS XI



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Cover: *Heteromeringia veitchi* Bezzi (Diptera: Clusiidae)

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FIJI ARTHROPODS XI

Editors' Preface

We are pleased to present the eleventh issue of *Fiji Arthropods*, a series offering rapid publication and devoted to studies of terrestrial arthropods of the Fiji Group and nearby Pacific archipelagos. Most papers in this series will be the results of collecting and research on the Fijian fauna deriving from the NSF-funded "Terrestrial Arthropods of Fiji" project. Two co-PIs and 15 specialists form the core team of scientists who have agreed to publish new taxa that result from collecting during this survey. However, as space allows, we welcome papers from any scientist who is currently working on arthropod taxonomy in Fiji.

This issue contains results of discoveries of new species of Clusiidae (Diptera—Lonsdale & Marshall), Pipunculidae (Diptera—Skevington & Kehlmaier), Goeridae (Trichoptera—Johanson & Oláh), and Empididae (Diptera—Plant & Sinclair). Manuscripts are currently in press or in preparation on Auchenorrhyncha, Muscidae, Keroplatidae, Mycetophilidae, Mythicomyiidae, Limoniidae, Dolichopodidae, and Brenthidae, and will appear in future issues.

The editors thank the Government of Fiji (especially the Ministries of Environment and Forestry), the National Science Foundation (DEB 0425970), and the Schlinger Foundation for their support of this project. Types of new species deriving from this study and voucher specimens will be deposited in the Fiji National Insect Collection, Suva.

All papers in this series are available free of charge as pdf files downloadable from the following url:

http://hbs.bishopmuseum.org/fiji/fiji-arthropods/

We encourage interested authors to contact us before submitting papers.

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Fiji Arthropods XI. Edited by Neal L. Evenhuis & Daniel J. Bickel. *Bishop Museum Occasional Papers* 98: 3–14 (2008).

The Clusiidae (Diptera: Schizophora) of Fiji, with redefinition of *Heteromeringia* Czerny and synonymy of *Tranomeringia* Sasakawa[1]

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Abstract. The Clusiidae of Fiji include five species in three clusiodine genera (*Craspedochaeta* Czerny, *Hendelia* Czerny, *Heteromeringia* Czerny), two of which (*Hendelia similis* **n. sp.** and *Hendelia amerinx* **n. sp.**) are described here as new. *Craspedochaeta sasakawai* Lonsdale & Marshall, the only Fijian species of Clusiidae not endemic to the islands, is newly recorded. The eggs of *Hendelia similis* and *C. sasakawai* are described. *Tranomeringia* Sasakawa **n. syn.** is found to be a junior synonym of a redefined *Heteromeringia*.

INTRODUCTION

We here record three genera and five species from Fiji, all of which belong to the subfamily Clusiodinae, of which two are newly described and one of which is new to Fiji. The material used for this revision is mostly from recent and historical surveys [see Evenhuis & Bickel (2005)] that have added material to the Fiji National Insect Collection, Suva (FNIC) and the Bishop Museum, Honolulu (BPBM).

Clusiids can be separated from other Fijian Acalyptratae by their porrect (not elbowed) antenna, dorsal subapical (not dorsobasal) arista, and angulate extension on the outer margin of the pedicel. They are relatively slender (Figs. 1, 2), 2.4–5.4 mm in length, and have an anterodistally infuscated wing with a complete subcostal vein. Although we have no biological or behavioral data on the Fijian Clusiidae, clusiid adults elsewhere frequently occur on leaves and dead wood and are often attracted to dung (Lonsdale & Marshall, 2006b, 2007a, 2007b).

MATERIALS AND METHODS

Specimen preparation and terminology follows that in Lonsdale & Marshall (2006b). Holotypes and paratypes of new species and vouchers of previously described species are deposited either in FNIC, BPBM, or the National Museum of Natural History, Washington, D.C. (USNM); one specimen of *H. kondoi* is in the University of Guelph Insect Collection (DEBU). M_{1+2} ranges are the length of the ultimate section of vein M

1. Contribution No. 2008-002 to the NSF-Fiji Arthropod Survey.

Figs. 1–2. Dorsal (left) and lateral (right) photo; **1.** *Heteromeringia veitchi* Bezzi; **2.** *Hendelia similis*. Characters useful for separation of these two superficially similar species: a – anterior fronto-orbital bristle inclinate; b – hind (third) fronto-orbital bristle present; c – presutural (third) dorsocentral bristle present; d – arista densely plumose; e – both mid and hind tibiae with dorsal preapical bristles. Only females of *Hendelia similis* have bicoloured fore tarsi.

divided by the length of the penultimate section. Material collected after 1981 is preserved in 95% ethanol; the remaining specimens are air-dried and pinned.

KEY TO THE CLUSIIDAE OF FIJI

1. Anterior fronto-orbital bristle inclinate (Fig. 1). All tibiae without dorsal preapical bristles. One small lateral scutellar bristle. Phallus long, dark, coiled and double-ribbed (Fig. 14) ..…….....…… **Heteromeringia** Czerny … 2

–. Anterior fronto-orbital bristle reclinate (Fig. 2). Mid and hind tibiae with dorsal preapical bristles. Two well-developed lateral scutellar bristles. Phallus sac-like (Figs. 5, 8) .....……... 3

2. Bristles brown. First flagellomere usually dark brown to brownish-orange (rarely orange in males); pedicel neither large nor enclosing first flagellomere. Scutum with large anteromedial spot. Knob of halter white. Fore tibia brown. Length 3.1–4.1 mm. Surstylus much smaller than cerci (Fig. 12). Distiphallus with large dark distal sclerites (Fig. 14) ……...…… **Heteromeringia veitchi** Bezzi

–. Bristles black. First flagellomere orange, sometimes with brown outer and apical infuscations; partially enclosed by enlarged pedicel. Scutum with shoulders and postsutural stripe brown. Knob of halter brown. Fore tibia yellow. Length 4.7 mm. Surstylus as long as cerci (Fig. 15). Distiphallus without complex distal sclerites (Fig. 17) ..... **Heteromeringia kondoi** Sasakawa

3. Arista sparsely short-plumose. Second (of four) fronto-orbital proclinate and inclinate. Two dominant dorsocentral bristles, with small, but well developed setula immediately in front of anterior dorsocentral. Notum brown. Pleuron brown, or yellow with brown subnotal stripe. Ejaculatory apodeme mushroom-shaped (Fig. 5). Phallapodeme rod-like ...……. **Craspedochaeta sasakawai** Lonsdale & Marshall

–. Arista long-plumose, with hairs sparsely or densely arranged. Both fronto-orbitals reclinate. Three long, widely separated dorsocentral bristles. Notum yellow with dark anteromedial spot. Pleuron yellow-orange. Ejaculatory apodeme long and thin with apex only slightly widened (Fig. 8). Phallapodeme flat and thin with medial keel .....……. **Hendelia** Czerny … 4

4. Arista sparsely plumose. Interfrontal bristle absent. Fore tibia brown. Surstylus and cerci small and rounded (Figs. 6, 7). Ventral projection of hypandrium+pregonite with several distal setulae (Fig. 8) ..... **Hendelia amerinx** Lonsdale & Marshall, **n. sp.**

–. Arista densely plumose. Interfrontal bristle present. Fore tibia yellow. Surstylus and cerci very long and slender (Figs 9&10). Ventral projection of hypandrium+pregonite densely setulose (Fig. 11) …… **Hendelia similis** Lonsdale & Marshall, **n. sp.**

SPECIES DESCRIPTIONS

Craspedochaeta sasakawai Lonsdale & Marshall
(Figs. 3–5, 19, 20)

Czernyola pleuralis Curran, 1936: 54. Sasakawa, 1971: 60; 1990: 59.

Czernyola palliseta pleuralis Curran. McAlpine, 1960: 80. Soós, 1962: 449.

Tonnoiria palliseta pleuralis (Curran). Steyskal & Sasakawa, 1966: 248.

Craspedochaeta pleuralis (Curran). Sasakawa, 1974: 162. Pitkin & Evenhuis, 1989: 536. [Preoccupied by Williston, 1896.]

Craspedochaeta sasakawai Lonsdale & Marshall, 2006b: 47. Replacement name.

Description. Body length 2.4–3.9 mm.

Male: Bristles light brown. Two dorsocentral bristles plus additional small bristle in front of anterior dorsocentral. Acrostichal bristle absent. Arista sparsely short-plumose, with hairs not much wider than diameter of central filament. Ocellar bristle well developed. Interfrontal bristle absent. Four fronto-orbital bristles (second pair from front inclinate and proclinate, others reclinate), with posterior bristle minute. Two pairs of lateral scutellar bristles. Mid and hind tibiae with dorsal preapical bristles (relatively far from apex). Notum dark brown. Pleuron yellow with proepisternum and dorsal margin of anepisternum brown. Legs light yellow with coxae and base of femora white and dorsal tip of mid and hind femora brownish. Frons dark brown with anteromedial margin orange; head light yellow below antenna with gena and anterior half of occiput white and silvery tomentose (posterior margin of occiput brown); antenna (excluding arista) light yellow with infuscation at base of arista; back of head (excluding ventral margin) dark brown. Abdomen dark brown. M_{1+2} ratio 3.9–4.8. Wing dusky on distal half (fading posteriorly).

Female: As described for male except as follows: first flagellomere evenly brown; gena, occiput, clypeus and palpus dark brown; face dirty white; femora and tibiae brown (excluding knees and bases of femora); terminalia yellow.

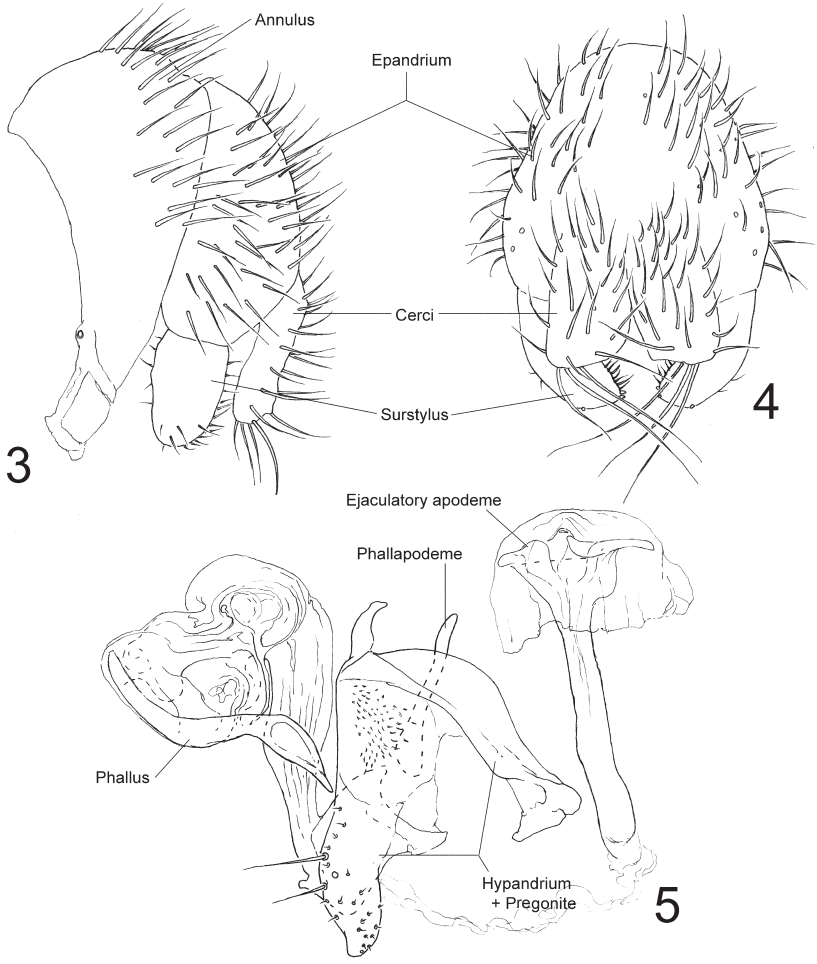
Male terminalia (Figs. 3–5): Annulus well-developed with sternite strongly convex. Length of epandrium slightly more than half width and height. Cerci truncated, setose, almost entirely divided, and as high as epandrium is long. Surstylus almost bare on both faces, with inner face densely short setose along posterior margin; twisted so that inner surface visible posteriorly; three small distal tubercles (two anterior and one posterior). Hypandrial arm weakly attached to hypandrium+pregonite; hypandrium+pregonite membranous and setose on basal half and well sclerotized, setose (two or three well developed bristles) and setulose on distal half; with acute posteromedial projection. Distiphallus long and weakly sclerotized, with basal half straight and distal half convoluted and sac-like with several interspersed sclerotized sections (including long, well-defined apical sclerite). Ejaculatory apodeme mushroom-shaped and as long as hypandrium+pregonite.

Female terminalia **(Fig. 20)**: Ventral receptacle relatively small with apex slightly recurved; subterminal flagellum thin at base, and broad and truncated apically. Spermatheca clear and cylindrical with base twisted, end broadly rounded and apex with thin rounded cone. Spermathecal duct nearly as long as spermatheca and connected to genital chamber via a small, spherical bulb.

Material examined: FIJI: **Kioa**: 1♀, S. coast to center, 0–60 m, 4 Oct 1979, M.K. Kamath, S.N. Lal, G.A. & S.L. Samuelson (BPBM). **Vanua Levu**: 1♂, 1♀, 0.6 km S of Rokosalase Village, 23 Apr–8 May 2004, Malaise in forest, Schlinger, Tokota'a, -16.5333°, 179.0181°W, 180 m (BPBM). **Viti Levu**: 1♂, Nausori Highlands, 500–600 m, 1 Oct 1970, N.L.H. Krauss (BPBM); 1♂, Lami, 20–200 m, Mar 1976, N.L.H. Krauss (BPBM).

Comments: *Craspedochaeta sasakawai* is a widely distributed species otherwise known from Australia, Sri Lanka, Malaysia, Vanuatu, New Guinea and the Solomon and Caroline Islands. The Fijian representatives largely match the description in Sasakawa (1971) but they are slightly larger and the female first flagellomere is more heavily infuscated (with the exception of the basal margin), making them more similar in appearance to *C. palliseta* (Curran), which may be conspecific.

While a subterminal flagellum is clearly visible on the ventral receptacle of the Fijian specimen examined here, it appears to be absent in the specimen from Papua New Guinea examined by Lonsdale & Marshall (2006b). This specimen from Papua New Guinea (which has been reexamined) is in poor condition, particularly compared to the alcohol-preserved material used here, making it likely that the flagellum has broken off and become lost amongst the rectal papillae and abdominal tracheae. The presence of this flagellum in both the *Craspedochaeta biseta* group and *Heteromeringia* (Fig. 22) is notable, because its absence in the *C. concinna* species group is now subsequently interpreted as a derived character, providing additional evidence for the monophyly of this otherwise poorly-defined clade.



Figs. 3–5. *Craspedochaeta sasakawai*, male genitalia; **3.** External, left lateral; **4.** External, posterior; **5.** Internal, left lateral.

Hendelia amerinx Lonsdale & Marshall**, n. sp.**

(Figs. 6–8)

Description

Male: As described for *H. similis*, except as follows: body length 3.0 mm; bristles brown; arista sparsely plumose; interfrontal bristle absent; fore tibia and tarsi brown; M_{1+2} ratio 3.3.

Female: Unknown.

Male terminalia (Figs. 6–8): Annulus short and sparsely setose. Epandrium relatively wide and bulbous, swelling above dorsal margin of annulus; perianal area longer than wide. Cerci very small, fused, rounded and setose, with one pair of longer central bristles. Surstylus longer than high, bare

on anterior half of outer face and with numerous small rounded tubercles along inner-distal margin. Hypandrium thin and straight with three medial setae. Hypandrium+pregonite thinnest apically with numerous terminal setulae. Keel of phallapodeme relatively shallow. Distiphallus rod-like on basal half and weakly sclerotized and sac-like on distal half. Ejaculatory apodeme slightly longer than hypandrium with end flat and abruptly widened.

Type material: *Holotype* ♂, FIJI: **Viti Levu**: 4 km WSW Colo-i-Suva Vlg., Mt. Nakobalevu, 372 m, Malaise 3, Schlinger, Tokota'a, 18.055°S, 178.424°E, 25 Feb–17 Mar 2003 (FNIC). *Paratype*: FIJI: **Viti Levu**: 1♂, Lami, 100–300 m, 1 Mar 1971, N.L.H. Krauss (BPBM).

Comments: See comments for *Hendelia similis*.

Etymology: The specific name adds the prefix "a" (Gr. *without*) to "merinx" (Gr. *hair*), denoting the absence of the interfrontal bristle in this species, as well as the relative lack of hairs on the arista.

Hendelia similis Lonsdale & Marshall, **n. sp.**
(Figs. 2, 9–11, 18, 21)

Description. Body length 2.9–3.6 mm.

Male: Bristles yellow to light brown. Three dorsocentral bristles (anterior bristle slightly shorter). Acrostichal bristle absent. Arista densely plumose (hairs more sparsely arranged apically), with hairs much longer than diameter of central filament. Ocellar bristle absent. Interfrontal bristle long. Two reclinate fronto-orbital bristles with anterior bristle half length of posterior bristle (hind fronto-orbital absent). Anterior lateral scutellar bristle minute and posterior bristle long. Mid and hind tibiae with dorsal preapical bristles. Thorax yellow with orange tint and anterior margin of scutum with large dark brown spot. Legs light yellow. Abdomen brown with tergite 1 yellow. Frons, back of head, occiput, parafacial, ventral margin of gena, clypeus and palpus dark brown to black; first flagellomere light yellow; face and gena dirty white; first flagellomere yellowish-white. M_{1+2} ratio 5.5. Wing dusky.

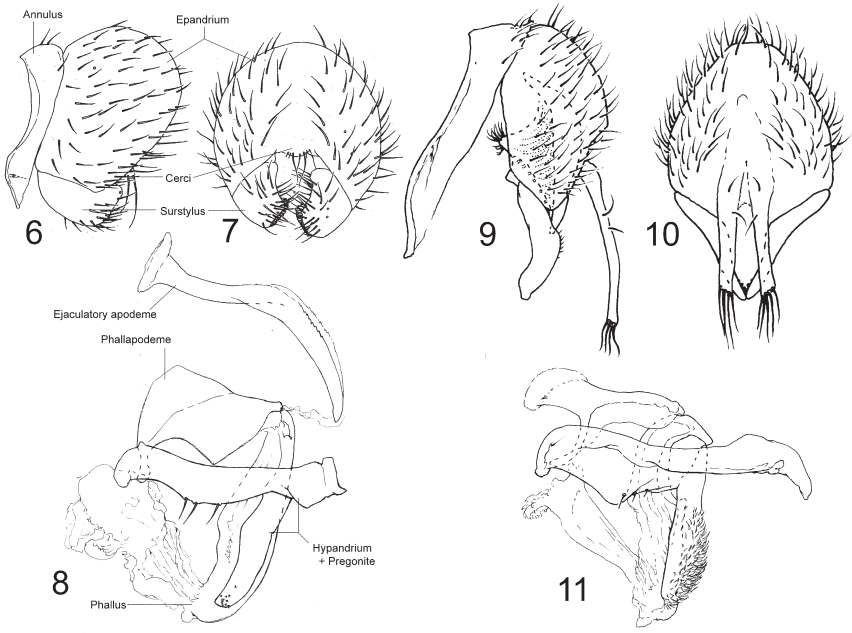
Female (Fig. 2): As described for male except as follows: gena black and shiny; fore tarsomeres 2(3)–5 white and tarsomere brown to light brown; first flagellomere sometimes with infuscation at base of arista; notal spot extending posteriorly as acute stripe; scutum with one pair of short faded postsutural stripes (not touching posterior margin).

Male terminalia (Figs. 9–11): Annulus well-developed, with few dorsal bristles. Epandrium slightly tapering dorsally; perianal area longer than wide; closely associated (or fused) with subepandrial sclerite (which projects past distal margin of epandrium), producing heavily setose inner anteromedial process. Cerci very thin, and elongate, with two medial bristles and 4–5 apical bristles. Surstylus thin, curved and nearly as high as epandrium; bare on outer face and setose on inner face, with stout row of bristles along inner-basal margin. Phallapodeme relatively high and narrow. Arm of hypandrium stout with three medial bristles; ventral process heavily setose along posterior margin.

Female terminalia (Fig. 21): Ventral receptacle sac-like basally and with long subterminal flagellum (not resembling other *Hendelia* but similar to *Craspedochaeta* and *Heteromeringia)*. Spermatheca darkly pigmented and strongly telescoped and wrinkled, with apex thin, pointed and invaginated; length twice width with base widest. Spermathecal duct approximately three times length of spermatheca.

Type material: *Holotype* ♂, FIJI: **Viti Levu**: Nukura Forest, 60–130 m, 15 Oct 1979, 260-in forest logging area, M.K. Kanath, S.N., Lal, G.A. & S.L. Samuelson (BPBM Type No. 16838). *Paratypes*: FIJI: **Viti Levu**: 1♀, 4 km WSW Colo-i-Suva Vlg., Mt. Nakobalevu, 372 m Malaise 3, Schlinger, Tokota'a, 18.055°S, 178.424°E, 12–25 Feb 2003 (BPBM); 1♀, 14-26 Jul 2003 (BPBM); (1♀, 25 Feb–17 Mar 2003 BPBM).

Comments: The closely related *Hendelia similis* and *H. amerinx* superficially resemble the Burmese *H. punctifrons* (Frey), which has a similar notal pattern, but the latter



Figs. 6–8. *Hendelia amerinx* male genitalia; **6.** External, left lateral; **7.** External, posterior; **8.** Internal, left lateral.
Figs 9–11. *Hendelia similis* male genitalia; **9.** External, left lateral; **10.** External, posterior; **11.** Internal, left lateral.

species has a sparsely short-plumose arista, a distally dark first flagellomere, a yellow frons and an anteromedially brown scutellum. Furthermore, although the characteristic white and brown fore tarsi of *H. similis* females (females are unknown for *H. amerinx*) are variably found in several Neotropical and Australian *Hendelia*, none of these taxa exhibit other features that would indicate a close phylogenetic relationship.

An unusual aspect of the Fijian *Hendelia* is that although they do not closely resemble congeners, they are strikingly similar in appearance to both Fijian species of *Heteromeringia* (Fig. 1), suggesting that there may be some selection pressure leading to a convergence in coloration. The superficially similar species of these two genera can be separated using the key and the characters highlighted in figures 1 and 2.

Phylogenetically important characteristics of *Hendelia similis* include relatively slender spermathecal ducts and a ventral receptacle without a subterminal disc, since both are synapomorphic of *Hendelia* plus *Clusiodes* (Lonsdale & Marshall, 2007b)). *Hendelia amerinx* also varies from the hypothetical *Hendelia* plus *Clusiodes* ground-plan in that the interfrontal bristles are absent. Although the absence of these structures indicates that the Fijian *Hendelia* could represent a lineage basal to *Hendelia*+*Clusiodes*, they are here retained in *Hendelia* pending further evidence.

Etymology: The specific name is Latin for "resembling", as the overall coloration of this species, particularly the female, is highly convergent with that of *Heteromeringia veitchi* (see Figs. 1, 2).

Heteromeringia kondoi Sasakawa
(Figs. 15–17)

Heteromeringia kondoi Sasakawa, 1966: 89. Pitkin & Evenhuis, 1989: 534.

Description. Body length 4.7–5.4 mm.

Male: Bristles black. Two dorsocentral bristles plus a small bristle in front of anterior dorsocentral. Acrostichal bristle absent. Arista sparsely plumose, with hairs much longer than diameter of central filament. Ocellar bristle minute. Interfrontal bristle absent. Three fronto-orbital bristles (reclinate, with anterior bristle inclinate). Pedicel relatively large, somewhat enclosing first flagellomere. Gena relatively high (approximately 1/4 height of eye). Fore and hind tibiae with inner surface densely covered with short, erect setae; fore tibia with row of short, stout, pointed bristles on inner-basal half. One small lateral scutellar bristle. Tibiae without dorsal preapical bristles. Scutum yellow with central pointed notal stripe extending past suture, with postpronotum, notopleuron and anterolateral corners of scutum brown. Scutellum yellow with wide brown central stripe. Katatergite brown and anatergite yellow. Pleuron yellow with dorsal margin of anepisternum brown. Legs yellow with fore tarsi brown, excluding distal two tarsomeres, which are yellowish-white. Frons dark brown excluding lateral margins; first flagellomere lightly infuscated on anterior and lateral surfaces; back of head with one pair of thin dorsal stripes radiating from foramen; head light yellow below antenna; remainder of head yellow; upper 1/3 of gena and anterodorsal margin of occiput pilose. Knob of halter brown, excluding light apex. Abdomen dark brown with tergite 1 yellowish-orange. M_{1+2} ratio 5.7–5.9. Wing dusky on distal 1/3, darkest to costa.

Female: As described for male except shoulders mottled with yellow and pleuron with complete subnotal stripe.

Male terminalia (Figs. 15–17): Surstylus approximately 3/5 height of epandrium with slight inward curve at midpoint and six pointed tubercles apically; outer face sparsely setulose. Cerci widest subapically, narrowest at base and with shallow emargination apically. Phallapodeme slightly longer than surstylus with apex thin and more weakly-sclerotized. Pregonite bilobed, with two stout bristles on thinner lobe and several setulae on base and apex of shorter, wider lobe. Distiphallus not spit into segments and ribs of subequal length, membrane at apex with several thin, weakly-sclerotized sections.

Type material examined: *Holotype* ♂, FIJI: **Viti Levu**: Nandarivatu, 7 Nov 1938, 2700 ft, Y. Kondo (BPBM).

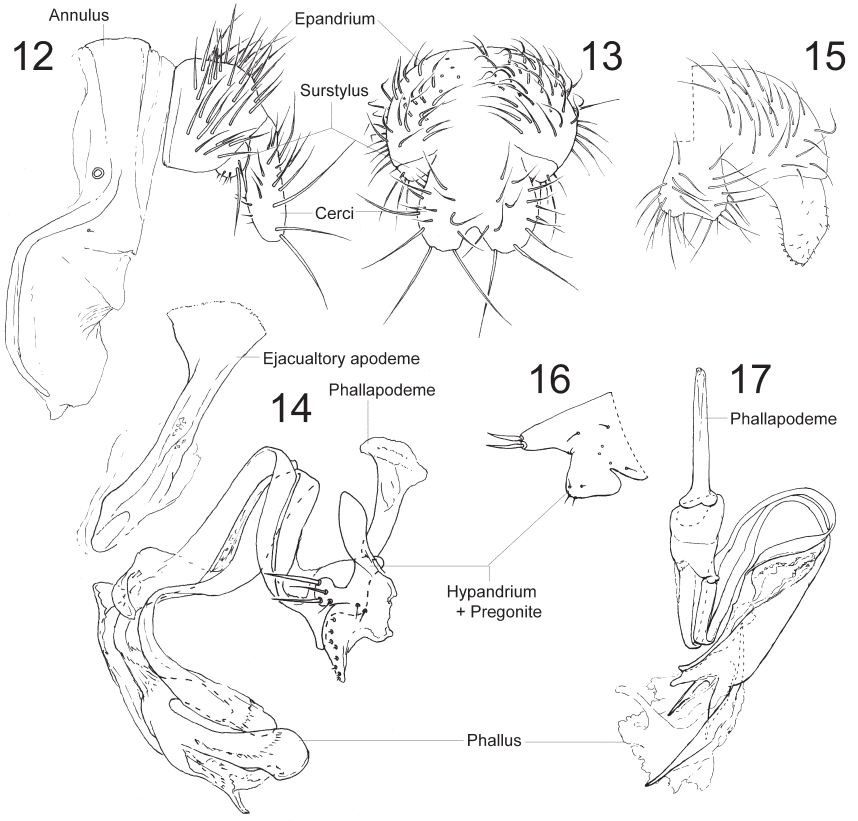
Additional material examined: **Viti Levu**: 1♀, Nandarivatu, Yoo Microwave Stn., 1000–1100 m, 16–23 Aug 1978, S. & J. Peck, forest dung (DEBU).

Heteromeringia veitchi **Bezzi**
(Figs. 1, 12–14, 22)

Heteromeringia veitchi Bezzi, 1928: 87. Frey, 1960: 25. Sasakawa, 1966: 92. Pitkin & Evenhuis, 1989: 534.

Description. Body length 3.1–4.1 mm.

Male (Fig. 1): Bristles brown. Two dorsocentral bristles plus small bristle in front of anterior dorsocentral. Acrostichal bristle absent. Arista sparsely short plumose, with hairs several times diameter of central filament. Ocellar bristle minute. Interfrontal bristle absent. Three fronto-orbital bristles (reclinate, with anterior bristle small and inclinate). One minute lateral scutellar bristle. Tibiae without dorsal preapical bristles. Body yellow with orange tint, and anterior margin of scutum (excluding postpronotum) dark brown with complete faded central stripe extending posteriorly onto scutellum and (sometimes) anatergites. Legs yellow with fore tibia and inner-distal tip of fore femur brown, fore tarsi brown with tarsomeres 4 and 5 white. Head dark brown with frons black, mouthparts pale, antenna sometimes yellow, gena dirty white to brown and pilose. Abdomen dark brown. M_{1+2} ratio 6.0–6.3. Wing dusky.



Figs. 12–14. *Heteromeringia veitchi*, male genitalia; **12.** External, left lateral; **13.** External, posterior; **14.** Internal, left lateral. **Figs. 15–17**. *Heteromeringia kondoi*, male genitalia; **15.** Posterior (portion of left side excluded); **16.** Hypandrium+pregonite, left lateral; **17.** Phallapodeme and phallus, anterior.

Female: As described for male except as follows: notal stripe usually stronger; gena shiny and dark brown; fore tarsomere 3 white.

Male terminalia (Figs. 12–14): Annulus large and ill-defined along anterior and posterior margins, with membranous ventral pouch enclosing phallus. Epandrium small and broadly rounded. Cerci as high as epandrium and with long setae; narrowest basally and emarginate apically. Surstylus rounded and very small with several short and two long bristles. Hypandrium+pregonite strongly arched anteriorly; medially with projection bearing two stout and two thin bristles; triangular and minutely setose distally. Phallapodeme nearly as long as hypandrium+pregonite. Distiphallus double-ribbed on basal half, with ribs blending into irregular medial and distal sclerites. Ejaculatory apodeme as long as combined length of phallapodeme and hypandrium+pregonite, with apex flared and rounded.

Female terminalia (Fig. 22): Ventral receptacle broadly rounded and recurved; subterminal flagellum present. Spermatheca darkly pigmented, transversely wrinkled on basal half, strongly telescoped, and subquadrate in shape. Spermathecal duct approximately four times length of spermatheca.

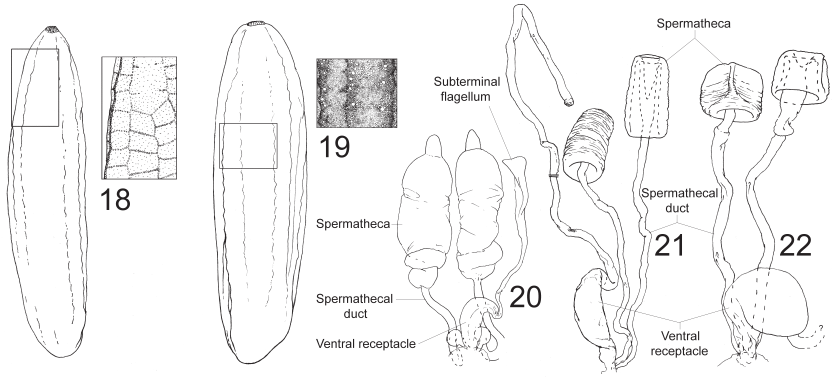
Type material: *Holotype* ♂, FIJI: **Viti Levu**: Lautoka, 4 Jul 1922, R. Veitch, in the Natural History Museum London (not examined).

Material examined: FIJI: **Ovalau**: 2♀, Levuka, 0–150 m, Mar 1969, N.L.H. Krauss (BPBM). **Taveuni**: 1♂, 5.6 km SE of Tavuki Village, Malaise, rainforest, 3–10 Jan 2003, Schlinger, Tokota'a, -16.843°, -179.965°, 1187 m (BPBM); 1♂, Taveuni Estate, 31 Oct–21 Nov 2002, Malaise in garden, M. Irwin, E. Schlinger, M. Tokota'a, 179°59'E, 16°50'S, 140 m (BPBM). **Vanua Levu**: 1♂, 0.6 km S of Rokosalase Village, 23.iv–8 May 2004, Malaise in forest, Schlinger, -16.5333°, 179.0181°, 180 m (BPBM). **Viti Levu**: 1♀ 1♂, Suva, vi.1963, M.R. Wheeler (USNM); 1♂, Belt Road 42, 44 mi W of Suva, 23 Jul 1938, beating shrub, 300 ft, E.C. Zimmerman (BPBM); 1♂, Lami, 0–200 m, N.L.H. Krauss, Mar 1981 (BPBM); 1♀, Feb 1981 (BPBM); 1♂, 1 km E Abaca Vlg., Koroyanitu Ntl. Pk., 800 m, Gavuione Trail, 17°40'S, 177°33'E, 19-26 Oct 2002, Malaise, E. Schlinger, Tokota'a (BPBM); 1♂, Sigatoka Sand Dunes N.P., Malaise, 11 Jun–9 Jul 2003, 44 m, M. Irwin, E. Schlinger, N. Tokota'a, 177°28'910"E, 18°9'99"S (BPBM); 1♂, Sigatoka Sand Dunes N.P., Malaise, 1.1 km SSW of Volivoli, 55 m, 6–17 Apr 2004, Schlinger, Tokota'a, -18.1694°, 177.4847° (BPBM); 1♂, Nakobalevu Mt., 12–24 Mar 2003, 178°25'E, 18°03'S, S rainforest, M. Irwin, E. Schlinger, N. Tokota'a, Malaise, 340 m (BPBM); 1♀, 4 km WSW Colo-i-Suva Vlg., Mt. Nakobalevu, 325 m, Malaise 2, 14–26 Jul 2003, Schlinger, Tokota'a, 18.056°S, 178.422°E (BPBM).

DISCUSSION

Immature Stages

The eggs of *Craspedochaeta sasakawai* and *Hendelia similis* differ from those described from other clusiids (Lonsdale & Marshall, 2006a, 2006b) in that they are more shallowly tuberculate and furrowed, and the surface is more elaborately textured with thin scalloped ridges and more variation in tubercle size (Figs 18&19). In *H. similis* (Fig. 18), minute irregularly-spaced tubercles are arranged within staggered quadrilateral cells bordered by single rows of slightly larger tubercles. In *C. sasakawai* (Fig. 19), irregular rows of large tubercles intersperse rows of contiguous circular patches containing smaller and more densely-arranged tubercles.



Figs. 18–19. Eggs, with enlarged detail of microtexture: **18.** *Hendelia similis*; **19.** *Craspedochaeta sasakawai*. **Figs. 20–22**. Female internal genitalia; **20.** *C. sasakawai*; **21.** *Hendelia similis*; **22.** *Heteromeringia veitchi*.

Synonymy of *Tranomeringia* with *Heteromeringia*

Tranomeringia (including *T. zosteriformis* Sasakawa, the type, and *T. melasoma* Sasakawa) was described as a close relative of *Heteromeringia*, differing in having a short propleural bristle, a bifurcated basiphallus and extremely pronounced male vibrissae (Sasakawa, 1966). We have examined individuals of *T. zosteriformis* (Tel Aviv University, Israel), an undescribed *Tranomeringia* (Royal Ontario Museum, Toronto), and most *Heteromeringia* species, and we can see no evidence to support this genus as distinct and separate from *Heteromeringia*. Although the male vibrissae are certainly derived, the propleural bristle is as large as that seen in any other *Heteromeringia* and the basiphallus is not significantly different. Furthermore, these species are strikingly similar (and almost certainly related) to other *Heteromeringia* with small ocellar bristles, brown bristles (black in *H. kondoi*), no anepisternal disc, and black and white fore tarsi, including the two Fijian species described above, supporting its placement within that genus.

For these reasons, *Tranomeringia* **n. syn.** is included here as a junior synonym of *Heteromeringia*, which can now be redefined using the following distinct and often easily-observed synapomorphies: anterior fronto-orbital bristle inclinate; one (not two) pair of small lateral scutellar bristles; acrostichal bristle absent; tibiae without dorsal preapical bristles; distiphallus elongate and with one pair of heavily-sclerotized lateral "ribs"; annulus (male sternites 6–8) with enlarged ventral membranous pouch to enclose the distiphallus when at rest; apex of ejaculatory apodeme fan-like.

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A New Species of *Chalarus* Walker from Fiji (Diptera: Pipunculidae)[1]

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Abstract: *Chalarus irwini* is described from Fiji. Diagnostic characters are illustrated and the possible relationship of the new species to other Old World *Chalarus* species is discussed.

INTRODUCTION

This is the third in a series of papers that ultimately aims to document the diversity of all Fijian Pipunculidae. Earlier papers documented the taxonomy of *Collinias* Aczél (Skevington, 2006) and *Tomosvaryella* Aczél, 1939 (Skevington & Földvári, 2007). Until the recent inventory of Fijian invertebrates, *Collinias vitiensis* Muir, 1906, was the sole representative of the Fijian pipunculid fauna (named from two specimens). From recent collecting efforts, we now know that over 25 species in seven genera are supported by a collection of 2180 specimens collected within the scope of the Fiji Arthropod Survey (Skevington & Földvári, 2007; Skevington, unpublished data). The bulk of the family's diversity occurs in the genus *Clistoabdominalis* and almost all Fijian pipunculid species are endemic.

Chalarus is a diverse, globally distributed pipunculid genus containing 42 described species including two nomina dubia (Jervis, 1992; De Meyer, 1996; De Meyer and Skevington, 2000). This number belies the true diversity of the group. *Chalarus* has received little attention from taxonomists and the true number of species might be around 200. No species have been described from Australia (where several are present), the Afrotropics, or the Indian subcontinent, and only one taxon has been described from North America so far where there are likely at least 25 species (J. Skevington, unpubl. data). The European species are currently under revision by the junior author. Other than this upcoming work, only three authors have ever attempted to review regional faunas of this genus (Jervis, 1992; Morakote & Hirashima, 1990; Rafael, 1990). Of these, only the last treated an entire biogeographical region and it was not comprehensive. *Chalarus* is previously undocumented from oceanic islands, but poor sampling could bias this as these flies are easily overlooked. For example, based on current knowledge, they are absent from New Caledonia, New Zealand, and Hawai'i (De Meyer, 2000; J. Skevington, unpubl. data). *Chalarus* are endoparasitoids of typhlocybine leafhoppers (Cicadellidae, Typhlocybinae) (Jervis, 1992). Records cited by Kapoor *et al.* (1987) of *Chalarus* attacking other groups of leafhoppers (Agallinae and Idiocerinae) are incorrect and are based on their

1. Contribution No. 2008-003 to the NSF-Fiji Arthropod Survey.

erroneous interpretations of Hardy (1943).

In the hope of obtaining more material, we waited until all of the material from the first few years of Fijian collecting was available to us before describing this species. *Chalarus* species are normally a major component of the pipunculid diversity so it is surprising that out of ~2200 Fijian pipunculids, we have only one specimen of *Chalarus*. We are convinced this perceived rarity is a sampling artifact and we will make more efforts to collect specimens of this genus in the future.

Superficially, members of *Chalarus* look very alike or are indistinguishable and dissection and study of the genitalia is, therefore, essential.

MATERIALS AND METHODS

The sole specimen examined will be deposited in FNIC (Fiji National Insect Collection, Suva, Fiji; currently held at Bishop Museum, Honolulu). Specimen preparation follows Skevington (2003). Photographs were taken through a Leica DM550B compound microscope and through a Canon EOS 10D camera equipped with a 65 mm macro lens. Leica Application Suite (LAS) was used to create a montage from multiple layers of photographs. Measurements were made using a graticule. Scale bars on the figures are all 0.1 mm.

The specimen is labeled with a unique reference number, in the format J. Skevington Specimen # *n* (shortened to follow the format JSS*n*). These numbers are used in a database of Pipunculidae specimens that JHS maintains (available upon request) and in the Fijian Arthropod Database (http://www.inhs.uiuc.edu/cee/fijimandala/).

Terminology and measurements are the same as those used by Skevington (2003, 2005) and Kehlmaier (2006). Genitalic terminology nomenclature follows Sinclair (2000) and is discussed by Kehlmaier (2006) and Skevington & Yeates (2001) with specific reference to Pipunculidae. For a recent summary of these items, see Skevington (2006). Abbreviations used in ratios in the description are as follows: LW: length of wing; MWW: maximum width of wing; LS: length of pterostigma; LSC: length of second costal section of wing; LTC: length of third costal section of wing; LFC: length of fourth costal section of wing ; LT35: maximum length of tergites 3 to 5; WT2: maximum width of tergite 2.

For details on the molecular methods used, see Skevington (2006).

TAXONOMY

Chalarus Walker

Chalarus Walker, 1834: 269. Type species: *Cephalops spurius* Fallén, 1816, by subsequent designation (Westwood, 1840: 135).

Chalarus is a very distinctive genus of tiny flies with reduced wing venation (discal cell open and anal vein poorly developed), closely related to *Verrallia* Mik, 1899 and *Jassidophaga* Aczél, 1939 within the subfamily Chalarinae (Rafael & De Meyer, 1992). They share several distinctive characters with other Chalarinae (none of which occur in Fiji): bristles present on frons and ocellar ridge, occiput narrow, head subhemispherical (flattened at back – round in other pipunculids), males dichoptic (only regularly encountered in *Dorylomorpha* Aczél outside of the Chalarinae), tergum and sternum 7 of females

fused to form syntergum, terga and sterna 6 and 7 of males fused to form synterga, epandrium small, gonopods enlarged and separate and phallus with two symmetric processes (can be reduced or lost secondarily). A key to the world genera of Pipunculidae is available in Skevington & Yeates (2001) and a key to Fijian genera is available in Skevington & Földvári (2007).

Chalarus irwini Skevington & Kehlmaier, **new species**
(Fig. 1)

Diagnosis. Male: *Chalarus irwini* is characterized by a narrow phallic shaft (Fig. 1D), considerably broadened phallic processes that show a strong rim (Fig. 1C) and are covered with fine bristles in their distal third (Fig. 1D), a distinctly elongated tip of distiphallus (Fig. 1D) and by all three ejaculatory ducts placed distally on the membranous tip of the distiphallus (Fig. 1D).

Description. Lengths: Body: 2.4 mm; wing: 2.5 mm.

Male. *Head*. Face black, silver pollinose. Labellum and palps light brown, the latter with two distal hairs on each. Eyes separated, all ommatidial facets of same size. Frons black, silver-grey pollinose in lower quarter. At its narrowest point width of 1.5 ommatidial facets. Antenna dark brown. Pedicel with three long upper and three lower bristles, two of the latter longer than flagellum which has an ovoid-kidney shape, typical for the genus, and is only slightly longer than wide. Vertex black. Ocellar triangle with two pairs of short ocellar bristles. Occiput black, hardly visible in lateral view.

Thorax. Postpronotal lobe, prescutum, scutum, scutellum, subscutellum and pleuron dark brown to black, sparsely brownish pollinose dorsally, more densely brown pollinose on pleuron. Dorsal surface of prescutum and scutum covered with rather widely spaced black hairs, as in other species of the genus, the longest ones towards the lateral and posterior margins (notopleural (1), supraalar and postalar (2) bristles). Scutellum with 2–3 pairs of long black marginal bristles, dorsally with one pair of short bristly hairs. Pleuron bare except anepimeron with 3 bristly hairs.

Legs. Entirely dark brown except tarsal segments which are light brown. All hairs mid to dark brown. Front legs missing (removed for DNA extraction); mid femur with 15 long hairs in posteromedial row, 7 shorter hairs in dorsal row, and 2 long posteroventral hairs at base of femur; hind femur with 4 long hairs in posterodorsal row and 7 shorter anterodorsal hairs. Pulvilli shorter than distitarsus.

Wing and halter. LW:MWW = 3.1. Wing surface with brownish tinge and covered with microtrichia except near base. Pterostigma brown and incomplete (LS:LTC = 0.8). LSC:LTC: LFC = 11.2: 6.8:1.0. Wing venation incomplete, as in other members of *Chalarus*. Halter pale brownish yellow.

Abdomen. Entirely dark brown and covered with sparse brown pollinosity. Hairs mid to dark brown and widely spaced. Dorsally and ventrally short, along lateral margins long. Tergites 1–4 almost parallel sided. LT35:WT2 = 1.0. Ventral aspect of abdomen with terminalia removed as in Fig. 1A.

Genitalia. Viewed laterally from left, surstylus as in Fig. 1E and dorsally as in Fig. 1F. Surstyli slightly asymmetrical, right surstylus with slightly more pronounced medial protuberance (“ventral process” sensu Jervis, 1992) (Fig. 1F). Gonopods essentially symmetrical (Fig. 1E). Subepandrial sclerite long and very narrow. Phallus with straight and narrow shaft (Figs 1C–D). Tip of distiphallus very long and apically rounded (Fig. 1D). Phallic processes slightly longer than membranous tip of distiphallus (compare Figs 1C with 1D), considerably broadened “tongue-shaped”, with distinct lateral rim and covered with small bristles on distal third, not orientated parallel with membranous tip of distiphallus but roughly 90° towards it (Fig. 1D). All three ejaculatory ducts placed distally on membranous tip of distiphallus (Fig. 1D). Ejaculatory apodeme parasol-shaped (Figs 1C-D).

Female unknown.

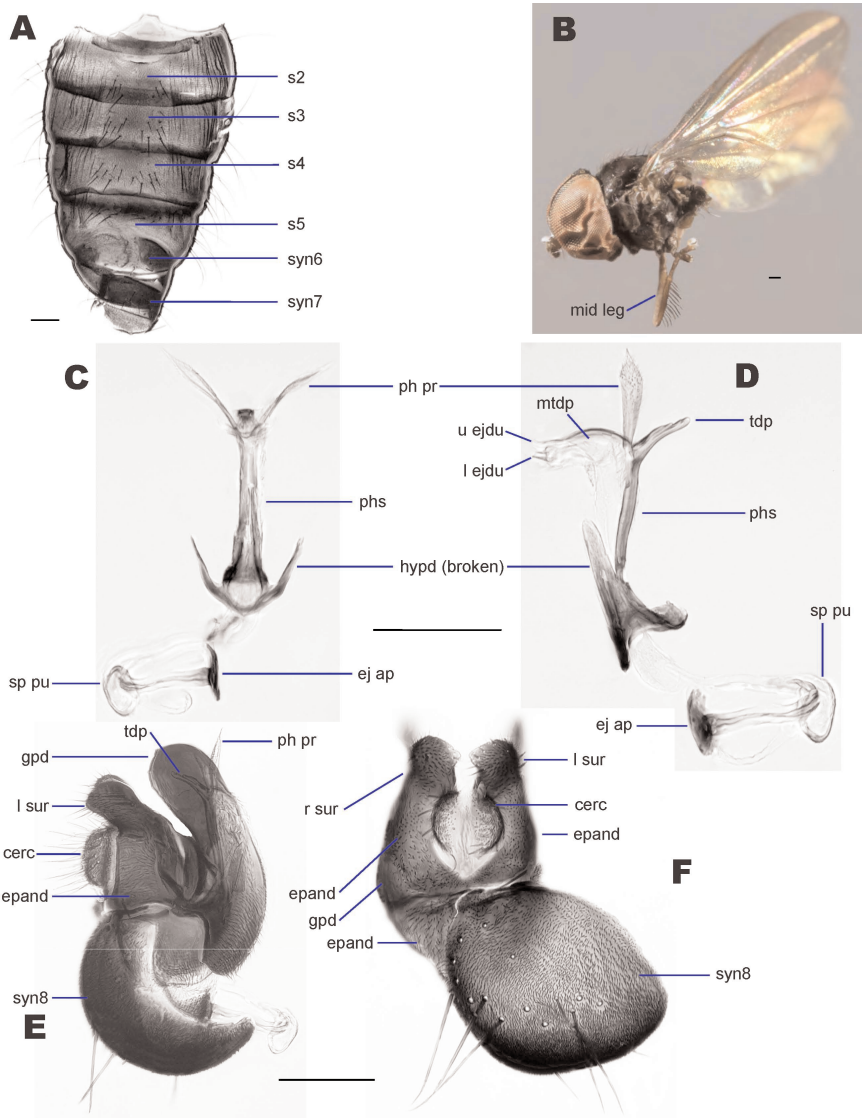

Figure 1. *Chalarus irwini* holotype (JSS15603). **A**. ventral of abdomen with genitalia removed. **B**. left lateral, abdomen removed. **C**. dorsal of phallus and associated structures. **D**. lateral of phallus and associated structures. **E**. left lateral of male terminalia. **F**. dorsal of male terminalia. Abbreviations: cerc = cercus; ej ap = ejaculatory apodeme; epand = epandrium; gpd = gonopod; hypd = hypandrium; l ejdu = lower ejaculatory ducts; l sur = left surstylus; mtdp = membranous tip of distiphallus; ph = phallus; ph pr = phallic process; phs = phallic shaft; r sur = right surstylus; s = sternite, sp pu = sperm pump; syn = syntergosternite; t = tergite; tdp = tip of distiphallus; u ejdu = upper ejaculatory duct. Scale bars = 0.1 mm.

Material examined. Holotype ♂ FIJI: **Kadavu**: Solodamu, 19°04' S, 178°07' E, 25 Aug–23 Oct 2003, 128 m, in coastal limestone forest, E.I. Schlinger, M. Irwin, M. Tokota'a, Malaise trap FJ-41B,[JSS 15603] (FNIC).

Etymology. Named after Mike Irwin, a prolific collector of flies who was involved with the collection of this specimen. We have examined over 2100 pipunculids collected by Mike in 12 countries, and there are undoubtedly many more specimens available that we have not yet seen. Few people have collected as many pipunculids from as many different parts of the world. He has been involved in collecting 176 of the known Fijian pipunculid specimens.

Remarks. We sequenced part of *cox1* (mitochondrial DNA from cytochrome c oxidase I) using 4 legs from the holotype (GenBank # DQ507246). Although only 273bp long, these data should help with future association of females and larvae with this species. We were unable to generate a complete barcode (650bp) and did not want to consume more of the holotype in an attempt to do so. Caution should thus be used when associating future specimens with this incomplete dataset. The data have also been incorporated into a working dataset (Kehlmaier & Assmann, unpubl.) to examine the relationships of this taxon with other Old World *Chalarus* species. Both morphological and molecular data suggest that *C. irwini* is more closely related to the European *C. brevicaudis* Jervis and *C. longicaudis* Jervis than any other species barcoded to date (note that no Australian *Chalarus* species have been barcoded yet). Uncorrected pairwise distance ranges between 7.7–8.1% for *C. brevicaudis* and 14.0–14.4% for *C. longicaudis* (Kehlmaier & Assmann, unpubl.). It is likely that as species in the Australasian and Oriental regions are discovered and studied, we will find that this genetic lineage constitutes numerous taxa separated by lower genetic distance. In most pipunculid genera studied, genetic distances between sister taxa are less than 5% (C. Kehlmaier & J. Skevington, unpubl. data). However, note that genetic distances between sister taxa in the 7 to 8% range were normal within Australian *Clistoabdominalis* species (Skevington *et al.* 2007). We are thus not suggesting that the Fijian species and the European species are sibling taxa, but there is a remote chance that they may be.

Compared to both European species, *C. irwini* has a narrow phallic shaft (instead of broad). The long tip of distiphallus is closest to *C. brevicaudis* (short in *C. longicaudis*) whereas the broadened phallic processes strongly resemble *C. longicaudis* with its strong rims and hairy tips (differently shaped in *C. brevicaudis* with weak rims and less hair). The Eastern Palaearctic *C. angustifrons* Morakote & Hirashima also belongs to this group but has almost twice as long and narrower phallic processes (other features: phallic shaft thin, tip of distiphallus long).

Note that the second author compared this new species to most described *Chalarus* species and concluded that it cannot be confused with any other species for which males are known.

Distribution. Presently only known from the island of Kadavu in Fiji.

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The Fijian Species of *Goera* Stephens, 1829 (Trichoptera: Goeridae) with Description of Two New Species[1]

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Abstract. *Goera vuda*, **n.sp**. and *Goera abaca*, **n.sp**. are described and illustrated from Viti Levu, Fiji and compared with *Goera fijiana* Banks, the only previously known species from Fiji. Records are given of unassociated females collected on Viti Levu and Vanua Levu, and distribution maps are presented for all Fijian species in the genus.

INTRODUCTION

The family Goeridae Ulmer belongs to the caddisfly suborder Breviten toria Weaver (Kjer *et al*., 2001; Weaver, 1983). The 11 genera recognized in the family are divided into the subfamilies Goerinae Ulmer (9 genera), Larcasinae Navas and Lepaniinae Wiggins, the latter 2 each with a single genus. The 6 species in the genus *Larcasia* Navas are known from either the Palaearctic or the Oriental Region and the monotypic genus *Lepania* Ross is endemic to the Nearctic Region. The most diverse genus of the Goerinae is *Goera* Stephens which, with 133 described species, represents more than 80% of the Goeridae species diversity. Representatives of the genus are recorded in the Nearctic, Palaearctic and Afrotropical Regions but the highest number of species is recorded in the Oriental Region. Two *Goera* species have previously been described from the Australasian Region. *Goera aneityuma* Neboiss was described from the Vanuatu (Aneityum) based on a relatively large sample comprising 5 males and 10 females. No species have been recorded so far from other areas in the Australasian biogeographical region, and the Vanuatu and Fijian species represent the southernmost records of the genus.

MATERIALS AND METHODS

This study is based on material collected in the Terrestrial Arthropod Survey of Fiji project founded by the US National Science Foundation and the Schlinger Foundation. Right wing pairs of the three species were removed, mounted on slides in glycerol and photographed using the Olympus DP70 digital camera mounted on an Olympus SZX12 stereomicroscope. The abdomens were cleared in ProteinaseK — which also generated DNA extracts — followed by final maceration in hot 8% KOH for half an hour. The abdomens were dehydrated in absolute alcohol and mounted in Euparal on a microscope slide before

1. Contribution No. 2008-004 to the NSF-Fiji Arthropod Survey.

examination and drawing. All drawings were produced by help of a drawing tube mounted on a Leitz Ortholux II. After drawings were completed the abdomens were returned to the alcohol vial with the rest of the animal. The illustrations were completed on drawing film, scanned at 600 dpi grayscale, and mounted onto plates in Adobe© Photoshop© 8.0. The records were plotted on maps from Map Resources using the iMap©2 software. The nomenclature applied to the genitalic morphology follows that of Nielsen (1957). Specimens are deposited in the following repositories Bishop Museum, Hawai'i (BPBM), Fiji National Insect Collection, Suva (FNIC) [currently held at Bishop Museum], Museum of Comparative Zoology, Harvard University, Cambridge, Mass. (MCZ), and the Swedish Museum of Natural History, Stockholm (NRM).

SYSTEMATICS

Goera Stephens

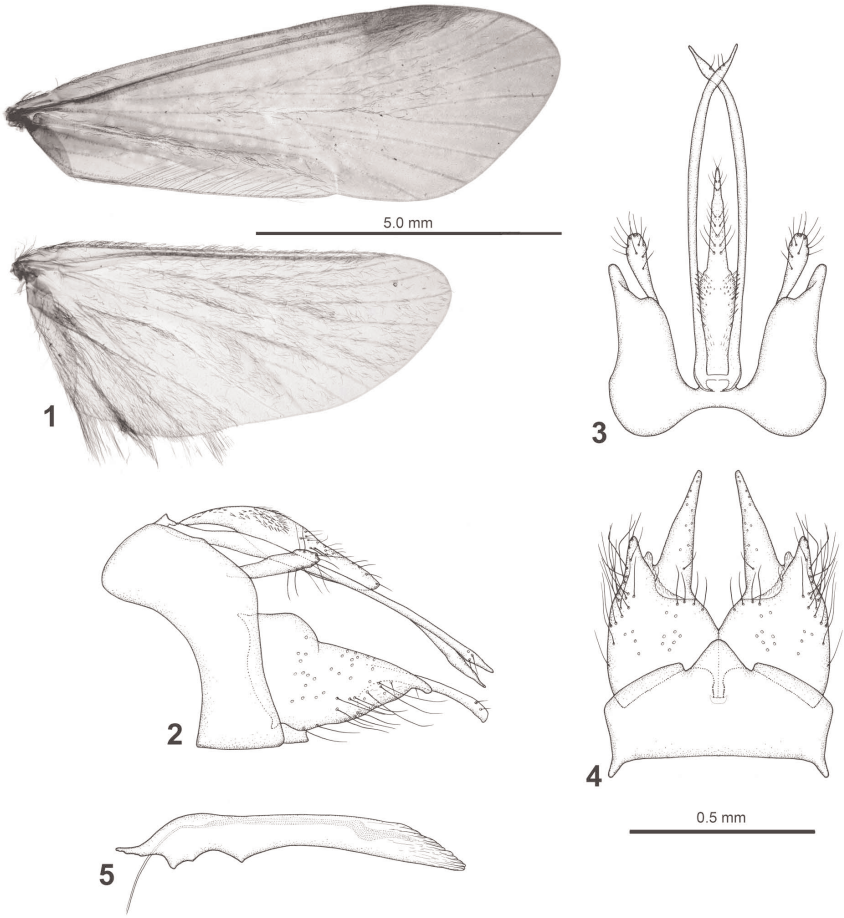
Goera Stephens, 1829: 28. Type species, *G. pilosa* (Fabricius, 1775) (=*Phryganea pilosa* Fabricius, 1775) (subsequent designation by Westwood, 1840)
Lasiostoma Rambur, 1842; Fischer, 1967: 3.
Sinion Barnard, 1934; Schmid, 1980: 190.
Spathidopteryx Kolenati, 1848; Hagen, 1858: 119.

Goera fijiana Banks
(Figs. 1–5)

Goera fijiana Banks, 1924: 444.
Goera vunida Mosely, 1941: 362; Neboiss, 1986a: 220.

Diagnosis. This species is distinguished from the other Fijian *Goera* species in that the dorsal part of segment IX is less strongly produced anterad; the dorsal process of segment X is wider in its proximal half in dorsal view; the coxopodites in lateral view are broader basally than in the middle; and the harpagones are depressed and narrow in lateral view.

Re-description based on new material. Male.
Wings (Fig. 1). Forewing length 6.0–9.1 mm, hind wing length 5.0–7.2 mm. Forewing crossvein M—Cu about as long as basal-most part of M3+4.
Abdomen. Ventral processes of segments VI and VII slightly curving posterad in lateral view (as in Fig. 7), sternum VII process shorter than sternum VI process; apices truncate in ventral view.
Genitalia (Figs. 2–5). Segment IX anterior and posterior margins nearly parallel in lateral view (Fig. 2); subdorsal parts produced anterad, with rounded anterior apices; in dorsal view (Fig. 3) with widely U-shaped, diverging posteromesal margin; anterior margin shallowly concave; in ventral view (Fig. 4) with widely triangular posteromesal process, anterior margin nearly straight. Superior appendages originating from segment IX well below dorsal-most part of segment IX (Fig. 2). Dorsal process of segment X strongly exceeding superior appendages (Fig. 2); broad in lateral view (Fig. 2); basal half with microtrichia being shortest at base of process; distal half with minute setae; basal half about 2 times broader than distal half in dorsal view (Fig. 3). Lateral processes of segment X narrowly tuboid, sub-straight in lateral view, with nearly drop-shaped apices and with 2–3 minute, subapicolateral setae (Figs. 2, 3); apices crossing each other in dorsal view (Fig. 3). Coxopodites more or less triangular, proximal one-third of each coxopodite distinctly wider than its central and distal parts (Fig. 2); tapering distally from one-third its length, apex pointed; ventral margin nearly straight (Fig. 2). Harpagones uniformly narrow in lateral view (Fig. 2), slightly curving ventrad, with numer-



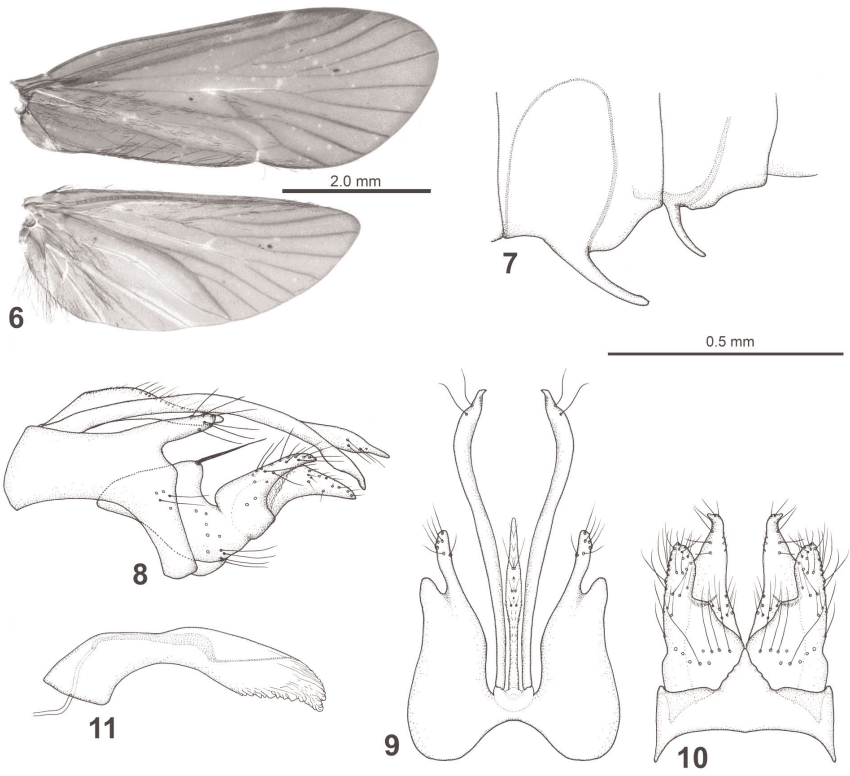
Figures 1–5. *Goera fijiana* Banks. **1**, right wings, dorsal; **2**, genitalia, left lateral view; **3**, genitalia, dorsal view; **4**, genitalia, ventral view; **5**, phallus, left lateral view. The scale bar in Fig. 1 relates to Fig. 1. The scale bar in Fig. 4 relates to Figs. 2–5.

ous setae; in ventral view (Fig. 4) uniformly tapering toward posterad-oriented apices. Phallus (Fig. 5) nearly straight, with large membranous posterior part; sperm duct anteriorly narrow before widening and darkening from one-fifth length inside phallus.

Female. Figures of the female genitalia purportedly of this species were given by Neboiss (1986b): 167.

Type. *Holotype* ♂ FIJI: **Viti Levu**: Nandarivatu, 17°34'S, 177°58'E, W.M. Mann (MCZ 14819, genitalia cleared, in separate vial, examined).

Material examined: FIJI: **Viti Levu**: 2♂, Mt. Nakobalevu, 22 Sep–9 Oct 2002, 18°03'S, 178°25'E, 340 m, Malaise trap, M. Irwin, E. Schlinger, M. Tokota'a; 6♂, PABITRA, 1034 m, 17–20 Nov 2003, Malaise trap, Wabu Baseline Survey, collected from



Figures 6–11. *Goera vuda*, new species. **6**, right wings, dorsal; **7**, abdominal segments VI and VII, with ventral processes; **8**, genitalia, left lateral view; **9**, genitalia, dorsal view; **10**, genitalia, ventral view; **11**, phallus, left lateral view. The scale bar in Fig. 6 relates to Fig. 6. The scale bar in Fig. 7 relates to Figs. 7–11.

Delena Veikovi, 17.5833°S, 178.0833°E; 1♂, Koroyanitu Prk., 1 km E Abaca Vlg., 26 Nov–3 Dec 2002, 17.667°S, 177.55°E, 800 m, Malaise trap 1, Schlinger, Tokota (BPBM).

Remarks. *Goera fijiana* Banks, 1924 was described from Fiji based on a single specimen from Viti Leon (= Viti Levu), Nadarivatu, collected by W. M. Mann (no date given), and was cited in the list of Fijian species by Mosely (1934). Additional records of this species were given by Banks (1936) from Wainganitu and Mt. Victoria, Viti Levu and by Mosely (1941) as *Goera vunida* from Vunidawa and Waidgi, Viti Levu. *Goera vunida* was synonymized with *G. fijiana* by Neboiss (1986a).

The original description of the species included mainly body color and wing venation details. No genitalic characters were described or illustrated. The male genitalia and right wing venation were illustrated by Mosely (1941) under the synonymous name *G. vunida*. Illustrations purportedly of the female were given by Neboiss (1986b).

Examination of the holotype of *G. fijiana* (in MCZ) confirms that the illustrations given by Mosely (1941) corresponds completely to the genitalia of the holotype of *G. fijiana*. The genitalia of the newly collected specimens are slightly different from those of the holotype, i.e. the ventral half of segment IX is broader than in the holotype, and the posteromesal process of segment IX is more widely triangular. Until more material and the morphological variation of this species has been examined, the new individuals are considered belonging to *G. fijiana* and the differences in the genitalia due to intraspecific variation.

Goera vuda Johanson & Oláh, **new species**
(Figs. 6–11)

Diagnosis. This species is distinguished from the other *Goera* species by having subdorsal margins of segment IX strongly produced anterad, a generally narrow dorsal process of segment X that is broadest at half length in dorsal view, coxopodites that are basally very broad, abruptly narrowed dorsally in their central part in lateral view, and conical harpagones that are broad in lateral view.

Description. Male.

Wings (Fig. 6). Forewing length 5.7 mm, hind wing length 4.6 mm. Forewing crossvein M—Cu tangent to basis of M3+4.

Abdomen. Ventral processes of segments VI and VII slightly curving posterad in lateral view (Fig. 7), sternum VII process shorter than sternum VI process; apices truncate in ventral view.

Genitalia (Figs. 8–11). Segment IX subventral part short, oriented posteroventrad, subdorsal parts twice as long as subventral part, strongly produced anterad, apices pointing ventrad (Fig. 8); in dorsal view (Fig. 9) with narrow irregularly U-shaped, posteromesal margin; anteromesal margin deeply concave; in ventral view (Fig. 10) with sharply triangular posteromesal process; anterior margin nearly straight. Superior appendages originating from dorsolateral part of segment IX (Fig. 8). Dorsomesal process of segment X slightly exceeding superior appendages (Fig. 8); moderately thick in lateral view (Fig. 8); basal half with microtrichia, these being shortest at base of process; in dorsal view, broadest at mid-length, distal half with minute setae (Fig. 9). Lateral processes of segment X slender, tubular, divergent basally, convergent apically, and slightly curving ventrad along their lengths, apices drop-shaped, each with 2–3 minute, lateral setae (Figs. 8, 9) not crossing each other in dorsal view (Fig. 9). Proximal part of coxopodites about 2 times taller than median part (Fig. 8); each with blackish, stout seta at posterodorsal corner; coxopodites abruptly more slender and tapering distally from two-thirds their lengths, apices pointed; ventral margins nearly straight (Fig. 8). Harpagones with numerous setae; conical, wide basally, narrowing distally in lateral and ventral views (Figs. 8, 10); apices curving laterad in ventral view (Fig. 10). Phallus (Fig. 11) slightly curving along its length, with large membranous posterior part; sperm duct anteriorly narrow before widening and darkening from one-fifth inside phallus.

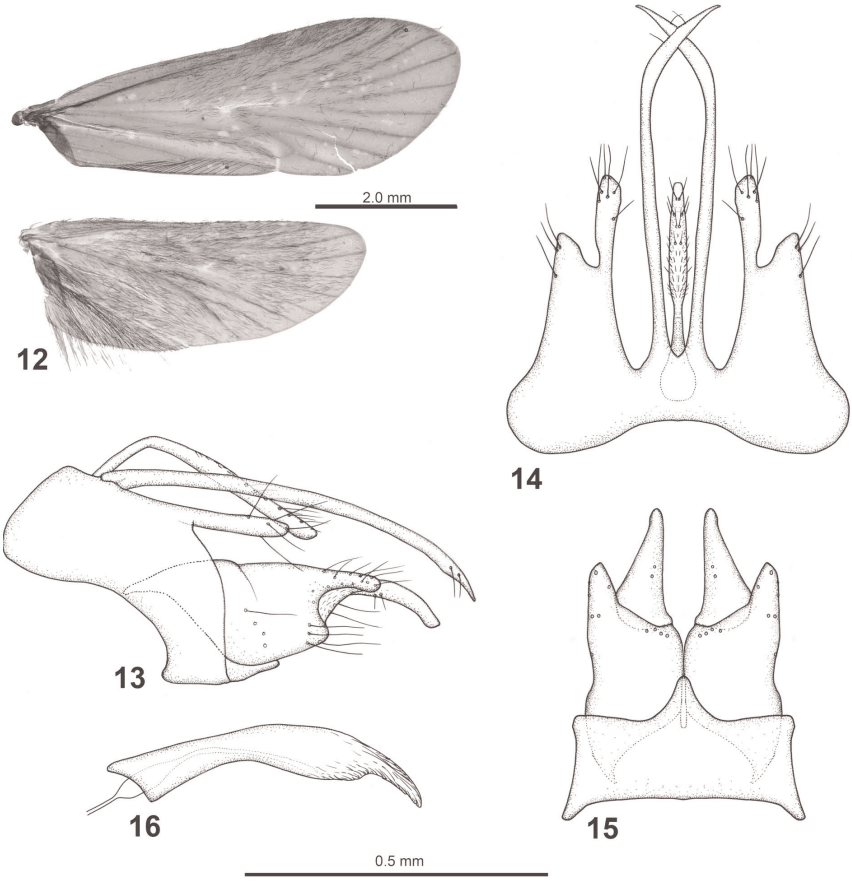
Female. Unknown.

Type. *Holotype* ♂ FIJI: **Viti Levu**: km WSW Colo-i-Suva Village, Mt. Nakobalevu, 12 Apr 2004, 18.057°S, 178.42°E, 300 m, Malaise trap, E. Schlinger, M. Tokota'a (FNIC).

Etymology. The species name is in reference to the type locality.

Goera abaca Johanson & Oláh, **new species**
(Figs. 12–16)

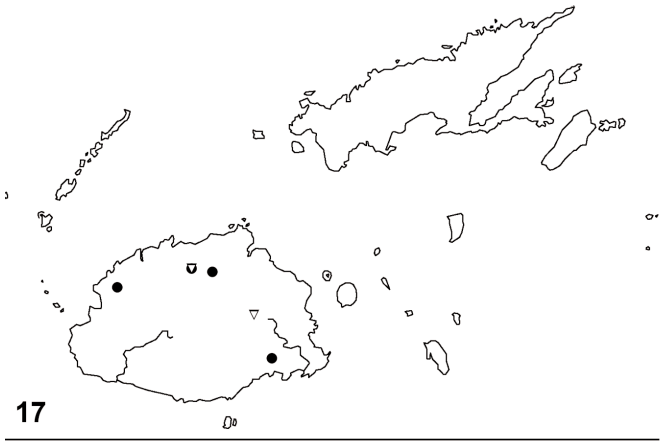
Diagnosis. This species is distinguished from the other *Goera* species by having subdorsal margins of segment IX strongly produced anterad, a generally slender dorsal process of segment X that is broadest at half length in dorsal view and nearly right angled at prox-



Figures 12–16. *Goera abaca*, new species. **12**, right wings, dorsal; **13**, genitalia, left lateral view; **14**, genitalia, dorsal view; **15**, genitalia, ventral view; **16**, phallus, left lateral view. The scale bar in Fig. 12 relates to Fig. 12. The scale bar in Fig. 16 relates to Figs. 13–16.

imal one-third its length in lateral view, coxopodites that are only slightly broader basally than in their central part in lateral view, and depressed harpagones that are narrow in lateral view.

Figures 17–19. Maps of *Goera* species in Fiji. **17**. Map with the new (filled circles) and earlier (open triangles) records of *Goera fijiana* Banks. **18**. Map with the records of *Goera vuda*, new species (filled triangle) and *Goera abaca*, new species (filled circle). **19**. Map with the records of unidentified *Goera* spp. females (filled circles).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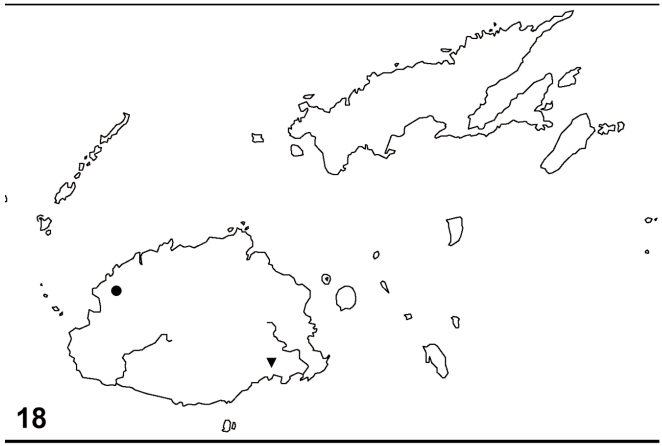
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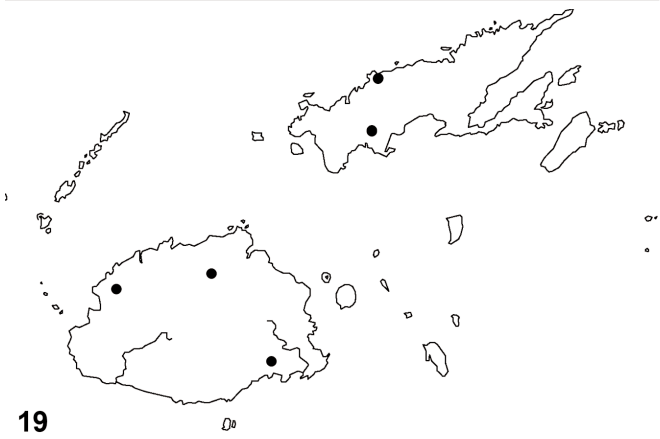
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Description. Male.

Wings (Fig. 12). Forewing length 6.1 mm, hind wing length 4.8 mm. Forewing crossvein M—Cu tangent to basis of M3+4.

Abdomen. Ventral processes of segments VI and VII slightly curving posterad in lateral view (as in Fig. 7); sternum VII process shorter than sternum VI process; apices truncate in ventral view.

Genitalia (Figs. 13–16). Segment IX subventral parts moderately short, lengthened dorsally, oriented ventrad, subdorsal parts twice as long as shortest ventral parts, strongly produced anterad, apices pointing ventrad (Fig. 13); in dorsal view (Fig. 14) with wide U-shaped, posteromesal margin; anteromesal margin shallowly concave; in ventral view (Fig. 15) with triangular posteromesal process; anterior margin nearly straight. Superior appendages originating from dorsolateral parts of segment IX (Fig. 13). Dorsomesal process of segment X slightly exceeding superior appendages (Fig. 13); in lateral view (Fig. 13) slender, bent posteroventrad at basal one-third; basal half with microtrichia, these being shortest at base of process; in dorsal view, broadest from one-third its length, distal half with minute setae (Fig. 14). Lateral processes of segment X slender, tubular, slightly divergent basally, convergent apically, and slightly curving ventrad along their lengths, apices weakly drop-shaped, each with 2 minute, lateral setae (Figs. 13, 14), crossing each other in dorsal view (Fig. 14). Proximal part of each coxopodite slightly taller than median part (Fig. 13); without blackish, stout seta at posterodorsal corner; coxopodites tapering distally from two-thirds their lengths, apices pointed; ventral margins nearly straight (Fig. 13). Harpagones with few visible setae; depressed and narrow in lateral view (Fig. 13), narrowing distally in ventral view (Figs. 15), their apices directed posterad in ventral view (Fig. 15). Phallus (Fig. 16) slightly curving along its length, with large membranous posterior part; sperm duct widest at anterior end, narrowing posteriorly inside phallus.

Female. Unknown.

Type. *Holotype* ♂ FIJI: **Viti Levu**: Koroyanitu Prk., 1 km E Abaca Vlg., 26 Nov–3 Dec 2002, 17.667°S, 177.55°E, 800 m, Malaise trap 1, Schlinger, Tokota'a [FBA 180476] (FNIC).

Etymology. The species name is in reference to the type locality.

In addition, females of unidentified *Goera* spp. were collected at various sites on Viti Levu and Vanua Levu.

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New Species of *Hemerodromia* Meigen from Fiji (Diptera: Empididae)[1]

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Abstract. Thirteen species of *Hemerodromia*: *H. dromodromoa* **n. sp.**, *H. iqasoa* **n. sp.**, *H. kumia* **n. sp.**, *H. moqimoqilia* **n. sp.**, *H. raradamua* **n. sp.**, *H. senivaua* **n. sp.**, *H. spiculata* **n. sp.**, *H. subiqasoa* **n. sp.**, *H. votovotoa* **n. sp.**, *H. vucea* **n. sp.**, *H. vulacia* **n. sp.**, *H. vutivutia* **n. sp.**, and *H. watlingi* **n. sp.** (Diptera, Empididae, Hemerodromiinae) are described and illustrated from Fiji. A key to males is given.

INTRODUCTION

The empidid genus *Hemerodromia* Meigen includes about 130 described species distributed across the Palaearctic, Nearctic, Neotropical, Afrotropical and Indomalayan Realms and there are undescribed species from Australia and Oceania. Immature stages are aquatic, and require usually well oxygenated water for development (Vaillant 1981, Smith 1989, Vaillant & Gagneur 1998). The fauna is particularly abundant and diverse around flowing waters in humid tropical and temperate forest biotopes and around the water margins at higher latitudes and altitudes. Adult flies are small, from 2–4 mm long, with strongly raptorial front legs presumably employed in predatory activity. They are often captured in Malaise traps, especially near flowing water, and have been observed running on gravels and more frequently on riparian vegetation marginal to water bodies. The present work describes 13 new species of *Hemerodromia* from Fiji.

MATERIALS AND METHODS

This study is based on dried and alcohol-preserved material from the Fiji Arthropod Survey funded by US National Science Foundation and the Schlinger Foundation. Types and vouchers are deposited in the Bishop Museum, Honolulu (BPBM), Fiji National Insect Collection, Suva (FNIC), Canadian National Collection of Insects, Ottawa, Canada (CNC), and National Museum of Wales, Cardiff, UK (NMWC). Morphological terms are essentially those of McAlpine (1981) and Stuckenberg (1999). Interpretation of the male genitalia follows Sinclair (2000).

Morphological abbreviations used are: C_1, front coxa; F_1, front femur; T_1, front tibia. Orientation was denoted by: av, anteroventral; pd, posterodorsal, pv, posteroventral. The front femora bear two rows of long setae ventrally between which is a double row of much

1. Contribution No. 2008-005 to the NSF-Fiji Arthropod Survey.

shorter peg-like setae (Fig. 40). This study employs the term spine to describe setae of the outer rows and denticle denotes shorter setae between these rows. The femoral formula (Plant 2007) records the number of spines or denticles in each series starting from the most anterior and working posteriorly. Thus a femoral formula of 7/15/16/6 indicates that there are 7 av spines, 15 av denticles, 16 pv denticles and 6 pv spines. In a few species, the apical part of either row of denticles is laterally displaced from the basal part forming a disjunction in linearity of the row. Inter-sexual differences in femoral formula occur (although in most cases the sample size is too low to accurately quantify) and in males of many species, the basal denticle of the pv series (which usually originates from a slight basal swelling) is larger and distinctly separated from main series by a short bare area (Fig. 40).

Colour is *ground colour*, and any colouration due to dusting is not mentioned as it was difficult to interpret in fluid-preserved specimens. Colour descriptions should be treated with caution as in the predominantly yellow species, the intensity of yellow colour varies somewhat and when darker markings occur, they can be variable. Insufficient material was available to properly assess this range of variation.

In addition to full locality / date / collector data, almost all specimens are labelled with a unique reference (prefixed FBA) and some with a collection site lot number (prefixed FJ).

SYSTEMATICS

Hemerodromia Meigen

Hemerodromia Meigen, 1822: 61. Type species: *Tachydromia oratoria* Fallén, 1815, des. Rondani, 1856: 148. [Suspension of I.C.Z.N. rules required to validate Rondani's type species designation, and to set aside earlier type designations by Westwood (1840: 132) and Desmarest *in* d'Orbigny (1845: 528) in the interests of stability and common usage; see Melander (1928: 252), Collin (1961: 715).]

Diagnosis. *Hemerodromia* (Fig. 39) is readily distinguished from other members of the tribe Hemerodromiini *sensu* Sinclair & Cumming (2006) as amended by Plant (2007) by the following combination of characters. Wing (Fig. 41) with fork R_{4+5} and M_{1+2} present, cells bm+dm fused, cell cup absent. Vein Sc fused with C basally, becoming more or less separated about level with radiocubital node. Vein h absent. Head strongly dorsoventrally flattened, eyes with anterior ommatidia enlarged (especially in males). Postpedicel shortly lanceolate, arista no longer and with basal article present but weakly differentiated. Thorax with only notopleural and sometimes scutellar setae well developed; acrostichal and dorsocentral setulae usually present but minute. Front femur always with two rows of minute black denticles and with adjacent posteroventral and anteroventral rows of more normal setae variably developed (Fig. 40).

Characteristics of Fijian *Hemerodromia*. *Hemerodromia* occurs in all faunal realms excepting Antarctica. The genus appears to be well founded (although *H. radialis* Collin from New Zealand differs especially in wing venation and is undoubtedly incorrectly assigned to *Hemerodromia*; and some South African forms have cell cup partially developed) and although the generic diagnosis accommodates this relatively homogeneous fauna, regional variations do occur for which several informal species-groups have been proposed by MacDonald (1998) in the Nearctic Realm and by Vaillant & Gagneur (1998) in the Palaearctic. These species-groups were based primarily on the shape, size and setation of the epandrium and cerci, degree of elongation of the female terminalia, the

presence or absence of a basal process on the front femur and an apical spur on the front tibia. Vaillant & Gagneur (1998: 381) considered that the *H. melangyna* Collin-group was sufficiently distinct to warrant generic status but did not erect a genus for it.

In the absence of a formal or phylogenetic analysis, and without studying the wider world fauna, we consider it unwise to speculate unduly on the affinities of Fijian *Hemerodromia*. However, setation of the head is well developed in Fijian *Hemerodromia*, with a pair of vertical setae in particular being well developed (usually much weaker in at least the Palaearctic species) and being contiguous with 2–3 not much smaller postocular setae. The scutellum always bears a pair of strong erect setae (present otherwise in the *H. melangyna*-group), vein R_5 and M_1 are distinctly convergent (but not as markedly as in *H. fusca* Yang & Yang from China). An apicoventral spur is always present on the front tibia but the basal process on the front femur is at most, weakly developed in the Fijian species. *Hemerodromia vucea* n. sp. is distinctive amongst Fijian species on account of an enormously enlarged hypandrium (Fig. 25) and is perhaps rather disparate from the other species that have more normal hypandria and share overall similarities in the morphology of the epandrium and cercus.

Separation of species relies heavily on male external genital morphology. Determination of females is problematical and in most cases probably unfeasible without associated males. The shape and pigmentation of tergite 10, sternite 10, and the cerci are useful characters but subject to intraspecific variation in the extent of dark colouration.

Key to Males of Fijian *Hemerodromia*

Determination of species should always be confirmed by reference to genital morphology described in the species accounts.

1. Thorax predominantly brown ..... **raradamua** Plant & Sinclair, **n**. **sp**.
–. Thorax predominantly yellow (Fig. 39) 2

2. Hypandrium greatly inflated, egg-shaped (Fig. 25) .... **vucea** Plant & Sinclair, **n**. **sp**.
–. Hypandrium otherwise 3

3. Scutum with at least faint brown longitudinal linear marking 4
–. Scutum entirely yellow 5

4. Scutum posteriorly with dark median line (basal pv denticle on F_1 not separated from rest of series by a short bare area) ..... **votovotoa** Plant & Sinclair, **n**. **sp**.
–. Scutum with pale brown lateral stripes which fade laterally (basal pv denticle on F_1 separated from rest of series by a short bare area; Fig. 40) .... **kumia** Plant & Sinclair, **n**. **sp**.

5. Genitalia entirely deep black; at least one of double row of denticles beneath F_1 with linear disjunction subapically 6
–. Genitalia yellow or only partly black; both rows of denticles beneath F_1 without linear disjunction subapically 8

6. Anteroventral series of denticles on F_1 with linear disjunction subapically; epandrium and hypandrium densely pilose 7
–. Both av and pv series of denticles on F_1 with linear disjunction subapically; epandrium and hypandrium not densely pilose (Fig. 31) .... **vutuvutia** Plant & Sinclair, **n**. **sp**.

7. Phallus not extending beyond cercus, lacking spicules (Figs. 12–13) .... **moqimoqilia** Plant & Sinclair, **n**. **sp**.
–. Phallus extending beyond cercus, with spicules on apical portion (Fig. 35) .... **spiculata** Plant & Sinclair **n**. **sp**.

8. Genitalia entirely yellow, only cercus darkened apically 9
–. Genitalia bicoloured yellow and black 10

9. Male cercus very narrow and sharply incurved apically (Figs. 6, 7) .... **iqasoa** Plant & Sinclair, **n**. **sp**.
–. Male cercus broad and truncate in lateral view, apical third more gradually incurved (Figs. 37, 38) ..... **subiqasoa** Plant & Sinclair, **n**. **sp**.

10. Cercus subapically with pointed, inwardly directed process (Figs. 1, 19) 11
–. Cercus otherwise 12

11. Cercus with short subapical process, less than width of cercus (Fig. 1) , postgonite not emerging dorsally from inner face …….. **dromodromoa** Plant & Sinclair, **n**. **sp**.
–. Cercus without subapical process, but with sharply pointed postgonite emerging dorsally on inner face, reaching almost to tip of cercus (Fig. 19) .... **senivaua** Plant & Sinclair, **n**. **sp**.

12. Hypandrium rounded apically; cercus in lateral view with distinct dorsoapical hooked process (Fig. 32) ..... **watlingi** Plant & Sinclair, **n**. **sp**.
–. Hypandrium with sharply pointed and curved apical process (Fig. 28); cercus rather apically broadened ..... **vulacia** Plant & Sinclair, **n**. **sp**.

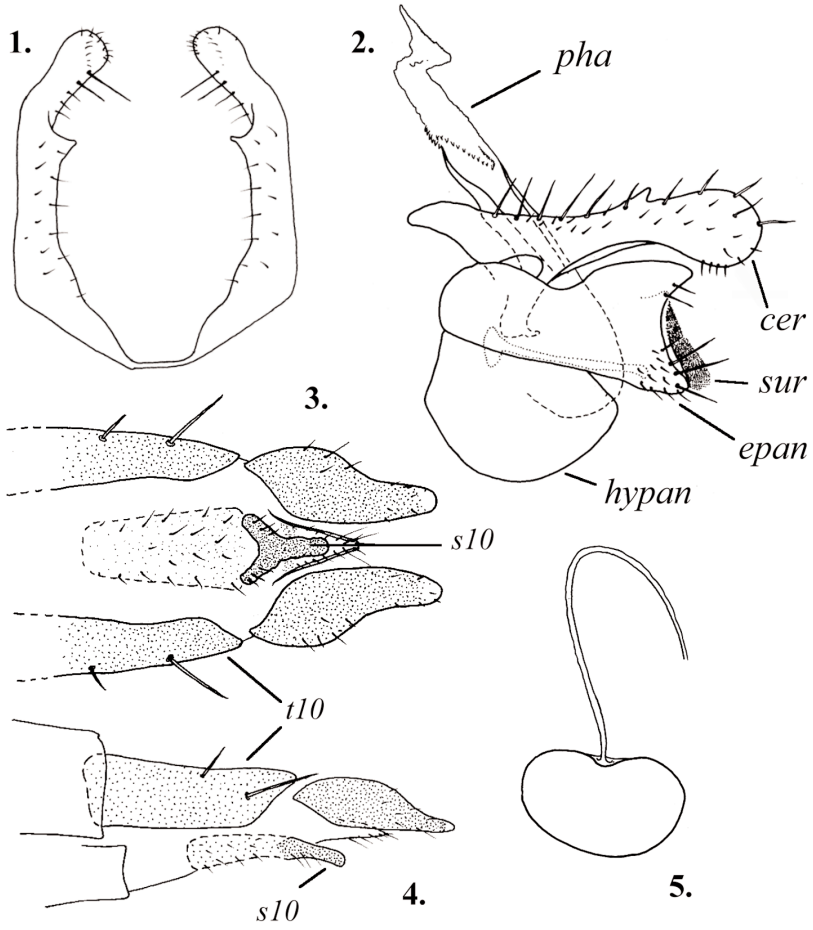
Hemerodromia dromodromoa Plant & Sinclair, **new species**
(Figs. 1–5, 39)

Diagnosis. A yellow species, characterized in the male by partly-coloured black and yellow genitalia with apically lobed cerci bearing a small inwardly directed pointed process.

Description. **Male**. (Fig. 39). *Head.* Strongly dorsoventrally flattened, yellow, all setae whitish, ocellar triangle black, front of frons and antennae whitish. Eyes iridescent black, ommatidia conspicuously enlarged anteriorly; narrowly separated on face which bears fine upturned setulae. Frons with 1–2 frontal setulae. A pair of fine vertical setae midway between anterior ocellus and eye margin contiguous with 2–3 postocular setae (longest posteriorly). Occiput bearing scattered fine hairs; clypeus with rather dense short downwardly directed pile. Antenna with scape and pedicel bearing distinct short dorsal setulae; postpedicel short lanceolate, about 1.5 x as long as wide, style slightly shorter than postpedicel with inconspicuous basal article and apical sensillum.

Thorax. Elongate, hardly arched below; yellow, all setae yellowish, very small and fine except one notopleural and pair of scutellars, separated by less than length of seta.

Legs. Whitish yellow. C_1 about as long as distance between C_1 and C_2, 5 x as long as wide with a few pale dorsoapical setae. F_1 rather longer than C_1, 4.5–5.0 x as long as wide, evenly inflated, widest 0.5 from base. Femoral formula 6–7/15–17/15–16/6–7; denticles black, becoming closer together and the two rows converging distally, in linear series without distal discontinuity but basal denticle of pv series (which originates from a slight basal swelling) rather larger and distinctly separated from main series by short bare area; spines yellow, becoming weaker and shorter distally. T_1 0.8 x as long as F_1, evenly curved, ventral face shallowly concave; about 15–18 sharply pointed spine-like setae ventrally on distal 0.8, almost as long as T_1 is deep with adjacent av series of smaller setulae; dorsal ciliation of decumbent short pale setulae denser distally; slight apicoventral exten-



Figures 1–5. *Hemerodromia dromodromoa.* **1**. Male cerci, dorsal view; **2**. Male terminalia, lateral view; **3**. Female terminalia, ventral view; **4**. Female terminalia, lateral view; **5**. Female spermatheca and duct. Abbreviations: *cer* – cercus; *epan* – epandrium; *hypan* – hypandrium; *pha* – phallus; *sur* – surstylus; *s10* – sternite 10; *t10* – tergite 10.

sion on T_1 bearing strong black spur, longer than T_1 is deep, sharply pointed and rather dorsoventrally flattened. Mid and hind legs slender, lacking strong setae but T_3 with dorsal setae rather longer and strong 'comb' of short setae posteroapically.

Wing. Membrane faintly yellowish tinged, veins yellow; fork R_{4+5} less than 90° and slightly distal of fork M_{1+2}; R_5 and M_1 convergent apically; second submarginal cell (r_4) rather long, vein R_5 about 3 x as long as R_4. Halteres whitish yellow.

Abdomen. Yellow with pale setae most conspicuous on hind margin of posterior sternites. Cercus (Fig. 1) black, narrow, with rounded apical lobe, small pointed subapical process directed

internally 0.6 from base also visible in lateral view (Fig. 2), distinctly setose. Epandrium (Fig. 2) black distally, sometimes brownish yellow proximally, somewhat Y-shaped, constricted medially but distally blunt-ended with posterior margin slightly concave and bearing distinct setae, particularly posteroventrally. Surstylus with apex usually visible in lateral view as rather paler flattened plate, behind and slightly longer than epandrial lobe. Hypandrium yellow, sometimes brownish posterolaterally, rather rounded, not reaching to end of epandrium, not markedly inflated, lacking strong setae; pair of lancelate postgonites flanking base of phallus, slightly shorter than sclerotized portion of phallus. Phallus, whitish, when extended visible part almost as long as cercus.

Female. Very similar to male but F_1 with basal denticle of pv series not separated from main series. Ventral spines on F_1 stronger, especially basal pair. Abdomen with tergite 10 black, rather elongate, bearing one long and one shorter lateral seta (Figs. 3–4). Cercus shining black, tip paler; broad basally, narrowing apically; sternite 10 Y-shaped, black. Spermatheca (Fig. 5) flattened ovate, black with narrow pale duct.

Types. *Holotype* ♂ FIJI: **Taveuni**: 5.6 km SE Tavuki Vlg., Mt Devo, 1187 m, 27 Dec 2002–3 Jan 2003, Malaise 1, coll. Schlinger. M. Tokota'a, 15.843°S, 179.996°W [FBA 161515]. Holotype deposited in FNIC. *Paratypes*: 108♂, 69♀ [FBA 020471, 057722, 042923, 042925–042926, 070329, 110280–110281, 146365, 005116–005130, 041395–041419, 053629–053639, 056730–056739, 095501–095506, 113318–113320, 129297–130308, 147690–147698, 149319–149323, 150181–150201, 150765–150766, 161516–161524, 153763–153772, 162060–162062, 162900–162904]; topotypic, all captured in Malaise traps between 800 m and 1200 m in all months between June and January except September (BPBM, CNC, FNIC, NMWC). *Additional material*: 1♂, 5♀, same data as paratypes (FNIC).

Etymology. From the Fijian 'dromodromo' meaning yellow, in reference to the yellow colour of the species.

Hemerodromia iqasoa Plant & Sinclair, **new species**
(Figs. 6–8)

Diagnosis. An entirely yellow species only darkened on the ocellar triangle, tip of male cercus and wing veins basally. Best distinguished by shape of the male cercus being very narrow and strongly incurved apically.

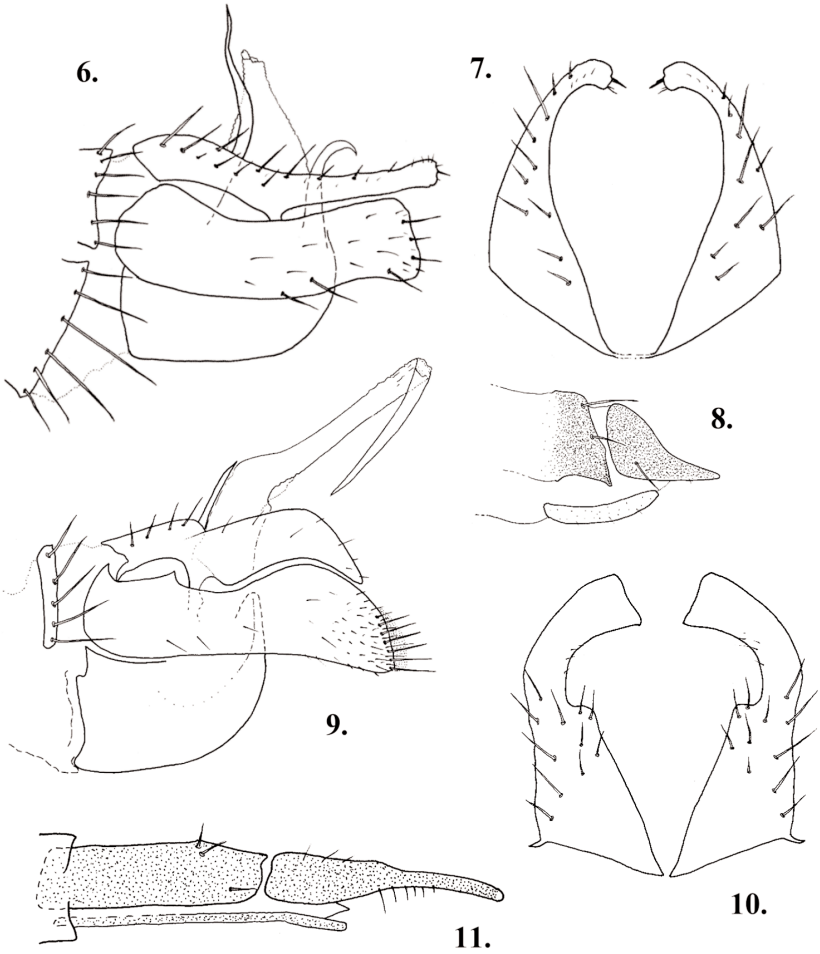
Description. **Male**. Very similar to *H. dromodromoa* n. sp., differing as follows:

Legs. Femoral formula 6–7/16–18/15–17/5–7, both series of denticles linear and convergent apically, basal denticle of pv series slightly larger and distinctly separated from main series by short bare area.

Wing. Veins brownish yellow, usually distinctly darker basally, especially about base of R_{2+3} beyond apex of cell br, vein Cu at base of cell bm+dm and posterior wing margin at extreme base. Fork R_{4+5} almost 90° and about level with fork M_{1+2}.

Abdomen. Entirely yellow including hypopygium (Fig. 6), only cerci somewhat darkened apically. Tergite 8 and sternite 8 with distinct long yellow bristles on posterior margins. Cercus (Fig. 7) very narrow, strongly incurved distally, bearing 2–3 very short, erect setulae apically and with longer setae dorsally. Epandrium narrow, slightly constricted medially, with distinct setae posteroventrally and apically. Postgonite apically curved and sharply pointed, distally emergent above cercus in lateral view. Hypandrium bare. Phallus apparently broad.

Female. The single female included in the type series was recognized only by association with males. Very similar to male and to female of *H. dromodromoa* n. sp. F_1 femoral formula 8/18/18/6, basal denticle of pv series not larger or separated from the rest; basal pair of spines, very strong, yellow. Fork R_{4+5} rather less than 90°. Cerci (Fig. 8) black, short, broad, almost triangular basally, nar-



Figures 6–11. *Hemerodromia* spp. **6–8**. *Hemerodromia iqasoa*. **6**. Male terminalia, lateral view; **7**. Male cerci, dorsal view; **8**. Female terminalia, lateral. **9–11**. *Hemerodromia kumia* **9**. Male terminalia, lateral view; **10**. Male cerci, dorsal view; **11**. Female terminalia, lateral view.

row apically, with distinct lateral seta. Tergite 10 black distally, bearing two pairs of distinct setae, yellow and weakly sclerotized proximally. Sternite 10 pale yellow, apparently with only minute setulae.

Types. *Holotype* ♂ FIJI: **Viti Levu**: 3.8 km N Veisari stlmt., log rd to Waivudawa, 12.xii.2002–3.i.2003, 300 m, Malaise 2, Schlinger, Tokota'a, 18.079°S, 178.363°E [FBA 103830]. Holotype is deposited in FNIC. *Paratypes*: **Viti Levu**: 1♂, 4.8 km N Veisari Stlmt., log rd to Waivudawa, 300 m, 12.xii.2002–3.i.2003, Malaise 1, Schlinger, Tokota'a, 18°4'30"S, 178°21'43"E, [FBA 177563] (CNC); 3♂, 1♀, Savuione Trail, FJ-1 Malaise 21.x–18.xi.2004 N. Irwin E. Schlinger M. Tokoka'a 17°40'S 177°33'E, 450 m, [FBA

049170] (CNC, FNIC, NMWC); 1♂, 1 km E Abaca Vlg., Koroyanitu Natl. Pk., 800 m, Savuione Trail, 17°40'S, 177°33'E, 26.x–5.xi.2002, Malaise, E. Schlinger, Tokota'a, FJVL01_MO1_05, [FBA 083637] (NMWC).

Etymology. From the Fijian 'iqaso' meaning a hook or hook-shaped in reference to the shape of the postgonite.

Hemerodromia kumia Plant & Sinclair, **new species**
(Figs. 9–11, 40)

Diagnosis. A yellow species with pale brown lateral stripes on the scutum which fade laterally. Best distinguished by the male genitalia in which the cercus is broad, and apically decurved in lateral view.

Description. **Male**. Similar to *H. dromodromoa* n. sp., differing chiefly as follows:

Thorax. Scutum yellow dorsally, sharply contrasting with brown stripe along line of acrostichal setulae but which grades to more brownish yellow laterally. Postpronotal lobe brownish, suture between it and lateral margins of scutum contrastingly yellow.

Legs. Femoral formula 6–8/17–18/16–19/6; double rows of denticles beneath F_1, becoming smaller and converging distally (Fig. 40), without linear discontinuity in either row, basal pv denticle clearly separated from others in series but only slightly larger. Spines distinct. T_1 with about 17 sharply pointed spine-like setae ventrally and strong, sharply pointed apical spur obviously longer than T_1 is deep.

Wing. Veins yellowish, slightly darker basally. Fork R_{4+5} almost right angular, only slightly beyond fork M_{1+2}.

Abdomen. Yellow; small brown median submarginal mark on tergites 2–6; ventrum pale. Hypopygium (Fig. 9) yellow with hypandrium apically, epandrium distally and cerci black. Cercus broad (Fig. 10), apically decurved in lateral view (Fig. 9); distinctly incurved, abruptly narrowed, then much expanded apically with flattened tip (appearing much broader distally than shown in Fig. 10 when viewed in dorsolateral aspect). Epandrium long, distinctly constricted medially, rounded and with distinct setae apically. Hypandrium short, bare. Phallus long, whitish, apical section sharply pointed.

Female. Very similar to the male but brown markings of thorax less distinct. Basal pv denticle of F_1 not separated from others of series by bare area and spines rather stronger. Terminalia elongate (Fig. 11); cercus black, extreme apex pale, not greatly broadened basally; sternite 10 back, very long and almost overlapped laterally by lower margin of tergite 10.

Types. *Holotype* ♂ FIJI: **Vanua Levu**: 6 km NW Kilaka, 15–28.vi.2004, Batiqere Range, Malaise, 146 m, Schlinger, Tokata'a, FJVN58d_M01_07, 16.8153°S, 178.9864°E [FBA 072356]. Holotype is deposited in FNIC. *Paratype*: 1♂, same data as holotype but 61 m, 3–10.vi.2004, Malaise 3, 16.811°S, 178.988°E [FBA 115312] (FNIC); 1♀, same data as holotype but FJ-58E, 24.vi.–21.vii.2004, 178°59'290"E, 16°48'412"S, M.E. Irwin, E. Schlinger, M. Tokota'a, 98 m, Malaise [FBA 028297] (FNIC).

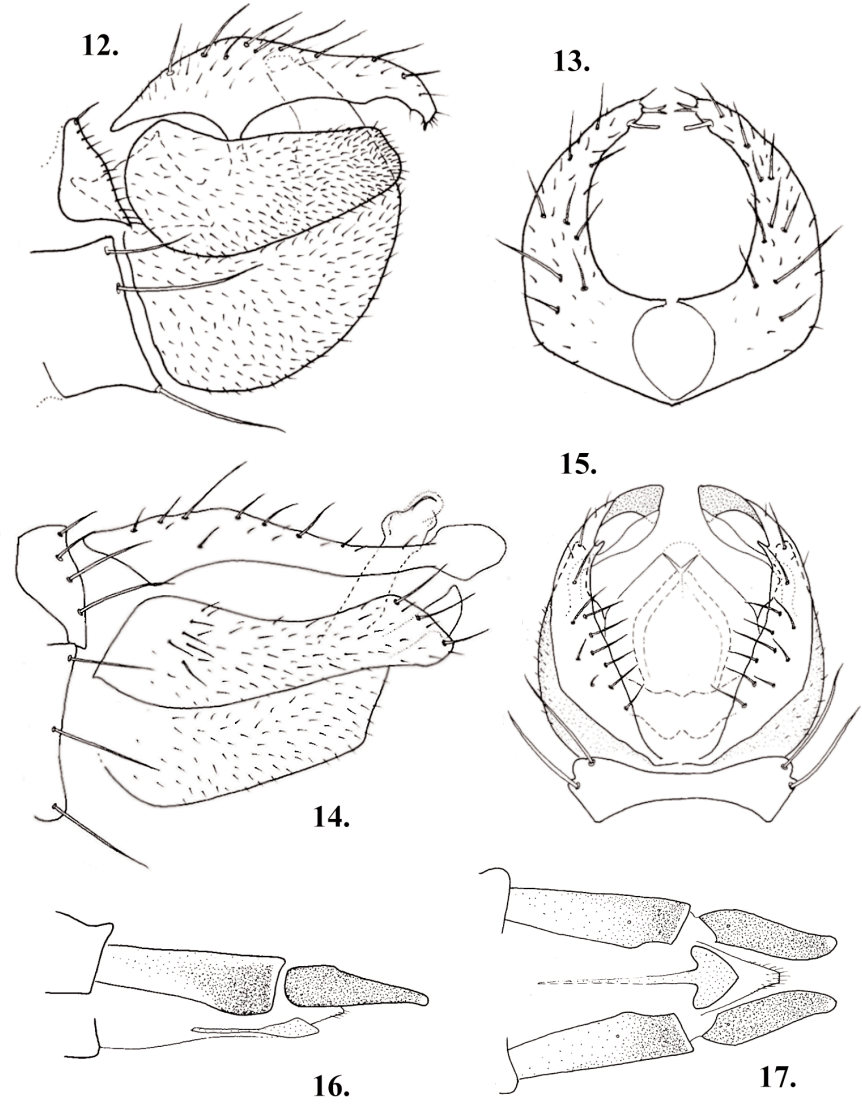
Etymology. From the Fijian 'kumi' meaning beard, in reference to the distinct setae apically on the epandrium of this species.

Hemerodromia moqimoqilia Plant & Sinclair, **new species**
(Figs. 12, 13)

Diagnosis. A yellow species with abdomen brown dorsally and denticles of F_1 arranged in discontinuous rows. The male genitalia are deep black, rather rounded, with distinctive cerci and densely pilose epandrium and hypandrium.

Description. **Male**. Similar to *H. dromodromoa* n.sp., differing as follows: *Thorax*. Darker yellow.

Legs. C_1 rather more slender, 7–8 x as long as wide. F_1 with the two series of denticles slight-



Figures 12–17. *Hemerodromia* spp. **12–13**. *Hemerodromia moqimoqilia*. **12**. Male terminalia, lateral view; **13**. Male cerci, dorsal view; **14–17**. *Hemerodromia raradamua*. **14**. Male terminalia, lateral view; **15**. Male cerci, dorsal view; **16**. Female terminalia, lateral view (setae not shown); **17**. Female terminalia, ventral view (setae not shown).

ly diverging distally; av series with distal two denticles in a line discontinuous with proximal series and positioned slightly more ventrally; pv denticles in two discontinuous rows, proximal row of 8–9 rather evenly and widely spaced, and clearly differentiated from distal row of 6–8 more closely apposed denticles. T_1 with apical spur shorter, hardly as wide as T_1 is deep.

Wing. Membrane clear; veins darker, brownish yellow.

Abdomen. Tergites 2–6 with broad brown markings dorsally; tergite 7 yellow; tergite 8 narrow, blackish. Vent pale yellow but pregenital sternite darkened on posterior margin. Hypopygium (Fig. 12) deep black, rather rounded in lateral view. Cercus (Fig. 13) narrow, bluntly pointed and slightly down-turned apically, bearing distinct setae dorsally and 2–3 short stout setae on inner face apically. Epandrium and hypandrium densely covered with minute setulae. Hypandrium with left and right lobes separated ventrally by narrow pale membranous area. Phallus apparently short, tip not emerging beyond cerci.

Female. Unknown.

Type. *Holotype* ♂ FIJI: **Taveuni**; 5.5 km SE Tavuki Vlg., Malaise, rainforest, 30.vi–14.viii.2004, Schlinger, Tokota'a, FJTA8b_MO2_02, 16.843°S, 179.996°W, 1188 m [FBA 070328]. Holotype is deposited in FNIC.

Etymology. From the Fijian 'moqimoqili' meaning globular, in reference to the rather globular male genitalia of the species.

Hemerodromia raradamua Plant & Sinclair, **new species**
(Figs. 14–17, 41)

Diagnosis. Readily recognized in the male as being the only predominantly brown species known from Fiji, with darkened wing veins and all black genitalia with cercus long, narrow, apically incurved and broadened into a rather rounded plate.

Description. **Male**. *Head*. Brown, ocellar triangle black; all setae whitish or yellow; antennae white.

Thorax. Brown, more yellowish brown on postpronotal area and along line of acrostichal setulae anteriorly.

Legs. Yellow but rather darker than in *H. dromodromoa* n. sp. Denticles of F_1 rather numerous, femoral formula 8/20/17/7, basal denticle of pv series not separated from rest of series by bare area. T_1 with about 20 sharply pointed spine-like setae ventrally.

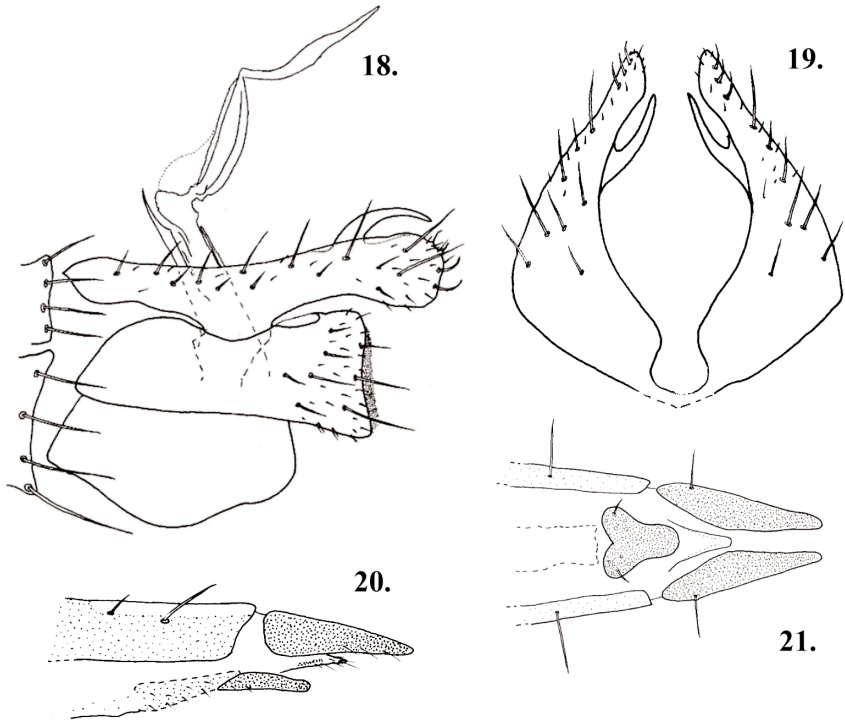
Wing. Membrane faintly tinged brown, veins dark, brownish (Fig. 41).

Abdomen. Brown dorsally, whitish ventrally with sternites 1–5 narrowly brown at extreme anterior margin and pregenital sternite yellowish. Hypopygium (Figs. 14–15) dark brown. Cercus long, narrow, apically incurved and broadened into a thin rather rounded plate. Epandrium narrow, evenly constricted medially, almost as long as cercus, bearing minute setulae and with longer setae basally and apically. Hypandrium rather thickly minutely setulose. Phallus short, hardly emerging above cerci.

Female. Similar to male but head and pleurae yellowish. (one female paratype is paler still, being only rather vaguely darkened on scutum and with abdomen paler; it is probably teneral. Femoral formula 7/20/19/6. Wing veins paler brown. Terminalia (Figs. 16–17) very similar to *H. senivaua* n. sp. but sternite 10 rather more arrow-shaped than heart-shaped.

Types. *Holotype* ♂ FIJI: **Viti Levu**: PABITRA Wabu Baseline Survey, 1034 m 17–20.xi.2003, Malaise samples collected from Delena Veikoi 17.5833°S 178.0833°E [FBA 053108]. Holotype is deposited in FNIC. *Paratypes*: 2♀, same data as holotype (FNIC).

Etymology. From the Fijian 'raradamu' meaning brown, in reference to the brown colour of this species.



Figures 18–21. *Hemerodromia senivaua*. **18**. Male terminalia, lateral view; **19**. Male cerci, dorsal view; **20**. Female terminalia, lateral view; **21**. Female terminalia, ventral view.

Hemerodromia senivaua Plant & Sinclair, **new species**
(Figs. 18–21)

Diagnosis. A yellow species with partly coloured black and yellow male genitalia, very similar to *H. dromodromoa* n. sp. distinguished primarily by presence of a strong, sharply pointed postgonite emerging subapically on the inner face of the male cercus. Females doubtfully distinguished.

Description. **Male**. Very similar to *H. dromodromoa* n. sp., differing as follows:

Legs. Femoral formula 7/17–18/15–17/6–7, rows of denticles converging distally, basal denticle of pv series rather larger and distinctly separated from main series by a short bare area. T_1 with apical spur longer than T_1 is deep at tip.

Abdomen. Hypopygium (Fig. 18) yellow with cercus and epandrium black distally. Cercus (Fig. 19) narrow, similar to *H. dromodromoa* n. sp. but sharply pointed postgonite emerging subapically on inner face and extending almost to tip of cercus and very apparent in lateral view. Epandrium slightly constricted medially; hardly concave, almost linear apically. Surstylus apparently similar to *H. dromodromoa* n. sp. but hardly extending beyond epandrial lobe. Hypandrium bare. Phallus whitish and pale brown, apically pointed; when fully extended, fully 3 x as long as hypopygium.

Female. Identified only by association with males. Femoral formula 5–7/18–20/17/6–7. Cerci

(Figs. 20–21) more slender and more evenly narrowed apically than in *H. dromodromoa* n. sp., only extreme apex pale. Sternite 10 heart-shaped. Tergite 10 yellowish to brownish with at least mid line dorsally yellow and apparently weakly sclerotized

Types. *Holotype* ♂ FIJI: **Taveuni**: Tavuki Vlg., Mt Devo, 734 m., 30.vi– 14.viii.2004, Malaise, E.I. Schlinger, M. Tokota'a, FJTA9a_MO5_02, 16.831°S, 179.99°W [FBA 071171]. Holotype is deposited in FNIC. *Paratypes*: 1♂, 5♀, same data as holotype [FBA 071172–071177] (FNIC, NMWC); 1♂, same data as holotype except 892 m, 31.vii–14.viii.2004, 16.837°S, 179.973°W [FBA 113321] (CNC); 2♂, Devo Forest Reserve, 800 m, 3–10.i.2003, FJ-9 malaise, M. Irwin, E. Schlinger, M. Tokota'a, 16°50'S 170°59'E [FBA 042920–042921] (BPBM); 3♂, 1♀, Mt. Devo, Malaise, 10–16.i.2003, FJ-7,8,9, M. Irwin, E. Schlinger, M. Tokota'a [FBA 038643–038646] (BPBM, FNIC); 1♂, 5.6 km SE Tavuki Village, Malaise, rainforest, 3–10.i.2003, E. Schlinger, M. Tokota'a, 16.843°S 179.965°E, FJTABa_M01-12 [FBA 057692] (CNC).

Etymology. From the Fijian 'senivau' meaning light yellow (literally the flower of *Hibiscus tilaceus*) in reference to the yellow colour of the species.

Hemerodromia spiculata Plant & Sinclair, **new species**
(Figs. 35, 36)

Diagnosis. A yellow species with abdomen brown dorsally and denticles of F_1 arranged in discontinuous rows. The male genitalia are deep black, rather rounded, with distinctive cerci and spicule-like projections on the phallus.

Description. **Male**. Similar to *H. dromodromoa* n. sp., differing as follows: *Thorax*. Scutellar setae more widely separated by greater than length of seta.

Legs. F_1 with the two series of denticles slightly diverging distally; av series with distal three denticles in a line discontinuous with proximal series and positioned slightly more ventrally; pv denticles in two discontinuous rows, proximal row of 7 rather evenly and widely spaced, and clearly differentiated from distal row of 9 more closely apposed denticles. T_1 with apical spur shorter, hardly as wide as T_1 is deep, with hooked apex.

Wing. Membrane clear; veins brownish yellow.

Abdomen. Tergites 2–6 distinctly pigmented; tergite 7 yellow; tergite 8 narrow, blackish. Ventrum pale yellow but pregenital sternite darkened on posterior margin. Hypopygium (Fig. 35) deep black, rather rounded in lateral view; epandrium and hypandrium densely pilose. Cercus (Fig. 36) narrow, bluntly pointed and strongly up-turned apically, bearing distinct setae dorsally and 2–3 short stout setae on inner face apically, including broad flattened modified seta. Epandrium rounded, shorter than cercus. Surstylus hook-like, directed medially. Hypandrium with left and right lobes separated ventrally by narrow pale membranous area; apex with flattened rectangular pair of postgonites. Phallus with membranous half clothed in some 10 sharp spicules.

Female. Unknown.

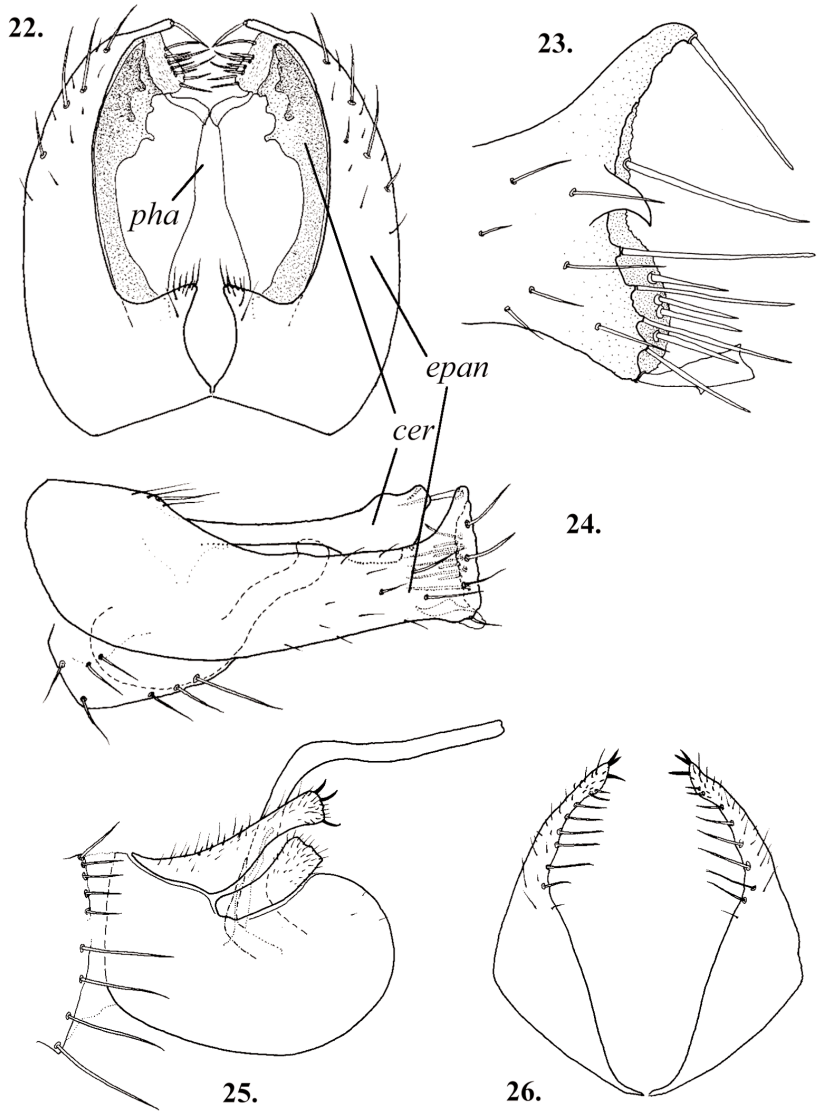
Type. *Holotype* ♂ FIJI: **Viti Levu**: 4 km WSW Colo-i-Suva Village, Mt. Nakobalevu, 300 m, 12.iv.2004, Malaise 1, Schlinger, Tokota'a, 18.057°S, 178.42°W [FBA 188354]. Holotype is deposited in FNIC.

Etymology. Named in reference to the spiculate phallus of the male.

Hemerodromia subiqasoa Plant & Sinclair, **new species**
(Figs. 37, 38)

Diagnosis. An entirely yellow species only darkened on the ocellar triangle, tip of male cercus and wing veins basally. Best distinguished by shape of the male cercus being stout, incurved apically and apex truncate in lateral view.

Description. **Male**. Very similar to *H. dromodromoa* n. sp., differing as follows:



Figures 22–26. *Hemerodromia* spp. **22–24**. *Hemerodromia votovotoa*. **22**. Male terminalia, dorsal view; **23**. Male, apex of left epandrial lamella, slightly oblique posterior view; **24**. Male terminalia, lateral view; **25–26**. *Hemerodromia vucea*. **25**. Male terminalia, lateral view; **26**. Male cerci, dorsal view. Abbreviations: *cer* – cercus; *epan* – epandrium; *pha* – phallus.

Legs. Femoral formula 6/16/17/6, both series of denticles linear and convergent apically, basal denticle of pv series slightly larger and distinctly separated from main series by short bare area.

Wing. Veins brownish yellow, usually distinctly darker basally, vein Cu at base of cell bm+dm and posterior wing margin at extreme base. Fork R_{4+5} almost 90° and distal to fork M_{1+2}.

Abdomen. Entirely yellow including hypopygium (Fig. 37), only cerci darkened apically. Cercus (Fig. 38) strongly incurved distally, with pointed apex dorsally; bearing 4–5 very short setulae along inner apical margin; apex truncate in lateral view. Epandrium broad basally, slightly constricted medially and truncate apically, with distinct setae posteroventrally and apically. Postgonite apically curved and sharply pointed. Hypandrium bare. Phallus broad, tubular.

Female. Unknown.

Type. *Holotype* ♂ FIJI: **Viti Levu**: 4.8 km N Veisari Stlmt., log rd to Waivudawa, 300 m, 12.xii.2002–3.i.2003, Malaise 1, Schlinger, Tokota'a, 18.175°S, 178.362°E [FBA 177565]. Holotype is deposited in FNIC.

Etymology. Named in reference to its similarity to *H. iqasoa* and their hooked postgonite.

Hemerodromia votovotoa Plant & Sinclair, **new species**
(Figs. 22–24)

Diagnosis. A yellow species similar to *H. dromodromoa* n. sp. but with a dark median line on scutum, abdomen brown dorsally and cell r_4 short. The male genitalia are yellow with black cerci almost enclosed within epandrial lamellae which bear characteristically arranged strong setae.

Description. **Male**. Similar to *H. dromodromoa* n. sp., differing as follows:

Thorax. Yellow with narrow, diffuse edged, brown median stripe posteriorly on scutum.

Legs. Yellow, F_1 with femoral formula approximately 7/14/16/6, basal denticle of pv series not separated from rest of series by bare area. T_1 rather short, about 0.65–0.7 x as long as F_1.

Wing. Veins brownish yellow, slightly darker basally, almost black on posterior margin at extreme base. Fork R_{4+5} about 70°, noticeably beyond fork M_{1+2}; cell R4 rather short, vein R_5 about 2.5 x as long as R_4.

Abdomen. Greyish yellow, tergites 2–6 brown dorsally. Hypopygium (Figs. 22–24) yellow with cerci black. Cercus narrow, inwardly curved, more or less hidden between epandrial lamellae in lateral view; spathulate apically, bearing distinct, short, blunt protuberances on inner face. Epandrium narrow, slightly constricted medially, spathulate apically (Fig. 23) with short triangular process mid way along rather concave apical margin; apically with inner row of 4–5 evenly sized stout setae and an outer row of 6–7 longer setae; dorsal seta of outer row, long, straight, inwardly directed; ventral seta of same row strongly differentiated and flattened. Hypandrium short, 0.5 x as long as epandrial lobes, bearing several distinct yellow setae. Phallus short, hidden between lamellae.

Female. Unknown

Type. *Holotype* ♂ FIJI: **Viti Levu**: Navai village, FJ-11A, Malaise, 24.x–8.xi.2003, M. Irwin, E. Schlinger, M. Tokoka'a, 17.37°S, 177.59°E, 700 m [FBA 031550]. Holotype is deposited in FNIC.

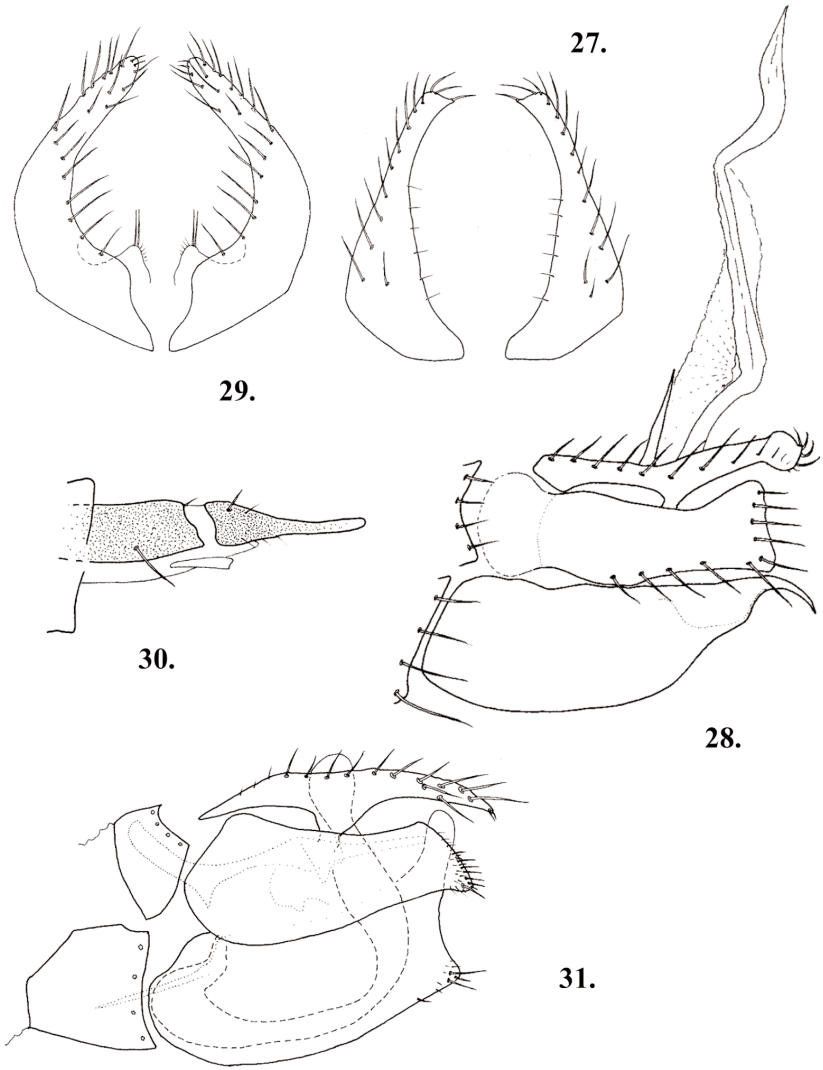
Etymology. From the Fijian 'votovotoa' meaning bristly, in reference to the setose epandrium of this species.

Hemerodromia vucea Plant & Sinclair, **new species**
(Figs. 25, 26)

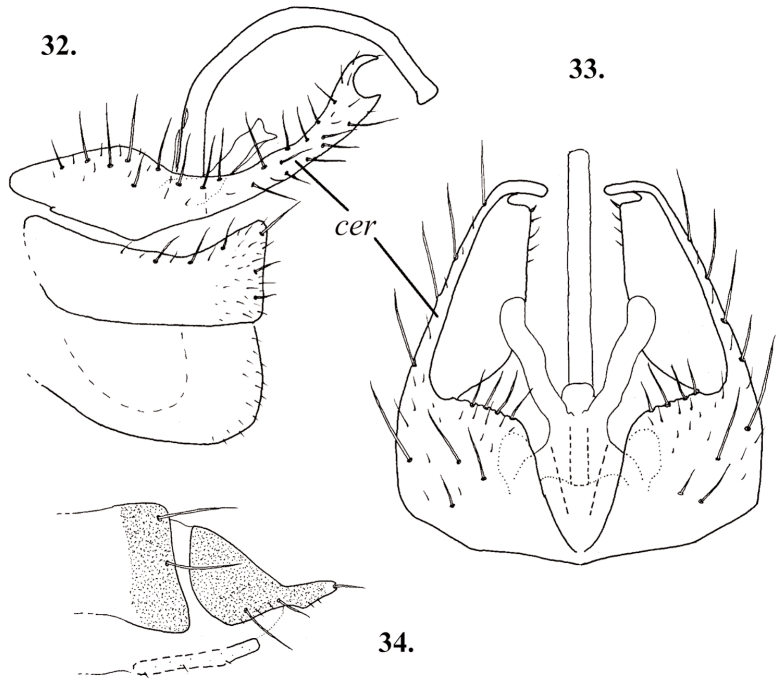
Diagnosis. A yellow species very similar to *H. dromodromoa* n. sp. but with distinctive male genitalia in which the epandrium is very small while the hypandrium is very conspicuously inflated and egg-shaped.

Description. **Male**. Very similar to *H. dromodromoa* n. sp., differing as follows:

Wing. Vein C yellow, other veins darker, Cu at base of cell bm+dm and posterior wing margin



Figures 27–31. *Hemerodromia* spp. **27–28**. *Hemerodromia vulacia*. **27**. Male cerci, dorsal view; **28**. Male terminalia, lateral view; **29–31**. *Hemerodromia vutivutia*. **29**. Male cerci, dorsal view; **30**. Female terminalia, lateral view; **31**. Male terminalia, lateral view.



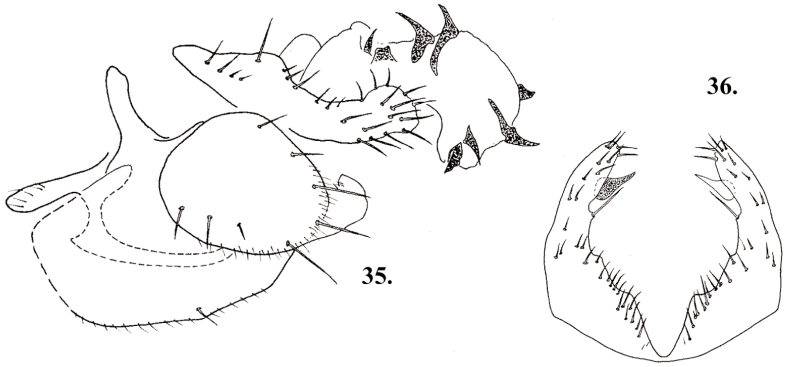
Figures 32–34. *Hemerodromia watlingi.* **32**. Male terminalia, lateral view; **33**. Male terminalia, dorsal view; **34**. Female terminalia, lateral view. Abbreviations: *cer* – cercus.

at extreme base blackish.

Abdomen. Hypopygium yellow with cerci, epandrium and small part of hypandrium adjacent to epandrium, deep blackish. Cercus (Fig. 26) apically narrowed, blunt-ended in lateral view, more pointed viewed dorsally; apically with several short, strong, blunt black setae. Epandrium short and narrow, only 0.5 x as long as cercus, rather densely setulose distally (on dissection, the epandrial apex is seen to be hook-like and there is a broad subapical process, curved anteriorly) Hypandrium (Fig. 25) very large, greatly inflated, egg-shaped, a few pale setae apically but otherwise bare. Phallus white, long, reflexed posteriorly, apically blunt.

Female. A single female (FBA 109112, FNIC) associated with the male holotype and 4 females (FBA 187161–187164) associated with a male paratype are probably this species. However, they are indistinguishable from females of *H. iqasoa* n. sp. and are not included in the type series.

Types. *Holotype* ♂ FIJI: **Viti Levu**: Koroyanita Eco Pk., 0.5 km N Abaca vlg., 800 m, 12–19.xi.2002, Malaise, Schlinger, Tokota'a, 17.667°S, 177.55°E [FBA 109111]. Holotype is deposited in FNIC. *Paratypes*: **Viti Levu**: 1♂ [FBA 081927] (FNIC), as in holotype but Savuione Trail, 17° 33'E, 177°33'E, 7–12.x.2002, FJCL01_M01_02; 1♂ [FBA 037116] (CNC); 1♂ [FBA 187165] (BPBM), same as previous, 17°40'E, 177°33'E, 11–19.iii.2003, Malaise, FJ 11-C, E. Schlinger, M. Tokota'a, 17°37'S, 177°59'E, 700 m, 24.x–8.xi.2003; 1♂ [FBA 049171] (FNIC) same data as FBA 037116 but FJ-1,



Figures 35–36. *Hemerodromia spiculata*. **35**. Male terminalia, lateral view; **36**. Male cerci, dorsal view.

21.x–18.xi.2003, 17°40′S, 177°33′E, 450 m; 1♂ [FBA 177567] (BPBM), 4.8 km N Veisari Stlmt., log rd to Waivudawa, 300 m, 12.xii.2002–3.i.2003, Malaise 1, Schlinger, Tokota'a, 18°4′30′′S, 178°21′43′′E.

Etymology. From the Fijian 'vuce' meaning swollen, in reference to the hugely inflated hypandrium.

Hemerodromia vulacia Plant & Sinclair, **new species**
(Figs. 27, 28)

Diagnosis. A yellow species, very similar to *H. dromodromoa* n. sp., males of which are best distinguished by the sharply pointed and curved posterior hypandrial process.

Description. **Male**. Very similar to *H. dromodromoa* n. sp., differing as follows:

Legs. Femoral formula 6/16/16/6.

Abdomen. Hypopygium (Fig. 28) yellow with cerci, epandrium and hypandrium darkened apically. Cercus (Fig. 27) narrow, slightly incurved, apically rather broadened in lateral view with several minute curved apical setulae. Epandrium long, slightly constricted medially, broadened apically with almost linear posterior margin bearing distinct setae. Hypandrium long, reaching to end of epandrium, with a sharply pointed and decurved posterior hypandrial process. Phallus long, apically pointed.

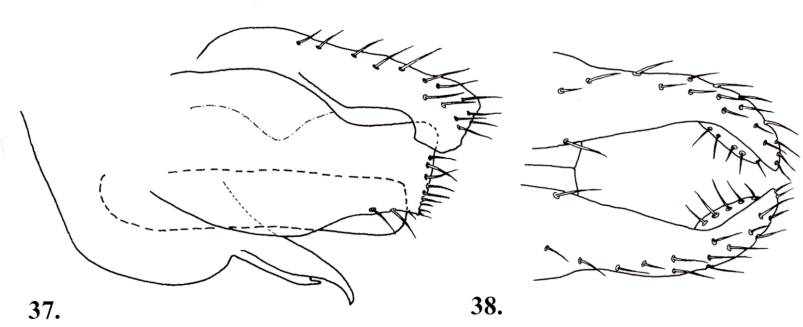
Female. Unknown.

Type. *Holotype* ♂ FIJI: **Vanua Levu**: 6 km NW Kilaka, 3–15.vi.2004, Batiqere Range, Malaise, 113 m, Schlinger, Tokata'a, FJVN59c_M02_06, 16.7317°S, 178.997°E [FBA 069261]. Holotype is deposited in FNIC.

Etymology. From the Fijian 'vulaci' meaning unnaturally pale, in reference to the pale yellow colour of the species.

Hemerodromia vutivutia Plant & Sinclair, **new species**
(Figs. 29–31)

Diagnosis. A yellow species with abdomen darkened dorsally and in the male, a disjunction between basal and distal rows of denticles of both av and pv series. The species is best distinguished by the male genitalia which are deep black and characteristically shaped.



Figures 37-38. *Hemerodromia subiqasoa.* **37**. Male terminalia, lateral view; **38**. Male cerci, dorsal view.

Description. **Male**. Similar to *H. dromodromoa* n. sp., differing as follows:

Thorax. Entirely yellow apart from rather well defined, minute black spot on extreme front of postpronotal area, either side of thoracic 'collar'.

Legs. Yellow. Femoral forumula 7/14/18/7; basal av and pv spines quite strong, otherwise all spines rather weak, almost hair-like; av denticles arranges in two discontinuous rows, basal series of about 10 denticles distally becoming more anteriorly positioned, distal series of 4 denticles more ventrally situated and obviously discontinuous with basal series; pv denticles also in two discontinuous rows, basal series of about 11 denticles more widely spaced and obviously discontinuous with distal series of about 7 denticles which are more closely apposed and displaced posteriorly; basal denticle of pv rows larger and distinctly separated from others by short bare area.

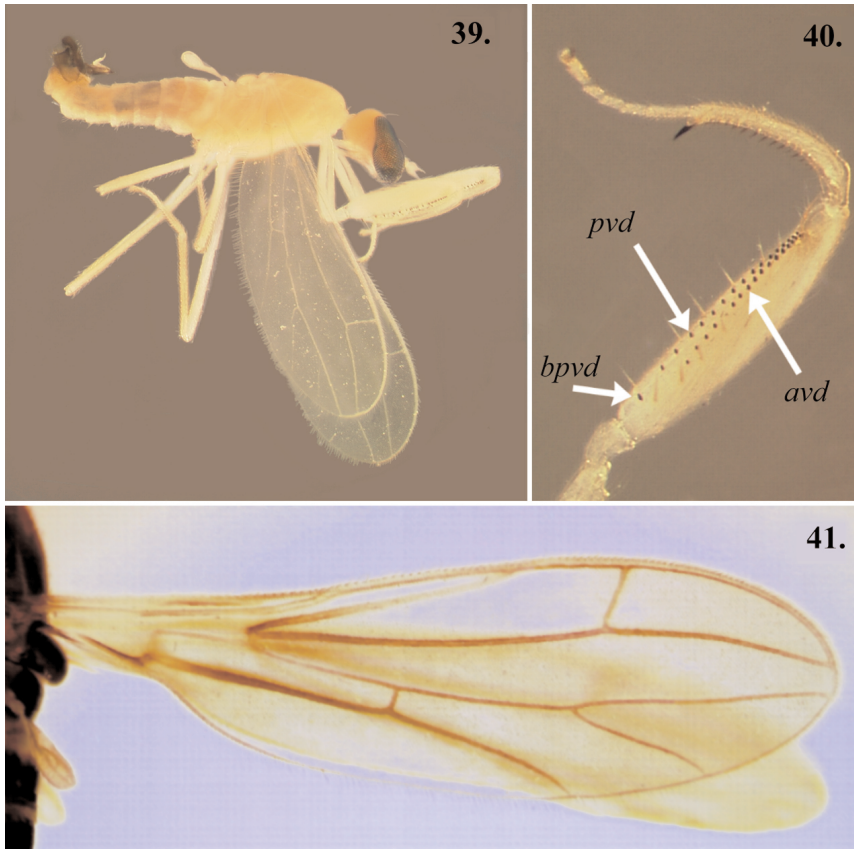
Wing. Veins brownish yellow; fork R_{4+5} about 80°, clearly distal to fork M_{1+2}.

Abdomen. Tergites darkened, becoming progressively darker distally. Ventrum pale. Hypopygium (Fig. 31) deep black with cerci slightly paler. Cercus (Fig. 29) narrowed distally in lateral view, broader in dorsal view, gradually incurved. Epandrium rather narrowed distally with apical pubescence and a few strong setae. Hypandrium abruptly slightly concave apically with a few distinct setae amongst smaller setulae posteroapically. Postgonite rounded apically, just visible above apex of epandrial lobe in lateral view. Phallus, short, rather broad, hardly visible above cerci in lateral view.

Female. Very similar to male but femoral formula about 8/20/18/7. No obvious discontinuity between basal and distal denticles of av or pv series; basal pv denticle not differentiated or separated from others and all spines (especially basal pair) stronger. Cercus (Fig. 30) with apical process narrow, elongate, paler apically. Sternite 10 whitish yellow, weakly sclerotized. Tergite 10 black, posterior margin rather irregular.

Types. *Holotype* ♂ FIJI: **Viti Levu**: PABITRA Wabu Baseline Survey, 1034 m 17–20.xi.2003 Malaise samples collected from Delena Veikoi 17.5833°S, 178.0833° [FBA 053109]. Holotype is deposited in FNIC. *Paratype*: 1♀, same data as holotype, [FBA 053110] (FNIC).

Etymology. From the Fijian 'vutivutia' meaning hairy, in reference to the apically pilose epandrium of this species.



Figures 39–41. *Hemerodromia* spp. **39**. *Hemerodromia dromodromoa*, male habitus; **40**. *Hemerodromia kumia*, front right leg in oblique anteroventral view (note that tibia and tarsal segments are foreshortened); **41**. *Hemerodromia raradamua*, wing. Abbreviations: *avd* – anteroventral denticles; *bpvd* – basal posteroventral denticle; *pvd* – posteroventral denticles.

Hemerodromia watlingi Plant & Sinclair, **new species**
(Figs. 32–34)

Diagnosis. An entirely yellow species with a distinctive bicoloured hypopygium with narrow apically hooked cercus bearing an incurved flattened plate distally.

Description. **Male**. Similar to *H. dromodromoa* n. sp., differing as follows:

Legs. F_1 with femoral formula 6–7/13–15/12–15/6–7; basal denticle of pv series not separated from main series by a short bare area (but bare area *is* present in one paratype). T_1 about 0.7 x as long as F_1 with 13–15 sharply pointed spine-like setae ventrally

Abdomen. Hypopygium (Figs. 32, 33) black with basal 0.1 of cerci and 0.5 of epandrium yellow; hypandrium yellow except a small pd blackened patch. Cercus in lateral view (Fig. 32) swollen basally, narrow and almost parallel-sided distally with dorsoapical hooked process; broad inwardly directed flattened plate distally appearing much broader in dorsal view. Epandrium narrow, hardly

constricted medially, much shorter than cercus, with small but distinct setae apically and dorsally on distal half. Hypandrium with minute setulae apically, otherwise bare. Phallus white, parallel-sided, blunt apically, evenly curved posteriorly, clearly visible above cercus in lateral view.

Female. Very similar to male and *H. dromodromoa* n. sp. female but wing veins brownish yellow, darker basally, especially vein Cu at base of cell bm+dm and posterior wing margin at extreme base. Femoral formula 6–7/17/15/6. Terminalia (Fig. 34) similar to *H. iqasoa* n. sp. but cercus with narrow apical process slightly angular and slightly upturned, bearing 2 longer setae laterally and with apex distinctly white from which a short but distinct seta emerges. Tergite 10 yellow to black (black in FBA 083699 but distinctly yellowish in FBA 049169) bearing 2–3 distinct setae. Sternite 10 whitish yellow, hardly differentiated from adjacent membrane, bearing only a few minute setulae.

Types. *Holotype* ♂ FIJI: **Viti Levu**: 1 km E Abaca Vlg., Koroyanita Ntl. Pk., 800 m, Savuione Trail, 17°40'E, 177°33'E, E. Schlinger, Tokota'a, Malaise, FJVL01_M01_07, 12–19.xi.2002 [FBA 083698]. Holotype is deposited in FNIC. *Paratypes*: **Viti Levu**: 1♂, 4.8 km N Veisari Stlmt., log rd to Waivudawa, 300 m, 12.xii.2002–3.i.2003, Malaise 1, Schlinger, Tokota'a, 18°4'30"S, 178°21'43"E [FBA 177564] (BPBM); 1♂ [FBA 083699] (FNIC), data as in holotype; 1♂ [FBA 081926] (CNC), data as holotype but FJVL01_M01_02, 7–12.x.2002; 1♂, 1♀ [FBA 049168–049169] (NMWC), data as holotype but FJ1 21.x–18.xi.2003, 450 m, M. Irwin, E. Schlinger, M. Tokota'a.

Etymology. Named in honour of Dick Watling who has done much to encourage the study and conservation of Fijian wildlife.

GENERAL DISCUSSION

Ten of the new species of *Hemerodromia* were confined to montane wet forest or cloud forest above 300 m and three from lowland wet forest below 150 m. All the Fijian species thus appear to be restricted to humid forest biotopes, but there are no data available concerning proximity to streams or other water bodies. Two or three species were often observed to be sympatric, collected together in the same malaise traps.

Each of the three major Fijian islands has an apparently endemic complement of *Hemerodromia* species; eight species from Viti Levu, three from Taveuni and two from Vanua Levu (Table 1) All the species appear to be fairly closely related with the possible exception of *H. vucea* n. sp., with its enormously enlarged hypandrium, and *H. votovotoa* in which the cerci are distinctly internalised and hidden by the epandrium in lateral view. The Fijian plate, on which the archipelago sits, has experienced extensive compression and extension throughout the Tertiary and Quaternary which has created differential updoming, uplift and subsidence across the islands (Heads 2006). It is speculated that ancestral *Hemerodromia* populations radiated in response to lateral migrations of habitat along developing island arcs and altitudinal habitat displacements during island orogenesis.

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Table 1. Distribution of *Hemerodromia* among major islands of Fiji.

Species	Taveuni	Vanua Levu	Viti Levu	Altitude (m)
H. dromodromoa	x			800–1200
H. iqasoa			x	300–800
H. kumia		x		61–146
H. moqimoqilia	x			1188
H. raradamua			x	1034
H. senivaua	x			734–892
H. spiculata			x	300
H. subiqasoa			x	300
H. votovotoa			x	700
H. vucea			x	300–800
H. vulacia		x		113
H. vutivutia			x	1034
H. watlingi			x	300–800
Total	**3**	**2**	**8**	

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FIJI ARTHROPODS XI

(edited by N.L. Evenhuis & D.J. Bickel)

TABLE OF CONTENTS