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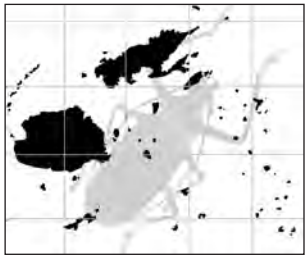

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FIJI ARTHROPODS X

Editors' Preface

We are pleased to present the tenth 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. Five co-PIs and 18 specialists (see Fiji Arthropods I, p. 18) 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 Buprestidae (Coleoptera–Bellamy), Lygistorrhinidae (Diptera—Evenhuis), and Dolichopodidae (Diptera—Bickel). Manuscripts are currently in press or in preparation on Auchenorrhyncha, Hybotidae, Keroplatidae, Mycetophilidae, Mythicomyiidae, Limoniidae, and Dolichopodidae, 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:

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We encourage interested authors to contact us before submitting papers.

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Fiji Arthropods X. Edited by Neal L. Evenhuis & Daniel J. Bickel. *Bishop Museum Occasional Papers* 97: 3–12 (2008).

The Genus *Maoraxia* Obenberger in Fiji (Coleoptera: Buprestidae: Maoraxiini)[1]

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Abstract. The genus *Maoraxia* Obenberger is reviewed for the four Fijian species: *M. viridis* Bellamy, 1985; *M. viti*, **sp. nov**.; *M. kadavuensis*, **sp. nov**.; *M. tokotaai*, **sp. nov**. The species are fully described, illustrated and differentiated in a key.

INTRODUCTION

The buprestid genus *Maoraxia* Obenberger, 1937 is currently represented in Fiji by a single species: *M. viridis* Bellamy, 1985. At the time of that description (Bellamy *in* Bellamy & Williams 1985), the first modern revision of the genus was conducted resulting in synonymy to a single New Zealand species and new species described from Australia, Fiji, and Tonga. Further studies and additional species of *Maoraxia* are known from Philippines (Bellamy 1990), New Caledonia (Bellamy 1991), Lord Howe Island, New South Wales, Australia (Bellamy & Peterson 2000) and Solomon Islands (Bílý *et al*. 2006). Besides the three new Fijian species described herein, there are also new species from New Caledonia, Samoa, Tonga and Vanuatu awaiting description.

MATERIALS AND METHODS

Abbreviations. The following collection codens are used in the text: BPBM - Bishop Museum, Honolulu; FNIC, Fiji National Insect Collection, Suva; CLBC - Bellamy research collection, this address. Label data are cited verbatim. Holotypes of material deriving from the NSF-funded Fiji Arthropod Survey are to be deposited in FNIC but are currently being held in trust in BPBM.

SYSTEMATICS

Tribe MAORAXIIINI

Maoraxiini Hołyński, 1984: 106; Bellamy & Williams, 1985: 148; Bílý, 2000: 110; Volkovitsh, 2001: 56; Bellamy, 2003: 51. Type genus: *Maoraxia* Obenberger, 1937.

Maoraxiina: Hołyński, 1988: 49; Bellamy, 1990: 189; 1991: 458; Hołyński, 1993: 14; Bílý, 2000: 110; Bellamy, 2002: 138.

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1. Contribution No. 2007-044 to the NSF-Fiji Arthropod Survey.

Genus *Maoraxia* Obenberger

Maoriella Obenberger, 1924: 19 (name preoccupied by *Maoriella* Attems, 1903 - Myriapoda); Théry, 1925: 225; Obenberger, 1926: 98; 1928: 78; 1936: 142; Bellamy, 1985: 421; 1986: 590; 2002: 139; 2003: 51. Type species: *Maoriella novaezeelandiae* Obenberger, 1924 (fixed by original designation).

Maoraxia Obenberger, 1937: 1449 (replacement name for *Maoriella* Obenberger, 1924); Bellamy & Williams, 1985: 150 (species key); Hołyński, 1988: 49; Bellamy, 1990: 187; 1991: 457 (species key); Hołyński, 1993: 14; Bellamy & Peterson, 2000: 101; Bílý, 2000: 111; Bellamy, 2002: 139; 2003: 51.

This interesting genus occupies a relatively isolated place in the higher classification of the Buprestidae, quite separate from the earlier placements by Obenberger (1928, 1936) who assumed a close relationship with the Haplostethini LeConte. This relationship was later refuted by Hołyński (1984, 1988, 1993) and further refined by Bílý (2000), Volkovitsh (2001) and Bílý & Volkovitsh (2005). What was once known only as a strange relict from New Zealand has increased in number of species to 13 described (and at least four still undescribed) and an ever-widening geographic range (see Introduction) through additional modern collecting and fauna surveys plus sorting the accumulations of small, undetermined specimen holdings of collections in Australia, Europe and Honolulu which have yielded nearly all of the species described since 1985.

As this genus becomes better known with the subsequent description of additional new species, I'm sure that a first impression I shared with my colleagues that there should be only a single species in each island group, i.e. *M. bourgeoisi* Bílý, Curletti & Aberlenc from the Solomon Islands, *M. roseocuprea* Bellamy & Peterson from Lord Howe Island, *M. tongae* Bellamy from Tonga and *M. viridis* Bellamy from Fiji and more than a single species from larger land masses, i.e. *M. auroimpressa* (Carter) and *M. storeyi* Williams from eastern Australia, *M. cordicollis* (Fauvel) and *M. excavata* (Fauvel) from New Caledonia is incorrect. That this impression is wrong as is evident from the results of the Fijian Arthropod Survey as three new species are available for description. This pattern of speciation within a small island group in *Maoraxia* is the same pattern observed in several genera, e.g. *Helferella* Cobos and *Micrasta* Kerremans of the Haplostethini. An interesting coincidence considering earlier opinions about the placement of *Maoraxia* within that higher taxon (e.g., Obenberger 1937, 1957). That these unrelated taxa exhibit similar island speciation events suggests, rather than any immediate phylogenetic pattern or relationship, two older lineages that found themselves in habitats and niches that were available for colonization and thus have evolved into more species than might have been expected. I anticipate that the same will be found in the Fijian *Helferella* which I'll turn to next.

A key to the Fijian species of *Maoraxia*

1. Species mostly green on dorsal surface, generally disc of pronotum either green, coppery or black and with two large oblique spots on posterior portion of elytral disc 2
–. Species mostly black, either with perimeter of protonum or also perimeter of elytra with narrow iridescent margin 3
2. Body more robust, elytra broader (Fig. 1); frontoclypeal margin feebly, broadly concave; dorsal punctation more coarse, slightly more deep; pronotal disc with vestiture subequal to lateral portions of pronotal disc ... (Ringold Islands) .... **M. viridis** Bellamy

–. Body more slender, elytra narrower (Figs. 2, 3); frontoclypeal margin feebly, broadly convex; dorsal punctation especially frontovertex and pronotal disc less dense, less deep; disc of pronotum with shorter vestiture ... (Viti Levu) .... **M. viti** Bellamy, **sp. nov.**

3. Posterior margin of pronotum with bright green transverse fascia; two small aeneous areas on elytra disc, which is otherwise nitid black (Fig. 4) ... (Viti Levu) ....…….…….. **M. tokotaai** Bellamy, **sp. nov.**

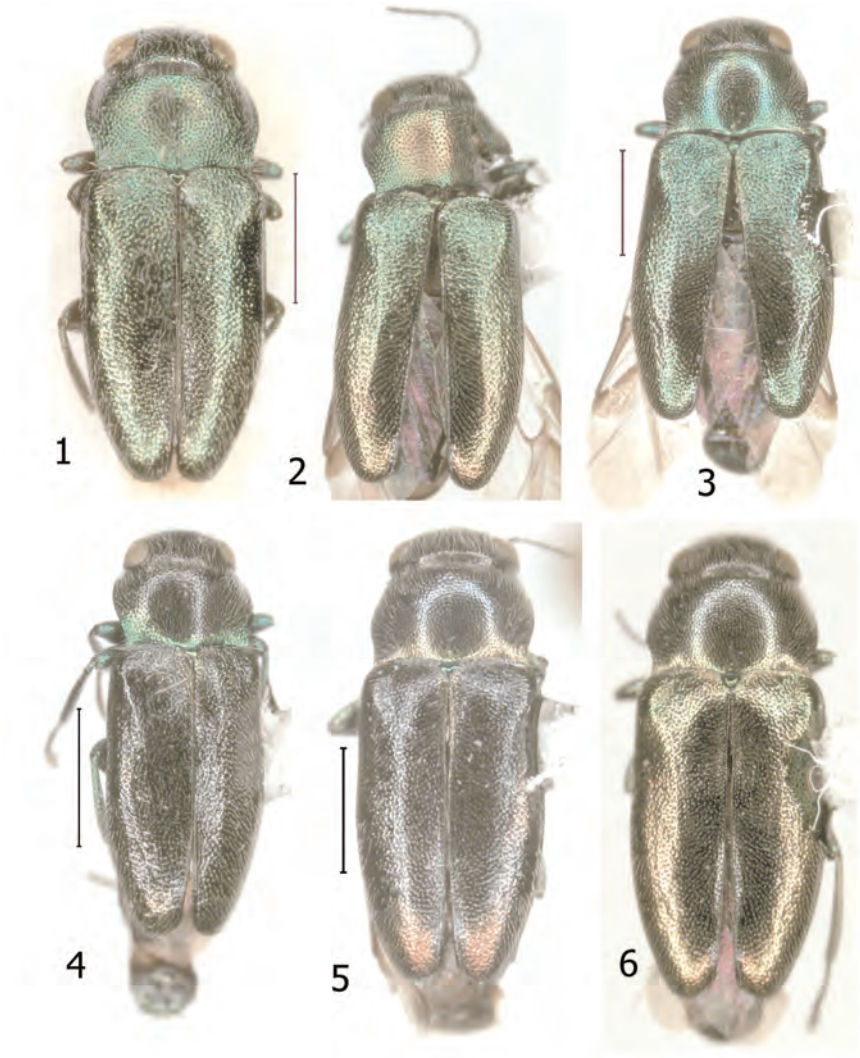
–. Posterior margin of pronotum with aeneous to cupreous to roseocupreous transverse fascia, never green except for very narrow medial band above scutellum; four small aeneous to cupreaenous areas on elytral disc on otherwise nitid black disc which can be completely confluent leaving only elongate ovoid medial black area (Figs. 5, 6) ... (Kadavu) ..... **M. kadavuensis** Bellamy, **sp. nov.**

Maoraxia viridis Bellamy
(Figs. 1, 7, 9)

Maoraxia viridis Bellamy *in* Bellamy & Williams 1985: 158; Bellamy, 1990: 189; 1991: 461.

Redescription of ♂ Holotype (Fig. 1). Size small, 3.5 mm x 1.5 mm (maximum length vs. width); slightly flattened above, elongate; surface densely punctate generally, clothed with dense semierect, short white setae with brunneous tinge; frontal area of head and dorsal surface of pronotum and elytra shining metallic green with darker tints on pronotum and along elytral margins; ventral surface black with greenish reflections along lateral margins, basal antennomeres and on legs. Head transverse, narrower than pronotum; eyes ovoid, inner margins subparallel; front slightly convex; one sharply elevated carina extends from above antennal cavities down and shallowly, arcuately across frontal surface; frontoclypeus very short and very feebly broadly convex medially; gena grooved for reception of basal antennomeres; antennae slender, one completely missing, other missing antennomeres 7–11, 4–6 serrate, ca. 2 x as long as wide. Pronotum 1.8 x wide as long, widest at middle; lateral margins arcuately rounded to slight constriction before posterior margin; lateroposterior angles slightly acutely rectangular; anterior margin slightly sinuate; posterior margin moderately bisinuate; lateral margin well developed, strongly elevated and explanate dorsally, entire from posterior to anterior margins; disk convex, slightly impressed lateroposteriorly, a slightly indicated medial line entire from posterior to anterior margins and small elongate fovea anterior to scutellum; scutellum cordate, disk slightly depressed, impunctate. Elytra slightly wider than pronotum at base, widest at humeri, sides subparallel to apical 1/3, then converging to separately rounded, finely serrate apices; disk weakly convex, slightly depressed at base between humeri and suture; humeri moderately developed, less densely punctate; one moderately elevated carina separates disc and epipleura; epipleura broad anteriorly, narrowing apically and becoming confluent with lateral margin at posterior 1/4; broadly rounded pygidium visible beyond elytral apices. Prosternum densely punctate, anterior margin straight; metacoxal plates strongly dilated internally; abdomen with suture between 1st and 2nd ventrites vaguely indicated; last visible ventrite broadly rounded. Legs with femora fusiform, unarmed, sparsely shallowly punctate; tibiae slender, unarmed, densely deeply punctate with dense, short recumbent setae; 1st protarsomere subequal to 2nd; 1 meso-, metatarsomere as long as respective 2+3+4 together; 4th with expanded deeply bilobed pulvilli; tarsal claws broadly appendiculate. Aedeagus as in Fig. 9.

Specimens examined. Holotype ♂ (BPBM 13277): FIJI: [Ringold Isles]: Thikombia [Cikobia], 26 Sep 1924, E.H. Bryan, Jr.



Figures 1–6, Fijian *Maoraxia* spp. **1**, *M. viridis* Bellamy, holotype; **2–3**, *M. viti*, sp. nov., **2**, holotype; **3**, paratype; **4**, *M. tokolaati*, sp. nov., holotype; **5–6**, *M. kandavuensis*, sp. nov., **5**, holotype, **6**, paratype. Scale bars = 1.0 mm and are equal for 1, 2 and 5, 6.

Etymology. This species is named for the green dorsal coloration.

Fiji Distribution: Ringold Islands

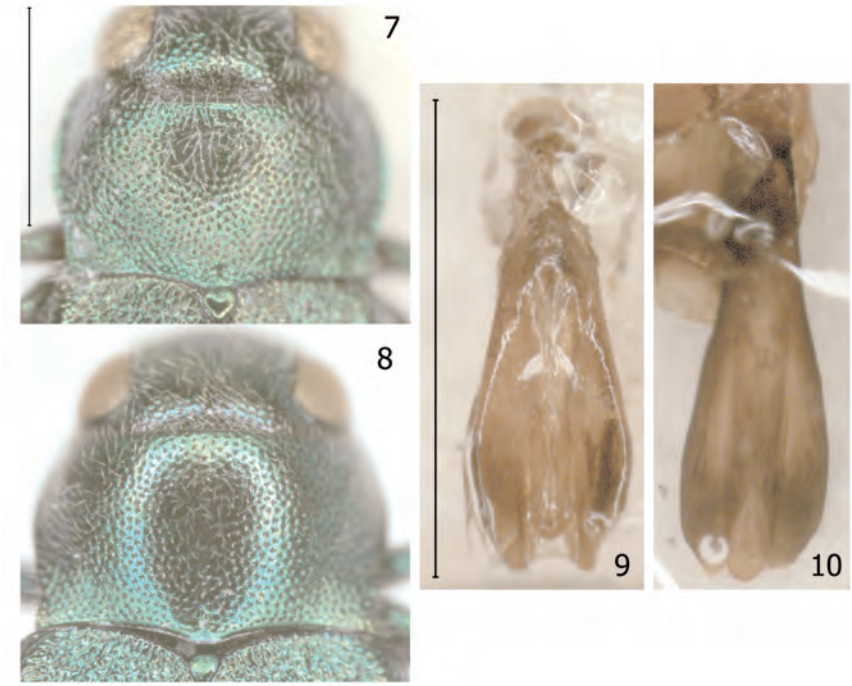
Comments. As the first *Maoraxia* species described from Fiji, *M. viridis*, one may be forgiven for the assumption that any specimen of this genus taken in Fiji would be this species. However, with *M. viridis* coming from a relatively obscure small subset of Fijian islands, that have not been subsequently surveyed, it may be more exception than rule. Being one of the two green species, I initially thought that the two specimens described below as *M. viti*, sp. nov. were variations of *M. viridis* until I began to compare digital images of each and noted the obvious differences in punctation, vestiture and body proportion.

Maoraxia viti Bellamy, **sp. nov.**
(Figs. 2, 3, 8)

Description of ♂ Holotype (Fig. 2). Size small, 3.6 mm x 1.2 mm (maximum length vs. width); slightly flattened above, elongate, surface generally densely punctuate, clothed with dense recumbent, elongate dirty white setae; frontal area of head and dorsal surface of pronotum and elytra shining metallic green; disc of pronotum with golden and golden brown longitudinal bands medially; lateroapical elytral margins with aeneocupreous reflections; ventral surface black with greenish reflections along lateral margins, basal antennomeres and on legs. Head transverse, narrower than pronotum; eyes ovoid, inner margins subparallel; front slightly convex; one sharply elevated carina extends from above antennal cavities down and shallowly, arcuately across frontal surface; frontoclypeus very short, distal margin feebly, broadly convex; gena grooved for reception of basal antennomeres; antennae slender, one completely missing, other missing antennomeres 7–11, 4–6 serrate, ca. 2 x as long as wide. Pronotum (crushed in upper right quadrant) 1.8 x wide as long, widest at middle; lateral margins arcuately rounded to slight constriction before posterior margin; lateroposterior angles slightly acutely rectangular; anterior margin slightly sinuate; posterior margin moderately bisinuate; lateral margin well developed, strongly elevated and explanate dorsally, entire from posterior to anterior margins; disk convex, slightly impressed lateroposteriorly, a slightly indicated medial line entire from posterior to anterior margins and small elongate fovea anterior to scutellum; scutellum cordate, disk slightly depressed, impunctate. Elytra slightly wider than pronotum at base, widest at humeri, sides subparallel to apical 1/3, then converging to separately rounded, finely serrate apices; disk weakly convex, slightly depressed at base between humeri and suture; humeri moderately developed, less densely punctate; one moderately elevated carina separates disc and epipleura; epipleura broad anteriorly, narrowing apically and becoming confluent with lateral margin at posterior 1/4; broadly rounded pygidium visible beyond elytral apices. Prosternum densely punctate, anterior margin straight; metacoxal plates strongly dilated internally; abdomen with suture between 1st and 2nd ventrites vaguely indicated; last visible ventrite broadly rounded. Legs with femora fusiform, unarmed, sparsely shallowly punctate; tibiae slender, unarmed, densely deeply punctate with dense, short recumbent setae; 1st protarsomere subequal to 2nd; 1 meso-, metatarsomere as long as respective 2+3+4 together; 4th with expanded deeply bilobed pulvilli; tarsal claws broadly appendiculate. Genitalia: not described, mounted on card beneath specimen.

Variation: one ♀ paratype (Figs. 3, 8) differs from the holotype as follows: length 3.6 mm from frons to elytral apex, width 1.5 mm across elytra at humeri; the male specimen has the discal markings on the pronotum and elytra are green-aeneous rather than the black of the holotype; the black markings are slightly larger than of the holotype.

Specimens examined. *Holotype* ♂ **Viti Levu**: 1.5 km SW Vatura Dam, 550 m, 23 Sep–5 Oct 2004, Malaise 1, A. Namaqa, 17.744 S, 177.676 E (FBA 511077). *Paratype* 1 ♀, Naraiyawa, 178°5'E, 17°56'S, 28–30 Nov 1986, R.L. Brown, blacklight trap (CLBC).



Figures 7–10, Fijian *Maoraxia* spp. **7**, **8**, pronotum; **9**, **10**, aedeagus, dorsal aspect; **7**, **9**, *M. viridis* Bellamy, holotype; **8**, **10**, *M. tokolaati*, sp. nov., holotype; Scale bars = 1.0 mm and are equal for 7, 8 and 9, 10.

Etymology. This new species is named for Viti Levu, the island from which both type specimens came.

Fiji Distribution: Known only from Viti Levu.

Comments. There are a number of subtle differences between this new species and *M. viridis*, e.g. coloration, vestiture, punctation (Fig. 8) and body proportion. This species is slightly more slender overall as are the elytra. Figures 1–3 represent these proportional differences, subtle as they are, better than the measurements and ratios do. With the damage to the holotype, the paratype is also illustrated (Fig. 3). The aedeagus of the holotype is damaged, mounted on a card beneath the specimen and not figured.

Maoraxia tokotaai Bellamy, **sp. nov.**
(Figs. 4, 10)

Description of ♂ Holotype (Fig. 4). Size small, length 3.2 mm from frons to elytra apex, width 1.1 mm across widest portion of pronotum; slightly flattened above, elongate, surface generally densely

punctuate, clothed with dense semierect, short white setae; dorsal surface nitid black with frontoclypeus, basal antennomeres, mentum, posterior margin of pronotum, scutellum and legs metallic green; anterior margin of pronotum and on anterior portion, on medial third and before posterior apex of disc with faint irregular, iridescent reflections; ventral surface entirely black. Head transverse, narrower than pronotum; eyes ovoid, inner margins subparallel; frontoclypeus very short, slightly convex, margin shallowly arcuate; one sharply elevated carina extends from above antennal cavities down and shallowly, arcuately across frontal disc; gena grooved for reception of basal antennomeres; antennae slender, elongate, antennomeres slender, subrectangular. Pronotum 1.5 x wide as long, widest just anterior to middle; lateral margins arcuately rounded to slight constriction before posterior margin; lateroposterior angles slightly acutely rectangular; anterior margin very narrowly sinuate on either side of midpoint; posterior margin moderately bisinuate; lateral margin well developed, strongly elevated and explanate dorsally, entire from posterior to anterior margins; disk convex; scutellum subcordate, disk slightly depressed, impunctate. Elytra slightly wider than pronotum posteriorly, widest across humeri, sides subparallel to apical 1/3, then converging to separately rounded, finely serrate apices; disk weakly convex, slightly depressed at base between humeri and suture; humeri moderately developed, less densely punctate; one vague sinuate costa extends from each humeral elevation posterior and inward then subparallel to about posterior 1/3; one moderately elevated carina separates disc and epipleura; epipleura broad anteriorly, narrowing apically and becoming confluent with lateral margin preapically; broadly rounded pygidium visible beyond elytral apices. Prosternum densely punctate, anterior margin feebly concave laterally; metacoxal plates strongly dilated internally; abdomen with suture between 1stand 2nd ventrites vaguely indicated; last visible ventrite broadly rounded. Legs with femora fusiform, especially metafemora, unarmed, sparsely shallowly punctate; tibiae slender, unarmed, densely deeply punctate with dense, short recumbent setae; 1st protarsomere subequal to 2nd; 1st meso-, metatarsomere as long as respective 2+3+4 together; 3rd with small pulvillus, 4th with expanded deeply bilobed pulvillus; 5th short, narrow, tarsal claws broadly appendiculate. Aedeagus as in Fig. 10.

Variation. Known only from the holotype.

Specimens examined. Holotype ♂ (FNIC): **Viti Levu**: Navai, Malaise 6, 15 Jun 2003, 700 m, Eteni, 177°59'E, 17°37'S [FBA 013513].

Etymology. This new species is named to honor Moala Tokota'a for his substantial involvement and varied contributions in the entire Fiji Arthropod survey and for keeping special watch over the four visiting beetle gringos (see Acknowledgments) in November 2005.

Fiji Distribution: Viti Levu.

Comments. *Maoraxia tokotaai* differs from the Fijian congeners by virtue of its coloration, surface sculpture and vestiture, as indicated in the species key.

Maoraxia kadavuensis Bellamy, **sp. nov.**
(Figs. 5, 6)

Description of ♀ Holotype (Fig. 5). Size small, 3.5 mm from frons to elytra apex x 1.3 mm across widest portion of pronotum; slightly flattened above, elongate; surface generally coarsely, shallowly, moderately punctuate, clothed with dense semierect, short white setae; dorsal surface generally nitid black; posterior margin of pronotum with transverse cupreoaeneus fascia, slightly iridescent green

medially; scutellum bright iridescent green; elytra with iridescent markings as follows: one short sinuate mark on each humerus, cupreous; along sutural margin from scutellum to about anterior 1/4, cupreoaeneus; one sinuate mark just anterior and posterior to midpoint at lateral edge of disc, cupreous; most of disc of separately rounded apices, cupreous; ventral surface black; antennae brunneous except antennomeres 1–3 blue-green; dorsal-distal portion of profemora and protibiae iridescent blue-green; dorsal-distal portion of meso- and metafemora slightly golden green; a slight blue-green band on posterior margin of metacoxal plate. Head transverse, narrower than pronotum; eyes ovoid, inner margins subparallel; front slightly convex; one sharply elevated carina extends from above antennal cavities down and shallowly, arcuately across frontal surface; frontoclypeus very short and distal margin shallowly arcuate; gena grooved for reception of basal antennomeres; antennae slender, widely subserrate from antennomere 4. Pronotum 1.75 x wide as long, widest at middle; lateral margins arcuately rounded to slight constriction before posterior margin; lateroposterior angles feebly acute; anterior margin slightly sinuate; posterior margin moderately bisinuate; lateral margin well developed, strongly elevated and explanate dorsally, entire from posterior to anterior margins; disk convex, slightly impressed lateroposteriorly, one small elongate fovea anterior to scutellum; scutellum subcordate, disk slightly depressed, impunctate. Elytra slightly wider than pronotum at base, widest at humeri, sides subparallel to apical 1/3, then converging to separately rounded, finely serrate apices; disk weakly convex, slightly depressed at base between humeri and suture; humeri moderately developed, less densely punctate; one moderately elevated carina separates disc and epipleura; epipleura broad anteriorly, narrowing apically and becoming confluent with lateral margin at posterior 1/4; broadly rounded pygidium visible beyond elytral apices. Prosternum densely punctate, anterior margin straight; metacoxal plates strongly dilated internally; abdomen with suture between 1st and 2nd ventrites vaguely indicated; last visible ventrite broadly rounded. Legs with femora fusiform, unarmed, sparsely shallowly punctate; tibiae slender, unarmed, densely deeply punctate with dense, short recumbent setae; 1st protarsomere subequal to 2nd; 1 meso-, metatarsomere as long as respective 2+3+4 together; 4th with expanded deeply bilobed pulvilli; tarsal claws broadly appendiculate.

Variation. The three ♀ paratypes differ as follows: size: 3.6–4.2 x 1.4–1.7 mm (length from head to elytral apices vs. maximum width of pronotum); dorsal coloration varies in an apparent allometric way with the larger specimens having more of the dorsal surface with the iridescent colors. The largest paratype (FBA 044132) has the entire perimeter of the elytral disc with connected via longitudinal and transverse bands of both cupreous and viridoaeneous color surrounding an elongate ovoid central disc. The two smaller paratypes, both of which are slightly larger than the holotype, are intermediate between the color of the holotype and largest paratype. One of these paratypes (FBA 017560) has the posterior pronotal fascia slightly expanded anterolaterally and with the color transitioning from nitid aureous to roseocupreous; the elytral coloration is very close to that of the holotype. The other paratype (FBA 044124) has the slightly longer posterior pronotal fascia but the color is aeneous on posterior margin to cupreous anterolaterally; the elytra coloration has the midpoint discal sinuate vita extending posteriorly and connecting with preapical spots, with this marking being feebly roseocupreous to cupreous.

Specimens examined. *Holotype* ♀ (FNIC): **Kadavu**: 0.25 km SW Solodamu Vlg, Moanakaka Bird Snctry, 19°04'39" S, 178°07'15.5"E, 60 m, 19 Dec 2003–Jan 2004, Malaise, Schlinger, Tokota'a [FBA 087344], 3 *paratypes*: 1 ♀ same data as holotype [FBA 044132]; 1 ♀, Solodamu, 29 Aug–23 Oct 2003, Malaise in coastal limestone forest, M. Irwin, E. Schlinger, M. Tokota'a, 178°07'E, 19°04'S 128 m [FBA 017560]; 1 ♀, Solodamu, Malaise in coastal limestone forest, 29 Oct–19 Dec 2003, M. Irwin, E. Schlinger, M. Tokota'a, 178°07'E, 19°04'S 128 m [FBA 044124]. One paratype will be deposited in FNIC, BPBM and CLBC.

Etymology. This species is named for the island of Kadavu.

Fiji Distribution: Only known from Kadavu.

Comments. This new species from Kadavu is immediately distinguished from its three Fijian congeners as indicated the species key above. With the range of dorsal coloration discussed under Variation above, one of the paratypes is also figured (Fig. 6).

ACKNOWLEDGMENTS

I first thank Neal Evenhuis, BPBM for including me on the beetle team of the Fiji Arthropod project; Al Samuelson, Chris Reid, Steve Lingafelter and Moala Tokota'a for the interesting and entertaining two week field trip companionship in November of 2005; again to Al for so many favors and loans over the years; and to Shepherd Myers, BPBM Entomology for locating and making the loan of additional specimens used herein and for other papers on the Fijian Buprestidae. The Government of Fiji, especially the Ministries of Forestry and Environment, are thanked for their support of this project and allowing us to collect. Fieldwork for this study was supported in part by NSF DEB grant 0425970 "Fiji Arthropod Survey" and the Schlinger Foundation.

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A New Species of *Lygistorrhina* Skuse from Fiji (Diptera: Lygistorrhinidae)[1,2]

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Abstract. A new species of *Lygistorrhina*, *L. fijiensis*, **n. sp.**, is described and illustrated. It is similar in appearance to four other species of *Lygistorrhina* with pictured wings, *L. pictipennis* Okada (Japan), *L. cincticornis* Edwards (Borneo), *L. chaoi* Papp (Taiwan), and *L. legrandi* Matile (Gabon, Cameroon). It marks the first record of the family Lygistorrhinidae from Fiji.

INTRODUCTION

Until the advent of Malaise trapping, lygistorrhinids were rarely encountered in collecting or collections. Thompson (1975) provided a world view of the family at that time and his work led others to investigate the biodiversity of the family and its familial placement among mycetophiloid-looking flies. In 1975, 11 extant species in 1 genus were known in the family. Subsequent works by Matile (1979, 1986, 1990, 1996), Grimaldi & Blagoderov (2001), Papp (2002, 2005), Hippa *et al.* (2005) added new species and genera worldwide, primarily the Old World tropics. Currently, there are 32 extant species in 7 extant genera. Fossil taxa exist but some recently proposed genera in Blagoderov & Grimaldi (2004) may not be properly placed in Lygistorrhinidae (*q.v.* Hippa *et al*. 2005) and require further study.

MATERIALS AND METHODS

Specimens in this study derive primarily from collecting and trapping conducted by the Fiji Biodiversity of Arthropods (FBA) and NSF-funded Fiji Terrestrial Arthropod Survey projects, types and voucher specimens of which will be deposited in the Fiji National Insect Collection, Suva (FNIC). Where series numbers permit, paratypes and duplicates are deposited in the Bishop Museum, Honolulu (BPBM) and the National Museum of Natural History, Washington, DC (USNM). Morphological terminology follows Søli *et al*. (2000).

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2. Contribution No. 2007-019 to the Pacific Biological Survey.

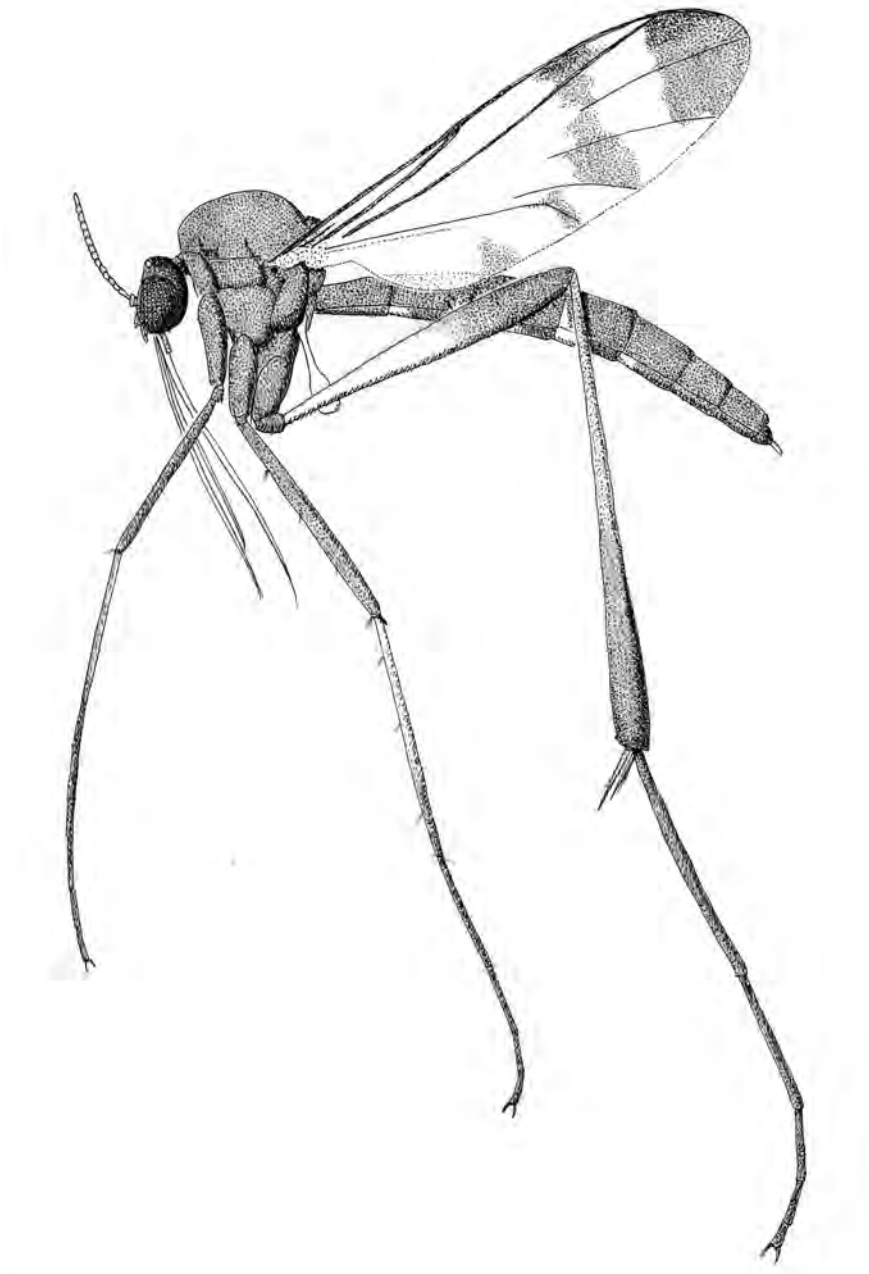


Figure 1. *Lygistorrhina fijiensis*, sp. nov., female habitus.

SYSTEMATICS

Lygistorrhina Skuse

Lygistorrhina Skuse, 1890: 598. Type species *Lygistorrhina insignis* Skuse, 1890, by monotypy.

The genus was proposed by Skuse (1890) for an Australian species, *L. insignis* Skuse. Six years later, Williston (1896) described the genus *Probolaeus* for the West Indian species *P. singularis*. *Probolaeus* is currently considered a subgenus of *Lygistorrhina* and is restricted to the New World. Old world species are treated in the nominate subgenus. Including the new species described here, some 17 species are now known in *Lygistorrhina* (8 of these in the subgenus *Probolaeus*).

Lygistorrhina fijiensis Evenhuis, **n. sp.**

(Figs. 1–8)

Diagnosis. Most similar in appearance to the African *L. legrandi* Matile by virtue of the solid infuscation at the apex of the wing (Fig. 7) but can easily be separated from it by the concolorous antennal flagellomeres (some flagellomeres contrastingly black in *L. legrandi*) and the different male genitalic characters. This species also differs from the other species of *Lygistorrhina* with pictured wings that are hyaline at the apex (*L. pictipennis*, *L. cincticornis*, and *L. chaoi*) by the concolorous antennal flagellomeres (these flagellomeres with contrasting black subapical segments in *L. pictipennis*, *L. cincticornis*, and *L. chaoi*).

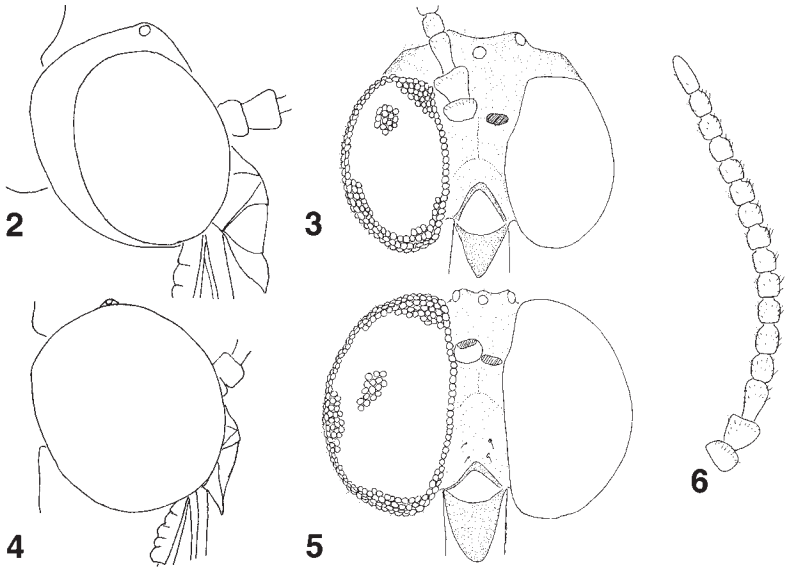
Description. **Male**. Lengths. Body: 3.5–4.8 mm; wing: 2.8–3.5 mm.

Head (Figs. 3, 5). Medial portion of occiput, vertex, and frons dark brown to black, clypeus and labrum shiny brown, remainder of head brown to pale brown; three ocelli, median ocellus slightly smaller than lateral ocelli; eyes large, globular, taking up much of head; proboscis length subequal to fore coxa and femur combined. Antennae (Fig. 6) unicolorous pale brown to yellow, scape and pedicel with short stiff hairs apically; flagellomeres with short stiff hairs on lateral and dorsal surfaces, short fine hairs on ventral surface, medial surface generally bare; first flagellomere cylindrical, length 2 times width, flagellomeres 2–13 squarish, length subequal to width, flagellomere 14 blunt cylindrical, length ca. 1.5 times width, tip rounded.

Thorax. Brown throughout; mesoscutum with minute hairs anteriorly and dorsally; proepimeron with four setae; laterotergite with row of setae caudally; halter stem and knob white.

Legs. Coxae and fore and mid femora brown; fore coxa with row of 6–8 short stiff hairs anteriorly; mid coxa with transverse row of 4–5 stiff hairs apically; hind coxa with 2 short setae subapically; hind femur 1.5 times length of mid femur, swollen on apical half, greatest width subapically, hind femur yellow to yellowish brown with brown to dark brown on apical one-third; tibiae yellow basally, brown apically, setulae in regular rows; hind tibiae narrow basally, gradually becoming wider apically to apex where width subequal to femur; tibial spurs 1:2:2; spurs short on fore and mid tibiae, long on hind tibia, length of tibial spurs on hind leg ca. 1/4 length of hind basitarsus; tarsi brown, with typical setulae and hairs; fore and mid claws pale brown long, slender with basal tooth ca. one-third length of claw; hind claws black, short, thick, with rudimentary subbasal tooth.

Wing (Fig. 7). Suffused pale yellowish brown throughout with contrasting brown pattern as follows: two transverse bands from costa to posterior margin of wing (darkest at costa): one at apical 1/5 of wing from end of vein R5 to anterior edge of vein M2; second from costa at about apical third posteriorly to anterior edge of vein M3+4. Brown spot also at apex of vein CuA1 and pale brown spot



Figures 2-6. *Lygistorrhina fijiensis*, sp. nov. **2**. Female head, lateral (diagrammatic). **3**. Male head, lateral (diagrammatic). **4**. female head, anterior. **5.** Male head, anterior. **6**. Male antenna.

in apical one-third of anal cell. Sc incomplete. Basal portions of M1, M2 and M3+4 effaced, M1 slightly sinuous to wing margin.

Abdomen. Extremely long, thin; dark brown to black with yellow to white on posterior margins of segments II-VI; tergite I bare on anterolateral two-thirds, with short black hairs elsewhere; abdominal segments II-VII (tergites and sternites) with sparse short black hairs evenly distributed except bare on yellow to white areas.

Genitalia (Fig. 8). Hypopygium brown with apical 2/3 of gonostyli pale yellow with brown apex. Gonocoxites with sparsely distributed stiff setae; gonostylus porpoise-head shaped apically, densely pilose on inner margin, with short, stiff hairs on outer apical surface; typical subbasal long seta present on inner margin; additional long seta present at about mid-length on inner margin. Tergite 9 with dense spikey, villa-like setation along caudal margin, strong setae sparsely distributed throughout dorsal surface.

Female. as in male except as follows: Head (Figs. 2, 4) with eyes much smaller, spherical, not globular; occiput and vertex much more prominent, predominantly black with pale brown along inner eye margins; occiput and vertex sparsely black setose. Abdomen thicker than male, all brown; tergites with yellow on anterolateral portion of segments III–VI; sternites with small yellow spots on apical portions of segments III–VI. Genitalia not dissected; cerci rounded apically, pale yellow.

Types. *Holotype* ♂ and 11♂, 6♀ *paratypes* from FIJI: **Taveuni**: 5.3 km SE Tavuki Village, Mt. Devo, 1064 m, 16.841°S, 179.958W, 2–10 Oct 2002, Malaise, E.I. Schlinger, M. Tokota'a [FBA 160499–160516]; 8♀, same data except 2–27 Dec 2002 [FBA 127925–127932];. *Other paratypes*: Fiji: **Taveuni**: 2♀, 3.2 km NW Lavena Village, Mt. Koronibuabua, 234 m, 16.855°S, 179.891°W, 4–18 Jan 2004, Malaise, B. Soroalau [FBA 092512092513]; 1♂, 5♀, Soqulu House in Soqulu Estate, 140 m, 16.833°S, 180.0°W, 14–21 Nov 2002, Malaise, E.I. Schlinger, M. Tokota'a [FBA 099520–099525]; 1♂, 2♀, 5.5

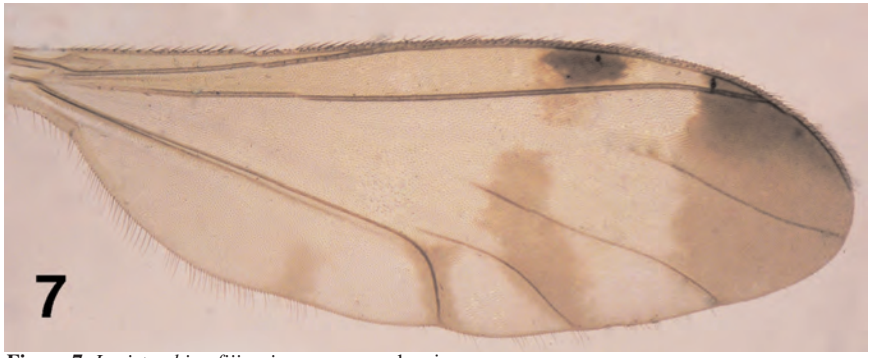


Figure 7. *Lygistorrhina fijiensis*, sp. nov., male wing.

km SE Tavuki Village, Devo Peak, 1188 m, 16.843°S, 179.966°W, 30 Jun–14 Jul 2004, P. Vodo [FBA 152717–152719]; 1♂, 2♀, 5.3 km SE Tavuki Village, Mt. Devo, 1064 m, 16.841°S, 179.958W, 17–24 Oct 2002, Malaise, E.I. Schlinger, M. Tokota'a [FBA 126520–126522]; 5♂, 9♀, same data except 10-17 Oct 2002 [FBA 0913653– 091376]; 3♂, 3♀, same data except 24–31 Oct 2002 [FBA 105852–105857]; 2♂, 2♀, same data except 14–21 Nov 2002 [FBA 162084–162087]; 1♂, same data except 17–24 Oct 2002 [FBA 095539]; 7♂, 10♀, same data except 31 Jul–14 Aug 2004 [FBA 107700– 107716]; 1♂, 3♀, same data except 28 Jan–11 Feb 2005, P. Vodo [FBA 531744–531747]; 4♀, same data except 27 Dec 2002–3 Jan 2003 [FBA 145531–145537];]; 4♂, 3♀, same data except 17–24 Oct 2002 [FBA 098478–098484]; 1♂, 1♀, same data except 24–31 Oct 2002 [FBA 147907–147908]; 1♂, 1♀, same data except 2–10 Oct 2002 [FBA 108214– 108215]; 3♂, 3♀, 6 km SE Tavuki Village, Devo Peak, 1187 m, 16.843°S, 19.966°W, 21 Nov–13 Dec 2002, Malaise, E.I. Schlinger, M. Tokota'a [FBA 149483–149488]; 1♀, same data except 20–27 Dec 2002 [FBA 144472]; 1♀, same data except 24–31 Oct 2002 [FBA 091188]; 2♂, 2♀, same data except 31 Oct–14 Nov 2002 [FBA 091189–091192]; 1♂, 1♀, same data except 27 Dec 2002–3 Jan 2003 [FBA 161615–161616]; 1♂, same data except 14–21 Nov 2002 [FBA 129712]; 1♂, 2♀, same data except 30 Jun–14 Aug 2004 [FBA 51429–151431]; 1♀, Tavuki Village, Mt. Devo, 892 m, 16.837°S, 179.973°W, 14–31 Jul 2004, Malaise, P. Vodo [FBA 151639]; 1♀, same data except 14–31 Jul 2004 [FBA 099300]; 5♂, 3♀, Tavuki Village, Mt. Devo, 734 m, 16.831°S, 179.98°W, 14 Jul–14 Aug 2004 [FBA 091460–091467]; 8♂, 4♀, same data except 14 Aug–9 Sep 2004 [FBA 531724–531735]. **Gau**: 1♀, 3.3 km SE Navukailagi Village, Mt. Delaco, 564 m, 17.986°S, 179.278°E, 26 Mar–7 Apr 2005, Malaise, U. Racule [FBA 531748]; 1♀, 4.0 km SE Navukailagi Village, 496 m, 17.98°S, 179.275°E, 7–19 Apr 2005, Malaise, U. Racule [FBA 531742]. **Kadavu**: 1♀, 0.25 km SW Solodamu Village, Moanakaka Bird Sanctuary 60 m, 19.078°S, 178.121°E, 6 Nov 2004—8 Jan 2005, Malaise, S. Lau [FBA 531743]; 1♀, same data except 28 Jul—4 Sep 2004 [FBA 531749]. **Vanua Levu**: 4♂, 7♀, Batiqera Range, 6 km NW Kilaka Village, 98 m, 16.807°S, 178.991°E, 3–10 Jun 2004, Malaise, P. Manueli [FBA 092735–092745]; 1♀, same data except 28 Jun–21 Jul 2004 [FBA 092729]; 2♂, 2♀, same data except 28 Jun–21 Jul 2004 [FBA 092721–092724]; 2♂, same data except 61m, 16.811°S, 178.998°E, 3–10 Jun 2004 [FBA 115308–115309]; 3♂, same data except 3–10 Jun 2004 [FBA 114247–114249]; 3♂, 1♀, same data except 15–28 Jun 2004 [FBA 092835–

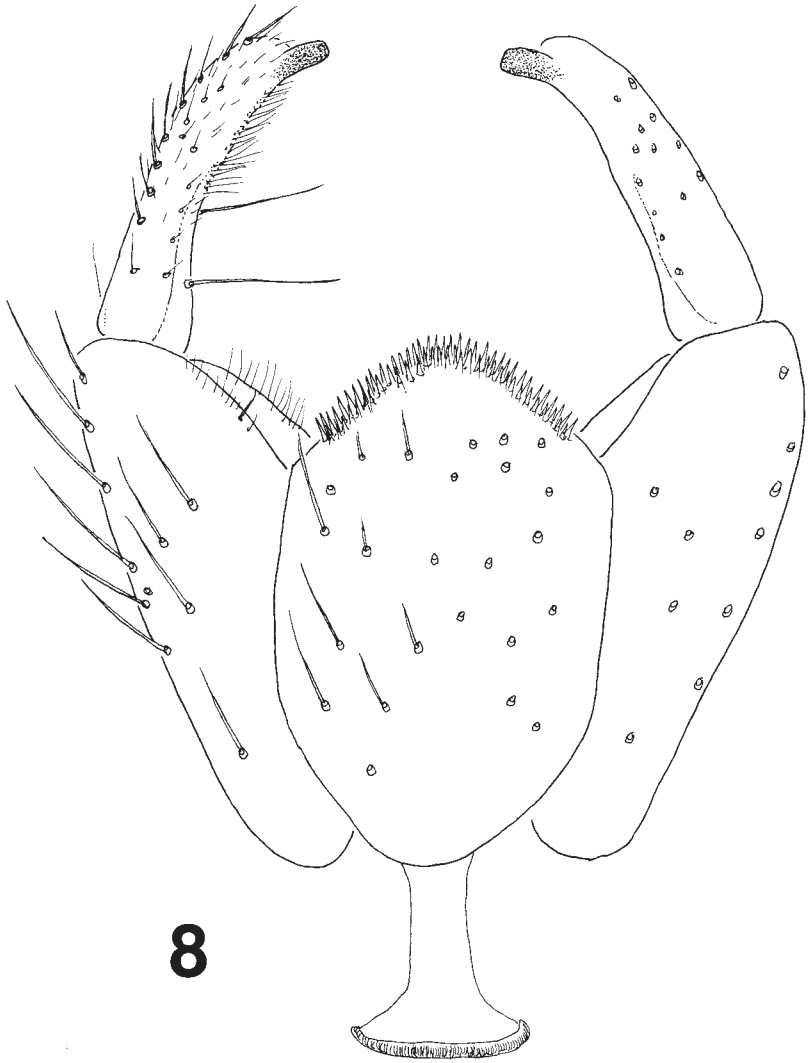


Figure 8. *Lygistorrhina fijiensis*, sp. nov., male genitalia. ventral.

092838]; 1♂, 1♀, same data except 146m, 16.815°S, 78.986°E, 28 Jun–21 Jul 2004 [FBA 104793–104794]; 13♂, 3♀, same data except 113 m, 16.732°S, 179.0°E [FBA 092762–092777]; 3♂, 1♀, same data except 154 m, 16.807°S, 178.988°E, 15–28 Jun 2004 [FBA 092839–092842]. **Viti Levu**: 1♀, 4 km NW Lami Town, Mt. Korobaba, 400 m, 18.102°S, 178.383°E, 1–13 Dec 2004, Malaise, K. Koto [FBA 531737]; 2♀, Wainivalau, Sovi Basin, 300 m, 17.9°S, 178.233°E, 8–16 May 2003, Malaise, M.E. Irwin, E.I. Schlinger, M. Tokota'a [FBA 002062–002063]; 1♀, 4 km NW Colo-i-Suva Village, Mt. Nakobalevu, 372

m, 10.055°S, 178.424°E, 17–24 Mar 2003, Malaise, Timoci leg. [FBA 090629]; 8 ♀, same data except: 4-14 Nov 2003 [FBA 095466–095473]; 2♀, Koroyanitu Eco Park, 0.6 km N. Abaca Village, Mt. Evans Range, 800 m, 17.667°S, 177.66°E, 26 Oct–6 Nov 2002, Malaise, Schlinger, Tokota'a [FBA079555, 079558]; 3♀, 1.8 km E. Navai Village, old trail to Mt. Tomaniivi, 700 m, 17.621°S, 177.998E, 30 Aug–23 Sep 2004, Malaise, E. Namatalau [FBA 531738–531740]; 1♀, Koroyanitu Eco Park, 0.5 km N. Abaca Village, Mt. Evans Range, 800 m, 17.667°S, 177.55°E, 7–13 Oct 2002, Malaise, L. Tuimereke [FBA 090251]. Holotype will be deposited in FNIC (currently in BPBM). Paratypes in FNIC, BPBM, and USNM.

Remarks. Three of the five species of *Lygistorrhina* with pictured wings (*L. pictipennis*, *L. cincticornis*, and *L. chaoi*) have the apex of the wing with hyaline spots and are found clustered in the eastern Asian region (Borneo, Taiwan, and Japan). In contrast, *Lygistorrhina fijiensis* and the tropical African *L. legrandi* have the apex of the wing solidly infuscate and therefore appear more similar to each other than to the Asian group. An additional undescribed species is known to the senior author from Sulawesi (single male specimen in BPBM) that also has a similar pictured wing pattern that fits with the *L. legrandi* and *L. fijiensis* group.

Etymology. Named for the type locality of Fiji.

ACKNOWLEDGMENTS

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Krakatauia (Diptera: Dolichopodidae: Sciapodinae) From the Southwest Pacific, With a Focus on the Radiation in Fiji[1]

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Abstract. The genus *Krakatauia* Enderlein is revised for the southwest Pacific. Based on existing collections and newly collected material from Fiji, 29 species are treated and keyed, including 25 newly described species. The *alanae* group includes three species from Fiji, *K. luctuosa* (Parent), *K. lamiensis* **n. sp.**, and *K. moanakaka* **n. sp**. The *alanae* group is defined by strong synapomorphies in the male hypopygial structure and also includes two species from eastern Australia. The *nupta* group comprises three species at the easternmost limit of *Krakatauia*: *K. nupta* (Bezzi) from Fiji, and two new species, *K. cicia* **n. sp**. from the Lau Group, and *K. planticorum* **n. sp**. from Tonga & Niue. The *evulgata* group is diverse in the western Pacific, and notes and new records are provided for the widespread species *K. evulgata* (Becker) and *K. micronesiana* Bickel. Three species are newly described: *K. hutuna* **n. sp.**, from the Solomon Islands, and *K. ounua* **n. sp**. and *K. tanna* **n. sp.**, both from Vanuatu. The *malakula* group is a poorly defined assemblage that includes five newly described species: *K. cheesmanae* **n. sp.**, *K. epiensis* **n. sp.**, and *K. malakula* **n. sp.**, all from Vanuatu, *K. graciosa* **n. sp.**, from the Solomon Islands, and *K. sigatoka* **n. sp.**, from Fiji. The *Krakatauia abaca* group comprises a large radiation within the Fijian Archipelago, especially in upland forests on the main islands, with 13 newly described species: *K. abaca* **n. sp.**, *K. auribarba* **n. sp.**, *K. bisignata* **n. sp.**, *K. bouma* **n. sp.**, *K. evodevo* **n. sp.**, *K. hurleyi* **n. sp.**, *K. korobaba* **n. sp.**, *K. namatalaui* **n. sp.**, *K. natewa* **n. sp.**, *K. navai* **n. sp.**, *K. solodamu* **n. sp.**, *K. tomaniivi* **n. sp.**, and *K. vuda* **n. sp**. Most of these species are from single sites or adjacent sites, suggesting a high level of local endemicity. Of particular interest is the diversity of antennal flags, almost all of them diagnostic at the species level, and probably used in species recognition during courtship. Some of these flags have distinctly different obverse sides, and one species *K. bisignata,* has a three dimensional structure, with a white vane perpendicular to the underlying black flag.

INTRODUCTION

Krakatauia Enderlein is a member of the subfamily Sciapodinae (Dolichopodidae) comprising 57 species (25 newly described) from tropical Australasia and the Oriental region. The genus was redefined and summarized in Bickel (1994).

This paper describes recently collected Fijian *Krakatauia* and was expanded to include material from nearby island groups: Vanuatu, Solomon Islands, Tonga and Niue. The newly discovered richness of the Fijian fauna is based on some 250 specimens collected in Malaise traps as part of the Terrestrial Arthropod Survey of Fiji.

Of particular interest in the Fijian fauna is the diversity of male antennal flags (Fig. 2), almost all of them diagnostic at the species level, and probably used for species recognition while mating. Despite being collected in bulk samples from Malaise traps and field

1. Contribution No. 2007-045 to the NSF-Fiji Arthropod Survey.

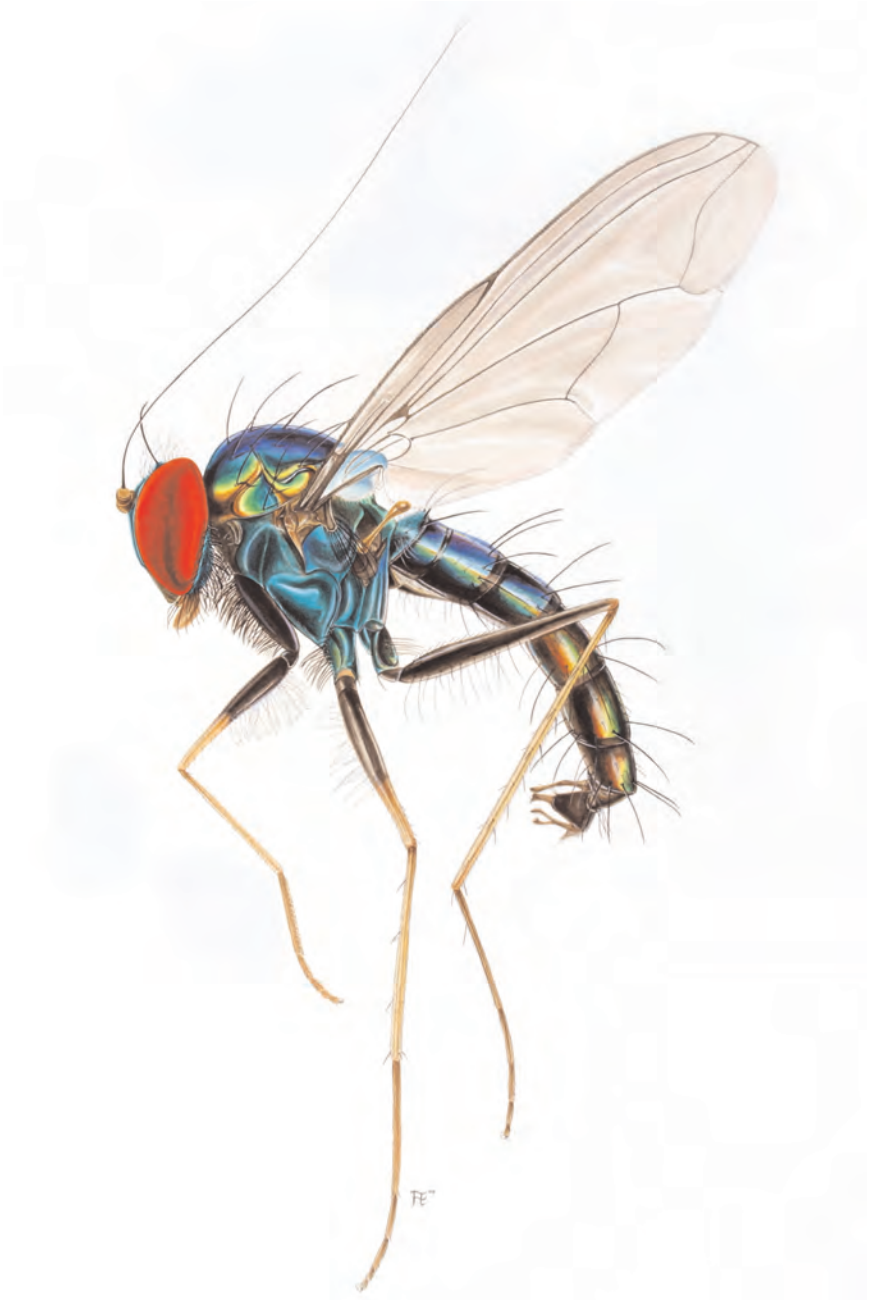

Fig. 1. *Krakatauia planticorum,* male habitus.

preserved in alcohol, most male specimens had their elongate antennal aristae and diagnostic apical flags intact, the result of careful handling and sorting.

MATERIAL AND METHODS

This study is based on material housed in the American Museum of Natural History, New York (AMNH), Australian Museum, Sydney (AMS), Natural History Museum, London (BMNH), Bishop Museum, Honolulu (BPBM), California Academy of Science, San Francisco (CAS), Fiji National Insect Collection, Suva (currently held in trust at the Bishop Museum) (FNIC); National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM), New Zealand Arthropod Collection, Auckland (NZAC); Zoological Museum, University of Copenhagen (ZMUC), and collection of Richard Hurley, Montana State University, Bozeman.

Regarding material collected from Malaise traps in the NSF-funded Fiji Terrestrial Arthropod Survey, all unique males, type material, and some representatives from large samples were dry mounted. However, duplicate specimens from large samples remain in alcohol.

The left lateral view of the hypopygium or male genital capsule is illustrated for all species. In describing the hypopygium, 'dorsal' and 'ventral' refer to morphological position prior to genitalic rotation and flexion. Thus, in figures showing a lateral view of the hypopygium, the top of the page is morphologically ventral, while the bottom is dorsal. Morphological terminology follows Bickel (1994). The CuAx ratio is the length of the dm-cu crossvein/ distal section CuA. The position of features on elongate structures such as leg segments is given as a fraction of the total length, starting from the base. The relative lengths of the podomeres should be regarded as representative ratios and not measurements. The ratios for each leg are given in the following formula and punctuation: trochanter + femur; tibia; tarsomere 1/ 2/ 3/ 4/ 5. The following abbreviations and terms are used: MSSC, male secondary sexual character(s), non-genitalic characters found only on the male body; I, II, III: pro- , meso-, metathoracic legs; C, coxa; T, tibia; F, femur; ac, acrostichal setae; ad, anterodorsal; av, anteroventral; dc, dorsocentral setae; dv, dorsoventral; pd, posterodorsal; pv, posteroventral; t, tarsus; t_{1-5}, tarsomeres 1 to 5. On the figures, arrows are used to indicate diagnostic features.

Etymology. Unless otherwise noted, the specific epithets for newly described species are geographical place names of indigenous origin in Fiji, Vanuatu, and the Solomon Islands. These names should be regarded as nouns in apposition.

TAXONOMY

Genus *Krakatauia* Enderlein

Krakatauia Enderlein, 1912: 408. Type species: *Psilopus rectus* Wiedemann, 1830, orig. des.

Diagnosis

General: body relatively compact, legs and abdomen not greatly prolonged.

Head: male frons with abundant pale or black hairs (MSSC), without isolated vertical seta; female frons lacking hairs, but with strong vertical seta; male face often bulging (MSSC); clypeus usually distinctly free from margin of eyes in male, adjacent to or near eyes in female; eyes often with pale hairs between facets, longer in males than in females; pedicel usually with only short dorsal and ventral setae; male scape, and/ or first flagellomere sometimes modified (MSSC); arista dorsoapical

to apical; male arista sometimes with apical flag (MSSC).

Thorax: ac present as 2–3 long pairs; male with 2 strong posterior dc, anterior dc represented by 4–5 weak hairs (MSSC); 5 strong dc present in female; 1 postalar, 2 postsutural supra-alar, 2 presutural intra-alar, 2 notopleural, 1 presutural supra-alar, and 1 weak postpronotal setae present; pair strong median scutellar setae present; lateral scutellar setae vary from about 2/3 length of medians to short and hair-like.

Legs: TI usually bare of major setae, although modified hairs (MSSC) often present on males; TII with ad-pd setal pairs, especially in female.

Wing: often infuscated or with large brown maculation; vein M_1 sometimes strongly curved towards R_{4+5}; crossvein dm-cu straight to distinctly sinuous; halter sometimes black in both sexes.

Abdomen: aedeagus with weak dorsal angle; cercus usually branched with large lobate ventral projection and short distal digitiform projection; large subtriangular projection present between cercal bases.

Remarks. *Krakatauia*, like many genera in the Sciapodinae, is not defined by strong synapomorphies (see discussion in Bickel 1994). It comprises a group of species that share some of the following features in mosaics of combinations: abundant setae on the male frons (MSSC), male face bulging (MSSC), eyes often with pale hairs between facets, pedicel usually with rather short dorsal and ventral setae, male aristal flags sometimes present (MSSC), tibia I often bare of major setae, wing often infuscated, halter sometimes black in both sexes, cercus with large ventral clavate arm and short distal digitiform projection, large subtriangular projection present between cercal bases.

Krakatauia comprises 57 species (25 newly described) from the tropical Orient and Australasia, with an extension into subtropical eastern Australia. In the southwest Pacific there has been a large radiation in Fiji, documented here, and species extend eastward to Tonga and Niue.

Five *Krakatauia* species groups were delineated in Bickel (1994), of which the *evulgata* and *alanae* groups are expanded and discussed below. As well, the *nupta, malakula,* and *alanae* groups are newly defined here. The *funeralis* group, confined to eastern Australia and New Guinea, and possibly the Solomon Islands, is close to the *abaca* group, but is distinguished principally by male FI having a row of long pv setae (MSSC).

Nomenclatural note. The Fijian species *Chrysosoma melanochirus* Bezzi, was incorrectly referred to *Krakatauia* in Bickel (1994). Re-examination of the holotype (BMNH) confirms it should be retained in its original genus. It will be treated in a revision of central Pacific *Chrysosoma* currently in preparation.

Key to *Krakatauia* species from eastern Melanesia and the Central Pacific
(Based on males, except for *K. moanakaka*, known from females only)

1. Vertex not excavated, and frons appears flattened in anterior view (Fig. 2a); body color often emerald green with bronze reflections 2
–. Vertex distinctly excavated, such that lateral frons is sloping; body color usually metallic blue-green 9

2. Male arista longer than body length, and with apical flag; male coxae I and II and sometimes basal femora I and II with dense black setae that appear roughened or shagreened; scutellar disc with supernumerary setae (Fiji, Tonga & Niue) .. (*nupta* group) 3
–. Male arista only slightly longer than head height and simple, without flag; coxae I and II with unmodified setae; scutellar disc bare (Australasia, Pacific, and Orient) .. (*evulgata* group) 5

3. Arista with black apical flag bearing two white apical filaments (Fig. 2d); tibia I bare; (Fiji: Lau Group) ..... **cicia** Bickel, **n**. **sp**.
–. Arista with ovate or subrectangular apical flag; tibia I various 4

4. Arista with white ovate apical flag (Fig. 2c); TI with posterior row of some 25 fine pale white slanted setae along entire length; hypopygium (Fig. 4a); habitus (Fig. 1); (Tonga, Niue) ..... **planticorum** Bickel, **n**. **sp**.
–. Arista with asymmetrical subrectangular flag, white at base and black distally (Fig. 2b); TI bare of setae; hypopygium (Fig. 4b) (widespread Fiji) ..... **nupta** (Bezzi)

5. M and R_{4+5} join internally, closing cell r_5 before wing margin; femur I entirely black; It_1 bare; cercus with 2 long subparallel ventral arms (Micronesia) .... **micronesiana** Bickel
–. M and R_{4+5} each join wing margin separately; femoral colour various; It_1 with pale ventral pile; cercus (e.g. Fig. 5a) with short distal projection and large clavate ventral arm which bears strong apical setae 6

6. Femora yellow 7
–. Femora black at least on basal half 8

7. Coxa I dark brown; palp with abundant white setae; first flagellomere prolonged, subtriangular (Fig. 2f); hypopygium (Fig. 5a) ... (Solomon Islands) .... **hutuna** Bickel, **n**. **sp**.
–. Coxa I yellow; palp with black dark setae; first flagellomere subtriangular (Fig. 2g); hypopygium (Fig. 5b) ... (Vanuatu: Malakula, Espiritu Santo) ..... **ounua** Bickel, **n**. **sp**.

8. Tibia I with dorsal seta at 1/5; hypopygium not figured (SW Pacific east to Vanuatu) ..... **evulgata** (Becker)
–. Tibia I without dorsal seta, but with posterior row of 16–20 white hairs along length, longest hair near midlength; hypopygium (Fig. 5c) deeply forked with outer arm bearing median blade-like seta (Fig. 5d) (widespread Vanuatu) .... **tanna** Bickel, **n**. **sp**.

9. Wing with dark brown maculation (Fig. 3b); epandrium prolonged and tapering, with straight dorsal margin; cercus flattened, blade-like and elongate, with pair of bean-shaped apical setae, readily visible on whole specimen (e.g., Figs. 3a, 3c) (Fiji, Australia) ... (*alanae* group) 10
–. Wing hyaline or with smoky infuscation, but not dark brown; epandrium subtriangular with lobate surstylus; cercus with split distal arm and often with short basoventral projection (e.g., Figs. 6a, 7e) 12

10. Coxa I mostly yellow; all femora yellow (Fiji: Kadavu, Viti Levu) .... **moanakaka** Bickel, **n**. **sp**.
–. Coxa I and all femora mostly dark brown 11

11. Arista simple, without flag; femora I and II dark brown, but yellow on distal fifth; hypopygium (Fig. 3a); (Fiji: Viti Levu, Vanua Levu) ..... **luctuosa** (Parent)
Arista with black truncate apical flag (Fig. 2e); femora I and II dark brown with yellowish knees; hypopygium (Fig. 3c) ... (Fiji: Viti Levu) ..... **lamiensis** Bickel, **n**. **sp**.

12. Lateral frons with white hairs, either entirely white or mixed white and black ... 13
–. Lateral frons with all hairs black (*abaca* group) 17

13. Halter yellow; aristal flag (Fig. 2w) black, narrowly ovate with pointed white apex; It_1 with brownish ventral pile; lower calypter with fan of white setae; hypopygium (Fig. 8b); cercus subrectangular, with distal indentation forming two subequal arms (Fiji: Viti Levu, Vanua Levu) ..... **sigatoka** Bickel, **n**. **sp**.
–. Halter dark brown to black; other features various 14

14. Lower calypter with white setae; aristal flag (if evident) very narrow with white apex (e.g., Fig. 2h); TI without pv row of fine hairs; cercus with strong subtriangular basal projection, and inner distal arm with curved blade-like apical setae (e.g., Fig. 6a) 15
–. Lower calypter with black setae; aristal flag obovate (e.g., Fig. 2j); TI with pv row of 30–35 fine erect hairs along length; cercus with weak basal projection, and inner distal arm with only short apical setae (e.g., Fig. 6b) 16

15. Aristal flag (Fig. 2i) very narrowly lanceolate with white apex; FI with 6–7 long white ventral setae to 3/4, slightly decreasing in size distally; TI with long pv seta near 1/2; It_1 with brownish ventral pile; TIII without suberect basal anterior hairs; hypopygium (Fig. 6a) (Vanuatu, widespread) ..... **cheesmanae** Bickel, **n**. **sp**.
–. Aristal flag narrowly lanceolate with thin white apical filament (Fig. 2h); FI with weak ventral hairs; TI without long pv seta; It_1 with golden ventral pile; TIII with some suberect anterior hairs along basal third; hypopygium (Fig. 6d) (Solomon Islands: Santa Cruz) ..... **graciosa** Bickel, **n**. **sp**.

16. Femora dark brown with only apices yellow; aristal flag (Fig. 2j) obovate, black basally, white apically; hypopygium (Fig. 6b); cercus with 2–3 strong projecting basal spike-like setae, and outer arm subrectangular and distinct irregular surface and subapical curved hook-like seta (Vanuatu: Malakula) .... **malakula** Bickel, **n**. **sp**.
–. FI and FII black to 1/2 and FIII black to 2/3, otherwise yellow; arista flag (Fig. 2k) obovate, brown; hypopygium (Fig. 6c); cercus deeply cleft forming inner arms with apical setae, and curved blade-like outer arm (Vanuatu: Epi) .... **epiensis** Bickel, **n**. **sp**.

17. Ventral postcranium with abundant golden setae; TI with posterior row 16–20 long slightly curved brownish hair-like setae along length; cercus (Fig. 8c) deeply forked, with outer arm bearing strong whitish seta, and inner arm with group of 6 long basally directed setae (Fiji: Taveuni) ..... **auribarba** Bickel, **n**. **sp**.
–. Ventral postcranium with setae either white or black; other characters various ... 18

18. Cercus deeply incised (almost to the base) with consequent long arms (Fig.7e) .. (*tomaniivi* subgroup) 19
–. Cercus not incised beyond midlength (e.g., Figs. 7a, c) 22

19. Lower calypter with fan of white setae; aristal flag ovate, black on one side, and white with black tip on the reverse side (Figs. 2s–t) (Fiji: Viti Levu) .... **namatalaui** Bickel, **n**. **sp**.

–. Lower calypter with fan of black setae; other features various 20

20. It_1 short, less than length of distal tarsomeres combined; aristal flag ovate (Fig. 2z), mostly white at base with black distal lobe (Fiji: Viti Levu) .... **tomaniivi** Bickel, **n**. **sp**.

–. It_1 longer than the length of distal tarsomeres combined 21

21. Aristal flag ovate (Fig. 2v) white in the basal fifth and black distally; TI with distal two-thirds of av surface covered with fine golden vestiture (Fiji: Viti Levu) .... **vuda** Bickel, **n**. **sp**.

–. Arista flag ovate, blunt, white but with black margins at very base (Fig. 2u); TI with 15 short spaced setulae (Fiji: Vanua Levu) ..... **natewa** Bickel, **n**. **sp**.

22. Basitarsus I with curved posterior setae 23

–. Basitarsus I without posterior setae 25

23. Ventral postcranium with white setae; basitarsus I (Fig. 7b) with posterior row of whitish curved hairs; aristal flag lanceolate (Fig. 2l), black basally with white tip; hypopygium (Fig. 7a) (Fiji: Viti Levu, Vanua Levu, Ovalau, and Gau) .... **abaca** Bickel, **n**. **sp**.

–. Ventral postcranium with black setae; other features various 24

24. Basitarsus I with short pale curved pv hairs along basal two-thirds; arista slightly asymmetrical, black with white tip, and bent (Fig. 2y) (Fiji: Vanua Levu) .... **hurleyi** Bickel, **n**. **sp**.

–. Basitarsus I posterior margin with curved, almost crocheted setae from base to midlength; aristal flag ovate (Fig. 2m) basally black with irregular white tapering apex; hypopygium (Fig. 7c) (Fiji: Taveuni, Vanua Levu) ... **bouma** Bickel, **n**. **sp**.

25. Basitarsus I distinctly shorter than second tarsomere I; ventral postcranium with white setae; aristal flag (Fig. 2x) black, slightly asymmetrical obovate, with perpendicular semi-ovate white vane, (Fiji: Vanua Levu) ... **bisignata** Bickel, **n**. **sp**.

–. Basitarsus I longer than second tarsomere I; ventral postcranium with black setae 26

26. FI with black setae on ventral surface; TI with row of some 30–35 short pv setae along length; wing with dark brown clouding; aristal flag lanceolate, black basally, with white tip (Fig. 2n); hypopygium (Fig. 7d) (Fiji: Taveuni) .... **evodevo** Bickel, **n**. **sp**.

–. FI with white ventral setae; TI without short pv setae; wing only faintly clouded 27

27. Aristal flag oval (Fig. 2q, r), one surface black with narrow whitish margin distally, and reverse surface whitish grey and black basolaterally; hypopygium (Fig. 8a) (Fiji: Kadavu) ..... **solodamu** Bickel, **n**. **sp**.

–. Aristal flag narrowly lanceolate, black basally with white tip (Fig. 2o, p) 28

28. TI with dorsal at 1/10, short ad, and longer pd and ventral seta at 1/2, and with 2–3 white curved pv setae on distal eighth; It_1 slightly flattened, with pale ventral pile from base to 2/3; aristal flag (Fig. 2p) (Fiji: Viti Levu, Ovalau) .... **korobaba** Bickel, **n**. **sp**.

–. TI with short dorsal at 1/6, longer dorsal at 1/2, and pv seta at 1/3 and 1/2; It_1 with narrow band of yellowish ventral pile to 4/5; cercus (Fig. 7f); aristal flag (Fig. 2o) (Fiji: Viti Levu, Taveuni) ..... **navai** Bickel, **n**. **sp**.

The *Krakatauia alanae* group

Diagnosis

Head: vertex strongly excavated, lateral frons in male with black hairs, without distinct vertical seta (MSSC); female frons bare of hairs, except for strong vertical seta; face sometimes bulging in male (MSSC); first flagellomere triangular with dorsoapical to apical arista in both sexes; male arista either simple or with apical flag, female arista simple (MSSC).

Thorax: 3 pairs ac; 2 strong posterior dc with 4 weak hair-like dc anteriad; lateral scutellar seta length varies from about one fifth to two-thirds length of medians.

Legs: It_1 sometimes dorsoventrally flattened with pale ventral pile (MSSC).

Wing: broad and usually with dark smoky brown membrane; M_1 and R_{4+5} strongly converging at wing apex; R_{2+3} in both sexes with distinctive subapical bend (Fig.3b); crossvein dm-cu distinctly sinuous; halter brown to black in males, usually yellowish in females.

Abdomen: epandrium prolonged and tapering, with relatively straight dorsal margin; cercus flattened, elongate and blade-like, bearing only scattered setulae and with pair of bean-shaped apical setae.

Remarks: The *Krakatauia alanae* group is known only from Australia and Fiji. The two Australian species are found in rainforests, *K. alanae* Bickel in northern New South Wales and southeastern Queensland, and *K. malanda* Bickel in the Cairns district, northern Queensland (see Bickel, 1994). Three species occur in Fiji, *K. luctuosa* (Parent) from Viti Levu and Vanua Levu, *K. lamiensis* n. sp. from southeastern Viti Levu, and *K. moanakaka* n. sp. from Kadavu and southern Viti Levu.

The *alanae* group is well-defined by strong synapomorphies of the hypopygium (Figs. 3a, c), diagnostic for both Fijian and Australian species: epandrium prolonged and tapering, cercus flattened and blade-like, without strong setae, and with flattened and curved bean-shaped setae at apex of cercus.

There are three distinct differences between the Australian and the Fijian species:

1. Color of halter club: Australian species black in both sexes; Fijian species dark brown to black in male, yellowish in female.
2. Coxa I setae: Australian species with white anterior setae and some strong black distolateral setae; Fijian species with all setae white.
3. Lateral scutellar setae length: Australian species about half length of median setae; Fijian species about one fifth length of median setae.

All Fijian species are readily recognized by the dark brown cloud covering most of the wing (Fig. 3b). I have described *K. moanakaka* based on females, because the yellow leg coloration is so distinctive. I have little doubt that males, when discovered, will have a hyopopygial structure that places them in the *alanae* group.

The following species are treated here:

lamiensis n. sp. Fiji (Viti Levu).
luctuosa Parent, 1928: 195 (*Chrysosoma*). Fiji (Viti Levu, Vanua Levu).
moanakaka n. sp. Fiji (Kadavu).

Krakatauia luctuosa (Parent)
(Fig. 3a, b)

Chrysosoma luctuosum Parent, 1928: 195.

Description. **Male**: length 5.4–6.2 mm; wing: 5.3 x 1.8–5.8 x 2.0 mm.

Head: vertex and frons shining dark blue metallic green; vertex strongly excavated, not flat-

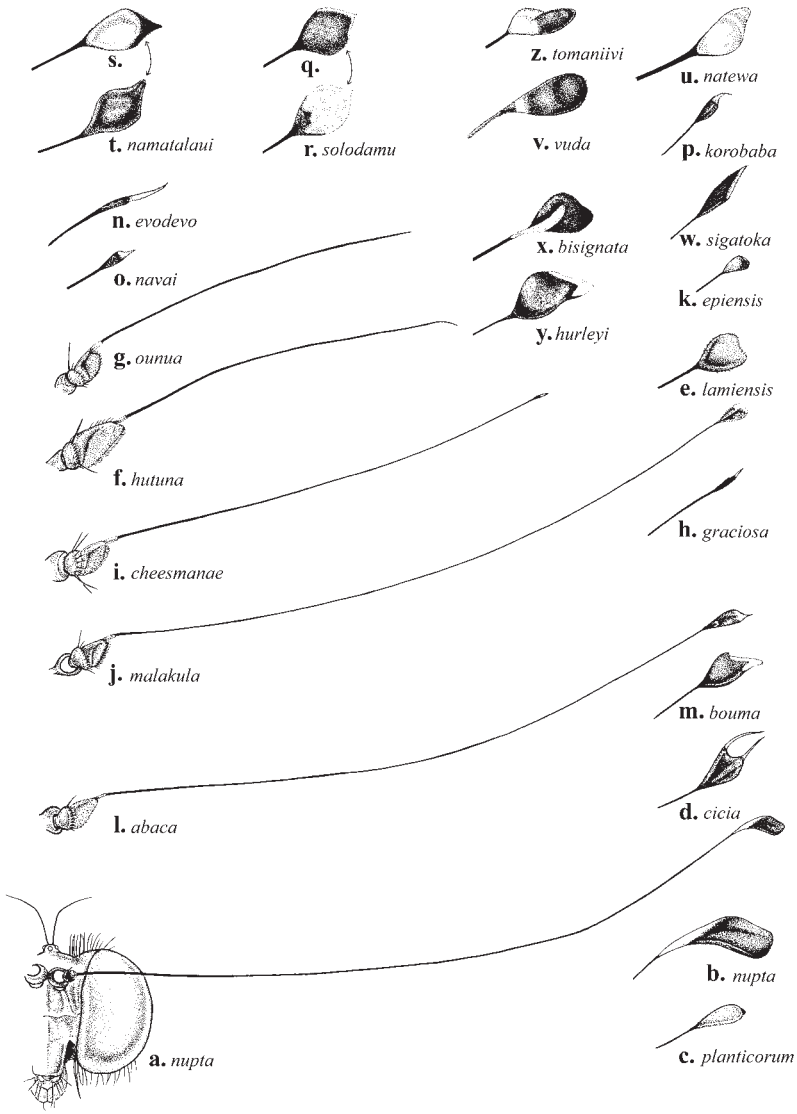

Fig. 2. Male head, antennae, and aristal apices: *Krakatauia nupta,* **a**. head, anterior; **b**. aristal apex. *K. planticorum,* **c.** aristal apex. *K. cicia,* **d**. aristal apex. *K. lamiensis,* **e**. aristal apex. *K. hutuna,* **f.** antenna, median. *K. ounua*, **g.** antenna, median. *K. graciosa*, **h**. aristal apex. *K. cheesmanae*, **i**. antenna, median. *K. malakula*, **j**. antenna, median. *K. epiensis*, **k.** aristal apex. *K. abaca*, **l.** antenna, median.. *K. bouma*, **m**. aristal apex. *K. evodevo*, **n**. aristal apex. *K. navai,* **o**. aristal apex. *K. korobaba*, **p**. aristal apex. *K. solodamu*, **q.** aristal apex; **r.** aristal apex, reverse. *K. namatalaui,* **s**. aristal apex; **t.** aristal apex, reverse. *K. natewa*, **u**. aristal apex. *K. vuda*, **v.** aristal apex. *K. sigatoka*, **w.** aristal apex. *K. bisignata*, **x.** aristal apex. *K. hurleyi*, **y.** aristal apex. *K. tomaniivi,* **z.** aristal apex.

tened; lateral frons in male with abundant black setae (MSSC); upper face not bulging; face and clypeus with silvery pruinosity; palp black with black setae; proboscis brown; first flagellomere triangular with dorsoapical to apical arista in both sexes; antenna yellowish but black dorsally ; scape not swollen; pedicel with some strong dorsal setae only, no ventral setae; first flagellomere triangular; arista dorsoapical, black, length almost twice head width, simple; lower postorbitals white.

Thorax: metallic blue-green with bronze areas over ac band; scutellum metallic blue; setae black; pleura with grey pruinosity; lateral scutellars reduced to short weak hairs, about one fifth length of medians.

Legs: coxae and trochanters dark brown; femora dark brown, but FI and FII yellow on distal fifth; tibiae and basitarsi I and II yellow; TIII brownish; distal tarsomeres I and II and all tarsus III dark brown; CI with some white anterior hairs and white distolateral setae; CII with white anterior hairs; CIII with white lateral seta and tuft of pale hairs; I: 6.0; 5.7; 4.2/ 1.0/ 0.8/ 0.4/ 0.4; FI with pale ventral hair-like setae; TI with short dorsal seta at 1/6 and 1/2, and short pd at 1/6; TI from 1/6 to apex with anterior to av surface bare of normal setulae, but covered with short golden vestiture; It_{1-2} not flatted, but with ventral white pile; II: 7.5; 9.0; 6.2/ 1.6/ 1.2/ 0.4/ 0.3; FII with pale ventral hairs, and row of strong black av setae from 3/5 to apex (MSSC); TII with short anterior seta at 1/3 and 1/2, pd at 1/8 and 1/3, and strong subapical av seta; III: 8.7; 11.5; 5.0/ 2.0/ 1.5/ 0.7/ 0.5; FIII with weak white ventral setae basally, with 2–3 black av setae on apical sixth; TIII with ad at 1/5 and with 4–5 dorsal setae.

Wing: (Fig. 3b); broad with dark brown maculation over most of anterior membrane, with posterior margin hyaline; R_{2+3} with distinctive subapical bend; lower calypter brown with fan of black setae in which are mixed 2–3 white setae; halter black.

Abdomen: tergum 1 with dark brown dorsal membrane; terga 1–6 deep metallic blue-violet with black vestiture and black marginal setae, with some white hair-like setae laterally and ventrally; hypopygium dark brown with yellow cerci (Fig. 3a); epandrium elongate subtriangular; hypandrial arm elongate, reaching almost to apex of aedeagus; 2 epandrial setae present; epandrial lobe with 1 long and 1 short seta; surstylus with faint suture line marking join with epandrium; surstylus hatchet shaped, with distal tapering digitiform projection with curved apical seta; cercus elongate, flattened and blade-like, bearing only scattered setulae and pair of flattened bean shaped apical setae; cercus with curved dorsal margin.

Female: similar to male except: lateral slope of frons bare except for strong vertical seta; 5 strong dc; femora with only short pale ventral hairs; TI also with anterior to av surface with short golden vestiture; It_{1-2} unmodified.

Types. Parent described *Chrysosoma luctuosum* based on females from "Fiji" (Zoologisches Museum, Universität Hamburg, destroyed). A male neotype from Sigatoka, Viti Levu (AMS) was designated by Bickel (1994).

Additional material. FIJI: **Vanua Levu**: 1♀, Batikere Range, 6 km NW of Kilaka, 6 km NW Kilaka Village, lowland wet forest, [-16.807, 178.991], 98 m, 28 Jun–21 Jul 2004, Malaise, P. Manueli (FBA 142956). **Viti Levu**: 1♂, 1♀, Sigatoka, 27 Dec 1976, Eastwood (AMS); 1♂, 1♀, Nadarivatu, 11 Nov 1964, McFarland (SAM); 1♂, Korotongo, 0–100 m, Mar 1981, Krauss; 1♀, Tilivaleva, 305–366 m, 25 Mar 1970, Krauss; 1♀, 60 km E of Nadi, 21 Jul 1967, Sedlacek; 1♀, Rewa, 1920, Pemberton (BPBM); 2♀, 3.2 km E Navai Village, Veilaselase Track, gymnosperm dominated rainforest, [-17.624, 178.009], 1020 m, 15 May–2 Jun 2003, Malaise trap M01, E. Namatalau (FBA 041712); 2♀, Mt Korobaba, 4 km NW Lami Town, [-18.104 178.381], 260 m, lowland wet forest, 13 Dec 2004–3 Jan 2005, Malaise, K. Koto (FBA 502147); 2♀, Koroyanitu EcoPark, Batilamu Range, 1 km E Abaca Village, Savuione Trail, disturbed mid-elevation moist forest, [-17.667, 177.55], 800 m, 20 Sep–5 Oct 2004, Malaise, L. Tuimereke (FBA 180716); 1♀, 1.8 km E Navai Village, old trail to Mt Tomaniivi, gymnosperm dominated rainforest, [-17.621, 177.998], 700 m, 16 Nov 2004–3 Feb 2005, Malaise, E. Namatalau (FBA 507967) (FNIC).

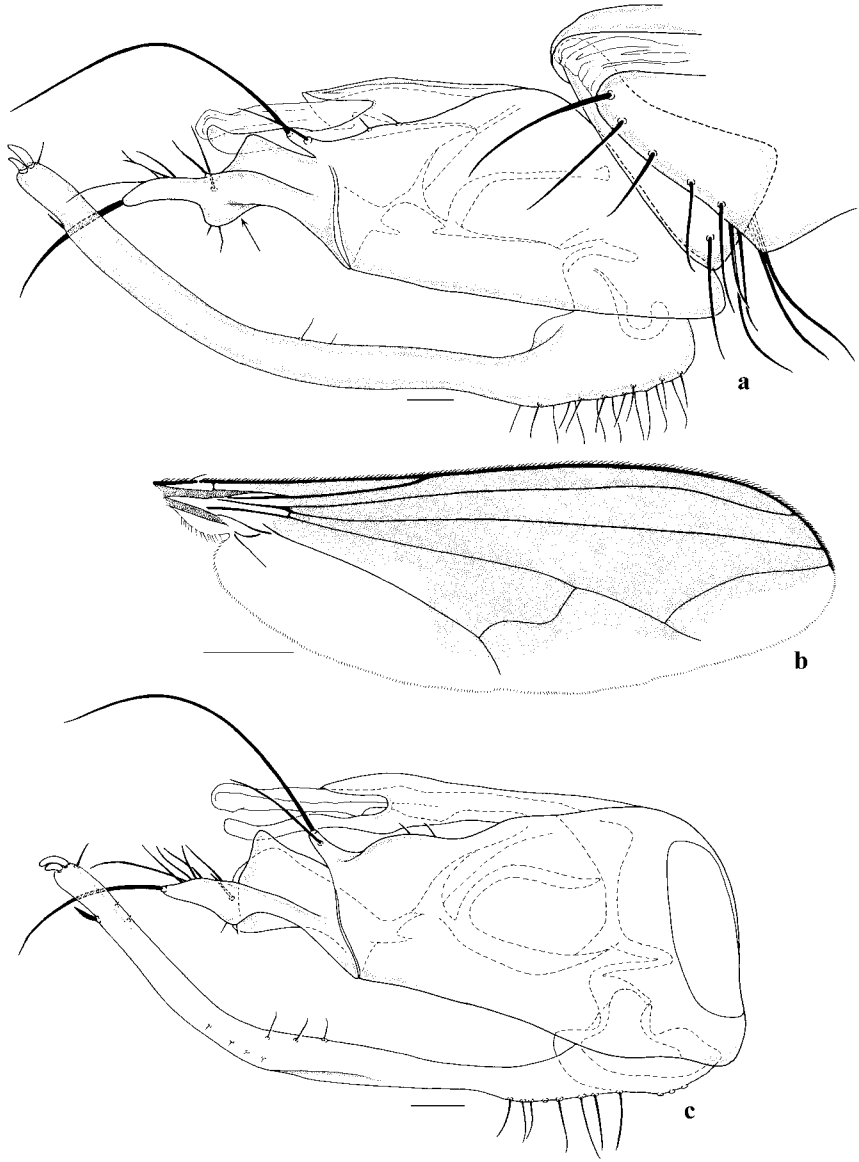

Fig. 3. *Krakatauia luctosa*: **a.** hypopygium, left lateral; **b.** male wing dorsal. *K. lamiensis*: **c**. hypopygium, left lateral.

Remarks. *Krakatauia luctuosa* is known from many locales in Viti Levu, from lowland habitats to at least 800 m, and from lowland western Vanua Levu.

Krakatauia lamiensis Bickel, **new species**
(Figs. 2e, 3c)

Description. **Male**: length 4.5 mm; wing: 4.6 x 1.6 mm; similar to *K. luctosa* except as noted:

Head: upper face not bulging; face and clypeus with silvery pruinosity; palp black with brownish setae and strong black apical seta; antenna yellowish; scape slightly swollen and extended medially; pedicel with strong dorsal seta only, no ventral seta; first flagellomere triangular; arista dorsoapical, black, length almost twice head width, with distinctive black truncate apical flag (Fig. 2e) (MSSC).

Legs: coxae and trochanters dark brown; femora dark brown with yellowish knees; tibiae and basitarsi I and II yellowish; TIII brownish; distal tarsomeres I and II and all tarsus III dark brown; I: 5.2; 5.0; 3.5/ 1.0/ 0.8/ 0.4/ 0.4; FI with pale hair-like ventral setae; TI with short dorsal setae at 1/6 and 1/2, and short pd at 1/6; TI with anterior to av surface bare of normal setulae, but covered with short golden vestiture; It_{1-2} not flattened, but with ventral white pile and lacking normal vestiture (MSSC); II: 6.0; 7.8; 5.5/ 1.5/ 1.0/ 0.4/ 0.3; FII with pale ventral hairs; TII with short anterior setae at 1/3 and 1/2, pd at 1/8 and 1/3, and strong subapical av seta; III: 8.0; 10.2; 4.5/ 1.8/ 1.2/ 0.6/ 0.5; FIII with some weak white ventral setae basally, and 2–3 black av setae on apical sixth; TIII with ad at 1/5 and 4–5 dorsal setae.

Wing: broad with dark brown maculation over much of membrane, only posterior and area posteriad of CuA1 hyaline; M_1 and R_{4+5} strongly converging but joining wing apex separately; R_{2+3} with subapical bend; lower calypter brown with fan of black setae.

Abdomen: hypopygium (Fig. 3c); epandrium elongate subtriangular; 2 epandrial setae present; epandrial lobe with 1 long and 1 short apical setae; surstylus hatchet shaped with distal tapering digitiform projection which bears curved apical seta; cercus flattened, blade-like and elongate, bearing only scattered setulae and with pair of bean shaped apical setae; cercus with curved dorsal margin.

Female: similar to male except lack MSSC and as noted; 5 strong dc; femora with only short pale ventral hairs; TI also with anterior to av surface with short golden vestiture; It_{1-2} unmodified and ventrally with short vestiture, wing also with maculation; setae of lower calypter yellowish; halter also brownish.

Types. Holotype ♂ (BPBM 16,816), FIJI: **Viti Levu**: Lami, 20–200 m, Mar 1976, N.L.H. Krauss (BPBM).

Additional material. FIJI: **Viti Levu**: 1♀, trail, Yayu to Nadrau, 27–29 Jun 1958, B. Malkin (BPBM).

Remarks. *Krakatauia lamiensis* is known from Viti Levu, and is relatively small compared to the other Fijian species in the *alanae* group: *K. luctuosum* and *K. moanakaka.* This species has a truncate male apical flag, while *K. luctuosa* has an unmodified male arista.

Krakatauia moanakaka Bickel, **new species**

Description. **Female**: length 4.5–4.7 mm; wing: 5.2 x 1.6 mm.

Head: vertex and frons shining metallic blue-violet; frons with strong black vertical seta; upper face not bulging; face and clypeus with silvery pruinosity; palp yellowish with black setae; proboscis dark brown; scape and pedicel brown, first flagellomere yellowish; pedicel with strong dorsal seta only, no ventral seta; first flagellomere triangular; arista dorsoapical, black, length almost twice head width, simple.

Thorax: metallic blue-green; scutellum metallic blue; setae black; pleura with grey pruinosity; lateral scutellar seta reduced to short hair, about one-sixth length of median setae.

Legs: CI yellow but dark brown/metallic blue at very base; CII and CIII dark brown; trochanters, femora and tibiae I and II yellow; TIII and tarsi I and II yellowish; tarsus III brown; CI with some white anterior hairs and white distolateral setae; CII with white anterior hairs; CIII with white lateral seta; I: 4.5; 5.7; 3.6/ 1.0/ 0.7/ 0.4/ 0.4; FI with pale ventral hair-like setae; TI with ad-pd setal pair at 1/6, with anterior to av surface with short golden vestiture; II: 6.5; 7.5; 5.5/ 1.5/ 1.0/ 0.4/ 0.3; FII with pale ventral hairs, with strong subapical av seta and weaker subapical pv seta; TII with anterior setae at 1/8, 1/2 and 2/3, dorsal at 1/6 and 2/5, and strong subapical av, pv and ad setae; III: 7.6; 10.8; 4.7/ 1.2/ 0.8/ 0.5/ 0.3; FIII ventrally bare, and with subapical av and pv setae; TIII with ad at 1/5 and 4–5 short dorsal setae.

Wing: (similar to Fig. 3b); broad with dark brown maculation over most of anterior membrane, with posterior margin hyaline; R_{2+3} with distinctive subapical bend; lower calypter brown with fan of black setae; halter with brownish stalk and yellow club.

Abdomen: terga 1–6 dark metallic blue-violet with black vestiture.

Male: unknown.

Types. Holotype ♀, FIJI: **Kadavu**: 1.3 km E Kadavu Air Strip nr. Namalata Village, secondary moist forest, [-19.06, 178.187], 139 m, 6 Feb–16 Mar 2005, Malaise, H. Reece, (FBA 502182) (FNIC). Paratypes, 3♀, 0.25 km SW Solodamu Village, Moanakaka Bird Sanctuary, [-19.078, 178.121], coastal limestone forest, 60 m, 11 Jun–6 Jul 2003, 18 Jul–25 Aug 2003, 9–15 Feb 2004, Malaise trap, S. Lau (FBA 046119, 065872, 147687) (FNIC).

Additional material. FIJI: **Viti Levu**: 1♀, 2 km SE Nabukavesi Village, Ocean Pacific Resort, coastal lowland moist forest, [-18.171, 178.258], 40 m, 26 Apr–5 May 2004, Malaise, W. Naisilisili (FBA 118570) (FNIC).

Remarks. *Krakatauia moanakaka* is known from both sides of the Kadavu Passage, from two sites in Kadavu and one in southern Viti Levu. This species is described from females, based on the characteristic dark brown wing maculation associated with other Fijian *alanae* group species. The yellow femora are unique in the group, and if a male is found, I predict it will have the characteristic *alanae* group hypopygium.

The *Krakatauia nupta* group

Diagnosis

Head: male vertex not strongly excavated, with frons flat and wide; lateral frons in male with about 15 white hairs on each side, and without distinct vertical seta (MSSC); female vertex more distinctly excavated, with single setae on lateral frons; male upper face slightly bulging (MSSC), face and clypeus shining metallic blue-green; palp dark brown with black setae; proboscis dark brown; antenna black; male scape swollen and cup-like, and extended medially (as in Fig. 2a); pedicel short subrectangular with short setae; first flagellomere usually short, rounded; arista apical, black, longer than body (at least 5 mm in length), and with diagnostic apical flag (MSSC); female scape unmodified; pedicel short subrectangular with short setae, and first flagellomere subtriangular; arista dorsoapical, short, about 1/3 body length, and simple; ventral postcranium with black setae in male, white in female.

Thorax: metallic green with bronze reflections and irregular brown area over ac band, and no pruinosity; setae black; 3–4 irregular pairs of long ac; 2 strong posterior dc with 4 weaker dc anteriad; female with all dc strong; pleura with areas of brown cuticle; lateral scutellars reduced to short weak hairs, about one fifth length of medians, with short supernumerary setae on scutellar disc, more abundant in male than in female.

Legs: CI and CII with dense black setae in basal half, and distally with long black setae that appear scaled or shagreened, and form dense field projecting over trochanters (MSSC); FI also with shagreened setae; It_1 slightly wider at base, and with white ventral pile along entire length (MSSC); FII with long white distally crenulated ventral hairs to about 3/5(MSSC).

Wing: membrane smoky in male, hyaline in female; male costal cell sometimes slightly enlarged anteriorly (MSSC); veins R_{4+5} and M_1 approach each other but join margin separately at wing apex; M_2 (beyond branch with M_1) sinuate before joining margin (MSSC); dm-cu slightly sinuous; CuAx ratio >2.0; lower calypter brown with fan of black setae; halter black in males, either black or yellow in females.

Abdomen: tergum 1 with dark brown dorsal membrane; terga 1–6 metallic green bronze, with matt brown areas over tergal overlap, with black marginal setae and with white hair laterally and ventrally; epandrium subtriangular; hypandrial arm elongate, reaching almost to apex of aedeagus; epandrial lobe with long apical and shorter subapical seta; surstylus with faint suture line marking join with epandrium; surstylus lobate with dorsal curved apical projection; cercus with basal triangular projection, elongate and deeply forked.

Remarks. The *nupta* group is known from Fiji, Tonga, and Niue. With its flattened male frons, the *nupta* group could be accommodated into the *evulgata* group. However, based on the shared male characters of the shagreened coxal and femoral setae, supernumerary setae on the disc of the scutellum in both sexes (although females with fewer setae than males), the globular first flagellomere and particularly long male arista, this group is distinct enough to be considered a separate monophyletic radiation at the eastern edge of the *Krakatauia* distribution.

The following species are treated here.

cicia n. sp. Fiji (Lau Group).

nupta Bezzi, 1928: 67 (*Condylostylus*). Fiji (Viti Levu, Vanua Levu, Kadavu, Taveuni, Yasawas).

planticorum n. sp. Tonga, Niue.

Krakatauia planticorum Bickel, **new species**
(Figs. 1, 2c, 4a)

Description. **Male**: length 6.2–6.3 mm; wing: 5.3 x 1.8 mm. Fig. 1, habitus.

Head: antenna (as in Fig. 2a); arista with distinctive white ovate apical flag (Fig. 2c) (MSSC); lower postcranial setae black, and forming beard around proboscis.

Thorax: metallic green with bronze reflections and irregular brown area over ac band; lateral scutellars as short weak hairs, about one-fifth length of medians, and with short supernumerary setae on scutellar disc.

Legs: coxae and trochanters black; FI and FII black in basal half, FIII entirely black; distal half of FI and FII, all tibiae, and basal tarsomere I and II yellow; distal tarsomeres I and II and all tarsus III brown; CI with dense black setae in basal half, and distally with long black setae that appear shagreened or scaled and form dense field projecting over trochanters (MSSC); CII also with dense black scaled hairs on anterior surface (MSSC); CIII with group of 4 black lateral setae and some very short whitish setae distally; I: 5.9; 5.6; 3.4/ 0.8/ 0.8/ 0.4/ 0.4; FI with dense white scaled setae from base to 3/4, and 8 fine black posterior setae from base to 1/2 (MSSC); TI without major setae, but with posterior row of some 25 fine pale slanted setae, mostly longer than tibial thickness, along entire length (MSSC); It_1 slightly wider at base, and entire tarsus I with white ventral pile along entire length (MSSC); II: 7.2; 8.0; 5.4/ 1.8/ 1.2/ 0.6/ 0.5; FII with long white distally crenulated ventral hairs to about 3/5, and bare to apex (MSSC); TII with short ad at 1/6, short anterior setae at 1/3, 1/2, and 3/4, and strong subapical ad and av setae; III: 9.7; 12.2; 5.0/ 2.2/ 1.3/ 0.7/ 0.6; FIII with row of long white ventral setae to 5/6 and row of 6–8 long black av setae from 2/5 to 5/6 (MSSC); TIII with strong dorsal at 1/8, with 4–5 anterior and 4–5 dorsal setae spaced along length.

Wing: membrane smoky; costal cell slightly enlarged anteriorly (MSSC); CuAx ratio 2.5; lower calypter brown with fan of black setae.

Fig. 4. *Krakatauia planticorum*: **a.** hypopygium, left lateral. *K. nupta*: **b.** hypopygium, left lateral. *K. cicia*: **c**. hypopygium, left lateral. Legend: aed, aedeagus; cer, cercus; epl, epandrial lobe; hyp, hypandrium; lah, lateral arm of hypandrium; S8, sternum 8; sur, surstylus.

Abdomen: hypopygium dark brown with brown cerci (Fig. 4a); cercus with basal triangular projection, and elongate and deeply forked, with inner arm slightly clavate and bearing some apical setae, and outer arm curved slightly expanded and bearing subapical blade-like seta.

Female: thorax also metallic green with bronze reflections and irregular brown area over ac band, scutellum also with short supernumerary setae on disc; leg color similar except FII black in basal two-thirds; without crenulated setae; CI and CII with short white anterior hairs and black distolateral setae; CIII with strong black lateral seta and some white hairs; femora with white ventral setae, TI with strong ad seta at1/5, without posterior row of fine setae; TII with strong ad at 1/6, short pd at 1/8, strong anterior setae at 1/2 and 2/3, dorsal at 2/5, and with strong subapical ad, pd and av setae; TIII with strong ad at 1/6, with 3 strong anterior and 4–5 dorsal setae spaced along length; wing hyaline; costal cell not enlarged; wing narrower; M_2 straight beyond branch with M_1.

Types. Holotype ♂ (BPBM 16,823), paratypes, 3♂, 2♀, TONGA: **Tongatapu**: Nukualofa, 0–100 m, Nov 1969, N.L.H. Krauss (BPBM); paratypes, 3♂, 1♀, same but 25 Oct 1945, D.G. Hall (USNM).

Additional material. NIUE: 1♂, Alofi, Dec 1979, N.L.H. Krauss (AMNH); 2♂, 1♀, same (BMNH); 1♂, 1♀, NIUE: 1979, flying around *Cucumis sativus*, T.G. Mautama (NZAC).

Remarks. *Krakatauia planticorum* is known only from the low Pacific Islands of Tonga and Niue, to the southeast of Fiji, and represent the easternmost distribution for the genus. It is the sister species of *K. nupta,* and the two species share similar features, in particular the black-scaled hairs that form dense fields on male coxae I and II and femur I, and their hypopygia are almost identical, especially noting the shape and setation of the cerci (c.f., Figs. 4a, 4b).

Etymology. *Krakatauia planticorum* is named in honor of the staff of Plantic Technologies Ltd., Melbourne, a company that won the 2005 Eureka Award for environmental innovation.

Krakatauia nupta (Bezzi)
(Figs. 2a, 2b, 4b)

Condylostylus nuptus Bezzi, 1928: 67.

Description. **Male**: length 4.5–4.6 mm; wing: 4.5 x 1.5 mm.

Similar to the description for *K. planticorum* except:

Head: (Fig. 2a); vertex and frons shining metallic blue-green; arista also almost as long as body, with distinctive asymmetrical subrectangular flag, white at base and black distally (Fig. 2b) (MSSC).

Thorax: deep metallic blue-green, without brown area over ac band, also with short supernumerary setae on scutellar disc.

Legs: coloration similar; CI and CII with similar dense field of black setae that appear scaled (MSSC); CIII with black lateral seta among group of long white setae; FI with white-scaled setae from base to 3/4, but not dense, and with 8 fine black posterior setae from base to 1/2 (MSSC); TI bare, without posterior row of slanted setae; tarsus I similar; leg II similar; FIII with row of long white ventral setae to 5/6 and row of 6–8 long white av setae from 2/5 to 5/6 (MSSC).

Wing: membrane less smoky.

Abdomen: hypopygium (Fig. 4b); cercus with more elongate basal projection, but also deeply forked, with inner arm bearing some apical setae, and outer arm curved and bearing subapical blade-like seta.

Female: almost identical to female of *K. planticorum,* and also with short supernumerary setae on scutellar disc, however, halter yellowish not black.

Types. Bezzi described *Condylostylus nuptus* based on specimens from Suva, Sep–Oct 1920 (Holotype ♂, BMNH, examined) with additional specimens from Sigatoka River, Oct 1922 and the Lautoka Mountains, 21 Jan 1920.
Additional material. FIJI: 39♂, 20♀, FIJI: **Kadavu**: 0.25 km SW Solodamu Village, Moanakaka Bird Sanctuary, coastal limestone forest, [-19.078, 178.121], 60 m, 2 May–28 Jul 2004, 11 Apr–2 May 2004, 7 Mar–11 Apr 2004, 18 Jan–1 Feb 2004, Malaise trap, S. Lau (FBA 172237, etc.). **Taveuni**: 3.2 km NW Lavena Village, Mt Koronibuabua, lowland rainforest, [-16.855, -179.892], 235 m, 5–17 Jun 2004, Malaise trap M01, B. Soroalau (FBA 123532, etc.). **Vanua Levu**: 4 km NW Kilaka Village, Wainibeqa, lowland wet forest, [-16.806, 178.99], 150 m, 24 Feb–8 Mar 2005, Malaise trap M01, P. Manueli (FBA 511550). **Viti Levu**: 1.1 km SSW Volivoli Village, Sigatoka Sand Dunes, mixed littoral forest on sand, [-18.169, 177.485], 55 m, 14–22 Dec 2002, 23 Sep–8 Oct 2002, 31 Jan–12 Feb 2003, 24 Nov–15 Dec 2003, 2 Aug–13 Sep 2004, 25 Mar–6 Apr .2004, 20 Jan–4 Feb 2005 (FBA 000212, etc.). Koroyanitu EcoPark, Mt Evans Range, 1 km E Abaca Village, Savuione Trail, disturbed mid-elevation moist forest, [-17.667, 177.55], 800 m, 7–12 Nov 2002, 16–29 Nov 2004, Malaise trap M01, L. Tuimereke (FBA 080618, 502863); 1.0 km SW Vaturu Dam, montane transition forest, [-17.754, 177.665], 620 m, 23 Sep–6 Oct 2004, 13–23 Sep 2004, Malaise trap M03, A. Namaqa (FBA 502485, etc.); 1.5 km SW Vaturu Dam, montane transition forest, [-17.744, 177.676], 550 m, 23 Sep–6 Oct 2004, Malaise trap M01, A. Namaqa (FBA 511504, etc.); Lomalagi, Heavens Edge Lodge, Vaturu Dam, montane transition forest, [-17.745, 177.665], 540 m, 19–31 Aug 2004, Malaise trap M05, A. Namaqa (FBA 503309); 4 km NW Lami Town, Mt Korobaba, lowland wet forest, [-18.102, 178.383], 400 m, 13 Dec 2003–14 Jan 2004, Malaise trap M02, K. Koto (FBA 114789); Lami Town, Mosquito Island, mangrove forest, [-18.188, 179.663], 7 m, 2–3 Jun 2006, pan trap P01(FBA 525896); 2 km SE Nabukavesi Village, Ocean Pacific Resort, coastal lowland moist forest, [-18.171, 178.258], 40 m, 26 Apr–5 May 2004, Malaise trap M01, W. Naisilisili (FBA 118587). **Yasawa Group**: Yasawa-i-Lau Cave, 2 km SE Nabukeru Village, dry forest, [-16.837, 177.445], 118 m, 2–15 Feb 2006, Malaise trap M01, J. Veibete (FBA 522400).
Remarks. *Krakatauia nupta* is known from lowlands to mid-elevation rainforest at 800 m on Viti Levu, and from lowland sites on Vanua Levu, Kadavu, Taveuni, and the Yasawa Group. This species was particularly abundant in Malaise traps set in coastal forest on stabilized sands dunes at Sigatoka, often with more than 50 individuals in each sample.

Krakatauia nupta is close to *K. planticorum* found on the low islands of Tonga and Niue to the east of the Fijian Group, and both species have a large ovate aristal flag in males, and very dense shagreened setal fields on male coxa I and II. However, *K. nupta* (wing length = 4.5 mm) is distinctly smaller than *K. planticorum* (wing length = 5.3), lacks the posterior row of slanted setae on male tibia I, and has a different male aristal flag.

Krakatauia cicia Bickel, **new species**
(Figs. 2d, 4c)

Description. **Male**: length 4.6 mm; wing 4.7 x 1.3 mm.

Head: first flagellomere globular with apical arista; arista about 6 mm long, curved, with black apical flag bearing two white apical filaments (Fig. 2d); ventral postcranium with abundant black setae that extend below eye; postorbital setae black.

Thorax: dorsum metallic blue-green; pleura mostly dark brown with metallic blue-green reflections; 3 pairs long ac; lateral scutellars about half length of medians; scutellar disc with 0–4 short supernumerary setae.

Legs: coxae, trochanters, basal two-thirds of FI and FII, and FIII almost black to apex; distal third of FI and FII, knee of FIII, tibiae, and tarsi yellow, with distal tarsomeres only slightly infuscated; CI with abundant black setae over anterior surface, setae on distal third appear roughened on apical half (MSSC); CII also with black roughened setae on anterior surface (MSSC); CIII with 4 black lateral setae; I: 5.3; 4.5; 2.7/ 0.7/ 0.5/ 0.4/ 0.4; FI with row of long black ventral setae, and pv row of white hairs; TI bare; It_1 only slightly flattened, ventrally bare of normal vestiture and with pale ventral pile along entire length (MSSC); II: 6.0; 6.5; 4.2/ 1.4/ 1.0/ 0.4/ 0.3; FII with long black ventral hairs on basal two-thirds, and av row of white hairs; TII with short ad seta at 1/10, short anterior setae at 2/5 and 3/5, short pv setae at 2/5 and 3/5, and strong subapical ad and av setae; III: 6.8; 9.6; 3.8/ 2.7/ 1.2/ 0.6/ 0.4; FIII with av row of long black hairs, and long white ventral hairs; TIII with four short dorsal and three short anterior setae.

Wing: CuAx ratio: 2.3; lower calypter brown with fan of black setae; halter brown.

Abdomen: hypopygium (Fig. 4c) mostly dark brown with yellowish cerci; cercus with short basal projection, distally forked, with outer arm broad and lobate with some external setae, and inner arm clavate with apical blade-like seta.

Female: similar to male except lack MSSC and as noted: scutellar disc with 1–2 supernumerary setae; CI and CII with black distolateral setae and short white anterior setae; CIII with black lateral seta, and three short pale setae; femora with only short white hairs; TI with short dorsal at 1/5; TII with short ad seta at 1/10, short anterior setae at 2/5 and 3/5, short pv setae at 2/5 and 3/5, and strong subapical ad and av setae; TIII strong ad at 1/6 and 5 dorsal setae, with short av setae; halter also brown.

Types. Holotype ♂ (BPBM 16,822), paratypes, 1♂, 4♀, FIJI: **Lau Group**: Cicia, Mabula, 0–10 m, 13 Feb 1970, N.L.H. Krauss (BPBM).

Remarks. *Krakatauia cicia* is known from the island of Cicia in the Lau Group, Fiji. The male aristal flag, with its black base and two white apical filaments (Fig. 2d), is distinctive.

Supernumerary setae are weakly expressed in *K. cicia*. Of the two male specimens, one has the scutellar disc bare while the other has 3 short setae, while all female specimens have either one or two setae on the disc.

The *Krakatauia evulgata* group

Diagnosis

Head: male vertex and frons shallowly excavated, almost flat, with abundant hairs on flattened lateral surface (MSSC); male without distinct vertical seta; female vertex slightly flattened and without hairs, but with strong vertical seta; male upper face usually bulging ventrad of antennal base (MSSC); arista varies from dorsal to dorsoapical; arista usually simple, without male apical flag; ventral postcranium usually with white setae.

Thorax: metallic green with bronze reflections; setae black; 3 pairs long ac; dc with 2 strong posterior setae and three weaker setae anteriad; median scutellars strong, lateral setae variable in length with respect to the median setae.

Legs: It_1 relatively long, with pale ventral pile, with $It_{2–5}$ each rather short (MSSC).

Wing: M_1 strongly approaching R_{4+5}; sometimes M_1 approaches R_{4+5} in a broad arc, making cell r_5 hatchet shaped, in some species M_1 joins R_{4+5} before wing apex, closing cell r_5; crossvein dm-cu straight to slightly sinuous.

Abdomen. metallic blue-green with wide matt brown bands around areas of tergal overlap; epandrium subtriangular; hypandrial arm arising at midlength and extending beyond hypandrial hood; aedeagus elongate and extending beyond apex of surstylus; surstylus lobate with lateral setae, with ventral lobe and dorsal curved digitiform projection; 2 short epandrial setae present; epandrial lobe with long and short seta.

Remarks. The *Krakatauia evulgata* group is characterized by the male frons flattened

with abundant white or black hairs on flattened lateral surface (similar to Fig. 2a), frons and face at antennal base often bulging, arista distinctly dorsal, It_1 relatively long and with pale ventral pile, and vein M_1 strongly approaching R_{4+5}. Many species have a characteristic metallic emerald green body color. The *evulgata* group occurs in the southwestern Pacific and eastern Australia, and is particularly diverse in the Papuan region (see discussion in Bickel, 1994). Many species in the *evulgata* group are associated with low-lying coastal habitats, and *K. evulgata* itself is particularly widespread in the western Pacific, and including isolated atolls.

The following species are treated here:

evulgata Becker, 1922: 205 (*Sciapus).* Bismarck Archipelago, Caroline Is, Marshall Is, Solomon Is, Nauru, Vanuatu.

hutuna n. sp. Solomon Islands (Rennell).

micronesiana Bickel, 1994: 99. Guam, Belau, Northern Marianas, Midway, Wake, Kure.

ounua n. sp. Vanuatu (Malakula, Espiritu Santo).

tanna n. sp. Vanuatu (Tanna, Epi, Erromango, Espiritu Santo, Malakula)

Krakatauia evulgata (Becker)

Sciapus evulgatus Becker, 1922: 205.

Remarks: *Krakatauia evulgata* was redescribed and discussed in Bickel (1995). This species is common throughout the western tropical Pacific, and known from the Bismarck Archipelago, Caroline Is (Truk, Yap, Ponape, Caroline Atolls), Marshall Is, Solomon Is (incl. Ontong Java), Trobriand Is, Nauru, and Vanuatu. It occurs on both high islands and low and isolated atolls. Despite this wide distribution in the western Pacific, it is not known from the Fiji Group, New Caledonia, or any archipelago further east.

Further to Bickel (1995), female *K. evulgata* have FI black in basal half and yellow in distal half, a distinctive combination that should serve to distinguish females from sympatric congeners. As noted previously, intraspecific variation is evident in size, halter color (from yellow to brown) and the extent of black coloration on basal FI. As well, the abundance of fine pale hairs on the slope of the male frons is variable. And some Solomon Island specimens have the distal fifth of the male basitarsus I unflattened, similar to that of *K. hutuna* (*q.v.*). Such intraspecific variation might be expected in such an abundant and widespread species.

Additional records: SOLOMON ISLANDS: **Choisul**: Sasamongga, 0–100 m, Feb 1984. **Guadalcanal**: Honiara, 0–200 m, Dec 1975. **Malaita**: Auki, 0–100 m, Dec 1975. **Nda**: Bethlehem, 0–10 m, Dec 1972. **New Georgia**: Munda, 0–150 m, Nov 1976. **San Cristobal**: Kira-Kira, 0–200 m, 7 Nov 1964. **Santa Cruz**: Graciosa Bay, 0–50 m, Jan 1977 (AMNH). **Sikaiana**: Sikaiana, 0–10 m, Dec 1972 (all BPBM, except where noted). VANUATU: **Ambrym**: Dec 1984, 0–100 m. BANKS GROUP: **Vanua Lava**: Sola, Feb 1974, 0–200 m (USNM). **Efate**: Vila, Jan 1978, 0–100 m. **Epi**: Lamen Bay, 3 Feb 1976, 0–20 m; Vaemali, 100–150 m, 6–10 Aug 1967. **Erromango**: Dillon Bay, Aug 1978, 0–100 m, Dec 1985, 0–100 m. **Espiritu Santo**: Luganville, Jan 1984, 0–100 m; Segond Channel, Jul 1944 (USNM). **Maewo**: Kerepei, Dec 1983, 0–200 m. **Malakula**: Lakatoro, 23 Sep–19 Oct 1967, Feb 1973, 0–200 m; Port Sandwich, 1 Sep 1979, 0–50 m. **Pentacost**: Batnavni, 3 Sep 1979, 0–100 m. SHEPHERD GROUP: **Tongariki**: 29 Aug 1979, 0–300 m; **Tanna**: Lenakel, Jan 1977, Mar 1980, Jan 1973, 0–200 m; Port Resolution, 6 Mar 1970, 100 m (all BPBM, except where noted).

Krakatauia micronesiana Bickel

Krakatauia micronesiana Bickel, 1995: 99.

Remarks: *Krakatauia micronesiana* was described in Bickel (1995). This species occurs on far-flung Pacific islands: Guam, Belau, Northern Marianas, Midway, Wake, and Kure Atoll. It is closely related to the allopatric *K. recta* known from southeastern Asia and New Guinea. Both species have M_1 joining R_{4+5} before the apex.

Further to the description in Bickel (1995), the male wing often has a brown clouding (faint in some specimens) posteriad of vein R_{2+3} and occupying most of wing cell r_{4+5} basad of crossvein dm-cu, to just beyond CuA. Female wings are totally hyaline.

Krakatauia hutuna Bickel, **new species**
(Figs. 2f, 5a)

Description: Male: length 4.3 mm; wing: 4.3 x 1.3 mm.

Head: vertex, frons, face and clypeus metallic blue-green; frons broad and flat with fine pale hairs on lateral slope (MSSC); proboscis yellow; antenna black; pedicel with strong dorsal and ventral setae; first flagellomere subtriangular and elongate (Fig. 2f), longer than that of *K. evulgata*; arista dorsal, about 1 1/2 longer than head height and simple.

Thorax: metallic blue-green; pleura and coxae with silvery pruinosity; lateral setae short, about one-fifth length of medians.

Legs: all coxae and trochanters dark brown; femora, tibiae, and basitarsi I and II entirely yellow; FIII dark brown; TIII brownish; distal tarsomeres I and II and all tarsus III dark brown; CI and CII with white anterior setae; CIII with white lateral setae; femora with white ventral hairs only; I: 5.5; 5.3; 4.0/ 1.2/ 0.8/ 0.7/ 0.6; TI with dorsal at 1/8 and ?, and strong ventral apical seta; It_1 relatively long, slightly flattened, and with pale ventral pile along basal four-fifths (MSSC); II: 6.0; 7.8; 5.5/ 1.8/ 1.2/ 0.4/ 0.4; TII with ad at 1/8, pd at 1/3, and ventrals at 1/3 and 3/5; IIt_1 with some short ventral setae; III: 8.0; 10.8; 4.6/ 2.2/ 1.3/ 0.8/ 0.4; TIII with strong ad seta at 1/5, and some short dorsal setae.

Wing: hyaline; M_1 approaches R_{4+5} in broad arc, and join margin separately; dm-cu only slightly sinuous; CuAx ratio: 2.7; lower calypter brown with fan of pale setae; halter yellow.

Abdomen: hypopygium (Fig. 5a) entirely dark brown; surstylus with ventral lobe and dorsal curved digitiform projection; cercus with short distal setose projection which bears long curved apical setae, and bilobate ventral arm, and bears modified apical strong setae as figured.

Female: unknown.

Types. Holotype ♂, paratypes 2♂, SOLOMON ISLANDS: **Rennell**: Hutuna, 16 Mar 1965, Torben Wolff (ZMUC).

Remarks. *Krakatauia hutuna* is known only from the Rennell Island type locality in the southernmost Solomon Islands. It is very close to the widespread *Krakatauia evulgata* (*q.v.*), and both species have a similar hypopygial structure. However, as noted in the text key, they can be readily separated by differences in leg color and setation, and by the elongate male first flagellomere and abundant white setae on the palp of *K. hutuna.*

Krakatauia ounua Bickel, **new species**
(Figs. 2g, 5b)

Description. **Male**: length 4.5 mm; wing 3.6 x 1.2 mm.

Head: vertex, frons, face and clypeus metallic green with little pruinosity; frons broad and flat-

tened with 7–10 pale white hairs on lateral slope (MSSC); eyes without short setae between facets; palp brown with black setae; proboscis brownish; antenna (Fig. 2g) black; first flagellomere subtriangular, longer than high; arista dorsal, long as head width, simple.

Thorax: metallic green with bronze reflections; pleura and coxae with silvery pruinosity.

Legs: coxa and trochanter I mostly yellow, but with some slight infuscation; coxae and trochanters II and III dark brown; all femora, tibiae, and basitarsi yellow, but slightly infuscated at femoral knees; distal tarsomeres dark brown; CI and CII with white anterior setae; CIII with white lateral setae; femora with pale ventral hairs only; I: 4.6; 4.3; 3.0/ 1.0/ 0/8/ 0.6/ 0.4; TI with dorsal at 1/5, but lacking ventroapical seta; It_1 slightly flattened, and in basal fifth with pale ventral pile (MSSC); II: 5.2; 6.4; 4.5/ 1.7/ 1.2/ 0.6/ 0.4; TII with ad setae at 1/6 and 3/5, and pd at 2/5; IIt_1 with some short ventrals; III: 6.0; 8.0; 3.5/ 1.8/ 1.2/ 0.7/ 0.5; TIII with ad seta at 1/8 and 2/3, and dorsal near 3/5.

Wing: hyaline with smoky color on anterior half of wing; M_1 approaches R_{4+5} in broad arc, but each vein joins margin separately; dm-cu slightly sinuous; CuAx ratio: 2.9; lower calypter brown with fan of pale setae; halter brown.

Abdomen: hypopygium mostly dark brown (Fig. 5b); cercus with only short basal projection, and distally forked, with outer arm bearing long and curved outer setae and strong lateral and apical setae, and inner arm bearing short setae as figured.

Female: similar to male except lack MSSC and as noted: frons without lateral hairs; coxae and legs with similar coloration; It_1 unmodified; halter also brown.

Types. Holotype ♂, VANUATU: **Malakula**: Ounua, Mar–Apr 1929, L.E. Cheesman, B.M. 1929-343 (BMNH); paratypes 1♂, 1♀, same but N. Lakatoro, 22–30 Sep 1967, J. & M. Sedlacek (BPBM).

Other material: VANUATU: **Espiritu Santo**: 1♂, Matantas, 0–100 m, 11 Sep 1979, G.M. Nishida & G. A. Samuelson (BPBM).

Remarks. *Krakatauia ounua* is known from the nearby large islands of Malakula and Espiritu Santo, Vanuatu. This species is close to the widespread *K. evulgata* but may be readily separated by the entirely yellow femora of both sexes (partially black in *K. evulgata*), and male basitarsus I only slightly flattened with pale ventral pile in basal sixth.

The single male from Espiritu Santo has a much weaker development of MSSC than the Malakula specimens, with only 2 pale hairs on the lateral frons and ventral basitarsus I in the basal sixth bare of normal vestiture but without pale ventral pile. However, details of the hypopygium are identical, and I regard these as intraspecific differences.

Krakatauia tanna Bickel, **new species**
(Fig. 5c, d)

Description. **Male**: length 4.3 mm; wing: 4.6 x 1.4 mm.

Head: frons metallic blue-green with about 15 long white hairs on lateral slope; eyes without tiny white setulae between the facets; palp black with white hairs and black distal setae; proboscis brown; antenna black; pedicel with strong dorsal seta; first flagellomere short subtriangular with dorsoapical arista, about half body length; arista simple.

Thorax: metallic green with bronze reflections; matt brown stripe dorsad of notopleuron; lateral scutellar setae 1/3 length of medians.

Legs: coxae, trochanters and femora black, except distal fifth of FI and FII yellow; tibiae and basitarsus I and II yellow; basitarsus III brownish; distal tarsomeres brown; CI and CII with white anterior hairs and setae; CIII with white lateral seta and additional long white hairs; all femora with white ventral hairs; I: 4.2; 4.4; 2.8/0.8/ 0.6/ 0.4/ 0.4; TI without major setae, but with posterior row of 16–20 white hair-like setae along length, longest near mid-tibial length (MSSC); It_1 slightly flat-

Fig. 5. *Krakatauia hutuna*: **a.** hypopygium, left lateral. *K. ounua*: **b**. hypopygium, left lateral**.** *K. tanna*: **c**. hypopygium, left lateral; **d.** outer cercal arm, dorsal.

tened to 3/4 and covered with fine white pile (MSSC); distal quarter of It_1 and distal tarsomeres with normal vestiture; II: 4.8; 6.3; 4.3/1.5/ 1.0/ 0.5/0.3; TII with anterior setae at 2/5 and 2/3, dorsal at ?, with strong subapical anterior and pv setae; III: 7.0; 9.0; 3.7/ 1.8/ 1.2/ 0.6/ 0.4; TIII with short anterior setae at 1/2, and some short dorsal setae; $IIIt_1$ with strong curved ventral seta at base.

Wing: hyaline; M_1 approaches R_{4+5} in broad arc, but each vein joins margin separately; dm-cu slightly curved; CuAx ratio: 2.2; lower calypter brown with fan of white setae with 2–3 black setae; halter brown.

Abdomen: hypopygium (Fig. 5c) black with brown cerci 2 epandrial setae present; cercus without basal projection, but deeply forked, forming two strong arms, with outer arm bearing strong median blade-like seta (Fig. 5d), and with group of apical setae on inner arm as figured.

Female: similar to male except lack MSSC and as noted: first flagellomere subtriangular; TI with short dorsal at 1/5; It_1 unmodified; TII with ad-pd pair at 1/5, ad seta much stronger, anterior setae at 1/2 and 3/4, pd seta at 1/2, some short ventrals, and strong subapical ad, av, and pv setae; TIII strong ad at 1/6, anterior at 3/5, and 4–5 dorsal setae with stronger dorsal at 2/3; $IIIt_1$ also with strong curved ventral seta at base; wing hyaline; halter also brown.

Types. VANUATU: Holotype ♂ (BPBM 16,818), paratypes 3♂, 1♀, **Tanna**: Lenakel, 0–150 m, Mar 1970, N.L.H. Krauss; paratypes: 2♂, 3♀, same but Mar 1980; 1♂, same but Nov 1978; 1♂, 2♀, same but Jan 1981; 1♀, same but Jan 1973 (BPBM).

Additional material. VANUATU: **Epi**: 3♂, Lamen Bay, 0–20 m, 3 Feb 1976, Krauss; 2♀, Vaemali, 100–150 m, 6–10 Aug 1967, Sedlacek (BPBM). **Erromango**: 1♂, 1♀, Dillon's Bay, 0–100 m, Feb 1981, Jan 1984, Krauss (BPBM). **Espiritu Santo**: 1♂, 15 km NE Luganville, 12 Apr 1964, Straatman (BPBM); 1♂, 1♀, Santo, Aug 1929, Cheesman (BMNH). **Malakula**: 5♂, 3♀, Ounua, Feb–Apr 1929, Cheesman; 2♂, 1♀, Atchin I, Jul 1929 Cheesman, (BMNH); 7♂, 2♀, Lakatoro, 0–200 m, 22–30 Sep 1967, Feb 1973, Sedlacek (BPBM). **Tanna**: 1♂, 1♀, 2 km S of Ipeukeul, 300 m, 23 Aug 1979, Gagné (BPBM).

Remarks. *Krakatauia tanna* is widespread in lowland Vanuatu, and occurs from Tanna in the south to Espiritu Santo in the north of the archipelago.

The *Krakatauia malakula* group

Diagnosis

Head: male vertex and frons distinctly excavated, almost flat, with abundant mostly white hairs on lateral surface (MSSC); female vertex with vertical seta only; male upper face usually bulging ventrad of antennal base (MSSC); arista varies from dorsoapical to apical, usually with apical flag, even if very narrow.

Thorax: metallic green with bronze reflections; setae black; 3 pairs long ac present; dc with 2 strong posterior setae and 3 weaker setae anteriad; median scutellars strong, lateral setae variable in length with respect to the median setae.

Legs: It_1 relatively long, with pale ventral pile, with $It_{2–5}$ each rather short (MSSC).

Wing: M_1 strongly approaching R_{4+5} in broad arc, but each joins margin separately; crossvein dm-cu straight to slightly sinuous.

Abdomen. metallic blue-green with wide matt brown bands around areas of tergal overlap; epandrium subtriangular; hypandrial arm arising at midlength and extending beyond hypandrial hood; aedeagus elongate and extending beyond apex of surstylus; surstylus lobate with lateral setae, with ventral lobe and dorsal curved digitiform projection; 2 short epandrial setae; epandrial lobe with 1 long and 1 short seta;

Remarks. The *Krakatauia malakula* group is poorly defined and comprises an assemblage of species with characters of both the *evulgata* and *abaca* groups, rather than a clearly defined monophyletic group. The male frons is distinctly excavated in all species

(almost flat in males of the *evulgata* group), but not as strongly as in *abaca* group species. Most *malakula* group species have the white lateral hairs on male frons, while all *abaca* group species have black hairs.

This group includes two pairs of closely related sister species, *K. cheesmanae* from Vanuatu and *K. graciosa* from the Solomon Islands, and *K. malakula* and *K. epiensis* both from Vanuatu, and a fifth species, *K. sigatoka* from Fiji.

The following species are treated here:

cheesmanae n. sp. Vanuatu (Malakula, Ambrym, Epi, Espiritu Santo, Tanna).
epiensis n. sp. Vanuatu (Epi).
graciosa n. sp. Solomon Islands (Santa Cruz).
malakula n. sp. Vanuatu (Malakula)
sigatoka n. sp. Fiji (Viti Levu, Vanua Levu).

Krakatauia cheesmanae Bickel, **new species**
(Figs. 2i, 6a)

Description. **Male**: length 5.4–5.6 mm; wing: 5.2–5.4 x 1.4–1.6mm.

Head: frons metallic green with bronze reflections, about 15 long white hairs (sometimes with a few black hairs) on lateral slope; frons not bulging; face and clypeus metallic blue-green with some silvery pruinosity; palp black with white hairs and black distal setae; proboscis brown; antenna (Fig. 2i) black; scape globular; pedicel with strong dorsal seta; first flagellomere subtriangular with dorsoapical arista, about half body length; aristal apex with very narrowly lanceolate with white apex (MSSC); ventral postcranium with white setae.

Thorax: metallic green with bronze reflections; matt brown stripe dorsad of notopleuron; setae black; median scutellars long, lateral about two-thirds length of medians.

Legs: coxae, trochanters and femora black, although CI with some metallic blue-green reflections; tibiae and tarsi dark brown; CI and CII with abundant white anterior hairs; CIII with group of 3–4 white lateral setae; I: 5.3; 4.5; 3.2/0.8/ 0.5/ 0.4/ 0.4; FI with 6–7 long white ventral setae to 3/4, slightly decreasing in size distally (MSSC), and with 5–6 short black av setae in distal quarter; TI with some short dorsal setae in basal two-fifths, some weak posterior setae, and long pv seta near 1/2; It_1 slightly flattened with brownish ventral pile along length to 4/5 (MSSC), distally with unmodified vestiture; II: 6.0; 7.0; 5.2/1.6/ 1.1/ 0.5/0.4; FII with white ventral hairs; TII with dorsal seta at 1/3, anterior seta at 1/3 and 2/3, and subapical anterior seta; III: 7.3; 9.5; 4.2/ 2.0/ 1.3/ 0.7/ 0.5; FIII with white ventral hairs; TIII with some anterior and dorsal setae longer than normal vestiture.

Wing: mostly smoky brown with only posterior margin of membrane hyaline; dm-cu straight; CuAx ratio: 2.5; lower calypter brown with fan of white setae; halter dark brown.

Abdomen: metallic blue-green with bronze reflections, with wide matt brown bands at tergal overlap; with strong black marginal setae and pale lateral hairs; hypopygium black with brown cerci (Fig. 6a); epandrium subtriangular; surstylus lobate with dorsal digitiform projection; cercus with subtriangular basal projection with strong apical setae and curved ventral projection; distally forked with 2 closely parallel arms, outer arm distally clavate, and inner arm bearing 2 apical blade-like setae.

Female: similar to male except: arista simple; 5 strong dc; leg color similar, but TI and TII often yellowish; FI with 3 white ventral setae in basal quarter, distal three-quarters bare; TI similar, also with long pv seta near 1/2; It_1 not flattened, without ventral pile, but with some short erect ventral setae; FII ventrally bare; TII with strong ad at 1/5, strong pd at 1/2, dorsal seta at 1/3, anterior seta at 2/5 and 3/5, with subapical ad, av, pd and pv setae; FIII ventrally bare; TIII with ad seta at 1/5, anterior setae at 1/3, 1/2, and 3/5, dorsal setae at 2/5 and 3/5, with subapical ad seta; wing entirely hyaline; halter yellow.

Fig. 6. *Krakatauia cheesmanae*: **a.** hypopygium, left lateral. *K. malakula*: **b.** hypopygium, left lateral. *K. epiensis*: **c.** hypopygium, left lateral. *K. graciosa*: **d.** hypopygium, left lateral.

Types. Holotype ♂, paratypes, 2♂, 2♀, VANUATU (as New Hebrides): **Malakula** (as Malekula): Ounua, Mar–Apr 1929, L.E. Cheesman, B.M.1929-343; paratypes, 1♂, same but Feb 1929, B.M.1929-234; ♀, same but Apr–May 1929, B.M.1929-371; paratypes, 2♂, Atchin I, Jul 1929, L.E. Cheesman, B.M.1929-414 (BMNH).
Additional material. VANUATU: **Ambrym**: 1♂, 2♀, Ranon to Mt Toyo, 0–100 m, 2 Sep 1979, Gagné, Nishida, & Samuelson (BPBM); 2♂, 1♀, 0–100 m, Krauss (BPBM); 1♂, Olal Catholic Mission, 2 Jan 1989, Lachlan (AMS). **Anatom**: 1♂, Nov 1930, Cheesman (BMNH). **Epi**: 1♂, Lamen Bay, 0–20 m, 3 Feb 1976, Krauss; 1♂, Vlave, 2 Aug 1967, Sedlacek; 2♂, 1♀, Lamen, 0–10 m, Jan 1976, Krauss (BPBM). **Espiritu Santo**: 1♂, 1♀, Luganville, Jan 1974, Krauss (BMNH); Luganville, 0–100 m, Dec 1984, Krauss (BPBM); 1♀, Santo, Aug 1929, Cheesman (BMNH). **Malakula**: 2♂, 1♀, Bushmans Bay, 21–24 May 1977, Bickel (AMS). **Tanna**: Port Resolution, 0–100 m, 6 Mar 1970, Krauss; 1♂, Lenakel, 0–100 m, Mar 1970, Krauss (BPBM).
Remarks. *Krakatauia cheesmanae* is widespread across the Vanuatu archipelago. There is some variation in the development of the male aristal apex. On Anatom and Tanna in the south, the apex is white and very narrowly lanceolate, while on Malakula (including the type series) and nearby Ambrym and Epi, the aristal apex is hardly evident, and the arista appears unmodified but with a white tip. As well, most males from Malakula have a few black setae among the white hairs on the lateral frons. I regard this as intraspecific variation, as the hypopygium is similar in all specimens.

Krakatauia cheesmanae is the sister species of *K. graciosa* from the Solomon Islands, as the two species share similar cerci (compare Figs. 6a, d) and similar very narrow aristal flags with white apices (Figs. 2h, 2i).
Etymology. This species is named in honor of Evelyn Cheesman (1881–1969), the remarkable English entomologist who collected extensively in remote areas of the Pacific and wrote several books about her adventures.

Krakatauia graciosa Bickel, **new species**
(Figs. 2h, 6d)

Description. **Male**: length 5.7 mm; wing: 4.9 x 1.6 mm; similar to *K. cheesmanae* except as noted:

Head: frons metallic blue-green with 20–25 hairs on lateral slope, with black hairs laterally and white hairs medially (MSSC); arista with narrow lanceolate apical flag with narrow white apical filament (Fig. 2h) (MSSC).

Legs: coxae, trochanters and remainder of legs black although tibiae may appear reddish; CI with abundant white anterior hairs and 4–5 stronger white distolateral setae; CII with pale anterior hairs; CIII with single white lateral seta and tuft of long white hairs; FI and FII with white ventral hairs, and FIII with ventral hairs only basally; I: 6.2; 5.3; 3.3/1.1/ 0.7/ 0.5/ 0.6; TI with 2 short dorsal setae, at 1/6 and 1/4; It_1 flattened to 7/8 , bare of normal vestiture ventrally, but covered with golden ventral pile (MSSC); II: 6.6; 8.2; 6.0/1.8/ 1.2/ 0.6/0.5; TII with setae damaged, but with some ad setae and strong subapical anterior seta; III: 8.2; 11.2; 4.8/ 2.2/ 1.5/ 0.6/ 0.5; TIII with some suberect anterior hairs along basal third (MSSC) and with some short dorsal setae.

Abdomen: hypopygium black with brown cerci (Fig. 6d); epandrium subtriangular; distalmost seta stronger; surstylus with unusual elongate dorsal arm arising from base; surstylus lobate with dorsal digitiform projection; cercus with rounded basal projection bearing long setae; distally divided into two arms, outer arm bearing row of median setae, and inner arm with 2 blade-like apical setae as figured.
Female: unknown.

Types. Holotype ♂ (BPBM 16,820), SOLOMON ISLANDS: **Santa Cruz**: Graciosa Bay, 0–50 m, Jan 1977, N.L.H. Krauss (BPBM).

Remarks. *Krakatauia graciosa* is known only from the lowland type locality on Santa Cruz, Solomon Islands. This species is close to the Vanuatu *K. cheesmanae*, as noted above.

The epandrium (Fig. 6d) is unusual in having an elongate dorsal projection arising from the base of surstylus. Possibly this is an aberration, but other specimens would be needed to confirm this.

Krakatauia malakula Bickel, **new species**
(Figs. 2j, 6b)

Description. **Male**: length 5.1 mm; wing: 4.1–4.2 x 1.4 mm.

Head: frons metallic blue-green with about 15 long white hairs on lateral slope; lower frons not bulging, but upper face bulging ventrad of antennal base (MSSC); face and clypeus metallic blue with some silvery pruinosity; palp black with white hairs and black distal setae; proboscis brown; antenna (Fig. 2j) black; scape globular; pedicel with dorsal seta; first flagellomere subtriangular with dorsoapical arista, about half body length; arista with obovate apical flag, black basally, white apically (MSSC); ventral postcranium with white setae.

Thorax: metallic green with bronze reflections; matt brown stripe dorsad of notopleuron; lateral setae short, about one-third length of medians.

Legs: coxae, trochanters and femora brown, with knees on FI yellow; tibiae and tarsi yellow, with distalmost tarsomeres slightly infuscated; CI and CII with mixture of white and fewer black anterior hairs and setae; CIII with white lateral seta and additional long white hairs; all femora with long white ventral hairs; I: 5.3; 5.0; 2.8/1.0/ 0.6/ 0.5/ 0.4; TI without major setae, but with posterior row of 16–20 white hair-like setae along length (MSSC); It_1 slightly flattened to 3/4 and ventrally bare of normal vestiture, but covered with fine white pile (MSSC), and distal quarter of It_1 and distal tarsomeres with normal vestiture and some fine white pile (MSSC); II: 6.6; 8.2; 6.0/1.8/ 1.2/ 0.6/0.5; TII with anterior seta at 2/3, and in some specimens at 1/3 as well, and with strong subapical anterior and pv setae; III: 7.2; 9.5; 4.0/ 2.0/ 1.3/ 0.7/ 0.5; TIII with short anterior setae at 2/5 and 2/3, and some short dorsal setae; $IIIt_1$ with strong curved ventral seta at base.

Wing: hyaline with faint brown wash; crossvein dm-cu slightly curved; CuAx ratio: 2.4; lower calypter brown with fan of black setae; halter dark brown.

Abdomen: hypopygium black with brown cerci (Fig. 6b); epandrium subtriangular; surstylus lobate with dorsal digitiform projection and with setae; cercus with 2–3 strong projecting basal spike-like setae, and distally forked, with outer arm subrectangular and distinct irregular surface and subapical curved hook-like seta, and inner rod-like arm bearing curved apical seta.

Female: similar to male except lack MSSC and as noted: first flagellomere subtriangular; arista short, slightly longer than head height, and bare; leg color similar; coxae with white hairs only; femora with only short white hairs; TI with short dorsal at 1/5; It_1 unmodified; TII with ad-pd pair at 1/5, ad seta much stronger, anterior seta at 2/3, pd seta at 3/5, some short ventrals, and strong subapical ad, av, and pv setae; TIII strong ad at 1/6, anterior at 3/5, and 4–5 dorsal setae with stronger dorsal at 2/3; $IIIt_1$ also with strong curved ventral seta at base; wing hyaline; halter also dark brown.

Types. Holotype ♂ (BPBM 16,821), paratypes, 3♂, 2♀, VANUATU: **Malakula**: Port Sandwich, 0–50 m, 1 Sep 1979, W.C. Gagné, G.M. Nishida, & G.A. Samuelson (BPBM).

Additional material. VANUATU: **Malakula**: 1♂, Bushmans Bay, 12 Jul 1977, Bickel (AMS); 2♂, 5♀, N. Lakatoro, 22–30 Sep 1967, Sedlacek (BPBM); 2♂, 1♀, Ounua, Feb 1929, Cheesman, B.M.1929-234 (BMNH).

Remarks. *Krakatauia malakula* is known only from several lowland locales on the island

of Malakula, Vanuatu. It is close to *K. epiensis* in sharing an obovate aristal flag, tibia I with pv row of 30–35 fine erect hairs along length, and the cercus having deeply cleft distal arm and a rather short basal projection.

Krakatauia epiensis Bickel, **new species**
(Figs. 2k, 6c)

Description. **Male**: length 4.3 mm; wing: 4.0 x 1.2 mm; similar to *K. malakula* except as noted:

Head: frons broad and flattened, metallic emerald green with bronze reflections, with about 12 white hairs on lateral slope; antenna black; first flagellomere subtriangular with dorsoapical arista, about half body length, apex (Fig. 2k) with brown obovate aristal flag (MSSC).

Legs: coxae and trochanters black, although CI with some metallic blue-green reflections; FI and FII black to 1/2 and FIII black to 2/3; all distal femora, tibiae, and tarsi yellow, with distal tarsomeres infuscated; CI and CII with abundant white anterior hairs; CIII with strong white lateral seta surrounded by 3–4 weaker lateral setae; I: 5.0; 4.5; 3.1/ 1.0/ 0.7/ 0.4/ 0.4; FI with white ventral setae to 3/4, slightly decreasing in size distally; TI bare of major setae, but with pv row of 30–35 fine erect hairs along length, distal two-thirds of anterior surface covered with fine golden vestiture (MSSC); It_1 flattened with whitish ventral pile along length to 4/5 (MSSC), distally with unmodified vestiture; II: 6.0; 6.7; 4.8/1.6/ 1.1/ 0.4/0.3; FII with white ventral hairs in basal half; TII with offset ad-pd setal pairs at 1/8, dorsal at 4/5, with anterior seta at 1/3 and 2/3; III: 7.2; 9.5; 3.4/ 1.9/ 1.2/ 0.7; 0.4; FIII with white ventral hairs; TIII with ad at 1/6 and strong dorsal at 2/3.

Wing: CuAx ratio: 2.1; lower calypter brown with fan of white setae; halter brown.

Abdomen: hypopygium (Fig. 6c) dark brown; surstylus lobate with dorsal digitiform projection; cercus with subtriangular basal projection and deeply cleft distal arm, with inner arm bearing apical setae, and curved blade-like outer arm.

Female: similar to male except as noted: arista simple; 5 strong dc; leg color similar, FIII back to 7/8; TI with dorsal at 1/5 and 1/2, long pv near 1/2, and also with pv row of 30–35 fine erect hairs along length, but without fine golden vestiture on distal anterior surface; It_1 not flattened, without ventral pile; TII with strong ad and weak pd at 1/5, strong pd at 1/2, ventral at 1/2, and with subapical ad, av, pd and pv setae; TIII with ad seta at 1/5, dorsal seta at 2/3, with subapical ad seta; wing entirely hyaline; halter yellow.

Types. Holotype ♂ (BPBM 16,819), VANUATU: **Epi**: 1♂, Lowekewou, 0–100 m, 31 Aug 1979, W.C. Gagné, G.M. Nishida & G.A. Samuelson; paratypes, 1♂, 2♀, same but Vaemali, 100–150 m, 6–10 Aug 1967, J. & M. Sedlacek; paratype 1♂, Vaemali, 80–150 m, 11–18 Aug 1967, J. & M. Sedlacek (BPBM).

Remarks. *Krakatauia epiensis* is known only from Epi, an island near the middle of the Vanuatu archipelago.

Krakatauia sigatoka Bickel, **new species**
(Figs. 2w, 8b)

Description. **Male**: length 4.8 –4.9 mm; wing: 4.3 x 1.3 mm.

Head: frons flattened, metallic green with bronze reflections, about 15 long white hairs on lateral slope; upper face bulging ventrad of antennal base; face and clypeus metallic blue-green with some silvery pruinosity; palp black with white hairs and black distal setae; proboscis yellow; antenna black; scape globular; pedicel with strong dorsal seta; first flagellomere subtriangular with dorsoapical arista, about half body length; aristal flag (Fig. 2w) black, narrowly ovate with pointed white apex (MSSC); ventral postcranium with white setae.

Thorax: metallic green with bronze reflections; lateral scutellar setae about 2/3 length of medians.

Legs: CI and femora metallic green, with knees of FI and FII yellow; coxae and trochanters II and III dark brown, TI and TII yellow; TIII yellow basally, becoming dark brown in distal half; tarsi dark brown; CI and CII with abundant white anterior hairs; CIII with group of 3–4 white lateral setae; femora with only short white ventral to av hairs; I: 5.4; 5.0; 3.5/ 1.2 / 0.8/ 0.5/ 0.5; FI with some 3–4 white ventral setae in basal third, in addition to short white hairs; TI with short dorsal setae at 1/6 and 1/5, long ad setae at 2/5 and 2/3, and pv seta at 2/5; It_1 slightly flattened and with brownish ventral pile along length (MSSC), II: 6.0; 7.0; 5.5/ 1.8/ 1.3/ 0.6/0.4; TII with short ad-pd setal pair at 1/6, strong ad at 1/5, pd at 2/5, anterior at 1/2, and subapical ad, pd, av and pv setae; III: 7.5; 11.0; 4.5/ 2.2/ 1.5/ 0.7/ 0.5; TIII with ad at 1/6, anterior at 2/5 and some short dorsal setae longer than normal vestiture.

Wing: hyaline with faint smoky tinge; dm-cu straight; CuAx ratio: 2.6; lower calypter brown with fan of white setae; halter yellow.

Abdomen: hypopygium (Fig. 8b) black with brown cerci; epandrial lobe with long apical and shorter subapical setae; surstylus lobate with dorsal digitiform projection; cercus subrectangular, with distal indentation forming two subequal setose arms.

Female: similar to male, including leg colour but lacking MSSC.

Types. Holotype ♂, FIJI: **Viti Levu**: 1.1 km SSW Volivoli Village, Sigatoka Sand Dunes, mixed littoral forest on sand, [-18.169, 177.485], 55 m, 20 Jun–9 Jul 2003, Malaise trap M02, T. Ratawa (FBA 030977); paratypes, 1♂, same (FBA 030962); 1♂, same but 24 Nov–15 Dec 2003 (FBA 025522); 1♂, same but 22 Dec 2002–3 Jan 2003 (FBA 045661) (FNIC).

Additional material. FIJI: **Vanua Levu**: 1♂, 1♀, Savusavu, 0–100 m, Mar 1973, N.L.H. Krauss (BPBM).

Remarks. *Krakatauia sigatoka* is known from lowland Viti Levu and Vanua Levu. All the Sigatoka specimens were collected from the same Malaise trap in littoral forest on stabilized dunes.

The *Krakatauia abaca* group

Diagnosis

Head: male frons not flattened but broadly excavated with some 15–20 black hairs on lateral slope (MSSC); distal frons sometimes bulging dorsad of antennae, but upper face always bulging ventrad of antennae (MSSC); scape globular (MSSC); first flagellomere subtriangular; male arista always with diagnostic apical flag (MSSC).

Thorax: laterals about one-third to half length of medians.

Legs: coxae, trochanters, and femora mostly black; It_1 usually slightly flattened, and with pale ventral pile; male secondary sexual setation, especially on leg I, and color often diagnostic.

Wing: sometimes hyaline but usually with brown smoky tinge; dm-cu slightly curved; halter dark brown to black in both sexes (where known from females).

Abdomen: hypopygium usually dark brown with yellowish cerci; epandrium subtriangular; hypandrial arm arising at midlength and expanded and extending beyond hypandrial hood; epandrial lobe pedunculate with long and short seta; cercus often with diagnostic setation and structure.

Remarks. The *Krakatauia abaca* group constitutes a large radiation within the Fijian Archipelago, with 13 newly described species. However, most of the species are known only from single locales or including nearby collection locales, suggesting the fauna is much larger, with much local endemicity.

Of particular interest is the diversity of antennal flags (Fig. 2), almost all of them diagnostic at the species level, and probably used for species recognition while mating. Some of these flags have distinctly different obverse sides [e.g., *K. solodamu* (Figs. 2q, r)

and *K. namatalaui* (Figs. 2s, t)], and one species *K. bisignata* (Fig. 2x), has a three dimensional structure, with a white vane perpendicular to the underlying black flag.

The *abaca* group appears superficially similar to the *funeralis* group of Australia and New Guinea (see Bickel 1994), but differs in having only short white hairs on male femur I, while in the *funeralis* group, males have a row of long strong pv setae on femur I.

The *tomaniivi* subgroup includes four species within the *abaca* group, all having a deeply incised cercus (almost to the base) with consequent long arms (e.g., Fig.7e), while in other members of the *abaca* group, the cercal arm is forked beyond midlength (e.g., Figs. 7a, c). This *tomaniivi* subgroup comprises large-sized species from mid-elevation rainforest, three from Viti Levu: *K. namatalaui* and *K. tomaniivi* (both sympatric near Mt Tomaniivi), *K. vuda* from the Batilamu Range, Koroyanitu N.P., and *K. natewa* from Vanua Levu. Most species are only known from a few specimens.

The following species comprise the *abaca* group (* indicates *tomaniivi* subgroup):

abaca n. sp., Fiji (Viti Levu, Vanua Levu, Ovalau, Gau)
auribarba n. sp., Fiji (Taveuni).
bisignata n. sp., Fiji (Vanua Levu)
bouma n. sp. Fiji (Taveuni).
evodevo n. sp., Fiji (Taveuni).
hurleyi n. sp., Fiji (Vanua Levu)
korobaba n. sp., Fiji (Viti Levu, Ovalau)
***namatalaui** n. sp., Fiji (Viti Levu)
***natewa** n. sp., Fiji (Vanua Levu)
navai n. sp., Fiji, (Viti Levu, Taveuni)
solodamu n. sp., Fiji (Kadavu)
***tomaniivi** n. sp., Fiji (Viti Levu)
***vuda** n. sp., Fiji (Viti Levu)

All *abaca* group species have the following characters in common and will not be repeated in the descriptions unless needing clarification:

Head: vertex and frons dark metallic blue-green, without pruinosity; frons broadly excavated with some 15–20 black hairs on lateral slope (MSSC); frons sometimes bulging dorsad of antennae, but upper face always bulging ventrad of antennae (MSSC); face and clypeus metallic blue-green and with silvery pruinosity; clypeus free from eye margin; eyes with pale setulae between facets; palp black, with black setae and often with white hairs; proboscis dark brown; antenna black; scape globular (MSSC); pedicel short, with corona of short setae and strong dorsal seta only; first flagellomere subtriangular.

Thorax: setae black; pleura brown with metallic green reflections, and with dusting of grey pruinosity; 3 pairs long ac; dc with 2 strong posterior setae and 3 weaker setae anteriad; median scutellars strong, laterals about one-third to half length of medians.

Legs: coxae, trochanters, and femora mostly black; It_1 usually slightly flattened, and with pale ventral pile; FII and FIII with short subapical av and pv setae.

Wing: hyaline but usually with brown smoky hue; M_1 approaches R_{4+5} in broad sinuous arc, but each vein joins margin separately before apex; dm-cu straight to slightly curved; CuAx ratio: 2.9; lower calypter brown with fan of black setae; halter brown.

Abdomen: metallic blue-green with wide matt brown bands around tergal overlap; white setae present along lateral terga, with longer black setae near distal tergal margins; hypopygium usually dark brown with yellowish cerci; epandrium subtriangular; hypandrial arm arising at midlength and

expanded and extending beyond hypandrial hood; 2 short epandrial setae present; epandrial lobe pedunculate with long and short seta; surstylus with suture marking joining with epandrium; surstylus with ventroapical projection, and with group of distal setae; cercus often with diagnostic setation and structure.

Female: similar to male except lack MSSC and as noted: vertex and frons metallic blue-green; frons with strong vertical seta and bare of hairs; face not bulging; scape unmodified; pedicel with both dorsal and ventral setae; first flagellomere subtriangular; arista short, slightly longer than head height, bare; 4 strong dc setae present.

Krakatauia abaca Bickel, **new species**
(Figs. 2l, 7a, 7b)

Description. **Male**: length 4.3 mm; wing 4.3 x 1.4 mm.

Head: antenna (Fig. 2l); first flagellomere subtriangular; arista dorsal, more than half body length, with lanceolate apical flag, black basally, with white tip; ventral postcranium with abundant white setae.

Thorax: dorsum metallic blue-green; pleura mostly dark brown with metallic blue-green reflections; lateral scutellars almost half length of medians.

Legs: coxae, trochanters, and femora black; TI and TII yellow, with TIII brownish; tarsomeres brown; CI with white hairs over anterior surface, and 3 black distolateral setae; CII with white anterior hairs; CIII with black lateral seta subtended by 3–4 weaker white setae; I: 5.5; 4.2; 3.9/ 1.0/ 0.7/ 0.5/ 0.4;FI with white ventral hairs; TI (Fig. 7b) with short dorsal at 1/8, long pd setae at 1/3 and 1/2, and 5–7 long weak posterior to pv setae along length (MSSC); It_1 slightly flattened, ventrally bare of normal vestiture and with pale ventral pile from base to 7/8, with posterior row of some 15 pale curved hairs along length to 7/8 (MSSC); II: 6.5; 7.4; 5.5/ 1.7/ 1.0/ 0.5/ 0.4; FII with white ventral hairs; TII with short ad seta at 1/6, short dorsal setae at 1/10 and 2/5 and 3/5, and anterior seta at 1/2; III: 7.5; 11.3; 4.6/ 2.0/ 1.4/ 0.7/ 0.4; FIII with spaced ventral long white hairs to 3/4; TIII with ad seta at 1/6, four short dorsal and three short anterior setae.

Wing: elongate; hyaline; CuAx ratio: 2.9; lower calypter brown with fan of black setae; halter brown.

Abdomen: hypopygium (Fig. 7a) mostly dark brown with yellowish cerci; cercus without basal projection, and distally forked, with outer arm lobate with strong curved blade-like seta, and inner arm with group of strong apical setae.

Female: similar to male except lack MSSC and as noted: ventral postcranium with abundant white setae; leg color similar; femora with only short white hairs; TI and It_1 unmodified; halter also brown.

Type material. Holotype ♂, FIJI: **Viti Levu**: Koroyanitu EcoPark, Batilamu Range, 0.5 km N Abaca Village, disturbed mid-elevation moist forest, [-17.667, 177.55], 800 m, 7–12 Oct 2002, Malaise trap M01, L. Tuimereke (FBA 001270); 20♂, 16♀ paratypes: same data as holotype (FBA 001248, 001254, etc.); paratypes: 1♂, same but 21 Sep–7 Oct 2002 (FBA 005386); 2♂, same but 21 Oct–18 Nov 2003 (FBA 049530, 080538); same but 1 km E Abaca Village, Savuione Trail, [-17.667, 177.55], 800 m, 26 Nov–3 Dec 2002 (FBA 049513); same but 21 Oct–18 Nov 2003 (FBA 049516, 049517, etc.); same but 5–18 Oct 2004 (FBA 502359); same but 7–12 Oct 2002 (FBA 001268); same but 21 Oct–18 Nov 2003 (FBA 005386, 049530, 080538 (FNIC).

Additional material. FIJI: **Gau**: 1♂, 4.0 km SE Navukailagi Village, Mt Delaco, [-17.98, 179.275], 496 m, 29 Jun–11 Jul 2005, Malaise trap M02, U. Racule (FBA 507809); 2♂, same but 20 Oct–2 Nov 2005 (FBA 511152, 511163). **Ovalau**: 2♂, 1♀, Levuka, 0–200 m, Dec 1970, N.L.H. Krauss (BPBM). **Vanua Levu**: 2♂, 3♀, Batiqere Range, 6 km NW Kilaka Village, lowland wet forest, [-16.807, 178.991], 98 m, 28 Jun–21 Jul 2004, Malaise

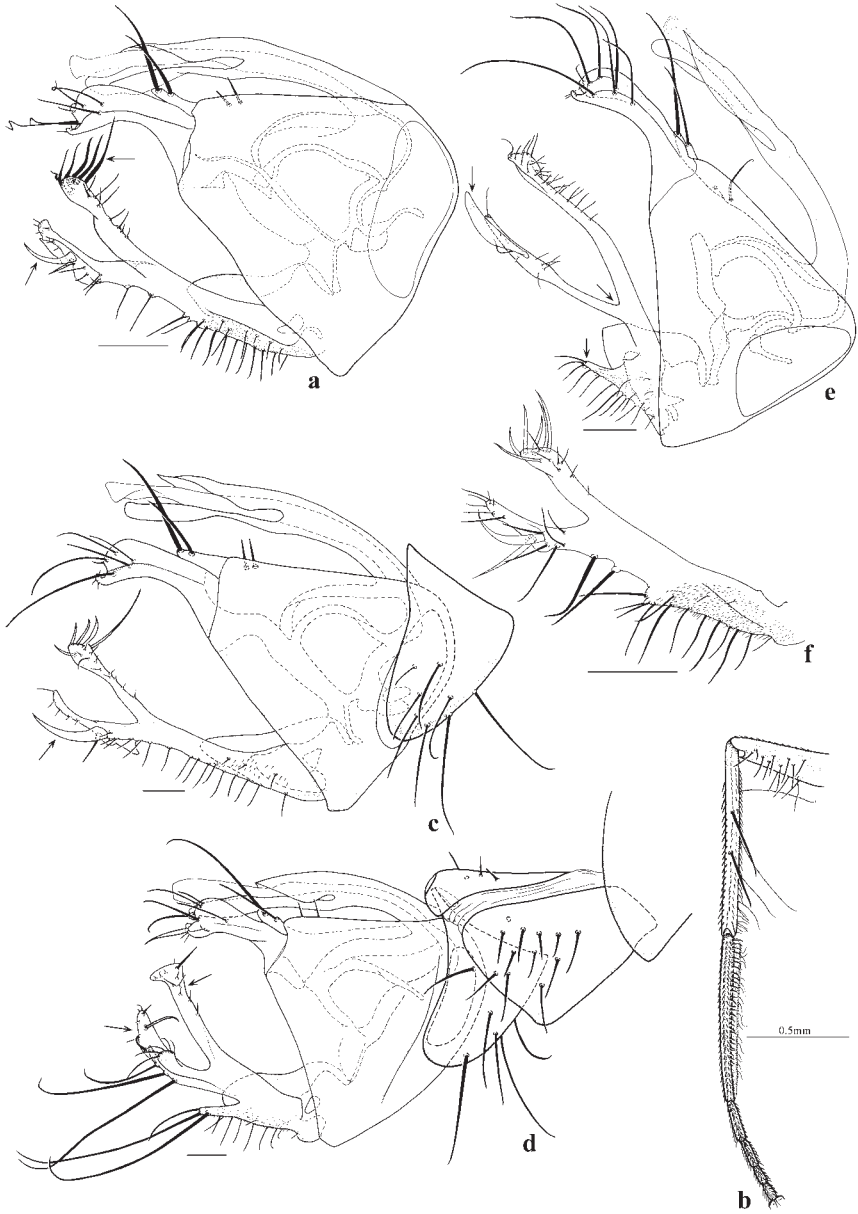

Fig. 7. *Krakatauia abaca*: **a.** hypopygium, left lateral. **b.** male leg tibia and tarsus I, posterodorsal. *K. bouma*: **c.** hypopygium, left lateral. *K. evodevo*: **d.** hypopygium, left lateral. *K. namatalaui,* **e.** hypopygium, left lateral. *K. navai*: **f.** cercus, left lateral.

trap M05, P. Manueli (FBA 142935, 142953, 142954); **Viti Levu**: 1♂, Navai, 800–900 m, 3 Oct 1971, (BPBM); 1♂, Mt Korobaba, 40–50 m, 12–13 Sep 2006, yellow pans on forested creek, D. Bickel (AMS, FNIC); Colo-i-Suva Track, Prop. Naivikinikini, 17–18 Nov 2004 M.Tokota'a (AMS, FNIC).

Remarks. *Krakatauia abaca* is widely distributed in the Fijian archipelago, is known from Viti Levu, Vanua Levu, Ovalau, and Gau, and is commonly captured in Malaise traps. It occurs in wet forests, from lowlands to 800–900 m.

This species can be separated from the closely related and sympatrically occurring *K. korobaba* (*q.v.*) by the shape of the aristal flag and the characteristic setation of male leg I (Fig. 7b).

Krakatauia korobaba Bickel, **new species**
(Fig. 2p)

Description. **Male**: length 4.3 mm; wing 4.2 x 1.4 mm; similar to *K. abaca* except:

Head: arista with narrow lanceolate apical flag, black basally, with white tip (Fig. 2p); ventral postcranium with abundant black setae (MSSC).

Legs: coxae, trochanters, and femora black; TI and TII yellow, TIII dark brown; tarsomeres brown; CI with black hairs over anterior surface and 3 black distolateral setae; CII with black anterior hairs, and CIII with black lateral seta subtended by 3–4 weaker black setae; femora with white ventral hairs; I: 5.0; 4.6; 3.2/ 1.1/ 0.7/ 0.5/ 0.4;FI with long white ventral hairs, and posterior row of black hairs along length; TI with dorsal at 1/10, short ad, longer pd and ventral setae at 1/2, with 2–3 white curved pv setae on distal eighth (MSSC); It_1 slightly flattened, ventrally bare of normal vestiture, with pale ventral pile from base to 2/3, and distally unmodified (MSSC); II: 5.6; 7.0; 5.0/ 1.5/ 0.9/ 0.5/ 0.4; FII white ventral hairs, longer basally; TII with ad seta at 1/6, dorsal at 2/5, strong anterior seta at 3/5 and strong subapical ad, ad and av setae; III: 7.3; 10.9; 4.5/ 2.1/ 1.3/ 0.7/ 0.4; FIII with spaced long white ventral hairs to 3/4;TIII with ad seta at 1/6, 4 short dorsal and anterior seta at 3/5.

Wing: elongate; hyaline with smoky wash; CuAx ratio: 2.9; lower calypter brown with fan of black setae; halter dark brown.

Abdomen: similar to that of *K. abaca*: hypopygium not figured, but similar to Fig. 8a.

Female: not clearly associated, but probably similar to female *K. abaca;* all females from Mt Korobaba collection with white ventral postcranial setae.

Types. Holotype ♂, paratypes 6♂, FIJI: **Viti Levu**: Mt Korobaba, 40–50 m, 12–13 Sep 2006, yellow pans on forested creek, D. Bickel (FNIC).

Additional material. FIJI: **Ovalau**: 1♂, Levuka, 0–200 m, Dec 1970, N.L.H. Krauss (BPBM).

Remarks. *Krakatauia korobaba* is known from southeastern Viti Levu and Ovalau, a high island off the eastern coast of Viti Levu, Fiji.

Krakatauia korobaba and the closely related *K. abaca* are regarded as sister species, and are sympatric in southeastern Viti Levu, and were collected together in yellow pans at Mt Korobaba, and both species were taken in the same Ovalau collections. Indeed, I initially thought the species were conspecific. However, while describing them, I noticed differences in the male tibia I setation, and the black vs. white ventral postcranial setae. It then became clear the two species could be separated by several distinct characters: *K. korobaba* has a narrower aristal flag, has black setae on the ventral postcranium, and lacks the long curved posterior setae on basitarsus I.

Krakatauia solodamu Bickel, **new species**
(Figs. 2q, r and 8a)

Description. **Male**: length 5.0 mm; wing: 4.5 x 1.4 mm.

Head: frons slightly bulging dorsad of antennal base; proboscis yellow; first flagellomere subtriangular with dorsoapical arista, about three-quarters length of body; arista with oval apical flag (Fig. 2q, r) with one surface black and with narrow whitish margin distally, and reverse, whitish grey and black basolaterally (MSSC); postcranium with abundant black setae near proboscis and white setae near occiput.

Legs: all coxae, trochanters, and femora dark brown to black; tibiae and basitarsi I and II yellow; TIII brownish; distal tarsomeres I and II dark brown; CI and CII with abundant white anterior hairs (possible MSSC); CIII with 2 white lateral setae; FI with white ventral setae in basal two-thirds and black ventral setae distally; FII and FIII with long white ventral setae; I: 5.5; 5.2; 3.3/1.2/ 0.8/ 0.6/ 0.5; TI with ad at 1/6 and 3/5, and posterior seta near 1/2; It_1 slightly expanded in basal third, bare of normal vestiture ventrally, and with pale ventral pile in basal third, but without posterior setae (MSSC); II: 6.5; 7.8; 5.9/1.6/ 1.2/ 0.4/ 0.3; TII with dorsals at 1/6 and 1/2, and with pd setae at 1/6 and 2/3; III: 8.0; 11.1; distal segments missing; TIII with ad seta at 1/5, anterior seta at 3/5, and 7–8 dorsal setae along length.

Wing: faint smoky brown color with only posterior margin of membrane hyaline; CuAx ratio: 2.3; lower calypter brown with fan of pale setae; halter dark brown.

Abdomen: hypopygium black with brown cerci (Fig. 8a); epandrium subtriangular; cercus without basal projection, and distally forked, with outer arm bearing strong elbowed seta near base of fork, with inner arm bearing apical setae as figured.

Female: unknown.

Types. Holotype ♂, FIJI: **Kadavu**: 0.25 km SW Solodamu Village, Moanakaka Bird Sanctuary, coastal limestone forest, [-19.078, 178.121], 60 m, 23 Oct–19 Dec 2003, Malaise trap M03, S. Lau (FBA 043985) (FNIC).

Remarks. *Krakatauia solodamu* is known only from the lowland type locality on the island of Kadavu, Fiji. The male aristal flag has one surface black with a narrow whitish margin distally, and the reverse with a whitish grey surface and black basolaterally. *Krakatauia namatalaui* also has different reverse surfaces on the arista flag.

Krakatauia bouma Bickel, **new species**
(Figs. 2m, 7c)

Description. **Male**: length 4.0 mm; wing: 3.7 x 1.3 mm.

Head: first flagellomere subtriangular with dorsoapical arista, about three-quarters length of body; aristal flag ovate (Fig. 2m), basally black with irregular white tapering apex (MSSC); ventral postcranium with abundant black setae.

Thorax: metallic green with bronze reflections; matt brown stripe dorsad of notopleuron.

Legs: all coxae, trochanters, and femora dark brown to black; tibiae and basitarsi I and II yellow; TIII brownish; distal tarsomeres I and II and all tarsus III dark brown; CI and CII with abundant black anterior hairs (MSSC); CIII with 3–4 black lateral setae; femora with long white ventral setae; I: 5.2; 4.3; 3.0/ 1.2/ 0.8/ 0.4/ 0.4; TI with ad and posterior seta near 2/5; It_1 slightly expanded at base, bare of normal vestiture ventrally, with pale ventral pile in basal third, and posterior margin with curved almost crocheted setae from base diminishing in size to midlength (MSSC); II: 5.8; 7.0; 5.5/ 1.7/ 1.2/ 0.5/ 0.3; TII with dorsals at 1/8 and 2/5, and av seta at 2/3; III: 7.5; 9.0; 4.2/ 1.7/ 1.2/ 0.4/ 0.4; TIII with ad seta at 1/5, anterior seta at 3/5, and 7–8 dorsal setae along length.

Wing: faint smoky brown color with only posterior margin of membrane hyaline; CuAx ratio: 2.4; lower calypter brown with fan of pale setae; halter brown.

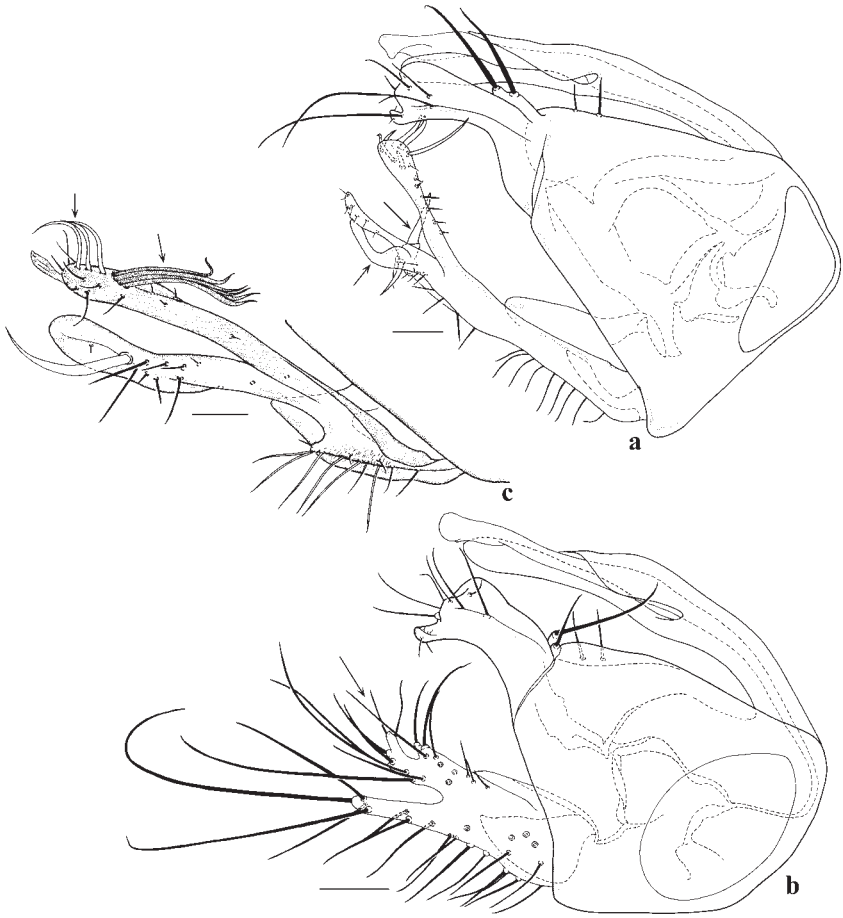

Fig. 8. *Krakatauia solodamu,* **a.** hypopygium, left lateral. *K. sigatoka,* **b.** hypopygium, left lateral. *K. auribarba,* **c.** hypopygium, left lateral.

Abdomen: hypopygium black with brown cerci (Fig. 7c); cercus distally forked, with outer arm bearing strong tapering claw-like setae arising near base of fork, and with inner arm clavate and bearing long apical inward directed seta, with other setae as figured.

Female: similar to male except: first flagellomere subrectangular, rounded; ventral postcranium with abundant white setae; coxae I and II with abundant pale anterior hairs, not black; leg color similar but FI and FII with distal third yellow; TIII yellow; wing not as strongly clouded, more hyaline; halter also black.

Types. FIJI: **Taveuni**: Holotype ♂ (BPBM 16,814), paratypes 1♂, 1♀, Bouma (as "Mbouma"), 0–50 m, 25 Jan 1972, N.L.H. Krauss (BPBM).

Additional material. FIJI: **Vanua Levu**: 1♂, 2♀, 4 km SE Lomaloma Village, Vatudiri,

disturbed mid-elevation moist forest, [-16.63, 179.208], 630 m, 26 Mar 2006, hand collection: H01, A. Raikabula (FBA 522352, 522354, 522355); 1♂, Batiqere Range, 6 km NW Kilaka Village, lowland wet forest, [-16.815, 178.986], 146 m, 28 Jun–21 Jul 2004, Malaise trap M02, P. Manueli (FBA 077247). **Taveuni**: 1♂, 1♀, Tavuki Village, Mt Devo, montane wet forest, [-16.831, -179.98], 734 m, 23 Oct–15 Nov 2004, Malaise trap M05, P. Vodo (FBA 502221, 502217).

Remarks. *Krakatauia bouma* is known from lowland Taveuni and nearby Vanua Levu. There is some slight intraspecific variation in the extent of white coloration on the aristal flag. *K. bouma* is close in genitalic structure to *K. solodamu* from Kadavu.

Krakatauia navai Bickel, **new species**
(Figs. 2o, 7f)

Description. **Male**: length 4.6 mm; wing: 4.3 x 1.5 mm.

Head: first flagellomere subtriangular with dorsoapical arista, about three-quarters length of body; aristal flag (Fig. 2o) tiny, lanceolate, black with white apex; ventral postcranium with abundant black setae (MSSC).

Thorax: metallic green with bronze reflections; matt brown stripe dorsad of notopleuron.

Legs: all coxae, trochanters, and femora dark brown to black, but with yellow knees on FI and FII; tibiae and basitarsi I and II yellow; TIII brownish; distal tarsomeres I and II and all tarsus III dark brown; CI and CII with abundant black anterior hairs (MSSC); CIII with 3–4 black lateral setae; all femora with white ventral hairs; I: 5.0; 4.5; 3.0/ 1.0/ 0.7/ 0.4/ 0.4; TI with short dorsal at 1/6, longer dorsal at 1/2, and pv seta at 1/3 and 1/2; It_1 slightly expanded at base, with narrow band of yellowish pile along length to 4/5 (MSSC), without posterior crocheted setae; II: 5.7; 6.9; 5.0/ 1.6/ 1.0/ 0.5/ 0.3; TII with offset ad-pd setae at 1/6, pd at 2/5, ad near 2/3, and ventral at 1/2; III: 7.5; 10.2; 4.2/ 2.0/ 1.2/ 0.6/ 0.4; TIII with ad seta at 1/5, anterior seta at 3/5, and 7–8 dorsal setae along length.

Wing: faint smoky brown color with only posterior margin of membrane hyaline; CuAx ratio: 2.7; lower calypter brown with fan of pale setae; halter brown.

Abdomen: hypopygium black with brown cerci; cercus (Fig. 7f) with small basal projection, and distally forked, with outer arm bearing strong tapering claw like setae, and inner arm bearing apical setae.

Female: similar to male except: ventral postcranium with abundant white setae; 5 strong dc; coxae I and II with abundant pale anterior hairs, not black; leg color similar; It_1 unmodified; wing more hyaline; halter also black.

Types. Holotype ♂, FIJI: **Viti Levu**: 0.75 km E Navai Village, old trail to Mt Tomaniivi (Victoria), gymnosperm dominated rainforest, [-17.621, 177.989], 700 m, 6 Nov–13 Dec 2004, Malaise trap M05, E. Namatalau (FBA 532187); paratypes 3♂, 3♀, [-17.583, 178.083], 1034 m, 17–20 Nov 2003, Malaise trap M01, PABITRA Wabu Baseline Survey, Veikori & Claridge (FBA 053051); 3.2 km E Navai Village, Veilaselase Track, gymnosperm dominated rainforest, [-17.624, 178.009], 1020 m, 30 Aug–23 Sep 2004, 23 Sep–18 Oct 2004, Malaise trap M02, E. Namatalau; FBA 502426, 502430, 502440); 2 km E Navai Village, old trail to Mt Tomaniivi (Victoria), gymnosperm dominated rainforest, [-17.621, 178], 700 m, 14 May–4 Jun 2004, 23 Sep–18 Oct 2004, Malaise trap M03, E. Namatalau (FBA 504538)

Additional material. FIJI: **Taveuni**: 1♂, 1♀, 5.3 km SE Tavuki Village, Mt Devo, montane wet forest, [-16.841, -179.968], 1064 m, 31 Oct–14 Nov 2002, Malaise trap M03, P. Vodo (FBA 522413, 522414).

Remarks. *Krakatauia navai* is known from high elevation rainforest on both Viti Levu (700–1030 m) and Taveuni (1064 m). This species is close to both *K. solodamu* from Kadavu, and *K. bouma* from lowland Taveuni and nearby Vanua Levu.

Krakatauia auribarba Bickel, **new species**
(Fig. 8c)

Description. **Male**: length 5.7 mm; wing: 5.6 x 1.7 mm.

Head: proboscis yellow; first flagellomere with arista originating dorsoapically; arista missing on specimen; ventral postcranium with abundant golden yellow setae.

Thorax: metallic green with bronze reflections; matt brown stripe dorsad of notopleuron.

Legs: all coxae and trochanters black; FI black except apex yellowish; tibia and basitarsus I yellow and distal tarsomeres yellowish; legs II and III missing; CI and CII with yellow anterior hairs and setae, becoming denser and stronger distally; CIII with group of long yellowish setae; I: 6.9; 8.0; 2.8/1.2/ 0.8/ 0.6/ 0.5; FI with some long pale yellow hairs along length; TI with short ad setae at 1/8 and 1/2, and posterior row of 16–20 long slightly curved brownish hair-like setae along length (MSSC); It_1 very slightly flattened and ventrally bare of normal vestiture, but covered with fine white pile (MSSC); distal tarsomeres unmodified.

Wing: with a smoky brown wash; CuAx ratio: 3.3; lower calypter brown with fan of long black setae.

Abdomen: hypopygium dark brown with yellowish cerci; cercus (Fig. 8c) with short basal projection, and forked with two arms diverging at 2/3, with outer arm bearing strong pale seta, with inner arm bearing apical blade like seta and group of 3 curved subapical setae, and group of 6 long basally directed setae as figured.

Female: unknown.

Types. Holotype ♂, FIJI: **Taveuni**: 5.6 km SE Tavuki Village, Devo Peak, cloud forest, [-16.843, -179.966], 1187 m, 21 Nov–13 Dec 2002, Malaise trap M01, E. Ratu (FBA 149963) (FNIC).

Remarks. *Krakatauia auribarba* is known only from cloud forest in the high elevation Devo Peak on Taveuni. The unique specimen is damaged, without an arista (hence the presence of an aristal flag is unknown) and lacking both legs II and III. However, the golden setae on the ventral postcranium and coxae I and II are unique, and the cercus is diagnostic, so it is worth describing.

Etymology. The specific epithet *auribarba* is from the Latin, meaning "golden beard", referring to the gold colored setae on the ventral postcranium.

Krakatauia bisignata Bickel, **new species**
(Fig. 2x)

Description. **Male**: length 4.9 mm; wing: 4.7 x 1.5 mm.

Head: proboscis yellowish; pedicel with dorsal seta; first flagellomere short subtriangular with dorsoapical arista; arista about half body length, with black slightly asymmetrical obovate apical flag, with white, half ovate vane perpendicular to this (Fig. 2x) (MSSC); ventral postcranium with abundant white setae.

Thorax: metallic blue-green.

Legs: coxae, trochanters and femora black; all tibiae and basitarsus I and II yellow; distal tarsomeres I and II and tarsus III yellowish to brownish; CI and CII with white anterior hairs and setae, with a few black setae; CIII with white lateral seta and additional long white hairs; all femora with white ventral hairs; I: 6.3; 7.5; 2.1; 2.8/0.8/ 0.6/ 0.4/ 0.4; TI without major setae, but with short dorsal at short dorsal at 2/5, and 3 long curved posterior setae along distal third (MSSC); It_1 relatively short, slightly curved, slightly flattened and ventrally covered with fine white pile (MSSC); II: 6.3; 8.9; 6.1/1.8/ 1.1/ 0.6/0.5; TII with pd at 1/8, dorsal at 1/3, ventral at 2/5, av setae at 3/5, and strong subapical ad, pd, av and pv setae; III: 7.5; 12.0; 5.1/ 2.2/ 1.4/ 0.6/ 0.4; TIII with strong ad seta at 1/5, row of 6–7 dorsal setae along length, 3 weaker anterior setae along distal half, and strong anterior and posterior apical setae.

Wing: anterior smoky brown, but posterior margin hyaline; CuAx ratio: 3.1; lower calypter brown with fan of black setae.

Abdomen: hypopygium black with yellowish cerci (not figured); cercus similar to Fig. 8e.

Female: similar to male except: leg color similar; TI with short dorsals at 1/8, 1/3, and 1/2, ventral at 1/2 and 4/5, without curved posterior setae; It_1 unmodified, and longer than distal tarsomeres combined; TII with very strong ad at 1/8, weaker pd just basad, dorsal at 2/5, anterior at 3/5, and short ventral setae at 2/5 and 2/3; and strong subapical ad, av, and pv setae; TIII strong ad at 1/6, anterior at 3/5, and 4–5 dorsal setae with stronger dorsal at 2/3; $IIIt_1$ with curved ventral seta at base; wing hyaline; halter also brown.

Types. Holotype ♂, paratype ♀, FIJI: **Vanua Levu**: 4 km SE Lomaloma Village, Vatudiri, [-16.63, 179.208], 587 m, 26 Jan–7 Feb 2006, Malaise trap M03, N. Qarau (holotype FBA 522382; paratype FBA 522381) (FNIC).

Remarks. *Krakatauia bisignata* is known from Vanua Levu. The aristal flag of this species is unusual in being 3-dimensional, with a white vane perpendicular to the black flag base, while all species have aristal flags that are two-dimensional and planar. Also of note, the male basitarsus I is unusually short, shorter that the following tarsomere.

Etymology. The specific epithet *bisignata* is from the Latin and refers to the "two signals" on the aristal flag.

Krakatauia hurleyi Bickel, **new species**
(Fig. 2y)

Description. **Male**: length (not given, abdomen missing); wing: 4.3 x 1.5 mm.

Head: proboscis brown; aristal flag black, asymmetrical ovate with bent white tip (MSSC) (Fig. 2y); ventral postcranium with abundant black setae.

Thorax: dorsum metallic blue-green; pleura dark brown with metallic blue-green reflections.

Legs: coxae, trochanters and femora dark brown; very apices of FI and FII, tibiae and tarsi I and II yellow; tibia and tarsus III brownish; CI and CII with black anterior hairs and setae; CIII with group of long black setae; all femora with white ventral hairs; I: 4.7; 4.1; 3.2/ 0.9/ 0.7/ 0.5/ 0.4; TI with pd seta and longer pv seta at 2/5, dorsal seta at 1/8, followed distally by row of 8 short spaced setulae, with some short weak pv setae along distal third and 2 long curved subapical pv (MSSC); It_1 longer than distal tarsomeres combined, ventrally covered with fine white pile (MSSC), and short pale curved pv hairs along basal two-thirds of tarsomere (MSSC); II: 5.5; 6.6; 5.0/1.3/ 1.0/ 0.4/ 0.4; TII with short ad-pd pair near 1/8, dorsal at 1/3, ventral at 2/5, anterior at 1/2, and strong subapical ad, pd, av and pv setae; III: 6.8; 10.3; 4.2/ 1.7/ 1.3/ 0.8/ 0.3; TIII with strong ad seta at 1/5, row of 6–7 dorsal setae along length, and anterior seta at 3/5, with strong anterior and posterior apical setae.

Wing: mostly hyaline but with smoky infuscation anteriorly; CuAx ratio: 2.3; lower calypter brown with fan of black setae.

Abdomen: missing from unique specimen.

Types. Holotype ♂ (BPBM 16,815), FIJI: **Vanua Levu**: 42.9 km SW of Nabalebale, 13 Jun 1988, R. Hurley (deposited BPBM).

Remarks. *Krakatauia hurleyi* is known only from the type locality on Vanua Levu. Although the single male is missing its abdomen, I here describe it based on as the many diagnostic characters associated with the legs and the male aristal flag.

Etymology. This species is named for the collector of the holotype, the dolichopodid specialist Richard Hurley.

Krakatauia evodevo Bickel, **new species**
(Figs. 2n, 7d)

Description. **Male**: length 4.4 mm; wing 4.5 x 1.4 mm.

Head: arista dorsoapical with lanceolate apical flag, black basally, with white tip (Fig. 2n); ventral postcranium with black setae.

Thorax: dorsum metallic blue-green; pleura most dark brown with metallic blue-green reflections.

Legs: coxae, and remainder of legs dark brown to black; CI and CII with black setae and brown hairs over anterior surface, CIII with group of 4 brownish lateral setae; I: 5.0; 4.4; 3.2/ 1.2/ 0.6/ 0.4/ 0.4; FI with long black setae on ventral surface, and pv row of white hairs; TI with row of some 30–35 short pv setae along length (MSSC); It_1 slightly flattened with ventral tuft of white pile in basal eighth (MSSC); $It_{2–3}$ with ventral row of fine erect hairs (MSSC); II: 6.0; 6.5; 5.2/ 1.5/ 0.8/ 0.4/ 0.3; FII with white ventral hairs; TII with ad seta at 1/5, pd at 1/3, with short av setae at 1/2, 2/3, and 3/4,and strong subapical ad, av, and pd setae; III: 7.2; 9.8; 3.9/ 1.6/ 0.9/ 0.8/ 0.4; FIII long white ventral hairs; TIII with 4 dorsal and 3 short anterior setae and ad seta at 1/5.

Wing: with dark brown clouding that cover most of wing but with posterior margins external to CuA_1, and R_4 hyaline; CuAx ratio: 2.3; lower calypter brown with fan of black setae; halter dark brown.

Abdomen: hypopygium (Fig. 7d) mostly dark brown with brown cerci; surstylus tapering with group of distal setae and strong median seta; cercus with short basal projection with long apical seta, and distally forked, with outer arm lobate with some long external setae, subtended by shorter lobe bearing apical setae, inner arm clavate with apical seta.

Female: unknown.

Types. Holotype ♂, FIJI: **Taveuni**: 5.3 km SE Tavuki Village, Mt Devo, montane wet forest, [-16.841, -179.968], 1064 m, 2–10 Oct 2002, Malaise trap M03, P. Vodo (FBA 108192); paratype ♂, same but, Tavuki Village, Mt Devo, montane wet forest, [-16.831, -179.98], 734 m, 7–23 Oct 2004, Malaise trap M05, P. Vodo (FBA 503761).

Remarks. *Krakatauia evodevo* is only known from elevations above 700 m in wet forest surrounding Mt Devo, Taveuni.

Etymology. The specific epithet *evodevo* is a noun in apposition with two derivations, one based on *Ev* Schlinger who liked to collect on Mt *Devo*, and *evodevo* as an abbreviation for "evolutionary development," in reference to the wide range of aristal flags (Fig. 2) that have evolved in Fijian *Krakatauia*.

Krakatauia namatalaui Bickel, **new species**
(Figs. 2s–t, 7e)

Description. **Male**: length 5.9–6.1 mm; wing: 5.6 x 2.1 mm.

Head: proboscis yellow; antenna black; arista apical, almost as long as body, with expanded ovate apical flag, black on one side, and white with black tip on reverse side (Figs. 2s–t) (MSSC); ventral postcranium with white setae.

Thorax: mostly metallic green with bronze reflections, with some grey pruinosity on pleura; matt brown stripe dorsad of notopleuron.

Legs: coxae, trochanters, and femora black, but with very apex of FI and FII yellowish; tibiae mostly yellow, but very base of all tibiae black on dorsal surface only; TIII becoming dark brown on distal third; basitarsi I and II yellow, but distal tarsomeres brown; tarsus III black; CI and CII each with abundant white anterior hairs, and 3–4 black distal setae; CIII with 3 white lateral setae and additional long white hairs; all femora with long white ventral hairs; I: 6.8; 6.5; 3.5/ 1.3/ 1.0/ 0.7/ 0.6;

TI with short dorsal setae at 1/8, 1/4, and 1/2, ventral setae at 2/5 and 3/5, with 3–5 slender curved posterior setae along distal third (MSSC); It_1 not distinctly flattened, but ventrally with fine white pile along entire length (MSSC); II: 7.5; 9.0; 7.2/2.0/ 1.7/ 0.7/0.5; TII with anterior setae at 2/5 and 2/3, pd setae at 1/8 and 1/3, and strong subapical anterior, ventral, pv and dorsal setae; III: 8.5; 12.8; 5.9/ 2.5/ 1.7/ 0.9/ 0.6; TIII with ad seta at 1/5, short anterior setae at 1/2, and dorsal setae at 2/5 and 2/3; $IIIt_1$ with strong curved ventral seta at base.

Wing: hyaline but with brownish clouding in membrane surrounding major veins; cell c slightly bulging anteriorly; CuAx ratio: 2.7; lower calypter dark brown with fan of white setae.

Abdomen: hypopygium (Fig. 7e) dark brown with yellowish cercus; surstylus lobate with dorsal digitiform projection and with 6–7 strong ventral seta as figured; cercus with short basal projection, and with deep distal fork separating two narrow arms, with outer arm bearing large lateral lobate seta, and inner arm with short setae as figured.

Female: unknown.

Types. Holotype ♂, FIJI: **Viti Levu**: 0.75 km E Navai Village, old trail to Mt Tomaniivi (Victoria), gymnosperm dominated rainforest, [-17.621, 177.989], 700 m, 6 Nov–13 Dec 2004, Malaise trap M05, E. Namatalau (FBA 532186); paratypes 2♂, 3.2 km E Navai Village, Veilaselase Track, gymnosperm dominated rainforest, [-17.624, 178.009], 1020 m, 6 Nov–28 Dec 2004, Malaise trap M02, E. Namatalau (FBA 502418), 1.8 km E Navai Village, old trail to Mt Tomaniivi (Victoria), gymnosperm dominated rainforest, [-17.621, 177.998], 700 m, 23 Sep–1 Oct 2004, Malaise trap M04, E. Namatalau (FBA 504535).

Remarks. *Krakatauia namatalaui* is known from 700–1020 m, in rainforest near Mt Tomaniivi, Viti Levu. Males have the very base of all tibiae dorsally black, an unusual pattern in the Sciapodinae.

Etymology. This species is named in honour of Eliki Namatalau, who tended the traps that collected all the specimens.

Krakatauia tomaniivi Bickel, **new species**
(Fig. 2z)

Description. **Male**: length 5.5 mm; wing: 5.4 x 1.8 mm.

Head: scape swollen and vaselike (MSSC); pedicel with strong dorsal seta; arista dorsoapical, about two-thirds body length, with ovate apical flag (Fig. 2z) which is mostly white at the base with distal black lobe; ventral postcranium with pale yellow setae.

Thorax: metallic blue-green with bronze reflections.

Legs: coxae, trochanters and femora black, except apices FI and FII yellow; all tibiae and basitarsi I and II yellow; basitarsus III brownish; distal tarsomeres brown; CI and CII with white anterior hairs and setae; CIII with group of white lateral setae; all femora with white ventral hairs; I: 5.6; 7.2; 2.3/1.1./ 0.7/ 0.4/ 0.4; TI with 3 curved brown posterior setae, at 2/3, 3/4 (both long) and subapically (shorter) (MSSC); It_1 short, less than length of distal tarsomeres combined, slightly expanded and ventrally covered with fine white pile (MSSC); II: 6.5; 8.2; 6.0/2.0/ 1.4/ 0.6/0.5; TII with ad-pd setal pair near 1/8, dorsal at 1/3, anterior at 3/5, and strong subapical anterior, ventral, pv and dorsal setae; III: 8.0; 12.1; 5.5/ 2.5/ 1.7/ 0.8/ 0.6; TIII with ad at 1/5, anterior seta at 3/5 and 6 dorsal setae along length.

Wing: hyaline; CuAx ratio: 3.0; lower calypter brown with fan of black setae.

Abdomen: hypopygium dark brown with brownish cerci (not figured, but similar to Fig. 8e for *K. namatalaui*) cercus also deeply cleft, but cercus without short basal digitiform projection.

Female: unknown.

Types. Holotype ♂, FIJI: **Viti Levu**: 0.75 km E Navai Village, old trail to Mt Tomaniivi (Victoria), gymnosperm dominated rainforest, [-17.621, 177.989], 700 m, 22 Jan–3 Feb 2005, Malaise trap M05, E. Namatalau (FBA 508208) (FNIC).

Remarks. *Krakatauia tomaniivi* is known only from the type locality east of Navai near Mt Tomaniivi. In addition to the distinctive apical flag, males also have 3 posterior setae on tibia I and a relatively short basitarsus I.

Krakatauia vuda Bickel, **new species**
(Fig. 2v)

Description. **Male**: length 4.9 mm; wing: 5.1 x 1.7 mm.

Head: scape swollen and vase-like (MSSC); pedicel with strong dorsal seta; first flagellomere short subtriangular; arista dorsoapical, about two-thirds body length, with ovate apical flag (Fig. 2v) which is white in the basal fifth and black distally; ventral postcranium with white setae.

Thorax: metallic green with bronze reflections; matt brown stripe dorsad of notopleuron.

Legs: coxae, trochanters and femora black, except apices FI and FII yellow; tibia and basitarsus I and II yellow; basitarsus III brownish; distal tarsomeres brown; CI and CII with white anterior hairs and setae; CIII with group of white lateral setae; all femora with white ventral hairs; I: 6.5; 6.8; 3.8/1.2/ 0.8/ 0.6/ 0.4; TI with dorsal seta at 2/5, ad seta at 1/8, followed distally by row of 8 short spaced setulae, with some 3–4 long but weak and curved pv hairs along distal half (MSSC), and distal two-thirds of anterior to av surface covered with fine golden vestiture; It_1 longer than distal tarsomeres combined, ventrally covered with fine white pile (MSSC), with short pale curved pv hairs along basal 2/3 (MSSC); II: 7.2; 9.5; 7.0/2.1/ 1.5/ 0.7/0.5; TII with ad-pd setal pair near 1/8, dorsal at 2/5 and ventral at 1/2, and strong subapical anterior, ventral, pv and dorsal setae; III: 9.5; 13.2; 5.7/ 2.5/ 1.8/ 1.0/ 0.5; TIII with ad at 1/5, strong pd at 1/6, 8 dorsal seta along distal two-thirds, anterior setae at 1/3 and 3/ 5; $IIIt_1$ with strong curved ventral seta at base, and 6 short ventral setae along length.

Wing: hyaline; CuAx ratio: 2.9; lower calypter brown with fan of black setae.

Abdomen: hypopygium dark brown with brownish cerci (not figured); similar to Fig. 8f for *K. namatalaui*, cercus also deeply cleft, but cercus without short basal digitiform projection.

Female: unknown.

Types. Holotype ♂, FIJI: **Viti Levu**: Koroyanitu EcoPark, Batilamu Range, 1 km E Abaca Village, Savuione Trail, disturbed mid-elevation moist forest, [-17.667, 177.55], 800 m, 19–26 Oct 2002, Malaise trap M01, L. Tuimereke (FBA 088665).

Remarks. *Krakatauia vuda* is known only from the Batilamu Range in western Viti Levu.

Krakatauia natewa Bickel, **new species**
(Fig. 2u)

Description. **Male**: length 4.4–4.5 mm; wing: 4.5 x 1.7 mm.

Head: arista dorsoapical, about two-thirds body length, with blunt ovate apical flag, white but with black margins at very base (Fig. 2u); ventral postcranium with white setae.

Thorax: dark metallic blue-green; with areas of dark brown cuticle on pleura.

Legs: coxae, trochanters and femora dark brown; tibia yellow except very base and apex dark brown; tarsi I and III mostly brown; basitarsus II yellow but becoming brown in distal quarter with remainder of tarsus II brown; CI and CII with white anterior hairs and setae; CIII with group of 5–6 white lateral setae; all femora with white ventral hairs, not differentiated into distinct rows; I: 6.0; 6.5; 3.6/1.3/ 0.6/ 0.6/ 0.4; TI with dorsal seta at 2/5, short ad seta at 1/8, followed distally by ad row of 15 short spaced setulae (MSSC); It_1 ventrally with fine white pile (MSSC); II: 7.0; 8.5; 6.2/1.9/ 1.3/ 0.6/0.5; TII with ad-pd setal pair near 1/8, dorsal at 2/5 and ventral at 1/2, and strong subapical anterior, ventral, pv and dorsal setae; III: 8.0; 11.3; 5.0/2.2/ 1.4/ 0.7/0.5; TIII with ad at 1/5, strong pd at 1/6, 8 dorsal seta along distal 2/3, anterior setae at 2/5, 2/3 and 4/ 5; $IIIt_1$ with strong curved ventral seta at base.

Wing: with smoky brown clouding over most of wing, but darker anteriorly, and with only posterior margin of wing hyaline; cell c somewhat bulging anteriorly (MSSC); CuAx ratio: 2.8; lower calypter brown with fan of black setae; halter brown.

Abdomen: hypopygium dark brown with brownish cerci (not figured); similar to Fig. 8f (for *K. namatalaui*), cercus also deeply cleft, and with short basal digitiform projection, and outer arm also bearing lobate seta.

Female: similar to male except lack MSSC and as noted: femora with only short white hairs; TI with similar setae but with additional ventral setae at 2/5 and 7/8; It_1 unmodified; TII with ad-pd pair at 1/5, ad seta much stronger, anterior setae at 1/2 and 3/4, pd seta at 1/2, some short ventrals, and strong subapical ad, av, and pv setae; TIII strong ad at 1/6, anterior at 3/5, and 4–5 dorsal setae with stronger dorsal at 2/3; $IIIt_1$ also with strong curved ventral seta at base; wing hyaline; costal cell not enlarged; halter brown.

Types. Holotype ♂, paratype ♀, FIJI: **Vanua Levu**: Natewa Peninsula, 2.6 km SSE Vusasivo Village, Mt Navatadoi, lowland wet forest, [-16.593, 179.772], 400 m, 9–23 Jun 2005, Malaise trap M01, L. Waqa (Holotype FBA 507857; paratype FBA 507858) (FNIC); paratypes, 3♂, 1♀, 4 km SE Lomaloma Village, [-16.63, 179.208], 630 m, 26 Jan–7 Feb 2006, Malaise trap M02, N. Qarau (FBA 522343-44); 2♀, [-16.63, 179.208], 587 m, 7–18 Feb 2006, Malaise trap, M03, N. Qarau (FBA 522346, 522348) (FNIC).

Remarks. *Krakatauia natewa* is known from wet forest at low elevations on the Natewa Peninsula, Vanua Levu.

RELATIONSHIPS AND BIOGEOGRAPHY OF *KRAKATAUIA* IN THE SOUTHWEST PACIFIC

The biogeography and distribution of the southwest Pacific *Krakatauia* is summarized in Table 1.

This revision focuses primarily on the fauna of Fiji and Vanuatu, with additional species described from the Solomon Islands and Tonga/ Niue. Fiji has been the subject of an intensive faunal survey, with continuous Malaise trapping at both upland and lowland sites throughout the archipelago (Evenhuis & Bickel, 2005). The upland sites (higher than 600 m) harbour many local endemics and as a result, Fiji has the greatest species richness for this genus. However, there can be little doubt that *Krakatauia* would be as rich or richer in island groups further west. The five new species described from Vanuatu were all collected at lowland sites, and there is little material from uplands sites, especially on large islands like Malakula and Espiritu Santo. The Solomon Islands also would have an enormous uncollected/undescribed sciapodine diversity based on what I have seen in collections, again largely from lowland sites (and the Solomons reach elevations greater than 2000 m). Tonga, Niue and the Fijian Lau Group mark the easternmost limit of the genus. *Krakatauia* is unknown in nearby New Caledonia, an island which hosts a rich autochthonous sciapodine fauna with Gondwanan rather than tropical Australasian affinities (Bickel, 2002).

Sister species or species assemblages with shared synapomorphies are noted in the text, but I make no excuse for not providing a detailed phylogenetic analysis of all species treated here. To begin with, *Krakatauia* species are defined by a mosaic of male characters (aristal flags, details of leg I setation, setation of frons, structure of the cercus, etc.), many of which are highly plastic in expression and without evident polarities. Also, describing the large number of new taxa is a much more productive use of time than attempting to obtain a meaningful cladogram from a mass of equivocal data.

The following points summarize the biogeographical patterns evident in the southwest Pacific *Krakatauia*:

Table 1. Distribution and Site Occurrence of Southwest Pacific *Krakatauia*

Krakatauia taxa	Solomon Is	Vanuatu	Fiji	Polynesia	Extralimital areas	# sites
***abaca* group**						
abaca			Vl, Vn, Ga, Ov			8
auribarba			Tv			1
bisignata			Vl			1
bouma			Tv, Vn			4
evodevo			Tv			2
hurleyi			Vn			1
korobaba			Vl, Ov			2
namatalaui			Vl			3
natewa			Vn			2
navai			Vl, Tv			6
solodamu			Kv			1
tomaniivi			Vl			1
vuda			Vl			1
***alanae* group**						
lamiensis			Vl			2
luctosa			Vl, Vn			11
moanakaka			Kv, Vl			3
***evulgata* group**						
evulgata	widespread	widespread			Australasia, Micronesia	many
hutuna	Rennell					1
micronesiana					Micronesia	many
ounua		Ma, Es,				3
tanna		Ma, Es, Tn, Ep, Er				10
***malakula* group**						
cheesmanae		Ma ,Es, Am, An, Ep,Tn				15
epiensis		Ep				2
graciosa	Santa Cruz					1
malakula		Ma				4
sigatoka			Vl, Vn			2
***nupta* group**						
cicia			Lau Gp.			1
nupta			Vl Vn Kv Tv Ys			16
planticorum				Tonga, Niue		3

Island Abbreviations. **Fiji:** Ga, Gau; Kv, Kadavu; Ov, Ovalau; Tv, Taveuni; Vl, Viti Levu; Vn, Vanua Levu; Ys, Yasawa Group. **Vanuatu:** Am, Ambrym; An, Anatom; Ep, Epi; Es, Espiritu Santo; Ma, Malakula; Tn, Tanna.

1. The *alanae* group is defined by strong unique synapomorphies and comprises three species from Fiji and two from eastern Australia. I have not seen species from western Melanesia, although this region is poorly collected. This Fiji and eastern Australia disjunction therefore stands in the strongest monophyletic group in *Krakatauia*.
2. The *evulgata* group is diverse in the western Pacific, and includes a number of lowland tramp species. The single new species from the Solomon Islands and the two new Vanuatu species are clearly within this group.
3. The *nupta* group is undoubtedly derived from the *evulgata* group at the easternmost limit of *Krakatauia* in Fiji, the Lau Group, Tonga, and Niue, and both groups share a preference for lowland and coastal habitats. However, the *nupta* group share a number of synapomorphies and is monophyletic.
4. The *malakula* group is a poorly defined assemblage that includes five newly described species from Vanuatu, the Solomons, and Fiji. *Krakatauia cheesmanae* from Vanuatu and *K. graciosa* from the Solomon Islands are sister species.
5. The *abaca* group comprises a large radiation within the Fijian Archipelago, especially in upland forests on the main islands, with 13 newly described species. This group shows a wide range of male aristal flags and leg I setation. Although most species are localized

endemics, some occur in the upland forest of several high islands, for example, *K. abaca, K. bouma, K. korobaba,* and *K. navai.*

Upon completion of the taxonomic description of the Fijian Sciapodinae (some 100 species), the entire Fijian fauna will be subject to a more comprehensive landscape ecology analysis, to determined centres of richness, endemicity and species diversity. However, for now, it should be noted that over half of the species described here are from a single collecting site or a group of nearby sites. This suggests much local endemicity, and therefore more species awaiting collections from new locations.

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