

NUMBER 94, 40 pages

7 September 2007

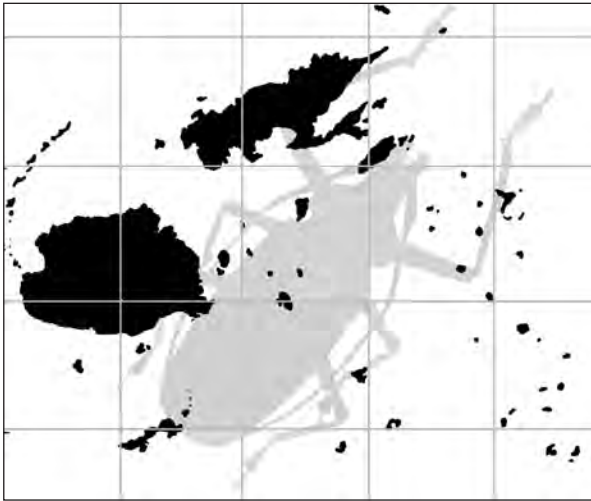
BISHOP MUSEUM OCCASIONAL PAPERS

FIJI ARTHROPODS IX

NEAL L. EVENHUIS

AND

DANIEL J. BICKEL, EDITORS



9



BISHOP MUSEUM PRESS
HONOLULU

RESEARCH PUBLICATIONS OF BISHOP MUSEUM

Bishop Museum Press has been publishing scholarly books on the natural and cultural history of Hawai'i and the Pacific since 1892. The Bernice P. Bishop Museum Bulletin series (ISSN 0005-9439) was begun in 1922 as a series of monographs presenting the results of research in many scientific fields throughout the Pacific. In 1987, the *Bulletin* series was superseded by the Museum's five current monographic series, issued irregularly:

Bishop Museum Bulletins in Anthropology	(ISSN 0893-3111)
Bishop Museum Bulletins in Botany	(ISSN 0893-3138)
Bishop Museum Bulletins in Entomology	(ISSN 0893-3146)
Bishop Museum Bulletins in Zoology	(ISSN 0893-312X)
Bishop Museum Bulletins in Cultural and Environmental Studies	(ISSN 1548-9620)

Bishop Museum Press also publishes *Bishop Museum Occasional Papers* (ISSN 0893-1348), a series of short papers describing original research in the natural and cultural sciences.

To subscribe to any of the above series, or to purchase individual publications, please write to: Bishop Museum Press, 1525 Bernice Street, Honolulu, Hawai'i 96817-2704, USA. Phone: (808) 848-4135. Email: press@bishopmuseum.org. Institutional libraries interested in exchanging publications may also contact the Bishop Museum Press for more information.

ISSN 0893-1348
Copyright © 2007 by Bishop Museum



BISHOP MUSEUM

The State Museum of Natural and Cultural History
1525 Bernice Street
Honolulu, Hawai'i 96817-2704, USA

FIJI ARTHROPODS IX

Editors' Preface

We are pleased to present the ninth 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 Sciaridae (Diptera—Evenhuis, Sarnat & Tokota’a), Scelionidae (Hymenoptera—Masner & Johnson), crickets (Orthoptera: Grylloidea—Otte), and Pseudococcidae (Hemiptera—Hardy). Manuscripts are currently in press or in preparation on Auchenorrhyncha, 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:

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

We encourage interested authors to contact us before submitting papers.

—Neal L. Evenhuis, Co-editor, neale@bishopmuseum.org
Daniel J. Bickel, Co-editor, dan.bickel@austmus.gov.au

A New Genus and Species of Sciarid Ant Guest from Fiji (Diptera: Sciaridae) with an Annotated Checklist of Fiji Sciarids^{1, 2}

NEAL L. EVENHUIS

*Pacific Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, Hawai'i
96817-2704, USA; email: neale@bishopmuseum.org*

ELI SARNAT

*Department of Entomology, University of California, One Shields Avenue, Davis,
California 95616, USA*

MOALA TOKOTA'A

Wildlife Conservation Society, 11 Ma'afu Street, Suva, Fiji

Abstract: A new genus and species of sciarid fly (*Vulgisciara myrmecophila* Evenhuis, gen. nov., sp. nov.) from Fiji is described and illustrated. An annotated checklist of known taxa is appended with *Pseudozygoneura musicola* Steffan and *Trichosia (Mouffetina)* newly recorded from Fiji.

INTRODUCTION

There are only six species of sciarid flies previously recorded in the literature from Fiji (Evenhuis, 2006): *Bradysia radicum* Brunetti, *Cosmosciara pernicioso* (Edwards) (as *Plastosciara*), *Dodecasciara debilis* Edwards, *Phorodonta pacifica* Edwards (as *Odontosciara*), "*Plastosciara*" *flavibasis* Edwards, and *Sciara distigma* Edwards. The biologies of many of these in Fiji remain unknown, but none are known to be associated with ant nests.

Bernard (1968) and Wilson & Hölldobler (1990) recorded two species of sciarids associated with ground dwelling ants, *Lycoriella subterranea* (Märkel) (as "*Sciara*") and *Sciara medullaris* Giard. Other ant-associated sciarids (all ground dwelling ant associates) include *Pnyxia dispar* Schmitz, *Hyperlasion wasmanni* Schmitz, *Lycoriella vanderwieli* (Schmitz), and *Scaptosciara myrmecophila* Frey.

Collecting on Taveuni in Fiji as part of the Fiji Terrestrial Arthropod Survey has resulted in the first records of sciarids from arboreal rubiaceo-ant-plants. Adults were collected from an ant plant on one occasion and larvae were collected from the same species in the same general area on a separate collecting trip. Although the immature stages were not reared out, because of the rarity of sciarids in arboreal ant-plants in Fiji (let alone worldwide), it is assumed the larvae represent the same species as the adults. The specimens collected represent a new genus and species of sciarids described below.

1. Contribution No. 2007-011 to the NSF-Fiji Arthropod Survey.

2. Contribution No. 2007-014 to the Pacific Biological Survey.

MATERIALS AND METHODS

Material derives from the Fiji Terrestrial Arthropod Survey, funded in part by the National Science Foundation and the Schlinger Foundation. Types will be deposited in the Fiji National Insect Collection, Suva (FNIC). Vouchers are in the Bishop Museum, Honolulu (BPBM). Adult morphological terminology follows Menzel & Mohrig (1997).

SYSTEMATICS

Vulagisciara Evenhuis, *gen. nov.*

Type species: *Vulagisciara myrmecophila* Evenhuis, sp. nov., by present designation.

Diagnosis: Using the key in Menzel & Mohrig (1997), *Vulagisciara* keys to *Epidapus* Haliday by virtue of the single-segmented maxillary palpus with sensilla on the surface and not in a pit and the lack of specialized setae at the apex of the fore tibia; but it differs by the alate wings with macrotrichia on veins M and Cu, the bare fore tibial spur, and the shape and structures of the male genitalia. The description of the species below serves to also describe the genus.

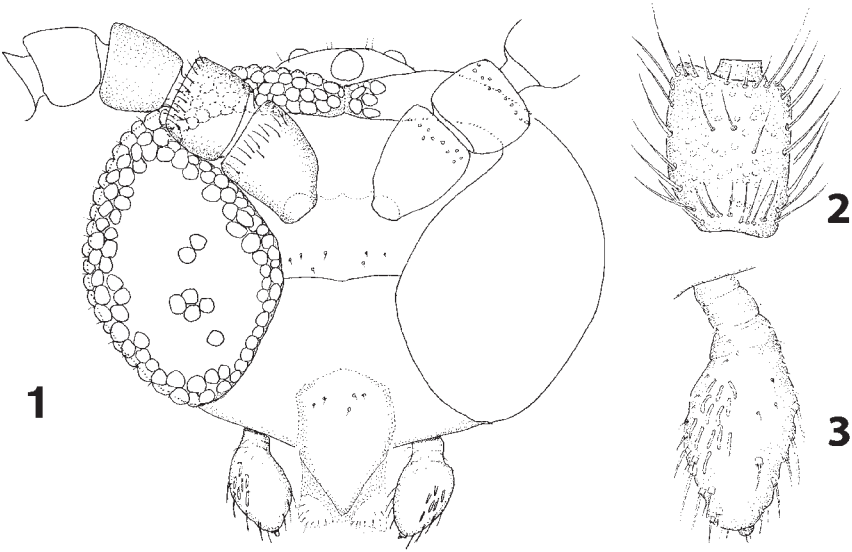
Vulagisciara myrmecophila Evenhuis, *sp. nov.*

(Figs. 1–7)

Description.

Adult Male. Lengths: Body: 1.95–2.20 mm; Wing: 2.20–2.40 mm. *Head* (Fig. 1). Yellowish to brown with darker occiput. Eye bridge complete, slightly constricted medially, with three to four rows of ommatidia. Interfacetal setae of eyes sparse, long, extending slightly beyond curvature of ommatidium. Anterior vertex with 8 setae. Prefrons with 7 setae. Clypeus with 6 setae. Maxillary palpus (Fig. 3) one-segmented, with papillate apex, with several lateral and ventral setae, without sensory pit. Antennal scape and pedicel length subequal to width; antennae with 14 flagellomeres, segments 1–13 generally slightly longer than wide with short necks, setae distributed irregularly (Fig. 2), apicalmost flagellomere ovate, with apical seta borne on small protuberance. Length/width ratio of flagellomere 4: 1.7. *Thorax.* Pale brown throughout except for darker brown mesonotum and dorsum of scutellum. Acrostichal setae in single row, dorsocentrals in paired admedian rows; lateral setae of scutum not evident; scutellum without long setae. Anterior pronotum setose; episternum 1 with 4 setae; other pleura bare. Katepisternum subtriangular, length subequal to width. Halter (Fig. 6) bare, relatively short, stem not elongate; knob with row of minute setae on dorsal edge. *Legs.* Yellowish, tarsi generally darker than tibiae. Legs unmodified. Fore tibia with slightly sinuous bare apical spur (Fig. 4), spur length subequal to width of tibial apex; apical or subapical triangular patch or comb of fore tibia absent; two strong hairs apically; two tibial spurs of equal length on mid and hind legs, these spurs subequal in length to fore tibial spur. Tarsal claws without teeth. *Wing* (Fig. 5). Subhyaline pale brown. Anal lobe normal, alula reduced. Wing membrane without macrotrichia. Costa extending about two-thirds distance beyond R5 toward M1. Vein R1 ending in costa at level approximately equal to fork of M1 and M2. Veins M1, M2, Cu1, and Cu2 with macrotrichia. Medial and cubital veins visible due to dense microtrichia and not wing field pigmentation; stM evanescent, with sparse macrotrichia. *Abdomen.* Segments unmodified, pale brownish. *Genitalia* (Fig. 7). Gonocoxites narrowly fused basoventrally, with small hemispherical projection medially. Gonostylus subtriangular, tapering to small spatulate apex; setose throughout, three large setae subapically. Genital rod forked caudally; aedeagal teeth absent. Cerci large, hirsute distally. Tegmen narrow, slightly bilobed.

Adult female. Unknown.

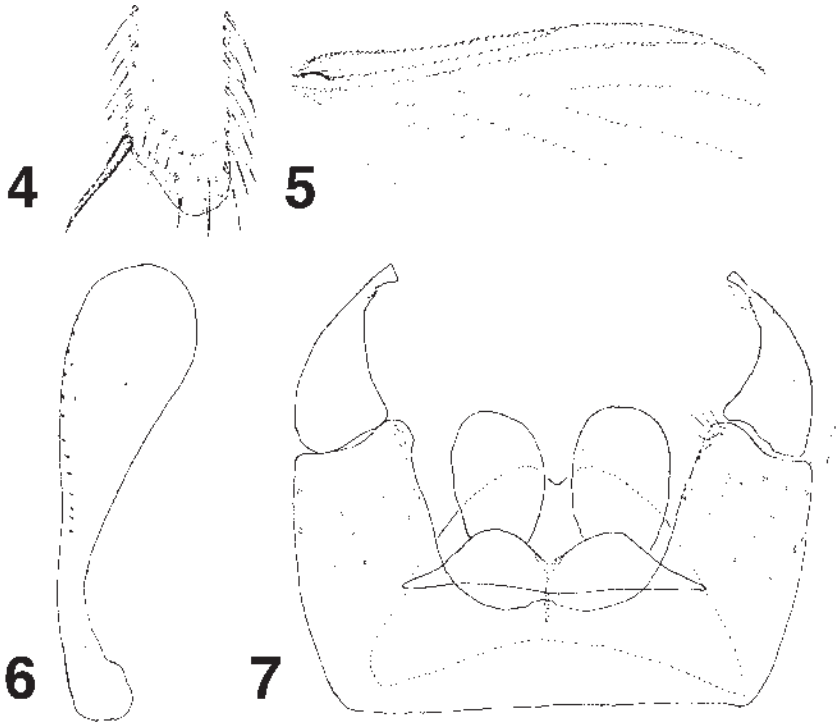


FIGURES 1–3. *Vulagisciara myrmecophila* Evenhuis, n. sp. 1. Head anterior view. 2. Flagellomere 4. 3. Maxillary palp.

Types: Holotype male and three paratype males from: FIJI: **Taveuni:** Devo Peak, 3.6 km SE Tavuki Village, 734 m, 16°49.8'S, 179°58.8'W, 22 Mar 2005, E.M. Sarnat (EMS1946) [FBA xxxxxx–xxxxxx]. Holotype will be deposited in FNIC. Paratypes in FNIC and BPBM.

Non-Types: 3 larvae from FIJI: **Taveuni:** Devo Peak (forest), 800 m, 16°50'35.1"S, 179°57'58.3"W, in ant-plant, N.L. Evenhuis, M. Tokota'a, S. Gaimari, J.K. Skevington (in BPBM) [FBA xxxxxx–xxxxxx].

Remarks. In addition to the similarities to *Epidapus* mentioned in the diagnosis, *Vulagisciara* is similar in some respects to *Pnyxiopalpus* Vilkamaa & Hippa (1999) (primarily the one-segmented maxillary palpus and generally similar male genitalia), but is separated from it by the lack of a sensory pit in the palpus (present in *Pnyxiopalpus*), the lack of dark peg-like setae on the apical portion of the fore tibia (present in *Pnyxiopalpus*), and the different shape and structure of the male genitalic structures (significantly the apex of the gonostylus is spatulate in *Vulagisciara*; the tip is acute in *Pnyxiopalpus*). It is also similar in some respects to *Ceratosciara* Enderlein from the Seychelles but is easily separated from it by the presence of macrotrichia on the posterior wing veins (absent in *Ceratosciara*), the fourth antennal flagellomere longer than wide (wider than long in *Ceratosciara*), and the bare fore tibial spur (with vestiture in *Ceratosciara*). Other one-segmented sciarid genera were compared and differ in various respects, mainly the presence of normal wings in *Vulagisciara* (wings brachypterous or apterous in some of the other genera) or complete eye bridge with multiple rows of ommatidia (eye bridge incomplete or with one to two rows in some of the other genera). Although used in keys as a convenient grouping, Vilkamaa & Hippa (2004) have shown



FIGURES 4–7. *Vulagisciara myrmecophila* Evenhuis, n. sp. 4. Apex of fore tibia. 5. wing. 6. Halter. 7. Male genitalia, ventral view.

that the presence of a one-segmented palpus is not a synapomorphy in Sciaridae since it has evolved independently a number of times in many parts of the sciarid phylogenetic topology (primarily in association with reduced or absent wings). Although *Vulagisciara* has fully alate wings, it is reluctant to fly (see below under “Biological Notes”), thus flightlessness and not necessarily the reduction of the wings may be a better association of many of the one-segmented genera of sciarids—although this has yet to be tested. Females have not yet been collected and it is not known if they exhibit any reduction of wing morphology.

Biological Notes: The adults and immatures of the sciarid were collected from the ant-plant *Myrmecodia tuberosa* (Rubiaceae) on the island of Taveuni. The ant plants were arboreal epiphytes, found from 5–10 meters above the ground. Adults were collected by one of us (EMS) by climbing approximately 5 meters to knock the bulb down to the ground. The nest was occupied by an aggressive colony of the ant *Philidris nagasau* (Mann), the workers of which poured from the plant and stung vigorously when the nest was disturbed. After slicing open the plant and collecting workers and alate queens, the adult sciarid flies were noticed walking and standing within the interior chambers. Despite the sudden exposure of the interior chambers upon slicing the plant open as well as the



FIGURE 8. Rubiaceous ant-plant *Myrmecodia tuberosa* from type locality of *Vulagisciara myrmecophila* on Taveuni, split open to show internal cavities and associated ants.

frenzied movements of the ants, the flies did not fly but preferred to remain within the chambers and were easily collected. This reluctance to fly no doubt explains why no specimens of this fly have been found in extensive Malaise trapping in this area: from October 2002 through to October 2005, seven Malaise traps had been employed at two localities a few hundred meters above and below the type locality providing 92 samples from which thousands of sciarids have been collected and sorted.

Immatures of the sciarid fly were collected in a subsequent collecting trip to the same area of Devo Peak. Specimens of the ant and fly larvae were obtained by knocking the bulb to the ground using a telescopic insect sweep net. Once on the ground, the bulb was sliced open and searched for Diptera. The three larvae found were located in the lower cavities of the domatium. Ants swarmed all over the bulb and our hands and arms during collection but did not sting.

Also associated with the ant-plant was an apparently undescribed new species of staphylinid beetle of the genus *Fustiger*. Mann (1920) described five species of *Fustiger* found in ant-plants on Viti Levu (the only described species of the genus known in Fiji). No species of *Fustiger* were previously known from Taveuni. The specimens collected on Taveuni are closest in appearance to *Fustiger vitiensis* Mann but lack the prominent femoral spine typical of the other known Fijian *Fustiger* species (in the Taveuni specimens it is reduced to a sharp point).

All specimens associated with the ant-plant were collected into 95% ethanol.

Etymology: The name derives from the Greek, $\mu\upsilon\mu\omicron\mu\epsilon\kappa\omicron\varsigma$ = ant + $\pi\eta\lambda\omicron\varsigma$ = loving; referring to the apparent mutualistic association of these flies with their ant hosts.

ANNOTATED CHECKLIST OF FIJI SCIARIDAE

Bradysia radicum Brunetti

Specimens from Pacific Islands may belong to other species. After examining the type of *Bradysia radicum* and finding that it differed from Hawaiian specimens, Steffan (1973) described the Hawaiian specimens misidentified as *Bradysia bishopi* and cautioned that further work was necessary before the identity of other Pacific Island species could be verified as *B. bishopi* and may belong to a complex of species including new ones. Until Fiji specimens are studied in detail and compared with *B. radicum*, we prefer to tentatively keep them identified as *B. radicum*. Menzel & Smith (2007) identified specimens from the Seychelles as *B. bishopi*, but may have been premature in extending the distribution of *B. bishopi* to Pacific Islands (including Fiji) as they did not list any specimens examined from areas other than the Seychelles.

Cosmosciara pernicioso (Edwards)

This species was known in the literature for many years as *Plastosciara pernicioso*. Menzel (1997) transferred *P. pernicioso* to *Cratyna* Winnertz, where many species of *Plastosciara* ended up, and this combination was also used in Menzel *et al.* (2006) where it was placed in the subgenus *Cratyna* (*Peyerimhoffia*). Menzel & Heller (2007) most recently transferred the species to *Cosmosciara* Frey (where it was originally placed as the type species of it). That last generic combination is followed here.

Dodecasciara debilis Edwards

In addition to Fiji, specimens in BPBM have been examined from Tonga and Samoa.

Phorodonta pacifica Edwards

This species is listed in Evenhuis (2006) in *Odontosciara*. Vilkamaa (2000) showed that it belongs back in the original generic combination of *Phorodonta pacifica* and this treatment is followed here. Its placement in *Dolichosciara* (Menzel, Vilkamaa, *in litt.*) has not been verified.

"*Plastosciara*" *flavibasis* Edwards

Menzel (1997) synonymized *Plastosciara* under *Cratyna* and transferred a few of its species there. However, *Plastosciara flavibasis* was not transferred to *Cratyna* and has previously not been transferred to another genus. Given the confusion of the true generic identity of many species previously placed in *Plastosciara*, we prefer to retain *flavibasis* here until further study is done to ascertain its proper generic placement.

Pseudozygoneura musicola Steffan

This conspicuous genus (easily spotted by virtue of the striking antennal flagellomere shape and setation) was revised by Hippa *et al.* (1998). The specimens from Fiji all belong to *P. musicola*, marking the first record of the genus from there and extending the distribution of *P. musicola* further into the islands of the Pacific.

Sciara distigma Edwards

A number of specimen of *Sciara* have been seen from Malaise trap samples and may represent a suite of new species that await description.

Trichosia (Mouffetina) sp.

Undetermined specimens of this subgenus have been seen in the Malaise trap samples and fit in the group of species that are characterized by the white apical antennal flagellomeres. This marks the first record of the genus from Fiji.

Vulagisciara myrmecophila Evenhuis

Described and illustrated herein.

ACKNOWLEDGMENTS

We thank the Fiji Government Ministries of Forestry and Environment for their support of this project. Funding was provided in part by the National Science Foundation Grant DEB 0425790 “Fiji Terrestrial Arthropod Survey” and the Schlinger Foundation. The present and former staff of the Wildlife Conservation Society, Suva Office, especially David Olson and Akanisi Caginitoba, are thanked for logistical help. Pekka Vilkamaa and Frank Menzel are thanked for comments and suggestions in reviewing the manuscript and provided generous assistance with recent literature.

LITERATURE CITED

- Bernard, F.** 1968. Les fourmis (Hymenoptera) d'Europe occidentale et septentrionale. Masson et C^{ie}, Paris.
- Evenhuis, N.L.** 2006. Checklist of Diptera of Fiji. *Bishop Museum Technical Report* 35(7), 32 pp.
- Hippa, H., Vilkamaa, p. & Heinakroon, A.** 1998. The genus *Pseudozygoneura* Steffan (Diptera, Sciaridae). *Acta Zoologica Fennica* 210: 1–86.
- Mann, W.M.** 1920. Ant guests from Fiji and the British Solomon Islands. *Annals of the Entomological Society of America* 13: 60–69.
- Menzel, F. & Heller, K.** 2007. Bemerkungen zur Nomenklatur der Sciariden (Diptera: Bibionomorpha: Sciaridae). *Studia Dipterologica* 13(2): 209–229.
- . & **Mohrig, W.** 1997. Family Sciaridae, pp. 51–69. In: Papp, L. & Darvas, B. (eds.), *Manual of Palaearctic Diptera (with special reference to flies of economic importance)*. Volume 2. Nematocera and Lower Brachycera. Science Herald, Budapest. 592 pp.
- . & **Mohrig, W.** 1998. Contributions to taxonomy and faunistics of the Palaearctic sciarid flies (Diptera, Sciaridae). Part 6 – New results from type study and their taxonomic and nomenclatural consequences. *Studia Dipterologica* 5(2): 351–378.
- . & **Smith, J.E.** In press. Sciaridae. In: Gerlach, J. (ed.), *Diptera of the Seychelles islands. Seychelles Fauna Monographs* 5: in press.
- , **Smith, J.E. & Chandler, P.** 2006. The sciarid fauna of the British Isles (Diptera: Sciaridae), including descriptions of six new species. *Zoological Journal of the Linnean Society* 146(1): 12–147.
- Steffan, W.A.** 1973. Notes on Hawaiian Sciaridae (Diptera) and descriptions of two new species. *Pacific Insects* 15(3-4): 353–361.

- Vilkamaa, P.** 2000. Phylogeny of *Prosciara* Frey and related genera. *Systematic Entomology* **25**: 47–72.
- . & **Hippa, H.** 1999. The genus *Pnyxiopalpus* gen. n. (Diptera: Sciaridae). *Systematic Entomology* **24**: 209–241.
- . & **Hippa, H.** 2004. The genus *Xenosciara* gen. n. and the phylogeny of the Sciaridae (Diptera). *Zootaxa* **699**, 24 pp.
- Wilson, E.O. & Hölldobler, B.** 1990. *The ants*. Belknap Press, Boston, Massachusetts. 732 pp.

***Xentor*, a New Endemic Genus from Fiji (Hymenoptera: Platygastroidea: Scelionidae) and Description of Three New Species¹**

LUBOMÍR MASNER

*Agriculture and Agri-Food Canada, Research Branch, K. W. Neatby Building, Ottawa,
Ontario K1A 0C6, Canada*

NORMAN F. JOHNSON

*Department of Entomology, The Ohio State University, 1315 Kinnear Road, Columbus,
Ohio 43212, USA; email: johnson.2@osu.edu*

Abstract. A new genus known only from the Fijian archipelago, *Xentor* **n. gen.** (Hymenoptera: Platygastroidea, Scelionidae) is described with three new species: *X. schlingeri* **n. sp.** (type species of the genus), *X. convexifrons* **n. sp.**, and *X. filicornis* **n. sp.** The unusual insertion of the antennae, far dorsad of the clypeus and close to the inner orbits of the compound eyes, is unique within the superfamily.

INTRODUCTION

The synapomorphies that characterize the parasitoid wasps of the superfamily Platygastroidea (Masner, 1993; Austin *et al.*, 2005) include the position at which the antennae are inserted into the head: the toruli are located at the dorsal margin of the clypeus and are close together in the midline of the head, narrowly separated by the interantennal process, and therefore distant from the inner orbits of the eyes. The three new species described below as a new genus represent the only departure from this configuration in the superfamily. We interpret this as an apomorphic feature, which implies a moderate expansion in the taxonomic delimitation of the superfamily. This new genus otherwise is comfortably classified within the Scelioninae. One species exhibits a very peculiar structure of the mandible, never previously observed in our collective experience with platygastroids.

MATERIALS

The material examined in this study derives primarily from specimens collected under the auspices of the NSF-funded “Fiji Arthropods Survey” and the Schlinger Foundation-funded Fiji Biodiversity of Arthropods study (Evenhuis & Bickel, 2005). Primary types will be deposited in the Fiji National Insect Collection, Suva (FNIC). Other material is deposited in the Canadian National Collection of Insects, Ottawa, Ontario, (CNCI); the C.A. Triplehorn Insect Collection at The Ohio State University, Columbus, Ohio (OSUC); and the Queensland Museum, Brisbane (QMBA). A total of 37 specimens are known.

1. Contribution No. 2007-012 to the NSF-Fiji Arthropod Survey.

Abbreviations and terms used in text: A1, A2, ... A11: antennomere 1, 2, ... 11; claval formula: distribution of the large, multiporous basiconic sensilla on the underside of apical antennomeres of the female, with the segment interval specified followed by the number of sensilla per segment (Bin, 1981); T1, T2: metasomatic terga 1, 2. Morphological terminology follows Masner (1980). Extended focus imaging was done using AutoMontage™ software and GT-Vision hardware.

SYSTEMATICS

Xentor Masner & Johnson, **new genus**

(Figs. 1–16)

Diagnosis: Toruli widely separated from dorsum of clypeus, far from one another, close to inner orbits (Figs. 3, 7, 10, 13, 16); T2 moderately to distinctly the longest tergite, 2.0–6.0 times length of T3. Some species of *Calliscelio* Ashmead and *Probaryconus* Kieffer have T2 slightly longer than T3, and T2 is distinctly the longest in *Yunkara* Galloway and *Phoenoteleia* Kieffer. *Xentor* may be distinguished from these by the position of the toruli. Additionally, *Calliscelio* species have the metanotum expanded into a lamella and the propodeum is unarmed; *Probaryconus* has the lateral corners of the propodeum expanded into small spines. *Yunkara* has no armature on either the metanotum or propodeum, and T1 is not produced into a horn. *Phoenoteleia* females have the T1 horn remarkably elongate, fitting into a longitudinal furrow on the dorsum of the mesothorax so that the upper side of the horn is nearly flush with the mesoscutum, and the horn bears a V-shaped carina; in addition, the hind basitarsus of both sexes is enlarged.

Description: Small, length 2.4–2.9 mm; body moderately elongate, gracile (Figs. 1, 5, 11), with relatively long, slender legs, antenna elongate, all antennomeres longer than wide; head, body yellow to brown; macropterous.

Head (Figs. 3, 6, 7, 10, 13, 16) in dorsal view weakly transverse; vertex smooth, sparsely setose; hyperoccipital carina absent; occipital carina well-developed, continuous medially, finely crenulate; lateral ocellus nearly contiguous with inner orbit of compound eye, OOL varying from less than 0.5 times to nearly 2.0 times diameter of lateral ocellus; compound eye large, glabrous; frons shape variable, deeply concave to broadly convex; antenna inserted close to inner orbit, high above clypeus, torulus opening anteriorly to anterolaterally; interantennal process absent; submedian carina absent; orbital carina absent; lower frons, including cheek, without fanlike striae; interocular space slightly shorter than eye height; inner orbits diverging ventrally; clypeus variable in shape, broadly convex or raised in strong dorsoventral crest, strongly transverse to pentagonal, apically pointed, not divided into anteclypeus and postclypeus; malar sulcus present; gena strongly expanded, convex, smooth, sparsely setose; labrum hidden behind clypeus and mandibles; mandible basically short, apex with three apical, acute, subequal teeth, sometimes with additional, dorsal, broadly truncate tooth (*X. filicornis* n.sp., Fig. 7, *dt*), or with strong acute dorsal projection from upper margin of mandible (*X. schlingeri*, n.sp., Figs. 13, 14, *dma*); maxillary palpus 3-segmented, all segments cylindrical; labial palpus 2-segmented; antenna 12-merous in both sexes; radicle inserted apically into A1, nearly parallel to longitudinal axis of A1; A1 distinctly flattened; A3 distinctly longer than A2; female antenna with or without (*X. filicornis*, n.sp.) distinct clava; gustatory sensilla on female antenna arranged in longitudinal pairs on apical antennomeres; claval formula either A8-A12 2-2-2-2-1 or A4-A12 1-2-2-2-2-2-2-2-1; male antenna with tyloid on A5.

Mesosoma in dorsal view longer than wide (Figs. 4, 9, 15), in lateral view longer than high (Figs. 2, 5, 12); pronotum in dorsal view very narrow laterally, anterolateral corners weakly angulate; transverse pronotal carina absent; vertical epomial carina absent; dorsal epomial carina present; anterior face of pronotum short, visible in dorsal view; lateral face of pronotum nearly flat below dorsal

epomial carina, facing anterolaterally, without distinct scrobe for reception of foreleg; netrion present, open ventrally; anterior margin of mesoscutum flexed ventrally to meet pronotum; mesoscutum pentagonal in outline, posterolateral corner rounded; parapsidal lines absent; notauli present, percurrent; skaphion absent; transscutal articulation well-developed, crenulate; scutellum wider than long, unarmed laterally, weakly convex; axilla small, dorsal margin sinuate; metanotum narrow, dorsellum clearly differentiated, unarmed; dorsal surface of propodeum with dense, fine pilosity; keels, plicae of propodeum variably developed, propodeum produced medially into narrow triangular prominence or flat, apically rounded lamella; posterior face of propodeum smooth, glabrous; mesopleural depression well-developed; mesopleural carina absent; sternaulus absent; mesopleural pit present, distinct; anterior margin of ventral portion of mesepisternum and acetabular carina transverse, not extended forward between forecoxae; mesepisternum and mesepimeron separated by line of well-developed foveae; episternal foveae absent; dorsal corner of mesepimeron produced into rounded or angulate, not produced into tooth; anteroventral portion of metapleuron continuous with lateral face, glabrous; metapleuron without distinct pit, with oblique, narrow, deep furrow extending from anterodorsal corner to posterior margin; posterior margin of metapleuron narrowly lamellate; propodeum with longitudinal carinae variably developed, setose throughout, posterolateral corners not projecting posteriorly; legs slender, femora weakly incrassate; posterior surface of hind coxa with smooth, setose; trochantellus present on all legs; outer surface of fore-, midtibia short, semidecumbent setae; tibial spur formula 1-1-1; tarsal formula 5-5-5; tarsomeres tapering in width apically; pretarsal claws simple; apex of forewing extending beyond apex of metasoma, hyaline; R straight, extending beyond basal 0.5 of length of forewing, with strong bristles arising throughout its length, at apex curved to meet costal margin forming distinct marginal vein; bulla absent; R_1 extending far along costal margin to form elongate postmarginal vein, longer than both marginal and stigmal veins; r-rs (stigmal vein) straight, arising from costal margin; basal vein strongly indicated, sharply defined; no other tracheate veins in forewing; hindwing with R tracheate from base of wing to hamuli and costal margin; with two strong dark bristles on R basally; three hamuli present.

Metasoma with first segment cylindrical, otherwise flattened; T2 distinctly longest tergite; female with 6 terga, 6 sterna visible externally, male with 8 terga, 6 sterna visible externally; submarginal ridge well-developed, defined by narrow laterotergites to form deep submarginal rim; no spiracles visible; base of segment 1 generally longitudinally costate, horn, if present, smooth basally; suture between segments 1 and 2 basally crenulate; otherwise sutures between segments 6 simple; female T6 without median raised field of microsetae or secretion; S1 not laterally compressed; anterior margin of S2 straight; no felt fields present on sterna.

Type species: *Xentor schlingeri* Masner & Johnson, n. sp.

Etymology: The name *Xentor* is a combination derived from the Greek *xenos*, different, and *tor*, for torulus, referring to the unique position of the antennal insertions. The name is masculine in gender.

Geographic distribution: Collected from the Fijian islands of Taveuni, Vanua Levu, and Viti Levu.

Host: Unknown.

Comments: This new genus seems to fall best within the concept of the tribe Calliscelionini (*sensu* Masner 1976). The relationships among the genera of the tribe have not been resolved, and the monophyly of the tribe itself is uncertain. Therefore, specification of the phylogenetic position of *Xentor* is not possible at this time.

We can only speculate on possible function of the modifications of the head and mandibles in *X. flicornis*, n.sp. (Figs. 6, 7) and *X. schlingeri* n.sp. (Fig. 13). The most likely scenario seems to be that they are somehow involved with emergence from the host egg.

KEY TO SPECIES OF *XENTOR*

Females

1. Frons between toruli distinctly convex, not excavate (Fig. 3), and without distinct black bristles; T1 without hump, entirely longitudinally costate (Fig. 4, *TI*)
..... **convexifrons** Masner & Johnson, **n. sp.**
- Frons between toruli deeply excavate, strongly raised laterad of depression, with distinct black bristles (Figs. 6, 7, 13); T1 with distinct hump, its apex smooth (Figs. 9, 15, *TI*) 2
2. Antenna threadlike, without distinct clava; antennomeres 4–12 with specialized spikelike sensilla on underside (Fig. 8, *gs*); mandible tridentate, sharply truncate, without dorsal toothlike appendage (Fig. 7, *dt*); median propodeal lamina with sharply pointed triangular plate (Fig. 9, *pl*); clypeus posteriorly reflexed ...
..... **filicornis** Masner & Johnson, **n. sp.**
- Antenna with distinct 5-merous clava (Fig. 11); antennomeres 8–12 with typical basiconic sensilla on underside; mandible with additional dorsal truncate tooth and moderate to large acute dorsal appendage (Figs. 13, 14, *dt*, *dma*); median propodeal lamina broadly rounded to truncate (Fig. 15, *pl*); clypeus vertical, parallel with frons **schlingeri** Masner & Johnson, **n. sp.**

Males

1. Clypeus with strong median longitudinal keel, apex beaklike (Fig. 16, *cc*); anterior margin of mesopleuron marked by column of elongate foveae (as in Fig. 12, *mf*) **schlingeri** Masner and Johnson, **n. sp.**
- Clypeus flat, without longitudinal keel (Fig. 10); mesopleuron anteriorly with longitudinal rugulae dorsally, lacking column of foveae (as in Fig. 6)
..... **filicornis** Masner & Johnson, **n. sp.**

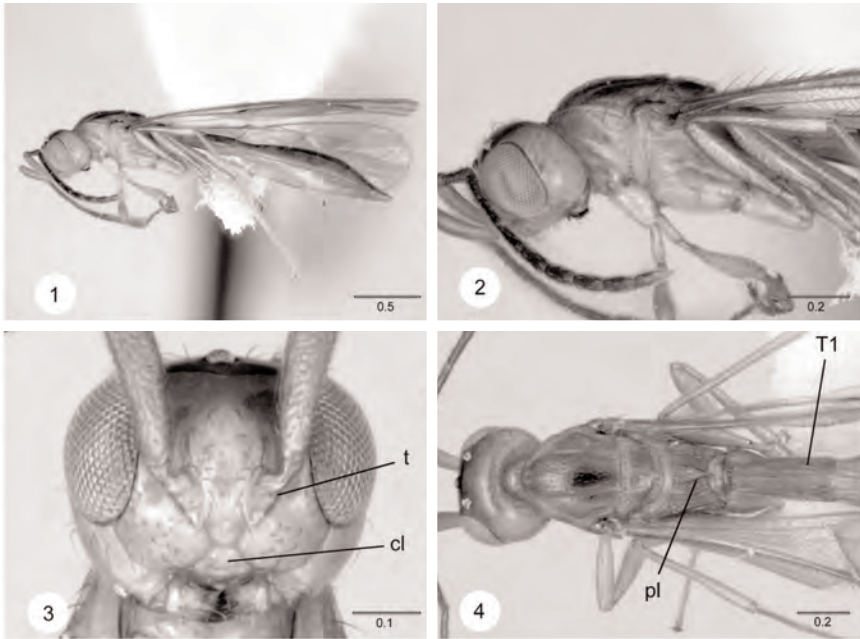
***Xentor convexifrons* Masner & Johnson, new species**
(Figs. 1–4)

Diagnosis: Distinguished from other species of *Xentor* by the simple, broadly convex frons and the absence of a horn on T1.

Description: *Female:* Length: 2.7 mm; head and body dark brown dorsally, light brown ventrally; radicle, A1 light brown; A2-A12 dark brown; legs light brown; wing membrane hyaline; apex of mandible tridentate, dorsal margin not elaborated (Fig. 3); median portion of frons convex (Fig. 3, *cl*); frontal lobes absent, frons evenly convex, setose, without strong black bristles; lateral ocelli close to inner orbits, LOL less than one ocellar diameter; clypeus pentagonal, weakly convex; antennal clava clearly developed, elongate, laterally flattened; claval formula: A8-A12 2-2-2-1; mesoscutum (Fig. 4) with finely incised reticulate microsculpture; notauli nearly parallel; propodeal excavation very shallow, emarginate only at extreme apex; propodeum with acute triangular tooth formed by confluence of expanded submedial plicae (Fig. 4, *pl*); dorsal epomial carina well developed throughout its length, surface dorsal to carina rugulose; anterior mesopleural margin: predominantly simple, with few elongate longitudinal rugulae dorsally; T1 nearly cylindrical (Figs. 1, 2, *TI*), without horn, longitudinally costate throughout its length.

Male: unknown.

Etymology: The epithet *convexifrons* refers to the shape of the front of the head.



Figures 1–4. *Xentor convexifrons* Masner & Johnson, new species, holotype female (FBA 040460). 1, lateral habitus; 2, head and mesosoma, lateral view; 3, head, frontal view; 4, head and mesosoma, dorsal view. *cl*, clypeus; *pl*, propodeal lamella; *t*, torulus; *T1*, first metasomatic tergite. Scale bars in millimeters.

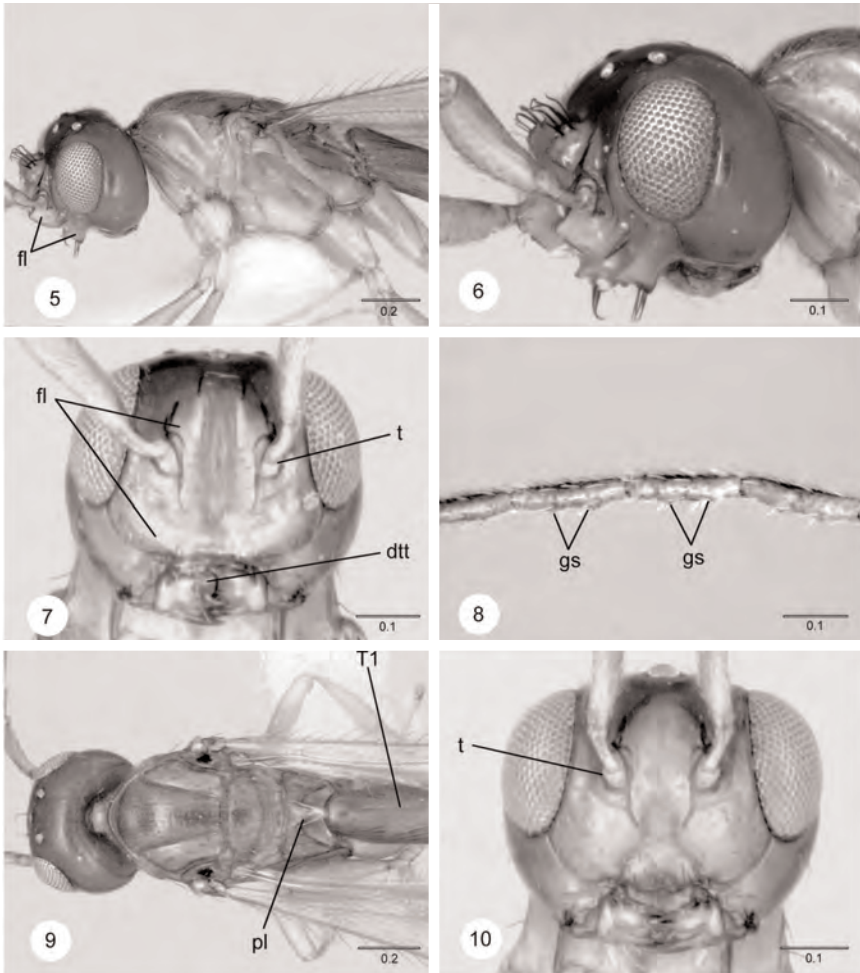
Material Examined: Holotype female: **FIJI:** Vanua Levu, Bua Prov., Kilaka; 146 m; FJ-58A; 16° 48.927'S 178° 59.110' E; 3.VI–10.VI.2004, M.E. Irwin, E. Schlinger, M. Tokota'a; Malaise [FBA 040460]. To be deposited in FNIC; temporarily in BPBM.

Xentor filicornis Masner & Johnson, new species

(Figs. 5–10)

Diagnosis: The female may be distinguished by its elongate filiform antenna; the presence of large paired ventral sensilla on A5–7, and a single such sensillum on A4; the strong transverse ridge defining the dorsal margin of the clypeus, and the two pairs of frontal projections.

Description: *Female:* Length: 2.7 mm; head, body, appendages light brown, slightly darker dorsally; wing membrane hyaline; apex of mandible tridentate, with additional broadly truncate, transversely oriented tooth dorsal to normal dentition (Fig. 7, *dt*); median portion of frons deeply excavate; two pairs of frontal lobes present (Fig. 5–7, *fl*), strongly raised above surface of frons, dorsal lobe bearing the torulus, this lobe separated from the ventral lobe by a deep incision (Fig. 7, *fl*); frons with thick dark bristles on both frontal lobes, clypeal margin; lateral ocelli distinctly separated from inner orbits, LOL much greater than ocellar diameter (Fig. 9); clypeus with dorsal margin marked by strong transverse ridge, otherwise strongly reflexed, hidden behind mandibles (Fig. 6); antennal clava absent, all antennomeres strongly elongate, generally cylindrical; claval formula: A4–A12



Figures 5–10. *Xentor filicornis* Masner & Johnson, new species. **5**, head and mesosoma, lateral view, holotype female (FBA 164917); **6**, head, oblique lateral view, holotype female; **7**, head, frontal view, paratype female (FBA 105149); **8**, A7–A10 (right to left), paratype female (FBA 105149); **9**, head and mesosoma, dorsal view, paratype female (FBA 105149); **10**, head, frontal view, paratype male (FBA 105155). *dt*, dorsal truncate tooth of mandible; *fl*, frontal lobe; *gs*, gustatory sensilla; *pl*, propodeal lamella; *t*, torulus; *T1*, first metasomatic tergite. Scale bar in millimeters.

1-2-2-2-2-2-2-2-1 (Fig. 8, *gs*); mesoscutum with finely incised reticulate microsculpture (Fig. 9); notauli distinctly converging posteriorly; propodeum distinctly, but incompletely excavate; propodeal armature in form of flat triangle (Fig. 9, *pl*); dorsal epomial carina fading posteriorly, surface dorsal to carina smooth; anterior mesopleural margin predominantly simple, with few elongate longitudinal rugulae; T1 base produced into moderately developed horn, T1 smooth anteriorly, otherwise longitudinally costate (Fig. 9, *T1*).

Male: Length: 2.6–2.8 mm; differing from female as follows: flagellum dark brown; frontal lobes weakly developed; clypeus broadly convex, apex rounded, without median carina (Fig. 10); T1 cylindrical, longitudinally costate throughout its length.

Etymology: The epithet *filicornis* refers to the unusual shape of the female antenna.

Material Examined: *Holotype* female from FIJI: **Taveuni**: 5.3 km SE Tavuki Vlg., Mt. Devo, 1187 m, 16.843°S, 179.966°W, 24-31.X.2002, Malaise 1, Schlinger, Tokota'a, [FBA 164917]; to be deposited in FNIC, temporarily in BPBM. *Paratypes*: FIJI: **Taveuni**: one female with same data as holotype [FBA 147878]. **Vanua Levu**: Batiqere Range, 5 km NW Kilaka Village, 146 m; 16.815°S 178.986°E; 28.VI–21.VII.2004, Schlinger, Tokota'a; Malaise 1, one female, three males, [FBA 105149, FBA 105140, FBA 105145, FBA 105155]; Batiqere Range, 6 km NW Kilaka Village, 61 m, 16.811°S, 178.988°E, 3–10.VI.2004, Malaise 3, Schlinger, Tokota'a, one male, one female [FBA 115166, FBA 115175]. **Viti Levu**: Lomaiviti, Nadarivatu, Naqaranabuluti Park, Mt. Lomalagi, 1140 m; 17.573°S 177.973°E; 24–26.VI.2005, Malaise 01, Bennett, Tokota'a; one male [FBA 181268] (in OSUC); 3.5 km N Veisari Silmt., logging rd. to Waivudawa, 300 m, 18.068°S, 178.367°E, 14.II-8.III.03, Malaise 3, E. Schlinger, M. Tokota'a, one male [FBA 136308]. (in BPBM).

Comments: The shape of the antenna of the holotype initially led us to believe that the specimen was a male. However, instead of a single tyloid on A5, we found a series of strong, elongate, downward projecting sensilla on the undersides of A4–A12 (Figs. 5, 8, gs). These probably correspond to the gustatory sensilla found on the apical clavomeres of all female platygastroids. The number of antennomeres involved, however, is unusually high. To our knowledge, such a large number is known only in the genus *Nixonia* Masner, in which the sensilla is found on A5–A14 (Johnson & Masner, 2006).

In one female (FBA 105149, Fig. 7) the frontal lobes are distinctly smaller than those in the other two females (Fig. 6). In addition, the frontal bristles are finer and lighter in color.

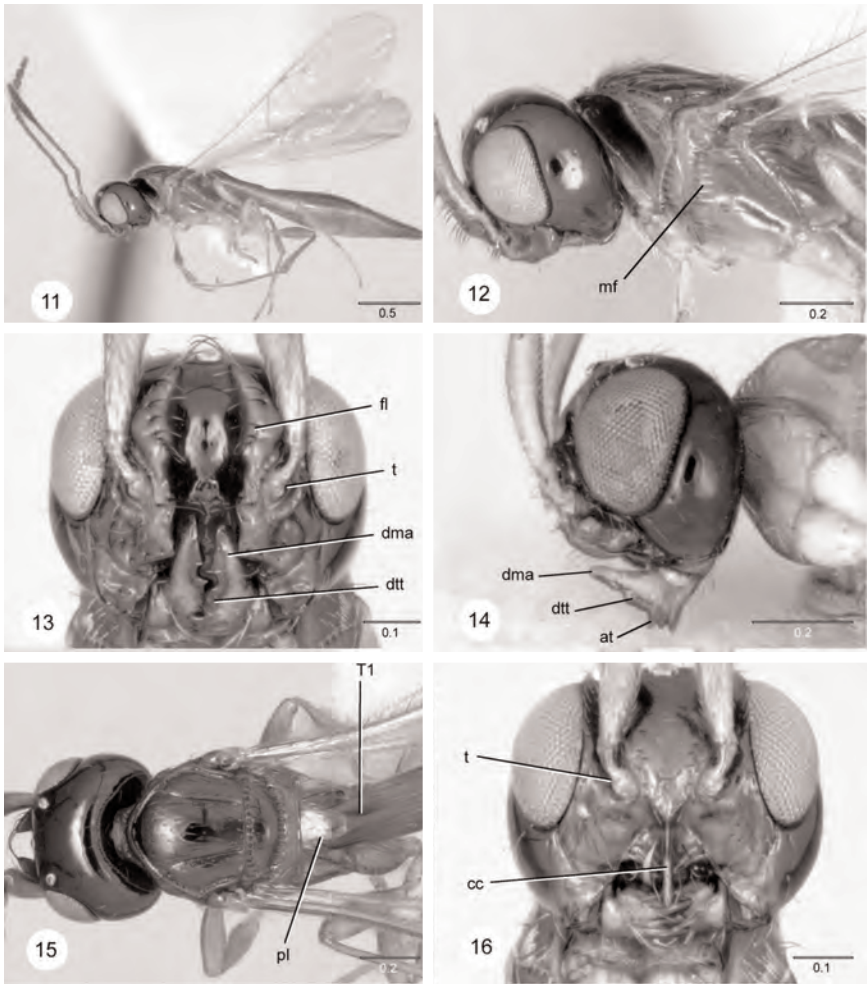
We associated the males with females on the basis of the simple anterior margin of the mesopleuron and the presence of frontal lobes and bristles on the face.

Xentor schlingeri Masner & Johnson, new species

(Figs. 11–16)

Diagnosis: The female may be immediately distinguished from the other two species of *Xentor* by the elongate dorsal mandibular appendage (Figs. 13, 14, *dma*). The male may be distinguished by the presence of a column of elongate foveae at the anterior margin of the mesopleuron (as in Fig. 12, *mf*).

Description: *Female*: Length: 2.4–2.9 mm; head dark brown; body brown ventrally, dark brown dorsally; radicle, A1 light brown; A2–A12 dark brown; legs uniformly brown; wing membrane hyaline; apex of mandible tridentate, dorsal margin produced into elongate acute process, mesal margin with truncate tooth ventrally, triangular tooth dorsally (Figs. 13, 14, *dt*, *dma*); median portion of frons deeply excavate; frontal lobes present, strongly raised above surface of frons (Fig. 13, *fl*), in some specimens with dorsal portion separated from surface of frons; frons with thick dark bristles on frontal lobes, clypeal margin; lateral ocelli close to inner orbits, LOL less than or equal to 1 ocellar diameter (Fig. 15); clypeus flat, largely hidden behind mandibles, without strong transverse dorsal ridge (Fig. 13); antennal clava clearly developed (Fig. 11), elongate, laterally flattened; claval formula: A8-A12 2-2-2-2-1; mesoscutum largely smooth and shining, especially on median lobe (Fig. 15); notauli distinctly converging posteriorly; propodeum entire excavate medially; propodeal arma-



Figures 11–16. *Xentor schlingeri* Masner & Johnson, new species. **11**, lateral habitus, holotype female (FBA 047915); **12**, head and mesosoma, lateral view, holotype female; **13**, head, frontal view, holotype female; **14**, head and mandible, lateral view, paratype female (OSUC 148459); **15**, head and mesosoma, dorsal view, holotype female; **16**, head, frontal view, paratype male (FBA 042199). *at*, apical teeth of mandible; *cc*, central clypeal carina; *dma*, dorsal mandibular appendage; *dtt*, dorsal truncate tooth of mandible; *fl*, frontal lobe; *mf*, mesopleural foveae; *pl*, propodeal lamella; *t*, torulus; *T1*, first metasomatic tergite. Scale bar in millimeters.

ture in form of broad, flat lamella, rounded or emarginate at apex, overlapping base of T1 horn (Fig. 15, *pl*); dorsal epomial carina well developed throughout its length, surface dorsal to carina rugulose; anterior mesopleural margin marked by series of 6-8 longitudinally elongate foveae (Fig. 12, *mf*); T1 with base produced into moderately developed horn, T1 smooth basally, otherwise longitudinally costate (Fig. 15, *T1*).

Male: Length: 2.5–2.6 mm; differing from female as follows: radicle, A1, A2 light brown; A3–A12 dark brown; free frontal lobes absent, frons broadly convex; clypeus with strong median crest (Fig. 16, *cc*), apex sharply pointed medially; mesoscutum with finely incised reticulate microsculpture; T1 cylindrical, longitudinally costate throughout its length.

Etymology: Named in honor of Dr. Evert Schlinger for his leadership and support of studies of the arthropod biodiversity of Fiji.

Material Examined: *Holotype* female: FIJI: **Taveuni**: Cakadrove [sic: misspelling for Cakaudrove], 5.6 km SE Tavuki Village, 1187 m, 16.843°S 179.965°W; 3–10.I.2003; Schlinger, Tokota'a; rainforest; Malaise; FJTA8a_M01_12 [FBA 058980]. *Paratypes*: FIJI: **Taveuni**: male, female with same data as holotype [FBA 058990, FBA 058995]; 5.5 km SE Tavuki Village, 1188 m, 16.843°S, 179.966°W, 30.VI–14.VIII.2004, Malaise, rainforest, FJTA8B_M02_02, Schlinger, Tokota'a, female [FBA 070880]; Devo Peak Radio Tower, 1200 m, 16°51'S 179°58'E, 2.X–10.X.2002, Malaise in rainforest, FJ-8, M. Irwin, E. Schlinger, M. Tokota'a, female [FBA 021441]; 5.3 km SE Tavuki, Devo Peak, 1064 m, 16.8431°S 179.9681°E, 14.XI–21.XI.2002, Malaise, FJTA9c_MO3_07, Schlinger, Tokota'a, female [FBA 054135]; 5.3 km SE Tavuki Vlg., Mt. Devo, 1064 m, 16.841°S, 179.968°W, 31.X–14.XI.02, Malaise 3, coll. Schlinger, M. Tokota'a, two females [FBA 149375, FBA 149377]; 5.3 km SE Tavuki Vlg., Mt. Devo, 1064 m, 16.841°S, 179.968°W, 3–20.XII.2002, Malaise 3, Schlinger, M. Tokota'a, two females [FBA 154042, FBA 154045]; 5.3 km SE Tavuki Vlg., Mt. Devo, 1064 m, 16.841°S, 179.968°W, 27.XII.2002–3.I.2003, Malaise 3, Schlinger, M. Tokota'a, four females [FBA 146509–146512]; 5.3 km SE Tavuki Vlg., Mt. Devo, 1187 m, 16.843°S, 179.966°W, 27.XII.2002–3.I.2003, Malaise 1, Schlinger, Tokota'a, one male [FBA 164887]; Devo Forest Reserve, 800 m; 16°50'S 179°59'E; 3.I–10.I.2003, M. Irwin, E. Schlinger, M. Tokota'a, FJ-9 Malaise, male, female [FBA 042199, FBA 042149]; Soqulu House in Soqulu Estate, 140 m; 15.833°S 180°W, 13–20.XII.2002, E.I. Schlinger, M. Tokota'a, Malaise 1, female [FBA 121077]. **Vanua Levu**: Bua, Batiqere Range, 6 km NW Kilaka, 113 m, 16.7317°S, 178.9997°E, 3.VI–15.VI.2004, Schlinger, Tokota'a, Malaise, FJVN58c_M02_05, female [FBA 069480]; Batiqere Range, 6 km NW Kilaka Village, 61 m, 16.811°S, 178.988°E, 3–10.VI.2004, Malaise 3, Schlinger, Tokota'a, female [FBA 115165]; Kilaka, 146 m; 16°48.927'S 178°59.110'E; 3.VI–10.VI.04, M. Irwin, E. Schlinger, M. Tokota'a, Malaise, FJ-58A, male, female [FBA 040449, FBA 040459]; Kilaka, 154 m; 16°48.412'S 178°59.017'E, 28.VI–2.VII.04, M. Irwin, E. Schlinger, M. Tokota'a, Malaise, FJ-58D, female [FBA 047915]; Batiqere Range, 6 km NW Kilaka Village, 146 m; 16.815°S, 178.986°E, 28.VI–21.VII.2004, Schlinger, Tokota'a, Malaise 1, female [FBA 105147]. **Viti Levu**: Nadarivatu Res., 850 m, 11.VII.1987; G. & S. Monteith, Pyrethrum/trees and logs, female [OSUC 148459]; Naitasiri, 3.8 km N Veisari Stlmt., log rd. to Waivudawa, 300 m, 18.079°S 178.363°E, 12.XII.2002–3.I.2003, Schlinger, Tokota'a, Malaise 2, female [FBA 104318]. Specimen OSUC 148459 is deposited in QMBA; FBA 105147 in CNCI; FBA 069480 in OSUC; all others will be deposited in FNIC and BPBM.

Comments: The extraordinary modifications of the front of the head of this species are unlike anything we have seen in the Scelionidae. In some ways the enlarged frontal lobes, especially those with the free apices, and the black bristles remind one of a small drosophilid fly! The exact shape of the frontal lobes varies from those in which the upper portion merges smoothly with the dorsal portion of the frons, to those in which the lobe appears as a free appendage. These lobes are not elaborated in the males. They, in contrast, have an enlarged, beaklike clypeus that is especially prominent in lateral view.

ACKNOWLEDGMENTS

We thank L. Musetti, J. Cora, S. Hemley, C. Freeman, L. Brorstrom, and E. Schlinger for technical support. Most of the material used in this study derived from the NSF "Terrestrial Arthropod Survey of Fiji" DEB-0425970 and the Schlinger Foundation. We thank these agencies as well as the Fiji Ministries of Environment and Forestry for their support of the project. This material is also based upon work supported in part by the National Science Foundation under grant Nos. DEB-0344034 and DEB-0614764.

LITERATURE CITED

- Austin, A.D., N.F. Johnson, & M. Dowton.** 2005. Systematics, evolution, and biology of scelionid and platygastriid wasps. *Annual Review of Entomology* **50**: 553–582.
- Bin, F.** 1981. Definition of female antennal clava based on its plate sensilla in Hymenoptera Scelionidae Telenominae. *Redia* **64**: 245–261.
- Evenhuis, N.L. & D.J. Bickel.** 2005. The NSF-Fiji Terrestrial Arthropod Survey: overview. In: Evenhuis, N.L. & Bickel, D.J. (eds.), Fiji Arthropods I. *Bishop Museum Occasional Papers* **82**: 3–25.
- Johnson, N.F. & L. Masner.** 2006. Revision of world species of the genus *Nixonia* Masner (Hymenoptera: Platygastroidea, Scelionidae). *American Museum Novitates* **3518**:1–32.
- Masner, L.** 1976. Revisionary notes and keys to world genera of Scelionidae (Hymenoptera: Proctotrupeoidea). *Memoirs of the Entomological Society of Canada* **97**: 1–87.
- . 1980. Key to the genera of Scelionidae of the Holarctic region, with descriptions of new genera and species (Hymenoptera: Proctotrupeoidea). *Memoirs of the Entomological Society of Canada* **113**: 1–54.
- . 1993. Superfamily Platygastroidea, p. 558–565. In: Goulet, H. & J. T. Huber, *Hymenoptera of the world: an identification guide to families*. Research Branch, Agriculture Canada Publication 1894/E, Ottawa. 668 pp.

New Cricket Genera and Species (Orthoptera: Grylloidea) from the Pacific Region Deposited in the Bishop Museum, Honolulu

DANIEL OTTE

*Department of Entomology, Academy of Natural Sciences, Philadelphia, Pennsylvania 19103,
USA; email: otte@ansp.org*

Abstract: Ten new genera and 99 new species of crickets from Fiji and the western Pacific are validated through bibliographic reference to their original description and the addition of type depositories.

In two recent papers on Pacific crickets (Otte & Cowper, 2007; Otte, 2007) the type depositories were inadvertently omitted for the new species described, which resulted in them being invalid nomenclaturally and ultimately caused the new genus-group names based on them to also be invalid nomenclaturally. This paper provides a complete list of the new species giving bibliographic reference to characters to differentiate each species, indicates where the types are deposited, and validates 10 genus-group names with bibliographic references to characters differentiating each as well as giving a valid type species designation [NB: the genus *Nausorixipha* Otte & Cowper was validly proposed in Otte & Cowper (2007) as it was based on a previously described species].

The new species described from Fiji are currently deposited in the Bishop Museum in Honolulu (BPBM) but will eventually be deposited in the Fiji National Insect Collection in Suva (FNIC). The new species in Otte (2007) deriving from Bishop Museum material are permanently deposited in BPBM.

FIJI TAXA

Subfamily Gryllinae

***Modicogryllus vaturu* Otte & Cowper, n. sp.**

Modicogryllus vaturu Otte & Cowper, 2007: 219.

Type.— Holotype male. FJ-92. FIJI: **Viti Levu**: Nausori Highlands, 8–14 km SE of jet of Vaturu Dam Rd and Sigatoka River Rd, 3.iii.1985, hand netted (Alexander, Otte and Rice) (FNIC; currently in BPBM).

***Modicogryllus nandi* Otte & Cowper, n. sp.**

Modicogryllus nandi Otte & Cowper, 2007: 219.

Type.— Holotype male. FJ-88. FIJI: **Vanua Levu**: Labasa-Savusavu road, near mountain crest, rainforest, 23.ii.1985, hand netted (Alexander, Otte and Rice) (FNIC; currently in BPBM).

***Modicogryllus volivoli* Otte & Cowper, n. sp.**

Modicogryllus volivoli Otte & Cowper, 2007: 219.

Type.— Holotype male. FJ-81. FIJI: **Taveuni**: Cakaudrove, 3.2 km NW Lavena Vlg., Mt. Koronibuabua, 16.855°S, 179.892°W, 235 m, 5–17.vi.2004, Malaise 1 (E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Subfamily Nemobiinae

***Dictyonemobius labasa* Otte & Cowper, n. sp.**

Dictyonemobius labasa Otte & Cowper, 2007: 219.

Type.— Holotype male. FJ-93. FIJI: **Vanua Levu**: Labasa-Savusavu road, near mountain crest, rainforest, 23.ii.1985, hand netted (Alexander, Otte and Rice) (FNIC; currently in BPBM).

***Dictyonemobius conaros* Otte & Cowper, n. sp.**

Dictyonemobius conaros Otte & Cowper, 2007: 220.

Type.— Holotype male. FJ-84. FIJI: **Taveuni**: Cakaudrove, 5.3 km SE Tavuki Vlg., Mt. Devo, 16.841°S, 179.968°W, 1064m, 3–10.i.2003, Malaise 3 (E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Dictyonemobius savu* Otte & Cowper, n. sp.**

Dictyonemobius savu Otte & Cowper, 2007: 220.

Type.— Holotype male. FJ-87. FIJI: **Viti Levu**: Vuda, 1 km E Abaca Vlg., Koroyanitu Ntl. Pk., Savuione Trail, 17°40'S, 177°33'E, 800 m, 7–12.x.2002, Malaise (E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Dictyonemobius trico* Otte & Cowper, n. sp.**

Dictyonemobius trico Otte & Cowper, 2007: 220.

Type.— Holotype male. FJ-85. FIJI: **Taveuni**: Cakaudrove, 5.3 km SE Tavuki Vlg., Mt. Devo, 16.841°S, 179.968°W, 1064m, 3–10.i.2003, Malaise 3 (E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Subfamily Trigonidiinae

***Trigonidium inopinum* Otte & Cowper, n. sp.**

Trigonidium inopinum Otte & Cowper, 2007: 221.

Type.— Holotype male. FJ-61. FIJI: **Vanua Levu**: Labasa-Savusavu road, near mountain crest, rainforest, 23.ii.1985, hand netted (Alexander, Otte and Rice).

***Fijixipha* Otte & Cowper, n. gen.**

Fijixipha Otte & Cowper, 2007: 221.

Type species.—*Fijixipha batia* Otte & Cowper, 2007, by present designation.

***Fijixipha atalos* Otte & Cowper, n. sp.**

Fijixipha atalos Otte & Cowper, 2007: 221.

Type.— Holotype male. FJ-33. FIJI: **Taveuni**: Cakaudrove, 5.3 km SE Tavuki Vlg., Mt. Devo, 16.841°S, 179.968°W, 1064 m, 2–10.x.2002, Malaise 3 (E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Fijixipha batia Otte & Cowper, n. sp.

Fijixipha batia Otte & Cowper, 2007: 222.

Type.— Holotype male. FJ-26. FIJI: **Kadavu**: 0.25 km SW Solodamu Vlg., Moanakaka Bird Snctry, 19.078°S, 178.121°E, 60 m, 25.viii–23.x.2003, Malaise 4 (E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Fijixipha configens Otte & Cowper, n. sp.

Fijixipha configens Otte & Cowper, 2007: 224.

Type.— Holotype male. FJ-56. FIJI: **Viti Levu**: Vuda, 1 km E Abaca Vlg., Koroyanitu Ntl. Pk., Kokabula Trail, 17°40'S, 177°33'E, 800 m, 12–19.xi.2002, Malaise (E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Fijixipha exuros Otte & Cowper, n. sp.

Fijixipha exuros Otte & Cowper, 2007: 225.

Type.— Holotype male. FJ-41. FIJI: **Vanua Levu**: Bua, 6 km NW Kilaka, Batiqere Range, 16.8153°S, 178.9864°W, 146 m, 15.vi–28.vi.2004, Malaise (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Fijixipha harpeza Otte & Cowper, n. sp.

Fijixipha harpeza Otte & Cowper, 2007: 225.

Type.— Holotype male. FJ-1. FIJI: **Viti Levu**: Naitasiri, Nakobalevu Mt., rainforest, 18°03'S, 178°25'E, 340 m, 24.x–29.x.2003, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Fijixipha inaudax Otte & Cowper, n. sp.

Fijixipha inaudax Otte & Cowper, 2007: 225.

Type.— Holotype male. FJ-13. FIJI: **Kadavu**: 0.25 km SW Solodamu Vlg., Moanakaka Bird Snctry, 19°04'39"S, 178°07'15.6"E, 60 m, 19.xii.03–18.i.2004, Malaise (E.I. Schlinger, M. Tokota'a) [FBA 087423] (FNIC; currently in BPBM).

Fijixipha naitasiri Otte & Cowper, n. sp.

Fijixipha naitasiri Otte & Cowper, 2007: 225.

Type.— Holotype male. FJ-8. FIJI: **Viti Levu**: Naitasiri, Navai Village, Eteni, 17°37'S, 177°59'E, 700 m, 15.v–2.vi.2003, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Fijixipha penita Otte & Cowper, n. sp.

Fijixipha penita Otte & Cowper, 2007: 226.

Type.— Holotype male. FJ-17. FIJI: **Vanua Levu**: Bua, Kilaka, 16°48'41"S, 178°59'290"E, 98 m, 28.vi–21.vii.2004, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Fijixipha titilans Otte & Cowper, n. sp.

Fijixipha titilans Otte & Cowper, 2007: 226.

Type.— Holotype male. FJ-42. FIJI: **Kadavu**: 0.25 km SW Solodamu Vlg., Moanakaka Bird Snctry, 19.078°S, 178.121°E, 60 m, 25.viii–23.x.2003, Malaise 3 (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Fijixipha valens* Otte & Cowper, n. sp.**

Fijixipha valens Otte & Cowper, 2007: 226.

Type.— Holotype male. FJ-45. FIJI: **Vanua Levu**: Macuata, Rokosalase, in forest, 16°31'891"S, 179°01'147"E, 105 m, 26.iii–9.iv.2004, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Fijixipha xipheres* Otte & Cowper, n. sp.**

Fijixipha xipheres Otte & Cowper, 2007: 226.

Type.— Holotype male. FJ-6. FIJI: **Viti Levu**: Naitasiri, 4 km WSW Colo-i-Suva Village, Mt. Nakobalevu, 18.055°S, 178.424°E, 372m, 14–28.vii.2003, Malaise 3 (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***KADAVUXIPHA* Otte & Cowper, n. gen.**

Kadavuxipha Otte & Cowper, 2007: 227.

Type species.—*Kadavuxipha soladamu* Otte & Cowper, 2007, by present designation.

***Kadavuxipha soladamu* Otte & Cowper, n. sp.**

Kadavuxipha soladamu Otte & Cowper, 2007: 227.

Type.— Holotype male. FIJI: **Kadavu**: Solodamu, coastal limestone forest, 19°04'S, 178°07'E, 128 m, 11.vi–6.vii.2003, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***LEVUXIPHA* Otte & Cowper, n. gen.**

Levuxipha Otte & Cowper, 2007: 227.

Type species.—*Levuxipha viticola* Otte & Cowper, 2007, by present designation.

***Levuxipha viticola* Otte & Cowper, n. sp.**

Levuxipha viticola Otte & Cowper, 2007: 227.

Type.— Holotype male. FJ-25. FIJI: **Viti Levu**: Naitasiri, 4 km WSW Colo-i-Suva Village, Mt. Nakobalevu, 18.055°S, 178.424°E, 372 m, 25.ii–17.iii.2003, Malaise 3 (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***MINUTIXIPHA* Otte & Cowper, n. gen.**

Minutixipha Otte & Cowper, 2007: 228.

Type species.—*Minutixipha exenios* Otte & Cowper, 2007, by present designation.

***Minutixipha exenios* Otte & Cowper, n. sp.**

Minutixipha exenios Otte & Cowper, 2007: 228.

Type.— Holotype male. FJ-62. FIJI: **Vanua Levu**: 12 km N of Savusavu, along lumber road, rainforest, 24.ii.1985, hand netted (Alexander, Otte and Rice) (FNIC; currently in BPBM).

***Nausorixipha dogotuki* Otte & Cowper, n. sp.**

Nausorixipha dogotuki Otte & Cowper, 2007: 228.

Type.— Holotype male. FJ-40. FIJI: **Vanua Levu**: Macuata, Dogotuki, 2.5 km E of Nasavu River, 16.2519°S, 179.7833°E, 226 m, 7.vii.2003, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Nausorixipha euthetos* Otte & Cowper, n. sp.**

Nausorixipha euthetos Otte & Cowper, 2007: 228.

Type.— Holotype male. FJ-29. FIJI: **Viti Levu**: Naitasiri, 3.2 km E Navai Vlg., Veilaselase Track, 17.624°S, 178.009°E, 1020 m, 6.vi–15.vii.2003, Malaise 2 (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Nausorixipha nakubalevu* Otte & Cowper, n. sp.**

Nausorixipha nakubalevu Otte & Cowper, 2007: 229.

Type.— Holotype male. FJ-22. FIJI: **Viti Levu**: Naitasiri, 4 km WSW Colo-i-Suva Village, Mt. Nakobalevu, 18.055°S, 178.424°E, 372 m, 25.ii–17.iii.2003, Malaise 3 (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Nausorixipha navai* Otte & Cowper, n. sp.**

Nausorixipha navai Otte & Cowper, 2007: 229.

Type.— Holotype male. FJ-10. FIJI: **Viti Levu**: Naitasiri, Navai Village, Eteni, 17°37'S, 177°59'E, 700 m, 15.v–2.vi.2003, Malaise (M.E. Irwin, E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Nausorixipha viti* Otte & Cowper, n. sp.**

Nausorixipha viti Otte & Cowper, 2007: 229.

Type.— Holotype male. FJ-2. FIJI: **Viti Levu**: Sigatoka, Sigatoka Sand Dunes N.P., 18°09'939"S, 177°28'967"E, 4 m, 24.xi–16.xii.2003, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***SAVUXIPHA* Otte & Cowper, n. gen.**

Savuxipha Otte & Cowper, 2007: 230.

Type species.—*Savuxipha tromodes* Otte & Cowper, 2007, by present designation.

***Savuxipha tromodes* Otte & Cowper, n. sp.**

Savuxipha tromodes Otte & Cowper, 2007: 230.

Type.— Holotype male. FJ-52. FIJI: **Viti Levu**: Vuda, 1 km E Abaca Vlg., Koroyanitu Ntl. Pk, Savuione Trail, 17°40'S, 177°33'E, 800 m, 7–12.x.2002, Malaise (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***TAVUKIXIPHA* Otte & Cowper, n. gen.**

Tavukixipha Otte & Cowper, 2007: 230.

Type species.—*Tavukixipha devo* Otte & Cowper, 2007, by present designation.

***Tavukixipha devo* Otte & Cowper, n. sp.**

Tavukixipha devo Otte & Cowper, 2007: 230.

Type.— Holotype male. FIJI: **Vanua Levu**: Bua, Kilaka, 16°48'41.2"S, 178°59'29.0"E, 98 m, 28.vi–21.vii.2004, Malaise (M.E. Irwin, E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***VANUAXIPHA* Otte & Cowper, n. gen.**

Vanuaxipha Otte & Cowper, 2007: 230.

Type species.—*Vanuaxipha perfixa* Otte & Cowper, 2007, by present designation.

Vanuaxipha adamantos Otte & Cowper, **n. sp.**

Vanuaxipha adamantos Otte & Cowper, 2007: 230.

Type.— Holotype male. FJ-63. FIJI: **Viti Levu**: Nausori Highlands, 8–14 km SE of jet of Vaturu Dam Rd and Sigatoka River Rd, 3.iii.1985, hand netted (Alexander, Otte and Rice) (FNIC; currently in BPBM).

Vanuaxipha dendriacos Otte & Cowper, **n. sp.**

Vanuaxipha dendriacos Otte & Cowper, 2007: 230.

Type.— Holotype male. FJ-54. FIJI: **Viti Levu**: Namosi, Ocean Pacific, Wainadoi, coastal forest, 18°10'S, 178°15'E, 40 m, 5.xi–24.xi.2003, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Vanuaxipha eteni Otte & Cowper, **n. sp.**

Vanuaxipha eteni Otte & Cowper, 2007: 231.

Type.— Holotype male. FJ-49. FIJI: **Viti Levu**: Naitasiri, Navai Village, Eteni, 17°37'S, 177°59'E, 700 m, 13.ii–18.ii.2004, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Vanuaxipha koroni Otte & Cowper, **n. sp.**

Vanuaxipha koroni Otte & Cowper, 2007: 231.

Type.— Holotype male. FJ-37. FIJI: **Taveuni**: Cakaudrove, 3.2 km NW Lavena Vlg., Mt. Koronibuabua, 16.855°S, 179.892°W, 235 m, 5-17.vi.2004, Malaise 1 (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Vanuaxipha perfixa Otte & Cowper, **n. sp.**

Vanuaxipha perfixa Otte & Cowper, 2007: 231.

Type.— Holotype male. FJ-58. FIJI: **Viti Levu**: Naitasiri, Navai Village, Eteni, 17°37'S, 177°59'E, 700 m, 24.x-8.xi.2003, Malaise (M.E. Irwin, E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Vanuaxipha tricoso Otte & Cowper, **n. sp.**

Vanuaxipha tricoso Otte & Cowper, 2007: 231.

Type.— Holotype male. FJ-50. FIJI: **Viti Levu**: Namosi, Ocean Pacific, Wainadoi, coastal forest, 18°10'S, 178°15'E, 40 m, 5.xi–24.xi.2003, Malaise (M.E. Irwin, E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Vanuaxipha xylicos Otte & Cowper, **n. sp.**

Vanuaxipha xylicos Otte & Cowper, 2007: 232.

Type.— Holotype male. FIJI: **Vanua Levu**: Macuata, 0.6 km S of Rokosalase Village, forest, 16.5333°S, 179.0181°E, 180 m, 22.v–8.vi.2004, Malaise (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

VEISARIXIPHA Otte & Cowper, **n. gen.**

Veisarixipha Otte & Cowper, 2007: 232.

Type species.—*Veisarixipha waivudawa* Otte & Cowper, 2007, by present designation.

***Veisarixipha waivudawa* Otte & Cowper, n. sp.**

Veisarixipha waivudawa Otte & Cowper, 2007: 232.

Type.— Holotype male. FJ-4. FIJI: **Viti Levu**: Naitasiri, 3.8 km N Veisari Stlmt., log rd to Waivudawa, 18.079°S, 178.363°E, 300 m, 12.xii.2002–3.i.2003, Malaise 2 (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***VITIXIPHA* Otte & Cowper, n. gen.**

Vitixipha Otte & Cowper, 2007: 232.

Type species.—*Vitixipha axios* Otte & Cowper, 2007, by present designation.

***Vitixipha axios* Otte & Cowper, n. sp.**

Vitixipha axios Otte & Cowper, 2007: 232.

Type.— Holotype male. FJ-11. FIJI: **Taveuni**: Cakaudrove, 5.3 km SE Tavuki Vlg., Mt. Devo, 16.841°S, 179.968°W, 1064 m, 17–24.x.2002, Malaise 3 (E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Vitixipha bua* Otte & Cowper, n. sp.**

Vitixipha bua Otte & Cowper, 2007: 233.

Type.— Holotype male. FJ-44. FIJI: **Vanua Levu**: Bua, 6 km NW Kilaka, Batiqere Range, 16.8153°S, 178.9864°W, 146 m, 15.vi–28.vi.2004, Malaise (E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Vitixipha chlora* Otte & Cowper, n. sp.**

Vitixipha chlora Otte & Cowper, 2007: 233.

Type.— Holotype male. FJ-46. FIJI: **Taveuni**: Cakaudrove, Taveuni Estate, in garden, 16°50'S, 179°59'E, 140 m, 31.x–21.xi.2002, Malaise (M.E. Irwin, E. I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Vitixipha kilaka* Otte & Cowper, n. sp.**

Vitixipha kilaka Otte & Cowper, 2007: 233.

Type.— Holotype male. FJ-15. FIJI: **Vanua Levu**: Bua, Kilaka, 16°48'412"S, 178°59'290"E, 98m, 28.vi–21.vii.2004, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Vitixipha peracta* Otte & Cowper, n. sp.**

Vitixipha peracta Otte & Cowper, 2007: 233.

Type.— Holotype male. FJ-59. FIJI: **Viti Levu**: Vuda, 1 km E Abaca Vlg., Koroyanitu Ntl. Pk, Savuione Trail, 17°40'S, 177°33'E, 800 m, 26.x–5.xi.2002, Malaise (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Vitixipha vuda* Otte & Cowper, n. sp.**

Vitixipha vuda Otte & Cowper, 2007: 233.

Type.— Holotype male. FJ-18. FIJI: **Viti Levu**: Vuda, Koroyanitu N.H.P., Abaca Village, 17°40'S, 177°33'E, 400 m, 6.v–26.v.2003, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

VUDAXIPHA Otte & Cowper, **n. gen.**

Vudaxipha Otte & Cowper, 2007: 234.

Type species.—*Vudaxipha kokabula* Otte & Cowper, 2007, by present designation.

Vudaxipha kokabula Otte & Cowper, **n. sp.**

Vudaxipha kokabula Otte & Cowper, 2007: 234.

Type.— Holotype male: FIJI: **Viti Levu**: Vuda, Koroyanitu Eco Park, 0.5 km N Abaca Vlg., 17.667°S, 177.55°E, 800 m, 12–19.xi.2002, Malaise 1 (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Subfamily Podoscritinae

Aphonoides catactictos Otte & Cowper, **n. sp.**

Aphonoides catactictos Otte & Cowper, 2007: 234.

Type.— Holotype male. FJ-82. FIJI: **Viti Levu**: Naitasiri, 4 km WSW Colo-i-Suva Village, Mt. Nakobalevu, 18.055°S, 178.424°E, 372m, 14–28.vii.2003, Malaise 3 (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Aphonoides kadavu Otte & Cowper, **n. sp.**

Aphonoides kadavu Otte & Cowper, 2007: 236.

Type.— Holotype male. FJ-73. FIJI: **Kadavu**: Solodamu, coastal limestone forest, 19°04'S, 178°07'E, 128m, 23.x–19.xii.2003, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Aphonoides namalata Otte & Cowper, **n. sp.**

Aphonoides namalata Otte & Cowper, 2007: 236.

Type.— Holotype male. FJ-72. FIJI: **Viti Levu**: Vuda, Koroyanitu N.H.P. Abaca Village, 17°40'S, 177°33'E, 400 m, 6.v–26.v.2003, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Aphonoides peristiges Otte & Cowper, **n. sp.**

Aphonoides peristiges Otte & Cowper, 2007: 237.

Type.— Holotype male. FJ-76. FIJI: **Taveuni**: Cakaudrove, 5.3 km SE Tavuki, Devo Peak, 16.8431°S, 179.9681°W, 1064m, 14.xi–21.xi.2002, Malaise (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Aphonoides tavuki Otte & Cowper, **n. sp.**

Aphonoides tavuki Otte & Cowper, 2007: 237.

Type.— Holotype male. FJ-71. FIJI: **Taveuni**: Cakaudrove, 5.5 km SE of Tavuki Village, rainforest, 16.843°S, 179.966°W, 1188m, 30.vi–14.viii.2004, Malaise (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Aphonoides xylurgos Otte & Cowper, **n. sp.**

Aphonoides xylurgos Otte & Cowper, 2007: 238.

Type.— Holotype male. FJ-78. FIJI: **Vanua Levu**: Macuata, Rokosalase, in forest, 16°31'891"S, 179°01'147"E, 105 m, 26.iii–9.iv.2004, Malaise (M.E. Irwin, E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

Subfamily Itarinae

***Phaloria eugenis* Otte & Cowper, n. sp.**

Phaloria eugenis Otte & Cowper, 2007: 238.

Type.— Holotype male. FJ-83. FIJI: **Taveuni**: Cakaudrove, 5.3 km SE Tavuki Village, Mt. Devo, 16°50'27.4"S, 179°58'04.1"W, 1064 m, 31.x–14.xi.2002, Malaise (E.I. Schlinger, M. Tokota'a) (FNIC; currently in BPBM).

***Phaloria galoa* Otte & Cowper, n. sp.**

Phaloria galoa Otte & Cowper, 2007: 238.

Type.— Holotype male. FJ-90. **Viti Levu**: Galoa Road ca. 10 N of Sigatoka-Suva Rd, rainforest, 25.ii.1985, hand netted (Alexander, Otte and Rice) (FNIC; currently in BPBM).

WESTERN PACIFIC TAXA

***Cardiodactylus gressitti* Otte, n. sp.**

Cardiodactylus gressitti Otte, 2007: 347.

Type.— Holotype male. SOLOMON ISLANDS: Mono Island, SE side, 50 m, 6–8 xi 1980 (Gressitt) (BPBM 16,760).

***Cardiodactylus vella* Otte, n. sp.**

Cardiodactylus vella Otte, 2007: 347.

Type.— Holotype male. SOLOMON ISLANDS: Vella Lavella, Mt. Arewana, 10–400 m, 16 xi 1963 (Gressitt) (BPBM 16,761).

***Cardiodactylus sedlaceki* Otte, n. sp.**

Cardiodactylus sedlaceki Otte, 2007: 347.

Type.— Holotype male. SOLOMON ISLANDS: San Cristobal, Wairahu River, 100–400 m, 9–15 v 1964 (J. Sedlacek) (BPBM 16,762).

***Cardiodactylus maai* Otte, n. sp.**

Cardiodactylus maai Otte, 2007: 347.

Type.— Holotype male. NEW GUINEA: Netherlands NG, River Tor (mouth) 4 km E of Hol Maffen, 2 vii 1959 (Maa) (BPBM 16,763).

***Cardiodactylus quatei* Otte, n. sp.**

Cardiodactylus quatei Otte, 2007: 347.

Type.— Holotype male. NEW GUINEA: West NG, Vogelkop, Kebar Valley, W of Manokwari, 550 m, 31 i 1962 (Quate and Quate) (BPBM 16,764).

***Cardiodactylus kondoi* Otte, n. sp.**

Cardiodactylus kondoi Otte, 2007: 348.

Type.— Holotype male. PHILIPPINES: (SW) Sulu: Tarawakan NE, 12 ii 1957 (Yoshio Kondo) (BPBM 16,765).

***Cardiodactylus riga* Otte, n. sp.**

Cardiodactylus riga Otte, 2007: 348.

Type.— Holotype male. PHILIPPINES: Camarines Sur, Mt. Iriga, 500–600 m, 3 iv 1962 (H.M. Torrevillas) (BPBM 16,766).

***Cardiodactylus brandti* Otte, n. sp.**

Cardiodactylus brandti Otte, 2007: 348.

Type.— Holotype male. NEW IRELAND: Schleinitz Mountains, Lelet Plateau, x 1959 (W.W. Brandt) (BPBM 16,767).

***Cardiodactylus manus* Otte, n. sp.**

Cardiodactylus manus Otte, 2007: 348.

Type.— Holotype male. MANUS ISLAND: Momote, 24 xii 1959 (Maa) (BPBM 16,768).

***Cardiodactylus pelagus* Otte, n. sp.**

Cardiodactylus pelagus Otte, 2007: 348.

Type.— Holotype male. BORNEO: Sarawak, Nanga Pelagus near Kapit, 180–585 m, 7–14 viii 1958 (Maa) (BPBM 16,769).

***Cardiodactylus muiri* Otte, n. sp.**

Cardiodactylus muiri Otte, 2007: 349.

Type.— Holotype male. CERAM: Piroe, ii 1909 (F. Muir) (BPBM 16,770).

***Cardiodactylus boharti* Otte, n. sp.**

Cardiodactylus boharti Otte, 2007: 349.

Type.— Holotype male. RYUKYU ISLANDS: Ishigaki Island, 10–15 xi 1952 (G.E. Bohart) (BPBM 16,771).

***Cardiodactylus kraussi* Otte, n. sp.**

Cardiodactylus kraussi Otte, 2007: 349.

Type.— Holotype male. TONGA: 'Eua Island, Ohonua, ii 1956 (N.L.H. Krauss) (BPBM 16,772).

***Cardiodactylus esakii* Otte, n. sp.**

Cardiodactylus esakii Otte, 2007: 349.

Type.— Holotype male. PALAU: Angaur: Saipan-Kitamura, 26 ii 1938 (Teiso Esaki) (BPBM 16,773).

***Cardiodactylus murakami* Otte, n. sp.**

Cardiodactylus murakami Otte, 2007: 349.

Type.— Holotype male. PALAU: Peliliou: Garukyoku, 20 i 1938 (Shiro Murakami) (BPBM 16,774).

***Cardiodactylus hentownesi* Otte, n. sp.**

Cardiodactylus hentownesi Otte, 2007: 350.

Type.— Holotype male. PONAPE: Mt. Dolennankap, 1800 feet, 11 viii 1946 (H.K. Townes) (BPBM 16,775).

***Cardiodactylus kusaiense* Otte, n. sp.**

Cardiodactylus kusaiense Otte, 2007: 350.

Type.— Holotype male. KUSAIE ISLAND: Mt. Tafeyat, 1000–1200 feet, 20 viii 1946 (H.K. Townes) (BPBM 16,776).

***Cardiodactylus gagnei* Otte, n. sp.**

Cardiodactylus gagnei Otte, 2007: 350.

Type.— Holotype male. VANUATU: Ambrym, Ranon to Mt. Toyo, 0–500 m, 2 ix 1979 (W.C. Gagné *et al.*) (BPBM 16,777).

***Cardiodactylus cheesmani* Otte, n. sp.**

Cardiodactylus cheesmani Otte, 2007: 350.

Type.— Holotype male. VANUATU: Tanna, x 1930 (L.E. Cheesman) (BPBM 16,778).

***Cardiodactylus bulolo* Otte, n. sp.**

Cardiodactylus bulolo Otte, 2007: 350.

Type.— Holotype male. NEW GUINEA: (NE) Bulolo, 700 m, 26 xi 1969 (Sedlacek) (BPBM 16,779).

***Cardiodactylus mamai* Otte, n. sp.**

Cardiodactylus mamai Otte, 2007: 350.

Type.— Holotype male. NEW GUINEA: (SE), Mamai Plantation, E of Port Glasgow, 150 m, 31 i 1965 (BPBM 16,780).

***Cardiodactylus empagatao* Otte, n. sp.**

Cardiodactylus empagatao Otte, 2007: 351.

Type.— Holotype male. PHILIPPINES: Misamis Or., Mt. Empagatao, 28 km SW of Gingoog, 12 iv 1961 (H.M. Torrevillas) (BPBM 16,781).

***Cardiodactylus efordi* Otte, n. sp.**

Cardiodactylus efordi Otte, 2007: 351.

Type.— Holotype male. SOLOMON ISLANDS: Bougainville (S.), Kokure, near Crown Prince Range, 900 m, 8 vi 1966 (E.J. Ford Jr) (BPBM 16,782).

***Cardiodactylus busu* Otte, n. sp.**

Cardiodactylus busu Otte, 2007: 351.

Type.— Holotype male. NEW GUINEA: (NW) Japen Island, SSE of Sumberbaba, Dawai River, 10 x 1962 (N. Wilson) (BPBM 16,783).

***Cardiodactylus tangtalau* Otte, n. sp.**

Cardiodactylus tangtalau Otte, 2007: 353.

Type.— Holotype male. SOLOMON ISLANDS: Malaita, Tangtalau, 200 m, 26 ix 1957 (BPBM 16,784).

***Cardiodactylus kokure* Otte, n. sp.**

Cardiodactylus kokure Otte, 2007: 353.

Type.— Holotype male. SOLOMON ISLANDS: Buka Agricultural Station, 6–10 xii 1959 (T.C. Maa) (BPBM 16,785).

***Cardiodactylus kuschei* Otte, n. sp.**

Cardiodactylus kuschei Otte, 2007: 353.

Type.— Holotype male. SOLOMON ISLANDS: Guadalcanal, 2-5-21 (Kusche) (BPBM 16,786).

***Cardiodactylus mumurai* Otte, n. sp.**

Cardiodactylus mumurai Otte, 2007: 353.

Type.— Holotype male. SOLOMON ISLANDS: Bougainville, Mumurai, 9 vi 1956 (Gressitt) (BPBM 16,787).

***Cardiodactylus shanahani* Otte, n. sp.**

Cardiodactylus shanahani Otte, 2007: 353.

Type.— Holotype male. SOLOMON ISLANDS: Kolombangara, Pepele, 30 m, 7 ii 1964 (Shanahan) (BPBM 16,788).

***Cardiodactylus enkraussi* Otte, n. sp.**

Cardiodactylus enkraussi Otte, 2007: 353.

Type.— Holotype male. VANUATU: Santo, Segond Channel, viii 1950 (Krauss) (BPBM 16,789).

***Cardiodactylus tathimani* Otte, n. sp.**

Cardiodactylus tathimani Otte, 2007: 354.

Type.— Holotype male. SOLOMON ISLANDS: NW Malaita Island, Dala, 11 vi 1964 (Straatman) (BPBM 16,790).

***Cardiodactylus wairahu* Otte, n. sp.**

Cardiodactylus wairahu Otte, 2007: 354.

Type.— Holotype male. SOLOMON ISLANDS: San Cristobal, Wairahu River, 100 m, 9–15 v 1964 (Sedlacek) (BPBM 16,791).

***Cardiodactylus kukugai* Otte, n. sp.**

Cardiodactylus kukugai Otte, 2007: 354.

Type.— Holotype male. SOLOMON ISLANDS: Bougainville, Kukugai Village, 150 m, x 1960 (W.W. Brandt) (BPBM 16,792).

***Cardiodactylus javarere* Otte, n. sp.**

Cardiodactylus javarere Otte, 2007: 354.

Type.— Holotype male. NEW GUINEA: Papua, Daradae, near Javarere, Musgrove River, 100 m?, 3 x 1958 (Gressitt) (BPBM 16,793).

***Cardiodactylus togerao* Otte, n. sp.**

Cardiodactylus togerao Otte, 2007: 354.

Type.— Holotype male. SOLOMON ISLANDS: Bougainville (E), Togerao, 600 m, 15 iv 1968 (Straatman) (BPBM 16,794).

***Cardiodactylus singuawa* Otte, n. sp.**

Cardiodactylus singuawa Otte, 2007: 355.

Type.— Holotype male. NEW GUINEA: (NE) Lae, Singuawa River, 147°10'E 6°45'S, 30 m, 1 iv 1966 (G. Lippert) (BPBM 16,795).

***Cardiodactylus kolombangara* Otte, n. sp.**

Cardiodactylus kolombangara Otte, 2007: 355.

Type.— Holotype male. SOLOMON ISLANDS: Kolombangara, Gollifer's Camp, 700 m, 24 i 1964 (Shanahan) (BPBM 16,796).

***Cardiodactylus lavella* Otte, n. sp.**

Cardiodactylus lavella Otte, 2007: 355.

Type.— Holotype male. SOLOMON ISLANDS: Vella Lavella, Ulo Crater, 10 m, xii 1963 (Shanahan) (BPBM 16,797).

***Madasumma zamboanga* Otte, n. sp.**

Madasumma zamboanga Otte, 2007: 355.

Type.— Holotype male. PHILIPPINE ISLANDS: Mindanao, Zamboanga del Norte, Masawan Trail to Mount Malindang, 1290 m, 14 vii 1958 (H. Milliron) (BPBM 16,798).

***Lebinthus makilingus* Otte, n. sp.**

Lebinthus makilingus Otte, 2007: 356.

Type.— Holotype male. PHILIPPINE ISLANDS: Luzon Island, Mount Makiling, 400 m, 16 v 1959 (BPBM 16,799).

***Landreva erromanga* Otte, n. sp.**

Landreva erromanga Otte, 2007: 356.

Type.— Holotype male. VANUATU: Erromanga Island, August 1930 (L.E. Cheesman) (BPBM 16,800).

***Mikluchomaklaia chuaye* Otte, n. sp.**

Mikluchomaklaia chuaye Otte, 2007: 356.

Type.— Holotype male. NEW GUINEA: Chuaye, 2000 m, 8–14 iii 1968 (BPBM 16,801).

***Mikluchomaklaia biaru* Otte, n. sp.**

Mikluchomaklaia biaru Otte, 2007: 356.

Type.— Holotype male. NEW GUINEA (NE): Upper Biaru, 1600–2200 m, 10 iii 1971 (Gressitt and Tawi) (BPBM 16,802).

***Mikluchomaklaia gorochovi* Otte, n. sp.**

Mikluchomaklaia gorochovi Otte, 2007: 356.

Type.— Holotype male. NEW GUINEA (NE): Upper Biaru, 1600–2200 m, 10 iii 1971 (Gressitt and Tawi) (BPBM 16,803).

***Modicogryllus abRICTOS* Otte, n. sp.**

Modicogryllus abRICTOS Otte, 2007: 357.

Type.— Holotype male. FJ-95. SOLOMON ISLANDS: Guadalcanal Honiara region, Mt Austin area forest edge, 5.iii.1985, hand netted (Alexander, Otte & Rice) (BPBM 16,804).

LITERATURE CITED

- Otte, D. 2007. New species of *Cardiodactylus* from the western Pacific region. *Proceedings of the Academy of Natural Sciences of Philadelphia* **156**: 341–400.
- . & G. Cowper. 2007. New cricket species from the Fiji Islands (Orthoptera: Grylloidea). *Proceedings of the Academy of Natural Sciences of Philadelphia* **156**: 217–303.

A New Mealybug Species (Hemiptera: Coccoidea: Pseudococcidae) from the Ant-Plant *Hydnophytum* sp. (Rubiaceae) in Fiji¹

NATE B. HARDY

*Department of Entomology, University of California, 1 Shields Avenue, Davis,
California 95616-8584, USA; email: nbhardy@ucdavis.edu*

Abstract. The adult female of a new species of Fijian mealybug, *Neosimmondsia hydnophytum* n. sp., from inside the domatium of a species of the ant-plant genus *Hydnophytum* (Rubiaceae: Rubioideae: Psychotriaceae) is described. A key is provided to the adult females of the species of *Neosimmondsia* Laing.

INTRODUCTION

Twenty-three species of mealybugs (Pseudococcidae) have been recorded from Fiji (Ben-Dov *et al.*, 2007). Some are cosmopolitan pests, e.g. *Pseudococcus longispinus* Targioni Tozzetti, *Ferrisia virgata* (Cockerell), and *Planococcus minor* (Maskell), but fourteen species are known only from islands in the south Pacific. Of these, five species are known only from Fiji: *Fijicoccus casuarinae* Williams & Watson; *Leptococcus gralator* Williams & Watson; *Paracoccus dendricola* Williams & Watson; *P. trichospermi* Williams & Watson; and *Paraputo aracearum* Williams. In August 2006, myrmecologist Philip S. Ward collected mealybugs from inside an ant-plant in the genus *Hydnophytum*, while collecting in mossy rainforest along an old logging track on Viti Levu, Fiji. These mealybugs represent an undescribed species, sharing several features with the south Pacific genus *Neosimmondsia* Laing.

The genus *Neosimmondsia* was erected by Laing (1930) for a single species, *N. hirsuta* Laing, found feeding on coconut (*Cocos nucifera*) in the Solomon Islands (Malaita). Takahashi (1939) described a second species, *N. esakii*, which feeds on palms and *Pandanus* on the Micronesian island Pohnpei (formerly Ponape) in the Caroline Islands (Beardsley, 1966). Williams (1960) redescribed and illustrated *N. hirsuta*, and Williams & Watson (1988) provided a key to the adult females of the 2 species of *Neosimmondsia*. The two described species of *Neosimmondsia* are characterized by having (1) the dorsum strongly convex; (2) the body outline nearly circular; (3) very poorly developed anal lobes with sclerotic areas on the ventral surface; (4) a dorsal anal ring with 6 setae, positioned ca. its own length from the margin; (5) antenna 6-segmented; (6) well-developed legs; (7) claw without a denticle; (8) anterior and posterior ostioles present; (9) recognizable cerarii absent; and (10) oral collar ducts and multilocular pores restricted to the venter. The undescribed species from *Hydnophytum* sp. shares all but 3 of these features: (1) the antenna is 7-segmented; (2) the anal ring has 10–12 setae; and (3) cerarii are present.

Species of *Hydnophytum* are part of a clade of myrmecophytic epiphytes that have domatia in the form of a multi-chambered tuber. The chambers have entrance holes for the

1. Contribution No. 2007-014 to the NSF-Fiji Arthropod Survey.

ants, and regions lined with “warts,” which are able to absorb nutrients from ant refuse piles (Huxley, 1978). Huxley & Jebb (1991) placed the genera *Anthorrihiza*, *Hydnophytum*, *Mymecodia*, *Mymephytum*, and *Squamellaria* in the subtribe Hydnophytinae (Rubiaceae: Rubioideae: Psychotriaceae); however, the classification of this group lags far behind current phylogenetic knowledge. Nepokroeff *et al.* (1999) found the extremely diverse *Psychotria* (1000–1500 described species) to be broadly paraphyletic with respect to more than ten genera, including those comprising Hydnophytinae. Hydnophytine ant-plants are distributed from Thailand to Fiji, with the highest diversity in Papua New Guinea. The only previous record of a scale insect from a hydnophytine ant-plant is *Psoraleococcus browni* Lambdin & Kosztarab (Lecanodiaspididae) from a species of *Mymecodia* in Papua New Guinea (Lambdin & Kosztarab, 1988). This pit scale also apparently lives inside the tuber of the host plant in association with ants, but the identity of the ants is not known.

Here I describe and illustrate the adult female of a new species of *Neosimmondsia*, the sixth mealybug species known only from Fiji, and the second scale insect known to feed on a hydnophytin ant-plant. I also revise the generic description of *Neosimmondsia* to include this new species and provide an updated key to the adult females of the species of *Neosimmondsia*.

MATERIALS AND METHODS

Freshly collected specimens were slide-mounted, with one female per microscope slide. The slide-mounting method of Gullan (1984) was used. Measurements were made using an ocular micrometer attached to a compound microscope. Values given for leg segments are lengths in μm . The morphological terms for Pseudococcidae follow those of Williams (1985). Draft illustrations were prepared with a drawing tube and then scanned and edited on a Macintosh computer using the Adobe programs Photoshop CS and Illustrator CS. Following the convention for scale insects, each figure displays the dorsal body surface on the left side of the page, and the ventral surface on the right; however, since the adult females of this new *Neosimmondsia* species are highly convex, the lateral-most areas of the dorsum, including the marginal fringe and cerarii, are shown on the right side of the figure. Enlargements of diagnostic features are located around the margin of the main figure; the sizes of these structures are provided in the text. The holotype adult female and one paratype third-instar female have been temporarily placed in the Bernice P. Bishop Museum, Honolulu (BPBM), and later will be deposited permanently in the Fiji National Insect Collection, Suva. Two further paratypes (one adult female and one third-instar female) have been deposited in the Bohart Museum of Entomology, University of California, Davis, California (BME). Specimens of the new species were compared with the published descriptions of the other two species of *Neosimmondsia* (Takahashi 1939; Williams 1960; Williams & Watson 1988) and with four slide-mounted specimens of *N. esakii* on one slide, labelled as follows: “*Neosimmondsia* / *esakii* Tak. / Ninani, Ponape I. / Caroline Is. / Aug. 1, 1950 / P. A. Adams / #1” (BME).

SYSTEMATICS

Neosimmondsia Laing

Neosimmondsia Liang, 1930: 19; Williams 1960: 414; Beardsley 1966: 420. Type species *Neosimmondsia hirsuta* Liang, by original designation and monotypy

Generic description. Body outline of slide-mounted female subcircular to circular. Antenna 6- or 7-segmented. Claw without denticle. Circulus rectangular. Anterior and posterior pairs of ostioles present. Anal ring dorsal, situated ca. its own length from margin, bearing 6–12 setae. Trilocular pores abundant. Multilocular pores present on venter. Tubular ducts restricted to venter. Cerarii present or absent, if present, each cerarius containing 2–5 small conical setae. Translucent pores restricted to hind coxae, which are more or less enlarged. Anal lobes weakly developed, each with distinct, broad sclerotization on ventral surface. Feeding on palms or inside tubers of *Hydnophytum* in the tropical south Pacific.

KEY TO ADULT FEMALES OF SPECIES OF *NEOSIMMONDSIA* LAING
(modified from Williams & Watson, 1988)

- 1. Marginal fringe of numerous elongate, flagellate setae present; trilocular pores concentrated along margin; multilocular disc pores only present on venter of abdomen 2
- Marginal fringe of elongate flagellate setae absent; trilocular pores not concentrated along margin; multilocular disc pores present on ventromedial areas of both thorax and abdominal segments **hirsuta** Laing
- 2. Antenna 7-segmented; cerarii, each containing 2–5 short conical setae, present along margin in addition to elongate flagellate setae **hydno***phytum* Hardy, **sp. n.**
- Antenna 6-segmented; cerarii absent, only elongate flagellate setae present along margin **esakii** Takahashi

*Neosimmondsia hydno**phytum* Hardy, **new species**

(Fig. 1)

Type. Fiji. Holotype adult female from FIJI: **Viti Levu:** 1.75 km SE of Waimoque Settlement, 17°40'S, 178°00'E, 850 m, ex nest of *Pheidole* sp., *knowlesi* complex, ants inside tuber of *Hydnophytum*, 28.viii.2006, P.S. Ward, accession #15763 (BPBM). Paratypes. 1 adult female (BME) and 2 third-instar females [1 slide BPBM, 1 slide BME (DNA voucher NH121)], same data as holotype.

Description. Adult female (n = 2): Body strongly convex, outline circular; length of slide-mounted adult female 1.9–2.0 mm (holotype 2.0 mm), greatest width 1.6–2.0 mm (holotype 2.0 mm). Anal lobes very poorly developed, but each with conspicuous ventral sclerotization. Eyes each ca. 40 µm wide. Antenna 7-segmented; length 485–580 µm; with 3 or 4 hair-like setae on segment I, 7–13 hair-like setae on segment II, 7–10 hair-like setae on segment III, 9 or 10 hair-like setae on segment IV, 6 or 7 hair-like setae on segment V, 5–7 hair-like setae + 1 fleshy seta on segment VI and 13–17 hair-like setae + 4 fleshy setae on segment VII. Tentorial box 370–410 µm long, ca. 350 µm wide. Labium 3-segmented, 325–350 µm long, ca. 170 µm wide, with 3 pairs of hair-like setae on basal segment, 1 pair of hair-like setae on medial segment, and 5 pairs of hair-like setae + 4 pairs of fleshy setae on the apical segment. Spiracles each 120–145 µm long, 70–90 µm wide across atrium. Circulus rec-

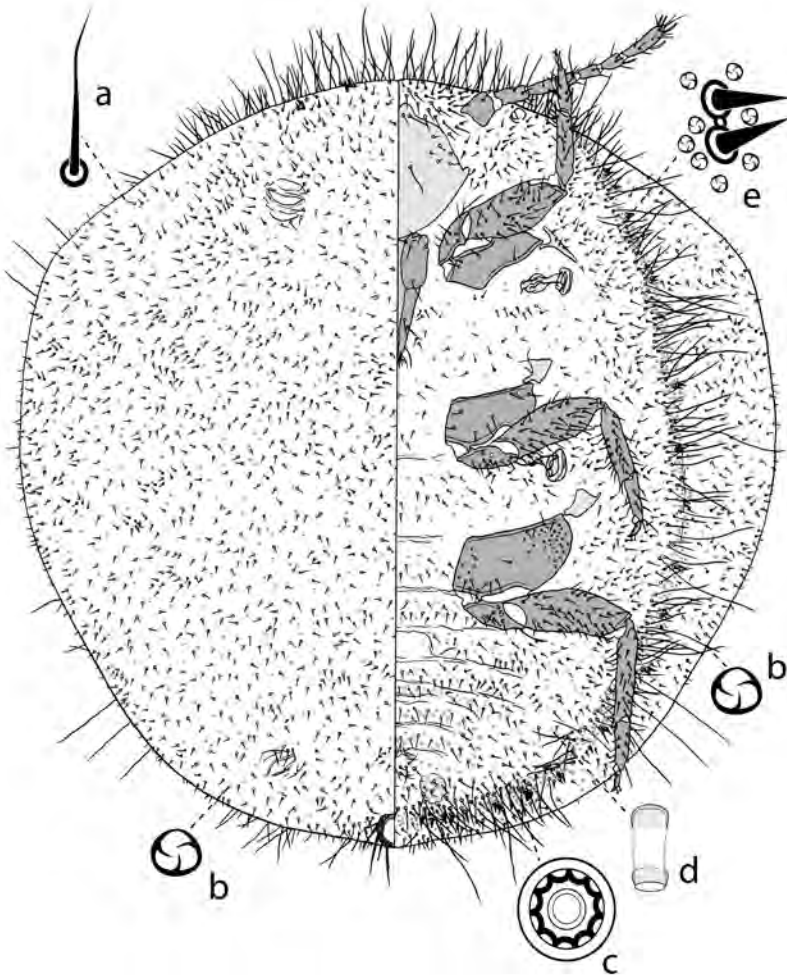


Figure 1. Adult female of *Neosimmondsia hydnoephytum* sp. n.: (a) dorsal seta; (b) trilocular pore; (c) multilocular pore; (d) oral collar duct; (e) cerarius.

tangular, ca. 75 μm long and ca. 200 μm wide, located between abdominal segments III and IV. Legs increasing in size caudad; fore legs: coxa ca. 125 μm , trochanter + femur 310–380 μm , tibia 185–225 μm , tarsus 115–125 μm ; mid legs: coxa ca. 145 μm , trochanter + femur 330–420 μm , tibia 195–230 μm , tarsus 120–130 μm ; hind legs: coxa ca. 170 μm , trochanter + femur 380–445 μm , tibia 235–260, tarsus 130–150 μm ; all legs each with: claw 45–55 μm long; tarsal digitules each 45–65 μm long, with minute apical knob, claw digitules each 40–50 μm long, with well-developed apical knob; coxa with 12–19 setae, trochanter with 16–23 setae, femur with 50–70 setae, tibia with 40–45 setae, tarsus with 15–20 setae. Translucent pores restricted to hind coxae, each with 100–150 pores on dorsal surface and 60–80 pores on ventral surface, each pore minute, ca. 1 μm wide. Ostioles each ca. 75

μm wide, with inner margins of lips sclerotized, each lip with ca. 15 trilocular pores and 10–15 setae. Anal ring 105 μm wide, with 10–12 anal ring setae, each 40–105 μm long.

Dorsum. Derm membranous, delimited by dense marginal fringe of elongate flagellate setae; longest marginal setae each ca. 350 μm long, most marginal setae each 100–150 μm long. Dorsal setae (Fig. 1a) flagellate, each 20–80 μm long, scattered uniformly over dorsum. Trilocular pores (Fig. 1b) each ca. 3 μm in diameter, scattered over dorsum, concentrated along margin near bases of elongate marginal setae. Cerarii numbering 18 pairs; each cerarius containing 2–5 conical setae, each ca. 12 μm long; each anal lobe cerarius containing 4–5 conical setae in transverse row surrounded by dense concentration of ca. 70 trilocular pores; anterior cerarii (Fig. 1e) on abdomen and thorax each containing 2–3 conical setae, cerarii on head each with 3–4 conical setae; a number of small conical setae present along margin in addition to those in cerarii.

Venter. Ventral setae each 10–125 μm long, covering entire venter. Multilocular pores (Fig. 1c) each ca. 9 μm in diameter, with ca. 11 loculi, confined to medial areas of posterior abdominal segments. Trilocular pores similar to those on dorsum, densely distributed over venter. Oral collar ducts (Fig. 1d) each ca. 8 μm long with dermal opening ca. 3 μm in diameter and with oral collars ca. 2 μm long, distributed in transverse rows across abdominal segments anterior to multilocular pores, and throughout margin and submargin.

Etymology. The species name is taken from that of its host plant. It is a noun in apposition.

DISCUSSION

The adult female of *Neosimmondsia hydnohytum* is superficially most similar to that of the Micronesian species *N. esakii*, in that both species have a dense marginal fringe of setae and trilocular pores, and multilocular pores are restricted to the ventroposterior abdominal surface. Adult females of *N. hydnohytum* can be distinguished from those of *N. esakii* by the presence of cerarii (absent in *N. esakii*); 7-segmented antennae (6-segmented in *N. esakii*); ventral oral collar ducts present in transverse bands across abdominal segments anterior of the multilocular pores and scattered along the margin and submargin (ventral oral collar ducts confined to submedial clusters on posterior abdominal surface in *N. esakii*); and relatively small ostioles, each ca. 75 μm wide, each lip with ca. 15 trilocular pores and 10–15 setae (ostioles in *N. esakii* are each ca. 230 μm wide, each lip with ca. 50 trilocular pores and ca. 30 setae). Adult females of *N. hydnohytum* will not key properly in the key to genera of tropical south Pacific Pseudococcidae provided by Williams & Watson (1988), because their key relies on a concept of *Neosimmondsia* in which all the species lack cerarii.

The DNA of *N. hydnohytum* was sequenced as part of a phylogenetic study of the Pseudococcidae (N.B. Hardy, unpublished data) and *N. hydnohytum* is part of the tribe Pseudococcini (Downie & Gullan, 2004). The other species of *Neosimmondsia* were not available for sequencing.

In his field notebook, P.S. Ward noted that in the same large (30 cm diameter) plant of *Hydnohytum* in which the mealybugs were associated with the brood of *Pheidole* sp., *knowlesi* complex, he found ants of three other species, *Campanotus maudella* s.l., *C. vitiensis*, and *Tetramorium pacificum*. The plant was growing on a partially-felled tree. He also opened four other plants of *Hydnohytum* sp. at the same locality and found ants of various species in three of them, but no further mealybugs, including none in another nest of the same *Pheidole* species as his collection #16763 that housed the mealybugs described above.

ACKNOWLEDGMENTS

Thanks to Philip S. Ward for collecting the material, and Penny J. Gullan for slide-mounting the specimens and commenting on a draft of the manuscript. Thanks also to D.J. Williams and Gillian W. Watson for providing useful comments on the manuscript. The collecting trip was sponsored by the NSF Fiji Terrestrial Arthropod Survey. The government of Fiji (Ministries of Environment and Forestry) and the Wildlife Conservation Society, Suva Office, are thanked for their support of the project. The author's research was supported by a National Science Foundation PEET grant DEB-0118718 to Penny Gullan.

LITERATURE CITED

- Beardsley, J.W.** 1966. Insects of Micronesia, Homoptera: Coccoidea. *Insects of Micronesia* **6**: 377–562.
- Ben-Dov, Y., Miller, D.R. & Gibson, G.A.P.** 2001. ScaleNet, Scales in a Country Query Results. 8 May 2007. Available at: <http://www.sel.barc.usda.gov/scalenet/scalenet.htm>.
- Downie, D.A. & Gullan, P.J.** 2004. Phylogenetic analysis of mealybugs (Hemiptera: Coccoidea: Pseudococcidae) based on DNA sequences from three nuclear genes, and a review of the higher classification. *Systematic Entomology* **29**: 238–259.
- Gullan, P.J.** 1984. A revision of the gall-forming coccoid genus *Apiomorpha* Rubsaaman (Homoptera: Eriococcidae: Apiomorphae). *Australian Journal of Entomology Supplemental Series* **97**: 1–203.
- Huxley, C.R.** 1978. The ant-plants *Myrmecodia* and *Hydnophytum* (Rubiaceae), and the relationships between their morphology, ant occupants, physiology and ecology. *New Phytologist* **80**: 231–268.
- . & **Jebb, M.H.P.** 1991. The tuberous epiphytes of the Rubiaceae 1: A new sub-tribe – the Hydnophytinae. *Blumea* **36**: 1–20.
- Laing, F.** 1930. A new genus and two new species of Coccidae from the Solomon Islands. *Bulletin of Entomological Research* **21**: 19–21.
- Lambdin, P.L. & Kosztarab, M.** 1988. *Psoraleococcus browni*: a new species of pit scale from Papua New Guinea (Homoptera: Coccoidea: Lecanodiaspididae). *Annals of the Entomological Society of America* **81**: 724–727.
- Nepokroeff, M., Bremer, B. & Sytsma, K.J.** 1999. Reorganization of the genus *Psychotria* and the tribe Psychotrieae (Rubiaceae) inferred from ITS and rbcL sequence data. *Systematic Botany* **24**: 5–27.
- Takahashi, R.** 1939. Some Aleyrodidae, Aphididae, and Coccidae from Micronesia (Homoptera). *Tenthredo* **2**: 234–272.
- Williams, D.J.** 1960. The Pseudococcidae (Coccoidea: Homoptera) of the Solomon Islands. *Bulletin of the British Museum (Natural History), Entomology* **8**: 387–430.
- . 1985. *Australian mealybugs*. British Museum (Natural History), London, 431 pp.
- . & **Watson, G.W.** 1988. *The Scale Insects of the Tropical South Pacific Region, Part 2, The mealybugs (Pseudococcidae)*. C.A.B. International, Wallingford, UK, 260 pp.