

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

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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.

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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.

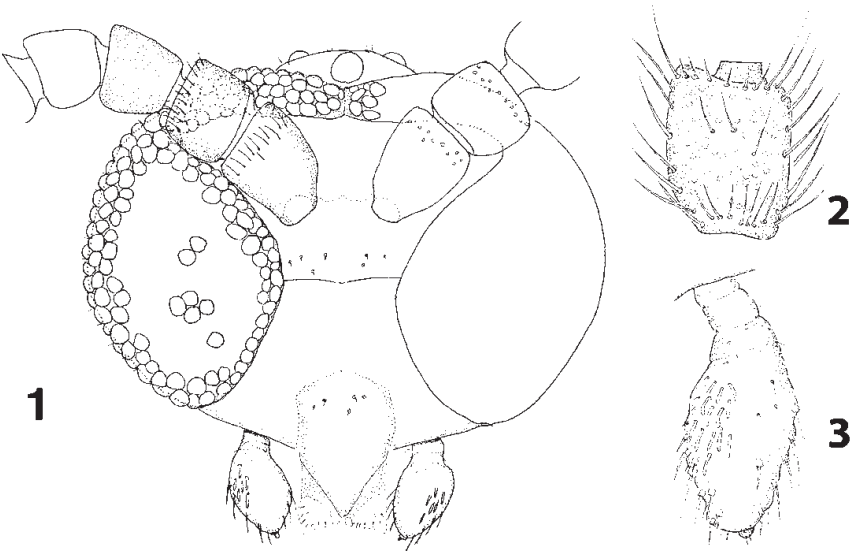
Vulagisciara myrmecophila Evenhuis, *sp. nov.*

(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.

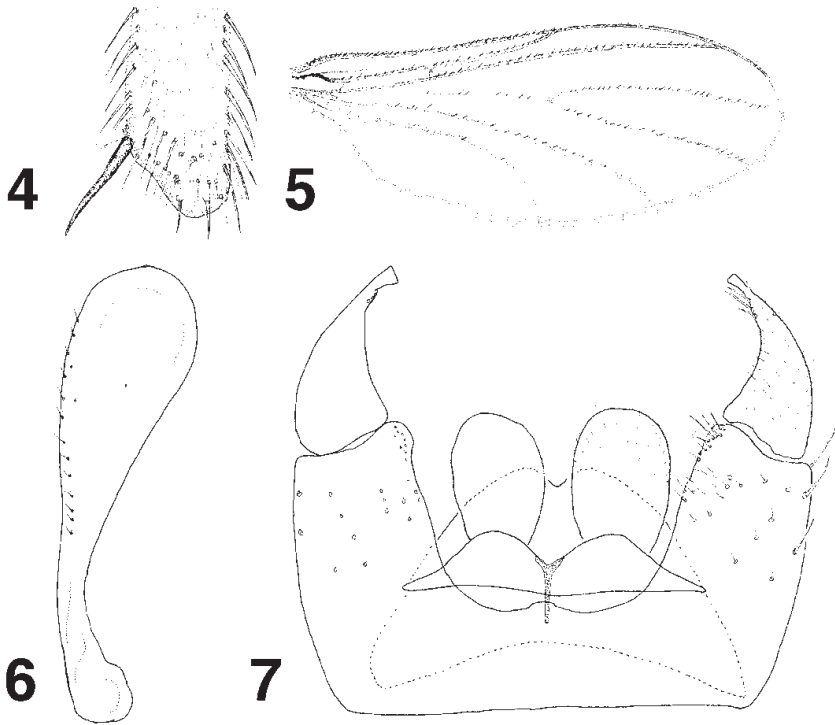


FIGURES 1–3. *Vulagisciara myrmecophila* Evenhuis, n. sp. 1. Head anterior view. 2. Flagellomere 4. 3. Maxillary palpus.

Types: Holotype male [FBA 536518] 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 536519–536521]. 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 536522–536524].

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 in *Vulagisciara* (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.

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