Vitilevumyia, an enigmatic new genus of Stratiomyidae from Fiji (Diptera)

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Abstract

A new genus and species of Stratiomyidae (Diptera), *Vitilevumyia bobwoodleyi* gen. et sp. nov., is described from the island of Viti Levu, Fiji. It exhibits an unusual combination of character states, but is tentatively placed in the tribe Prosopochrysini of the subfamily Stratiomyinae.

Key words: Diptera, Stratiomyidae, *Vitilevumyia*, new genus, new species, Viti Levu, Fiji

Introduction

Stratiomyidae of Fiji are moderately well known due to the work of Bezzi (1928), who provided a substantial review of the brachycerous Diptera of Fiji known at that time. There has been no subsequent work on Stratiomyidae of that archipelago since Bezzi’s treatment. Bezzi recorded twelve genera of stratiomyids from Fiji, five of which are endemic, and 21 species, 18 of which are endemic. Of the three species that occur beyond Fiji, all are on other islands of the Oceanian Region. Clearly the rate of species endemism in the Fiji archipelago is high. Because of the isolated nature of the Fijian fauna and its potential for endemism, a new, comprehensive survey, using primarily Malaise traps, was undertaken (Evenhuis & Bickel 2005). Among the hundreds of stratiomyids collected during that survey were four specimens of an unusual new genus that is described here. Material is deposited in the Bernice P. Bishop Museum, Honolulu, Hawaii, USA (BPBM) and the Department of Entomology, Smithsonian Institution, Washington, DC, USA (USNM).

Taxonomy

*Vitilevumyia* gen. nov.

Type species, *Vitilevumyia bobwoodleyi* sp. nov., by present designation.

Diagnosis. The combination of the following characters will distinguish *Vitilevumyia* gen. nov. from all other known Stratiomyidae: elongate antennal flagellum with six undifferentiated flagellomeres; scutum and scutellum with unusual punctures each with a small internal tubercle (Figs 1–2); unarmed scutellum; very small, triangular wing cell *r*₁; crossvein *dm-cu* absent, thus vein *CuA₁* forming the posterior segment of the discal cell. The form of the thoracic punctation and the reduced cell *r*₁ are apparently autapomorphic for the genus.

Description. Male. Head slightly narrower than thorax in dorsal view (Fig. 1; female). Eyes dichoptic, upper frons nearly parallel-sided with ocellar tubercle slightly prominent; lower frons very short, transverse sulcus only visible laterally; narrow groove present between antennal bases, extending slightly onto face; face with margins slightly diverging ventrally, receding, with very narrow groove next to eye margin. Gena narrowly visible in lateral view, contiguous with similar postgena, merging evenly with postocciput, which becomes wider toward vertex. Eye large, ommatidia of uniform size, essentially bare with only minute, extremely sparse microtrichia visible only...
at high magnification. Antenna about twice length of head, scape about twice length of pedicel, flagellum cylindrical with six similar, unmodified flagellomeres, the apical flagellomere becoming conical apically (Fig. 2); all flagellomeres with evenly distributed, roundish, presumably sensory areas and flagellomeres 4–6 with vaguely differentiated areas on medial surfaces. Palpus apparently one-segmented (not dissected), nearly spherical.

Thorax with scutum convex; scutellum flat dorsally, evenly rounded posteriorly, without spines; both scutum and scutellum evenly set with round punctures each with small, internal tubercle often with a short hair (Figs 1–2); a few such punctures also present on anepisternum. Post-tegula with a few short hairs. Legs unremarkable, without modifications, without tibial spurs. Wing evenly set with dense microtrichia except basally, alula bare except for a few microtrichia apically; costal vein extending slightly beyond apex of R3+4, ending just before wing apex; R4 originating above or slightly distal to r-m and ending in R1 at or slightly before its apex, thus cell r1 is small and triangular in shape; R5 present; anterior edge of discal cell formed by part of M1 faintly developed; veins emitted from discal cell also weakly developed, especially M1 and M3, all ending in wing margin; crossvein dm-cu absent, CuA1 forming posterior edge of discal cell; A1 virtually straight; alula narrow, parallel-sided, narrowly rounded apically.

Abdomen narrower than thorax, about 1.7 times longer than wide, segments slightly narrowing toward apex, dorsally flat, ventrally slightly convex.

Female. Differs from male as follows: Head with palpi larger, more robust.
Abdomen slightly longer, more tapered apically (Fig. 1). Cercus one-segmented, short.

Etymology. The generic name is composed of the name of the island, Viti Levu, in the Fiji archipelago from which all specimens originated, with the addition of the ending -myia, meaning fly. The name is feminine in gender.

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**FIGURE 1.** Habitus illustration of female of *Vitilevumyia bobwoodleyi* gen. n., sp.n. Illustration by Taina Litwak.
Vitilevumyia bobwoodleyi sp. nov.
(Figs. 1–8)

**Diagnosis.** *Vitilevumyia bobwoodleyi* gen. et sp. nov. is the only known species in the genus. It may be distinguished from other stratiomyid species by the characters noted in the generic diagnosis.

**Description. Male.** Head black but yellow on face, small frontal area just above antennae, gena, postgena, and very narrow line posterior to ocellar tubercle. Frons 0.29x width of head at anterior ocellus. Head without evident tomentum, face and gena with short, pale hair-like setae. Upper frons except medially and vertex with evident punctuation that is fine and relatively sparse. Antenna (Fig. 2) with scape, pedicel, and ventral side of first flagellomere dark yellowish, remainder black; scape and pedicel with dense, short, black hair-like setae; flagellum with velvety vestiture. Palpus pale yellow with velvety vestiture. Proboscis yellowish with some erect, hair-like setae.

Thorax dark yellow, extreme upper part of anepisternum near suture whitish; scutum, scutellum, and posterior part of anepimeron with very distinctive black punctation that strongly contrasts with ground color (Figs 1–2); hair-like setae arising from punctures short, dark in color. Anterior portion of anepisternum, most of katepisternum, and laterotergite with short, semi-erect, golden hair-like setae. Legs entirely yellowish with short, mostly pale vestiture but a few brownish hair-like setae present, especially notable on front tarsus. Wing slightly brownish infuscated, a bit more noticeable in costal region, cell \( r_1 \) slightly darker than rest of wing. Halter with stem yellowish, knob slightly brownish dorsally.

Abdomen dark yellow with lateral areas of tergite 3 and most of tergites 4 and 5 brown. Tergites evenly set with short, dense, semi-appressed hair-like setae that are dark brownish to black in color, a little longer and sparser on tergite 1; sternites with short, semi-appressed pale hair-like setae.
FIGURES 3–6. Male terminalia of Vitilevumyia bobwoodleyi gen. n., sp.n. 3, genital capsule, dorsal view. 4, phallic complex, left lateral view. 5, phallic complex, dorsal view. 6, epandrium and postgenital segments, dorsal view.
Male terminalia with gonocoxites (Fig. 3) rounded laterally, posterior margin of genital capsule slightly produced, more or less truncate; gonocoxal apodemes short, not attaining anterior margin of gonocoxites; gonostylus scoop-shaped (Fig. 3), concave dorsally, inserted somewhat ventrally; phallic complex trifid (Fig. 5), nearly straight in lateral view (Fig. 4), tapered anteriorly, medial lobe truncate apically, slightly shorter than pointed lateral lobes; epandrium more or less evenly rounded laterally and posteriorly (Fig. 6); cerci large, approximated dorsally.

Length 4.7 mm.

Female: Diffs from male as follows: Head with ventral side of flagellum with yellow sometimes extending to second and/or third flagellomere.

Abdomen with segment 6 narrower than 5, tubular, exerted partially out of segment 5.

Female terminalia with furca (Fig. 8) more or less ovoid, anterior margin with acute process, posterior margin broadly bilobed, evenly emarginate between lobes. Three hinged spermathecal ducts visible in cleared abdomen, spermathecae apparently membranous and unpigmented. Cerci one-segmented (Fig. 7), about 1.5 times longer than wide, dorsoventrally flattened, rounded apically; epiproct reduced, cerci separated from each other by less than width of a single cercus.

Length 6.0–6.3 mm.
**Specimens examined.** Holotype ♀, FIJI: Viti Levu, Naitasiri Prov., 2 km E of Navai Village, old trail to Mt. Tomaniivi, 17.621°S, 178°E, 700 m, 26.ix-11.x.2003, Malaise 3, Schlinger & Tokota’a, FBA 124531 (BPBM); 1♀ paratype, same data as holotype except 24.xi.-9.xii.2003, Malaise MO3, FBA 203997 (USNM); 1♀ paratype, FIJI: Viti Levu, Naitasiri Prov.: Navai Village, Eteni, 17°37′S, 177°59′E, 700 m, 9.xii-20.xii.2003, FJ-11C. Malaise, M. Irwin, E. Schlinger & M. Tokota’a, FBA 032069 (BPBM); 1♂ paratype, Naitasiri Prov.: 1.8 km E of Navai Village, old trail to Mt. Tomaniivi, 17.621°S, 177.998′E, 100 m, 16.iii-6.v.2005, Malaise 4, E. Namatalau, FBA 516717 (USNM).

**Etymology.** The species epithet is named for my father, Robert E. Woodley, known as Bob to his friends and family. He instilled in me an interest in natural history from an early age and always encouraged my study of it, for which I am grateful.

**Phylogenetic position of Vitilevumyia gen. nov.**

Based on having six flagellomeres, *Vitilevumyia gen. nov.* can be placed in a clade of three subfamilies recognized by Woodley (2001) that were defined by having six flagellomeres and aquatic larvae (larvae unfortunately not being known for *Vitilevumyia gen. nov.*). The included subfamilies are Stratiomyinae, Raphiocerinae, and Nemotelinae (although it should be noted that a molecular phylogenetic study of Stratiomyidae (Brammer & von Dolen 2007) did not support the hypothesis that Nemotelinae are most closely related to Stratiomyinae + Raphiocerinae). The only other subfamily of Stratiomyidae that sometimes has six flagellomeres is Sarginae, but *Vitilevumyia gen. nov.* can be excluded from that subfamily because it lacks the concave posterior surface of the head and aristate antennae that characterize the sargines.

Nemotelinae have two character states found in *Vitilevumyia gen. nov.*, an unarmed scutellum and one-segmented female cerci. However, nemotelines are small to medium-sized flies that have a short abdomen usually about as wide as long, and the fourth and fifth antennal flagellomeres modified, usually being narrower in diameter than the basal flagellomeres and usually much smaller. *Vitilevumyia gen. nov.* can be excluded from Nemotelinae based on its more slender body form and unmodified antennal flagellum.

In Stratiomyinae, Woodley (2001) recognized three tribes, Oxycerini, Prosopochrysini, and Stratiomyini. Stratiomyini always have the fifth and sixth flagellomeres much reduced in size, and sometimes the sixth is actually lost or completely fused with the fifth. Also, Stratiomyini have wings that are virtually bare of microtrichia, which is probably an autapomorphic feature of the tribe. They also always have two-segmented female cerci, although the second segment can be small to minute. These character states exclude *Vitilevumyia gen. nov.* from being placed in Stratiomyini.

In Oxycerini, the antennal flagellum generally has the first three flagellomeres shorter than the apical three, although some genera, such as *Oxycera* Meigen and an undescribed genus from Central America, have the apical two flagellomeres strongly reduced in diameter, with the fifth tiny and the sixth modified in the form of a style or arista. Oxycerini also have the costal vein usually ending well before the wing apex, although it is somewhat longer in the recently described genus *Oxycerina* Rozkošný & Woodley, and crossvein dm-cu is always absent. Also, the scutellum is always armed with two spines in Oxycerini. Almost all members of this tribe have females with two-segmented cerci, although occasional species of *Oxycera* and *Euparyphus* Gerstaecker have one-segmented cerci, but at least some species in both these genera have two-segmented cerci. Females of *Oxycera* have one-segmented female cerci as far as is known. *Vitilevumyia gen. nov.* can be excluded from Oxycerini based on its uniform antennal flagellomeres, unarmed scutellum, and longer costal vein.

In the molecular phylogenetic study of Brammer & von Dolen (2007), the tribe Prosopochrysini and the subfamily Raphiocerinae were sister groups, which rendered the Stratiomyinae as recognized by Woodley (2001) paraphyletic. Some morphological features corroborate the molecular results. For instance, both Prosopochrysini and Raphiocerinae have one-segmented female cerci in all members I have examined. Although this occurs sporadically in some other stratiomyid taxa, as noted above, it could be a synapomorphy for Prosopochrysini + Raphioceriniae. Thus, when more evidence is accumulated, it could be that these two taxa should be considered as a single tribe, or at least the rank of Raphioceriniae should be reduced to tribal level. However, I will discuss these two taxa here as traditionally recognized for the time being.
I exclude *Vitilevumyia* gen. nov. from Raphiocerinae because the latter have variously modified antennal flagella, often with the apical flagellomere or flagellomeres reduced into an arista. Also, raphiocerines always have crossvein dm-cu present, and the scutellum is always armed with two spines. It should be noted, however, that in common with *Vitilevumyia* gen. nov., all known raphiocerine males are dichoptic.

I think that the best placement of *Vitilevumyia* gen. nov. is incertae sedis in Prosopochrysini. Character states found in both of these taxa that seem to corroborate this placement include the one-segmented female cerci and the costal vein extending nearly to the wing apex. An unarmed scutellum is found in a few Prosopochrysini such as some *Nothomyia* Loew and the genus *Prosopochrysa* de Meijere. However, the form of the antenna in *Vitilevumyia* gen. nov. does conflict with this placement, as does its lack of a crossvein dm-cu. Also, the sinuous A1 vein found in most prosopochrysines that Woodley (1985) postulated as a possible synapomorphy for the tribe is also not found in *Vitilevumyia* gen. nov., which has a straight A1. This character state is also absent in *Exochostoma* Macquart. Prosopochrysini have an array of antennal morphologies that is similar to Raphiocerinae, ranging from slightly modified to highly modified and aristate. I am not aware of any Stratiomyinae or Raphiocerinae that have an antennal flagellum that is composed of nearly uniformly sized, unmodified flagellomeres as found in *Vitilevumyia* gen. nov. Thus, it is not possible to completely exclude the idea that *Vitilevumyia* gen. nov. represents a relictual genus of an unknown higher taxon within the Stratiomyinae + Raphiocerinae clade.

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