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Review of the *Campsicnemus fumipennis* group (Diptera: Dolichopodidae) in the Hawaiian Islands, with descriptions of new species and corrections of misidentifications

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Abstract

Species of the *Campsicnemus fumipennis* group in the Hawaiian Islands are reviewed. *Campsicnemus fumipennis* Parent, previously thought to be widespread in the Hawaiian Islands is found to be restricted only to the islands of Moloka'i and Maui (= geological Maui Nui). Based on comparison of the lectotype female of *C. fumipennis* with females of *C. flaviventer* Hardy & Kohn, *C. flaviventer* is found to be synonymous with *C. fumipennis*, **syn. nov.** Three new species, two of them previously misidentified as either *C. fumipennis* or *C. flaviventer,* are described and illustrated; all are island endemics: *C. leucostoma*, **sp. nov.** (Hawai'i), *C. spectabulus*, **sp. nov.** (O'ahu), and *C. aniani*, **sp. nov.** (Hawai'i). The first description of the male of true *C. fumipennis* is given, a key to species of the *C. fumipennis* group is presented, and a table of rearing records for immatures of species in the *C. fumipennis* group is given.

Key words: Taxonomy, Diptera, Dolichopodidae, *Campsicnemus*, Hawaiian Islands, O'ahu, Maui, Moloka'i, Hawai'i, Maui Nui

Introduction

The well isolated and tiny Pacific archipelago of the Hawaiian Islands is home to an incredible 170 or so endemic species of the predaceous long-legged fly genus *Campsicnemus* Haliday—with many more newly discovered species awaiting description. The vast majority of these species are small, clear-winged species whose main characters of differentiation are found in the variety of shapes, sizes, and setal patterns of the mid legs of the males, yet there are a few larger species to be found and also a few smaller species have body parts other than male mid legs that can be used to characterize species. But there is one species originally found almost 80 years ago in the valley of a rugged mountain stream on eastern Moloka'i that stands out from them all in its size and striking wing and body pattern.

This paper reviews the history of discovery and description of *Campsicnemus fumipennis* Parent from eastern Moloka'i and describes new species from islands other than Moloka'i that were previously misidentified as *C. fumipennis*.

Materials and methods

Material examined during this study derived from specimens in the Bishop Museum (BPBM), Hawaii Volcanoes National Park (HAVO), University of Hawaii Insect Museum (UHM), and original Hawaiian Sugar Planters' Association (HSPA) material that was transferred to the Hawaii Department of Agriculture (HDOA). Holotypes and paratypes of all new species are deposited in BPBM. Specimens collected by permit on National Park lands listed as in BPBM are held in trust for the National Park system in BPBM. Some specimens have BPBM database numbers [BPBM Ent 2008xxxxxx]. These are given in square brackets after the collector. Terminology and

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abbreviations follow recent papers on Hawaiian *Campsicnemus* (e.g., Evenhuis 2011, 2012); scutellar setation is different than most species of Hawaiian *Campsicnemus* and its descriptive formula is explained in the diagnosis for the species group. Male terminalia of all species were examined but are not illustrated as they are (as for most *Campsicnemus* species) virtually similar and offer no visible characters to separate species.

Untangling the misidentifications of *Campsicnemus fumipennis* and allies

In the midst of a paper that treated ten new species of dolichopodids from the Hawaiian Islands (including seven new species of *Campsicnemus*) that were sent to him for identification by F.X. Williams, Octave Parent (1937: 76) described a truly singularly remarkable species of *Campsicnemus* when he described *Campsicnemus fumipennis*. It is about twice the size of many other Hawaiian species, and is conspicuous in that both males and females have a marked fumose wing pattern and the abdomen is strikingly patterned with black and yellow.

It is apparently this striking pattern of wing and body as well as size that has duped Hawaiian Diptera taxonomists since soon after its discovery. All subsequent workers (including me) when identifying specimens from surveys and collections placed all of the large strikingly patterned species into *fumipennis* and, following the island distribution given in Tenorio (1969), it was generally thought that this was simply a widespread species.

The history of why there has been confusion as to the true identity of *C. fumipennis* begins with its original description. Since virtually all female *Campsicnemus* are fairly drab and look alike (lacking the male secondary sexual characters on the legs or other body parts that distinguish species), taxonomists normally do not describe new species of *Campsicnemus* based only on females. Exceptions of course can be made when there are distinctive body or wing patterns not found in any other species (in males or females). This is what happened with *C. fumipennis*. Parent (1937: 76) had no males of this species and described *C. fumipennis* based only on an unspecified number of females from eastern Moloka‘i; and he no doubt thought it was safe to do so since no other *Campsicnemus* had such heavily patterned wings or abdomen. When Williams (1938) gave his excellent account of the biology of *C. fumipennis* from O‘ahu, he made his identification based on the wing and abdominal patterning: males and females from his O‘ahu locality of Lulumahu Stream looked virtually identical to the Moloka‘i female specimen(s) from which the species was described by Parent (and Williams had the Molokai specimen(s) at hand to compare since he was working at the HSPA where the types were then located). However, this is where things started to go wrong.

When Hardy and Kohn (1964) revised the genus in Hawai‘i, males of *C. fumipennis* from Moloka‘i were still not known, but since females from Lulumahu Stream had the same wing and body pattern, it was thought a safe assumption by Hardy and Kohn that the males from the same population on O‘ahu were males of *C. fumipennis*: “The male of this species has not been seen from Molokai but female specimens from Oahu seem to fit the type in all details, and the species is probably correctly placed” (Hardy & Kohn, 1964: 93).

Being convinced that the O‘ahu male in Williams’s (1938) paper was *C. fumipennis* caused Hardy and Kohn (1964: 88) to make an error in describing *C. flaviventer* as a new species. The type of the latter species is also from Moloka‘i but the male has a significantly different leg setation pattern than the O‘ahu specimens that Williams and Hardy & Kohn had thought was *C. fumipennis*. Interestingly, no mention is made by Hardy and Kohn (1964) of the conspicuous wing pattern in the diagnosis paragraph for that species. Rather than state it was similar to *C. fumipennis* in wing and abdominal patterning, Hardy and Kohn instead gave weight to the leg characters and said *C. flaviventer* was on that basis related to *C. diamphidius* Hardy & Kohn from Maui.

Examination of the paratype material of *C. flaviventer* and now knowing the taxonomy of the species within this group helps explain why Hardy and Kohn discounted the wing pattern in diagnosing *C. flaviventer*. Their paratype material included specimens from Molokai, Maui, and Hawai‘i. The distinctive wing pattern of specimens from Moloka‘i also holds for the Maui specimens, but fades dramatically in specimens from the Big Island of Hawai‘i, yet all have the distinctive abdominal patterning. Hardy and Kohn no doubt felt that *C. flaviventer* was variable in wing pattern thus did not put any weight on this character in their diagnosis and did not compare that patterning to the wings of other Hawaiian species of *Campsicnemus*. The characters of setal pattern on the male mid leg seemed to them to be more consistent so that is what they used as the primary character in characterizing their new species and no doubt caused them to not relate it to *C. fumipennis* since the setal pattern of the male mid leg of the O‘ahu specimens were so different.

After examination of over 120 specimens in this study from O‘ahu, Moloka‘i, Maui, and the Big Island, it is here concluded that: (1) O‘ahu, Maui Nui (the ancient geological land mass that once included Molokai, Maui, and Lāna‘i) and the Big Island of Hawai‘i each has its own endemic species (with two from the Big Island), with new species described from O‘ahu and the Big Island; (2) that true *C. fumipennis* is restricted to Maui Nui (on Moloka‘i and Maui — not yet found on Lāna‘i); (3); that *C. flaviventer* (the holotype male from Moloka‘i and all other Moloka‘i and Maui specimens) is synonymous with *C. fumipennis*, **syn. nov**. (4) that specimens identified as *C. flaviventer* from the Big Island belong to a new species, *C. aniani*, **sp. nov.** and (5) specimens identified as *C. fumipennis* from O‘ahu belong to a new species *C. spectabulus*, **sp. nov.**

A third new species from the Big Island is newly discovered and, although it does not have a patterned wing, it is placed here in the *C. fumipennis* group based on antennal and male mid tibial characters and the patterning of the thorax and abdomen. It is described herein as *C. leucostoma*, **sp. nov.**

Had Hardy and Kohn examined the leg characters of all island populations more carefully and noted the antennal and thoracic differences, they would probably have come to many of the same conclusions as are described in this paper. But they, like subsequent workers, were most likely duped by the striking beauty of abdominal patterning in the species within this group and were blindly convinced that all belonged to one species.

Campsicnemus fumipennis group

Diagnosis. Species in this group are separated from all other Pacific *Campsicnemus* by their relatively large size (most from 3.5–5.0 mm in body length) in combination with a flared antennal scape; the conspicuous yellow lateral and posterolateral pattern on tergites I–VI of the abdomen contrasting with brownish to dark brownish color dorsally and basally on each tergite (Figs. 7–10); and the usually conspicuous fumose wing pattern (faded but still evident in *C. aniani*, **sp. nov.**; and not patterned in *C. leucostoma*, **sp. nov.** from the Big Island).

Remarks. This abdominal coloration is rather unusual in Pacific *Campsicnemus*. The *C. lobatus* group in the Society Islands (cf. Evenhuis 2008) also have species with conspicuous yellow color laterally on the tergites but this is restricted to just tergites I–II; and the wings of some of the species of the *C. lobatus* group have some infuscation but, if present, this is restricted to just a spot on the distalmost part of the wing tip and does not occur along the wing veins.

Infuscation in the wing occurs in a few other Hawaiian *Campsicnemus* but is present in those species as a smoky color basally and apically with a clear (hyaline) spot immediately posterior to the posterior crossvein (e.g., *C. halonae* Evenhuis from O‘ahu and *C. macula* Parent from Maui).

Additional features that are distinctive for species in this group are the unusually long mesonotal and scutellar setae (ca. 1.5–2.0 times the length found in many other Hawaiian *Campsicnemus*) and long row of acrostichal setae (usually 10–15). Most Hawaiian *Campsicnemus* do not have long mesonotal setae and have very few (if any) acrostichal setae; those that do have these setal characters are relatively large in size. Since the presence of these characters in species of this group may be due to size and not phylogenetic relationship, they are mentioned here but not included as diagnostic for the group. All species have 4 strong black dorsocentrals but also have a small hair anterior to and in the same line as the strong setae. All species in this group except *C. leucostoma* and *C. spectabulus* have a pair of strong scutellars and a pair of short fine lateral hairs and two pairs of short fine medial hairs and are written in the descriptions below in the formula 1 + 1 + 2 (going from lateral to mesal where the middle number is the strong scutellar seta) (note: *C. leucostoma* and *C. spectabulus* have the lateral hair but only a single pair of medial hairs). Most Hawaiian *Campsicnemus* studied have a single pair of medial fine hairs and no other hairs associated with the strong scutellars.

As not all species groups of Hawaiian *Campsicnemus* have been identified and verified yet through revisional study, it is premature to present a key to the Hawaiian species groups here. This species group is named and diagnosed as it is easily distinguishable from all of the Hawaiian *Campsicnemus*.

Key to species of the *Campsicnemus fumipennis* group

1. Male 2
- Female 5

2. Mid tibia with long, dense setation along lateral and mesal surfaces (Fig. 19); posterior crossvein subequal in length to last section of vein CuA_1 (Fig. 15); antennal postpedicel acute apically, length about 2X greatest width (Fig. 5) (O'ahu) . . . . . *C. spectabulus* Evenhuis, **sp. nov.**
- Mid tibia with short setae along mesal surface, lateral surface with a few long, strong black setae; posterior crossvein 1/2 to 2/3 length of last section of vein CuA_1 (Figs. 12–14); antennal postpedicel rounded apically, not acute, length generally about 1.5X greatest width (cf. Figs. 2–4) (Moloka'i, Maui, Hawai'i) 3
3. Laterotergite extensively brown to dark brown laterally (cf. Fig. 8); katepisternum with brown color anteroventrally; wing marked with fumose infuscation along most longitudinal veins and posterior crossvein (Fig. 13); mesonotal vittae broad (cf. Fig. 8) ... (Moloka'i, Maui) . . . . . *C. fumipennis* Parent
- Laterotergite predominantly yellowish white to yellow laterally, if brown color present, restricted to a spot surrounded by yellow; katepisternum yellow anteroventrally (cf. Figs. 1, 6); wing with infuscated areas faint or wing not infuscated; mesonotal vittae narrow (Figs. 7, 9) ... (Hawai'i) 4
4. Wing hyaline (Fig. 14); antennal postpedicel white (Fig. 4); mouthparts white; mid tibia white with patch of long setae in two rows at basal third, long hairs mesally on apical half of lateral surface, apex with three short fine setae (Fig. 18) . . . . . *C. leucostoma* Evenhuis, **sp. nov.**
- Wing with brownish marking but markings faint, most evident on posterior crossvein (Fig. 12); antennal postpedicel yellow-brown to grayish (Fig. 2); mouthparts brown; mid tibia brown to dark brown with three strong long black setae at apical third, long setae absent on apical half on lateral surface (Fig. 16) . . . . . *C. aniani* Evenhuis, **sp. nov.**
5. Wing hyaline; antennal postpedicel white; mouthparts white .... (Hawai'i) . . . . . *C. leucostoma* Evenhuis, **sp. nov.**
- Wing with some faint infumation surrounding veins, most distinct on longitudinal veins; antennal postpedicel yellowish brown to gray; mouthparts brown 6
6. Laterotergite brown to dark brown laterally 7
- Laterotergite yellowish white to yellow laterally ... (Hawai'i) . . . . . *C. aniani* Evenhuis, **sp. nov.**
7. Mesonotum (except yellowish humeri) (Fig. 8) generally brown with darker brown to black admedian vittae sometimes (in greasy specimens) indistinguishable from ground color; katepisternum with brown color anteroventrally; fore coxa and femora brown ... (Moloka'i, Maui) . . . . . *C. fumipennis* Evenhuis, **sp. nov.**
- Mesonotum (Fig. 10) yellowish brown with distinct brown admedian vittae; katepisternum all yellow; fore coxa and femora yellow, hind femur in some specimens with brown at extreme apex ... (O'ahu) . . . . . *C. spectabulus* Evenhuis, **sp. nov**.

Rearing records

Montgomery (1975) mentioned that he had incidentally reared a few specimens of *C. "fumipennis"* and *C. "flaviventer"* during his rearing studies for picture-winged *Drosophila* Fallén from various vegetative substrata. Table 1 shows the rearing records for species of the *C. fumipennis* group by species, plant, and island, based on records from the work of Montgomery shown on the labels of the specimens examined in this study. It is interesting to note that Montgomery (1975: 77) stated that the vast majority of his rearings of all species of *Campsicnemus* throughout the Hawaiian Islands were of two species (both members of the *C. fumipennis* group); whereas I have found that adult specimens of this group are uncommonly collected, with females much more common than males. Williams (1938) stated that the O'ahu specimens he observed were arboreal. This adult behavior could explain why immatures of the *fumipennis* group were the most common of the *Campsicnemus* reared from the various decaying vegetative matter on or near the ground, while adults of this species group were not as commonly encountered. Possibly shortly after emergence adult males and females fly up into the canopy, where they feed and mate and females only come down to the ground to oviposit in the decaying vegetation on the forest floor (and therefore can be found collected in yellow pans or by aerial sweeping), whereas males are rarely collected by these methods Unfortunately, a canopy fogging study of *Metrosideros* in the Hawaiian Islands (Gruner, 2004) failed to secure any species of this species group, although other species of *Campsicnemus* were identified from the samples.

Descriptions

Campsicnemus aniani Evenhuis, sp. nov.

(Figs. 1, 2, 7, 12, 16)

Campsicnemus flaviventer: Tenorio, 1969: 3, 41; Montgomery, 1975: 77; Hardy *et al*., 1981: 150, 151, 155; Preston, 1995: 12; Preston *et al*., 2004: 22; Anonymous, 2009: 80; 2012: 80. Misidentifications.

Campsicnemus fumipennis: Preston, 1995: 12. Anonymous, 2012: 80. Misidentifications.

TABLE 1. Rearing records for species of the *Campsicnemus fumipennis* group.

	Island		
	O‘ahu	Moloka‘i	Hawai‘i
Plant taxon/substrate			
Acacia koa, flux	S*		A
Charpenteria, log			A
Charpenteria, rotting bark	S		
Cheirodendron, leaves			A
Cibotium, rotting trunk			A
Clermontia, bark	S	F	
Fern, frond	S		
Pisonia, leaves	S		
Pisonia, stem	S		
Pritchardia, rotting fruit	S		
Tetraplasandra, rotting bark	S		
Touchardia, bark	S		
Urera, bark			A

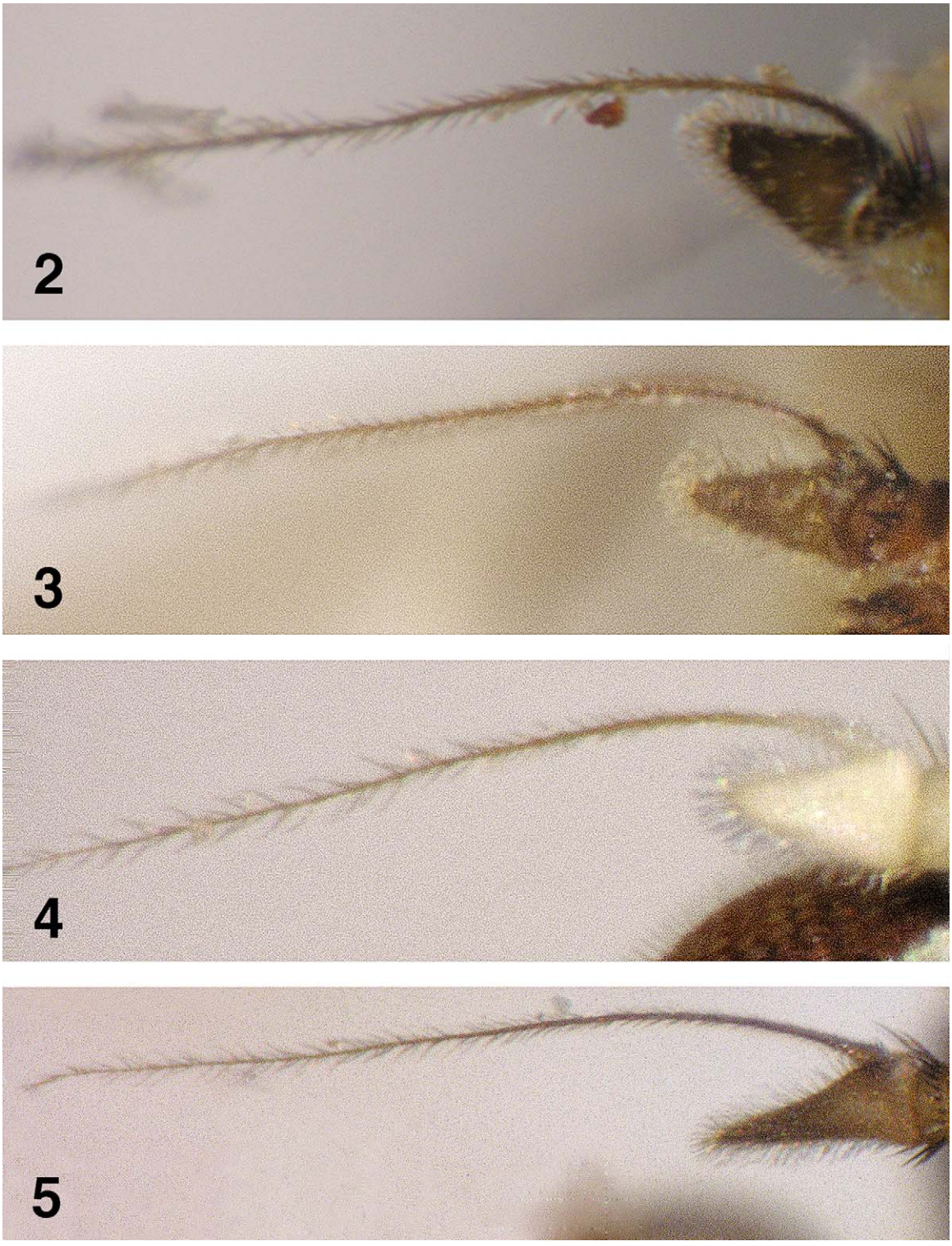
*Abbreviations: A = *C. aniani*, **sp. nov.**; F = *C. fumipennis*; S = *C. spectabulus*, **sp. nov.**

Diagnosis. Similar to *C. fumipennis* Parent, from which it can be easily distinguished by the laterotergite being yellow laterally (brown in *C. fumipennis*) and the mesonotal admedian vittae narrow (these vittae very broad in *C. fumipennis*); and similar to the other Big Island species in the *C. fumipennis* group, *C. leucostoma*, distinguished by the mouthparts being brown (mouthparts white in *C. leucostoma*) and the generally darker lateral body color throughout (lateral body color very pale yellow to white in *C. leucostoma*).

Description. Male: Body length: 3.5–3.8 mm. Wing length: 4.0–4.2 mm. **Head**: Face, front and clypeus yellow, gray tomentose; oc and vt black, about two-thirds length of antennal arista; occiput, and vertex black with blue-gray highlights; postgena with long fine white hairs; face constricted at middle, holoptic for a length of 4 ommatidia; palpus small, brown; proboscis brown, extending below eye in lateral view; antenna (Fig. 2) with all segments yellow; scape flared apically, length ca. 2X greatest width; pedicel subspherical, with ring of short spiky black setae subapically; postpedicel subtriangular, length about 1.5X width, rounded apically; arista slightly longer than head height. **Thorax**: Mesonotum (cf. Fig. 7) and pleura (except dark brown anepimeron) yellow, scutellum brownish dorsally, yellowish on posterior margin and ventrally; dorsum of mesonotum with pair of brown admedian vittae, each vitta narrow anteriorly, flaring posteriorly to tear-drop shape near prescutellar area; thoracic setae very long, black: 1 + 4 dc; 2 np; 2 ph; 1 + 1 pa; 1 + 1 + 2 sc; 10–12 ac; halter stem yellow, knob white. **Legs**: Yellowish except for CII, apical half of FIII, and all tarsi brown; coxae with normal setation; fore and hind legs unmodified and without MSSC; FII with row of 10–12 black hairs along ventral surface; TiII (Fig. 16) long, straight, with 6 long black setae subbasally, medially, and subapically on lateral surface (MSSC), mesal surface with short, stiff black spiky setae on basal two-thirds, intermixed with short fine hairs that extend entire length, becoming appressed on apical third (MSSC), apex with pair of strong long black setae on mesal surface. IIt_1 about 2.5X length of IIt_2, without MSSC. Remaining leg segments unmodified and without MSSC. **Wing** (Fig. 12): Subhyaline, with faint brownish infumation in costal and radial cells, posterior crossvein with cloud of brown infuscation; posterior half of wing iridescent hyaline; posterior crossvein length less than 1/2 apical segment of CuA_1. **Abdomen** (cf. Fig. 7): Brown dorsally with yellow laterally and posterolaterally, yellow color most extensive on basal tergites, becoming less extensive on succeeding tergites; sternites with brown medially and basally, otherwise yellow; tergal vestiture black, strongest along posterior margin of tergite I. Hypopygium yellowish brown with yellow cerci, not dissected. **Female**: As in male except for lack of MSSC and the following: eyes holoptic, separated at medial constriction by width of one ommatidium; antennal postpedicel length ca. 3/4 greatest width, rounded apically; all brown areas of thorax and abdomen in males darker and broader or more extensive.

FIGURE 1. *Campsicnemus aniani*, **sp. nov.**, male habitus. Body length: 3.8 mm.

Types. HOLOTYPE ♂ (BPBM 16,923) [BPBM Ent 2008010511] and 1♀ **paratype** from HAWAIIAN ISLANDS: **Hawai'i:** Upper Ola'a Forest, Aug 1952, W.C. Mitchell [paratype of *C. flaviventer* Hardy & Delfinado] BPBM Acc. 1989.349 (BPBM). **Other paratypes**: HAWAIIAN ISLANDS: **Hawai'i:** 1♀, Pauahi, 4300 ft [1806m], Jun 1955, W.C. Mitchell [paratype of *C. flaviventer* Hardy & Delfinado] [BPBM Ent 2008010519] (BPBM); 1♂, nr. Pawaina, Kona, 3000 ft [914 m], Jul 1953, D.E. Hardy [paratype of *C. flaviventer* Hardy & Delfinado] (UHM); 1♂, Pauahi, 4300 ft [1310 m], Jul 1952, W.C. Mitchell [paratype of *C. flaviventer* Hardy & Delfinado] (UHM); 3♂, forest above Pa'auilo, 3000–3200 ft [914–975 m], 25 Aug 1965, J. Fujii (UHM); 1♂, 1♀,



FIGURES 2–5. *Campsicnemus* male antennae. **2**, *C. aniani*, **sp. nov.**; **3**, *C. fumipennis*; **4**, *C. leucostoma*, **sp. nov.**; **5**, *C. spectabulus*, **sp. nov.**

Upper Ola'a Forest, Aug 1952, W.C. Mitchell [paratypes of *C. flaviventer* Hardy & Delfinado] (UHM); 1♂, Upper Ola'a Forest, Aug 1953, D.E. Hardy [paratype of *C. flaviventer* Hardy & Delfinado] (UHM); 2♂, Saddle Road, 14 Aug 1970, reared ex rotting *Cibotium* trunk, 2475, S.L. Montgomery (UHM); 1♀, Thurston Lava Tube, 20 Oct 1972, J. Fujii (UHM); 1♂, Kīlauea, Keouhou Ranch, Aug 1953, D.E. Hardy [paratype of *C. flaviventer* Hardy & Delfinado] (UHM); 1♂, Kaiholena, Kohala Mts, 4000 ft [1020 m], Aug 1952, D.E. Hardy [paratype of *C. flaviventer* Hardy & Delfinado] (UHM); 1♀, Mauna Loa truck trail, 4000 ft [1020 m], Aug 1952, D.E. Hardy

[paratype of *C. flaviventer* Hardy & Delfinado] (UHM); 1♀, Saddle Road, Kipuka #14, *Cheirodendron* leaves, emerged 24 Apr 1973 [no collector] (UHM); 1♀, Manuiahea, 4 Apr 1972, reared ex *Urera* bark, K.Y. Kaneshiro (UHM); 1♀, Kilauea Forest Reserve, 5400 ft [1645 m], 20 Feb 1973, reared ex koa flux, S.L. Montgomery (UHM); 6♀, Kulani State Prison, Kulani Boy's Home, 4–6 May 1994, pan traps, D.A. Foote [15B-350, 15B-450, 15B-250, 11B-50] (BPBM); 27♀, Hawaii Volcanoes National Park, Ola'a Forest, Pu'u Unit, 4600 ft [1080 m], Jun-Aug 1993, [2002-001, 2076-003, 2082-001, 2357-004, 2370-002, 2396-001, 2406-002, 2428-001, 2528-001, 2625-001, 2757-002, 2802-001, 3038-002, 3269-003, 34121-001, 3541-001, 3682-002, 3791-001, 3859-004, 3880-002, 4034-001], green pan traps, D.A. Foote, N.L. Evenhuis (HAVO); 1♀, Kohala Mts, Kohala Forest Reserve, 6–8 Aug 2012, 3873 ft [1153 m], 20°03.398'N, 155°40.097'W, yellow pan traps under *'ōhia* near stream, N. Evenhuis (BPBM).

Etymology. The specific epithet derives from the Hawaiian "*aniani*" = "clear, obvious", referring to the striking abdominal pattern and size.

Remarks. My experience observing adults of this species has almost invariably been of only females attracted to either the yellow pans I was setting up or the yellow rain jacket I wore into the rainforest. The reasons for the preponderance of females in the field as compared to many more males resulting from reared material is postulated above. Rearing records of immatures are given in Table 1.

Campsicnemus fumipennis Parent
(Figs. 3, 8, 13, 17)

Campsicnemus fumipennis Parent, 1937: 76. Williams, 1938a: 120, 1940: 295; Parent, 1940: 228; Hardy, 1952: 454; Smith, 1952: 430; Brown, 1956: 139; Wirth & Stone, 1956: 450; Hardy & Kohn, 1964: 92; Tenorio, 1969: 3; Montgomery, 1975: 77; Bickel & Dyte, 1989: 410; Nishida, 1992; 95, 1994: 89, 1997: 75, 2002: 92; Evenhuis, 1996: 55, 2007: 25; Yang *et al.*, 2006: 460.

Campsicnemus flaviventer Hardy & Kohn, 1964: 88. Tenorio, 1969: 3, 41; Montgomery, 1975: 77; Hardy *et al*., 1981: 150, 151, 155; Bickel & Dyte, 1989: 410; Nishida, 1992: 95, 1994: 89, 1997: 75, 2002: 92; Evenhuis & Thompson, 2004: 208; Preston *et al*., 2004: 22; Yang *et al.*, 2006: 460. **New synonymy**.

Campsicnemus funipennis: Satô, 1991: 53 (incorrect subsequent spelling).

Diagnosis. Similar to *C. spectabulus*, **sp. nov.** but can be easily separated from it by the distinctly shorter spiky setation on the male mid tibia (these hairs much longer and curved or wavy in *C. spectabulus*) and the posterior crossvein about half as long as the last section of CuA_1 (this crossvein subequal in length to the last section of CuA_1 in *C. spectabulus*).

Description. **Male**: Body length: 3.75–4.00 mm. Wing length: 4.0–4.2 mm. **Head**: Face, front and clypeus yellow, gray tomentose; oc and vt black, about two-thirds length of antennal arista; occiput, and vertex black with blue-green to brassy highlights; postgena with long black hairs; face constricted at middle, holoptic for a length of 3 ommatidia; palpus small, dark brown; proboscis brown, extending below eye in lateral view; antenna (Fig. 3) with scape and pedicel yellow, postpedicel brown to gray-brown; scape flared apically, length ca. 2X greatest width; pedicel subspherical, with ring of short spiky black setae subapically; postpedicel sublanceolate, length about 1.0–1.5X width, rounded apically; arista slightly longer than head height. **Thorax**: Mesonotum (except yellow humeri) and scutellum brown, golden pollinose dorsally and anteriorly; pleura yellow except anepimeron dark brown, laterotergite brown laterally, and katepisternum brown at base of CI, dark color extending ventrally in some specimens; dorsum of mesonotum with pair of brown admedian vittae (cf. Fig. 8), each vitta narrow anteriorly, flaring posteriorly to tear-drop shape near prescutellar area; thoracic setae very long, black: 1 + 4 dc; 2 np; 1 + 2 ph; 1 + 1 pa; 1 + 1 + 2 sc; 10–12 ac; halter stem and knob yellowish brown. **Legs**: CI yellowish, brown basally; coxae with normal setation, CII and CIII brown; fore and hind legs unmodified and without MSSC; FI and FII yellowish brown, FIII yellowish brown with darker brown at apex, without MSSC; remainder of legs yellowish brown to brown; FII with row of 12–14 black setae along ventral surface (MSSC), setae thinner toward apex and toward base; TiII (Fig. 17) long, straight, with 5 long black setae subbasally, medially, and subapically on lateral surface (MSSC), mesal surface with short, stiff black spiky setae on basal one-half, sparser medially, intermixed with short fine hairs basally and apically, becoming appressed on apical third (MSSC), apex with pair of strong long black setae on mesal surface. IIt_1 about 1.3X length of IIt_2, without MSSC. Remaining leg segments

unmodified and without MSSC. **Wing** (Fig. 13): Subhyaline, with brownish infumation surrounding apical one-half to one-third of R_{2+3} and R_{4+5} and coalesced between those two veins to wing margin; infuscation surrounding distal section of M_1 and basally proximal to posterior crossvein; infuscation also along CuA_1 just before, at, and after junction with posterior crossvein; posterior crossvein slightly more than one-half length of distal section of vein CuA_1. **Abdomen** (cf. Fig. 8): Dark brown dorsally with yellow laterally and posterolaterally, yellow color most extensive on basal tergites, becoming less extensive on succeeding tergites; sternites with brown medially and basally, otherwise yellow; tergal vestiture black, strongest along posterior margin of tergite I. Hypopygium yellowish brown with yellow cerci, not dissected. **Female**: As in male except for lack of MSSC and the following: eyes holoptic, separated at medial constriction by width of two ommatidia; antennal postpedicel subhemispherical, length very short, ca. 1/4 greatest width, rounded apically; all brown areas of thorax darker and broader or more extensive than in males; CI brown, CII and CII dark brown; remainder of leg segments brown; wing with darker infuscation than male; abdominal coloration (Fig. 8) more contrasting than in male.

Material examined. LECTOTYPE ♀ (BPBM 4059) (designated by Evenhuis, 2007: 25) from HAWAIIAN ISLANDS: **Moloka'i**: Moaula, 2400 ft [730 m], 29 Nov 1933, F.X. Williams. **Other material examined**: HAWAIIAN ISLANDS: **Moloka'i**: 2♀, Maunawainui Val, Jul 1952, D.E. Hardy [paratype of *C. flaviventer* Hardy & Delfinado] (UHM); 1♀, Pu'u Kolekole, 4500 ft [1370 m], 6 Sep 1978, reared ex *Clermontia* bark, S.L. Montgomery (UHM); 1♂, 3♀, Maunawainui Val, Jul 1952, D.E. Hardy [paratype of *C. flaviventer* Hardy & Delfinado] [BPBM Ent 2008010509–10, 2008010517, 2008010519] (BPBM); 1♂, same data, and paratype status except Aug 1953 [BPBM Ent 2008010513] (BPBM); 1♀, Pu'u Kolekole, Jul 1953, M. Tamashiro [paratype of *C. flaviventer* Hardy & Delfinado] [BPBM Ent 2008010518] (BPBM). **Maui (East)**: 1♂, Waikamoi, 4000 ft [1020 m], Aug 1958, D.E. Hardy (UHM); 1♀, same data except 24 Aug 1964, J.W. Beardsley (UHM); 1♀, Upper Hana Forest, 5675 ft [1730 m], G.W. Merrit (UHM); 1♀, Waikamoi, 4000 ft [1020 m], Aug 1958, D.E. Hardy [BPBM Ent 2008010514] (BPBM); 1♀, Makawao, UTM 784111 2306186, 833 m, 23 Mar 2005, 02162, yellow pan, W. Haines (BPBM); 1♀, same data except, UTM 784101 2305264, 941 m, 23 Mar 2005, yellow pan, 01665, W. Haines (BPBM); 1♀, Makawao Forest Reserve, pig hunter's trail, 21 Sep 2011, sweeping, K.R. Goodman, KRG1159, (BPBM); 1♀, same data except, 23 Sep 2011, pan trap in seep, KRG1190 (BPBM). **Maui (West):** 1♀, ridge above Kaulalewelewe, 3000 ft [914 m], 4 Aug 1964, D.E. Hardy [BPBM Ent 2008010515] (BPBM); 1♀, Mt. Lihau summit, 4000 ft [1020 m], 8–9 May 1993, Malaise trap, D.A. Polhemus (BPBM).

Remarks. Evenhuis (2007: 25) examined the type and gave label data and condition of the type specimen in addition to designating a lectotype. It should also be noted that Parent's (1937) description gave the year of collection incorrectly as "1923". The date on the label is "[19]33", which better fits with the dates F.X. Williams was in Hawai'i. Comparison of females of *C. flaviventer* from Moloka'i (including paratypes) with the lectotype female of *C. fumipennis* during this study shows no differences between the two, thus the **new synonymy** here.

Etymology. The specific name of the senior synonym derives from the Latin *fumi* = "smoky" + *pennis* = "wing" referring to the smoky wing pattern along the veins.

Campsicnemus leucostoma Evenhuis, sp. nov.

(Figs. 4, 6, 9, 14, 18)

Diagnosis. Similar to *C. aniani* and can be separated from it by the all generally white body except the occipital region of the head, the admedian vittae and brown tergal pattern (these white areas being yellowish brown to dark brown in *C. aniani*).

Description. Male: Body length: 3.0–3.5 mm. Wing length: 3.2–3.8 mm. **Head**: Vertex, occiput and postgena brown, remainder of head white; face and clypeus silvery tomentose; oc and vt brown, about two-thirds length of antennal arista; postgena with fine white hairs; face constricted at middle, holoptic for distance of 2 ommatidia; palpus small, white; proboscis white, extending below eye in lateral view; antenna (Fig. 4) with segments white; postpedicel subtriangular, length about 1.5X width, rounded apically; arista slightly longer than head height. **Thorax**: White except as follows: anepimeron brown at wing base; laterotergite with small brown spot laterally; pair of admedian vittae brown, prescutellar and prealar areas diffuse pale brown; scutellum brown dorsally; thoracic setae very long, brown: 1 + 4 dc; 2 np; 2 ph; 1 pa; 1 + 1 + 1 sc (strong scutellar as long as head height); 10–12 ac; halter stem and knob white. **Legs**: White, coxae and femora with white hairs except ventral femoral hairs

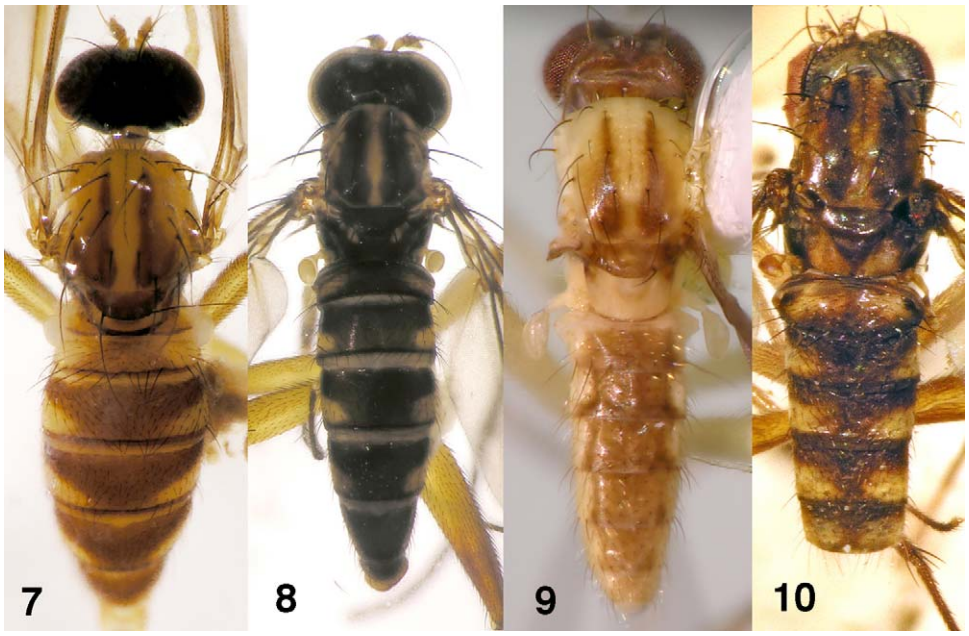
brown; FII with 20–25 setae ventrally, yellow, longest and thinnest on basal third, stiff, brown and shorter on apical two-thirds; TiII (Fig. 18) long, straight, with 4 long stiff, black setae on lateral surface, sparse patch of long hairs subbasally on lateral surface (MSSC), stiff hairs on medial surface, shortest on basal and apical third, longest on medial third, hairs erect on basal two-thirds, becoming appressed on apical third; apical tibial setae not as strong as in *C. aniani* or *C. fumipennis*. IIt_1 about 1.5X length of IIt_2, without MSSC. Remaining leg segments without MSSC. ***Wing*** (Fig. 14): Hyaline; posterior crossvein almost 1/3 length of distal section of vein CuA_1. **Abdomen**: Brown dorsally, with white laterally; short brown hairs dorsally on each tergite, hairs yellowish brown laterally, hairs longest on posterior margin of tergite I; sternites white. Hypopygium yellow with white cerci, not dissected. Female: As in male except for lack of MSSC and as follows: eyes dichoptic, separated by width of one ommatidium; antennal postpedicel length subequal to width; brown areas of thorax and abdomen slightly darker and more extensive than in male.

FIGURE 6. *Campsicnemus leucostoma*, **sp. nov.**, male habitus. Body length: 3.2 mm.

Types. **HOLOTYPE** ♂ (BPBM 16,756; preserved in spirit) and 1♂, ♀ **paratypes** from HAWAIIAN ISLANDS: **Hawai‘i**: Pu‘u Maka‘ala Natural Area Reserve, 1330 m, 4–10 Apr 1994, Malaise trap, D.J. Preston.

Other paratypes: HAWAIIAN ISLANDS: **Hawai'i**: 1♀, Pu'u Maka'ala Natural Area Reserve , Army Road 4, 1 mi S Stainback Hwy, 19°33.149'N, 155°13.849'W, 11–12 Aug 2012, yellow pan trap in *'ōhi'a/Cybotium* forest, N. Evenhuis (BPBM); 1♂, Upper Ola'a Forest Reserve, 4000 ft [1020 m], 16 Apr 1991, reared ex *Cheirodendron* leaves, K.Y. Kaneshiro (UHM); 1♂, Kona Hema TNC Nature Preserve, Papa Unit, 19°12'47.217"N, 155°49'41.625"W, 11 Jan 2006, Malaise trap MT1, R. Peck (BPBM); 1♂, Hawaii Volcanoes National Park, Ola'a Forest, Pole 44, 29 Jul 2010, general sweeping, B. Ort (BPBM), 4♂, 15♀, Hawaii Volcanoes National Park, Ola'a forest, SEA, Pu'u Unit, 4200 ft [1280 m], Jun–Aug 1993, 3185-001, 3929-002, 2333-001, 3845-002, 2111-001, 2636-003, 2829-004, 2352-001, 2341-006, 2327-003, 3021-002, 2316-001, 2249-001, green pan traps, D.A. Foote, N.L. Evenhuis (HAVO).

Etymology. The specific epithet derives from the Greek *leucos* = "white" + *stoma* = "mouthparts"; referring to the distinctive white mouthparts of the species.



FIGURES 7–10. *Campsicnemus* female thorax and abdomens. **7**, *C. aniani*, **sp. nov.**; **8**, *C. fumipennis*; **9**, *C. leucostoma*, **sp. nov.**; **10**, *C. spectabulus*, **sp. nov.**

***Campsicnemus spectabulus* Evenhuis, sp. nov.**
(Figs. 5, 10, 11, 15, 19)

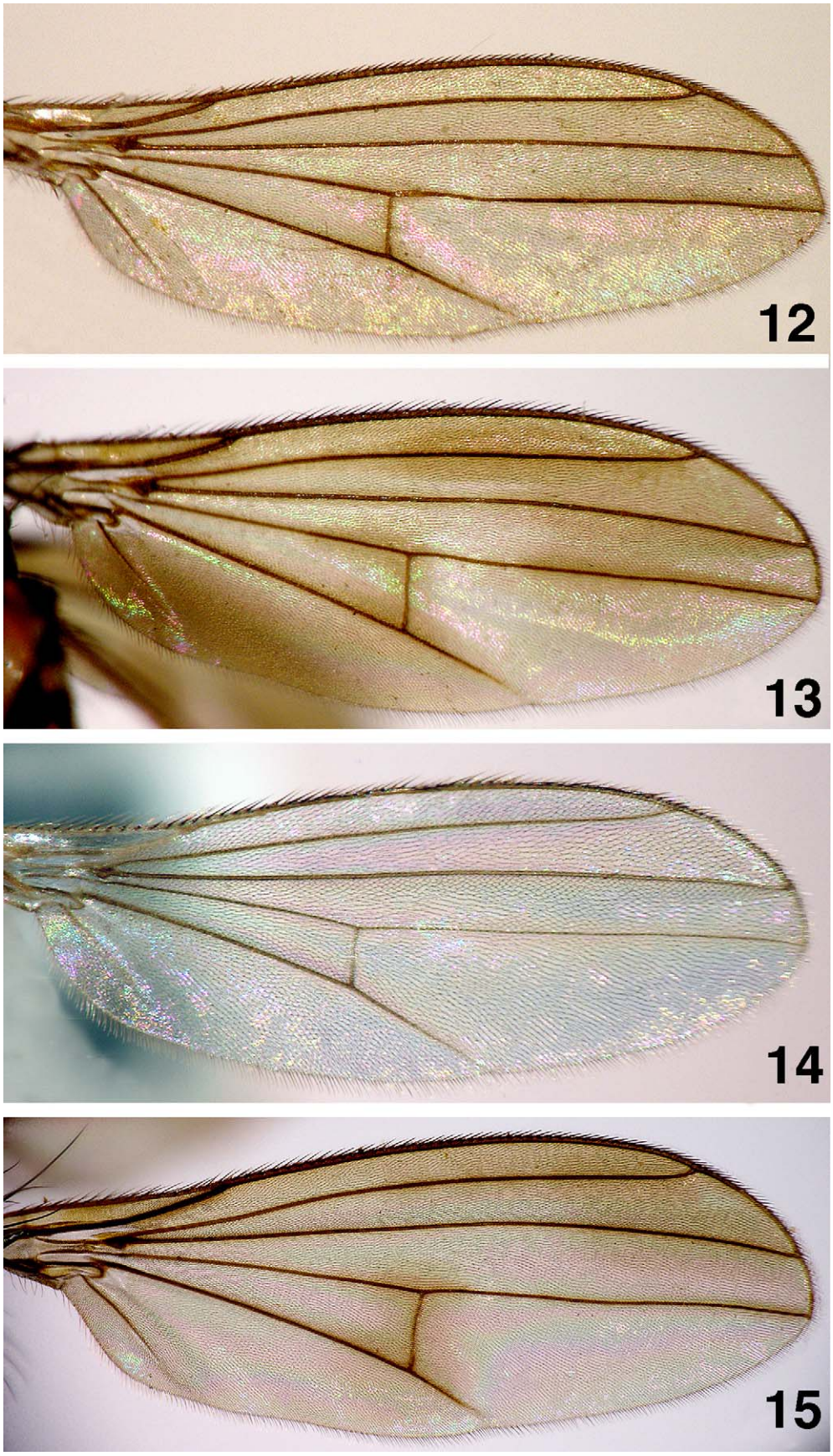
Campsicnemus fumipennis: Williams, 1938a: 120, 1940: 295; Smith, 1952: 430; Wirth & Stone, 1956: 450; Hardy & Kohn, 1964: 92; Tenorio, 1969: 3; Evenhuis, 1996: 55; Anonymous, 2009: 80. Misidentifications.

Diagnosis. Similar to *C. fumipennis* in wing and abdominal patterning but can be easily distinguished by the characteristic long hairs of the male mid tibia (Fig. 19) (much shorter in *C. fumipennis*) and the predominantly yellowish brown laterotergite (predominantly dark brown in *C. fumipennis*).

Description. **Male**: Body length: 3.5–5.0 mm. Wing length: 4.0–5.0 mm. **Head**: Black, face, front and clypeus yellow, face and clypeus silvery golden tomentose; oc and vt black, about two-thirds length of antennal arista; occiput, and vertex black with blue-green to brassy highlights; postgena with long black hairs; face constricted at middle, holoptic for a length of 6 ommatidia; palpus small, brown; proboscis brown, extending below eye in lateral view; antenna (Fig. 5) with scape and pedicel yellow, postpedicel brown to gray-brown; scape flared apically, length ca. 2X greatest width; pedicel subspherical, with ring of short spiky black setae subapically; postpedicel long, lanceolate, length about 2.2–2.5X width, acute apically; arista slightly longer than head height. **Thorax**: Mesonotum yellowish brown, scutellum brown; pleura yellow except anepimeron dark brown, laterotergite with spot of brown laterally; dorsum of mesonotum with pair of brown admedian vittae (cf. Fig. 10), each vitta narrow

FIGURE 11. *Campsicnemus spectabulus*, **sp. nov.**, male habitus. Body length: 3.8 mm.

anteriorly, flaring posteriorly to tear-drop shape near prescutellar area; thoracic setae very long, black: 1 + 4 dc; 2 np; 1 + 2 ph; 1 pa; 1 + 1 + 1 sc; 5–6 ac, ending at middle of mesonotum; halter stem and knob yellowish white. **Legs**: CI yellowish, spot of brown at extreme base; coxae with normal setation, CII brown, CIII yellow with some brown on posterior margin; fore and hind legs unmodified and without MSSC; FI and FII yellowish brown, FIII yellowish brown with darker brown at apex, without MSSC; TiII and TiIII yellow, remainder of legs brown; FII with 2 rows of 15–18 black setae along ventral surface in middle (MSSC), setae absent at apex and toward base; TiII (Fig. 19) very slightly sinuous, with long, slightly curved, black hairs along two-thirds of lateral surface (MSSC), mesal surface with short, stiff black spiky setae on basal half, longer curved hairs on apical half, becoming appressed on apical fourth (MSSC), apex with pair of strong long black setae on mesal surface. IIt_1 slightly longer than IIt_2, without MSSC. Remaining leg segments unmodified and without MSSC. **Wing** (Fig. 15): Subhyaline, with brownish infumation surrounding apical one-half to one-third of R_{2+3} and R_{4+5} and coalesced between those two veins to wing margin; infuscation faint along distal section of M_1, cloud of infuscation on M_1 at posterior crossvein; infuscation also along CuA_1 just before, at, and after junction with posterior crossvein and posterior crossvein clouded with brown; posterior crossvein longer than distal section of CuA_1. **Abdomen** (cf. Fig. 10): Dark brown dorsally with yellow laterally and posterolaterally, yellow color most extensive on basal tergites,



FIGURES 12–15. *Campsicnemus* wings. **12**, *C. aniani*, **sp. nov.**; **13**, *C. fumipennis*; **14**, *C. leucostoma*, **sp. nov.**; **15**, *C. spectabulus*, **sp. nov.**

FIGURES 16–19. *Campsicnemus* male mid tibiae. **16**, *C. aniani*, **sp. nov.**; **17**, *C. fumipennis*; **18**, *C. leucostoma*, **sp. nov.**; **19**, *C. spectabulus*, **sp. nov.**

becoming less extensive on succeeding tergites; sternites with brown medially and basally, otherwise yellow; tergal vestiture black, strongest along posterior margin of tergite I. Hypopygium grayish brown with pale brown cerci, not dissected. **Female**: As in male except for lack of MSSC and the following: eyes holoptic, separated at medial constriction by width of one ommatidium; antennal postpedicel subtriangular, length subequal to width, rounded apically; all brown areas of thorax darker and broader or more extensive than in males; TiII brown; wing with darker infuscation than male; abdominal coloration (Fig. 10) more contrasting than in male.

Types. **HOLOTYPE** ♂ (BPBM 16,663) and 1♂ paratype from HAWAIIAN ISLANDS: **O‘ahu**: Lulumahu Canyon, 4 Apr 1937, on banana stem, F.X. Williams (BPBM). **Other paratypes**: **O‘ahu**: 1♂1♀, same pin, Lulumahu Str, Konahanui,1800 ft [550 m], 20 Sep 1936, banana grove, F.X. Williams (BPBM); 1♂, same data (HDOA); 1♂, same data except 29 Sep 1836 (HDOA); 1♂, 1♀, same pin, Lulumahu Str, 1800 ft [550 m], 27 Sep 1936, F.X. Williams (HDOA); 1♀, same data (HDOA); 1♂, Lulumahu, 1750 ft [530 m], 21 Feb 1937, F.X. Williams (HDOA); 1♂, Lulumahu Val, 1900 ft [580 m], 11 Oct 1936, on banana stem, F.W. Williams (HDOA); 1♂, same data except, in banana grove (HDOA); 2♂, same data except 4 Oct 1936, on banana stem (HDOA); 2♂, on same pin [one only thorax and abdomen remaining], same data except 27 Sep 1936 (HDOA); 3♂, Lulumahu Val, 28 Mar 1937, on banana stem, F.X. Williams (HDOA); 1♂, Lulumahu Val, 1850 ft [564 m], 8 Nov 1936, on banana stem, F.X. Williams (HDOA); 1♀, Lulumahu Val, 21 Feb 1937, on banana stem, F.X. Williams (HDOA); 1♂, Kaluanui Val, 2000 ft [610 m], 18 Oct 1936, on banana stem, F.W. Williams (HDOA); 1♂, 1♀, Castle Trail, 11 Apr 1970, reared ex rotten bark of *Charpenteria*, S.L. Montgomery (UHM); 1♀, same data except reared ex rotten bark of *Tetraplasandra* (UHM); 2♂, Castle Trail, 15 Mar 1970, reared ex *Clermontia* bark, S.L. Montgomery (HUM); 2 ♂, same data except reared ex rotten fruit of *Pritchardia* (UHM); 1♀, Makaleha, 23 Jan 1970, reared ex *Pisonia* leaves, fed on *Dettopsomyia* [Drosophilidae], S.L. Montgomery (UHM); 1♀, S. Kahana Val, 31 May 1970, reared ex *Tetraplasandra* bark, S.L. Montgomery (UHM); 1♂, Hidden Val, S. Kahana, 31 May 1970, reared ex

Tetraplasandra bark, S.L. Montgomery (UHM); Kaluaa Pu‘u Hapapa, 15 Feb 1970, reared ex fern frond, S.L. Montgomery [with associated pupal case] (UHM); 1♂, Pu‘u Kaua, 13 Aug 1972, reared ex *Pisonia* stem, S.L. Montgomery (UHM); 1♀, Pia, Niu V[alley], 1400 ft [425 m], 23 Jan 1971, reared ex *Touchardia* bark w/ *Drosophila*, S.L. Montgomery (UHM); 1♀, Palehua, 2200 ft [670 m], 18 Apr 1970, reared ex koa sap flux, S.L. Montgomery (UHM); Mt Tantalus, 9 Oct 1963, M.R. Wheeler (UHM).

Etymology. The specific epithet derives from a combination of the Latin, *spectabilis* = “showy, notable” + fabulous, from the Latin *fabulor* = “story, tale”, in reference to the fabulous and showy wing and abdominal pattern and strikingly hirsute male mid tibia.

Remarks. The biology of this species [as “*C. fumipennis*”] and its immature stages were described in detail by Williams (1938) based on specimens observed and collected at Lulumahu Stream. Rearing records of immatures are shown in Table 1. One prey record is found on one label from a reared immature feeding on a species of the drosophilid *Dettopsomyia* at Makaleha, O‘ahu.

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