

## New Species of *Campsicnemus* (Diptera: Dolichopodidae) from the Ko‘olau Mountains of O‘ahu, Hawaiian Islands<sup>1</sup>

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Terrestrial arthropod surveys on O‘ahu over the years have resulted in a number of new species of endemic Hawaiian dolichopodids. The new species described here were all found in the Ko‘olau range of O‘ahu and are being described to allow their names to be used in the results of Hawaiian faunal surveys and phylogenetic and molecular analyses. The unusual discovery of three of these new species collected only recently from the commonly-hiked and entomologically-collected Poamoho Trail that were never discovered previously is a possible indication that further concentrated studies along the ridges and valleys of the Ko‘olau range specifically for these flies will turn up many more new species. The addition of the four new species described here brings the total number of Hawaiian *Campsicnemus* to 171, all of which are endemic to the islands.

### Material and Methods

Material derives from the Bishop Museum, Honolulu (BPBM). Holotypes and paratypes of new species described herein are deposited in BPBM. Vouchers of some of these species that were collected into 95% ethanol have been sent to the University of California, Berkeley (UCB), for molecular analysis.

Terminology and abbreviations for morphological characters follows recent papers on Hawaiian *Campsicnemus* by Evenhuis (2007, 2011).

### New Species Descriptions

#### *Campsicnemus ciliatoides* Evenhuis, new species

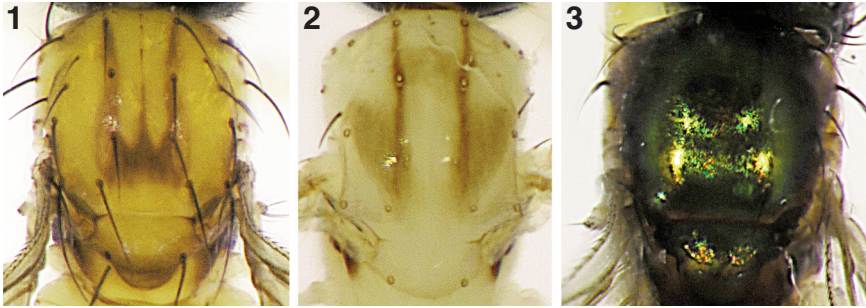
(Figs. 1, 4)

**Diagnosis.** Similar to *C. ciliatus* Van Duzee, but can be distinguished by the mesonotum yellowish with a middorsal brown trident pattern (Fig. 1) (mesonotum all dark brown in *C. ciliatus*); mid tibia much longer than the mid femur and thin (mid tibia as long as the mid femur and slightly swollen at basal one-third in *C. ciliatus*); and long setae on the mid tibia restricted to the apical one-fourth (long setae restricted to the apical half of the mid tibia in *C. ciliatus*).

**Description. Male.** Body length: 3.2–4.0 mm. Wing length: 3.5–4.2 mm. *Head.* Black, face small, dark brown to black; oc and vt black, about three-fifths length of antennal arista; front, occiput, and vertex black with blue highlights; face constricted at middle, almost holoptic, eyes separated below antennae by width of 1–2 ommatidia; palp small, dark brown; proboscis yellowish brown to brown, extending below eye in lateral view; scape and pedicel of antenna yellow; postpedicel yellowish white with brown edges, long, subtriangu-

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**Figures 1–3.** *Campsicnemus* male thoraxes, dorsal view. 1, *C. ciliatoides*, n. sp. 2, *C. niveisoma*, n. sp. (thoracic setae broken off) 3, *C. scintillatus*, n. sp.

lar with blunt apex, length about  $1.2 \times$  width; arista slightly longer than head height.

**Thorax:** Mesoscutum and scutellum yellow (except for tinge of brown on posterior margin of latter), dorsum of mesonotum with trident pattern medially (Fig. 1); pleura yellow to yellowish white except brown on following: anepisternum, anepimeron (dark brown), laterotergite, postscutellum medially); thoracic setae black: 4 dc; 2 np; 2 ph; 1 pa; 1 sc; 12–14 ac on anterior half; halter stem and knob yellowish white.

**Legs:** CI white, with 3–4 strong black setae apically, fine hairs basally; CII brown; CIII and remainder of legs yellowish;  $It_1$  slightly bowed with dense setation laterally (MSSC), remainder of foreleg unmodified; FII swollen at basal  $2/5$ , tapering to thin apex, with row of 12–14 long strong setae ventral surface becoming shorter apically (MSSC);  $TiIII$  (Fig. 4) long, thin, straight, laterally with two rows of short spines mesally, with long, slightly wavy setae laterally on apical one-fourth (MSSC);  $IIt_1$  slightly longer than  $IIt_2$ , with short stiff setae and sparser finer long hairs slightly curved apically (MSSC); remainder of legs unmodified.

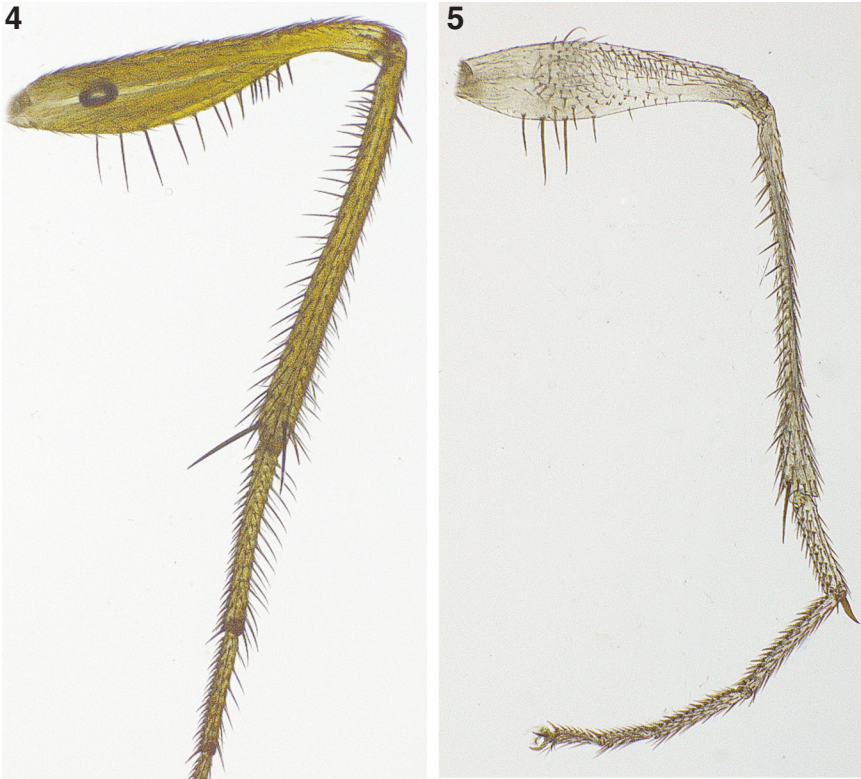
**Wing:** subhyaline throughout.

**Abdomen.** Tergites dark brown with short black hairs dorsally on each segment, a few longer hairs laterally; sternites I–IV, VI yellow to white, sternite V brown; hypopygium dark brown with brown cerci, not dissected.

**Female.** As in male but without MSSC; postpedicel of antenna half as long as high; mesonotal dark pattern darker and more filled in than male; brown areas of pleura darker brown and slightly more extensive than in male.

**Types.** *Holotype* ♂ (BPBM 17,517; preserved in fluid) and 1 ♀ paratype from HAWAIIAN ISLANDS: **O‘ahu:** Ko‘olau Mountains, Poamoho Trail, 30 May 2011, yellow pan traps in leaf litter in guava forest next to trail, 2300 ft [700 m],  $21^{\circ}31.984' N$ ,  $157^{\circ}55.808' W$ , N. Evenhuis (BPBM). Other paratypes: 3 ♂, same data, 16 Sep 2011, trap left for an hour, K.R. Goodman (BPBM); 13 ♂, 9 ♀, same data, 17 Sep 2011, trap left for a day, K.R. Goodman (BPBM). Holotype and paratypes in BPBM.

**Etymology.** The specific epithet refers to its close appearance to *C. ciliatus* Hardy & Kohn.



**Figures 4–5.** *Campsicnemus* male midlegs. 4, *C. ciliatoides*, n. sp., femur, tibia, and basal tarsal segments. 5, *C. niveisoma*, n. sp., femur, tibia, and tarsal segments.

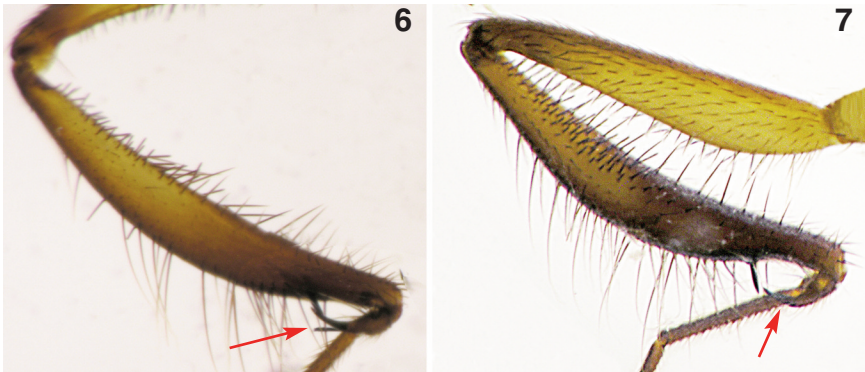
***Campsicnemus kaluanui* Evenhuis, new species**

(Fig. 6, 10)

**Diagnosis.** Similar in appearance to *C. lawakua* Evenhuis from Kaua‘i on the basis of the similar shape and setation on the male mid tibia and the long antennal scape, but it can be distinguished by the lack of a second strong black subapical spur on the mid basistarsus (two spurs present in *C. lawakua* cf. Fig. 6) and the much longer peg-like setae on the mesal surface of the mid tibia (these peg-like setae shorter in *C. lawakua*; cf. Fig. 6).

**Description. Male.** Body length: 3.5 mm. Wing length: 4.0 mm. *Head.* Black, face brown with bluish highlights; oc and vt black; front, occiput, and vertex black with blue highlights; face slightly constricted at middle, slightly dichoptic, eyes separated below antennae by width of 4–5 ommatidia; palp small, dark brown; proboscis brown, extending below eye in lateral view; scape and pedicel dark brown; postpedicel and arista broken off and missing.

*Thorax:* Dark brown; thoracic setae black: 4 dc; 2 np; 2 ph; 1 pa; 1 + 1 sc; ac absent; halter stem white, knob yellowish.



**Figures 6–7.** *Campsicnemus* male midlegs. 6, *C. lawakua* Evenhuis, 2003, femur, tibia, and basitarsus. 7, *C. kaluanui*, n. sp., femur, tibia, and basal two tarsal segments. Arrows point to apical spur of basitarsus.

*Legs:* CI white, with strong brownish setae apically, fine whitish hairs basally; CII and CIII brown; remainder of legs dark brown; femora yellowish brown, brown apically; FII swollen at basal 1/3, tapering to thin apex, with row of short and longer strong setae along entire ventral surface (MSSC); FIII with long fine seta along entire ventral surface (MSSC); TiII (Fig. 5) relatively thick, slightly bowed, thicker medially, with two rows of blunt peg-like spines on basal 2/3 of mesal surface, long hairs apically on mesal surface, laterally with row of longer hairs along entire length, longest near middle becoming shorter basally and apically, with thick, black, blunt spine subapically (MSSC); IIt<sub>1</sub> (Fig. 5) short, subglobular, with single strong hook-like apical spur (MSSC); remainder of legs unmodified.

*Wing:* pale smoky yellowish brown throughout.

*Abdomen* (semi-detached from thorax). Tergites dark brown with short black hairs dorsally on each segment, a few longer hairs laterally; sternites I–IV, VI yellow to white, sternite V brown; hypopygium dark brown with brown cerci, surstyli black, not dissected.

**Female.** Unknown.

**Types.** Holotype ♂ (BPBM 17,518; preserved in fluid) from HAWAIIAN ISLANDS: **O‘ahu:** Kaluanui Stream, 350 ft [106 m], swept from cliff rocks at plunge pool (Fig. 10) [Kalu140503], 14 May 2003, D.J. Preston. Holotype in BPBM.

**Remarks.** The original description and illustration of *C. lawakua* (Evenhuis, 2003) failed to indicate the second spur (see Fig. 6) on the mid basitarsus and the presence of a sub-apical thick spine on the mid tibia; otherwise the description is correct in the remaining salient characters.

**Etymology.** The specific name refers to the type locality of Kaluanui Stream on O‘ahu and is treated as a noun in apposition.



**Figure 8.** *Campsicnemus niveisoma*, male habitus, lateral view.

***Campsicnemus niveisoma* Evenhuis, new species**

(Figs. 2, 5, 8)

**Diagnosis.** Closest in appearance to *C. inermipes* Malloch from O<sup>o</sup>ahu, and can be separated from it by the white mesonotum with faint admedial stripes (Fig. 2) (mesonotum brown on posterior half and without vittae in *C. inermipes*), the dense patch of hairs at the dorsal middle of the mid femur (this middle patch absent but present at the apex of the femur in *C. inermipes*), and the postpedical of the antenna more than 2 times the width (slightly longer than wide in *C. inermipes*).

**Description. Male.** Body length: 1.7–2.0 mm. Wing length: 1.9–2.2 mm. *Head.* Face and clypeus light brown, front and vertex dark brown; oc and vt pale yellow, about one-half length of antennal arista; clypeus yellow; face constricted at middle, eyes almost holoptic below antennae, separated by width of 2 ommatidia; palp small, white; proboscis white, extending below eye in lateral view; antennal segments white, postpedicel subtriangular, length  $2.2 \times$  width; arista subequal to head height.

*Thorax.* White except faint yellowish brown admedian vittae on mesonotum (Fig. 2), dark brown anepimeron, and brown spot laterally on laterotergite; thoracic setae brown: 4 dc; 2+1 np; 1+1 ph; 1 pa; 1 sc; 10–12 pale ac anteriorly.

*Legs.* White. Leg I unmodified, without MSSC. FII swollen medially with patch of fine hairs dorsomedially and appressed fine hairs on apical 1/2 of dorsal surface, 2–3 black spines ventromedially (MSSC); TiII (Fig. 4) long, thin, wider apically than basally, row of short sparse stiff setae on basal 1/2 (MSSC), short hairs elsewhere; longer black setae on apical 1/4 and 1 seta mesoapically (MSSC); IIt<sub>1</sub> subequal in length to IIt<sub>2</sub>, with strong short black spur apically (Fig. 4) (MSSC); IIt<sub>2-5</sub> unmodified. IIIIt<sub>1</sub> with apical pecten, remainder of leg III unmodified, without MSSC; halter and knob white.

*Wing* subhyaline.

*Abdomen.* Tergites and sternites white with short pale yellow hairs dorsally on each tergite, a few longer hairs laterally. Hypopygium white, surstyli black, not dissected.

**Female.** As in male but without MSSC; antennal postpedicel subconical, as long as wide.

**Types.** Holotype ♂ (BPBM 17,519; preserved in fluid) and 1 ♀ paratype from HAWAIIAN ISLANDS: O‘ahu: Poamoho Trail, 30 May 2011, yellow pan traps in leaf litter in guava forest next to trail, 2300 ft [700 m], 21°31.984' N, 157°55.808' W, N.L. Evenhuis (BPBM). Other paratype: 1 ♂, same data except: 17 Sep 2011, yellow pan traps left for a day, K.R. Goodman (BPBM). Holotype and paratypes in BPBM.

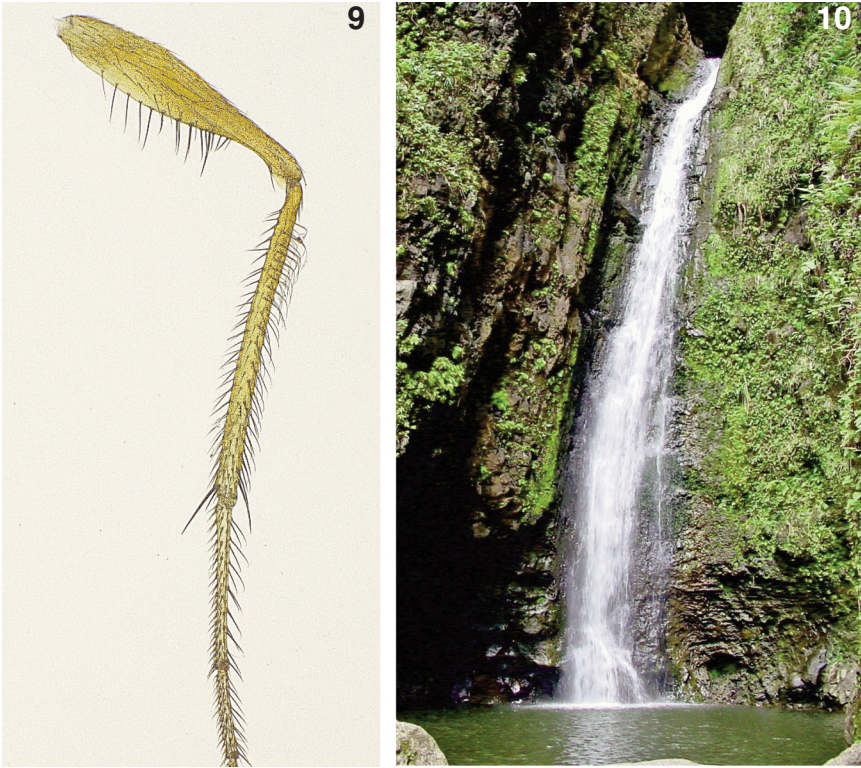
**Remarks.** The only three specimens known of *C. inermipes* are from Konahuanui (Ko‘olau Mountains near Honolulu) and an untraceable type locality on O‘ahu of “Kaumuahona”, which may have been an error for “Konahuanui”. *Campsicnemus niveisoma* is also from the Ko‘olau mountains but a few miles further north and is extremely close in appearance to *C. inermipes* (the two are the only two known species of *Campsicnemus* that lack melanization in almost all body parts), but it is clearly a separate species based on the consistent differences noted in the diagnosis.

**Etymology.** The specific epithet derives from the Latin *nivea* = snow white; referring to the complete absence of color in the integument except for the dark brown anepimeron and black occiput.

### *Campsicnemus scintillatus* Evenhuis, new species

(Figs. 3, 9)

**Diagnosis.** Keys to *C. furax* Parent using the key to species in Hardy & Kohn (1964) but differs by having the mesonotum shining metallic green (mesonotum reddish yellow with admedian brown stripes in *C. furax*) and the yellow CII with brown on the anterior and posterior edges (CII all yellowish brown in *C. furax*).



**Figure 9.** *Campsicnemus scintillatus*, n. sp., male midleg, showing femur, tibia, and basal two tarsal segments. **Figure 10.** Collection habitat for *C. kaluanui*, n. sp. along wet rock wall to the immediate right of the waterfall splash zone. Photo: David Preston.

**Description. Male.** Body length: 3.2 mm. Wing length: 3.5 mm. *Head.* Black, face small, dark brown to black; oc and vt black, about three-fifths length of antennal arista; front, occiput, and vertex black with blue highlights; eyes holoptic; palp small, yellowish brown; proboscis brown, extending below eye in lateral view; antenna yellow; postpedicel subtriangular with blunt apex, length about  $1.2 \times$  width; arista slightly longer than head height.

*Thorax:* Mesoscutum and scutellum dark brown, dorsum of mesonotum and scutellum shining metallic green with brassy highlights (Fig. 3); pleura yellowish except brown on following: upper anepisternum, anepimeron (dark brown), laterotergite, and postscutellum medially; thoracic setae black: 1 + 3 dc; 2 np; 2 ph; 1 pa; 1 sc; ac absent; halter stem and knob yellowish white, knob dusky brown at base.

*Legs:* CI white, without setae apically; CII yellowish medially with brown on anterior and posterior margins; CIII and remainder of legs yellowish;  $It_1$  slightly bowed, with rows of dense setae along entire length of medial and lateral surfaces; FII swollen at basal

2/5, tapering to thin apex, with patch of 8 strong black setae on subapical third of medial surface, 8 stiff setae on ventral surface (MSSC); TiII (Fig. 3) long, thin, slightly bowed, with long, slightly wavy setae laterally on basal one-half, straight along remainder of length, with shorter stiff setae on basal half of medial surface (MSSC); IIt<sub>1</sub> slightly longer than IIt<sub>2</sub>, with short stiff setae (MSSC); remainder of legs unmodified.

*Wing:* subhyaline throughout.

*Abdomen.* Tergites dark brown with short black hairs dorsally on each segment, a few longer hairs laterally; sternites yellow to white, sternites V–VI brown; hypopygium dark brown with brown cerci, not dissected.

**Female.** Unknown.

**Types.** *Holotype* ♂ (BPBM 17,527; preserved in fluid) from HAWAIIAN ISLANDS: **O‘ahu:** Ko‘olau Mountains, Poamoho Trail, 16–17 Sep 2011, yellow pan trap in leaf litter in guava forest next to trail, left for a day, 2300 ft [700 m], 21°31.984' N, 157°55.808' W, K.R. Goodman (BPBM). *Holotype* in BPBM.

**Etymology.** The specific epithet derives from the Latin *scintillo* = sparkle, glitter; and refers to the characteristic shining metallic green thorax.

#### Acknowledgments

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#### Literature Cited

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