

## New Species of *Campsicnemus* from East Maui, Hawaiian Islands (Diptera: Dolichopodidae)<sup>1</sup>

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Recent terrestrial arthropod surveys have resulted in a number of new species of endemic Hawaiian dolichopodids. The new species here are all from East Maui (= slopes of Haleakalā volcano) and are being described to allow their names to be used in Hawaiian faunal surveys and phylogenetic and molecular analyses of Pacific dolichopodids. The addition of the five new species described here brings the total number of Hawaiian *Campsicnemus* to 168, all of which are endemic to the islands.

### Material and Methods

Most of the material derives from the Bishop Museum, Honolulu (BPBM). Holotypes and paratypes of new species described herein are deposited in BPBM. Where numbers of series allow, some paratypes are deposited in University of Hawai'i at Mānoa Insect Museum (UHIM). Vouchers of some of these species that were collected into 95% ethanol have been sent to the University of California, Berkeley, for molecular analysis.

Terminology and abbreviations for morphological characters follows recent papers on Pacific *Campsicnemus* by Evenhuis (2007, 2008, 2009).

### New Species Descriptions

#### *Campsicnemus bennetti* Evenhuis, new species

(Fig. 1)

**Types.** *Holotype* ♂ (BPBM 17,309) and 2♂ paratypes from HAWAIIAN ISLANDS: **East Maui:** Makawao Forest Reserve, Olinda Road, stream below Heed Trail, skating on side pools to stream, 20.81214°N, 156.23820°W, 4201 ft [ca 1280 m], 24 Nov 2009, N.L. Evenhuis & Gordon Bennett. *Other paratypes:* HAWAIIAN ISLANDS: **East Maui:** 6♂, Hanawī Stream, 5000 ft [ca 1525 m], 11 Nov 1992, D.A. Polhemus; 1♂, tributary to middle Hanawī Stream, 2900 ft [ca 885 m], 12 Nov 1992, D.A. Polhemus; 10♂, upper west fork Honomau Stream, Waikamoi TNCH Preserve, 5600 ft [ca 1700 m], 12 Nov 1992, D.A. Polhemus. Holotype and paratypes in BPBM.

**Diagnosis.** Similar to *C. truncatus* Hardy & Kohn from Maui and can be distinguished by the mid tibial basal comb with short pointed setae confined to the basal third of the leg segment (Fig. 1) [these setae long and truncate along the entire length of the mid tibia in *C. truncatus* (Fig. 2)].

#### Description.

**Male.** Body length: 3.0–3.2 mm. Wing length: 3.2–3.4 mm. *Head.* Black, face dark brown

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**Figs. 1–2.** *Campsicnemus* male mid tibiae. 1, *C. bennetti*; 2, *C. truncatus* Hardy & Kohn.

to black with bronze highlights; oc and vt black, about one-half length of antennal arista; front, occiput, and vertex black with blue highlights; face slightly constricted at middle, distinctly dichoptic, eyes separated below antennae by width of antennal sockets; palp small, dark brown; proboscis dark brown to black, extending below eye in lateral view; antennal segments black to brown; postpedicel long, lanceolate, length about 2 x width; arista subequal in length to head height.

*Thorax.* Mesoscutum, scutellum, and pleura dark brown to black throughout, with a few metallic greenish and bronze highlights laterally; thoracic setae black: 4 dc; 2 np; 2 ph; 1 pa; 1 + 1 sc; ac present; halter stem white, knob brownish.

*Legs.* CI yellowish white, with black setae anteriorly, 4–5 strong setae apically; remainder of legs dark brown, FI and FII lighter brown ventrally in some specimens; femora unmodified, without MSSC; TiII (Fig. 1) with 4–6 strong apically pointed setae on basal one-third of ventral surface (MSSC), smaller black setae and hairs along entire ventral surface. Remainder of leg segments without MSSC.

*Wing.* Smoky gray-black throughout.

*Abdomen.* Dark brown with short black hairs dorsally on each tergite, a few longer hairs laterally; sternites brown. Hypopygium dark brown with brown cerci, not dissected.

**Female.** Unknown.

**Remarks.** Because specimens of *C. bennetti* were collected sympatrically with *C. truncatus*, it was impossible to associate females with either species.

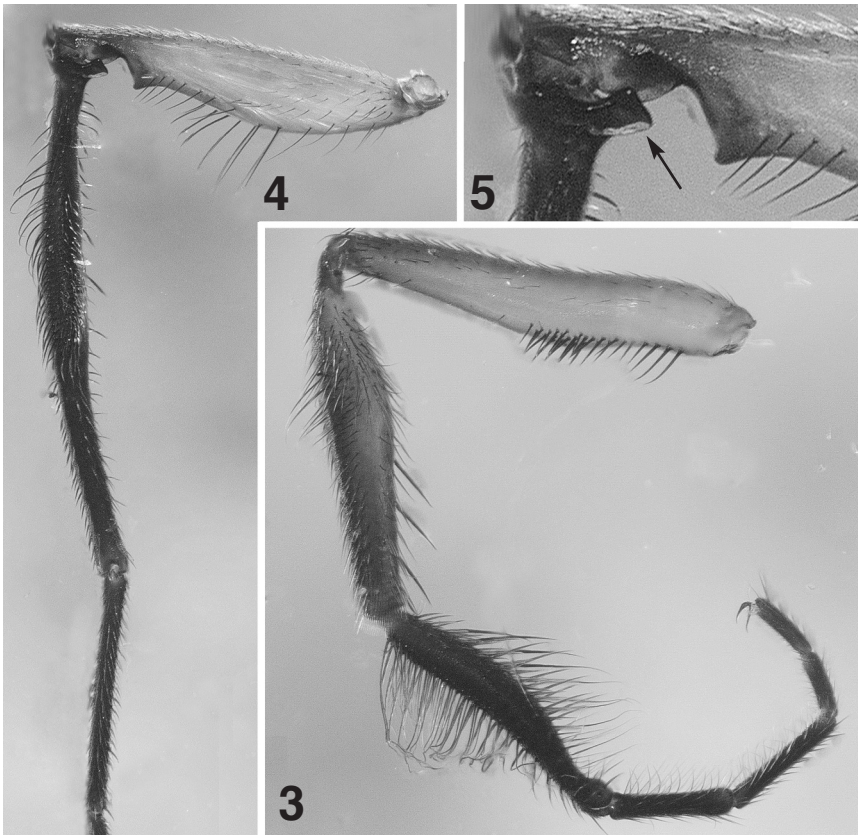
**Etymology.** The specific epithet honors the collector, Gordon Bennett, with whom I have had the pleasure of collecting on O‘ahu, Maui, and Molokai.

*Campsicnemus iii* Evenhuis, new species

(Figs. 3–5)

**Types.** Holotype ♂ (BPBM 16,920) and 4♂, 6♀ paratypes from HAWAIIAN ISLANDS: **East Maui:** headwaters of Wailuaiki Stream, 6900 ft [ca 3050 m], 10 Nov 1992, D.A. Polhemus. Holotype and paratypes in BPBM.

**Diagnosis.** Fits with species in the *bellulus* complex of species in Hawai'i by the presence of a subbasal mesally-directed projection (flange-like in *C. iii*) of the male mid tibia. It is closest in appearance to *C. williamsi* Van Duzee and can be distinguished from it by the fore basitarsus with long hairs laterally and mesally (these long hairs not present in *C. williamsi*), the mid tibia without long hairs subapically (long subapical hairs present in *C. williamsi*), and by the lack of a apical hook-like process on the mid femur (this hook-like process present in *C. williamsi*).



**Figs. 3–5.** *Campsicnemus iii* male legs. **3**, foreleg; **4**, mid tibia; **5**, detail of apex of mid femur and base of mid tibia to show tibial flange-like process (arrow).

**Description.**

**Male.** Body length: 3.2–4.0 mm. Wing length: 3.5–4.2 mm. *Head.* Black, face small, dark brown to black with bluish highlights, paler brown near clypeus; oc and vt black, about one-third 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 brown, extending below eye in lateral view; antennal segments black to brown; postpedicel long, subtriangular with blunt apex, length about 1.2 x width; arista slightly longer than head height.

*Thorax.* Mesoscutum and scutellum brown to black, paler laterally in notopleural and supraalar areas, with a few metallic greenish highlights; pleura dark brown above (anepisternum, anepimeron, laterotergite), yellowish brown below (katepisternum, meron, metakatepisternum); thoracic setae black: 1 + 3 dc; 2 np; 2 ph; 1 pa; 1 + 1 sc; ac absent; halter stem tan, knob brownish.

*Legs.* CI yellowish brown, with strong black setae apically, fine hairs basally; CII brown; CIII brown with yellowish brown spot lateromedially; femora yellowish brown; remainder of legs brown; foreleg (Fig. 3) with FI with dense patch of short strong spines ventrally in middle third; TiI attenuate basally, swollen at basal one-third, tapering to apex, with patch of long hairs on swollen portion, long spines on apical third of mesal surface (MSSC);  $It_1$  2.2 x length of  $It_2$ , slightly bowed, with dense long wavy hairs on lateral surface, long straight hairs on mesal surface (MSSC); remainder of tarsal segments unmodified; FII (Fig. 4) swollen at basal 2/5, tapering to thin apex, with row of 6–7 long strong setae medially on ventral surface, small subtriangular tubercle subapically on ventral surface (Fig. 5); TiII (Fig. 4) dark brown, long, thin, slightly swollen medially, with flat basal flange protruding mesally (Fig. 5), laterally with row of long spines medially at swelling, mesally with row of shorter spines along entire length;  $IIt_1$  length 2 x  $IIt_2$ , without MSSC; remainder of legs unmodified.

*Wing.* pale smoky throughout.

*Abdomen.* Dark brown with short black hairs dorsally on each tergite, a few longer hairs laterally; hypopygium dark brown with paler brown cerci, not dissected.

**Female.** As in male but without MSSC.

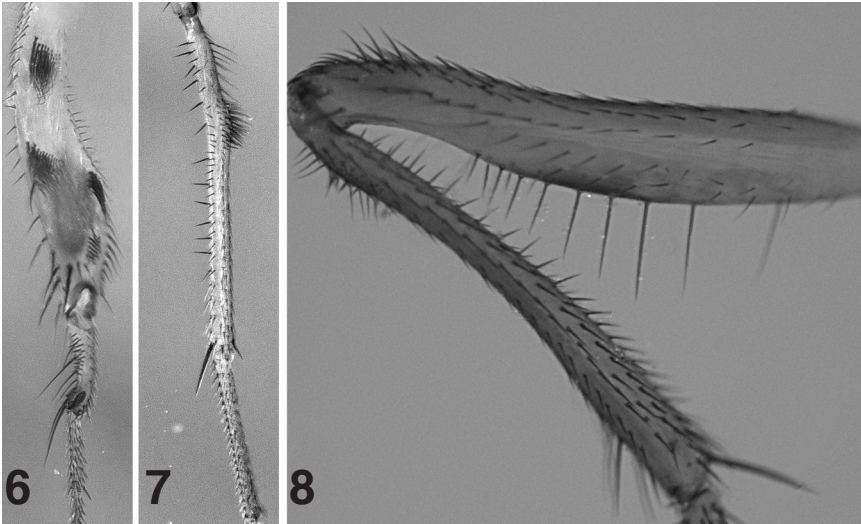
**Etymology.** The specific epithet honors John Papa I'i (1800–1870), leading citizen of the Hawaiian Kingdom during the 19th century when he was attendant to King Kamehameha II and close associate of many rulers of Hawai'i. One of his great-great-grandsons is my good friend and colleague in Hawaiian history, DeSoto Brown, collection manager of the Bishop Museum Archives.

***Campsicnemus makawao* Evenhuis, new species**

(Fig. 6)

**Types.** *Holotype* ♂ (BPBM 16,828) from HAWAIIAN ISLANDS: **Maui:** Makawao Forest Reserve, 2500 ft [ca. 762 m], NAD83 04Q 783589N 2306714W, 25 Nov 2004, yellow pan trap 27, W. Haines. *Paratypes.* HAWAIIAN ISLANDS: **Maui:** 1♂, Makawao Forest Reserve, Site 5, 931 m, NAD83 04Q 784122N 2306063W, 23–25 Mar 2005, yellow pan trap, W. Haines; 1♂, Makawao Forest Reserve, Site 2, 941 m, NAD83 04Q 784101N 2305264W, 23–25 Mar 2005, yellow pan trap, W. Haines. *Holotype* in BPBM. *Paratypes* in BPBM and UHIM.

**Diagnosis.** Similar in appearance to *C. penicillatus* and *C. penicillatoides* but can be distinguished by the three patches of thick, black setae on the basal half of the mid tibia (only two such patches in *C. penicillatus* and *C. penicillatoides*), the lack of a row of setulae



**Figs. 6–8.** *Campsicnemus* male legs. **6.** *C. makawao*, mid tibia; **7.** *C. quasimodicus*, mid tibia. **8.** *C. perkinsi*, mid femur and tibia.

apicomesally on the mid tibia (setulae present in this area either as a row or as patches in *C. penicillatus* and *C. penicillatoides*), and the mid basitarsus with a prominent subapical protuberance on the mesal surface (such a protuberance absent in *C. penicillatus* and *C. penicillatoides* but an apical spur is present).

#### **Description.**

**Male.** Body length: 3.0–3.1 mm. Wing length: 3.1–3.2 mm. *Head.* Face and clypeus dark brown, front and vertex brown pollinose, subshining in some portions; oc and vt black, about one-half length of antennal arista; clypeus slightly yellowish pollinose; face constricted at middle, eyes almost holoptic below antennae, separated by width of 1 ommatidium; palp small, brown; proboscis brown to yellowish-brown, extending below eye in lateral view; antennal scape and pedicel yellowish brown, postpedicel yellowish, subtriangular, as long as wide; arista subequal to head height.

*Thorax.* Yellowish on mesonotum and scutellum with brown admedian vittae extending from 1sr dc to 4th dc, vittae coalesced between 3rd and 4th dc; pleura yellowish brown above, whitish yellow below; thoracic setae black: 4 dc; 2+1 np; 1+1 ph; 1 pa; 1 sc; 5-6 pale ac anteriorly.

*Legs.* CI and CIII yellowish white, CII brown laterally; remainder of legs yellowish to yellowish brown. Leg I unmodified, without MSSC. FII without MSSC; TiII (Fig. 5) slightly wider apically than basally, with 3 dense patches of black setae, smaller patch of weaker setae subapically, with brown spot on apical half between two medial patches, single strong, long black seta subapically (MSSC); IIt<sub>1</sub> (Fig. 6) slightly longer than IIt<sub>2</sub>, slightly bowed, with thick prominent black apical protuberance (MSSC); IIt<sub>2-5</sub> unmodified. FIII with 3 black setae apicoventrally, remainder of leg III unmodified, without MSSC; halter and knob white.

*Wing.* Subhyaline.

*Abdomen.* Tergites and sternites brown with short black hairs dorsally on each tergite, a few longer hairs laterally; tergal interstices white. Hypopygium brown, not dissected.

**Female.** Unknown.

**Etymology.** The specific epithet derives from type locality of Makawao, Maui.

*Campsicnemus perkinsi* Evenhuis, new species

(Fig. 8)

**Types.** *Holotype* ♂ (BPBM 16,830) and 1♂, 1♀ *paratypes* from HAWAIIAN ISLANDS: **Maui:** Makawao Forest Reserve, 941 m, Site 2, NAD83 04Q 784101N 2305264W, 23–25 Mar 2005, yellow pan trap, W. Haines. *Other paratypes:* HAWAIIAN ISLANDS: **Lānaʻi:** 1♂, Lānaʻihale, 3200 ft [977 m], Jun 1963, D.E. Hardy; 1♂, Lānaʻihale, 3300 ft [1008 m], 12 Jul 1965, J. Fujii. **Maui:** 1♂, Kula Pipe Line, 4500 ft [1370 m], Mar 1932, E.H. Bryan; 1♂, Makawao Forest, 762 m, Banana Cave, NAD83 04Q 783589N 2306714W, 27–29 Nov 2004, yellow pan trap, W. Haines; 31♂, 14♀, Makawao Forest Reserve, 914 m, Reservoir, NAD83 04Q 783925N 2305577W, 27–29 Nov 2004, yellow pan trap, W. Haines; 2♂, Makawao Forest Reserve, 1060 m, Site 4, NAD83 04Q 783925N 2305577W, 23–25 Mar 2005, yellow pan trap, W. Haines; 3♂, 2♀, Makawao Forest Reserve, 941 m, Site 2, NAD83 04Q 784101N 2305264W, 23–25 Mar 2005, yellow pan trap, W. Haines; 2♂, Makawao Forest Reserve, 831 m, Site 1, NAD83 04Q 783590N 2306629W, 23–25 Mar 2005, yellow pan trap, W. Haines; 3♂, 1♀, Makawao Forest Reserve, 833 m, Site 5, NAD83 04Q 784111N 2306186W, 23–25 Mar 2005, yellow pan trap, W. Haines; 16♂, Makawao Forest Reserve, 945 m, Site 6, NAD83 04Q 783498N 2305035W, 23–25 Mar 2005, yellow pan trap, W. Haines. Holotype and paratypes in BPBM and UHIM.

**Diagnosis.** Closest in appearance to *C. scolimerus* from the Big Island of Hawaiʻi and can be separated from it by the lack of a strong stiff setae ventrally on the mid femur (4–6 long strong setae in *C. scolimerus*) and the weaker spines along the mesal surface of the mid tibia (these spines thicker in *C. scolimerus*).

**Description.**

**Male.** Body length: 2.1–2.4 mm. Wing length: 2.3–2.6 mm. *Head.* Black, face dark brown, gray pollinose; oc and vt black, about one-half length of antennal arista; front, occiput, and vertex black, gray pollinose, with blue highlights; face constricted at middle, almost holoptic, eyes separated below antennae at narrowest point by width of 1 ommatidium; palp small, brown; proboscis brown; antennal segments yellow; postpedicel subtriangular, length about 1.1 x width; arista long, ca. 1.5 x head height.

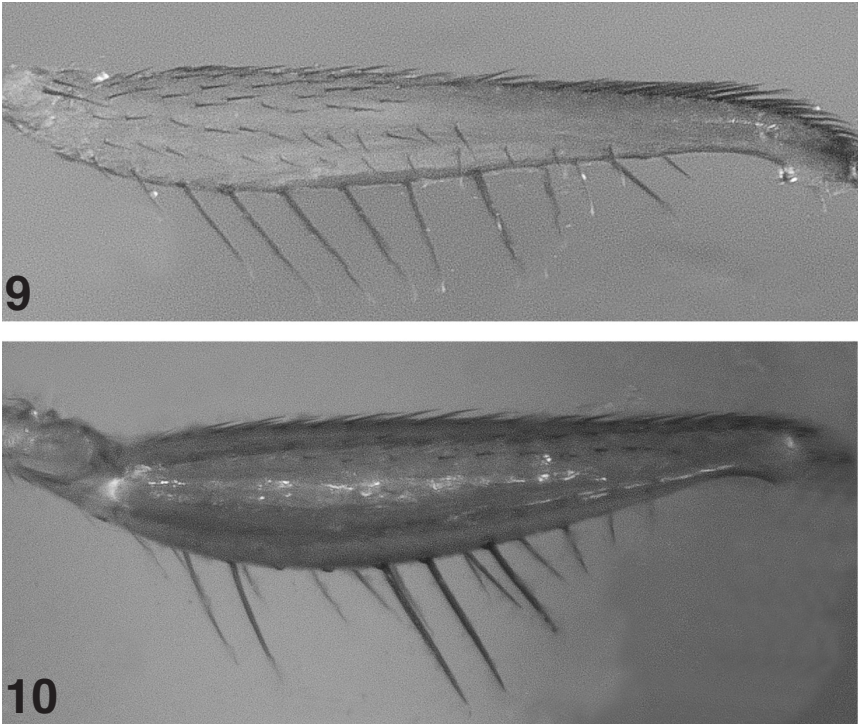
*Thorax.* Mesoscutum, scutellum, and pleura brown, katapisternum and metakatepisternum yellowish ventrally; thoracic setae black: 4 dc; 2 np; 2 ph; 1 pa; 1 sc; ac absent; halter stem and knob pale brown.

*Legs.* CI and CIII yellowish white, CI with 3–4 strong black setae apically; CIII brown, slightly paler than surrounding pleura; remainder of legs yellowish brown; fore leg and hind leg unmodified, without MSSC; FII (Fig. 8) slightly bowed apically with 4–6 strong spines ventrally, setae thinner toward apex, patch of stiff setae subapically on anterior and posterior surfaces, dense patch of short setae on apical surface; TiII (Fig. 7) slightly bowed, broadening apically, with 4–5 setae basally, patch of 4–6 longer setae apically (MSSC); IIt<sub>1</sub> (Fig. 8) long, about 2.5 x length of IIt<sub>2</sub>. Remainder of leg segments without MSSC.

*Wing.* Subhyaline throughout.

*Abdomen.* Brown with short black hairs dorsally on each tergite, a few longer hairs laterally; tergal interstices whitish; sternites brown. Hypopygium brown with paler brown cerci, not dissected.

**Female.** As in male except for lack of MSSC.



**Figs. 9–10.** *Campsicnemus* male mid femora. **9**, *C. quasimodicus*; **10**, *C. modicus* Hardy & Kohn.

**Etymology.** The specific epithet honors Robert Cyril Layton Perkins, who frequented the Makawao area and elevations above during his collecting for the Sandwich Islands Committee in the 1890s, the results of which led to the publication of the *Fauna Hawaiiensis*. Perkins indicated in his correspondence that this area of Maui was one of his favorite collecting spots in the Hawaiian Islands (Evenhuis, 2007c).

***Campsicnemus quasimodicus* Evenhuis, new species**

(Figs. 7, 10)

**Types.** *Holotype* ♂ (BPBM 16,829) from HAWAIIAN ISLANDS: **East Maui:** Makawao Forest Reserve, 945 m, Site 6, NAD83 04Q 783498N 2305035W, 23–25 Mar 2005, yellow pan trap, W. Haines. *Paratypes:* HAWAIIAN ISLANDS: **East Maui:** 48♂, 20♀, Makawao Forest Reserve, 1060 m, Site 4, NAD83 04Q 784326N 2304484W, 23–25 Mar 2005, yellow pan trap, W. Haines; 3♂, Makawao Forest Reserve, 945 m, Site 6, NAD83 04Q 783498N 2305035W, 23–25 Mar 2005, yellow pan trap, W. Haines. *Holotype* male deposited in BPBM. *Paratypes* in BPBM and UHM.

**Diagnosis.** Similar to *C. modicus* Hardy & Kohn but is distinguished from it by the mid tibia, long, thin, and its length twice that of the mid basitarsus (less than two times the length of the basitarsus in *C. modicus*), the more dense and darker patch of setae on the swollen area of the mid tibia (these setae paler and less dense in *C. modicus*) and the sparsely distributed row of stiff setae mesally on the mid tibia (this row of setae more dense in *C. modicus*) (cf. Figs. 9, 10).

**Description.**

**Male.** Body length: 2.0–2.3 mm. Wing length: 2.2–2.4 mm. *Head.* Black, face dark brown, gray pollinose; oc and vt black, about one-half length of antennal arista; front, occiput, and vertex black, gray pollinose, with blue highlights; face constricted at middle, almost holoptic, eyes separated below antennae at narrowest point by width of 1 ommatidium; palp small, brown; proboscis brown; antennae with scape and pedicel brown; postpedicel yellowish brown, short, subtriangular, length subequal to width; arista length ca. 1.2 x head height.

*Thorax.* Mesoscutum, scutellum, and pleura brown, katepisternum and metakatepisternum yellowish ventrally; thoracic setae black: 4 dc; 2 np; 2 ph; 1 pa; 1 sc; ac absent; halter stem and knob pale brown.

*Legs.* CI and CIII yellowish white, CI with 2 strong and 3–4 smaller black setae apically; CIII brown, slightly paler than surrounding pleura; remainder of legs yellowish brown; It<sub>1</sub> bowed, heavily setose (?MSSC); otherwise, fore leg and hind leg unmodified, without MSSC; FII (Fig. 9) with 4–5 thin spines ventrally; TiII (Fig. 7) with slightly swollen area on basal one-third of lateral surface, bearing patch of setae, setae extending basally, sparse row of stiff setae mesally (MSSC). Remainder of leg segments yellowish brown to brown, without MSSC.

*Wing.* Pale smoky throughout.

*Abdomen.* Brown with short black hairs dorsally on each tergite, a few longer hairs laterally; tergal interstices whitish; sternites yellowish brown. Hypopygium brown with paler brown cerci and small, rounded and darkly sclerotized surstyli, not dissected.

**Female.** As in male except for lack of MSSC.

**Etymology.** The species epithet derives from the Latin *quasi* = false + *modicus*; referring to the similarity in appearance of the male mid tibia of this species to *C. modicus* from the Big Island of Hawai'i.

**Acknowledgments**

The following are thanked for their assistance in the field, access to collections, and/or generosity in helping see this study to fruition: Gordon Bennett and Patrick O'Grady (University of California, Berkeley), Cynthia King, Dan Polhemus, and Betsy Gagné (Hawaii State Department of Land and Natural Resources), Will Haines (University of Hawai'i at Mānoa, Honolulu). Dan Bickel reviewed the manuscript and is thanked for his helpful comments. Fieldwork for this study was supported in part by a grant from the National Science Foundation (DEB-0842348).

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