

## New species of *Campsicnemus* Haliday (Diptera: Dolichopodidae) from the Kohala Mountains, Hawai'i Island<sup>1</sup>

NEAL L. EVENHUIS

Hawaii Biological Survey, Bernice Pauahi Bishop Museum, 1525 Bernice Street, Honolulu,  
Hawai'i 96817-2704, USA; email: neale@bishopmuseum.org

The Hawaiian Islands are home to an incredible diversity of species of the predatory dolichopodid genus *Campsicnemus* Haliday with an estimated 250–275 species found only on this island archipelago. Recent studies on this group in the Hawaiian Islands (e.g., Evenhuis, 2003, 2007, 2011, 2012a, 2012b; Evenhuis & O'Grady, 2010) have shown that even since the revision of the genus in Hawai'i by Hardy & Kohn (1964), there are still a large number of new species being discovered on all the islands.

The current study is restricted to just the Kohala Mountains of the Big Island of Hawai'i. It is the oldest of the existing emerged volcanoes on the Big Island (0.43 mya; Clague & Dalrymple, 1987), harbors an interesting diversity of species, and a number of new species have been discovered through Malaise and yellow pan trapping in recent years. Of the 17 species of *Campsicnemus* known to occur in the Kohala Mountains, five of them, *C. azyx* Evenhuis, n. sp.; *C. kariae* Evenhuis, n. sp.; *C. kohala* Evenhuis, n. sp.; *C. marilynnae* Evenhuis, n. sp.; *C. puuoumi* Evenhuis, n. sp., are here described as new to science. The new species are described and illustrated here to allow their names to appear in forthcoming publications of the genus in Hawai'i and the Pacific.

### Material and Methods

Specimens examined in this study derive primarily from collections of the Bishop Museum (BPBM) and recently collected material funded in part by the National Science Foundation (DEB-0842348), with vouchers deposited in BPBM. Morphological terminology, description format, and abbreviations used in the description follow Evenhuis (2012b). Holotypes and paratypes of all new species are deposited in BPBM. As length of series allow, duplicate paratypes are deposited in University of California, Berkeley (UCB).

### Taxonomy

#### Genus *Campsicnemus* Haliday

*Medeterus* (*Camptosceles*) Haliday, 1832: 357. Type species: *Dolichopus scambus* Fallén, 1823 (by subsequent designation of Coquillett, 1910: 518). Suppressed by I.C.Z.N, 1958: 349 (Opinion 531).

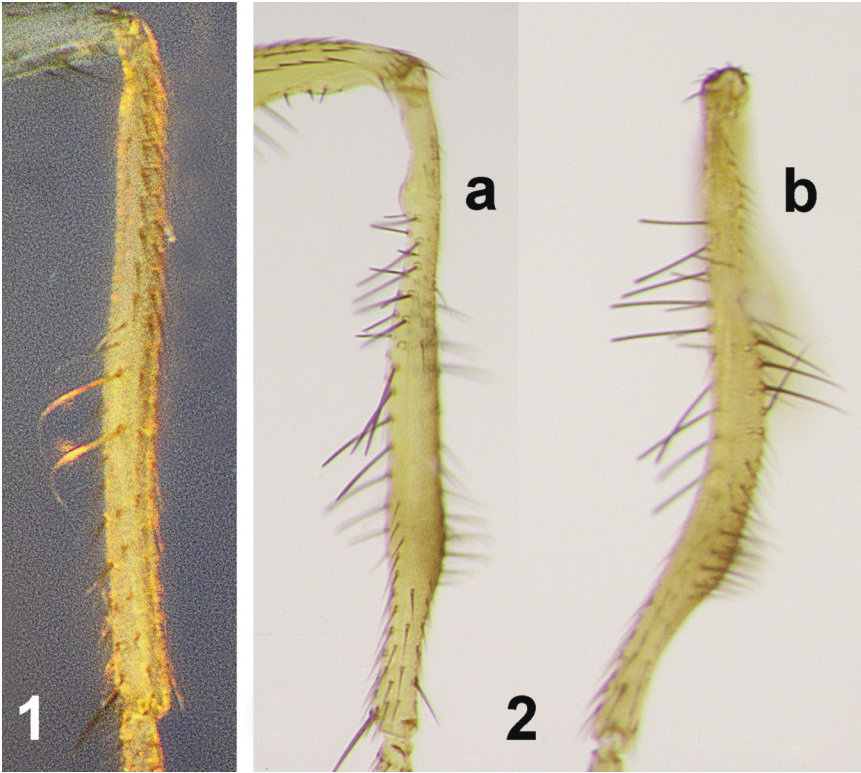
*Leptopezina* Macquart, 1835: 554. Type species: *Diastata gracilis* Meigen, 1820, by monotypy. *Nomen oblitum* (see Evenhuis, 2003: 3).

*Campsicnemus* Haliday in Walker, 1851: 187. Type species: *Dolichopus scambus* Fallén, 1823, by validation of I.C.Z.N, 1958: 351. *Nomen protectum* (see Evenhuis, 2003: 3).

*Camptoscelus* Kertész, 1909: 306 (unjustified replacement name for *Camptosceles* Haliday). Type species: *Dolichopus scambus* Fallén, 1823, automatic.

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**Figs. 1–2.** *Campsicnemus* male mid tibiae. 1. *C. azyx*, n. sp.; 2. *C. kariae*, n. sp., a. posterior view; b. lateral view.

There are currently 179 described species of Hawaiian *Campsicnemus* (all endemic) known from this remote island group in the Pacific Ocean, with many more new species awaiting description. Preliminary study of specimens of this genus from French Polynesia (Societies, Marquesas, and Australs) show a similar high biodiversity with over 50 undescribed species having been discovered in recent surveys from these islands (over 30 from the Marquesas alone) (see Evenhuis 2000, 2008, 2009 for keys to proposed species groups and descriptions of some of the newly discovered species). Additional species occur westward as far as Fiji (undescribed species are known from Tonga and Fiji). As more trapping and collecting is done in suitable habitats on the south Pacific islands, more new species should be found.

*Campsicnemus azyx* Evenhuis, n. sp.

(Fig. 1)

**Diagnosis.** Similar to *C. parvulus* Hardy & Kohn but differs from it by possessing a short row of 3–4 curved hairs on the male mid tibia restricted to the apical one-third (these hairs uncurved and along the entire length of the mid tibia in *C. parvulus*) and 4–5 long hairs on  $II_t_2$  (these hairs absent in *C. parvulus*).



**Figs. 3–5.** *Campsicnemus* male mid tibiae. 3. *C. kohala*, n. sp.; 4. *C. marilynæ*, n. sp.; 5. *C. puuoumi*, n. sp.

**Description. Male:** Body length: 1.8 mm. Wing length: 2.0 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 with all segments yellowish brown; scape subcylindrical, length subequal to width; pedicel obconical, with ring of short spiky black setae subapically; postpedicel subtriangular, length subequal to width, acute apically; arista slightly longer than head height. **Thorax:** Mesonotum and pleura (except dark brown anepimeron) brown, paler on postalar callus, scutellum brownish dorsally, yellowish laterally; disc of mesonotum darker brown than surrounding mesonotum; thoracic setae black: 4 dc; 2 np; 2 ph; 1 + 1 pa; 1 sc; 7 ac; halter stem yellow, knob white. **Legs:** Coxae brownish yellow basally, remainder of legs yellowish; coxae with normal anteroapical setation; fore and hind legs unmodified and without MSSC; FII with row of 5 black hairs along mesoventral surface; TII (Fig. 1) long, straight, with 3–4 long yellowish curved setae medially, (MSSC), lateral surface with short, stiff black spiky hairs along entire length (MSSC), apex with pair of strong long black setae on mesal surface. IIt<sub>1</sub> about 3 × length of IIt<sub>2</sub>, with row of 5–6 long apically curved white hairs along entire length, long straight hair at apex of row (MSSC). Remaining leg segments unmodified and without MSSC. **Wing:** Subhyaline, veins yellowish; posterior crossvein length less than 1/2 apical segment of CuA<sub>1</sub>. **Abdomen:** Brown, tergite VII darker brown along posterior margin; tergal vestiture black. Hypopygium dark brown with brown cerci, not dissected. **Female:** Unknown.

**Material Examined.** *Type.* HOLOTYPE ♂ (BPBM 17,551) from HAWAIIAN ISLANDS: HAWAI'I: Kohala Mountains: Puu O Umi Natural Area Reserve, 20°4.524'N, 155°43.140'W 5203 ft [1586 m], 8 Jul 2008, Malaise trap #4, R. Peck (BPBM).

**Etymology.** The specific epithet derives from the Greek “*ἄζύγος*” = solitary, unmarried, alone; referring to the discovery of only one specimen of this species while sorting hundreds of specimens from Malaise traps at the same locality.

*Campsicnemus kariae* Evenhuis, n. sp.

(Fig. 2)

**Diagnosis.** Similar to *C. terracola* Hardy & Kohn (which is also found in the Kohalas), but can be distinguished by the shape of the mid tibia (bend in *C. kariae* is near the middle; that in *C. terracola* is on the basal third) and the setation of the mid tibia with *C. kariae* lacking a dense row of long setae on apical fourth (this row of long hairs present in *C. terracola*).

**Description. Male:** Body length: 2.0–2.2 mm. Wing length: 2.0–2.2 mm. **Head:** Face, front and clypeus brown, 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, almost holoptic for a length of 2 ommatidia; palpus small, brown; proboscis brown, extending below eye in lateral view; antenna with scape and pedicel yellow, postpedicel brown; scape subcylindrical, length subequal to width; pedicel obconical, with ring of short spiky black setae subapically; postpedicel elongate subtriangular, length about 2.5 × width, acute apically; arista slightly longer than head height. **Thorax:** Yellow, except dark brown anepimeron; dorsum of mesonotum with pair of very thin brown admedian vittae; thoracic setae black: 4 dc; 2 np; 2 ph; 1 + 1 pa; 1 sc; 4 ac; halter stem and knob white. **Legs:** CI, CIII white, CII brown basally, white apically. Remainder of legs yellow; coxae with normal setation; fore and hind legs unmodified and without MSSC; FII with row of 6–8 very long, stiff spiky black setae along ventral surface; subapically with 3 small peg-like setae on small ventral bump. TiII (Fig. 2) contorted, bent near middle, with small subbasal subtriangular process mesally; mesally with row of 10–12 long, straight, blunt setae oriented variously (MSSC) intermixed with row of 10 much shorter, stiff black blunt setae on basal two-thirds (MSSC); laterally with basal row of 6–7 strong pointed setae, row beginning away (distally) from subbasal mesal process; apex of lateral surface with row of 6–7 long curved black setae; short hairs in irregular rows subapically; single strong black seta at apex of tibia. II<sub>1</sub> about 1.5 × length of II<sub>2</sub>, without MSSC. Remaining leg segments unmodified and without MSSC. **Wing:** Subhyaline, veins brown; posterior crossvein length less than 1/2 apical segment of Cu<sub>A1</sub>. **Abdomen:** Brown dorsally with yellowish white color laterally and posterolaterally, this pale color most extensive on basal tergites, becoming less extensive on succeeding tergites; sternites with brown medially and basally, otherwise yellowish white; tergal vestiture black, sparse. Hypopygium yellowish brown with yellow cerci, not dissected. **Female:** As in male except for lack of MSSC.

**Material Examined.** *Types.* HOLOTYPE ♂ (BPBM 16,948) and 3♂, 2♀ *paratypes* from HAWAIIAN ISLANDS: HAWAI'I: Kohala Mountains: Kohala Forest Reserve, 20°04.699'N, 155°40.218'W, 1213 m, 15 Jan 2011, pan traps in low bog vegetation, K.R. Goodman (KRG007.4B) (BPBM). *Other paratypes:* HAWAIIAN ISLANDS: HAWAI'I: 2♂, Kohala Mountains: Kohala Forest Reserve, 20°04.882'N, 155°40.410'W, 1244 m, K.R. Goodman (KRG007.4B); 2♂, Puu O Umi Natural Area Reserve, 20°4.340'N, 155°43.260'W, 4998 ft [1523 m], 5 Aug 2008, Malaise trap #2, R. Peck; 3♂♀, Puu O Umi Natural Area Reserve, 20°4.524'N, 155°43.140'W, 5203 ft [1586 m], 8 Jul 2008, Malaise trap #4, R. Peck; 5♂♀, Puu O Umi Natural Area Reserve, 20°4.524'N, 155°43.140'W,

5203 ft [1586 m], 3 Sep 2008, Malaise trap #4, R. Peck; 6♂♀, Puu O Umi Natural Area Reserve, 20°4.340'N, 155°43.260'W, 4998 ft [1523 m], 8 Jul 2008, Malaise trap #2, R. Peck. Holotype (preserved in fluid) and paratypes in BPBM. Duplicate paratypes in UCB.

**Etymology.** The species is named for Kari Roesch Goodman for collecting the holotype and for her valuable contributions to the molecular phylogeny of *Campsicnemus* and genera related to *Eurynogaster*.

*Campsicnemus kohala* Evenhuis, n. sp.

(Fig. 3)

**Diagnosis.** Similar to *C. obscurus* Parent from Moloka'i based on the short IIt1 with an apical spine. It can be distinguished from *C. obscurus* by the male mid femur lacking ventral setation on the apical third (this ventral setation present along the entire length of the femur in *C. obscurus*) and the medial long comb of thin blunt setae oriented in different positions (these stiff setae all directed mesally in *C. obscurus*).

**Description. Male:** Body length: 2.0–3.0 mm. Wing length: 2.2–3.2 mm. **Head:** Black; 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; eyes dichoptic, face width subequal to frons width, inner eye margin straight, not constricted medially; palpus large, brown; proboscis dark brown, extending below eye in lateral view; antenna with all segments dark brown; scape subcylindrical, length subequal to width; pedicel small, obconical, with ring of short spiky black setae subapically; postpedicel wider than pedicel, overlapping dorsally, subtriangular, length slightly less than width, rounded apically; arista slightly longer than head height. **Thorax:** Black; thoracic setae black dorsally, white laterally: 3 (small, weak) + 4 (strong) dc; 2 np; 2 ph; 1 + 1 pa; 1 sc; 4–6 ac medially on disc, absent anteriorly; halter stem white, knob brown. **Legs:** Dark brown except for brown CI and FI; CI and CII with row of strong black setae anteroapically; CII bare; all femora with row of 10–12 strong black setae along ventral surface; TIII (Fig. 3) long, straight, with comb-like arrangement of 8–10 long black setae basomesally with blunt apices (MSSC), anterolateral surface with row of 4 long black hairs on subapical one-fourth; posterolateral surface with 2 long hairs: uppermost at basal one-fourth, lowermost slightly distad of middle (MSSC); fine cilia on all surfaces; apex with pair of strong long black setae on mesal surface. IIt<sub>1</sub> shortened, about 1/3 length of IIt<sub>2</sub>, with curved black spine apically (MSSC); row of 3–4 long hairs posterolaterally. IIt<sub>2</sub> inserted subapically on IIt<sub>1</sub>. Remaining leg segments unmodified, without MSSC. **Wing:** Faint smoky brown throughout, veins dark brown; posterior crossvein length 1/3 of apical segment of CuA<sub>1</sub>. **Abdomen:** Dark brown to black; tergal vestiture black, strongest along posterior margin of tergite I. Hypopygium dark brown with dark brown cerci, not dissected. **Female:** As in male except for lack of MSSC.

**Material Examined. Types.** HOLOTYPE ♂ (BPBM 16,817) and 10♂, 22♀ paratypes from HAWAIIAN ISLANDS: **HAWAI'I:** Kohala Mountains: Puu O Umi Natural Area Reserve, Upper Alakahi Stream, 26 Jan 1992, 1150 m, pools in bog, D.A. Polhemus (BPBM). Other paratypes: **Hawai'i:** 9♂, 1♀, Kohala Mountains: Puu O Umi Natural Area Reserve, same data as holotype except 26 Jan 1992; 1♂, 1♀, Kohala Forest Reserve, Upper Hamakua Ditch Trail, 20°05.109'N, 155°40.753'W, 15 Jan 2011, B. Ort, B. Bennett, K.R. Goodman (B041.1). Holotype (preserved in fluid) and paratypes in BPBM.

**Etymology.** The specific epithet derives from the type locality in the Kohala Mountains of the Big Island of Hawai'i.

*Campsicnemus marilynae* Evenhuis, n. sp.

(Fig. 4)

**Diagnosis.** Similar to *C. kariae* based on the mid tibial setation but can be separated from it by the distinct mesonotal pattern of dark brown and yellowish white (mesonotum yellow with admedian vittae in *C. kariae*), the darkened apices of the otherwise whitish femora (femora all yellow in *C. kariae*), and the upper row of 8 lateral long black setae beginning at distal end of basomesal triangular flap (this row with only 4 strong lateral setae and beginning further distal to small triangular basomesal flap in *C. kariae*).

**Description. Male:** Body length: 2.0–2.2 mm. Wing length: 2.3–2.5 mm. **Head:** Face, front and clypeus black, silvery 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, almost holoptic for a length of 2 ommatidia; palpus small, brown; proboscis brown, extending below eye in lateral view; antenna with scape and pedicel yellow, postpedicel brown; scape subcylindrical, length subequal to width; pedicel subspherical, with ring of short spiky black setae subapically; postpedicel subtriangular, length about  $1.5 \times$  width, slightly rounded apically; arista length subequal to head height. **Thorax:** Mesonotum dark brown with yellow on following: humeral callus, antehumeral spot, postalar callus, prescutellar spot, base of scutellum, laterotergite surrounding posterior spiracle, and spot on postnotum; pleura yellow with clouds of brown on all sclerites except anepimeron black, scutellum brownish dorsally, yellowish on posterior margin and ventrally; thoracic setae black: 4 dc; 2 np; 2 ph; 1 + 1 pa; 1 sc; 4–6 ac; halter stem and knob white. **Legs:** White except for smoky brown on following: CII medially, apices of femora, tibiae (prominently brown on apical 1/4 of TiII) and tarsi; coxae with normal setation; fore and hind legs unmodified, without MSSC; FII with row of 6–8 very long, stiff spiky black setae along basal half of ventral surface, patch of dense short stiff setae subapically; TiII (Fig. 4) contorted as in *C. kariae* (see Fig 2b for shape), with small subbasal subtriangular process mesally; mesally with row of 6–8 long, straight, blunt setae oriented variously (MSSC) intermixed with row of 10–12 much shorter, stiff black blunt setae on basal two-thirds (MSSC); laterally with basal row of 4–6 strong pointed setae, row beginning near distal end of subbasal mesal process; lateral surface at distal end of bend (subapical third of TiII) with dense patch of short and long hairs; apex of lateral surface with short hairs in irregular rows subapically; single strong mesally oriented black seta at apex of TiII. II<sub>1</sub> about  $2 \times$  length of II<sub>2</sub>, without MSSC. Remaining leg segments unmodified and without MSSC. **Wing:** Subhyaline, veins dark brown; posterior crossvein length less than 1/2 apical segment of CuA<sub>1</sub>. **Abdomen:** Brown; tergal vestiture black, strongest along posterior margin of tergite I. Hypopygium brown with black surstylus and yellow cerci, not dissected. **Female:** Unknown.

**Material Examined.** *Types.* HOLOTYPE ♂ (BPBM 17,560) and 2♂ *paratypes* from HAWAIIAN ISLANDS: HAWAII: Kohala Mountains: Kohala Forest Reserve, headwaters of Alakahi stream, 3940 ft [1201 m], 20°03.951'N, 155°40.096'W, 6–8 Aug 2012, yellow pan traps near flume under stunted *Metrosideros polymorpha* in bog, N.L. Evenhuis, M.L. Nicholson (BPBM). *Other paratypes:* HAWAIIAN ISLANDS: HAWAII: 2♂ (one headless), Kohala Mountains: Kohala Forest Reserve, 3783 ft [1153 m], 20°03.398'N, 155°40.421'W, 6–8 Aug 2012, yellow pan traps near under large *Metrosideros polymorpha* near stream, N.L. Evenhuis, M.L. Nicholson (BPBM). Holotype and paratypes in BPBM.

**Etymology.** The species is named for my wife, Marilyn Nicholson, who helped with the collection of the type series and for her encouragement and support throughout the years for my studies on Diptera.

*Campsicnemus puuoumi* Evenhuis, n. sp.

(Fig. 5)

**Diagnosis.** Similar to *C. tibialis* Van Duzee but differs from it by the mesal comb of setae being much shorter and pointed (long and blunt in *C. tibialis*), by the generally brown colored femora (black in *C. tibialis*), and by the dense patch of spiky setae mesoventrally on FII (no such patch present in *C. tibialis*).

**Description. Male:** Body length: 1.8 mm. Wing length: 2.0 mm. **Head:** Face, front and clypeus black, silvery 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, almost holoptic for a length of 4 ommatidia; palpus small, brown; proboscis brown, extending below eye in lateral view; antenna with all segments yellow; scape subcylindrical, length subequal to width; pedicel subspherical, with ring of short spiky black setae subapically; postpedicel small, subtriangular, length subequal to width, rounded apically; arista length slightly less than head height. **Thorax:** Mesonotum, pleura (except dark brown anepimeron), and scutellum brown, paler brown laterally on mesonotum; thoracic setae black: 4 dc; 2 np; 2 ph; 1 + 1 pa; 1 sc; 5 ac medially, absent anteriorly; halter stem yellow, knob white. **Legs:** CII and CIII brown; rest of legs yellowish brown except for CI and all femora yellow; CI with 3–4 strong black setae anteriorly on apical one-third; remainder of coxae with normal setation; TII dense spicate on anterior surface (MSSC); It<sub>1</sub> dense setose (MSSC); hind legs unmodified, without MSSC; FII with dense row black hairs along ventral surface subapically, with dense patch of long spiky setae medially on mesal surface; TIII (Fig. 5) long, straight, with mesolateral row of adpressed setae basally, becoming longer and erect medially, and longest apically, 3–4 apicalmost setae long, curved apically (MSSC), anterior surface with single strong seta at basal one-third (MSSC), apex with 3 strong long black setae. Ilt<sub>1</sub> about 1.5 × length of Ilt<sub>2</sub>, without MSSC. Remaining leg segments unmodified, without MSSC. **Wing:** Faint pale brown, veins brown; posterior crossvein length less than 1/2 apical segment of CuA<sub>1</sub>. **Abdomen:** Black; tergal vestiture black, strongest along posterior margin of tergite I. Hypopygium yellowish brown, surstyli black, cerci yellow, not dissected. **Female:** Unknown.

**Material Examined.** *Types.* HOLOTYPE ♂ (BPBM 17,644) from HAWAIIAN ISLANDS: HAWAII: Puu O Umi Natural Area Reserve, 20°4.340'N, 155°43.260'W, 4998 ft [1523 m], 8 Jul 2008, Malaise trap #2, R. Peck. (BPBM).

**Etymology.** The specific epithet derives from the type locality in the Puu O Umi Natural Area Reserve.

**Acknowledgments**

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