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SURVEY FOR 2009–2010

PART I: ANIMALS

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AND

LUCIUS G. ELDREDGE, EDITORS



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RECORDS OF THE HAWAII BIOLOGICAL SURVEY FOR 2009–2010

Editors' Preface

We are pleased to present the annual compilation of *Records of the Hawaii Biological Survey*; this year for the years 2009–2010. We apologize for the delay in getting these *Records* published. The number and diversity of taxa reported in these issues attest to the continuing value of the *Records* as part of the ongoing effort to accurately inventory the Hawaiian biota. As was done for the last *Records*, we are splitting the traditional two volumes into plants and animals. This volume contains records pertaining to the animals. The second volume will contain the records for the plants.

The Hawaii Biological Survey, established by the Hawaii State Legislature in 1992 as a program of Bishop Museum, is an ongoing natural history inventory of the Hawaiian Archipelago. It was created to locate, identify, and evaluate all native and nonnative species of flora and fauna within the state; and by State Law to maintain the reference collections of that flora and fauna for a wide range of uses. In coordination with related activities in other federal, state, and private agencies, the Hawaii Biological Survey gathers, analyzes, and disseminates biological information necessary for the wise stewardship of Hawaii's biological resources.

An intensive and coordinated effort has been made by the Hawaii Biological Survey to make our products, including many of the databases supporting the papers published here, available to the widest user-community possible through our web server. Products currently available include taxonomic authority files (species checklists for terrestrial arthropods, flowering plants, nonmarine snails, marine invertebrates, fossil taxa, and vertebrates), bibliographic databases (vascular plants, nonmarine snails, and insects), specimen databases (fungi, fish, invertebrates, portions of the insect collection) and type specimens (entomology; botany—including algae and fungi; and vertebrates), collections data (lists of holdings for select groups of flies as well as Cicadellidae and Pentatomidae), detailed information and/or images on endangered, threatened, and extinct plants and animals; as well as our staff publication lists. Additional reference databases include: the list of insect and spider collections of the world (based on Arnett, Samuelson & Nishida, 1993, *Insect and spider collections of the world*) with links to institutional web pages where known; and the historical world Diptera taxonomists list with names of over 5,400 authors who have described flies.

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Hawaii Biological Survey's "Good Guys/Bad Guys" website

<http://hbs.bishopmuseum.org/good-bad/>

World Diptera taxonomist list

<http://hbs.bishopmuseum.org/dipterists/>

The *Records of the Hawaii Biological Survey for 2009–2010* were compiled with the assistance of Clyde Imada (botany), Frank Howarth (entomology) and other anonymous reviewers who helped referee papers; and was partially supported by funds from the John D. and Catherine T. MacArthur Foundation. Many of the new records reported here resulted from curatorial projects and field surveys funded by the National Science Foundation, the U.S. Geological Survey Biological Resources Division, the U.S. Fish & Wildlife Service, and the Hawaii Department of Land and Natural Resources.

We encourage authors with new information concerning flora or fauna occurring in the Hawaiian Islands to submit their data to the editors listed below for consideration for publication in the next *Records*. Submission and format of papers must follow our guidelines. Information on submission of manuscripts and guidelines for contributors may be obtained on the web (via pdf format) at:

<http://hbs.bishopmuseum.org/guidelines.pdf>

or by mail from: Hawaii Biological Survey, Department of Natural Sciences, Bishop Museum, 1525 Bernice Street, Honolulu, Hawai'i 96817-2704, USA.

—*N.L. Evenhuis &*
L.G. Eldredge, editors
[email: neale@bishopmuseum.org]

A new species of the endemic Hawaiian genus *Paraliancalus* Parent, with notes on the genus *Liancalus* Loew (Diptera: Dolichopodidae)¹

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The genus *Paraliancalus* was originally proposed by Parent (1938) for the single endemic Hawaiian species *Liancalus metallicus* Grimshaw, 1901, a widespread species found on most of the main Hawaiian Islands. It is one of the largest Hawaiian dolichopodids, being some 8 mm in length. Possibly due to this large size and assuming the genus contained only one species, dolichopodid workers have not paid close attention to specific morphological characters of the specimens, assuming all belonged to the type species, *P. metallicus*.

Recently, examination of a few male specimens in the Bishop Museum by one of us (DJB), showed that the genus is actually represented in Hawaii by two morpho-species, both of which are similar in appearance but differ in leg and genitalic characters. After borrowing specimens from the University of Hawai‘i Insect Museum and examining all material in the Bishop Museum, we conclude that there are indeed two species of *Paraliancalus* in Hawai‘i. We herein describe and illustrate the second species as *Paraliancalus laciniatofemur*, **n. sp.**, which is thus far known only from the island of Maui. Also, because the type species was originally described in the widespread genus *Liancalus* Loew, we have included some notes on this genus.

Materials and Methods

Specimens examined in this study derive from or are deposited in the Bishop Museum, Honolulu, Hawai‘i, USA (BPBM), the Natural History Museum, London, UK (BMNH), Hawaii State Department of Agriculture (HDOA), and the University of Hawai‘i Insect Museum (UHIM). Format of description follows Evenhuis (2007). Measurements are in millimeters and were made on representative dry specimens. Body length is measured from the base of the antennae to the tip of the seventh abdominal segment. The CuAx ratio is the length of the m-cu crossvein/ distal section CuA. The position of features on elongate structures such as leg segments is given as a fraction of the total length, starting from the base. The relative lengths of the podomeres should be regarded as representative ratios and not measurements. The ratios for each leg are given in the following formula and punctuation: trochanter + femur; tibia; tarsomere 1/ 2/ 3/ 4/ 5.

1. Contribution No. 2011-002 to the Hawaii Biological Survey.

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The following abbreviations and terms are used: I, II, III: fore-, mid-, hindlegs; C, coxa; T, tibia; F, femur; ac, acrostichal setae; ad, anterodorsal; av, anteroventral; dc, dorso-central setae; dv, dorsoventral; hm, postpronotal setae; np, notopleural setae; pa, postalar setae; pd, posterodorsal; pm, presutural supra-alar setae; ppl, proepisternal setae; pv, posteroventral; sa, postsutural supra-alar setae; sr, presutural intra-alar setae.

Systematics

Paraliancalus Parent

Paraliancalus Parent, 1938: 213. Type species: *Liancalus metallicus* Grimshaw, 1901, by original designation.

Diagnosis. Easily separated from other Hawaiian hydrophorine genera by the presence of a large black bristle on the lateral surface of the hind coxa. It is separated from *Liancalus* Loew by characters presented in the key below.

Paraliancalus Parent is one of the largest dolichopodids in Hawai'i (5–8 mm in length) and is known to occur on almost all of the main islands. Despite their rather large size, they are uncommon in collections.

From the label data, most specimens of both species apparently were collected above 450 m. Like the closely related *Liancalus* Loew, *Paraliancalus* is primarily found resting on vertical seeps but have also been collected by sweeping vegetation. In their revision of Hawaiian Dolichopodidae, Hardy & Kohn (1964) redescribed *Paraliancalus* and its type species *Liancalus metallicus* Grimshaw and gave characters for all parts of the body except the legs. Recent examination of a series of specimens in BPBM and UHIM shows there are two morpho-types in the males of this endemic Hawaiian genus: one with strong setae present at the base of the mid femora and one lacking these strong spines. In addition, there are differences in the vestiture of the hind femur, the color of pollinosity of the frons, and in the structure and setation of certain male genitalic components.

Females cannot as yet be differentiated but are known from the following islands: Hawai'i, Maui, Moloka'i, O'ahu, and Kaua'i. No males have been seen by us from O'ahu or Kaua'i so we cannot conclude if the true *P. metallicus* occurs in those populations or is another species.

Notes on the genus *Liancalus* Loew

Liancalus is a genus in the subfamily Hydrophorinae with 19 described species from the Palearctic, Nearctic, Afrotropical, and Oriental regions (Yang *et al.*, 2006). Adults are commonly found resting on wet rock surfaces and seeps. Species are relatively large (body length usually > 6 mm) with elongate legs. The genus has a diagnostic ventral digitiform projection on the proepimeron behind base of coxa I. As well, the male postabdomen (see Fig. 6a) is distinctive in having tergite 5 prolonged ventrally on each side, forming two lateral flaplike projections that act as a hood for the hypopygial apex (these flaps have been incorrectly cited in the literature as being derived from sternite 4, and this mistake was repeated in the key by Bickel, 2009). Other characters found in many



Fig. 1. Lectotype male of *Paraliancalus metallicus* (Grimshaw) in BMNH, lateral view showing how it is mounted and pinned.

Liancalus species include modification of the male wing apex (falcate tips, spots, etc.), an elongate filiform male cercus, and 3–4 pairs of scutellar setae.

Although *Paraliancalus* was initially regarded as a *Liancalus*, the two genera are distinct but probably closely related. If indeed these two genera are sister taxa, *Paraliancalus* is the more plesiomorphic group, lacking the proepimeron projection and the tergite 5 flaps. The two genera can be separated by the characters given in the key below.

The following characters are shared by *Liancalus* and *Paraliancalus*, some of which are found in other genera of Hydrophorinae: pair of large postvertical setae present on dorsal postcranium, out of line with the postorbital series; male face usually wide; fronto-clypeal suture distinct, at least laterally; both FII and FIII with strong anterior preapical setae; coxa III with strong lateral seta, crossvein dm-cu equal to or longer than distal section of CuA; abdomen ovate, not dorsosventrally flattened.

KEY TO SPECIES OF HAWAIIAN *PARALIANCALUS*
(based on males)

1. Proepimeron with ventral digitiform projection behind base of fore coxa; scutellum with 2–3 pairs of marginal setae; acrostichal setae as single row or absent; six long dorsocentral setae present; male tergite 5 ventrally prolonged and forming hood for hypopygial apex (Fig. 6a); cercus often elongate and filiform; Palearctic, Nearctic, Oriental & Afrotropical Regions *Liancalus* Loew
- Proepimeron rounded at base of fore coxa; scutellum with single pair of marginal setae; ac setae absent; acrostichal setae absent; 5 long dorsocentral setae present; male tergite 5 with only short ventral projection; male cercus short digitiform or subtriangular; Hawaiian Islands *Paraliancalus* Parent .. 2
2. Mid femur with spines basally on ventral surface (Fig. 4b); hind femur with dense fringe of setae on ventral surface; frons gray pollinose; genitalia with cercus broadly rounded apically bearing long wavy hairs that extend in all directions (Fig. 5b) **laciniifemur** Evenhuis & Bickel, **n. sp.**
- Mid femur lacking spines ventrally (Fig. 4a); hind femur with only row of very short fine hairs on ventral surface; frons silvery pollinose; genitalia with cercus tapering to narrow apex, with wavy hairs directed caudally (Fig. 5a)
..... **metallicus** Grimshaw

***Paraliancalus metallicus* Grimshaw**
(Figs. 1–3, 4a, 5a, 6b)

Liancalus metallicus Grimshaw, 1901: 13. Becker, 1922: 42; Van Duzee, 1933: 310; Bryan, 1934: 409, 449; Williams, 1934: 393.

Paraliancalus metallicus (Grimshaw): Parent, 1938: 213; Williams, 1940: 306; Hardy, 1952: 455; Hardy & Kohn, 1964: 248; Ibara, 1972: 160, 211; Bickel & Dyte, 1989: 405; Nishida, 1992: 98, 1994: 92, 1997: 77, 2002: 95; Polhemus, 1996: 23, 37, 41, 42, 53; Evenhuis & Grootaert, 1997: 74; Englund *et al.*, 1998: 24, 30, 2000: 104, 2002: 17, 2003: 8, 2006: 231, 2007: 229.

Type Material Examined. Lectotype ♂ (designated by Hardy & Kohn, 1964: 12) from HAWAIIAN ISLANDS: **Hawai'i**: “Olaa”, December 1896, R.C.L. Perkins (BMNH). *Other Material Examined.* HAWAIIAN ISLANDS: **Hawai'i**: Na‘alehu, Mountain [Home] Road, 23 Apr 1965, D.E. Hardy (UHIM); 1♂, Honokane Valley, 7 Jul 1971, M.D. Delfinado (UHIM); 1♂, Waia‘ama Stream, 2600 ft [ca. 800 m], 12 Feb 2002, D.J. Preston, sweeping vegetation over water (BPBM). **Maui (West)**: 2♂, Mahinahina, 21 June 1932, N.L.H. Krauss (BPBM); 1♂, Pu‘u Kukui, 900 m, 9–31 Oct 1971, J.L. Gressitt, Malaise trap (BPBM), 1♂, Pu‘u Kukui Ridge, 4000 ft [ca. 1020 m], 20 Jul 1971, D.E. Hardy (UHIM). **Maui (East)**: 1♂, Kula Pipeline, 25 Aug 1929, O.H. Swezey (BPBM); Kipahulu Valley, camp #1, 3100 ft [ca. 945 m], 10 Aug 1967, K.Y. Kaneshiro (UHIM). **Moloka‘i**: 1♂, Pu‘u Kolekole, Jul 1952, D.E. Hardy (BPBM); 1♂, Pu‘u Kolekole, 3000 ft [ca. 915 m], Jul 1953, D.E. Hardy (BPBM).

Description.

Male (Fig. 1). Body length: 6.0–8.2 mm. Wing length: 5.5–8.0 mm.

Head. Vertex and occiput shining black, with blue, blue-green, or magenta highlights; occiput golden tomentose; postocciput and postgena gray tomentose, with blue-green highlights ventrally; frons (below ocellar tubercle), face and clypeus silvery tomentose;



Fig. 2. *Paraliancalus metallicus* (Grimshaw), wing.



Fig. 3. Type labels for *Paraliancalus metallicus* (Grimshaw) in BMNH.

postvertical seta strong and positioned on dorsal postcranial slope; oc black, about two-thirds length of antennal arista, short weak vertical present laterad of ocellar seta; eyes separated below antennae by slightly less than width of antennal sockets, and face slightly tapering in width to clypeus; eye facets uniform; palp dark brown; proboscis brown, extending below eye in lateral view; antennal segments brown; scape ca 2 x width, sub-cylindrical; pedicel flattened; postpedicel short, length subequal to width; arista dorsal, slightly less than head height.

Thorax. Mesoscutum and scutellum dark brown to black, with metallic greenish, bluish, purplish, or magenta highlights; pleura gray tomentose; thoracic setae black: 5 dc

(with row of tiny hairs anterior to first dc); 2 np; 1 ph; 1 pa; 1 sc; ac absent; row 3–4 propleurals; median scutellar setae strong, laterals reduced to tiny hairs; proepimeron without ventral digitiform projection posteriad of CI; halter stem yellow, knob brownish yellow to yellow.

Legs. Coxae gray tomentose, remainder of legs shiny dark brown to black; CI with 6–7 strong black curved setae apically, two weaker setae near base, and longitudinal row of fine hairs laterally, 3–4 irregular rows of fine hairs mesally; CII and CIII with single long strong black setae laterally, CII with patch of curved black setae apically; all legs with short claws and pulvilli; all femora with row of short fine hairs ventrally (cf Fig. 4a); I: 8.6; 8.5; 5.2 /3.0/ 2.2/ 1.1/ 1.1 TI with offset dorsal-posterior setal pairs at 1/5 and 1/2 with dorsal seta stonger than posterior seta, and with strong subapical posterior seta; II: 10.0; 11.4; 6.5/ 4.2/ 2.8/ 1.7/ 1.2; FII with dorsoanterior preapical seta at 5/6, and row of 5–6 shorter pv seta in distal quarter; TII with ad seta at 1/6, 2/5, with pd seta at 1/6, 3/5, and strong apical ad, pd and pv setae; III: 12.0; 15.2; 5.2/ 5.0/ 3.0/ 1.8/ 1.5; FIII with dorsoanterior preapical seta at 5/6, and 2 subapical av and 2 subapical pv seta ; TIII strong ad setae at 1/4, 2/5, 3/5, and 4/5, pd at 1/5, and strong apical av, pv and ad setae.

Wing (Fig. 2). pale smoky throughout; squama with brown setae; CuAx ratio: 2.3.

Abdomen. Shiny dark brown with strong black setae on tergite I, shorter black hairs dorsally on each tergite, a few longer hairs laterally; sternites gray pollinose, bare; tergite 5 with short rounded ventroapical projection bearing short setae (Fig. 6b).

Genitalia (Fig. 5a). Hypopygium dark brown; cerci bulbous basally and long thin proximally, with numerous long wavy setae at apex (all directed caudally), short setae along dorsal and ventral surfaces; surstylus deeply forked, with dorsal arm bearing elongate digitiform projection; phallus (in extended position) with antler-like projections in middle on dorsal surface; hypandrium with extensive and dense thorny projections on dorsal (= inner) surface).

Female: similar to male except as noted: face and clypeus wider.

Remarks. Grimshaw (1901) based his description of *metallicus* on three specimens: one male syntype from “Olaa” on the island of Hawai‘i collected by R.C.L. Perkins in December 1896, a female syntype from Moloka‘i, and one female syntype from Kaua‘i (all three are in the BMNH). Hardy & Kohn (1964: 12) designated a lectotype by use of the wording “Type male” in the figure caption for the habitus of *P. metallicus* since only one male specimen was part of the syntype series. The lectotype has been examined in this study and lacks spines at the base of the mid femur. The type is pinned through the thorax and mounted on a celluloid stage (Fig. 1). The pin bearing the stage and labels has slight verdigris above and below the stage. The lectotype has the left wing broken off and glued to the celluloid stage, the left mid leg is glued to the specimen pin, and the right mid leg is broken off and missing; otherwise the specimen is in good condition. The labels for the lectotype are displayed in Figure 3. The red-ringed “Type ♂” label was placed on the specimen before the BMNH collection was moved to a country estate to avoid the bombing of London during WWII.

The exact type locality for the lectotype cannot be traced as the journal from this particular trip to the Big Island was one of the lost journals of Perkins (Evenhuis, 2007: 339). All that is known is Perkins left the Big Island in mid-December 1896 to return to Honolulu, so the collection of the male in “Olaa” (which could be anywhere from just below the current Volcano Village to the town of Ke‘eau) must have been made in the first half of the month of December.



Fig. 4. *Paraliancalus*, male mid femora; **a.** *P. metallicus* (Grimshaw); **b.** *P. lacinafemur*, n. sp.

Females of *Paraliancalus* are difficult to differentiate, and female specimens from islands other than Maui are likely to be *P. metallicus*.

***Paraliancalus lacinafemur* Evenhuis & Bickel, new species**

(Figs. 4b, 5b)

Types. Holotype ♂ (deposited in BPBM 17,293) from HAWAIIAN ISLANDS: **Maui (East):** Waikamoi, May 1967, N.L.H. Krauss (in BPBM). *Paratypes.* HAWAIIAN ISLANDS: **Maui (East):** 1♂, Waikamoi, 4000 ft [1020 m], 24 Jul 1965, D.E. Hardy (UHM); 1♂, Waikamoi Flume trail, 9 Jul 1968, J.A. Tenorio (UHM); 1♂, Kipahulu Valley, camp 2, 1250 m, Aug 1967, R. Wilson (BPBM); 1♂, Olinda, 1 Aug 1932, N.L.H. Krauss (BPBM); Haleakalā National Park, upper Kipahulu Valley, HAVO Transect #1, 1250 m, 29 Mar 1983, F.G. Howarth (BPBM); 1♂, Kipahulu Valley, tributary to Palikea Stream, 1500 ft [ca 457 m], 15 May 1993, D.A. Polhemus (BPBM; preserved in ethanol). **Maui (West):** 1♂, Honokohau Stream, 1500–1520 ft. [ca. 457–463 m], seep at end of hike, 23 Jan 2003, R. Englund (BPBM; preserved in ethanol). All specimens pinned unless otherwise noted.

Description.

Male. Body length: 6.2–7.2 mm. Wing length: 6.0–7.0 mm.

Head. Vertex and occiput shining black, with blue, blue-green, or magenta highlights; occiput golden tomentose; postocciput and postgena gray tomentose, with blue-green highlights ventrally; frons gray pollinose, face and clypeus silvery tomentose; oc black, about two-thirds length of antennal arista, short weak vertical present laterad of ocellar seta; eyes separated below antennae by slightly less than width of antennal sockets, slightly tapering in width to clypeus; palp dark brown; proboscis brown, extending below eye

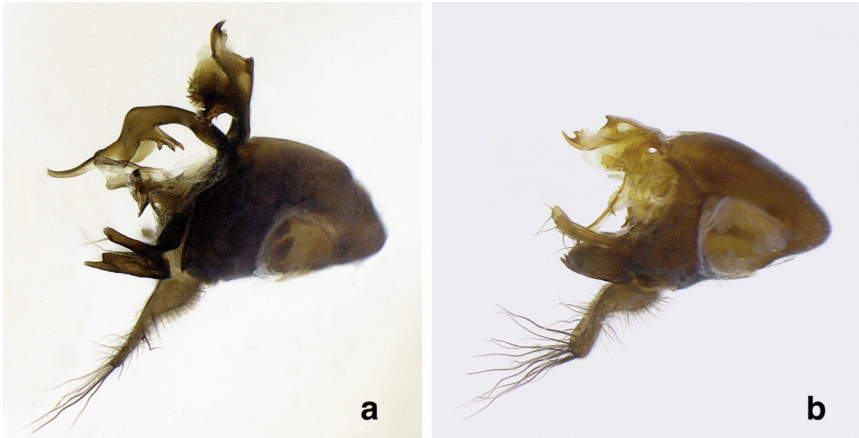


Fig. 5. *Paraliancalus* male genitalia, lateral view. a. *P. metallicus* (Grimshaw); b. *P. lacinaefemur*, n. sp.

in lateral view; antennal segments dark brown; scape ca. 2 x width, subcylindrical; pedicel flattened; postpedicel short, length subequal to width; arista slightly less than head height.

Thorax. Mesoscutum and scutellum dark brown to black, with metallic greenish, bluish, purplish, or magenta highlights; pleura gray tomentose; thoracic setae black: 5 dc (with row of tiny hairs anterior to first dc); 2 np; 1 ph; 1 pa; 1 sc; ac absent; 3–4 propleurals; halter stem yellow, knob brownish yellow to yellow.

Legs. Coxae gray tomentose, remainder of legs shiny dark brown to black with greenish highlights; CI with 6–7 strong black curved setae apically, longitudinal row of fine hairs laterally, 4–6 irregular rows of fine hairs mesally; CII and CIII with single long strong black setae laterally, CII with patch of curved black setae apically; femora with fine hairs on all surface, longer hairs ventrally, FI and FII with patch of short black curved setae apicomesally, FII (Fig. 4b) with 2 strong black spines basally on ventral surface, shorter, finer setae in row ventrally toward apex; TI with 2 strong setae on lateral surface, fine hairs and setae elsewhere; TII with 5 strong setae on lateral surface: 1 pair basally, 1 medially, 1 pair apically; TIII with 6 strong setae on lateral surface: 1 pair basally, 3 in medial two-thirds, 1 pair apically. Remainder of leg segments without strong setae.

Wing (cf. Fig. 2). pale smoky throughout; squama with black setae.

Abdomen. Shiny dark brown with strong black setae on tergite I, shorter black hairs dorsally on each tergite, a few longer hairs laterally; sternites gray pollinose, bare.

Genitalia (Fig. 5b). Hypopygium dark brown; cerci bulbous basally, with long, thin arm that is broadly rounded at apex, with numerous long wavy setae at apex (splayed in various directions), short setae along dorsal and ventral surfaces; hypandrium with thorny projections on dorsal (= inner) surface, less extensive than in *P. metallicus*.

Female: Unable to differentiate females in species of this genus.

Remarks. This species appears to be restricted to the slopes of Haleakalā on East Maui and Honokohau Stream on West Maui. Males from other localities on Maui and from other islands all belong to *P. metallicus*.

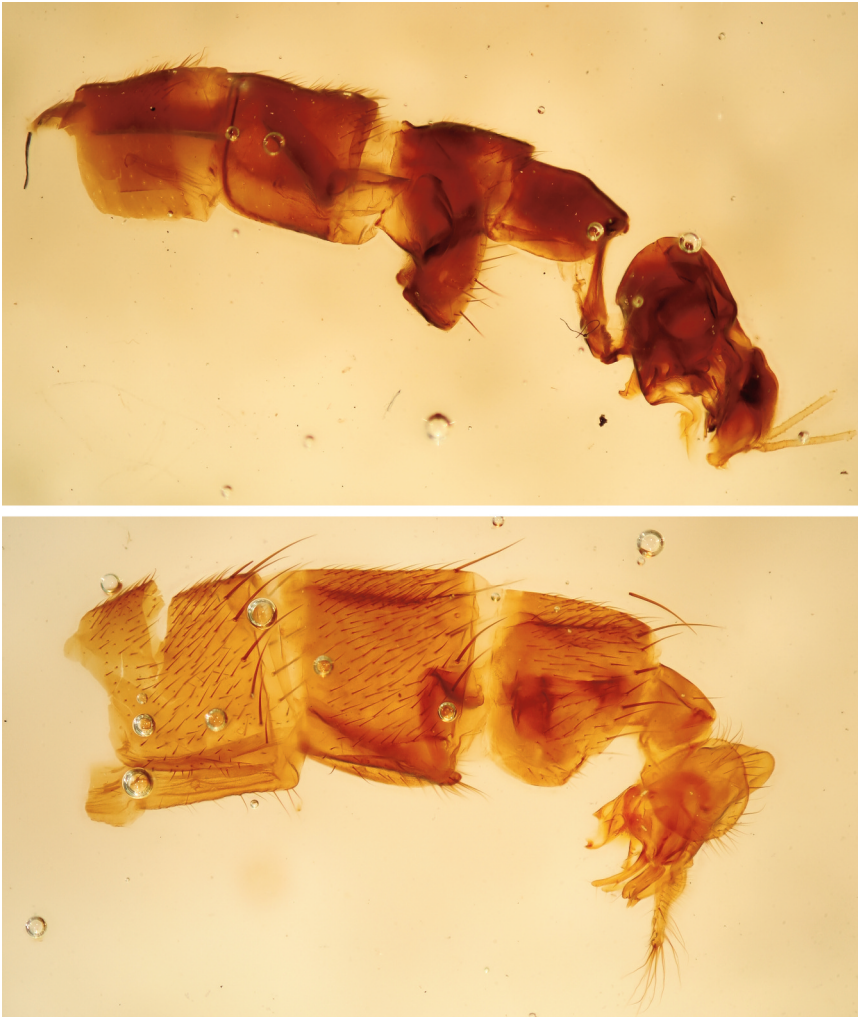


Fig. 6. Male postabdomens, left lateral view. **a.** *Liancalus virens* (Scopoli); **b.** *P. metallicus* (Grimshaw).

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Literature Cited

- Becker, T.** 1922. Dipterologische Studien. Dolichopodinae der Indo-Australischen Region. *Capita Zoologica* **1**(4), 247 pp.
- Bickel, D.J.** 2009. Family Dolichopodidae, pp. 671–694. *In*: Brown, B.V. *et al.*, Manual of Central American Diptera: Volume 1, NRC Press, Ottawa. 714 pp.
- Bickel, D.J. & Dyte, C.E.** 1989. Family Dolichopodidae, pp. 393–418. *In*: Evenhuis, N.L. (ed.), Catalog of the Diptera of the Australasian and Oceanian regions. *Bishop Museum Special Publication* **86**, 1155 pp.
- Bryan, E.H.** 1934. A review of the Hawaiian Diptera, with descriptions of new species. *Proceedings of the Hawaiian Entomological Society* **8**: 309–468.
- England, R.A., Arakaki, K., Preston, D.J., Evenhuis, N.L. & McShane, M.K.K.** 2003. Systematic inventory of rare and alien aquatic species in selected O‘ahu, Maui, and Hawai‘i island streams. Report prepared for Hawaii Department of Land and Natural Resources, Honolulu. ii + 14 pp.
- , & **Polhemus, D.A.** 2001. Evaluating the effects of introduced rainbow trout (*Oncorhynchus mykiss*) on native stream insects on Kauai Island, Hawaii. *Journal of Insect Conservation* **5**: 265–281.
- , **Polhemus, D.A. & Preston, D.J.** 1998. Assessment of the suitability of Kokee State Park streams as habitat for year-round catch and release fishing for rainbow trout without annual stocking contract C35895. Report prepared for Hawaii Department of Land and Natural Resources, Honolulu. 40 pp.
- , **Polhemus, D.A. & Preston, D.J.** 2000. Assessment of the impacts of rainbow trout predation on native aquatic invertebrate species within Kōke‘e State Park streams, Kaua‘i, Hawai‘i. *Bishop Museum Technical Report* **18**, 125 pp.
- , **Preston, D.J., Samuelson, G.A., Arakaki, K. & Evenhuis, N.L.** 2002. Aquatic organism study for the koa timber commercial forestry operation, South Hilo District, County of Hawai‘i. Report prepared for Koa Timber, Inc. Kapolei, Hawaii. 30 pp.
- , **Wright, M.G. & Polhemus, D.A.** 2006. Aquatic taxa as indicators of aquatic species richness, habitat disturbance, and invasive species impacts in Hawaiian streams. *In*: Fitzsimons, J.M. & Evenhuis, N.L. (eds.), *Biology of Hawaiian streams and estuaries. Bishop Museum Bulletin in Cultural and Environmental Studies* **3**: 209–234.
- Evenhuis, N.L.** 2007a. Barefoot on lava. The journals and correspondence of naturalist R.C.L. Perkins in Hawai‘i, 1892–1901. *Bishop Museum Bulletin in Zoology* **7**, 412 pp.
- . 2007b. New species of Hawaiian *Campsicnemus* (Diptera: Dolichopodidae). *In*: Evenhuis, N.L. & Eldredge, L.G. (eds.) Records of the Hawaii Biological Survey for 2006. *Bishop Museum Occasional Papers* **95**: 9–16.
- . 2008. Hawaii’s Diptera diversity, pp. 45–68. *In*: Pape, T., Bickel, D.J. & Meier, R. (eds.), *Diptera diversity: status, challenges and tools*. E.J. Brill, Leiden. 439 pp.
- , & **Grootaert, P.** 1997. A new species of *Thinophilus* (Diptera: Dolichopodidae) from the Hawaiian Islands. *In*: Evenhuis, N.L. & Miller, S.E. (eds.), Records of the Hawaii Biological Survey for 1996. *Bishop Museum Occasional Papers* **48**: 74–77.
- Grimshaw, P.H.** 1901. Diptera. *Fauna Hawaiiensis* **3**(1): 1–78.
- Hardy, D.E.** 1952. Additions and corrections to the Bryan’s check list of the Hawaiian Diptera. *Proceedings of the Hawaiian Entomological Society* **14**: 443–482.

- . & **Kohn, M.A.** Dolichopodidae. *Insects of Hawaii* **11**: 1–256.
- Nishida, G.M.** 1992. Hawaiian terrestrial arthropod checklist. *Bishop Museum Technical Report* [1], 262 pp.
- . 1994. Hawaiian terrestrial arthropod checklist. Second edition. *Bishop Museum Technical Report* **4**, 287 pp.
- . 1997. Hawaiian terrestrial arthropod checklist. Third edition. *Bishop Museum Technical Report* **12**, 263 pp.
- . 2002. Hawaiian terrestrial arthropod checklist. Fourth edition. *Bishop Museum Technical Report* **22**, 313 pp.
- Parent, O.** 1938. Quelques diptères dolichopodides des Iles Hawaii (Fin.). *Konowia* **16**: 209–219.
- Polhemus, D.A.** 1996. A survey of the aquatic insect faunas of selected Hawaiian streams. Revised edition. Report prepared for the Hawaii State Commission on Water Resource Management by the Hawaii Biological Survey, Honolulu. 131 pp.
- Van Duzee, M.C.** 1933. New Dolichopodidae from the Hawaiian Islands. *Proceedings of the Hawaiian Entomological Society* **8**: 307–356.
- Williams, F.X.** 1934. Notes and exhibitions: Molokai insects notes. *Proceedings of the Hawaiian Entomological Society* **8**: 393.
- . 1940. Biological studies on Hawaiian water-loving insects. Part III. Diptera or flies. B. Asteiidae, Syrphidae and Dolichopodidae. *Proceedings of the Hawaiian Entomological Society* **10**[1939]: 281–315.
- Yang D., Zhu Y., Wang M. & Zhang L.** 2006. *World catalog of Dolichopodidae (Insecta: Diptera)*. China Agricultural University Press, Beijing. vii + 704 pp.

New Species of *Campsicnemus* from East Maui, Hawaiian Islands (Diptera: Dolichopodidae)¹

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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

1. Contribution No. 2011-003 to the Hawaii Biological Survey.



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.

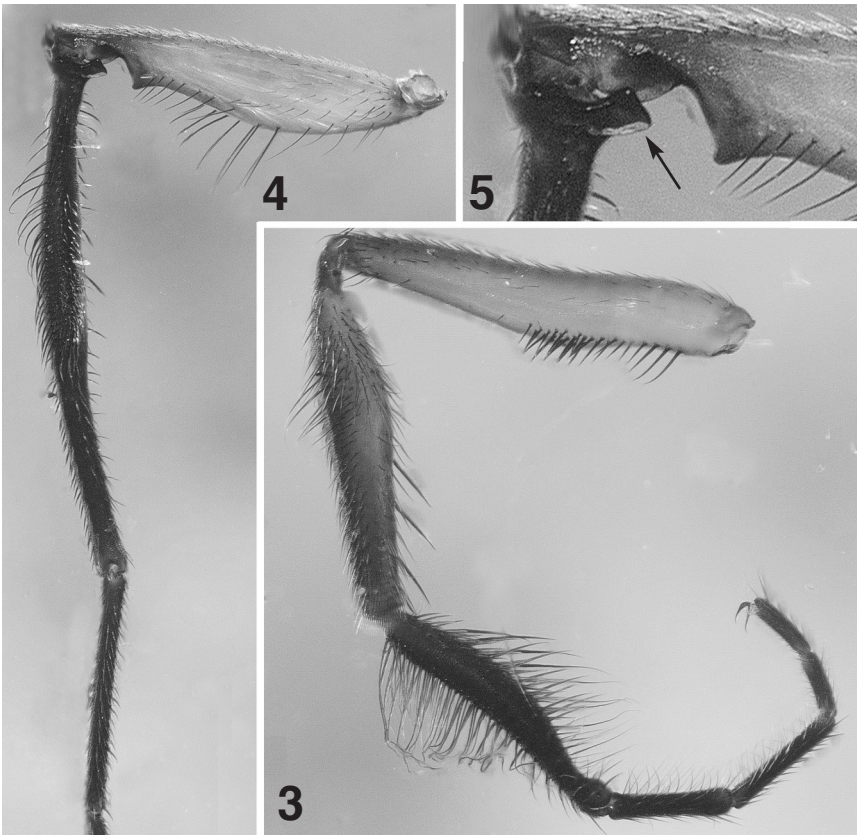
Etymology. The specific epithet honors the collector, Gordon Bennett, with whom I have had the pleasure of collecting on O‘ahu, Maui, and Molokai.

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.

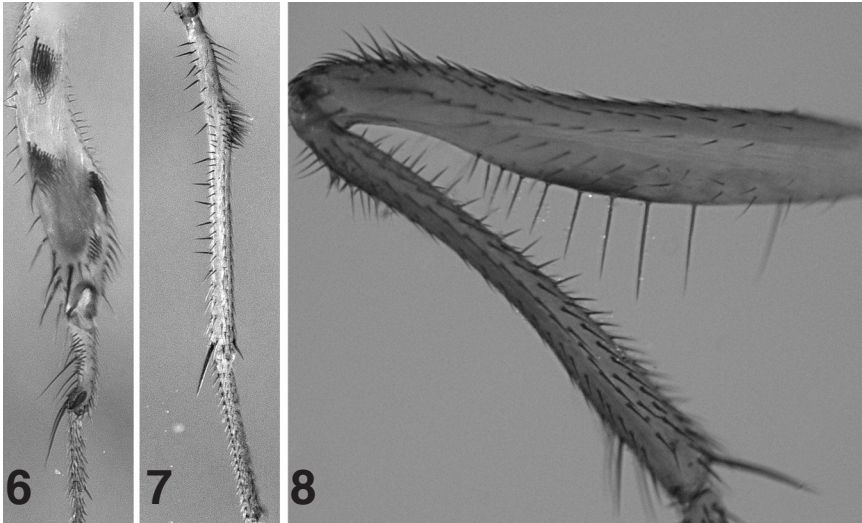
Etymology. The specific epithet honors John Papa I'i (1800–1870), leading citizen of the Hawaiian Kingdom during the 19th century when he was attendant to King Kamehameha II and close associate of many rulers of Hawai'i. One of his great-great-grandsons is my good friend and colleague in Hawaiian history, 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); IIt₁ (Fig. 6) slightly longer than IIt₂, slightly bowed, with thick prominent black apical protuberance (MSSC); IIt₂₋₅ 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.

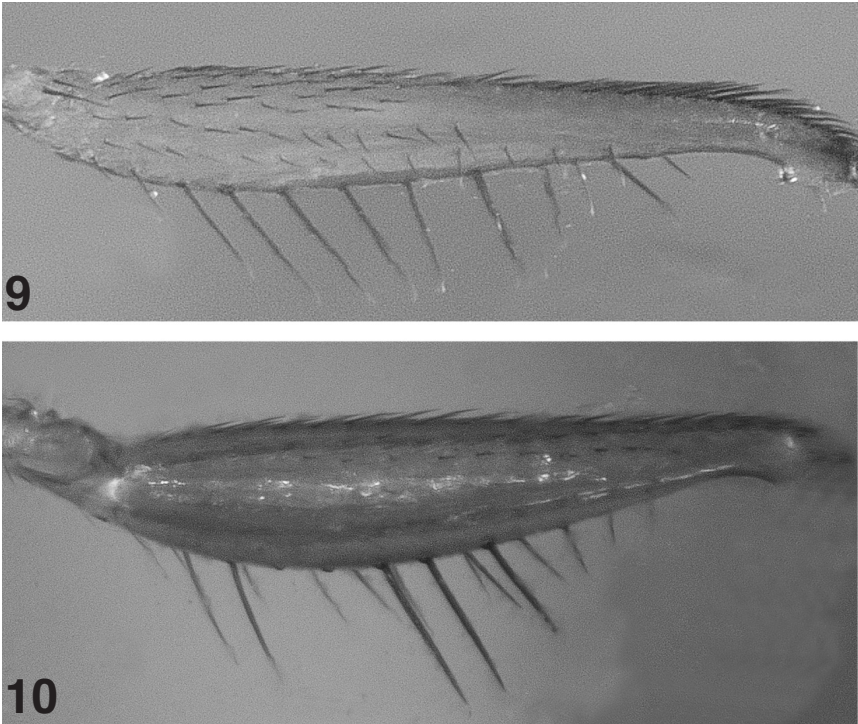
Thorax. Mesoscutum, scutellum, and pleura brown, katapisternum and metakatepisternum yellowish ventrally; thoracic setae black: 4 dc; 2 np; 2 ph; 1 pa; 1 sc; ac absent; halter stem and knob pale brown.

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); IIt₁ (Fig. 8) long, about 2.5 x length of IIt₂. 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; It₁ 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).

Literature Cited

- Evenhuis, N.L. 2007. New species of Hawaiian *Campsicnemus* (Diptera: Dolichopodidae). *In*: Evenhuis, N.L. & Eldredge, L.G. (eds.), Records of the Hawaii Biological Survey for 2006. *Bishop Museum Occasional Papers* 95: 9–16.
- . 2008. The *Campsicnemus lobatus* and *zigzag* groups in the Society Islands, French Polynesia (Diptera: Dolichopodidae). *Zootaxa* 1910: 27–40.
- . 2009. Review of *Campsicnemus* (Diptera: Dolichopodidae) of the Marquesas, French Polynesia, with description of four new species groups. *Zootaxa* 2004: 25–48.
- Hardy, D.E. & Kohn, M.A. 1964. Family Dolichopodidae Latreille. *Insects of Hawaii* 11: 13–256.

Hylaeus strenuus (Hymenoptera: Colletidae), a new alien bee on O‘ahu

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Hymenoptera: Colletidae

***Hylaeus strenuus* (Cameron)**

New state record

The first specimens of this species, one male and two females, were collected at Magic Island, Ala Moana Beach Park, in early 2007 by Patrick Aldrich. These were sent to Roy Snelling at the Los Angeles County Museum and tentatively identified as a member of the African subgenus *Deranchylaeus*. Unfortunately, with Mr. Snelling’s sudden passing last year, the specimens were lost, and with no additional ones available, it was uncertain whether the species was established.

Recently, WTN rediscovered this species at several sites along the southeast coast between Ala Moana Beach Park and Koko Crater, in company with the introduced carpenter bee *Ceratina smaragdula*. Reevaluation of it by one of us (HHD) identified it as *Hylaeus strenuus* (Cameron, 1897), which is described from Barrackpore, West Bengal, India. Virtually nothing is known about it in its home range, possibly due in part to the poor original description—the type is a male, not a female as described, and does not match the text very well. *Hylaeus* bees are poorly known from the Oriental region in general, and nearly all are not assigned to a subgenus (Michener, 2000). How it arrived in Hawai‘i is unknown, but it nests in twigs like *C. smaragdula* does, thus could be easily transported in wood.

In Snelling’s (2003) key to alien bees of Hawai‘i, this species would partially run to *H. leptocephalus*, as both lack a posterior emargination on sternum 6 and possess well-defined punctures and a transverse carina on the propodeum. However, in *H. strenuus* the mesepisternum is not more coarsely punctate than the rest of the body; the basal area of the propodeum is rugose only medially, with distinct smooth patches laterad; and the transverse carina is incomplete medially. The two may be easily separated by the face marks: in *H. strenuus*, both males and females have elongate lateral marks and a small anteromedial clypeal mark, whereas *H. leptocephalus* males have the entire face pigmented and females have only the lateral marks, the clypeus being entirely black. Males of *H. strenuus* additionally have long, attenuate gonoforceps which protrude slightly beyond the apex of the abdomen even when retracted and pale markings on the mandibles; the females’ mandibles are black but are unusually broad. Both sexes have the apical area of metasomal tergite 2 distinctly depressed, with the posterior rim shining, impunctate, and reflexed upward.

At present, records of *H. strenuus* are restricted to the lowlands east of Honolulu, where it is uncommon and found in company with other exotic bees. Systematic searches have not yet been carried out, and it is likely to spread much further. Given its similar

size and habits, including an apparent preference for *naupaka* (*Scaevola sericea*), it will probably be a competitor with the native *Hylaeus*, particularly the threatened coastal species *H. anthracinus* and *H. longiceps*.

Material examined. O'AHU: 3♂, 1♀, Koko Crater Botanical Garden, around *Scaevola sericea*, 10 Feb 2010, W. Nagamine (HDOA). 2♂, Koko Crater Botanical Garden, around *Scaevola sericea*, 11 Mar 2010, K. Magnacca (Univ. Hawaii, Hilo).

Acknowledgements

Thanks to Patrick Aldrich (University of Hawai'i Mānoa) for bringing *H. strenuus* to our attention.

Literature Cited

- Michener, C.D.** 2000. *The bees of the world*. The Johns Hopkins University Press, Baltimore. 913 pp.
- Snelling, R.R.** 2003. Bees of the Hawaiian Islands, exclusive of *Hylaeus* (*Nesoprosopis*) (Hymenoptera: Apoidea). *Journal of the Kansas Entomological Society* **76**(3): 342–356.

The subfamily Tethininae (Diptera: Canacidae) in the Hawaiian Islands¹

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Since Hardy & Delfinado's (1980) contribution to the Hawaiian fauna of the beach fly family Tethinidae (included now into Canacidae *s.l.*), no additional comprehensive faunal studies on these flies from the Hawaiian Islands have been done until present. In that paper Hardy and Delfinado recorded four species of tethinid flies from Hawai'i. *Pelomyia steyskali* Hardy & Delfinado (a junior synonym of *P. occidentalis* Williston) and *Dasyrhicnoessa vockerothi* Hardy & Delfinado were described by the two authors as species new to science. Also, they reported *Tethina variseta* (Melander) [a junior synonym of *T. willistoni* (Melander)] and *Dasyrhicnoessa insularis* (Aldrich) from these oceanic islands. Except for the pelomyiine species *P. steyskali*, all the other species belong to the subfamily Tethininae.

Based on the re-examination of both determined and undetermined material deposited in the Bishop Museum, Honolulu, and a few additional undetermined specimens from the collection of the Zoological Museum, University of Lund (Sweden), this study aims to strengthen and update the taxonomy of the subfamily Tethininae inhabiting the seashores of Hawai'i. After studying this material, three species were found to be new to this remote Pacific archipelago, namely *Dasyrhicnoessa clandestina* Munari, *D. fulva* (Hendel), and *Tethina pallipes* (Loew). Our concept of Hendel's species is based primarily upon the examination (Munari, 2002) of the syntypic series preserved in NMW (only three of the four syntypes were then examined). Unfortunately, no lectotype was designated. Additional syntypes are in DEI (Rohlfien & Ewald, 1972). Furthermore, the male terminalia of one of the examined syntypes perfectly match the figure given by Hennig (1939).

We have also found it useful to include here an identification key to all genera and species of Hawaiian Tethininae in order to facilitate future investigations.

Material and Methods

Material examined was borrowed from or is deposited in the following collections: BPBM (Bishop Museum, Honolulu, Hawai'i, USA); DEI (Deutsches Entomologisches Institut, Eberswald, Germany); MZLU (Museum of Zoology, Lund University, Lund, Sweden); NMW (Naturhistorisches Museum, Vienna, Austria). Unless otherwise noted in the material examined, specimens are deposited in BPBM.

1. Contribution No. 2011-004 to the Hawaii Biological Survey.

Taxonomy

Key to genera and species of Tethinae from the Hawaiian Islands

1. Face with a shiny knob laterad, just above the vibrissal angle, and with more or less developed median carina or tubercle on lower portion; no true vibrissa, at most a foremost vibrissa like peristomal seta present; eye bare; male mid femur without postero-ventral armature; terminalia of ♂ with a posterior surstylus only genus *Tethina* Haliday ... 5
- . Face lacking a shiny knob laterad, and without a median carina or tubercle on lower portion; true vibrissa present; eye with dense, tiny pubescence formed by several ommatidial microtrichia; male mid femur with postero-ventral armature formed by a row of black spinulae (figs. 8–9); terminalia of ♂ with both anterior and posterior surstyli genus *Dasyrhicnoessa* Hendel ... 2
2. Dark species, with dark brown thorax; legs sometimes paler, yellowish brown, with tibiae yellowish to brown 4
- . Entirely yellowish to rufous species; legs mostly yellow 3
3. Acrostichal setulae arranged in 4, occasionally 5, rows; forefemur with poorly developed antero-ventral ctenidium, formed by a row of 4–6 spaced, tiny, pale spinulae; mid femur of ♂ (fig. 8) with postero-ventral comb of spinelike setae on distal half or less, formed by 5–6 strong spines increasingly spaced towards rear; hind femur of ♂ with 3–5 irregularly long, fine, spaced ventral setae on proximal half, distinctly longer than half of femur height (= femur thickness); external terminalia of ♂ as in figs. 3–4, with minute, rod-like anterior surstylus and subtriangular posterior surstylus (lateral view); posterior surstylus with 4–5 minute, globular spinulae on apical ventral side ***Dasyrhicnoessa fulva*** (Hendel)
- . Acrostichal setulae arranged in 6, occasionally 7, rows; forefemur with well developed antero-ventral ctenidium, formed by a row of 6–12 close, stout, black spinulae; mid femur of ♂ (fig. 9) with postero-ventral comb of spinelike setae on distal two-thirds or its entire length, formed by 14–16 regularly spaced, close, strong spines; hind femur of ♂ with usual row of short, fine ventral setae, shorter than half of femur height; external terminalia of ♂ as in fig. 7, with very large, trapezoidal, anterior surstylus and spatulate posterior surstylus (lateral view); posterior surstylus without such globular spinulae ***Dasyrhicnoessa vockerothi*** Hardy & Delfinado
4. External terminalia of ♂ as in figs. 1–2; anterior surstylus longer than posterior surstylus length, with large, perfectly triangular (both in lateral and caudal views) apical part ***Dasyrhicnoessa clandestina*** Munari
- . External terminalia of ♂ as in figs. 5–6; anterior surstylus as long as or slightly shorter than posterior surstylus length, with characteristically kidney-shaped apical part (in caudal view) ***Dasyrhicnoessa insularis*** (Aldrich)
5. Pale grey species; setae and setulae of body and legs white to slightly off-white, sometimes with a few to many black main setae on mesonotum (incl. scutellum); gena whitish, uniformly microtomentose 6
- . Dark brown species; setae and setulae of body and legs black; gena yellowish, with broad, longitudinal, subshiny stripe ***Tethina pallipes*** (Loew)

- 6. External terminalia of ♂ with scarcely rounded epandrium, more vertically elongate, slightly rectangular in lateral view; surstylus in lateral view short and straight (Fig. 14) **Tethina willistoni** (Melander)
- . External terminalia of ♂ with rounded capsulate epandrium; surstylus in lateral view long and curved antero-ventrally (Fig. 10) **Tethina albula** (Loew)

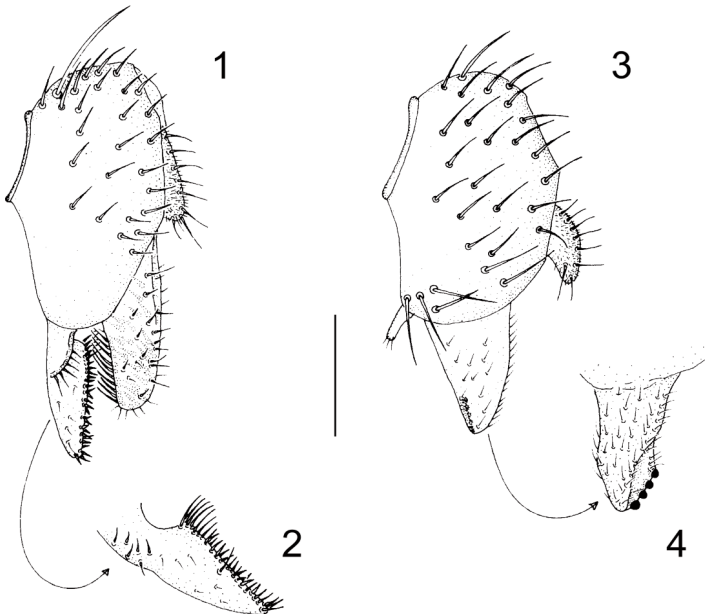
***Dasyrhicnoessa clandestina* Munari, 2002 New state record**
(Figs. 1–2)

Dasyrhicnoessa clandestina Munari, 2002: 543.

A poorly known species recently described from the southwestern Pacific and newly recorded here from the Hawaiian Islands. Except for the male terminalia, which are very distinctive in this species (Figs. 1–2), we have found no consistent external characters that distinguishes it from the closely related *D. insularis* (Aldrich). Therefore, females of *D. clandestina* can tentatively be assigned to this taxon only when strictly collected along with males, like the record below from Kalihi.

Material examined: HAWAIIAN ISLANDS: **O‘ahu:** Kalihi, on window, 14 May 1958, A. Suehiro, 1♂, 2♀.

Distribution. AUSTRALASIAN/OCEANIAN: Hawaiian Islands (new) (O‘ahu), ?New Caledonia, Fiji.



Figs. 1–4. External terminalia of male: **1.** *Dasyrhicnoessa clandestina* Munari, lateral view; **2.** Ditto, apical portion of the anterior surstylus in caudal view; **3.** *D. fulva* (Hendel), lateral view; **4.** Ditto, apical portion of the posterior surstylus in caudal view. Scale bar = 0.1 mm. [Slightly modified after Munari, 2002].

Dasyrhicnoessa fulva (Hendel, 1913)
(Figs. 3–4, 8)

New state record

Rhicnoessa fulva Hendel, 1913: 110.

Hendel (1913) described *Dasyrhicnoessa fulva* from two localities in Taiwan: Anping and Tainan. Since then, this species was almost forgotten until Munari (2002) newly recorded it from Sri Lanka and, later, from Oman (Munari, 2007) and the United Arab Emirates (Munari, 2010). Until now, *D. fulva* was known only from the northern Indian Ocean and the westernmost part of the northern Pacific. This species is newly recorded here from the Hawaiian Archipelago. The distribution of this species is now known to occur throughout the tropico-equatorial belt of the northern Indo-Pacific area, from the United Arab Emirates (the westernmost record) to the Hawaiian Archipelago (the easternmost record). *Dasyrhicnoessa fulva* differs from the externally similar *D. vockerothi* Hardy & Delfinado mainly by the characters given in the key couplet 3.

Material examined: HAWAIIAN ISLANDS: **Maui:** 2 km S Lahaina, swept on herbs and grass along seashore, loc. 41, 23 Oct 1981, L. & I. Cederholm leg., 4♂, 2♀ (MZLU). **O‘ahu:** Hickam AFB, 29 Oct 1977, 16, 19 Nov 1977, 28 Dec 1977, C.W. Mills III, 1♂, 3♀; Pouhala Marsh, first pool, 0 ppt. salinity, 19 Jun 1998, K. Arakaki & K. Kami, 1♂; Hālawā Stream, bridge area, 0–1 m, sweeping over mud along stream, 2 Jun 1998, G.A. Samuelson, K. Arakaki & K. Kami, 1♂, 1♀; *ibidem*, (upper), 0 m, over water, 2 Jun 1998, same collectors, 2♂, 1♀; *ibidem*, (lower), 0 m, mud bank under bridge, 2 Jun 1998, same collectors, 1♂; Honouliuli, mud bank, mangrove – *Batis*, 17 Jun 1998, same collectors, 1♂; *ibidem*, along mangrove bank, 17 Jun 1998, same collectors, 1♂, 1♀; Pearl Harbor, Middle Loch near Waiawa springs, sweeping shoreline – mud, sand, rocks and decaying seaweed, 6 May 1998, G.A. Samuelson, 3♂; “Panulū” [= Punalū‘u] Beach Park, swept in swamp and around small stream, loc. 40, 18 Oct 1981, L. & I. Cederholm leg., 1♂ (MZLU).

Distribution. AUSTRALASIAN/OCEANIAN: Hawaiian Islands (new) (Maui, O‘ahu). ORIENTAL: Sri Lanka, Taiwan. PALAEARCTIC: Oman, United Arab Emirates.

Dasyrhicnoessa insularis (Aldrich, 1931)
(Figs. 5–6)

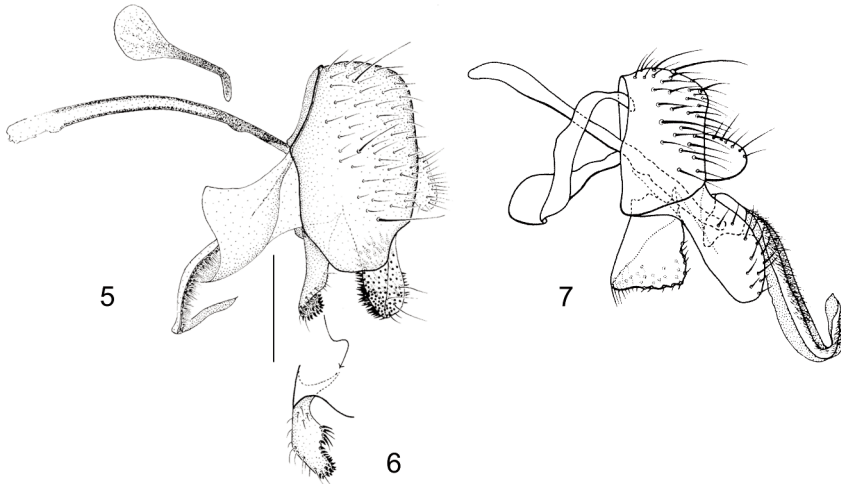
New island records

Tethina insularis Aldrich, 1931: 395.

A common, pantropical species occurring throughout the tropical seashores of the world. Like its congeners, it is associated mainly with mangrove swamps. Along with *D. clandestina*, Aldrich’s species from the Hawaiian Islands can be distinguished by its dark color. As opposed to the former species, it is commonly found in many maritime places. It is new to the Hawaiian Islands of Kaho‘olawe, Kaua‘i, and Moloka‘i.

Material examined: HAWAIIAN ISLANDS: **Hawai‘i:** Kealakekua, 12 May 1959, S. Kimoto, 1♂; Pololū Valley, 2 Aug 1958, L.W. Quate, 1♂, 3♀. **Kaho‘olawe:** *Sida* salt bush, E end, 900 ft elev., 14 Feb 1931, E.H. Bryan Jr, 1♀; **Kaua‘i:** Barking Sands, rock shore, 2 Apr 1969, J.L. Gressitt, 1♂, 5♀; **Midway Atoll:** Sand Island, Feb 1953, C.F. Clagg, 4♂, 11♀. **Molokai:** Kaunakakai, 21 Jun 1962, K. Yano, 1♂. **O‘ahu:** Barbers Point, light trap, Jan 1959, [no collector name], 1♀; Hanauma Bay, seashore, 6 Mar 1961, L.W. Quate, 2♂. **Pearl & Hermes Reef:** SE Island, ex crucifer, 14 Dec 1970, J.L. Gressitt, 1♂, 4♀; *ibidem*, *Solanum*, 14 Dec 1970, same collector, 2♂, 5♀; *ibidem* [no additional data], 14 Dec 1970, same collector, 1♂, 1♀; *ibidem*, *Tribulus*, 15 Dec 1970, same collector, 8♂, 6♀; *ibidem*, *Eragrostis*, 15 Dec 1970, same collector, 3♂, 1♀; *ibidem* [no additional data], 15 Dec 1970, same collector, 1♀.

Distribution. AFROTROPICAL: Cameroon, Madagascar, Nigeria. AUSTRALASIAN/OCEANIAN: American Samoa (Tutuila), Australia (Queensland), Bismarck Is-



Figs. 5–7. External terminalia of male: **5.** *Dasyrhicnoessa insularis* (Aldrich), lateral view; **6.** Ditto, apical portion of the anterior surstylus in caudal view; **7.** *D. vockerothi* Hardy & Delfinado, lateral view. Scale bar = 0.1 mm. [Figs. 5–6, slightly modified after Munari, 1994, as *D. freidbergi* Munari; fig. 7, slightly modified after Sasakawa, 1995].

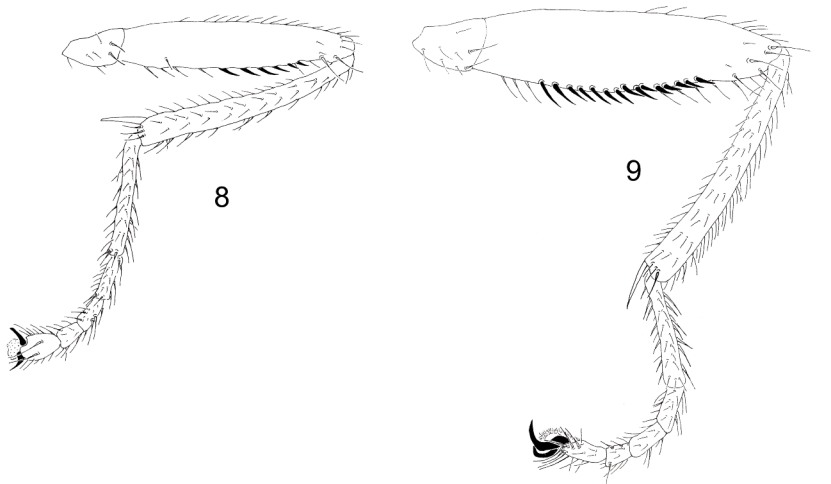
lands (Dyaul), Canton Island, Caroline Islands (Ponhpei, Chuuk, Yap, Palau), Fiji (Ovalau, Suva, Viti Levu), ?French Polynesia (Society Islands: Moorea), Hawaiian Islands (Hawai‘i, French Frigate Shoals, Kaho‘olawe (new), Kaua‘i (new), Lisiansky, Maui, Midway Islands, Moloka‘i (new), O‘ahu, Pearl & Hermes Reef), Kiribati (Butaritari, Makin, Eita, Tarawa, Abemama), Line Islands (Christmas), Mariana Islands (Saipan, Tinian), Marquesas (Hivaoa, Nuku Hiva), Marshall Islands (Majuro, Japtan, Parry, Lib, Jibu, Jaluit, Namorik), New Hebrides (Erromanga), Palmyra Island, Pitcairn Island, Rapa Island, Society Islands (Bora Bora), Wake Island. NEARCTIC: Bermuda, United States (Florida). NEOTROPICAL: Bahamas (South Bimini), Belize, Brazil (Ceará), Mexico (Tabasco), West Indies (Cuba, Dominica, St. Lucia, St. Kitts, St. Vincent).

***Dasyrhicnoessa vockerothi* Hardy & Delfinado, 1980**
(Figs. 7, 9)

Dasyrhicnoessa vockerothi Hardy & Delfinado, 1980: 373.

First recorded by Hardy (1952) as “*Tethina* sp.?, taken on beach at Waimanalo, Oahu, September, 1951”, it was later recognized to be a species new to science (Hardy & Delfinado, 1980). The holotype from “Haena, Kauai, collected on beach, August, 1953 (D. E. Hardy)” is deposited in BPBM.

A common Indo-Pacific species externally similar to *D. fulva* that can easily be distinguished from it by the many consistent characters given in the key. At first glance, both species are distinguished from their Hawaiian congeners primarily by their smaller size and yellowish to pale rufous color of body and legs.



Figs. 8-9. Posterior view of the male mid leg: **8.** *Dasyrhicnoessa fulva* (Hendel); **9.** *D. vockerothi* Hardy & Delfinado (the leg appears very slightly rotated postero ventrally. For this reason, both lengths of the femoral spinelike setae and the basitarsus give the impression to be proportionally shorter than those of *D. fulva*). Scale bar = 0.5 mm.

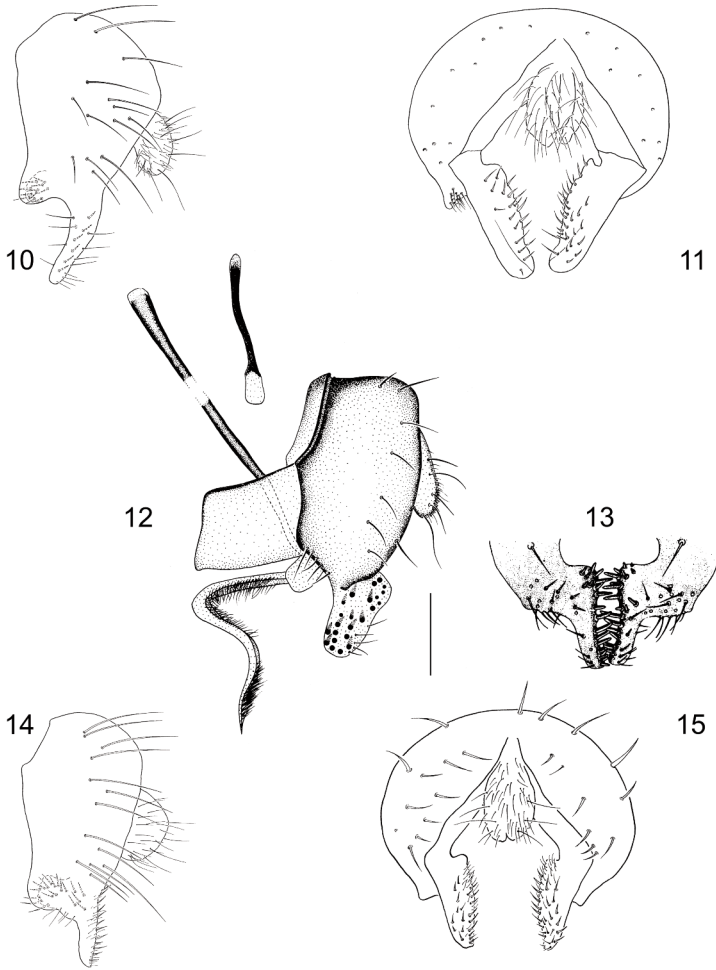
Material examined: HAWAIIAN ISLANDS: **Hawai'i:** Kealakekua, 12 May 1959, S. Kimoto, 1♂; **Kaua'i:** Barking Sands, rock shore, 2 Apr 1969, J.L. Gressitt, 8♂, 8♀; Koke'e, 4-6 Aug 1961, Maa, Miyatake & Yoshimoto, 2♀; Nawiliwili, at light, 9 Sep 1946, W.W. Wirth, 1♂; **O'ahu:** [no additional data], 9-10 Sep 1955, M.R. Wheeler, 1♂, 1♀; Barbers Point, 11 Aug 1966, C.M. Yoshimoto, 1♀; Hālawā Stream (upper), 0 m, over water, 2 Jun 1998, G.A. Samuelson, K. Kami & K. Arakaki, 1♀; Hickam AFB, at light, 28 Dec 1977, C.W. Mills III, 1♂, 1♀; Honolulu, on window, N.L.H. Krauss, 20 Dec 1941, 1♀.

Distribution. AFROTROPICAL: Seychelles (Aldabra, Mahé). AUSTRALASIAN/OCEANIAN: Australia (New South Wales, Northern Territory, Queensland), Bismarck Islands (Dyaul), Caroline Islands (Chuuk, Palau), Gilbert Islands, Hawaiian Islands (Hawai'i, Kaua'i, Maui, Moloka'i, O'ahu), Mariana Islands (Guam, Saipan), Marshall Islands, ?New Caledonia, Papua New Guinea, Wake Island. ORIENTAL: Japan (Ryukyus), Malaysia (Sarawak), Philippines, Sri Lanka.

Tethina albula (Loew, 1869)
(Figs. 10-11)

Rhichnoessa albula Loew, 1869: 44.

This species was first recorded from the Hawaiian Islands by Mathis & Foster (2007) who did not cite any locality of Hawai'i for specimens examined in that paper. The above distribution was later also reported by Foster & Mathis (2008a, b) and by Munari & Mathis (2010). Mathis & Foster (2007) stated that *T. albula* and *T. willistoni* are often captured together, and that these two species apparently have no external diagnostic characters that distinguish them. Very likely these two taxa are sibling species that can be distinguished from each other only on the basis of slight, though consistent, morphological characters



Figs. 10–15. External terminalia of male: **10.** *Tethina albula* (Loew), lateral view; **11.** Ditto, caudal view; **12.** *T. pallipes* (Loew), lateral view; **13.** Ditto, surstyli in caudal view; **14.** *T. willistoni* (Melander), lateral view; **15.** Ditto, caudal view. Scale bar = 0.1 mm. [Figs. 10–11 and 14–15, slightly modified after Mathis & Foster, 2007; Figs. 12–13, slightly modified after Munari, 1990 (as *T. (Rhicnoessa) canzonerii* Munari)].

of the male terminalia (cf. Figs. 10–11, 14–15). According to Mathis & Foster (2007), the concept of *T. albula* is limited to those specimens with the rounded capsulate epandrium and an anteroventrally curved and longer surstylus (Fig. 10). Contrastingly, the epandrium of *T. willistoni* is less rounded and more vertically elongate, slightly rectangular in lateral view. Furthermore, the surstylus of the latter species is shorter and straight in lateral view (Fig. 14). In conclusion, we think it very important to carry out in the future more

detailed morphological examinations on both preserved and newly captured materials in order to confirm the possible occurrence of *T. albula* in the Hawaiian Archipelago.

Distribution. AUSTRALASIAN/OCEANIAN: Hawaiian Islands (Hawai'i, Kaho'olawe, Kaua'i, Maui, O'ahu). NEARCTIC: Mexico (Baja California Sur), United States (California, Delaware, Florida, Maryland, Massachusetts, New York, North Carolina, Rhode Island, South Carolina, Virginia). NEOTROPICAL: Bahamas, Belize, Brazil (Rio de Janeiro), Costa Rica, Curaçao, Ecuador (incl. Galápagos Islands), Guyana, Mexico (Chiapas, Quintana Roo, Sonora), Panama, Peru, Trinidad and Tobago, West Indies (Anguilla, Antigua, Barbados, Barbuda, Dominica, Dominican Republic, Grand Cayman, Grenada, Jamaica, Montserrat, Puerto Rico, St. Croix, St. Lucia, St. Vincent, Turks and Caicos).

Tethina pallipes (Loew, 1865)

(Figs. 12–13)

Rhinoessa pallipes Loew, 1865: 37.

Originally described from Greece, this is now known to be a common subcosmopolitan species that is recorded here for the first time from the Hawaiian Islands.

Material examined: HAWAIIAN ISLANDS: **Lāna'i**: Lāna'ihale, 3000–3370 [feet], 26 Mar 1961, G. Arnemann & Y. Kondo, 1♀. **O'ahu**: Honolulu, on window, 6 Jan 1942, N.L.H. Krauss, 1♂; ibidem, [no additional data], A.M. Okumura, 1♀; Naval Air Station, P.H. [Timberlake], light trap #1B, 20 Aug 1944, Herms & Russell, 1♀; Waikiki, 1 Mar 1932, O. Bryant, 1♀.

Distribution. AFROTROPICAL: Cape Verde Islands, Senegal, Seychelles (Al-dabra), South Africa. AUSTRALASIAN/OCEANIAN: Australia (Western Australia), Hawaiian Islands (new) (Lāna'i, O'ahu). ORIENTAL: India, Taiwan. NEARCTIC: Bermuda, United States (Texas). NEOTROPICAL: Chile, Mexico (Chiapas, Tabasco). PALAEARCTIC: Algeria, Azores, Bulgaria, Canary Islands, Cyprus, Egypt, France, Greece, Israel, Italy, Jordan, Malta, Oman, Portugal (Madeira), Spain (including Balearic Islands), Tunisia, Turkey, United Arab Emirates.

Tethina willistoni (Melander, 1913)

(Figs. 14–15)

Rhinoessa willistoni Melander, 1913: 298.

See discussion under *Tethina albula*. Hardy & Delfinado (1980) recorded this species from the Hawaiian Islands as *T. variseta* (Melander, 1952), a junior synonym of *T. willistoni* (Melander, 1913).

Distribution. AUSTRALASIAN/OCEANIAN: Hawaiian Islands (French Frigate Shoals, Hawai'i, Kaho'olawe, Kaua'i, Lisiansky, Maui, O'ahu, Midway Atoll). NEARCTIC: Bermuda, United States (California, Connecticut, Delaware, Florida, Maryland, Massachusetts, North Carolina, South Carolina, Virginia). NEOTROPICAL: Bahamas, Belize, Brazil (Rio de Janeiro), Cuba, Curaçao, Ecuador, Mexico (Chihuahua, Tabasco), Panama, Peru, Trinidad and Tobago, West Indies (Anguilla, Antigua, Barbados, Barbuda, Dominica, Dominican Republic, Grand Cayman, Grenada, Jamaica, Montserrat, Puerto Rico, St. Croix, St. Lucia, St. Vincent, Turks and Caicos).

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Literature Cited

- Foster, G.A. & Mathis, W.N.** 2008a. Review of the genus *Tethina* Haliday (Diptera: Canacidae: Tethininae) from western North America. *Proceedings of the Entomological Society of Washington* **110**(2): 300–330.
- . & **Mathis, W.N.** 2008b. A review of the Tethininae (Diptera: Canacidae) from the Galápagos Islands. *Proceedings of the Entomological Society of Washington* **110**(3): 743–752.
- Hardy, D.E.** 1952. Additions and corrections to Bryan's check list of the Hawaiian Diptera. *Proceedings of the Hawaiian Entomological Society* **14**(3): 443–484.
- , & **Delfinado, M.D.** 1980. Family Tethinidae. *Insects of Hawaii* **13**: 369–379.
- Hendel, F.** 1913. Acalyprate Musciden (Dipt.) II. *In*: H. Sauter's Formosa-Ausbeute. *Supplementa Entomologica* **2**: 77–112.
- Hennig, W.** 1939. Beiträge zur Kenntnis des Kopulationsapparates und der Systematik der Acalypratzen. II. Tethinidae, Milichiidae, Anthomyzidae und Opomyzidae. (Diptera). *Arbeiten über Morphologische und Taxonomische Entomologie aus Berlin-Dahlem* **6**(2): 81–94.
- Mathis, W.N. & Foster, G.A.** 2007. Canacidae (Diptera) from the Delmarva states. *Proceedings of the Biological Society of Washington* **120**(4): 387–428.
- Munari, L.** 1990. Contributo alla conoscenza dei Tethinidae afrotropicali. IV. Tethinidae raccolti ad Aldabra dalla "Aldabra Atoll Royal Society Expedition (1967-68)" e nel Sud Africa da R.E. Turner e B. & P. Stuckenberg, con descrizione di due nuove specie (Diptera, Acalypratae). *Società Veneziana di Scienze Naturali - Lavori* **15**: 51–68.
- . 1994. Contribution to the knowledge of Afrotropical Tethinidae. VII. New species and records, with a check-list of Afrotropical species (Diptera, Acalypratae). *Società Veneziana di Scienze Naturali - Lavori* **19**: 15–28.
- . 2002. New species, records, and a new synonymy in the genera *Dasyrhicnoessa* Hendel, 1934 and *Pseudorhichnoessa* Malloch, 1914 (Diptera: Tethinidae). *Studia Dipterologica* **8**(2)[2001]: 539–551.
- . 2007. Tethinidae from the Arabian Peninsula, with descriptions of four new species (Diptera). *Bollettino della Società Entomologica Italiana* **139**(2): 101–118.
- . 2010. Order Diptera, family Canacidae (Part 2), pp. 647–660. *In*: van Harten, A. (ed.), *Arthropod fauna of the United Arab Emirates*. Volume 2. Dar Al Ummah, Abu Dhabi. 786 pp.
- . & **Mathis, W.N.** 2010. World catalog of the family Canacidae (including Tethinidae) (Diptera), with keys to the supraspecific taxa. *Zootaxa* **2471**: 1–84. Available at: <http://www.mapress.com/zootaxa/2010/f/zt02471p084.pdf>.

- Rohlfien, K. & Ewald, B.** 1972. Katalog der in den Sammlungen des ehemaligen Deutschen Entomologischen Institutes aufbewahrten Typen - VIII. (Diptera: Cyclorrhapha: Schizophora: Acalyptratae). *Beiträge zur Entomologie* **22**(7/8): 407–469.
- Sasakawa, M.** 1995. Insects of Micronesia. Volume 14, no. 8. Diptera: Tethinidae. *Micronesica* **27**(1-2): 51–72.

New arthropod records from Maui Nui

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The following contributions include new arthropod records from the islands of Kaho‘olawe (19), Lāna‘i (1), Moloka‘i (3), and Maui (1). Voucher specimens were collected by the authors, Kaho‘olawe Island Reserve Commission (KIRC) staff, Maui Invasive Species Committee (MISC) staff, and students in the MISC Hō‘ike environmental curriculum program. Most of the ants (Hymenoptera: Formicidae) were collected using peanut butter lures during surveys for the little fire ant (*Wasmannia auropunctata*) and were determined by either the authors or Paul Krushelnycky, University of Hawai‘i, College of Tropical Agriculture and Human Resources (CTAHR). Non-ant specimens were determined by the authors. Vouchers are housed in Bishop Museum, Honolulu.

Araneae: Araneidae

Gasteracantha mammosa Koch, 1844

New island record

Native to India and Sri Lanka, and now found throughout much of Asia and Hawai‘i (McCormack, 2007), *Gasteracantha mammosa* (Asian spinybacked spider) was reported by Nishida (2002) from all the main islands except Kaho‘olawe. This hard bodied spider that can occasionally reach pest levels is now also known from Kaho‘olawe, where it was found on a building at the Base Camp at Honokanai‘a.

Material examined. **KAHO‘OLAWA:** Honokanai‘a, on outside wall of galley at Base Camp, 33 ft [10 m], 27 Dec 2010, *Starr, Starr, & Bruch 101227-02* (1 specimen).

Blattodea: Blattidae

Euthyrrhapha pacifica (Coquebert, 1804)

New island record

Native to Brazil, Madagascar, and Polynesia (Walker, 1868), but an immigrant to the Hawaiian Islands (Nishida, 2002), *Euthyrrhapha pacifica* (Pacific cockroach) was previously reported from the islands of Kaua‘i, O‘ahu, Maui, and Hawai‘i (Nishida, 2002). This dainty cockroach with two orange spots on the wing cases is now also known from Kaho‘olawe, where it was found on planted *a‘ali‘i* (*Dodonaea viscosa*) on the summit of the island.

Material examined. **KAHO‘OLAWA:** Pu‘u Moaulanui, swept from *a‘ali‘i* (*Dodonaea viscosa*), 1450 ft [442 m], 29 Dec 2010, *Starr, Starr, & Bruch 101229-01* (1 specimen).

Coleoptera: Coccinellidae

Cryptolaemus montrouzieri Mulsant, 1853

New island record

Native to Queensland and New South Wales (CSIRO, 2004), *Cryptolaemus montrouzieri* (mealybug destroyer) was purposefully introduced to the Hawaiian Islands and was previously reported from Midway Atoll, and all the main islands except Kaho‘olawe (Leeper, 1976; Nishida, 2002). This lady bird beetle with a taste for soft bodied insects is now also known from Kaho‘olawe, where it was found on an experimental grove of native *wiliwili* (*Erythrina sandwicensis*) near the summit.

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Material examined. **KAHO'OLAWE:** Pu'u Moaulanui, on wiliwili (*Erythrina sandwicensis*) in grove planted by Niftal, 1400 ft [428 m], 29 Dec 2010, *Starr, Starr, & Bruch 101229-02* (1 specimen).

Diptera: Syrphidae

Allograpta obliqua (Say, 1823)

New island record

Established throughout most of the continental United States, Hawai'i, Bermuda, Mexico, and the West Indies (Weems, 2004), *Allograpta obliqua* was first recorded from the Hawaiian Islands when Fullaway (1923) reported finding this new immigrant syrphid fly in collections from Waimea in May 1921 on the island of Hawai'i. Nishida (2002) reported the fly from all the main islands except Kaho'olawe and Ni'ihau. These aphid eating flies are now also known from Kaho'olawe where they were collected in pan traps by Lua Kealialalo pond in 1997 (D. Foote, pers. comm.), and were still at Lua Kealialalo in 2010, where they were found on vegetation near the wetland.

Material examined. **KAHO'OLAWE:** Lua Kealialalo, vegetation near wetland, 800 ft [244 m] 28 Dec 2010, *Starr, Starr, & Bruch 101228-01* (2 specimens).

Diptera: Tephritidae

Dioxyna sororcula (Wiedemann, 1830)

New island record

Widespread throughout the tropics and subtropics, and first found in Hawai'i in 1966, *Dioxyna sororcula* breeds in flower heads of *Bidens*, *Coreopsis*, and probably other composites (Hardy, 1967). Nishida (2002) reported this nearly cosmopolitan fly from the islands of Kaua'i, O'ahu, Moloka'i, and Hawai'i. This yellowish fly with mottled wings is here reported from Kaho'olawe where it was found on vegetation at the island summit.

Material examined. **KAHO'OLAWE:** Pu'u Moaulanui, swept from a'ali'i (*Dodonaea viscosa*), 1450 ft [442 m], 29 Dec 2010, *Starr, Starr, & Bruch 101229-04* (3 specimens). Pu'u Moaulanui, swept from pluchea (*Pluchea indica*), 1450 ft [442 m], 29 Dec 2010, *Starr, Starr, & Bruch 101229-05* (2 specimens).

Hymenoptera: Formicidae

Anoplolepis gracilipes (Smith, 1857)

New island record

Most likely native to tropical Asia (Wetterer 2005), and first recorded from the state in 1952 (Krushelnycky *et al.*, 2005), *Anoplolepis gracilipes* (long-legged ant, yellow crazy ant) was previously known from Kaua'i, O'ahu, Maui, and Hawai'i (Nishida, 2002). This large invasive ant is now known from Moloka'i, where it was found in Kaunakakai by a student working with the Hō'ike project.

Material examined. **MOLOKA'I:** Kaunakakai, Kaiwi St., collected in yard by student, 150 ft [45 m], 10 May 2010, *Starr & Starr 100510-01* (4 specimens).

Camponotus variegatus (Smith, 1858)

New island record

Native to the Indo-Pacific area and first recorded from Hawai'i in 1879 (Krushelnycky *et al.*, 2005), *Camponotus variegatus* (carpenter ant) was previously known from Midway, Laysan, and all the main islands except Kaho'olawe (Nishida, 2002). This widespread ant that nests in tree cavities is now also known from Kaho'olawe, where it was found nesting in a rotten limb of wiliwili (*Erythrina sandwicensis*) at Pu'u Moaulanui in 1997 (D. Foote, pers. comm.) and was still present on wiliwili in the same area in 2010.

Material examined. **KAHO'OLAWE:** Pu'u Moaulanui, branch of wiliwili (*Erythrina sandwicensis*) tree, in experimental grove planted by Niftal, 1400 ft [428 m], 29 Dec 2010, *Starr, Starr, & Bruch 101229-03* (1 specimen).

Monomorium* sp. *bicolor* complex*New island records**

Brian Heterick (Curtin University of Technology, Australia) has determined this to be an as yet undescribed species in the *Monomorium bicolor* complex of species. This species is similar to *M. pharaonis*, from which it can be distinguished by the absence of two pairs of erect hairs on the pronotum (present in *M. pharaonis*) and a more globular post-petiole. Previously known from O‘ahu, Maui, and Hawai‘i (AntWeb, 2010), the *M. bicolor* complex is now also known from Moloka‘i and Kaho‘olawe. It was found in Kaunakakai, Moloka‘i by a student in the Hō‘ike program and at Honokanai‘a on the west side of Kaho‘olawe by the authors during little fire ant surveys.

Material examined. **KAHO‘OLAWE:** Honokanai‘a, Base Camp, attracted to peanut butter baits, 33 ft [10 m], 21 Dec. 2009, *Starr & Starr 091221-12* (7 specimens). **MOLOKA‘I:** Kaunakakai, Pano Pl., collected by student by mango tree, 10 ft [3 m], 14 Apr 2010, *Starr & Starr 100414-01* (12 specimens).

Monomorium destructor* (Jerdon, 1851)*New island record**

Native to Africa or India, and first recorded from the state in 1899, (Krushelnycky *et al.*, 2005), *Monomorium destructor* (Singapore ant) was previously known from Laysan, French Frigate Shoals, Kaua‘i, O‘ahu, Kaho‘olawe, and Hawai‘i (Nishida, 2002; Starr *et al.*, 2004). This tramp ant is now also known from Maui where it was found at a nursery near Kealia Pond in Kihei by MISC staff during little fire ant surveys.

Material examined. **MAUI:** Kihei, Nursery, attracted to peanut butter bait, 20 ft [6 m], 19 Jul 2010, *Starr & Starr 100719-01* (12 specimens).

Monomorium floricola* (Jerdon, 1851)*New island record**

Native to India and SE Asia, and first recorded from the state in 1899 (Krushelnycky *et al.*, 2005), *Monomorium floricola* (bicolored trailing ant) was previously known from a few of the Northwestern Hawaiian Islands and all the main islands except Kaho‘olawe and Ni‘ihau (Nishida, 2002). This elongate and shiny ant is now also known from Kaho‘olawe, where it was found along the coast on the northwest part of the island by the authors during little fire ant surveys.

Material examined. **KAHO‘OLAWE:** Kaukaikapapa, at peanut butter baits, 10 ft [3 m], 21 Dec 2009, *Starr & Starr 091221-01* (6 specimens). Kealaikahiki, at peanut butter baits, 10 ft [3 m], 22 Dec 2009 *Starr & Starr 091222-01* (1 specimen).

Monomorium pharaonis* (Linnaeus, 1758)*New island record**

Possibly native to Africa, and first recorded from the state in 1913 (Krushelnycky *et al.*, 2005), *Monomorium pharaonis* (pharaoh ant) was previously known from French Frigate Shoals, Kaua‘i, O‘ahu, Maui, and Hawai‘i (Nishida, 2002). This dull yellow ant is now also known from Moloka‘i where it was found in Kaunakakai by a student in the Hō‘ike program.

Material examined. **MOLOKA‘I:** Kaunakakai, Kapaakea Loop, collected by student by mango tree, 10 ft [3 m], 16 May 2010, *Starr & Starr 100516-01* (4 specimens).

Ochetellus glaber* (Mayr)*New island records**

Native to Australia and New Caledonia and first recorded from the state in 1977 (Krushelnycky *et al.*, 2005), *Ochetellus glaber* (black house ant) was previously known from Kaua‘i, O‘ahu, Kaho‘olawe, Maui, and Hawai‘i (Nishida, 2002; Starr *et al.*, 2004). This dark ant is now also known from Lāna‘i and Moloka‘i where it was found in residential locations by students in the Hō‘ike program.

Material examined. **LĀNA'I:** Lāna'i City, Palawai Ln, collected by student by papaya tree, 1500 ft [457 m], 22 Apr 2010, *Starr & Starr 100422-01* (4 specimens). **MOLOKA'I:** Kaunakakai, Pano Pl., collected by student by mango tree, 10 ft [3 m], 14 Apr 2010, *Starr & Starr 100414-02* (1 specimen). Kalae, Koala Pl., collected by student by house, 1500 ft [457 m], 15 May 2010, *Starr & Starr 100515-01* (2 specimens). Kaunakakai, Kahinani St., collected by student in kitchen, 100 ft [30 m], 15 May 2010, *Starr & Starr 100515-02* (2 specimens).

***Nylanderia bourbonica* (Forel, 1886)**

New island record

A recent taxonomic revision has transferred the majority of taxa formerly placed in the genus *Paratrechina* to *Nylanderia*, including *P. bourbonica* (LaPolla *et al.*, 2010). First recorded from the state in 1879, with no clear indication where it is native to (Krushelnicky *et al.*, 2005), *N. bourbonica* was previously known from Midway Atoll and all the main islands except Ni'ihau and Kaho'olawe (Nishida, 2002). This small dark ant is now known from Kaho'olawe, where it was found by KIRC staff on the offshore islet of Pu'u Koa'e.

Material examined. **KAHO'OLAWA:** Pu'u Koa'e, J. Bruch, peanut butter bait, 124 ft [38 m], 20 Apr 2010, *Starr & Starr 100420-01* (12 specimens).

***Tetramorium caldarium* (Roger)**

New island record

Tetramorium caldarium is believed to be native to Africa and is now widely distributed across the Pacific and other tropical regions (Sarnat, 2010). *T. caldarium* is nearly indistinguishable from *T. simillimum*, and many instances of *T. caldarium* are likely misidentified as *T. simillimum* (Sarnat, 2010). Such was our case, until Paul Krushelnicky brought the previously overlooked species to our attention while confirming our ant identifications. *T. caldarium* can be separated from *T. simillimum* by a weak antennal scrobe, a narrower node and peduncle, and an indented posterior margin of the head (Sarnat, 2010). This small reddish ant, which shares a close resemblance to the little fire ant (*Wasmannia auropunctata*), was previously reported from Kaua'i, O'ahu, Maui, and Hawai'i (AntWeb, 2010). It is now also known from the island of Kaho'olawe, where it was found in coastal locations on the west side of the island by the authors during little fire ant surveys.

Material examined. **KAHO'OLAWA:** Kaukaupapa, at peanut butter baits, 10 ft [3 m], 21 Dec 2009, *Starr & Starr 091221-10* (5 specimens). Honokanai'a, Base Camp, attracted to peanut butter baits, 33 ft. [10 m], 21 Dec. 2009, *Starr & Starr 091221-11* (3 specimens).

Hymenoptera: Sphecidae

***Ampulex compressa* (Fabricius, 1781)**

New island record

Native throughout India, Burma, and Ceylon, and inhabiting a wide range of areas elsewhere, *Ampulex compressa* (emerald cockroach wasp) was purposely introduced in 1940 from New Caledonia to the islands of Kaua'i, O'ahu, and Maui (Williams, 1942). Nishida (2002) has this cockroach parasite documented from Midway Atoll and all the main islands except Ni'ihau, Lāna'i, and Kaho'olawe. This large iridescent wasp is now known from Kaho'olawe where it was collected from "fly paper" at Smuggler's Cove compound and commonly observed around camp in 1997 (D. Foote, *pers. comm.*; Lindsey, 1997), and was still at Base Camp on hau (*Hibiscus tiliaceus*) foliage in 2010.

Material examined. **KAHO'OLAWA:** Honokanai'a, swept from hau (*Hibiscus tiliaceus*) tree, 33 ft [10 m], 28 Dec 2010, *Starr, Starr, & Bruch 101228-02* (1 specimen).

Hymenoptera: Vespidae***Delta campaniforme esuriens* (Saussure, 1852) New island record**

First collected in the Hawaiian Islands in 1976 (Beardsley, 1980), *Delta campaniforme esuriens* (yellow and black potter wasp) was previously only known from the island of O‘ahu. This colorful wasp is now also known from Kaho‘olawe where it was found on an *iliahii* (*Santalum ellipticum*) shrub near the shore at Honokanai‘a.

Material examined. **KAHO‘OLAWE:** Honokanai‘a, on *Santalum ellipticum* bush near shore, 15 ft [5 m], 27 Dec 2010, *Starr; Starr; & Bruch 101227-05* (1 specimen).

Polistes aurifer* Saussure, 1853*New island record**

Native to western North America, and noted as plentiful all over the islands in 1880 (Carpenter, 2008), *Polistes aurifer* (paper wasp) was previously documented from Kure, Midway, and all the main islands except Kaho‘olawe (Nishida, 2002). This widespread wasp is now known from Kaho‘olawe where it was collected by sweeping in mixed shrubs under *Prosopis* above Kamohio Bay in 1997 (D. Foote, pers. comm.), and was common on buildings and vegetation at Base Camp at Honokanai‘a in 2010.

Material examined. **KAHO‘OLAWE:** Honokanai‘a, swept from nest on volunteer hut, 33 ft [10 m], 28 Dec 2010, *Starr; Starr; & Bruch 101227-06* (3 specimens). Honokanai‘a, swept from hau (*Hibiscus tiliaceus*) tree, 33 ft [10 m], 28 Dec 2010, *Starr; Starr; & Bruch 101228-03* (2 specimens).

Polistes exclamans* Viereck, 1906*New island record**

Native to southeast North America (Carpenter, 2008), *Polistes exclamans* (common paper wasp) was first recorded in Hawai‘i in 1951 when colonies of the wasp were destroyed at a house at Aiea, O‘ahu following complaints that children were being stung (Clagg, 1952). Previously known only from O‘ahu and Moloka‘i (Nishida, 2002), this wasp is now also known from Kaho‘olawe where it was found visiting the hau (*Hibiscus tiliaceus*) tree at Base Camp at Honokanai‘a.

Material examined. **KAHO‘OLAWE:** Honokanai‘a, swept from hau (*Hibiscus tiliaceus*) tree, 33 ft [10 m], 28 Dec 2010, *Starr; Starr; & Bruch 101228-04* (1 specimen).

Lepidoptera: Geometridae***Anacamptodes fragilaria* (Grossbeck, 1909) New island record**

Pemberton (1964) reported *Anacamptodes fragilaria* (koa haole moth, citrus looper) as native to California. This geometrid first appeared at Pearl Harbor in August 1944, when a dozen adults were caught in a light trap operated by the Navy. By February 1945 it was found widespread over most of O‘ahu up to 500 m elevation. Being fairly large and a good flyer, this moth quickly spread to all of the main islands. The looper caterpillars were found defoliating some 30 different plants, many of which were of ornamental or other economic value (Pemberton, 1964). Nishida (2002) reported this moth from all the main islands except Kaho‘olawe. This common lowland moth is now also known from Kaho‘olawe where it has ample host plants, most notably *kiawe* (*Prosopis pallida*), and was found attracted to lights at the Base Camp at Honokanai‘a.

Material examined. **KAHO‘OLAWE:** Honokanai‘a, at light by buildings, 33 ft [10 m], 27 Dec 2010, *Starr; Starr; & Bruch 101227-04* (2 specimens).

Macaria abydata* Guenée, 1857*New island record**

Native from Northern Argentina to the Caribbean and southern U.S.A. (Holloway, 2011), *Macaria abydata* (koa haole moth, dot-lined angle) was first recorded from the Hawaiian

islands (as “*Semiothisa* probably *sanctaremaria*”) by Funasaki (1972) from catches from a light trap at Hālawā, O‘āhu during October 1970. It quickly spread and was recorded just one month later on Kaua‘i. Nishida (2002) listed this moth from all the main islands except Ni‘ihau and Kaho‘olawe. This common moth is now also known from Kaho‘olawe, where it was abundant at lights at Honokanai‘a and would flush from vegetation throughout much of the island.

Material examined. **KAHO‘OLAWE:** Honokanai‘a, at light by buildings, 33 ft [10 m], 27 Dec 2010, *Starr, Starr, & Bruch 101227-03* (4 specimens).

Lepidoptera: Noctuidae

Achaea janata (Linnaeus, 1758)

New island record

Widespread in the tropical and subtropical Pacific, Australia, and the Orient, *Achaea janata* (castor semi-loopers) was first recorded from the Hawaiian Islands in December 1944 (Williams, 1945) where it was collected as a caterpillar on the grounds of the Hawaii Sugar Planters’ Association Experimental Station in Honolulu. This large moth, often associated with castor bean (*Ricinus communis*), was previously reported from Midway Atoll, Nihoa, and all the main islands except Ni‘ihau and Kaho‘olawe (Nishida, 2002). It is now known also from Kaho‘olawe, where it was found visiting lights at the Base Camp at Honokanai‘a.

Material examined. **KAHO‘OLAWE:** Honokanai‘a, at light by buildings, 33 ft [10 m], 29 Dec 2010, *Starr, Starr, & Bruch 101229-06* (1 specimen).

Mantodea: Mantidae

Hierodula patellifera (Serville, 1839)

New island record

Native to Java and the Philippines and first recorded in the Hawaiian Islands from Waimea, Kaua‘i on April 1, 1924 (Swezey, 1933), *Hierodula patellifera* (giant Asian mantis) was next recorded in Pukalani, Maui in 1989 (Beardsley, 1992), and on O‘āhu by Nishida (2002). Noted from Kaho‘olawe in 1997 (D. Foote, pers. comm.), this species was locally common on vegetation at Lua Kealialalo and the summit area of Kaho‘olawe in 2010.

Material examined. **KAHO‘OLAWE:** Lua Kealialalo, vegetation near wetland, 800 ft [244 m] 28 Dec 2010, *Starr, Starr, & Bruch 101228-05* (1 specimen).

Odonata: Libellulidae

Tramea lacerata Hagen, 1862

New island record

Well distributed throughout the mainland U.S. and the Hawaiian Islands since at least 1935 (Williams, 1936), *Tramea lacerata* (black saddlebags, raggedy skimmer) was previously known from all the main Hawaiian islands except Ni‘ihau and Kaho‘olawe (Nishida, 2002). This large distinctive skimmer is here documented from Kaho‘olawe, where several were found hawking for insect prey by a wetland and nearby kiawe (*Prosopis pallida*) trees.

Material examined. **KAHO‘OLAWE:** Kaukaikapapa, near wetland, 10 ft [3 m], 27 Dec 2010, *Starr, Starr, & Bruch 101227-01* (1 specimen).

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Literature Cited

- AntWeb**. 2010. The California Academy of Sciences. Available at: <http://www.antweb.org>. (Accessed: 12 November 2010).
- Beardsley, J.W.** 1980. [Notes & Exhibitions:] *Delta campaniformis esuriens*. *Proceedings of the Hawaiian Entomological Society* **23**(2): 182.
- . 1992. [Notes and exhibitions:] *Hierodula patellifera* (Serville) (Orthoptera: Mantidae). *Proceedings of the Hawaiian Entomological Society* **31**: 5–6.
- Carpenter, J.M.** 2008. Review of Hawaiian Vespidae (Hymenoptera). *Bishop Museum Occasional Papers* **99**: 1–18.
- Clagg, C.F.** 1952. [Notes and Exhibitions:] *Polistes exclamans exclamans* Viereck. *Proceedings of the Hawaiian Entomological Society* **14**(3): 369.
- CSIRO**. 2004. Entomology: *Cryptolaemus montrouzieri*. Australian Government, Department of Agriculture, Fisheries, and Forestry. Available at: http://www.ento.csiro.au/aicn/system/c_733.htm (Accessed: 19 January 2011).
- Fullaway, D.T.** 1923. [Notes and Exhibitions:] Insects collected at Waimea, Hawaii. *Proceedings of the Hawaiian Entomological Society* **5**(2): 11–12.
- Funasaki, G.** 1972. [Notes and Exhibitions:] *Semiothisa* probably *santaremaria* (Walker). *Proceedings of the Hawaiian Entomological Society* **21**(2): 137.
- Hardy, D.E.** 1967. [Notes and Exhibitions:] *Paroxyna sororcula* (Wiedemann), [1830, Aussereur. Sweifl. Ins. 2: 509 (Tephritidae: Diptera)]. *Proceedings of the Hawaiian Entomological Society* **19**(3): 333.
- Holloway, J.D.** 2011. *The moths of Borneo*. Volume 11. University Sarawak Malaysia, The Natural History Museum, London, the ASEAN Regional Centre for Biodiversity Conservation (ARCBC). Available at: http://www.mothsofborneo.com/part-11/Macariini/macariini_5_1.php (Accessed: Jan. 19, 2011).
- Krushelnicky, P.D., Loope, L.L. & Reimer, N.J.** 2005. The ecology, policy, and management of ants in Hawai‘i. *Proceedings of the Hawaiian Entomological Society* **37**: 1–25.
- LaPolla, J.S., Brady, S.G. & Shattuck, S.O.** 2010. Phylogeny and taxonomy of the *Prenolepis* genus-group of ants (Hymenoptera: Formicidae). *Systematic Entomology* **35**: 118–131.
- Leeper, J.R.** 1976. A review of the Hawaiian Coccinellidae. *Proceedings of the Hawaiian Entomological Society* **22**: 279–306.
- Lindsey, G. D., Atkinson, C.T., Banko, P.C., Brenner, G., Campbell, E., David, R., III, Foote, D., Forbes, C., Morin, M.P., Pratt, T.K., Reynolds, M.H., Steiner, W.M., Sugihara, R.T. & Warshauer, R.** 1997. Technical options and recommendations for faunal restoration of Kaho‘olawe. Unpublished report to Kaho‘olawe Island Reserve Commission. Review of the biology, ecology, distribution, and control, including an annotated bibliography.
- McCormack, G.** 2007. Cook Islands Biodiversity Database, Version 2007.2. Cook Islands Natural Heritage Trust, Rarotonga. Available at: <http://cookislands.bishopmuseum.org>. (Accessed: 19 January 2011).

- Nishida, G.M.** 2002. Hawaiian terrestrial arthropod checklist. Fourth edition. *Bishop Museum Technical Report* **22**, 313 pp.
- Pemberton, C.E.** 1964. Highlights in the history of entomology in Hawai'i 1778–1963. *Pacific Insects* **6**(4): 689–729.
- Sarnat, E.M.** 2010. PIAkey: Identification guide to ants of the Pacific Islands, Edition 2.0, Lucid v. 3.4. USDA/APHIS/PPQ Center for Plant Health Science and Technology and University of California, Davis. Available at: <http://www.lucidcentral.org/keys/v3/PIAkey> (Accessed: 12 November 2010).
- Starr, F., Starr, K. & Loope, L.L.** 2004. New arthropod records for Kaho'olawe. *Bishop Museum Occasional Papers* **79**: 50–54.
- Swezey, O.H.** 1933. [Notes and Exhibitions of Materials:] *Hierodula patellifera* (Serv.). *Proceedings of the Hawaiian Entomological Society* **8**(2): 212.
- Walker, F.** 1868. *Catalogue of the specimens of Blattaria in the collection of the British Museum*. British Museum, London. 239 pp.
- Weems, H.V.** 2004. A hover fly, *Allograpta obliqua* (Say) (Insecta: Diptera: Syrphidae). Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. EENY-185. Available at: <http://edis.ifas.ufl.edu/pdf/IN/IN34200.pdf> (Accessed: 26 January 2011).
- Wetterer, J.K.** 2005. Worldwide distribution and potential spread of the long-legged ant, *Anoplolepis gracilipes* (Hymenoptera: Formicidae). *Sociobiology* **45**(1): 77–97.
- Williams, F.X.** 1936. Biological studies in Hawaiian water-loving insects, Part 1: Coleoptera or Beetles, Part 2: Odonata or Dragonflies. *Proceedings of the Hawaiian Entomological Society* **9**(2): 235–349.
- . 1942. *Ampulex compressa* (Fabr.), A cockroach-hunting wasp introduced from New Caledonia into Hawaii. *Proceedings of the Hawaiian Entomological Society* **11**(2): 221–233.
- . 1945. [Notes and Exhibitions:] *Achaea janata* (Linn.). *Proceedings of the Hawaiian Entomological Society* **12**(2): 233.

A new neuropteran record for the Hawaiian Islands (Chrysopidae)

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Ithaca, New York 14853, USA; email: cat6@cornell.edu)

Neuroptera: Chrysopidae

Mallada albofacialis Winterton, 1995 New state record

Mallada albofacialis Winterton was first observed on Hawai‘i in 2007 on the island of O‘ahu. A larva was collected in a home in the town of Mililani; the living specimen was transferred, via the Bishop Museum, to the Department of Entomology, University of California, Davis (quarantine laboratory). C.A. and M.J. Tauber reared the specimen to the adult stage; they recognized the larva and adult as a species of *Mallada* that is unlike the only other *Mallada* species known to occur on the Hawaiian Islands. Subsequently, the adult was identified by S.L. Winterton, California Department of Food and Agriculture, Sacramento, California, who had described the species from Australia (Winterton, 1995: 23).

Other than coastal Queensland and the Northern Territories of Australia, the distribution of *M. albofacialis* is unknown. The species is distinguished from *Mallada basalis* (Walker)—the other Hawaiian *Mallada* species—by its pale green body, white face with distinctive red markings, and genital characteristics (cf., Adams 1959: 24, as *Chrysopa basalis*). Images of the larva and adult are available on the MorphoBank website (<http://www.morphobank.org>, Project 459).

Mallada larvae are referred to as “trash carriers”, i.e., they cover themselves with plant material (mainly the waxy secretions of their prey). In Australia, *M. albofacialis* larvae were found feeding on exotic, fluted margarodid scales (*Icerya* spp.) in forested areas of moist coastal Queensland (Winterton, 1995: 27).

Because the record is based on a single specimen, it is currently unclear whether the species is established in Hawai‘i.

Material examined. One specimen with labels reading: [1] HI: O‘AHU: Honolulu County, South Mililani Town, Pat Sanden; [2] L3 collected 22.v.2007; adult emer. 1.vii.2007; [3] lab. reared M. J. & C. A. Tauber Lot 2007:27; [4] *Mallada albofacialis* Winterton, det. S.L. Winterton 2011 (BPBM).

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Literature Cited

- Adams, P.A. 1959. Neuroptera; Myrmeleontidae and Chrysopidae. *Insects of Micronesia*, 8(2): 13–33.
- Winterton, S.L. 1995. A new species of *Mallada* Navás (Neuroptera: Chrysopidae) from Australia with a key to species. *Journal of the Australian Entomological Society* 34: 23–27.

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