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## Records of the Hawaii Biological Survey for 2014 Part I: Articles

*Neal L. Evenhuis &*
*Scott E. Miller, editors*

Bishop Museum Press
Honolulu

Cover photo: *Drosophila kinoole* Magnacca, Wai‘anae Valley, one of four *Drosophila* species rediscovered on O‘ahu that were feared to be extinct; see p. 9 for article. Photo: Karl Magnacca.

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# RECORDS OF THE HAWAII BIOLOGICAL SURVEY FOR 2014

## Editors' Preface

We are pleased to present the annual compilation of *Records of the Hawaii Biological Survey,* this year for the year 2014, which comprises our 20th anniversary edition. This special edition of the *Records* is comprised of two volumes: one (vol. 116) containing records pertaining to both animals and plants; and one (vol. 117) contaning a brief 20-year summary of highlights of the *Records* and a 20-year index of all new records of plants and animals appearing on these pages. In celebrating our 20 years of recording the status of Hawai'i's plants and animals, original *Records* co-editor Scott E. Miller has reprised his role for this year's edition.

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 5,800 authors who have described flies.

**Our Primary Web Products**:
Hawaii Biological Survey Home Page
http://hbs.bishopmuseum.org/

Natural Sciences Databases
http://nsdb.bishopmuseum.org/

Hawaii Endangered and Threatened Species Web Site
http://hbs.bishopmuseum.org/endangered/
Insect and Spider Collections of the World Web Site
http://hbs.bishopmuseum.org/codens/
'
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 2014* were compiled with reviews by and/or assistance of Clyde Imada (botany, plant index), Kimberly Peyton (botany), David Preston (entomology), and Robert Cowie (malacology). 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; they are thanked for their support and partnership of the Hawaii Biological Survey over the years..

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

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

——*N.L. Evenhuis & Scott E. Miller, editors*

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# New species of *Campsicnemus* Haliday (Diptera: Dolichopodidae) from Moloka‘i, Hawaiian Islands[1]

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## Introduction

The Hawaiian Islands are home to an incredible diversity of species of the predatory dolichopodid genus *Campsicnemus* Haliday with an estimated 250–300 species found only on this island archipelago. Recent studies on this group in the Hawaiian Islands (e.g., Evenhuis 2003, 2007a, 2011, 2012a, 2012b, 2013a; Evenhuis & O’Grady 2010, Goodman *et al*. 2014) have shown that since the revision of the genus in Hawai‘i by Hardy & Kohn (1964), there are still a large number of new species being discovered on all the islands.

The current study is restricted to just the island of Moloka‘i. It harbors an interesting diversity of species, and a number of new species have been discovered through Malaise and yellow pan trapping in recent years. Of the 33 species of *Campsicnemus* currently known to occur on Moloka‘i, seven are here described as new to science. The new species are described and illustrated to allow their names to appear in forthcoming publications of the genus in Hawai‘i and the Pacific.

## Material and Methods

Specimens examined in this study derive primarily from collections of the Bishop Museum (BPBM) including recently collected material for molecular analysis funded in part by the National Science Foundation (DEB-0842348), with all vouchers deposited in BPBM. Additional specimens were borrowed from the University of Hawaii Insect Museum, University of Hawai‘i at Mānoa (UHIM). Morphological terminology, description format, and abbreviations used in the description follow Evenhuis (2013a). Holotypes of all new species are deposited in BPBM. Paratypes are deposited in BPBM and/or UHIM as indicated below.

## Taxonomy

### Genus *Campsicnemus* Haliday

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

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

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

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

1. Contribution No. 2015-001 the Hawaii Biological Survey.

With the seven new species described herein, there are currently 181 described species of Hawaiian *Campsicnemus* (all endemic) known from this remote island group in the Pacific Ocean, with many more new species awaiting description. A large diversity of this genus also exists in French Polynesia (Societies, Marquesas, and Australs) with more than 50 undescribed species having been discovered in recent surveys from these islands (some 30 from the Marquesas alone) (see Evenhuis 2000, 2008, 2009, 2013b for keys to proposed species groups and descriptions of some of the newly discovered species). Additional species occur westward as far as Fiji (undescribed species are known from Tonga and Fiji). As more Malaise and yellow pan trapping and other collecting is done in suitable habitats on the south Pacific islands, many more new species should be found.

## New Species Descriptions

***Campsicnemus adachiae*** Evenhuis, **n**. **sp**.
(Figs. 1, 2)

**Diagnosis**. Most similar to *C. amblytylus* Hardy & Kohn from Kahuku Ranch on the Big Island, but differs from it by the all white legs (yellow with brown tarsi in *C. amblytylus*), the lack of an apical flap-like process on the mid femur (present in *C. amblytylus*), the absence of a conspicuous dense patch of small black setae on the venter of the mid femur forming a point (present in *C. amblytylus*), the strongly bent mid tibia (slightly bent in *C. amblytylus*), and the lateral patch of short fine hairs on the apical third of the mid tibia (these hairs much longer and thicker in *C. amblytylus*).

**Description**. **Male** (Fig. 1): Body length: 1.2 mm. Wing length: 1.4 mm.

*Head*: Face, front and clypeus black; oc and vt black, about two-thirds length of antennal arista; occiput, and vertex black with blue-gray highlights; postgena with sparse short black hairs; face constricted at middle, separated by width of one ommatidium; palpus small, brown; proboscis yellowish brown, extending below eye in lateral view; antenna with scape and pedicel yellow; scape subcylindrical, length 1.5 × width; pedicel obconical, with ring of short spiky black setae subapically; postpedicel yellow with brown border, subtriangular, length 2 × width, acute apically; arista slightly longer than head height.

*Thorax*: Mesonotum and scutellum yellow, mesonotum with pair of brown admedian vittae; pleura yellow except brown anepimeron; thoracic setae black: 4 dc; 2 np; 2 ph; 1 pa; 1 sc; ac absent; halter stem and knob white.

*Legs*: Coxae with CII brown, remainder of legs yellowish; fore and hind legs unmodified and without MSSC; FII with row of 7 long stiff black setae along medial portion of ventral surface (MSSC); TiII (Fig. 2) bent slightly beyond middle, medial surface with row of 9 long thin peg-like setae and row of 8 shorter spiny setae adjacent to peg-like setae (MSSC); lateral surface with small patch of pale hairs subbasally, paired row of 6 strong setae near middle, and dense patch of short fine brown hairs at apical 1/3 (MSSC); $IIt_1$ 2/3 length of tibia. Remaining leg segments unmodified and without MSSC.

*Wing*: Subhyaline, veins pale brownish; posterior crossvein length 1/4 apical segment of $CuA_1$.

*Abdomen*: Brown dorsally, yellow laterally; tergal vestiture sparse, black. Hypopygium yellow with brown cerci, not dissected.

**Figure 1**. *Campsicnemus adachiae*, n. sp., holotype male habitus.

**Female**: Unknown.

**Material Examined**. *Type*. HOLOTYPE ♂ (BPBM 17,568) from HAWAIIAN ISLANDS: **Moloka'i**: TNCH Kamakou Preserve, sweeping along small stream behind Kolekole cabin, 21°06.456'N 156°53.817'W, 10 Jan 2011, S. Wang (BPBM).

**Etymology**. The species is named to honor the memory of the late Marion Adachi Kohn, who described and/or illustrated many new species of *Campsicnemus* from the Hawaiian Islands.

***Campsicnemus bartletti*** Evenhuis, **n**. **sp**.
(Fig. 3)

**Diagnosis**. Similar to *C. penicillatus* Hardy & Kohn from the Big Island (cf. Fig. 4), but differs from it by the size (*C. bartletti* roughly 1/2 the size of the much larger *C. penicillatus*) and by the different patterning of the mid tibia: the less extensive setation in the medial transverse band of hairs (more extensive in *C. penicillatus*) and the lack of a sagittally oriented row of setae between the two subapical patches of hairs (present in *C. penicillatus*).

**Description**. **Male**: Body length: 2.3 mm. Wing length: 3.0 mm.

*Head*: Face, front and clypeus yellow, golden tomentose; oc and vt black, about two-thirds length of antennal arista; occiput, and vertex black with blue-gray highlights; postgena with sparse stiff black hairs; face constricted at middle, holoptic for a length of 4 ommatidia; palpus small, brown; proboscis brown, not extending below eye in lateral view; antenna with all segments yellowish brown; scape subcylindrical, length subequal to width; pedicel obconical, with ring of short spiky black setae subapically; postpedicel subtriangular, length 2 × width, rounded apically; arista slightly longer than head height.


**Figures 2–4**. *Campsicnemus* left male mid tibiae. **2**. *C. adachiae*, n. sp. **3**. *C. bartletti*, n. sp.; **4**. *C. penicillatus* Hardy & Kohn. Arrows show areas of differentiation.

*Thorax*: Mesonotum and pleura (except dark brown anepimeron) grayish brown, paler on humeral and callus and posterior margin of scutellum; thoracic setae black: 4 dc; 2 np; 2 ph; 1 pa; 1 sc (minute hairs laterally and medially); 10 ac; halter and knob yellow.

*Legs*: Coxae with CI and CIII yellow, CII brown laterally; femora and tibiae yellowish brown, remainder of legs brown; FI with dense patch of stiff long black hairs basoventrally; hind legs unmodified and without MSSC; FII without row of strong black hairs ventrally; TiII (Fig. 3) broad, widest apically, with patches (bands) of black hairs in three areas: basally, at basal third, and subapically, bands at basal third and subbasally each appearing almost as two patches (MSSC); row of strong setae mesally, longest apically; single strong wavy seta originating from subbasal band on lateral surface (MSSC). $IIt_1$ short, with strong thick black apical process; $IIt_2$ originating subapically on $IIt_1$ (MSSC). Remaining leg segments unmodified and without MSSC.

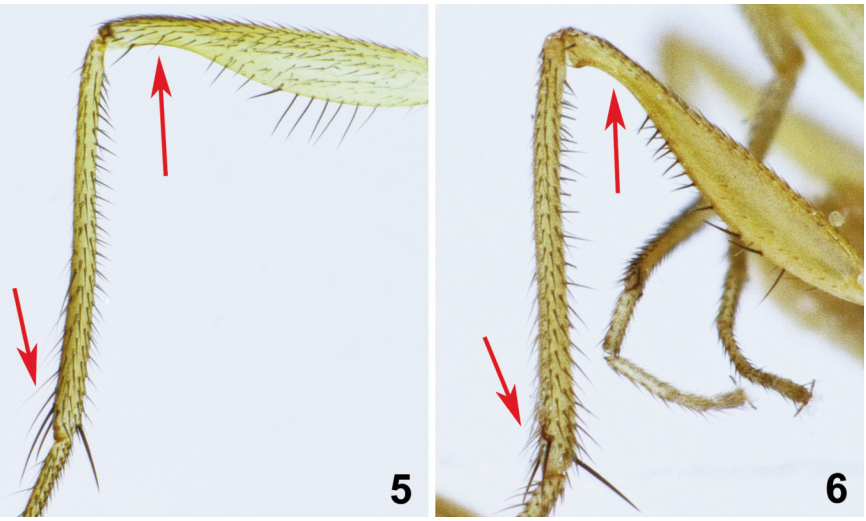
*Wing*: Subhyaline, veins yellowish; posterior crossvein length 1/4 apical segment of $CuA_1$.

*Abdomen*: Entirely dark brown; tergal vestiture sparse, black. Hypopygium brown with yellowish brown cerci, not dissected.

**Female**: Unknown.

**Material Examined**. *Type*. HOLOTYPE ♂ (BPBM 17,539) from HAWAIIAN ISLANDS: **Moloka‘i**: “E. Molokai T.H.”, 3000 ft [915 m] , 19 Mar 1966, J.W. Beardsley (BPBM). Paratypes: 2♂ from HAWAIIAN ISLANDS: **Moloka‘i**: Kamoku, 19 Jul 1963, D.E. Hardy (UHIM); 1♂, Puu O Kaeha, 3100 ft [965 m], Jul 1953, D.E. Hardy (UHIM).

**Remarks**. This species is one of a complex of species with similar patches of stiff hairs on the mid tibia that I call the *penicillatus* group. Hardy & Kohn (1964) and Tenorio (1969) recorded *C. penicillatus* from islands other than the island of Hawai‘i (its type




**Figures 5–6**. *Campsicnemus* left male midlegs (femur and tibia). **5**. *C. hiwi*, n. sp.; **6**. *C. rectus* Malloch (from Ko‘olau population). Arrows show areas of differentiation.

locality), namely, Moloka‘i, Maui, and Kaua‘i. These specimens from islands other than the Big Island have since been shown to be separate species, e.g., *C. penicillatoides* Evenhuis from Kaua‘i (Evenhuis 2003), *C. makawao* Evenhuis from Maui (Evenhuis 2007a), and *C. bartletti*, n. sp. from Moloka‘i described here.

**Etymology**. The specific epithet honors Randall Bartlett of the East Maui Watershed Partnership, who generously helped us with field logistics on Pu‘u Kukui, West Maui in 2011.

***Campsicnemus hiwi*** Evenhuis, **n**. **sp**.
(Fig. 5)

**Diagnosis**. Similar to the O‘ahu *C. rectus* Malloch (cf. Fig. 6) but differs from it by the long apical hairs on the lateral surface of the male mid tibia (these hairs a continuation of the short hairs along the entire lateral surface in *C. rectus*) and the presence of a minute hairs throughout the posterior surface (this surface predominantly bare in *C. rectus*).

**Description**. **Male**: Body length: 2.5–2.8 mm. Wing length: 2.4–2.8 mm.

*Head*: Face, front and clypeus dark brown; oc and vt black, about two-thirds length of antennal arista; occiput, and vertex black with blue-gray and brassy highlights; postgena with short stiff black hairs; face constricted at middle, holoptic for a length of 5 ommatidia; palpus small, brown; proboscis brown, only slightly extending below eye in lateral view; antenna with all segments yellowish brown; scape subcylindrical, length subequal to width; pedicel obconical, with ring of short spiky black setae subapically; postpedicel broken off and missing in all 3 specimens known.

*Thorax*: Mesonotum dirty yellow with thin brown admedian vittae and broad posta-

lar vitta, admedian and postalar vittae coalesce posteriorly in prescutellar area; scutellum dirty brownish, slightly darker than mesonotum; upper pleura brown, lower pleura yellow; thoracic setae black: 3 dc; 2 np; 2 ph; 1 pa; 1 sc; ac absent; halter stem brown, knob yellowish brown.

*Legs*: Coxae with CI and CIII white, CII brown on anterior half, white on posterior half, with numerous short hairs apically on anterior surface; foreleg with curved tibia bearing row of minute spiky hairs along anterior surface (MSSC); $It_3$ longer than $It_2$; hind legs unmodified and without MSSC; FII (Fig. 5) with row of 8–10 black hairs along mesoventral surface, posterior surface with minute hairs throughout and single stiff black hair subventroapically; TiII (Fig. 5) long, straight, with row of short stiff black setae along mesal surface (MSSC), lateral surface with short hairs along entire length, apical 3/5 with long setae (mixed black and white when viewed with a black background) (MSSC), apex with 3 strong long black setae. $IIt_1$ about 1/2 length of TiII, with row of long apically curved black and white hairs (latter hairs best viewed with black background) along entire length (MSSC). Remaining leg segments unmodified and without MSSC.

*Wing*: Subhyaline, veins yellowish brown; posterior crossvein length about 1/3 apical segment of $CuA_1$.

*Abdomen*: Brown, darker brown along posterior margins; tergal vestiture sparse, black. Hypopygium brown with brown cerci, not dissected.

**Female**: Unknown.

**Material Examined**. *Type*. HOLOTYPE ♂ (BPBM 17,556) and paratype ♂ from HAWAIIAN ISLANDS: **Moloka‘i**: TNCH Kamakou Preserve, stream along trail from cabin to bog, 11 Jan 2011, yellow pan traps, N.L. Evenhuis. *Other paratype*: HAWAIIAN ISLANDS: **Moloka‘i**: 1♂, TNCH Kamakou Preserve, 11 Jan 2011, S. Wang. Holotype and paratypes in BPBM.

**Remarks**. In their treatment of *C. rectus*, Hardy & Kohn (1964) mentioned variation in the mesonotal coloration, from brown to yellowish with brown vittae. *Campsicnemus hiwi*, n. sp., specimens are all a dirty yellow (yellowish brown) with brown admedian and postalar vittae. In making comparisons of this new species from Moloka‘i, I have examined the O‘ahu types of *C. rectus* Malloch and *C. flavicornis* Van Duzee (both currently considered synonymous). There are some differences in thoracic coloration and differences in leg characters that indicate the latter two may each be good species. It is evident that there is a species complex from O‘ahu and Moloka‘i that have outwardly similar leg shapes and setal patterns (currently observed in *C. rectus*, *C. hiwi*, n. sp., and the type series of *C. flavicornis*): all species characteristically have a similar mid tibial setal pattern, the fore leg with tibia curved, and $It_3$ longer than $It_2$. Further detailed study (outside the scope of this paper) may show that O‘ahu populations from the Wai‘anae Mountains (type locality of *C. flavicornis*) and the Ko‘olau Mountains (type locality of *C. rectus*) belong to two separate species. For now I keep them synonymous pending further study. For leg comparisons made in this study, specimens of *C. rectus* from Kawailoa Trail in the Ko‘olau Mountains were used (cf. Fig. 6).

**Etymology**. The specific epithet derives from the Hawaiian *hiwi* = skinny; referring to the long, thin male mid tibia.

**Figure 7**. *Campsicnemus kolekole*, n. sp., male habitus.

***Campsicnemus kolekole*** Evenhuis, **n**. **sp**.
(Figs. 7, 8)

**Diagnosis**. Similar to *C. restrictus* Hardy & Kohn from Lāna‘i, this rather tiny species is easily distinguished from it by the different setation of the male mid tibia: a small patch of 3 short stiff black setae subbasally (these setae absent in *C. restrictus*), row of 11–12 long setae on apical 3/5 of lateral surface (long hairs on lateral surface restricted to medial third in *C. restrictus*), and rows of very short hairs along mesal surface (this surface with longer slightly curved hairs on apical half in *C. restrictus*).

**Description**. **Male** (Fig. 7): Body length: 1.8–2.0 mm. Wing length: 2.0–2.2 mm.

*Head*: Face, front and clypeus dark brown; oc and vt black, about two-thirds length

of antennal arista; occiput, and vertex black with blue-gray highlights; postgena with fine white hairs; face constricted at middle, holoptic for a length of 3 ommatidia; palpus small, brown; proboscis brown, slightly extending below eye in lateral view; antenna with all segments yellowish brown; scape subcylindrical, length 1.5 × width; pedicel obconical, with ring of short spiky black setae subapically; postpedicel subtriangular, yellowish with brown tip, length slightly longer than width, acute apically; arista slightly longer than head height.

*Thorax*: Mesonotum, scutellum, and upper pleura (except brown anepimeron) tan, paler on postalar callus, lower pleura yellow; thoracic setae black: 1+3 dc; 2 np; 2 ph; 1 pa; 1 sc; 6 ac; halter stem and knob white.

*Legs*: Coxae with CI white; CII brown, CIII yellow; CI with 3–4 curved black hairs anteroapically. Femora white, tibiae yellowish white. Fore femur with patch of 5 thick black setae subapically on ventral surface at end of row of 3 more sparsely placed stiff setae ventrally (MSSC). TiII (Fig. 8) slightly curved at base, otherwise straight, thin, with small patch of very short black peg-like setae subbasally near small bulbous process mesally, row of 4–5 longer peg-like setae at basal third of mesal surface (MSSC), row of fine hairs on apical half of mesal surface; lateral surface with row of long, stiff, slightly curved setae on apical 3/5 (MSSC); apex with 2 strong black setae. $IIt_1$ 1.5 × length of $IIt_2$; all tarsi and remaining leg segments unmodified and without MSSC.

*Wing*: Subhyaline, veins yellowish brown; posterior crossvein length about 1/3 apical segment of $CuA_1$.

*Abdomen*: Brown, tergites I–II tan medially; tergites darker brown along posterior margins; tergal vestiture black, sparse. Hypopygium light brown with brown cerci, not dissected.

**Female**: Unknown.

**Material Examined**. *Types*. HOLOTYPE ♂ (BPBM 17,547) and paratype ♂ from HAWAIIAN ISLANDS: **Moloka‘i**: TNCH Kamakou Preserve, Kolekole cabin, 3900 ft [1188 m], 21–25 Oct 1997, Malaise trap, D.A. Polhemus. *Other paratype*: **Moloka‘i**: 1♂, TNCH Kamakou Preserve, Pu‘u Kolekole 3854 ft [1175 m], 28–30 Jul 2005, P. O’Grady. Holotype and paratypes in BPBM.

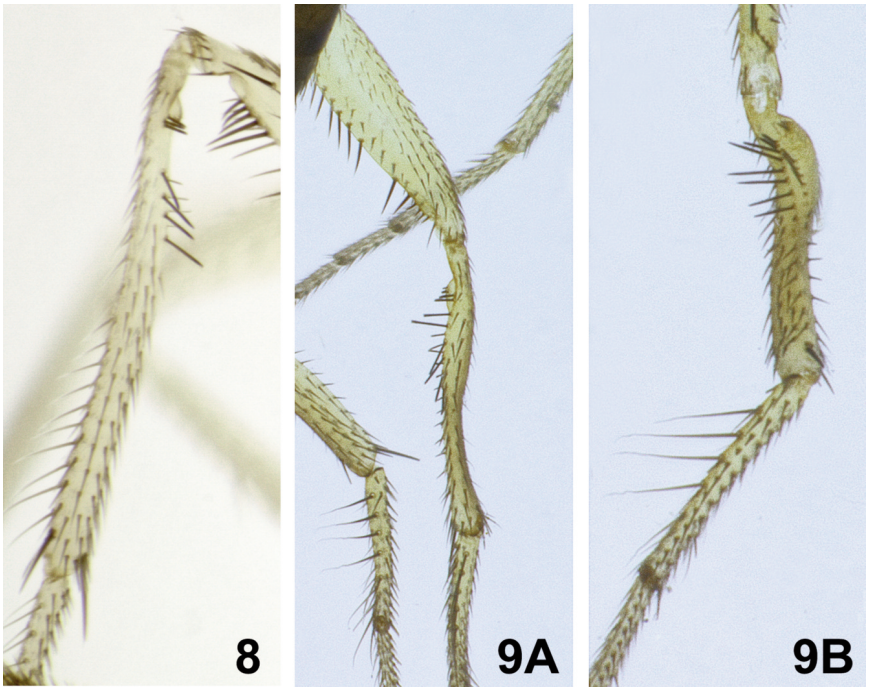
**Etymology**. The specific epithet derives from the type locality at Kolekole cabin in the TNCH Kamakou Preserve.

### ***Campsicnemus kumukumu*** Evenhuis, **n**. **sp**.
(Fig. 9)

**Diagnosis**. This species is similar to *C. clinotibia* Hardy & Kohn and *C. fulvifacies* Hardy & Kohn (both from Moloka‘i) on the basis of the mid basitarsus possessing long mesal hairs or setae. It is distinguished from both by the distinct row of peg-like setae mesally at the basal third of the mid tibia (lacking in *C. clinotibia* and *C. fulvifacies*) and by the distinctly bowed-out section of the mid tibia at the basal third (this area only slightly curved but not bowed out in *C. clinotibia* and *C. fulvifacies*).

**Description**. **Male**: Body length: 1.2–1.3 mm. Wing length: 1.7–1.8 mm.

*Head*: Face, front and clypeus dark brown; oc and vt black, about two-thirds length of antennal arista; occiput and vertex black with blue-gray highlights; postgena with sparse short stiff black setae; face constricted at middle, holoptic for a length of 4 ommatidia; pal-




**Figures 8–9**. *Campsicnemus* male midlegs. **8**. *C. kolekole*, n. sp., left mid tibia, posterior view; **9**. *C. kumukumu*, n. sp., **A**. anterior view showing peg-like setae of mid tibia of left leg (at right) and long hairs of mid basitarsus of right midleg (at left); **B**. mesal view of left mid tibia and basitarsus showing rows of setae on mesal surface.

pus small, brown; proboscis dark brown, slightly extending below eye in lateral view; antenna with all segments yellowish brown; scape subcylindrical, length subequal to width; pedicel obconical, with ring of short spiky black setae subapically; postpedicel subtriangular, length subequal to width, acute apically; arista slightly longer than head height.

*Thorax*: Mesonotum, scutellum, and upper pleura (except dark brown anepimeron) brown, paler on humeral and postalar calli, lower pleura yellowish white; disc of mesonotum darker brown than surrounding mesonotum; thoracic setae black: 4 dc; 2 np; 2 ph; 1 pa; 1 sc; ac absent; halter stem and knob white.

*Legs*: Coxae with CI and CIII white, CII brownish medially; femora yellowish white, remainder of legs light brown; coxae with normal anteroapical setation; fore and hind legs unmodified and without MSSC; FII (Fig. 9A) with row of 8–10 stiff black hairs along ventral surface, row of 4 minute black setae subapically on ventral surface (MSSC); TiII (Fig. 9) as long as FII, bowed (cf. Fig. 9B) in basal third, slightly curved (cf. Fig. 9A) in apical half; 4 minute peg-like setae mesally in association with small bulbous mesal projection subbasally, 4–6 longer stiff peg-like setae on mesal side of bowed portion, rows of short stiff hairs laterally and mesally (MSSC); single strong apical seta. $IIt_1$ about 1.2 × length of $IIt_2$, with row of 4 long stiff apically crinkled setae mesally, long hairs, 4–5 long

straight hair at apex (cf. fig 9A) (MSSC). Remaining leg segments unmodified and without MSSC.

*Wing*: Subhyaline, veins yellowish brown; posterior crossvein length 1/4 apical segment of $CuA_1$.

*Abdomen*: Brown, tergites darker brown along posterior margins; tergal vestiture sparse, black. Hypopygium dark brown with brown cerci, not dissected.

**Female**: Unknown.

**Material Examined**. *Type*. HOLOTYPE ♂ (BPBM 17,565) from HAWAIIAN ISLANDS: **Moloka'i**: Kolekole cabin, general sweeping, N 21°06.457'N 156° 53.817'W, 11 Jan 2011, Brian Ort. Holotype in BPBM.

**Etymology**. The specific epithet derives from the Hawaiian "*kumukumu*" = truncated stumps, stubble of a beard; referring to the peg-like setae on the basomesal portion of the male mid tibia. The name is treated as a noun in apposition.

### ***Campsicnemus poho*** Evenhuis, **n**. **sp**.
(Figs. 10, 11)

*"Campsicnemus elysium205364*": Goodman *et al*. 2014: 235 (MS name).

**Diagnosis**. This large, dark, water-skating species is a member of the *kuku* group of species (*crossotibia, disjunctus, ephydrus, flavipes, grimshawi, kokokekuku, kuku, latipenna*, and *viridulus*), which are characterized by the pointed barb-like process on the basomesal portion of the mid tibia. No previously described species in this group have been reported from Moloka'i. The most similar of these in appearance to *C. poho*, n. sp. is *C. kokokekuku* Evenhuis from the Big Island. Both species possess a long barb-like process with numerous minute setulae in a row along its length. This species can be separated from *C. kokokekuku* by the presence of 5 thick stiff black setae laterally near the medial third of the mid tibia (these setae more hair-like and present along the entire lateral surface in *C. kokokekuku*) and the dense setation basally on the mid tibia (this portion of the mid tibia almost bare in *C. kokokekuku*).

**Description**. **Male** (Fig. 10). Body: 3.5–3.8 mm; wing: 3.5–4.0 mm.

*Head:* Face and clypeus white, front and vertex shining black; oc and vt black, about one-half length of antennal arista; clypeus slightly yellowish pollinose; face only slightly constricted at middle, eyes dichoptic below antennae by 2 × width of median ocellus; palp small, brown; proboscis brown to yellowish-brown, extending below eye in lateral view; antennal scape and pedicel dark brown; postpedicel subhemispherical, rounded apically, length subequal to width; arista slightly longer than head height.

*Thorax:* Mesoscutum, scutellum, and upper pleura dark brown, lower pleura yellow; anterior portion of mesonotum clothed with fine hairs between humeral calli; thoracic setae black: 4 dc; 7–8 ac; 2+1 np; 2+1 ph; 1 pa; 1 sc; halter stem and knob pale yellow.

*Legs:* Coxae with CI yellow, CII and CIII coxa brown; Femora yellow; tibiae and tarsi dark brown. Leg I unmodified, without MSSC. FII swollen basally, tapering to thin apex, row of 20 fine stiff setae along ventral ventral surface (MSSC); single long stiff seta subapically on anterior surface; TII (Fig. 11) 2 × length of basitarsus, with basal barb-like projection bearing row of minute peg-like setae, 5–6 long lateral seta at medial 1/3, fine setae basally and along mesal and lateral surfaces (MSSC); $IIt_1$ 2 × length of $IIt_2$; IIt and leg III unmodified, without MSSC.


**Figure 10–11**. *Campsicnemus poho*, n. sp., **10**. Male habitus; **11**. Male mid tibia.

*Wing:* Subhyaline, veins brown; posterior crossvein length less than 1/2 apical segment of $CuA_1$.

*Abdomen:* Shining dark brown with short black hairs dorsally on each tergite, a few longer hairs laterally; venter paler brown. Hypopygium brown, not dissected.

**Female**. Female. Body: 3.8–4.5 mm; wing: 4.8–5.0 mm. As in male except as follows: eyes more dichoptic, width equal to separation of antennal sockets; postgena with white intermixed with black hair ventrally; katepisternum with magenta highlights; mesonotum laterally and abdominal tergites with greenish brassy highlights; legs without MSSC.

**Material Examined**. *Type*. HOLOTYPE ♂ (BPBM 17,532) and 2♂,1♀ paratypes from HAWAIIAN ISLANDS: **Moloka'i**: TNCH Kamakou Preserve, bog on trail near Transect 7, 12 Jan 2011, skating on small pools, N.L. Evenhuis, K.R. Goodman, B. Ort. *Other paratypes*: **Moloka'i**: 1♂, 1♀, TNCH Kamakou Preserve, rim of Pelekunu Valley, 4000 ft [1220 m], 22 Aug 1991, D.A. Polhemus; 4♂, 7♀, small forest pools along headwater tributary to headwaters East Fork Kawela Gulch, Transect 7 above Kolekole cabin, 4200 ft [1280 m], 5 May 1993, CL 8148, D.A. Polhemus. Holotype and paratypes in BPBM.

**Etymology**. The specific epithet derives from the Hawaiian "*poho*" = bog; referring to the bog near Transect 7 in the Kamakou Preserve where specimens of this species were hand-collected while they were water skating on small pools.

***Campsicnemus zoeae* Evenhuis, n. sp.**
(Fig. 14)

*Campsicnemus diffusus*, in part. Hardy & Kohn, 1964: 75, misidentification.

**Diagnosis**. Similar to *C. diffusus* Hardy & Kohn and *C. scolimerus* Hardy and Kohn from the Big Island of Hawai'i, all three of which form what I call the *scolimerus* group. The group is defined by the following: antennal arista 1.5 × head height; slightly S-shaped apical portion of male mid femora with patch of hairs dorsoapically; mid tibia with a patch of hairs or setae laterally in basal third; mid basistarsus with apically curved hairs along entire length, hairs longest basally and becoming progressively shorter apically. *Campsicnemus zoeae* is distinguished from each of the other two species in the group by the longer and more numerous hairs subapically on the mid tibia [these hairs shorter (*C. diffusus*) or sparser (*C. scolimerus*) in the other two species] (cf. Figs. 12–14); and the predominantly bare posterior surface of the mid femur (dorsal setation extending laterally onto the posterior surface in *C. diffusus*; subventrally with a row of short hairs along basal two-thirds in *C. scolimerus*).

**Description**. **Male**: Body length: 2.5 mm. Wing length: 3.1 mm.

*Head*: Face, front black, clypeus white; oc and vt black, about 1/2 length of antennal arista; occiput, and vertex black with blue-gray highlights; postgena with long fine white hairs; face constricted at middle, holoptic for a length of 4 ommatidia; palpus small, ovate; proboscis pale brown, extending below eye in lateral view; antenna with all segments yellowish brown apically; scape subcylindrical, length subequal to width; pedicel obconical, with ring of short spiky black setae subapically; postpedicel subtriangular, length 1.2 × width, acute apically; arista long, length ca. 1.5 × head height.

*Thorax*: Uniformly brown; thoracic setae black: 4 dc; 2 np; 2 ph; 1 pa; 1 sc; ac absent; halter stem and knob white.

*Legs*: Coxae with CI and CIII white, CII brown; CI with 3–4 small black hairs apically; fore and hind legs unmodified and without MSSC; FII (Fig. 14) slightly S-shaped apically, ventrally with row of 8–9 stiff black hairs interrupted by distinct gap in medial portion of ventral surface, patch of short hairs dorsoapically, row of 3 stiff hairs in apical third of posterior surface (in between dorsoapical patch and ventral row); TiII (Fig. 14) slightly bowed, lateral surface with dense patch of short setae subbasally and row of long hairs on apical third; mesal surface with row of short hairs along entire length; two strong black apical setae (all MSSC). $IIt_1$ (Fig. 14) about 2 × length of $IIt_2$, with row of long apically curved hairs along entire length, longest basally and tapering to shortest hairs apically (MSSC); $IIt_2$ and $IIt_3$ with sparse curved hairs laterally. Remaining leg segments unmodified and without MSSC.

*Wing*: Subhyaline, veins yellowish; posterior crossvein length 1/3 apical segment of $CuA_1$.

*Abdomen*: Uniformly brown; tergal vestiture sparse, black. Hypopygium brown with pale brown cerci, not dissected.


**Figures 12–14**. *Campsicnemus* left male mid tibiae, posterior view. **12**. *C. scolimerus* Hardy & Kohn; **13**. *C. diffusus* Hardy & Kohn. **14**. *C. zoeae*, n. sp. Arrows point to areas of differentiation on mid tibia.

**Female**: Body length: 2.5–2.7 mm. Wing length: 3.0–3.3 mm. As in male except as follows: eyes dichoptic, width equal to separation of antennal sockets; face, front, and clypeus brown; halter knob yellow; CIII brown; legs without MSSC.

**Material Examined**. *Type*. HOLOTYPE ♂ (BPBM 17,548) and 2♀ paratypes from HAWAIIAN ISLANDS: **Moloka'i**: TNCH Kamakou Preserve, W. Fork, Kawela Gulch at Pu'u Kolekole trail, 1040 m [3400 ft], 21°06'43"N, 156°54'26"W, 16 May 1992, D.A. Polhemus. *Other paratypes*: HAWAIIAN ISLANDS: **Moloka'i**: 1♂, Kahuaawi Gulch, Jul 1952, D.E. Hardy (BPBM); 1♂, Manawainui Valley, Jul 1952, D.E. Hardy (UHIM). Holotype in BPBM.

**Remarks**. In describing their new species *C. diffusus*, Hardy & Kohn (1964) included three specimens from Moloka'i: Manawainui Valley, Kahuaawi Gulch, and Waikolu Valley. The first two specimens were located and examined and found to belong to *C. zoeae*. The Waikolu Valley specimen could not be located but is presumed to also belong to *C. zoeae* as it is the only species of the *scolimerus* group known from Moloka'i.

**Etymology**. The specific epithet is named after the first wife of R.C.L. Perkins, Zoe [née Atkinson] Perkins. Zoe was Queen Lili'uokalani's social secretary at the time Perkins arrived in the Hawaiian Islands to conduct his zoological survey for the British Association for the Advancement of Science (Evenhuis 2007b).

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# Notes on native and alien Hymenoptera and Diptera (Insecta) from the Hawaiian Islands[1]

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Here I report new island records of alien species, as well as four notable rediscoveries of endemic picture wing *Drosophila* that have not been seen in over 40 years. Unless otherwise noted, specimens listed below were collected by KNM and deposited at the Bishop Museum (BPBM) and University of Hawai'i–Mānoa Insect Museum (UHIM) as noted. *Drosophila* vouchers are temporarily stored at the OANRP collection and will ultimately be deposited at UHIM.

## DIPTERA

### Culicidae

***Aedes japonicus*** (Theobald) **Range expansion**, **New island record**

This mosquito has been established on Hawai'i since 2003, and was first discovered on O'ahu in 2012 as a single individual in a Honolulu airport monitoring trap (Yang and Hasty 2013). It has now been found established in forested areas across the Wai'anae range, at Līhu'e (Schofield Barracks), Mākaha Valley, and Puali'i Gulch (also observed at Kūmaipō Gulch, Wai'anae Valley), where it is widespread but uncommon and sympatric with *Ae. albopictus* (Skuse). A single individual was also found on Kaua'i, the first record of the species there. Notably, all of these records are from mesic forest without any conspicuous standing water; it has not yet been found at the summit of Ka'ala or in the Ko'olau range, or in the wetter forest east of Kōke'e on Kaua'i, where the climate and forest are more similar to the upper elevations of Hawai'i Island that it now thrives in.

*Material examined*. **O'AHU**: Mākaha Valley, 720 m, 21.5014°N 158.1682°W, 7 Nov 2013 (1♀ BPBM). North Hale'au'au Gulch, Schofield West Range, 550 m, 21.5001°N 158.1238°W, 10 Sep 2014 (1♀ BPBM, 1♀ UHIM). North Puali'i Gulch, Honouliuli Forest Reserve, 550 m, 21.4254°N 158.0883°W, 12 Nov 2014 (1♀ BPBM). **KAUA'I**: Honopū Trail, 1125 m, 22.1498°N 159.6570°W, 24 May 2014 (1♀ BPBM).

### Drosophilidae

***Drosophila kinoole*** Magnacca **Rediscovery**

This species was known only from a single teneral, poorly-preserved specimen reared from *Urera glabra* (Urticaceae) in 1971, which was misidentified as *D. aglaia* Hardy (Montgomery 1975, Magnacca & Price 2012). At the time of publication, it was described based on fragmentary material because it was feared extinct. Examination of intact specimens reveals that the true wing pattern is more extensive than figured in the original description, and significantly different from any other species (Fig. 1). It is most similar to *D. aglaia*, differing in having the mark in cell $r_5$ attached to that on the dm-cu crossvein

1. Contribution No. 2015-002 the Hawaii Biological Survey.

**Fig. 1**. *Drosophila kinoole* Magnacca, Wai‘anae Valley.

rather than separate; lacking a separate mark on the r-m crossvein; and having the penultimate segment of vein M over 1.5 times as long as the antepenultimate segment (between the subbasal break and r-m crossvein), rather than about as long. In addition, the median stripe of the mesonotum is prominent and broadest at the posterior margin (rather than narrowing posteriorly in *D. aglaia*), and the male has a row of long posterodorsal cilia and shorter anterodorsal cilia on the front tibia (longest near the middle) with no long cilia at the base (the original description of this character was incorrect). Less than four months after they were found at Wai‘anae Valley, the site was severely damaged by large boulders rolling down from an eroding ridge above.

*Material examined*. **O‘AHU**: Kūmaipō Gulch, Wai‘anae Valley, 660 m, on [mushroom and banana] bait sponge, 21.4990°N 158.1533°W, 19 Feb 2014, 1♂.

***Drosophila neogrimshawi*** Hardy & Kaneshiro **Rediscovery**

This species was last recorded in 1972, and had not been seen in the Wai‘anae range since 1916. It breeds in *Clermontia* (Montgomery 1975), which is relatively rare on O‘ahu.

*Material examined*. **O‘AHU**: Ka‘ala below summit, Schofield West Range, 1150 m, on [mushroom and banana] bait sponge, 21.5080°N 158.1407°W, 9 Oct 2014, 1♂.

***Drosophila reynoldsiae*** Hardy & Kaneshiro **Rediscovery**

This species was last collected in 1971. It was included in the original proposal to list 18 *Drosophila* species as Endangered, but was one of the five that were not ultimately listed,

presumably because it was considered extinct. A total of four individuals were observed, in company with the rare *D. flexipes* Hardy & Kaneshiro and *D. paucicilia* Hardy & Kaneshiro, and the Endangered *D. obatai* Hardy & Kaneshiro.

*Material examined*. **O'AHU**: Manuwai Gulch, Lower Ka'ala NAR, 480 m, on [mushroom and banana] bait sponge, 21.5230°N 158.1259°W, 12 Feb 2014, 1♂.

***Drosophila spaniothrix*** Hardy & Kaneshiro **Rediscovery**

This somewhat enigmatic species was last recorded in 1971. It has a similar wing pattern to *D. odontophallus* Hardy & Kaneshiro, but has a much more prominent dorsal stripe on the mesonotum as in *D. grimshawi* Oldenberg and reduced ciliation of the male fore legs. The present specimens were found in a small grove of *Chrysodracon* (= *Pleomele*) *forbesii* (Asparagaceae) with few other host plants. Previous records also coincide with those of the other *Chrysodracon*-breeding species, *D. gymnophallus* Hardy & Kaneshiro, *D. psilophallus* Hardy & Kaneshiro, and *D. obatai*, suggesting that it is indeed a *Chrysodracon* breeder in the *odontophallus* species subgroup. Remarkably, this means that O'ahu has four sympatric *Chrysodracon* specialist *Drosophila*. A total of three individuals were observed.

*Material examined*. **O'AHU**: Central Makaleha Gulch, below culvert 45, 720 m, on [mushroom and banana] bait sponge, 21.5154°N 158.1625°W, 18 Sep 2014, 1♂.

## HYMENOPTERA

### Colletidae

***Hylaeus (Indialaeus) strenuus*** (Cameron) **New island record**

This Indian species was previously recorded only from O'ahu, where is has spread dramatically in both range and abundance since 2011, after staying at low levels for several years since being first discovered in 2007 (Magnacca *et al*. 2011, Magnacca *et al*. 2013). It was found for the first time on another island at Wailua on Kaua'i. While the island has not been sampled thoroughly, it can be expected to spread there as it has on O'ahu if it has not already. This species is potentially a serious threat to the native coastal *Hylaeus*, as it can reach high population densities and visits the same flowers.

*Material examined*. **KAUA'I**: Wailua, Lydgate Beach Park, at *Heliotropium foertherianum* (= *Tournefortia argentea*), 21.2930°N 157.6597°W, 9 Oct 2014 (1♂ BPBM, 1♂ UHIM).

### Megachilidae

***Megachile (Pseudomegachile) lanata*** (Fabricius) **New island record**

Two specimens of this newly-arrived species were discovered on O'ahu in 2012 during roadside bowl trap surveys (Magnacca *et al*. 2013). In a similar survey of Maui in 2013, it was found to be considerably more abundant, especially near the resort areas of West Maui.

*Material examined*. **MAUI**: West Maui, 20.8433°N 156.6516°W [Launiupoko], 3–4 May 2013, S. Droege (17♂ 1♀ BPBM). West Maui, 20.9393°N 156.6890°W [Kā'anapali], 3–4 May 2013, S. Droege (23♂ 3♀ UHIM). West Maui, 20.9699°N 156.6772°W [Nāpili], 3–4 May 2013, S. Droege (30♂ 5♀ BPBM). West Maui, 20.7946°N 156.4666°W [Keālia pond], 7–8 May 2013, S. Droege (3♂ BPBM). Waikapu, 20.8870°N 156.4995°W [coordinates are in Wailuku], 14 May 2013, S. Droege (2♂ UHIM).

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# New plant records from Maui, Kahoʻolawe, and Kauaʻi[1]

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The following contributions include new island, state, and high elevation records from Maui, Kahoʻolawe, and Kauaʻi. All records are for nonindigenous species. Images of the material examined can be seen at www.starrenvironmental.com. Voucher specimens and collections mentioned in the text are housed in Bishop Museum's *Herbarium Pacificum* (BISH), Honolulu, Hawaiʻi.

**Amaranthaceae**

***Achyranthes aspera*** L. var. ***aspera*** **New island record**

*Achyranthes aspera* var. *aspera*, commonly called Devil's horsewhip for its thorny, whip-like seedheads, was previously reported as naturalized on the islands of Oʻahu, Molokaʻi, and Hawaiʻi (Wagner *et al.* 1999; Staples *et al.* 2002). On Maui, a single seeding plant was found in Spreckelsville, which was pulled up and bagged. Follow-up surveys have not yet detected additional plants.

*Material examined.* **MAUI**: East Maui, Spreckelsville, Stable Rd, along bike path in dry coastal urban area, growing with *Leucaena leucocephala* and *Megathyrsus maximus*, 15 ft [49 m], 16 Jun 2013, *Starr & Starr 130116-01*.

***Alternanthera pungens*** Kunth **New island & new elevation record**

Previously reported from all the main Hawaiian islands except Niʻihau and Kahoʻolawe (Imada 2012), this prostrate, spiny plant was found near the coast of Kahoʻolawe in the Honokanaiʻa Basecamp area. Also, a collection from near the summit of Haleakalā at the Leleiwi Overlook parking lot represents a new high elevation record. In both areas there were only a few plants observed, all of which were removed. However, follow-up surveys found additional plants germinating from a seed bank.

*Material examined.* **KAHOʻOLAWE**: Honokanaiʻa, around quarters in base camp in dry coastal site, few plants in 2 spots by the same building, growing with *Prosopis pallida* and *Cenchrus ciliaris*, 33 ft [10 m], 18 Dec 2013, *Starr & Starr 131218-01*. **MAUI**: East Maui, Haleakalā National Park, Leleiwi, in crack near parking lot, in subalpine shrubland with *Dubautia menziesii* and *Sophora chrysophylla*, 8812 ft [2686 m], 1 Aug 2013, *Starr & Starr 130801-06*.

**Asteraceae**

***Matricaria discoidea*** DC. **New state record**

This diminutive herb, commonly known as pineapple weed and wild or false chamomile, is native to North America and northeastern Asia and has become a cosmopolitan weed in disturbed areas such as roadsides and footpaths. Plants are edible and can be used to make an aromatic tea (Wikipedia 2014). About a dozen small plants were recently found at the summit parking area of Haleakalā National Park near the parking lot and walking path. All plants have been pulled since being discovered, though it continues to germinate from

1. Contribution No. 2015-003 the Hawaii Biological Survey.

a seed bank. This is one of a half dozen temperate species with a climate match to the summit area of Haleakalā that have been detected during recent plant surveys along roads and parking areas of Haleakalā National Park. Pineapple weed is described as "Plant (1)10–30(50) cm; sweet-scented. Stem: generally branched from base. Leaf: <= 5 cm, glabrous, sessile. Inflorescence: heads generally ± 1 cm diam, conic, shattering at maturity. Ray flower: 0. Disk flower: corolla 1–2 mm. Fruit: 3–5-veined, with narrow brown glands extending down to ± bottom of fruit; tip truncate; pappus 0 or crown ± entire" (Keil 2013).

*Material examined.* **MAUI**: East Maui, Haleakalā National Park, summit, about a dozen plants in crack of parking lot/walkway border, in subalpine sparse shrub/grassland along with *Dubautia menziesii, Deschampsia nubigena, Argyroxiphium sandwicense* subsp. *macrocephalum*, 9990 ft [3045 m], 1 Aug 2013, *Starr & Starr 130801-01*.

**Cyperaceae**

***Cyperus aggregatus*** (Willd.) Endl. **New state record**

Inflatedscale flatsedge was found growing in lawns in Olinda, Maui. It looks a bit like *C. hillebrandii*, which occurs in nearby gulches. Described as "Herbs, perennial, cespitose, rhizomatous. Culms trigonous, 20–100 cm × 0.8–2.5 mm, glabrous. Leaves 5–10, V-shaped to flanged V-shaped, 10–70(–90) cm × 2–7 mm, margins and midribs scabridulous or glabrous. Inflorescences: spikes 1(–6), densely cylindric, 6–30 × 5–11 mm; rays 3–12, 0.4–5(–7) cm; rays and rachis glabrous; usually only 1–2 spikes of inflorescence on elongate rays, other spikes sessile or nearly so; bracts 4–7, horizontal to slightly ascending, 1–16 cm × 0.5–4 mm; rachilla deciduous, wings persistent, 0.5 mm wide. Spikelets 20–80, ellipsoid, roughly quadrangular, 3–5 × 1–1.4 mm; floral scales 1–2(–4), appressed, stramineous to golden brown, often red-speckled, medially greenish, 9-ribbed, elliptic to ovate, 2.4–3.4 × 1.8–2.6 mm, apex obtuse. Flowers: anthers 0.4–0.6 mm; styles 0.7–1.1 mm; stigmas 1.4–2.1 mm. Achenes dark brown to reddish brown, sessile, broadly ellipsoid, 1.8–2.1 × 0.8–1 mm, apex apiculate, surfaces glabrous to finely puncticulate" (Tucker *et al.* 2002).

*Material examined.* **MAUI**: East Maui, Olinda, Hawea Pl, growing in lawns, in association with *Cenchrus clandestinus* and *Eucalyptus* spp., 2700 ft [823 m], 28 Jan 2011, *Starr & Starr 110128-01; loc. cit.,* 10 Sep 2011, *Starr & Starr 110910-01.*

**Polygonaceae**

***Polygonum aviculare*** L. **New elevation record**

Naturalized on Maui and Hawai'i (Wagner *et al.* 1999), prostrate knotweed is established at Haleakalā National Park's maintenance baseyard at about 6800 ft [2073 m], and is now also found at the summit of Haleakalā, establishing a new high elevation record. This sprawling, mat-forming herb is most abundant on the septic system at the Haleakalā Visitor Center at 9730 ft [2966 m], but is also sparingly present in cracks in the parking lot below the Red Hill Summit Building at 9993 ft [3046 m].

*Material examined.* **MAUI**: East Maui, Haleakalā National Park, visitor center, in cinder area next to recycle bin, in association with *Dubautia menziesii, Deschampsia nubigena, Argyroxiphium sandwicense* subsp. *macrocephalum*, and *Galium* sp., 9730 ft [2966 m], 23 Jul 2013, *Starr & Starr 130723-04*; Haleakalā National Park, summit, in crack near parking lot, in association with the same species mentioned above, 9993 ft [3046 m], 1 Aug 2013, *Starr & Starr 130801-04*.

**Sapindaceae**

***Cupaniopsis anacardioides*** L. **New island record**

Carrot wood is occasionally planted as an ornamental tree in Hawai‘i and was first reported in the state as naturalized on O‘ahu (Frohlich & Lau 2010), and then on Maui (Starr & Starr 2011). During recent surveys of Kīlauea Point National Wildlife Refuge (NWR) on Kaua‘i, it was also found as naturalized, with a wide distribution along the coastal scrub portions of the refuge, including many seedlings and saplings, and a few larger trees. No obvious source or parent trees could be located during brief searches of nearby areas.

*Material examined.* **KAUA‘I**: Kīlauea, Kīlauea Point NWR, windward lowland coastal scrub from Kīlauea Point to Crater Hill, seedlings to fruiting trees in the understory and openings in canopies of *Casuarina equisetifolia*, *Schinus terebinthifolius*, and *Pandanus tectorius*, in association with *Leucaena leucocephala* and *Lantana camara*, 150 ft [45 m], 20 Mar 2013, *Starr & Starr 130320-01*.

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# Two new records of Diptera (Insecta) from the Hawaiian Islands[1]

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The following are new state records of two-winged flies that have recently been found in the Hawaiian Islands. Material examined derives from the following collections: BPBM (Bishop Museum, Honolulu); HDOA (Hawaii State Department of Agriculture, Pawa'a , Honolulu); UHIM (University of Hawai'i Insect Museum, University of Hawai'i at Mānoa).

**Dolichopodidae**

***Chrysotus crosbyi*** Van Duzee **New state record**

Originally described from Missouri, this species has a wide native distribution from the Midwestern states to the East Coast of the United States and ranges into the Caribbean and South America. It has been introduced into a number of Pacific islands including French Polynesia, Guam, and the Northern Mariana Islands (Capellari 2015). It was first collected on O'ahu in June 1998 by Keith Arakaki and others in Pearl Harbor drainages, and misidentified as *C. longipalpus* in the BPBM collection. A photograph of another specimen of it (cf. Fig. 1) collected in Mililani in central O'ahu, prompted one of us (RSC) to note that this was not *C. longipalpis*, but *C. crosbyi*. The recent revision of the *Chrysotus longipalpus* complex (Capellari 2015) confirmed the identity of this species. The shape of the palp (rounded in *C. crosbyi;* pointed in *C. longipalpus*) and the antennal color (brown in *C. crosbyi* and yellow in *C. longipalpus*) are useful characters in easily separating the two species (cf. Figs. 1–2).



**Figures 1–2**. *Chrysotus* spp. **1**. *Chrysotus crosbyi* male, habitus, frontal view. Photo: L. Tyler. **2**. *Chrysotus longipalpis*, head, lateral view showing pointed palpus and yellow antennae. Photo: N.L. Evenhuis.

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**Figures 3–4**. *Ocyptamus dimidiatus* (Fabricius). **3**. Live habitus showing characteristic dark infuscated wings. **4**. Live habitus showing frontal view of head. Photos: L. Tyler.

This marks the first record of the species in Hawai‘i and the furthest west the species has been found in the United States. Given the apparent recent introductions of it into a number of areas outside of its native range, it may spread easily and in the future be found on other Hawaiian Islands and possibly other Pacific islands.

*Material examined*. **O‘ahu**: 2♂, Kalauao Ponds, along pool edge, 0–1 m, 29 Jun 1998, K. Arakaki, G. Samuelson & K. Kami; 1♂, Kalauao Stream, tall grass along stream, 16 Jun 1998, K. Arakaki, G. Samuelson, K. Kami; 2♂, Kalihi Stream, mauka of Kamehameha Hwy, sweeping mud and

rocks, 4 Mar 1999, K. Kami; 1♂, Nu‘uanu Stream, mauka Kuakini Street, 1–2 m, sweeping mud and rocks under *Ficus*, 25 Mar 1999, K. Arakaki; 2♂, Mililani Town, 15 November 2014, L. Tyler (all BPBM).

— Renato S. Capellari, Neal L. Evenhuis, Lowell Tyler

**Syrphidae**

***Ocyptamus dimidiatus*** (Fabricius) **New state record**

Native to the Neotropics and found from Florida, Central America and the West Indies south to Brazil, this dark bluish syrphid with dark wings (Figs. 3, 4) was first collected in a community garden in the Ala Wai area of Honolulu in January 2008 by Ilse Hardy (widow of dipterist D.E. Hardy) and has since been found in a number of localities throughout central and southern O‘ahu. In addition to the localities below, it has been observed many times but not yet collected at the Bishop Museum.

*Material examined*. **O‘ahu**: 2 spms, Ala Wai Community Garden, 3ft [~1 m], 5 Jan 2008, Ilse Hardy (UHIM); 1 spm, Hawaii Kai community Garden, 25 ft [7.6 m], 13 Jan 2008, W.D. Perreira (UHIM); 1 spm, Pawa‘a, 9 Dec 2008, C. Young (HDOA); 4 spms, same data, 8 Jan 2009, 12 Dec 2012, J. Garcia, W. Nagamine (HDOA); 1 spm, Moanalua, 9 Jan 2009, sweeping stream, 21°20.9'N 157°53.7'W, F.G. Howarth (BPBM); 1 spm, Mililani, 20 Nov 2009 (HDOA), 7 spms, Moanalua, Tripler Army Medical Center, 17 Dec 2009, lower stream, D. Preston (BPBM); 11 spms, same data, 7 Jan 2010, at stream, K. Arakaki (BPBM); 2 spms, Koko Crater Botanical Garden, 3 Feb 2010, W. Nagamine (HDOA); 1 spm, University of Hawai‘i at Mānoa, quarry, 60 ft [18 m], 3 Aug 2011, W.D. Perreira (UHIM); 1 spm, Moanalua, Tripler Army Medical Center, stream near greenhouse, 19 Jan 2012, D. Preston (BPBM).

— F. Christian Thompson, Neal L. Evenhuis

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# *Delissea rhytidosperma* H. Mann (Campanulaceae) and *Phyllostegia kahiliensis* H. St. John (Lamiaceae) possibly extinct on Kaua‘i, Hawaiian Islands[1]

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Of the estimated 1191 native flowering plant and fern species in Hawai‘i, ca. 10% have not been documented for many years and are presumed to be extinct. Two possible new plant extinctions on Kaua‘i are reported here, *Delissea rhytidosperma* H. Mann (Campanulaceae) and *Phyllostegia kahiliensis* H. St. John (Lamiaceae), bringing the total number of known or possible/probable plant extinctions in Hawai‘i to 112 taxa (Wood 2007, 2012, 2014). The pronouncement of extinction is potentially fallible and is here inferred from the absence of observation/collection records and the passing of all known wild individuals (Wood 2012). A current analysis of Hawai‘i’s plant extinctions by the author indicate that 44% involved birds for pollination services and 96% depended on birds for seed dispersal. It is relevant to note that the Hawaiian Islands have lost 79 native bird species to extinction and are left with only 32 (James & Olson 1991; Olson & James 1991; Burney *et al.* 2001; Boyer 2008). With two-thirds of the surviving forest bird species in Hawai‘i being critically endangered and a continued decline in native arthropods, there is grave concern for the endangered Hawaiian flora and for their unique insular relationships with biodiversity as a whole. Even today, little is known about the life cycles, breeding system variations, and habitat preferences found in the Hawaiian flora. The great majority of Hawaiian plant extinctions (i.e., 35 taxa) have occurred in the Hawaiian lobeliads (Campanulaceae), a family renowned for their co-evolution with Hawai‘i’s honeycreeper birds, in the endemic subfamily Drepanidinae of the Fringillidae or finch family (Wood 2014). The Lamiaceae or mint family falls second in Hawaiian plant extinctions with 16 members having no known wild individuals remaining. Besides the decline of native pollinators and seed dispersers (Kearns *et al.* 1998; Milberg & Tyrberg 1993; Wood 2012), an increase in endemic plant extinctions throughout the islands of Oceania is commonly associated with habitat deterioration from invasive non-native plants and animals, anthropogenic factors that further the loss and fragmentation of natural habitats, devastation by severe storms, and a weak regional conservation ethic with inadequate funding. Other prominent factors indicating plants are at risk of extinction are their low historic population densities, very narrow geographic range, and strict habitat requirements (Sakai *et al.* 2002; Wood 2007), all of which correlate closely to the possible extinction of *Delissea rhytidosperma* and *Phyllostegia kahiliensis*.

**Campanulaceae**

***Delissea rhytidosperma*** H. Mann **Possibly extinct**

The endemic Hawaiian genus *Delissea* Gaudich. was historically known from 15 species distributed across all the main Hawaiian Islands except Kaho‘olawe, with each endemic to a single island (Lammers 2005). Two taxa, *D. kauaiensis* (Lammers) Lammers and *D.*

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*rhytidosperma*, are recognized from Kauaʻi. *Delissea kauaiensis* is currently known from only six mature and two immature individuals and *D. rhytidosperma* is reported here as recently extinct in the wild, bringing the total number of extinct *Delissea* species to twelve, with the remaining three on the edge of extinction.

Specimens of *Delissea rhytidosperma* were historically collected in several Kauaʻi mesic forest locations, namely Hanakāpīʻai, Hanapēpē, Hāʻupu, Kēalia, Kīpū, Limahuli, Wahiawa, and Wainiha (HBMP 2011; Lammers 2005). In recent decades botanists have monitored relictual colonies in the Hanakāpīʻai, Hāʻupu, and Limahuli Valleys and the National Tropical Botanical Garden (NTBG) has successfully brought this species into cultivation. It is recommended that further careful efforts be made to rediscover *D. rhytidosperma* near previously known colonies around Hanakāpīʻai and Hāʻupu and new efforts be initiated to explore some of the mesic cliffs and steep slopes of Kēalia and Moloaʻa Forest Reserve.

*Material examined.* **KAUAʻI**: Mt. Hāʻupu (Hoary Head Range), below Queen Victoria profile, rock outcrop, north exposure, 980 ft elev., multi-branched shrub of 4 ft, 12 Jan 1984, *Flynn 737* (PTBG); *loc. cit*., 12 Jan 1984, *Flynn 738* (PTBG); *loc. cit*., 12 Jan 1984, *Flynn 739* (PTBG); *loc. cit*., 12 plants, 2–10 ft height, with flower and fruit, 27 Feb 1992, *Perlman, Wood & Flynn 12611* (PTBG); *loc. cit*., 4 plants, 9 seedlings, 2–3 ft height, with fruit, 900 ft elev., 20 Oct 1994, *Perlman & Wood 14478* (PTBG); *loc. cit*., 12 plants, 1.5–2.5 m tall, plants scattered on cliff, 23 May 2001, *Perlman 17562* (PTBG); *loc. cit*., 988 ft elev., 22 Jul 2004, *Tangalin 147* (PTBG); *loc. cit*., 320 m elev., 19 Aug 2005, *Tangalin 426* (PTBG); Hanakāpīʻai Valley, east side of stream, 5 plants, 820 ft elev., 29 Dec 1999, *Perlman et al. 16918* (PTBG).

**Lamiaceae**

***Phyllostegia kahiliensis*** H. St. John **Possibly extinct**

*Phyllostegia* Benth. is composed of 34 species, 32 of which occur in the Hawaiian Islands. Intriguingly there are two disjunct extra-Hawaiian species that include a single species from Tahiti and one from Tonga (Wagner 1999). Seven species are recognized on Kauaʻi, all are single island endemics, with four federally listed as endangered (USFWS 2010) and the remaining three deserving of endangered status. Wood (2012) recently reported the extinction of *P. knudsenii* Hillebr. and hereby reports the possible extinction of *P. kahiliensis,* a species that historically exhibited a very narrow geographic range along with a very low population density. Of the five remaining Kauaʻi species, *Phyllostegia electra* C.N. Forbes has no status, but should be listed as endangered as it is only observed on rare occasions. *Phyllostegia renovans* W.L. Wagner hovers in numbers of around 50 wild individuals, while *P. helleri* Sherff*, P. wawrana* Sherff*,* and *P. waimeae* Wawra have each diminished to less than ten. The Kauaʻi Plant Extinction Prevention Program (PEPP) and NTBG have prioritized such taxa and efforts are ongoing to search for new individuals and facilitate conservation collections. Kāhili Mountain, the holotype locality and only known location for *P. kahiliensis*, is characterized by steep jagged ridges and precipitous side slopes that drop into numerous small headwater drainages dominated by native plant taxa. *Phyllostegia kahiliensis* has not been successfully cultivated and it is highly possible that rough-terrain field surveys around the Kāhili region may lead to its rediscovery.

*Material examined.* **KAUAʻI**: steep, moist slope just below the summit of Kāhili Peak, to the south, 860 m, 4 Jan 1974, *Fay 156* (holotype, PTBG; isotype, BISH); Wahiawa Mountains (Kāhili region), along ridge north of microwave relay towers, 2800–3000 ft elev., 26 Jun 1987, *Flynn et al. 2228* (PTBG); above Wahiawa Bog, between TV relay station and first peak on W side of Mt. Kāhili, 855 m elev., 22 Dec 1983, *Wagner et al. 5217* (BISH).

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# New plant records for the Hawaiian Islands 2014[1]

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Here, O'ahu Early Detection documents two new state records, three new naturalized records, five new island records, 1 range extension, and 1 species showing signs of naturalization. A total of 10 plant families are discussed.

Information regarding the formerly known distribution of flowering plants is based on the *Manual of the flowering plants of Hawai'i* (Wagner *et al.* 1999) and information subsequently published in the *Records of the Hawaii Biological Survey*. All supporting voucher specimens are deposited at B.P. Bishop Museum's *Herbarium Pacificum* (BISH), Honolulu, Hawai'i.

**Acanthaceae**

***Barleria repens*** Nees **New island record**

This species has been previously documented as naturalized on Kaua'i, O'ahu, Lāna'i, and Maui (Staples 2002; Oppenheimer 2003; Oppenheimer & Bustamente 2014). It is now known to be at least sparingly naturalized on Hawai'i island, where it was seen growing in open areas in a lowland windward coastal setting at the Pu'uhonua o Hōnaunau National Historical Park. Park staff are considering implementing a control program for this species on their lands.

*Material examined*. **HAWAI'I**: Pu'uhonua o Hōnaunau, near admin building, 10 Dec 2014, *M. Hayes s.n.* (BISH 762053).

**Bromeliaceae**

***Aechmea cephaloides*** J.A. Siqueira & Leme **New state record**

This large epiphytic bromeliad was only recently described as a new species in 2007 (Siqueira & Leme 2007) and is currently believed to be endemic to Pernambuco, Brazil, where it is considered a vulnerable species. Aside from the collection documented here, it does not appear to be known from cultivation anywhere outside its native range. It is unclear when it first arrived in Hawai'i, but appears to have been accessioned by a local botanical garden. It is now spreading beyond planted sites to various parts of the garden, established as an epiphyte high in trees. The individual collected as a voucher came from a fallen *Samanea saman* branch, but had been growing in dense shade in the middle canopy. The characters used to differentiate this species from similar-looking relatives include the inflorescences of globose-capitate heads; membranous, red, narrow (4–5mm) floral bracts that do not conceal the flowers (others are coriaceous, yellowish to orange, and 13–14 mm wide); short-pedicillate (vs. sessile) flowers; obovate (vs. subelliptic)

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sepals; and shorter petals (22–23 mm vs. 30–34 mm) with longer basal appendages (4–5 mm vs. 2–3 mm) (Siqueira & Leme 2007).

*Material examined*. **O'AHU**: Waimea Valley Botanical Garden, lowland cultivated setting, epiphytic herb ca 1 m tall, leaves ca 1 m long, with dark spines along margins, flowers golden yellow, salmon at base, 14 Jan 2014, *D. Frohlich & A. Lau 2014011405*.

**Cyperaceae**

***Rhynchospora inexpansa*** (Michx.) Vahl **New state record**

This sedge is native to the southeastern United States, where it is commonly found in sandy soils. It appears to have been accidentally introduced to Hawai'i, most likely through military training and operations, as it is so far only known from landing zones at Schofield Barracks. It was seen as occasional in disturbed, open areas characteristic of landing zone sites, and appeared to withstand frequent mowing. This species is distinguished from other *Rhynchospora* species known in Hawai'i by the following combination of characters: inflorescences with 3–6 clusters of spikelets along the main axis, these clusters drooping at the tips; 6 antrorsely barbellate perianth bristles; and conspicuously flattened, oblong achenes. A key to many species in the genus and a full description of the species can be found in the *Flora of North America* (Kral 2003).

*Material examined*. **O'AHU**: Schofield Barracks East Range, "Upper 72" military landing zone, open, disturbed habitat surrounded by mesic, mixed native/non-native forest, 5 Dec 2013, *J. Beachy 2013120505*.

**Fabaceae**

***Adenanthera pavonina*** L. **New island record**

This species has been documented as highly invasive elsewhere in the Pacific (Meyer 2000), and has been documented as naturalized on Kaua'i (Wagner & Herbst 1995) and Maui (Starr & Starr 2011). It is documented here as naturalized on O'ahu as well, where an established population was seen in the lower section of the Mālaekahana Trail, where 40-foot trees and abundant recruitment were seen just beyond farm lands in non-native dominated vegetation.

*Material examined.* **O'AHU**: Mālaekahana Trail, naturalized, growing with *Syzygium cumini*, *Casuarina equisetifolia*, *Clidemia hirta*, *Panicum maximum*, *Psidium guajava*, 16 Feb 2014, *K. Kawelo & J. Rohrer US Army 341*.

***Leucaena diversifolia*** (Schltdl.) Benth. **New island record**

*Leucaena diversifolia* is the most widely cultivated species of *Leucaena* after *L. leucocephala,* and is cultivated for similar purposes, which include livestock fodder, reforestation, and as a shade tree on coffee plantations (Hawaii-Pacific Weed Risk Assessment 2014). The invasiveness of this species is much less well-documented than *L. leucocephala*, but it possesses similar biological traits: year-round flowering and fruiting, abundant seed production, self-fertility, a long-lived seed bank, and the ability to resprout after fire (Hughes 1998). It has been found naturalizing in Jamaica and spreading from a strawberry and green onion farm on 'Ulupalakua Ranch, East Maui (Starr *et al.* 2008), and received a score of 9 (high risk) on the HPWRA (Hawaii-Pacific Weed Risk Assessment 2014). The only known locations of this species on O'ahu are Waimea Valley, Ho'omaluhia Botanical Garden, and the University of Hawai'i Research Station in Waimānalo. Several individuals of this species were mapped spreading down the Waimea River.

*Material examined.* **O'AHU**: Waimea Valley Botanical Garden, lowland mesic riparian area, along a seasonal streambank, sparingly naturalized in garden, 27 Feb 2014, *A. Lau & D. Frohlich 2014022702.*

**Heliconiaceae**

***Heliconia stricta*** Huber **New naturalized record**

*Heliconia stricta* is widely cultivated throughout the world, and over 200 cultivars of the species are known. It has been recorded as naturalized in Puerto Rico (Acevedo-Rodríguez & Strong 2005), but worldwide, few records of naturalization exist for this species. The 'Dwarf Jamaican' cultivar of this bird-dispersed species was collected in Waimea Valley, where it is a recognized weed of the area, naturalized and scattered throughout the understory of the botanical collection, usually in dense shade. This species can be easily confused with the similar-looking *H. bihai*, from which it differs in having dark green flowers with white tips (Staples & Herbst 2005). A key to the species of *Heliconia* in Hawai'i, as well as a description of the species and the common cultivars grown here, can be found in *A Tropical Garden Flora* (Staples & Herbst 2005).

*Material examined.* **O'AHU**: Waimea Valley Botanical Garden, mesic lowland cultivated setting, herbs to 75 cm tall, established throughout understory areas in the garden, often growing in deep shade, 14 Jan 2014, *A. Lau & D. Frohlich 2014011404.*

**Meliaceae**

***Swietenia mahogani*** (L.) Jacq. **New naturalized record**

Also known as West Indian mahogany, this commercially important species native to parts of the Caribbean has been introduced to various parts of the tropics as a timber tree (Staples & Herbst 2005). It has become naturalized in some other areas where it has been introduced, including Puerto Rico (Francis & Liogier 1991). It has been planted as a street and shade tree in Hawai'i, and is rarely seen spreading from those plantings. A large planting in Lualualei has resulted in the establishment of a naturalized population in Hālona Valley, where dozens of small mature trees and many saplings occur, the saplings establishing in dense to partial shade. A description of the species and a key separating it from other cultivated Meliaceae in Hawai'i can be found in *A Tropical Garden Flora* (Staples & Herbst 2005).

*Material examined.* **O'AHU**: Lualualei, Hālona Valley, dry lowland forest, ca 20 or more plants in area, growing in a dense pocket, other individuals scattered, saplings growing in dense shade, 21 Aug 2014, *A. Lau & D. Frohlich 2014082101.*

**Poaceae**

***Andropogon bicornis*** L. **New island record**

An invasive species in Hawai'i previously documented from Kaua'i (Snow & Lau 2010) is here documented from Hawai'i island as well. It was seen established in an area cleared for utility lines through mixed native/non-native *'ōhi'a* forest, just off the trail at the Lava Tree State Monument park. Observations from other botanists suggest this species may be established in multiple other areas of the island.

*Material examined.* **HAWAI'I**: Puna, Lava Tree State Monument, wet lowlands, disturbed open area with scattered *'ōhi'a* present, bunchgrass with culms to 2.5 m, locally common, 28 Dec 2013, *A. Lau 2013122801.*

**Pteridaceae**

***Adiantum macrophyllum*** Sw. **New naturalized record**

This native of tropical America has been documented in cultivation, including in Hawai‘i. It does not appear to be a common weed outside its native range. It was found sparingly naturalized on O‘ahu in a relatively remote area of Waikāne Valley. At the time of collection, only one patch of plants was known from the general area, where it was growing in dense shade in a wet gulch. This species can be distinguished from other members of the genus known to occur in Hawai‘i by its glabrous petioles and odd-pinnate fronds with large, sessile segments. A key and full description of the species can be found in *A Tropical Garden Flora* (Staples & Herbst 2005).

*Material examined.* **O‘AHU**: Waikāne Valley, lowland wet forest gulch, sparingly naturalized, ca 12 plants in a 10 x 10 m, remote area, clumping habit with runners, largest fronds 6–12 inches long, 24 Feb 2014, *P. Zweng* (sub *US Army 342*).

**Scrophulariaceae**

***Lophospermum erubescens*** D. Don **Range extension**

An invasive species native to Mexico, this escaped ornamental vine was previously documented from O‘ahu (Ko‘olau Mountains), Hawai‘i, and East Maui (Wagner *et al.* 1999; Starr *et al.* 1999). It has now also been documented as established in the Wai‘anae Range on O‘ahu, where a population was found in native-dominated habitat, in and around a restoration site. Natural resource managers in the area have conducted some control on this Wai‘anae population.

*Material examined.* **O‘AHU**: Lower Ka‘ala Natural Area Reserve, Manuwai Gulch, co-occurring with *Diospyros sandwicensis*, *Sapindus oahuensis*, *Erythrina sandwicensis*, *Nestegis sandwicensis*, *Syzygium cumini*, and *Psidium cattleianum*, 15 Oct 2012, *M. Walker US Army 297*.

***Veronica arvensis*** L. **New island record**

This small, weedy herbaceous species has been collected previously on the islands of Moloka‘i, Maui, and Hawai‘i (Wagner *et al.* 1999), and now on O‘ahu, where it was found by O‘ahu Army Natural Resources Program staff, spreading in the wash area of their baseyard.

*Material examined.* **O‘AHU**: OANRP West Base, Schofield Barracks, mesic disturbed area, growing in gravel, ca 50 plants present, 28 Jan 2014, *J. Beachy US Army 336.*

**Species showing signs of naturalization**

**Annonaceae**

***Cananga odorata*** (Lam. ) Hook.f. & Thomson

This species is documented as naturalized elsewhere in the Pacific region. Despite rare to occasional cultivation in Hawai‘i since at least 1927 (Imada *et al.* 2005), it has yet to become naturalized in Hawai‘i. A few small individuals of this species were mapped spreading a moderate distance downstream from a large, persisting individual in lowland O‘ahu non-native secondary forest.

*Material examined*. **O‘AHU**: Waimea Valley, ‘Elehāhā drainage, species persisting cultivation and beginning to escape from planted sites, 11 Oct 2013, *A. Lau, D. Frohlich & C. Frohlich 2013101101*.

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# New Species Records of Marine Benthic Algae in the Papahānaumokuākea Marine National Monument (Northwestern Hawaiian Islands)[1]

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The species listing below comprises an additional 29 species of marine benthic algae within the Papahānaumokuākea Marine National Monument (PMNM), a World Heritage site, which encompasses an area of 360,000 km$^2$ of the Northwestern Hawaiian Islands. The 10 islands, atolls and shoals within the PMNM, aligned from northwest to southeast, include Kure Atoll, Midway Atoll, Pearl & Hermes Atoll, Lisianski Island, Laysan Island, Maro Reef, Gardner Pinnacles, French Frigate Shoals, Necker Island and Nihoa Island.

The 29 new records for the PMNM consist of 1 species of Cyanobacteria, 23 species of Rhodophyta, 1 species of Phaeophyceae and 4 species of Chlorophyta, which were primarily reported by Abbott (1999) and Abbott & Huisman (2004) from at least one of the Main Hawaiian Islands (MHI) to the southeast. Other references which report species from the MHI are cited with the islands where the species were previously reported.

These 29 species increase the number of marine benthic algal species found in the PMNM from 335 (Tsuda 2014) to 364 species or by 8.6%. Voucher specimens with BISH numbers are deposited in *Herbarium Pacificum* (*BISH*) of the Bishop Museum. Voucher specimens with NWHI numbers are presently deposited in the Alison R. Sherwood Laboratory at the University of Hawai'i-Mānoa. AlgaeBase (Guiry & Guiry 2015) was consulted for current names and synonyms.

Two specimens were initially identified morphologically as the invasive species *Gracilaria salicornia* (C. Agardh) E.Y. Dawson and *Hypnea musciformis* (Wulfen) J.V. Lamouroux present in the MHI; however, molecular analyses (using the UPA region) ruled out the initial identification and document the specimens here as *Gracilaria* sp. and *Hypnea* sp.

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**Phylum CYANOBACTERIA**

***Schizothrix mexicana*** Gomont **New PMNM record**

The specimens consist of firm irregular gelatinous layers adhering to sand, up to 8.5 cm across and 2–7 mm thick (dried), and mostly blackish-green in color. Cells of trichomes are 4–6 µm in diameter and 1–2x diameter long. The specimens were initially identified as *Leptolyngbya crosbyana* (Tilden) Anagnostidis & Komárek; however, *L. crosbyana* usually forms brown or tan hemispherical buttons on solid substrata.

*MHI distribution.* O‘ahu (Khan 1967).

*PMNM materials examined.* **MARO**: 28–36 m deep, *RV Townsend Cromwell*, 4 Jul 1997, *BISH 694028* (*IA 23260*); lobster traps, 23.8–25.6 m deep, *R. Moffitt*, 27 Jun 2006, *BISH 723424* (*IA 31654*).

**Phylum RHODOPHYTA**

***Actinotrichia fragilis*** (Forsskål) Børgesen **New PMNM record**

*MHI distribution.* Kaua‘i, O‘ahu, Lāna‘i, Moloka‘i, Kaho‘olawe, Maui, and Hawai‘i (Abbott 1999).

*PMNM material examined.* **NIHOA**: Subtidal, *C. Agegian et al*., Summer 1981, *BISH 642557* (*IA 21215a*).

***Akalaphycus liagoroides*** (Yamada) Huisman, I.A. Abbott & A.R. Sherwood **New PMNM record**

[= *Stenopeltis liagoroides* (Yamada) Itono & Yoshizaki]

*MHI distribution.* Kaua‘i, O‘ahu, Moloka‘i, and Maui (Huisman *et al*. 2004).

*PMNM material examined.* **GARDNER**: *K. McDermid & B. Stuercke*, 14 Sep 2002, det. I.A. Abbott (31 Oct 2005), *BISH 694351*.

***Champia vieillardii*** Kützing **New PMNM record**

*MHI distribution.* Maui (Abbott 1999).

*PMNM material examined.* **NECKER**: NOWRAMP 2002, *K. Kukea-Shultz & K. Peyton*, 10 Sep 2002, *BISH 694269*.

***Chondrophycus succisus*** (A.B. Cribb) K.W. Nam **New PMNM record**

*MHI distribution.* Kaua‘i, O‘ahu, Moloka‘i, Lāna‘i, Maui, Kaho‘olawe, and Hawai‘i (Abbott 1999).

*PMNM material examined.* **FRENCH FRIGATE**: *C. Agegian et al*., Summer 1987, *BISH 691504* (*IA 19190*).

***Chrysymenia kaernbachii*** Grunow **New PMNM record**

*MHI distribution.* O‘ahu and Maui (Abbott 1999).

*PMNM materials examined.* **LISIANSKI**: *K. Geisler*, 22 Sep 2000, det. I.A. Abbott (4 Jun 2003), *BISH 698667*. **MARO**: NOWRAMP 2002, outside, *K. Kukea-Shultz & K. Peyton*, 16 Sep 2002, *BISH 694152*; MAR-27, *K. Geisler*, 19 Sep 2000, det. I.A. Abbott, *BISH 698074*.

***Cubiculosporum koronicarpis*** Kraft **New PMNM record**

*MHI distribution.* O‘ahu (Abbott 1999).

*PMNM material examined.* **NECKER**: NOWRAMP 2002, intertidal, *J. Polloi*, 10 Sep 2002, det. I.A. Abbott (12 Jan 2006), *BISH 694628*.

***Dasya murrayana*** I.A. Abbott &
A.J.K. Millar **New PMNM record**

*MHI distribution.* Kauaʻi, Oʻahu, and Hawaiʻi (Abbott 1999).

*PMNM material examined.* **LISIANSKI**: NOWRAMP 2, LIS-35, *K. Geisler*, 22 Sep 2000, det. I.A. Abbott (4 Jun 2003), *BISH 698663*.

***Dichotomaria obtusata*** (J. Ellis & Solander)
Lamarck **New PMNM record**

[=*Galaxaura obtusata* (J. Ellis & Solander) J.V. Lamouroux]

*MHI distribution.* Oʻahu and Hawaiʻi (Abbott 1999).

*PMNM material examined.* **NECKER**: *C. Agegian et al*., Summer 1981, *BISH 692289* (*IA 21228e*).

***Erythrocolon podagricum*** J. Agardh **New PMNM record**

*MHI distribution.* Oʻahu and Maui (Abbott 1999).

*PMNM material examined*. **MARO**: NOWRAMP 2002, *K. Kukea-Shultz* & *K. Peyton*, 15 Sep 2002, det. I.A. Abbott (2004), *BISH 692159*.

***Galaxaura divaricata*** (Linnaeus)
Huisman & R.A. Townsend **New PMNM record**

[= *Galaxaura fasciculata* Kjellman]

*MHI distribution.* Oʻahu, Molokaʻi, and Kahoʻolawe (Abbott 1999).

*PMNM materials examined.* **KURE**: NOWRAMP 2002, *M. Hughes*, 25 Sep 2002, *BISH 694991*. **LAYSAN**: NOWRAMP 2002, *K. Kukea-Shultz* & *K. Peyton*, 17 Sep 2002, *BISH 694706*; NOWRAMP 2002, *K. Kukea-Shultz* & *K. Peyton*, 17 Sep 2002, *BISH 694721*. **NECKER**: NOWRAMP 2002, *K. Kukea-Shultz* & *K. Peyton*, 10 Sep 2002, *BISH 693658*; NOWRAMP 2002, *K. Kukea-Shultz* & *K. Peyton*, 10 Sep 2002, *BISH 694279*; NOWRAMP 2002, *K. McDermid* & *B. Stuercke*, 10 Sep 2002, *BISH 294294*.

***Galaxaura filamentosa*** R.C.Y. Chou **New PMNM record**

*MHI distribution*: Penguin Bank located SW Molokaʻi (Agegian & Abbott 1985) and Maui (Abbott 1999).

*PMNM material examined.* **NIHOA**: NOWRAMP 2002, *J. Polloi*, 9 Sep 2002, *BISH 694608.*

***Gelidiella machrisiana*** E.Y. Dawson **New PMNM records**

*MHI distribution.* Oʻahu and Hawaiʻi (Abbott 1999).

*PMNM materials examined.* **MARO**: *K. Geisler*, 15 Oct 2000, det. I.A. Abbott (22 Oct 2003), *BISH 698634* (*IA 30373*). **NECKER**: NOWRAMP 2002, NEC-R-3, *K. Kukea-Shultz* & *K. Peyton*, 10 Sep 2002, det. I.A. Abbott (11 May 2004), *BISH 694307*.

***Gracilaria* sp**. **New PMNM record**

The herbarium sheet consists of two specimens, 4 and 5 cm long with branches extremely thin, 1 mm in diameter. The specimens were initially identified based on morphological characteristics as the invasive species *Gracilaria salicornia.* Although high quality DNA was not extracted from the Necker specimens, molecular analyses (UPA region; e.g., Sherwood et al. 2010) conducted on other *Gracilaria* collected in similar mesophotic habitats in the Main Hawaiian Islands did not reveal *G. salicornia*.

*PMNM material examined.* **NECKER**: 28–70 m deep, *RV Townsend Cromwell*, 16 Jun 1997, *BISH 691797* (*IA 23243*).

***Halymenia actinophysa*** M. Howe **New PMNM record**

*MHI distribution.* Maui (Abbott 1999).

*PMNM material examined.* **LAYSAN**: NOWRAMP 2002, LAY-03, *K. Kukea-Shultz* & *K. Peyton*, 17 Sep 2002, det. I.A. Abbott, *BISH 736158*.

***Halymenia stipitata*** I.A. Abbott **New PMNM record**

*MHI distribution*. O‘ahu and Maui (Abbott 1999).

*PMNM material examined.* **LISIANSKI**: NOWRAMP 2002, *K. Kukea-Schultz* & *K. Peyton*, 2 Nov 2002, *BISH 695858*.

***Hypnea* sp**. **New PMNM record**

About a third of the herbarium specimens from the deeper waters of the PMNM cited below possesses few tendril-like terminal branches which show some similarity to the invasive *Hypnea musciformis.* Molecular analyses using the UPA region, however, indicate that most specimens below are in a separate and unidentified clade from several different confirmed *H. musciformis* samples (Sherwood et al. 2010).

*PMNM material examined.* **PEARL & HERMES**. *K. Geisler*, 11 Oct 2000, *BISH 698755* (*IA 30463*). **MARO**: lobster traps, 25.6–45.7 m deep, *R. Moffitt*, 20 Jun 2006, *BISH 723408* (*IA 31675*). **NECKER**: Townsend-Cromwell Cruise 00-07, lobster trap, 26–37 m deep, *R. Moffitt*, 12 Jun 2000, *BISH 772522* (*IA 25307*); 26–31 m deep, *R. Moffitt*, 11 Jul 2004, *BISH 7133327* (*IA 29405*); 29–31 m deep, *R. Moffitt*, 10 Jun 2005, *BISH 715611* (*IA 31421*); O.E. Sette 05-08, lobster traps, 27.4–29.3 m deep, *R. Moffitt*, 16 Jun 2005, *BISH 715612* (*IA 31416*); lobster traps, 25.6–45.7 m deep, *R. Moffitt*, 12 Jun 2006, *BISH 723421* (*IA 31637*); lobster traps, 42.1–56.7 m deep, *R. Moffitt*, 11 Jun 2006, *BISH 723436* (*IA 31598*).

***Macrocarpus perennis*** (I.A. Abbott)
S.M. Lin, S.-Y. Yang & Huisman **New PMNM record**

[= *Liagora perennis* I.A. Abbott]

*MHI distribution.* O‘ahu, Type (Abbott 1999).

*PMNM material examined.* **GARDNER**: *K. McDermid* & *B. Stuercke*, 14 Sep 2002, det. I.A. Abbott (31 Oct 2005) as *Liagora perennis*, *BISH 694364*.

***Neoizziella divaricata*** (C.K. Tseng) **New PMNM record**
S.M. Lin, S.-Y. Yang & Huisman

[= *Liagora divaricata* C.K. Tseng]

*MHI distribution.* O‘ahu (Abbott 1999).

*PMNM material examined.* **MARO**: TC-22, *K. Peyton*, 23 Jul 2002, det. I.A. Abbott, *BISH 521692* (*IA 31545*).

***Pterocladiella caerulescens*** (Kützing)
Santelices & Hommersand **New PMNM record**

[=*Pterocladia caerulescens* (Kützing) Santelices]

*MHI distribution.* Kaua‘i, O‘ahu, Maui, and Hawai‘i (Abbott 1999).

*PMNM material examined.* **NIHOA**: NOWRAMP 2002, *J. Polloi*, 9 Sep 2002, det. I.A. Abbott (22 Sep 2004), *BISH 694609*.

***Rhodolachne decussata*** M.J. Wynne **New PMNM record**

*MHI distribution.* O‘ahu, Moloka‘i, and Maui (Abbott 1999).

*PMNM material examined.* **LISIANSKI**: NOWRAMP 2000, #2, *K. Geisler*, 22 Sep 2000, det. I.A. Abbott (6 Aug 2003), *BISH 705611* (*IA 30214*).

***Titanophora pikeana*** (Dickie) J. Feldmann **New PMNM record**

*MHI distribution.* Kaua‘i and O‘ahu (Abbott 1999).

*PMNM material examined.* **MIDWAY**: Sand Island, lagoon, *N. Hoffman*, Aug 2000, det. I.A. Abbott, *BISH 669210* (*IA 25468*).

***Trichogloeopsis mucosissima*** (Yamada) I.A. Abbott & Doty **New PMNM record**

*MHI distribution.* Kaho‘olawe and Hawai‘i (Abbott 1999).

*PMNM material examined.* **MIDWAY**: Reef crest near swim platform, intertidal, *K. McDermid*, 6 Jun 1999, det. I.A. Abbott, *BISH 720928* (*KM 4679*).

***Yamadaella caenomyce*** (Decaisne) I.A. Abbott **New PMNM record**

*MHI distribution.* O‘ahu, Moloka‘i, Maui, and Hawai‘i (Abbott 1999).

*PMNM materials examined.* **MIDWAY**: Reef face, *K. McDermid*, Jun 1999, det. I.A. Abbott, *BISH 710917* (*IA 31144, KM 4751*). **LAYSAN**: Tide pools on semi-exposed bench, *F. Ball*, 14 Jul 1977, *BISH 701534* (*IA 17261*).

**Phylum OCHROPHYTA**

**Class PHAEOPHYCEAE**

***Rosenvingea intricata*** (J. Agardh) Børgesen **New PMNM record**

*MHI distribution.* O‘ahu, Maui, and Hawai‘i (Abbott & Huisman 2004).

*PMNM examined.* **LISIANSKI**: NOWRAMP 2002, LIS-09-38, *K. Kukea-Shultz* & *K. Peyton*, 1 Oct 2002, det. J. Fisher, *BISH 736015*.

**Phylum CHLOROPHYTA**

***Cladophora catenata*** (Linnaeus) Kützing **New PMNM record**

[= *Cladophoropsis luxurians* W.J. Gilbert, *Cladophora luxurians* (W.J. Gilbert) I.A. Abbott & Huisman]

*MHI distribution.* Kaua‘i, O‘ahu, Moloka‘i, and Hawai‘i (Abbott & Huisman 2004).

*PNMN material examined.* **MARO**: NOWRAMP 2002, *K. McDermid* & *B. Stuercke*, 16 Sep 2002, *BISH 694197* (*KM 7048*).

***Cladophoropsis fasciculata*** (Kjellman) Wille **New PMNM record**

[=*Cladophoropsis sundanensis* Reinbold]

The specimens were identified by Isabella A. Abbott as *Cladophoropsis sundanensis* and fell within the circumscription of that species in the taxonomic revision of the genus by Leliaert & Coppejans (2006). The apical cells ranged from 56–160 µm in diameter.

*MHI distribution.* O‘ahu, Moloka‘i, Kaho‘olawe and Hawai‘i (Abbott & Huisman 2004).

*PMNM materials examined.* **KURE**: SE side, intertidal, *J. Polloi*, 25 Sep 2002, det. I.A. Abbott, *BISH 694985*. **PEARL & HERMES**: NOWRAMP 2002, *K. Kukea-Shultz & K. Peyton*, 19 Sep 2002, det. I.A. Abbott, *BISH 694386*; NOWRAMP 2002, *K. Kukea-Shultz* & *K. Peyton*, 19 Sep 2002, det. I.A. Abbott, *BISH 694412*. **NECKER**: Intertidal, *H. Fortner*, 27 Jun 1984, det. I.A. Abbott, *BISH 701413* (*IA 17328*).

***Cladophoropsis membranacea*** (Hofman Bang ex C. Agardh) Børgesen **New PMNM record**

The diameter of the apical cells was greater than in *Cladophoropsis fasciculata* and ranged between 180–320 µm.

*MHI distribution.* Kaua‘i, O‘ahu, Moloka‘i, Kaho‘olawe, and Hawai‘i (Abbott & Huisman 2004).

*PMNM materials examined.* **PEARL & HERMES**: *K. Geisler*, 8 Oct 2000, *BISH 698812 (IA 30434*). **NECKER**: lobster traps, 29.2–80.5 m deep, *R. Moffitt*, 13 Jun 2005, det. I.A Abbott, *BISH 717624* (*IA 31413*).

***Pseudochlorodesmis parva*** W.J. Gilbert **New PMNM record**

[= *Siphonogramen parvum* (W.J. Gilbert) I.A. Abbott & Huisman]

Clumps (about 6 mm across) of siphons were growing on sandy substrata. The siphons possess few branches, <1 cm long and 24–72 µm in diameter. The siphons of BISH 694216 were slender, 24–32 µm in diameter, and were initially identified as *Derbesia tenuissima* (Moris & Notaris) P. Crouan & H. Crouan. Verbruggen *et al*. (2009) showed that the *Pseudochlorodesmis-Siphonogramen* complex displayed cryptic diversity exceeding the family level and proposed to maintain *Pseudochlorodesmis* as a form genus with *Siphonogramen* incorporated under this genus.

*MHI distribution.* Kaua‘i and Oahu (Abbott & Huisman 2004).

*PMNM materials examined.* **LAYSAN**: NOWRAMP 2002, *J. Polloi*, 17 Sep 2002, *BISH 694216*; 58 m deep*, J. Leonard*, 23 May 2013, *NWHI-197*; 58 m deep, *J. Leonard*, 23 May 2013, *NWHI-199*; 61 m deep, *D. Wagner*, 24 May 2013, *NWHI-207*.

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Our sincere appreciation to all individuals who collected the above listed algal specimens between 1984 and May 2013 from the PMNM — Catherine Agegian, Fred Ball, Heather Fortner, Karen Geisler, Nancy Hoffman, Marc Hughes, J. Kanakoa Kukea-Shultz, Jason Leonard, Karla McDermid, Robert Moffitt, Ryan Okano, Kimberly Peyton, Jeremy Polloi, Brooke Stuercke and Daniel Wagner. The late Isabella A. Abbott is acknowledged for initially identifying many of the herbarium specimens, especially the red algae.

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# Rediscovery of *Auriculella pulchra* Pease, 1868 (Gastropoda: Pulmonata: Achatinellidae)[1]

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Hawaii supports one of the world's most spectacular land snail radiations and is a diversity hotspot (Solem 1983, 1984, Cowie 1996a, b). Unfortunately, much of the Hawaiian land snail fauna has been lost, with overall extinction rates as high as ~70% (Hayes *et al*., unpubl. data). However, the recent rediscovery of an extinct species provides hope that all is not lost, yet continued habitat destruction, impacts of invasive species, and climate change, necessitate the immediate development and deployment of effective conservation strategies to save this biodiversity treasure before it vanishes entirely (Solem 1990, Régnier *et al*. 2009).

**Achatinellidae**

***Auriculella pulchra* Pease 1868** **Notable rediscovery**

*Auriculella pulchra* (Fig. 1) belongs in the Auriculellinae, a Hawaiian endemic land snail subfamily of the Achatinellidae with 32 species (Cowie *et al*. 1995). It was originally described from the island of O'ahu in 1868 and was subsequently recorded throughout the Ko'olau Mountain range. There are no known published records of this species from 1923 to 1973. However, unpublished field notes and uncataloged lots from 1930–1970 at the Bishop Museum indicate that the species was extant and in good numbers.

Although *Auriculella pulchra* was reported from Poamoho in 1914 and Waimano from 1915–1919, there were no records (i.e., publications or catalogued lots) of this species for the next 55 years until one of us (DC) observed *Auriculella pulchra* in Waimano and Poamoho in 1974. Many individuals (too numerous to count) were observed in both areas annually from 1974 to 1976. However, over the next few subsequent years, the populations experienced a sharp decline and the numbers were so low that even after extensive searching only a few individuals were found. By 1981, Chung observed no individuals in Waimano. From 1976–1986, anywhere from zero to five snails were recorded each year in Poamoho, with the last individual seen in 1986. Similar declines and eventual extirpations

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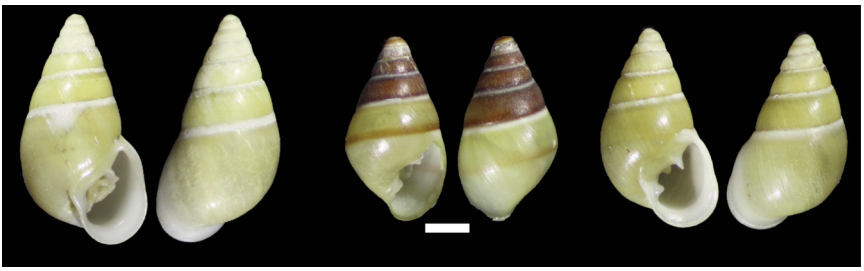

**Fig. 1**. *Auriculella pulchra*, Poamoho, Ko‘olau Mountains (BPBM 278618); scale bar = 2 mm.

in *A. pulchra* populations were seen in other areas in the Ko‘olau Mountains (i.e., Manana, Lanihuli, Haiku Stairs). The Waimano and Poamoho areas were surveyed annually by Chung from 1987–1997 and no *A. pulchra* were recorded. Based on these observations and a conservative estimate of extinction (>70% probability of extinction) calculated using the simplified Bayesian approach of Lee *et al*. (2014), *A. pulchra* was considered extinct as of 2011.

However, recent surveys resulted in rediscovery of *Auriculella pulchra* north of Poamoho, Ko‘olau Mountains in July 2013. The population size was not estimated, but consisted of at least 30 individuals.

*Material examined* [The exact locality data for material listed here are not listed here for conservation purposes but are kept in the State of Hawaii Department of Land and Natural Resources Snail Extinction Prevention Program and Bishop Museum Malacology databases]: **O‘ahu**: Hālawa, 1923 (BPBM 75477); Kahau‘iki, 1918 (BPBM 46194); Kalihi, 1907–1918 (BPBM 35221, 35222, 35393, 35958, 38299, 40453, 42156, 42849, 42850, 42868, 42879, 42885, 42891, 42896, 43668, 43669, 43735, 43758, 44037, 45802, 45805, 45809, 45818, 45974); Kawai‘iki, 1914 (BPBM 37336, 37342); Kīpapa, 1914 (BPBM 36633); Malaekahana, 1917 (BPBM 44852); Moanalua, 1919 (BPBM 49124, 49129, 49132, 49147, 49148, 49149); north of Poamoho, 2013 (BPBM 278617, 278618); Nu‘uanu, 1915–1917 (BPBM 44002, 44003, 44008, 44009, 44012, 42427, 42574, 43953, 43954, 43955, 43956, 43957); Opae‘ula, 1914–1917 (BPBM 37317, 37323, 37328, 37349, 43650); Poamoho, 1914 (BPBM 37349); Waimano, 1915–1919 (BPBM 40414, 47297, 49065).

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# Type Species Designation for *Pelagolimnaea* Germain, 1928, and a Correction Regarding the Type Species of *Pseudisidora* Thiele, 1931 (Gastropoda: Basommatophora: Lymnaeidae)[1]

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Germain (1928: 995–996) described *Pelagolimnaea* as a new subgenus of *Lymnaea* Lamarck, 1799, and assigned nine endemic Hawaiian species to it. He failed to select any one of these as type of his new subgenus, however, an omission which has not yet been remedied. Thiele (1931) established *Pseudisidora* as another subgenus of Hawaiian lymnaeids, but misidentified the species he identified as its type. This paper designates a type species for *Pelagolimnaea* and corrects Thiele's misidentification.

The question of how many genera and subgenera should be recognized within the Lymnaeidae is a matter of controversy (Vinarski 2013) and is outside the scope of this note, which is concerned only with ambiguities in the nomenclature of the various genus-level names that have been applied to the native Hawaiian lymnaeids. Hubendick (1951, 1952) assigned all of Hawaii's native lymnaeids to *Lymnaea* Lamarck, 1799 (type species: the Holarctic *Helix stagnalis* Linnaeus, 1758, by subsequent designation of Fleming 1818). Cowie et al. (1995) regarded the Hawaiian species as comprising one endemic genus, *Erinna* H. Adams & A. Adams *in* A. Adams, 1855 [not of Meigen (1800), a work suppressed by ICZN (1963)] (type species by original designation: *Erinna newcombi* H. Adams & A. Adams *in* A. Adams, 1855), and an endemic subgenus of *Lymnaea*, *Pseudisidora* Thiele (1931) (type species by original monotypy: *Lymnaea rubella* Lea, 1841). Cowie et al. (1995) recognized four valid Hawaiian species: *E. newcombi*, *E. aulacospira* (Ancey, 1889), *L.* (*P.*) *rubella,* and *L.* (*P.*) *producta* (Mighels, 1845), each of the last three with one or more synonyms. The most recent review of the family (Vinarski 2013) also recognized *Erinna* as a valid genus but elevated *Pseudisidora* [as "*Pseudoisidora*"] to full generic status with an included subgenus, *Pseudobulinus* Kruglov & Starobogatov, 1993b (type species by original designation: *Physa reticulata* Gould, 1847 [= *Physa producta* Mighels, 1845, *fide* Cowie *et al*. 1995]). None of these works recognized *Pelagolimnaea.*

Germain (1928) cited his new taxon as "*Pelagolimnaea* Germain, 1925", and in Germain (1934:111) he gave the publication date as 1926; the name first appeared in the proceedings of the 1926 Pan-Pacific Science Congress, however, which were not published until 1928. Although *Pelagolimnaea* has been cited in the literature at least four times (Germain 1934; Riech 1937; Taylor 1988; Kinzie 1992), it is not listed in Neave (1939–2004) or in the published compilation of Germain's new taxa (Fischer-Piette 1947) and has been overlooked by subsequent authors reviewing the supraspecific classification of the Lymnaeidae (Thiele 1931; Hubendick 1951, 1952; Zilch 1959–1960; Cowie *et al*.

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1995; Kruglov & Starobogatov 1993a, 1993b; Vinarski 2013).

*Pseudisidora*, on the other hand, has been recognized by numerous subsequent authors, either as a distinct genus (Zilch 1959–1960; Morrison 1968; Burch & Patterson 1971; Patterson & Burch 1978; Burch 1982; Haynes 1990; Ponder & Waterhouse 1997; Vinarski 2013), as a subgenus of *Lymnaea* (Cowie *et al*. 1995), or as a "section" of subgenus *Polyrhytis* Meek, 1876, of *Lymnaea* (Kruglov & Starobogatov 1993a). Finally, Kruglov & Starobogatov (1993b) erected *Pseudobulinus* as a subgenus of *Lymnaea*.

Germain (1928) included nine species in *Pelagolimnaea*: *Lymnaea compacta* Pease, 1870, *L. oahuensis* Souleyet, 1852, *L. rubella*, *L. reticulata*, *L. hartmanni* Clessin *in* Küster, Dunker, & Clessin, 1886, *L. hawaiensis* Pilsbry, 1904, *L. affinis* Souleyet, 1852, *L. volutata* Gould, 1847, and *L. turgidula* Pease, 1870. *L. hawaiensis*, is now regarded as a synonym of *E. aulacospira*, the others as synonyms of *rubella* (*oahuensis*, *volutata*, *turgidula*) or of *producta* (*reticulata*, *compacta*, *hartmanni*, *affinis*) (Cowie et al. 1995). Johnson (1994, 1996), on the other hand, contended that *compacta* is not a lymnaeid at all but is instead a synonym of *Physa mexicana* Philippi, 1841 (Physidae). Accordingly, the identity of *Pelagolimnaea* will remain ambiguous until a type species is designated.

The situation is further complicated by the fact that Thiele's designation of *Lymnaea rubella* as type species of *Pseudisidora* was based on a misidentification. His illustration representing that species (Thiele 1931: 476, fig. 571) is of a species having a sinistral shell, an error repeated by Zilch (1959–1960: 93, fig. 300). In fact, however, the shell of *L. rubella* is dextral (Hubendick 1951, 1952; Morrison 1968); examination of the holotype, National Museum of Natural History, Smithsonian Institution, catalog number 118646 (personal communication, Norine W. Yeung, April 9, 2014), confirms this. The only sinistral lymnaeid known to occur in the Hawaiian Islands, and indeed the only extant species of *Lymnaea* yet recognized from any location that is invariably sinistral (Burch 1982), is *L. producta*, the current name for the type species of *Pseudobulinus.* The error may have originated with Pease (1870), whose illustrations of *L. rubella* included both sinistral (pl. 3, fig. 1) and dextral shells (pl. 3, fig. 2). Pease either mislabeled his figures or failed to recognize that *L. rubella* and *L. producta* are separate species, one dextral and the other sinistral. The suggestion by Zimmerman (1948:136-137) that one of the native Hawaiian lymnaeids demonstrates chiral dimorphism is based on a misidentification. Yoshio Kondo, in marginalia dated 28 July 1965, in a copy of Zimmerman's work now held by Bishop Museum, noted that identifications by Hubendick (1952) of the material previously examined by Zimmerman demonstrate that the dextral specimens are *L. rubella* and the sinistrals are *L. producta*.

Thiele's illustration of a sinistral specimen (presumably of *L. producta*) as a representative of the invariably dextral *L. rubella* constitutes the "clear evidence" needed under Article 70.1 of the International Code of Zoological Nomenclature (I.C.Z.N. 1999, hereinafter "the Code") to overcome the usual presumption that his identification was correct, and thus the provisions of Article 70.3 of the Code are applicable providing that in such circumstances either "the nominal species previously cited as type species" or "the taxonomic species actually involved in the misidentification" may be selected as would "best serve stability and universality."

In order to resolve the existing uncertainties as to the identities and status of these taxa, it is necessary to select a type species for *Pelagolimnaea* pursuant to Article 69 of the Code (*i.e.*, any of the species assigned to that taxon in Germain's original description

of it) and to designate a corrected type species of *Pseudisidora* pursuant to Article 70.3 of the Code (*i.e.*, either the species supposedly designated by Thiele or the species that he in fact had before him).

Accordingly, *Lymnaea aulacospira* Ancey, 1889 (synonym: *Lymnaea hawaiensis* Pilsbry, 1904) is **here selected as type species** of *Pelagolimnaea* Germain, 1928, thereby rendering the latter a subjective synonym of *Erinna*. This action serves the interests of stability by preserving the current usage of *Pseudisidora* and *Pseudobulinus*, rather than replacing of one or the other with Germain's long-overlooked name.

Finally, *Lymnaea rubella* Lea, 1841, is **now selected as type species** of *Pseudisidora* Thiele, 1931, an action that "best serves stability and universality" by preserving the existing usage of *Pseudisidora* and avoiding the preemption of *Pseudobulinus* that would occur if *Lymnaea producta* were instead to become the type of *Pseudisidora*.

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