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Records of the Hawaii Biological Survey for 2018

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Cover photo: *Campsicnemus pulumi* Evenhuis, n. sp. from Kaua‘i (see page 19).

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RECORDS OF THE HAWAII BIOLOGICAL SURVEY FOR 2018

Editor's Preface

I am pleased to present the annual compilation of *Records of the Hawaii Biological Survey;* this year for the year 2018. 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 Hawai'i'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 almost 6,400 authors who have described flies.

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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 2018* were compiled with reviews by and/or assistance of Clyde Imada (botany), Ken Hayes, John Slapcinsky (malacology), and Dan Bickel and David Notton (entomology). 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, the Hawaii Department of Transportation, 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, editor*

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Records of the Hawaii Biological Survey for 2018. Edited by Neal L. Evenhuis. *Bishop Museum Occasional Papers* 126: 3–9 (2019)

New Hawaiian plant records for 2018[1]

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Ongoing field work, collections, and research continue to produce new, previously unpublished distributional records for the Hawaiian flora. In this paper, two new naturalized records, 14 new island records, two range extensions, and one notable rediscovery are reported. Additionally, seven taxa are reported as adventive and showing signs of naturalization. A total of 25 taxa in 16 plant families are discussed. One taxon is endemic, and another is possibly indigenous; the remainder are introduced. Collections cited were made on the islands Moloka'i, Maui, and Hawai'i. 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*.

Voucher specimens are deposited at the Bernice Pauahi Bishop Museum *Herbarium Pacificum* (BISH), Honolulu, with duplicates at the National Tropical Botanical Garden (PTBG), Lāwa'i, Kaua'i. A few specimens may be at only one or more facilities; only in these cases will the herbarium acronym be cited.

Amaranthaceae

Gomphrena globosa L. **New island record**

Cultivated and escaping in many parts of the world, this annual herb has been previously documented from Kaua'i and O'ahu (Wagner *et al*. 1999: 192; Lorence *et al*. 1995: 21). On Maui it was collected in a weedy, neglected area next to a paved parking lot, growing with *Cleome gynandra*.

Material examined. **MAUI**: East Maui, Makawao Distr, Pā'ia, 11 m, 5 Oct 2010, *Oppenheimer #H101005* (BISH).

Amaryllidaceae

Zephyranthes grandiflora Lindl. **New island record**

Previously documented from Lāna'i (Oppenheimer 2011: 8), the large pink rain lily was found in an overgrazed area on Maui, where it is ephemeral, depending on rainfall.

Material examined. **MAUI**: East Maui, Wailuku Distr, Kēōkea, SE of Pu'u o Kali, 686 m, 25 Nov 2013, *Oppenheimer, K. Bustamente, L. Kia, & K. Marchello #H111321*.

Araceae

Xanthosoma robustum Schott **New island record**

Known from Kaua'i, O'ahu, Maui, and Hawai'i (Staples & Woolliams 1997: 13; Imada *et al*. 2000: 10; Oppenheimer & Bartlett 2000: 2), this aroid was collected outside of cultivation on Moloka'i, where it is sparingly naturalized.

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Material examined. **MOLOKA‘I**: Kaunakakai, near forestry barracks, 650 m, 2 Apr 2009, *Oppenheimer H40914* (BISH).

Asteraceae

Cirsium arvense (L.) Scop. **New state record**

This thistle was found growing along with *C. vulgare* (Savi) Ten. along a disturbed trail in subalpine shrubland and forestry plantings of *Pinus* spp.

Material examined. **MAUI**: East Maui, Makawao Distr, ‘Alae, Kula FR, Waiakoa Trail, 1890 m, 13 Jun 2016, *Oppenheimer & M. Padgett #H61605*.

Gazania rigens (L.) Gaertn. **New naturalized record**

Native to South Africa and known as treasure flower in the horticultural trade, this herb is also naturalized in Australia (Wikipedia, accessed 2016/12/23). Three named varieties are accepted; the specimens have not been assigned to any of them.

Material examined. **MAUI**: East Maui, Makawao Distr, Kēōkea, locally common, mat forming, low-growing herb naturalized in lawns, flowers yellow, forms dense patches and spreads by runners, 908 m, 2 Apr 2016, *Oppenheimer #H41601.*

Leucanthemum x***superbum*** (J.W. Ingram) D.H. Kent **New island record**

Previously recorded from Hawai‘i Island (Pratt & Bio 2012: 75), this ornamental was found in a disturbed area and likely colonized after a large wildfire in 2007. It has been observed to be under cultivation several miles away at lower elevation.

Material examined. **MAUI**: East Maui, Makawao Distr, Waiohuli, Kula FR, below the unpaved road, 2026 m, 25 Nov 2015, *Oppenheimer & M. Padgett #H111504*.

Begoniaceae

Begonia cucullata Willd. **New island record**

This begonia was first documented as a naturalized species in the Hawaiian Islands from Kaua‘i and Hawai‘i in secondary, alien vegetation (Lorence *et al*. 1995: 25). This is consistent with its occurrence on Moloka‘i.

Material examined. **MOLOKA‘I**: Wailau Valley, escaped from cultivation into rocky sites, leaves succulent, 90 m, 11 Oct 2009, *Oppenheimer & S. Perlman #H100907.*

Begonia fusca Liebm. **New island record**

Cultivated since at least the 1930s and found naturalized on Kaua‘i and O‘ahu (Miller & Staples 2003: 22), it was speculated that other populations may occur on other islands as well. This begonia is now known from Maui.

Material examined. **MAUI**: East Maui, Hāna Distr, N of Kawaipapa Stream, 61 m, 25 Jan 2013, *Oppenheimer & S. Perlman #H11306*.

Brassicaceae

Lepidium oblongum Small **Range extension**

Known from Ni‘ihau, Kaua‘i, O‘ahu, Moloka‘i, Lāna‘i, East Maui, and Hawai‘i (Wagner *et al*. 1999: 407; Lorence *et al*. 1995: 26; Starr *et al*. 2006: 33), this peppergrass was collected on West Maui in dry shrubland dominated by native species.

Material examined. **MAUI**: West Maui, Lahaina Distr, Olowalu Valley, SE slope below ‘Ula‘ula, 549 m, 4 Feb 2009, *Oppenheimer & S. Perlman #H20910*.

Bromeliaceae

Guzmania monostachia (L.) Rusby ex Mez **New island record**

First reported as an epiphyte on O‘ahu (Frohlich & Lau 2010: 7), this species was found on Maui on a cliff in *Metrosideros/Diospyros* lowland forest, where it was obviously not under cultivation.

Material examined. **MAUI**: West Maui, Wailuku Distr, ‘Īao Valley, SW of ‘Īao Needle above Kinihāpai Stream, 415 m, 10 Sep 2013, *Oppenheimer, K. Bustamente, & S. Perlman #H91301* (BISH).

Cucurbitaceae

Sicyos hillebrandii H. St. John **Notable rediscovery**

This species was first collected in Kula, Maui by William Hillebrand, possibly accompanied by John M. Lydgate (Wagner & Shannon 1999), and described as a new species, *Sicyos laciniatus* Hillebr. Unfortunately, though, Hillebrand’s name turned out to be illegitimate, as Linnaeus had previously published the binomial *S. laciniatus* to describe a species from Mexico and Arizona, New Mexico, and Texas in the American southwest. Harold St. John corrected the error by renaming the Hawaiian material *S. hillebrandii* H. St. John (St. John 1934). The holotype specimen at B was presumably destroyed during World War II, with isotypes at BISH & K (K not seen). In 1995, Warren Wagner confirmed the type status of the BISH specimen and its identity as *S. hillebrandii*. Wagner *et al*. (1999: 577) presumed it was extinct. Recently, however, populations have been rediscovered in disturbed areas in Kula, Maui, where Hillebrand and Lydgate made their original collections. Research at various herbaria have brought to light other collections on Maui. Most of the Maui populations, save one, have been extirpated, succumbing to deer, goats, pigs, alien vegetation (especially *Neonotonia wightii*), drought, slugs, and urban development.

Material examined. **MAUI**: East Maui, Makawao Distr, Kula, Waiho, no date, *W. Hillebrand s.n.* (BISH 501821); Kula, Harry Hashimoto Farm, 23 May 2002, *L. Fujitani s.n.* (BISH 689778, 689780); Ka‘ono‘ulu, mauka of Rice Park, large vines sprawling over cultivated *Bougainvillea* hedge and climbing 5 m into cultivated *Acacia koa*, 914 m, 3 Feb 2009, *Oppenheimer & S. Perlman #H20908*; *loc. cit.,* 7 Mar 2009, *Oppenheimer #H30901*; *loc. cit.,* 23 Jun 2014, *R.W. Hobdy 4370*; *loc. cit.,* 15 Jul 2014, *Oppenheimer & K. Bustamente #H71402*; *loc. cit.,* 12 Aug 2014, *Oppenheimer #H81402, #H81403*; mauka of the junction of Kekaulike & Kula Hwys, N of Kaipoioi Gulch, 945 m, 16 Jul 2014, *Oppenheimer & K. Bustamente #H71403.*

Euphorbiaceae

Euphorbia lactea Haw. **New island record**

First reported in Hawai‘i from the islands of Kaua‘i and O‘ahu by Frohlich & Lau (2012: 35), they noted that it was not known to flower in cultivation and thus was apparently being spread by vegetative means. It was also reported from dry areas on both islands and on a cliff on Kaua‘i. On Maui widely separated individuals are growing on cliffs dominated by *Leucaena* and *Opuntia*.

Material examined. **MAUI**: West Maui, Lahaina Distr, Honolua Bay, west side of Kulaoka‘e‘a, near Līpoa Pt, 20 ft, 10 Jan 2010, *Oppenheimer & F. Duvall #H11003* (BISH).

Fabaceae

Crotalaria lanceolata E. Mey. **Range extension**

This rattlepod has been reported from O‘ahu, East Maui, and Hawai‘i (Wagner *et al.* 1999: 660; Oppenheimer 2004: 12; Imada 2007: 37). It is now known from West Maui.

Material examined. **MAUI**: West Maui, Lahaina Distr, Honokahua, occasional but locally common, growing at edge of abandoned golf course fairway, 76 m, 5 Apr 2015, *Oppenheimer & M. Oppenheimer #H41513*.

Dioclea wilsonii Standl. **New island record**

Naturalized or possibly indigenous, this species occurs in coastal forests in Honduras, and in Tahiti (where it is also presumed naturalized), as well as on Kaua‘i and Hawai‘i (Wagner *et al*. 1999: 670). Recently it was found on windward east Maui.

Material examined. **MAUI**: East Maui, Hāna Distr, Nāhiku, high-climbing vines in alien vegetation along disturbed roadside, 38 m, 19 Jun 2012, *Oppenheimer, K. Bustamente, & S. Perlman #H61206* (BISH).

Pueraria phaseoloides (Roxb.) Benth. **New island record**

In the discussion of the genus *Pueraria* DC., Wagner *et al.* (1999: 693) mentioned *P. phaseoloides* as widely cultivated and prone to naturalization and sometimes becoming a pest. Later, Frohlich & Lau (2008: 7) documented it as such on O‘ahu. On Maui it also has the potential to become a pest based on observation at least in the Kapi‘a area, where it occurs over several hundred meters.

Material examined. **MAUI**: East Maui, Hāna Distr, Ka‘elekū, 76 m, 22 Jan 2013, *Oppenheimer & S. Perlman #H11305* (BISH); Kakio, S side of Kapi‘a Stream, common, 244 m, 31 March 2016, *Oppenheimer & M. Padgett #H31611*.

Vigna luteola (Jacq.) Benth. **New island record**

Only recently reported as a naturalized species, it was found on Kaua‘i and O‘ahu (Staples *et al.* 2003: 12; Frohlich & Lau 2012: 39). On West Maui it was found to be locally common, covering over an acre of disturbed *‘ōhi‘a/lama* lowland forest.

Material examined. **MAUI**: West Maui, Wailuku Distr, ʻĪao Valley, *Oppenheimer, K. Bustamente, & J. Nielsen #H41401.*

Iridaceae

Trimezia steyermarkii R.C. Foster **New island record**

Native to southern Mexico through Central America to Venezuela and Colombia, this species was found on Maui in secondary lowland wet forest. Previously it was reported from O‘ahu (Frohlich & Lau 2014: 10).

Material examined. **MAUI**: East Maui, Hāna Distr, Wākiu, below Olopawa, 85 m, 21 Jun 2012, *Oppenheimer, K. Bustamente, & S. Perlman #H61213*.

Passifloraceae

Passiflora vitifolia Kunth **New island record**

Native to the lowland Neotropics from Central America to Peru, and cultivated for its showy red flowers, this species escapes cultivation and is sparingly naturalized on O‘ahu (Wagner *et al*. 1999: 1014). This is consistent with observations and collections from Maui.

Material examined. **MAUI**: East Maui, Makawao Distr, Kaupakalua, ‘Awalau Gulch, 439 m, 7 Apr 2013, *Oppenheimer & S. Aruch #H41303*.

Adventive species showing signs of naturalization

Asteraceae

Calendula arvensis L.

Field marigold is an annual herb native to Europe and is used medicinally. It is naturalized in California (www.calflora.org, accessed 20180810). On Maui a single plant was found growing out of a rock wall, where it apparently was not cultivated. The leaves have a strong smell, and the flowers are on single stalks with yellow ray and disc florets.

Material examined. **MAUI**: Lahaina Distr, Honokahua, 24 m, 23 Apr 2010, *Oppenheimer #H41004* (BISH).

Begoniaceae

Begonia serratipetala Irmscher

This attractive herb native to New Guinea was found outside of cultivation. It has fibrous roots and red stems that root where they come in contact with wet ground. Leaves are oblique, olive green with raised pink spots above, and red-purple beneath, as well as pink to red flowers (Staples & Herbst 2005: 178).

Material examined. **MAUI**: East Maui, Hāna Distr, lower Nāhiku, Honolulu Nui, 91 m, 19 Sep 2012, *Oppenheimer, I. Nelson, & T. Summers #H91212* (BISH).

Bromeliaceae

Aechmea fulgens Brongn.

Not previously known as a naturalized species in Hawai‘i, the only other species in the genus *Aechmea* Ruiz & Pavón naturalized is *A. bracteata* (Sw.) Griseb. on O‘ahu (Frohlich & Lau 2008: 4). The two differ in the size of the floral bracts, which are small or absent in *A. fulgens* (Staples & Herbst 2005: 634). This species is native to Brazil, where it grows both terrestrially and epiphytically (Staples & Herbst 2005: 634).

Material examined. **MAUI**: East Maui, Hāna Distr, lower Nāhiku, Honolulu Nui, specimens retrieved from large rotted and fallen branch from a large mango tree, 91 m, 19 Sep 2012, *Oppenheimer, I. Nelson, & T. Summers H91213* (BISH).

Lamiaceae

Origanum vulgare L.

The true oregano is native to most of Europe and cultivated worldwide as a culinary herb (Staples & Herbst 2005: 365). It is propagated from seed or cuttings, and easily grown from even short pieces of stem.

Material examined. **MOLOKA‘I**: Wailau Valley, apparently originally cultivated but sparingly spread into nearby rocky sites, 90 m, 11 Oct 2009, *Oppenheimer & S. Perlman #100906* (BISH).

Marantaceae

Calathea zebrina (Sims) Lindley

Not previously known to have escaped cultivation in Hawai‘i, zebra plant is grown for its patterned foliage and is used as a ground cover. It differs from *C. crotalifera* S. Watson, the other naturalized species of *Calathea* in Hawai‘i, by its shorter, more cylindrical inflorescence (Staples & Herbst 2005: 703).

Material examined. **MAUI**: East Maui, Hāna Distr, Honolulu Nui, herbs, locally naturalized, spreading at least vegetatively by runners and “walking,” in dark, shady, alien dominated forest, 84 m, 19 Jun 2018, *Oppenheimer #H61804*.

Menyanthaceae

Nymphoides aquatica (T. Walker) Kuntze

This aquatic herb, known as banana plant or water snowflake, is native to the eastern United States westward through Texas, where it grows in lakes, ponds, bogs, and ditches (Staples & Herbst 2005: 401). How it came to be growing in a small pool of muddy water is a matter of conjecture, but it is along a popular hiking trail.

Material examined. **MAUI**: West Maui, Wailuku Distr, Waiheʻe Ridge Trail below Lanilili summit, 680 m, 23 Sep 2011, *Oppenheimer & J. Nielsen #H91119*.

Rosaceae

Prunus persica (L.) Batsch var. ***nucipersica*** (Suckow) C.K. Schneider

The nectarine is a popular fruit, and viable seeds germinate where discarded, although at the present time it is unknown if these trees reproduce and multiply. The specimen was collected in an area that had burned in 2007. The fruit were small but delicious.

Material examined. **MAUI**: East Maui, Makawao Distr, Kēōkea, Kula FR, 1939 m, 1 Sep 2009, *Oppenheimer #H90901*.

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New records of Clausiliidae: *Tauphaedusa tau* (Boettger, 1877) (Gastropoda: Heterobranchia) on O‘ahu, Hawaiian Islands, and the first global record of infection of a clausiliid land snail with *Angiostrongylus cantonensis* (Chen, 1935), the rat lungworm[1]

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Clausiliidae

Tauphaedusa tau (Boettger, 1877) **New state record, new US record**

The only published record of clausiliids in the Hawaiian Islands (Cowie, 1997) is of two lots of unidentified specimens collected in 1965 at two localities on O‘ahu, one in Nu‘uanu Valley (including one live-collected specimen) and one in Makiki Valley (see material examined). This material was deposited in the Bishop Museum and has until now remained unidentified. Prior to these collections, unidentified clausiliids (shells only) were collected in Mānoa Valley, O‘ahu, in 1962 and deposited in the U.S. National Museum of Natural History (see material examined). The Mānoa specimens have not previously been reported in the literature, and no additional records of clausiliids in the Hawaiian Islands have been published until now. This is only the second clausiliid species to have been recorded anywhere within the United States and its territories, the other being *Nenia tridens* (Schweigger, 1820), which is native to Puerto Rico (van der Schalie 1948; Thompson 1998; Uit de Weerd & Gittenberger 2013).

In 2018, surveys were undertaken across O‘ahu as part of a project to screen snails of all species encountered for *Angiostrongylus cantonensis* (Chen, 1935), the rat lungworm. This nematode is the primary cause of eosinophilic meningitis in humans (Cowie

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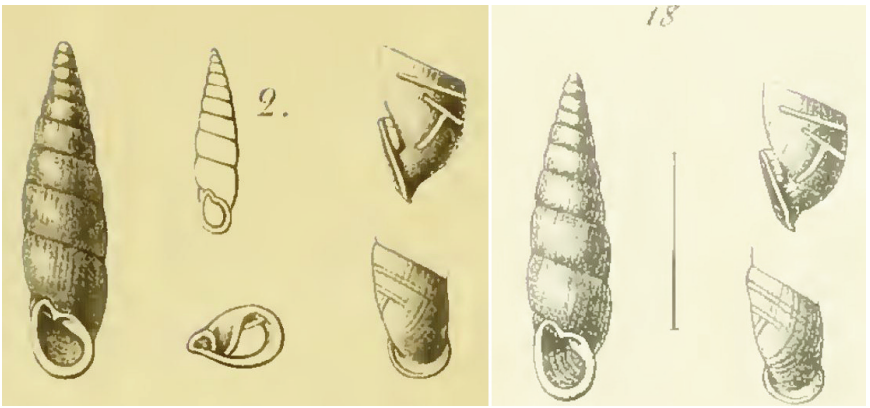

Fig. 1. Illustrations of *Clausilia tau* Boettger, 1877. **Left**, original illustration from Boettger (1878: pl. III, fig. 2). **Right**, illustration from Kobelt (1879: pl. VIII, fig. 18).

2013) and is widespread in the Hawaiian Islands (Kim *et al*. 2019). At two sites (Waiāhole and Kalihi Valleys) specimens of an unidentified species of Clausiliidae were found and identified as follows based on DNA sequences and shell morphology.

A 439 bp portion of the mitochondrially encoded cytochrome *c* oxidase subunit I (MT-COI) of one of the two living specimens found in Waiāhole Valley (see material examined) was amplified and sequenced using the universal mtDNA primers of Folmer *et al*. (1994). A GenBank BLAST (Benson *et al*. 2017) search indicated that at 100% query cover the sequence was 99.51% identical to a section of a 697 bp sequence (LC335870) from Japan, identified as *Euphaedusa tau* (Boettger, 1877) by Kawase *et al*. (2018).

The shells of the specimens collected from both Waiāhole and Kalihi Valleys were compared with the original description of this species (Boettger 1877) and with illustrations of this and other clausiliids from eastern Asia in subsequent publications (Boettger 1878, 1883; Kobelt 1879; Möllendorff 1883, 1887; Pilsbry 1902). In particular, the overall shape and size of the shells and the appearance of the transverse shell ribbing and of the apertural lamellae viewed both from the aperture and as visible through the somewhat translucent abapertural part of the shell confirmed this identification (Figs. 1–3). In addition, a specimen collected in 2018 by J.R. Kim and others in Nu‘uanu Valley was identified as belonging to this species, as were the specimens collected in 1962 (Fig. 4) and 1965 (see material examined). All these collected specimens were confirmed as belonging to a single species based on the morphological features noted above. A single live specimen was also found by State of Hawai‘i Department of Land and Natural Resources personnel in 2018 in Makiki Valley; it was photographed but not preserved.

Boettger (1877) described this species from Japan in the genus *Clausilia* section *Phaedusa*, and within *Phaedusa* in the “Gruppe der *shangaiensis* Pfr. (*Euphaedusa*)”. This constituted the original establishment of the genus-group taxon *Euphaedusa*, which has been treated variously as a section of *Clausilia* (e.g. Pilsbry 1902), a subgenus of *Phaedusa* (e.g. Loosjes 1950; Zilch 1959; Chang 1982), or as a full genus. Boettger’s species has been placed consistently in *Euphaedusa*, generally treated as a full genus, within the subfamily Phaedusinae (e.g., Ohtsuki & Takahashi 1982; Kato *et al*. 1989;

Figs. 2–3. *Tauphaedusa tau* (Boettger, 1877) collected in Kalihi Valley, Oahu, in 2018. BPBM 284894. Shell height: 12.5 mm. **2**, shell in apertural and right lateral view; **3**, Abapertural close-up of the specimen in Fig. 2 with the internal lamellae visible through the shell (arrowed) and corresponding to the illustrations in the original description.

Kaneda & Kitagawa 1990; Schileyko 2000; Ueshima *et al*. 2014; Waki 2017). However, Nordsieck (2003) introduced *Tauphaedusa* as a new subgenus of *Euphaedusa*, with *Clausilia tau* Boettger, 1877 as type species, an arrangement followed by Nordsieck (2007) and Uit de Weerd & Gittenberger (2013: Supplementary data on-line). *Tauphaedusa* was raised to a full genus by Motochin *et al*. (2017), whose classification was followed by Sulikowska-Drozd *et al*. (2018) and is also followed here.

Möllendorff (1883) listed a number of varieties of *Clausilia tau* from central and southern China but considered them to exhibit only minor differences in various shell morphology features that were gradual in nature, presumably grading into each other, which was why he treated them as varieties and not separate species *("Speciell bei unsern Clausilienformen sind die Unterschiede durchgängig so geringfügiger und gradueller Natur, dass es völlig hinreichend ist, die verschiedenen Lokalformen als Varietäten zu scheiden"*). The species was subsequently recorded from south-west Korea by Möllendorff (1887), who considered this form to be sufficiently different from Japanese and Chinese specimens to be a distinct, but un-named variety. However, the species has been recorded most extensively in Japan (e.g. Pilsbry 1902), where it is widespread and even used in folk medicine (Hamada & Minato 1987).

The greatest diversity of clausiliids is centered in three regions, western Eurasia, eastern Asia, and the Neotropics (including the Caribbean islands of Puerto Rico and Hispaniola), with a notable absence in North America (Kerney *et al*. 1979; Pfleger & Chatfield 1988; Thompson 1998; Uit de Weerd & Gittenberger 2013). Supposed North American records for clausiliids in the U.S. National Museum of Natural History have

Figs. 4–5. *Tauphaedusa tau* (Boettger, 1877). **4**, specimen collected in Mānoa Valley, O‘ahu, in 1962. One of four specimens in USNM 652985. Shell height 12.8 mm; **5**, specimens from O‘ahu, in the laboratory with offspring. The adults are preserved in BPBM Malacology 284894.

been represented by three lots cataloged as being from the United States. Lots 67597 and 67598 were identified as *Laminifera pauli* (Mabille, 1865) (now *Neniatlanta pauli*; see Shileyko 2000; Gargominy & Ripken 2011) with the locality “Bayonne, New Jersey”. *Neniatlanta pauli* is native to the western Pyrenees south of Bayonne, France, and adjacent areas of Spain (Mabille 1865; Kerney *et al*. 1979; Shileyko 2000; Gargominy & Ripken 2011); the locality in the USNM records has been corrected to “Bayonne, France”. Lot 31384 was identified as *Hemiphaedusa cylindrica* (Pfeiffer, 1846) (now *Cylindrophaedusa cylindrica*; Shileyko 2000; Budha *et al*. 2015) from “Western Hills Indiana”. However, *C. cylindrica* is native to northern India and Nepal (Pfeiffer 1846; Mitra *et al*. 2005; Budha *et al*. 2015), “Indiana” clearly being an error for “India”. Nonetheless, there is nothing in the USNM records to support this inference and the record has been retained in the USNM as “Indiana”, which we consider erroneous. Accordingly, we conclude that the present records, including those reported by Cowie (1997), which are referred to *Tauphaedusa tau* herein, along with *Nenia tridens* in Puerto Rico, as noted above, are the only valid records of Clausiliidae in the United States and its territories.

The circumstances of the introduction of *Tauphaedusa tau* to the Hawaiian Islands are not known. Numerous non-native species have been introduced to the Islands accidentally via the horticultural trade but this species has not been found in surveys of horticultural nurseries (Hayes *et al*. 2007, 2012; Cowie *et al*. 2008; Yeung *et al*. 2019). As these records from O‘ahu appear to be the first records of *T. tau* outside what is presumed to be its native range in Japan, China and Korea (Pilsbry 1908), it is plausible that it may have been brought in by the Asian community in Hawai‘i, either inadvertently or perhaps because of its use as a medicine in Japan (Hamada & Minato 1987), but this remains unknown. As the species has now been found in multiple locations on O‘ahu, spanning

approximately 20 km of the Koʻolau range, and over a period in excess of 50 years, it is here regarded as established in the Hawaiian Islands.

Prior to their preservation, live-collected individuals were kept in Petri dishes in the laboratory for photography and unexpectedly produced large numbers of live-born offspring, ~2 mm in shell height at birth (Fig. 5), confirming the observations of Sulikowska-Drozd *et al.* (2018) that *Tauphaedusa tau* is viviparous.

Six of the specimens from Kalihi Valley (see material examined) were screened for *Angiostrongylus cantonensis*. Tissue digestion was done in Longmire's lysis buffer (0.1 M Tris, 0.1 M EDTA, 0.01 M NaCl, 0.5 % sodium dodecyl sulfate), 24 µl of buffer per 1 mg of tissue and 150 µg of proteinase K. DNA was extracted from the digested lysate with Qiagen Blood and Tissue Spin Column Kits following the manufacturer's general protocol. The DNA was screened for *A. cantonensis* with a Taqman qPCR assay (ACANITS1, Life Technologies assay ID #AI39RIC) with oligonucleotides specific for the parasite's internal transcribed spacer 1 (ITS1) gene (Qvarnstrom *et al*. 2010). Each 10 µl qPCR reaction consisted of 5 µl of Taqman Fast Advanced master mix (2X), 3.5 µl of nuclease-free water, 0.5 µl of the Taqman assay mix (20X), and 1.0 µl of template DNA. The qPCR run conditions consisted of a 2 min incubation at 50 °C, a 20 s denaturation period at 95 °C, and 40 cycles of 95 °C for 1 s and 60 °C for 20 s. A sample with an exponential amplification curve crossing a threshold of 0.2 florescent units was to be interpreted as positive for the presence of *A. cantonensis*. One of the six specimens was positive for the parasite. Based on the global compilation by Kim *et al*. (2014) of records of *A. cantonensis* in gastropods, it appears that this is the first record of infection, natural or experimental, in a clausiliid.

Material examined: **OʻAHU**: "W. side Manoa Valley, Oahu, Hawaiian Is.; rotten log, Round Top Forest Reserve, Round Top Drive" [USNM label], 7 Jun 1962, R. W. Husband (USNM 652985, 4 dry shells, Fig. 4); "Nuuanu Valley about 200 yards from highway on left side of stream in the dirt under dead leaves" [CCC field notes], 5 Sep 1965, William R. Hay & CCC (BPBM Malacology 207626, 1 collected alive, 2 dry shells); "Makiki Valley below Poloke Pl., c. 1200 ft. elevation" [CCC field notes], 23 Mar 1965, CCC (BPBM Malacology 252169, 4 dry shells); Nuʻuanu Valley, lat. 21.349233, long. -157.821900, 29 March 2018, J. R. Kim, T. C. Goulding, R. S. Kong (BPBM Malacology 284639, 1 dry shell); Waiāhole Valley, lat. 21.482094, long. -157.863509, 25 May 2018, RHC, RLR, MCIM (BPBM Malacology 284892; 2 collected alive, of which 1 sequenced; shells only preserved); Kalihi Valley, lat. 21.361389, long. -157.840157, 14 Aug 2018, RHC, RLR, MCIM (BPBM Malacology 284893; 4 dry shells); Kalihi Valley, lat. 21.361389, long. -157.840157, 5 Sep 2018, RHC, MCIM (BPBM Malacology 284894; 12 collected alive, of which 6 screened for *A. cantonensis*, 2 died, 4 with bodies preserved).

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A new species of *Campsicnemus* (Diptera: Dolichopodidae: Sympycninae) from Kaua'i, Hawaiian Islands, with remarkable leg ornamentation[1]

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Abstract. A new species of endemic long-legged flies, *Campsicnemus pulumi* **n**. **sp**. from the island of Kaua'i is described and illustrated. It's mid-tibial ornamentation exhibits one of the longest setae on record for Hawaiian dolichopodids.

Keywords: Dolichopodidae, Hawaiian Islands, taxonomy, male secondary sexual characters

INTRODUCTION

The long-legged fly genus *Campsicnemus* Haliday is one of the most speciose Diptera genera in Hawai'i with an estimated 250–300 species. Evenhuis (2003) reviewed the genus occurring on Kaua'i and described 19 new species, bringing the total number of species on the island to 26. Many parts of the island are yet to be explored and undoubtedly many more species await discovery. The new species described here, *Campsicnemus pulumi* n. sp. exhibits one of the more remarkable leg modifications in Hawaiian *Campsicnemus* with two patches of long setae on a swollen portion of the male mid tibia.

MATERIAL AND METHODS

Material derives from collections made by Dan Polhemus and are deposited in the Bishop Museum, Honolulu, Hawai'i, USA (BPBM). Morphological terminology follows Evenhuis (2016). Confocal images were accomplished by using a Leica M165C stereo dissecting scope via the Leica Microsystems LAS Multifocus software (v. 4.12.0) and using Zerene Stacker® software (v. 1.04) (Zerene Systems, LLC, Richmond, Washington, USA) to align and stack-focus each final image.

TAXONOMY

Campsicnemus Haliday

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).

1. Contribution No. 2019-006 to the Hawaii Biological Survey.

Fig. 1. *Campsicnemus pulumi* n. sp., male habitus.

Campsicnemus pulumi Evenhuis, **new species**
(Figs. 1–4)
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Diagnosis. This species cannot be placed using the key to Kaua‘i *Campsicnemus* in Evenhuis (2003) as it is stymied at the first couplet: it has a yellowish brown mesonotum, but also has brown admedian vittae. There are no Kaua‘i *Campsicnemus* that have a large basal projection as in *C. pulumi* n. sp. and also no Kaua‘i species that have a swollen portion of the male mid tibia located medially (others are at the basal third). *Campsicnemus pulumi* n. sp. can be separated from all other congeners in the Hawaiian Islands by the presence of two patches of dense long setae on a medially situated swollen portion of the male mid tibia (these dual patches of long setae not found in other species of Hawaiian *Campsicnemus*).

Description. **Male** (Fig. 1). Body length: 1.9 mm. Wing length: 2.1 mm. *Head*. Shining black; oc and vt black, about one-half length of antennal arista; face constricted at middle,

Figs 2–4. *Campsicnemus pulumi* n. sp. **2**, dorsal view of head and thorax; **3**, mid leg, lateral view; **4**, detail of mid tibia.

eyes holoptic, contiguous below antennae for length of 3 ommatidia; palp small, dark brown; proboscis brown, slightly extending below eye in lateral view; antennae (Fig. 2) yellowish brown; postpedicel conical with blunt apex, length about 2× greatest width; arista slightly longer than head height.

Thorax (Figs. 1, 2). Dorsum of mesoscutum and scutellum yellowish brown, with pair of thin admedian brown vittae extending posterior to just above prescutellar area; upper pleura concolorous with mesoscutum, lower pleura yellowish; thoracic setae long, strong, black: 3 dc; 2 np; 1 ph; 1 pa; 1 sc; ac absent; halter stem and knob yellowish brown.

Legs. CI, CIII yellowish white, CI with 4 strong white setae apically, numerous smaller curved stiff setae; CII brown and yellowish white; remainder of legs pale yellow; foreleg and hindleg [both hindlegs broken off beyond femur] unmodified, without MSSC; midleg (Fig. 3) with FII unmodified, without MSSC; TiII (Fig. 4) with large swollen area medially bearing two patches of dense, long setae, curved at apex (MSSC), two rows of minute setulae mediolaterally; apical one-fourth of TiII bearing large thick yellowish white spine-like projection (MSSC). IIt_1 long, ca. 2× length of IIt_2; remainder of tarsi without MSSC.

Wing. Subhyaline, with typical normal venation for *Campsicnemus*.

Abdomen. Tergites I–IV concolorous with mesonotum, tergites V–VI brown, each tergite with short stiff curved black hairs dorsally; sternites yellowish white. Hypopygium yellowish brown, not dissected.

Female. Unknown.

Types. *Holotype* ♂ from Hawaiian Islands: **Kaua‘i**: Koaie Stream gauging station, 3700 ft. [1128 m], 7 Jan 1999, pyrethrum fog on mossy ōhi’a log, D.A. Polhemus. Holotype (in fluid) in BPBM.

Etymology. The specific name derives from the Hawaiian, *pulumi* = broom; referring to the patches of long setae on the male mid tibia.

Remarks. Goodman *et al.* (2014) conducted a molecular analysis of 70 species of *Campsicnemus* from the Hawaiian islands and included another 14 from French Polynesia, Europe, and North America. The resulting phylogeny showed support for a number of clades of endemic Hawaiian species and is a useful template for further taxonomic and systematic studies on the group in the Pacific. *Campsicnemus pulumi* n. sp. fits in Node C of Goodman *et al*. (2014), species of which are found on Kaua‘u, O‘ahu, Moloka‘i, and Hawai‘i islands, and is characterized morphologically by the male midleg having a swollen middle portion bearing setae of various sizes and patterns. The presence or absence of and variously-shaped (and placements) of) basal projections in some species in addition to the swollen area (e.g., basal projection present in *C. bellulus* Van Duzee, *C. gloriosus* Van Duzee, and *C. sinuatus* Van Duzee; absent in *C. pherocteis* Hardy & Kohn and *C. williamsi* Van Duzee) was initially (pre-molecular analysis) hypothesized as representative of discrete species groups; however, the molecular analysis grouped all together into Node C. *Campsicnemus pulumi* n. sp. possesses a large basal projection, but the presence of large setal patches on the swollen portion of the mid tibia appears to be of stronger phylogenetic significance. Further molecular analysis on more species of *Campsicnemus* in Hawai‘i will undoubtedly refine the limits and definitions of species groups represented and is strongly encouraged.

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Review of the type specimens of Hawaiian *Sierola* Cameron (Hymenoptera: Bethylidae) at the Natural History Museum, London, with lectotype designations[1]

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Abstract. *Sierola* Cameron is one of the largest radiations of endemic insects in Hawaii, but has been neglected for nearly 100 years. Four of the eight species described early in Hawaiian entomology were based on mixed syntype series and require lectotypification. Lectotypes are designated for these and the type status of the others is reviewed.

INTRODUCTION

The bethylid wasps of the genus *Sierola* Cameron are one of three "hyperdiverse" lineages in the Hawaiian islands, together with the *Hyposmocoma* moths and *Drosophila* pomace flies. Unfortunately, parasitic Hymenoptera was one of the weaker parts of the monumental *Fauna Hawaiiensis* (Perkins 1910), and as a result many taxa have been poorly studied since the early period of Hawaiian insect collecting. *Sierola* is notable for producing a remarkably high diversity of species per number of individuals collected (Fullaway 1920), but the large series collected by R.C.L. Perkins were grouped by Ashmead (1901) into only a few species. Although Fullaway (1920) recognized the great diversity of the group and described 171 new species, the collections available to him were almost entirely limited to the islands of O'ahu and Hawai'i, he did not have access to the previously-described specimens, and his key is difficult to use due to its subjective characters (e.g., "clypeal process large" vs. "clypeal process small"). As a result, study of the group has languished. Fullaway's description of such a large number of species from few specimens has been questioned (Gruner 2004), but examination of a large number of specimens from across all the islands indicates that the group is in fact considerably more diverse than described by Fullaway (unpubl. data). In preparation for future work on the Hawaiian species, it is necessary to designate lectotypes for several species with type series in the Natural History Museum, London (NHMUK).

The genus *Sierola* was described by Cameron (1881), based on a single Hawaiian specimen collected by Rev. Thomas Blackburn. Later, two more species were added (Blackburn & Cameron 1886). Although the descriptions of these are insufficient to distinguish them from the variety of species that exist, their taxonomy is not problematic since all three are based on single specimens. Two of the three (*S. testaceipes* Cameron and *S. monticola* Blackburn & Cameron) are very distinct morphologically and can be easily recognized. Four of the five species described by Ashmead (1901) consist of mixed series, and require lectotypification. Ashmead also identified numerous specimens collected by Perkins as members of the Blackburn & Cameron (1886) species; nearly all of these are incorrect identifications.

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MATERIALS AND METHODS

The syntype series for the eight Hawaiian species in the NHMUK and the Smithsonian National Museum of Natural History (NMNH) in Washington, D.C. were examined, along with additional specimens in those collections and at the Bernice Pauahi Bishop Museum (BPBM) obtained by Perkins. Lectotypes were selected primarily on the basis of specimen quality and, if relevant, on match to the species description. Some NHMUK specimens had red-ringed holotype labels in addition to blue syntype labels, but these indicate only the specimens that were taken to a safe location during World War II (D. Notton, pers. comm.; see also Evenhuis 2007a). NHMUK holotype and lectotype specimens were imaged using the museum's montage system and assigned unique specimen numbers. Specimen data and images for NHMUK specimens are recorded on the NHMUK database, and are publicly available through the NHMUK Data Portal (Natural History Museum, 2014). At NMNH, one specimen is kept in the type collection and the remainder in the regular collection; some of these have paratype labels and others do not. Since Ashmead (1901) did not specify type and non-type material, or designate paratypes, all of those identified in his descriptions are considered part of the syntype series (I.C.Z.N. 1999; Art. 72.4.1). Text on each label on the pin is separated from that on the next label by a double slash (//); lines within a label are separated by a single slash (/). Text on the underside of a label is enclosed in quotes; text in square brackets indicates additions for clarification.

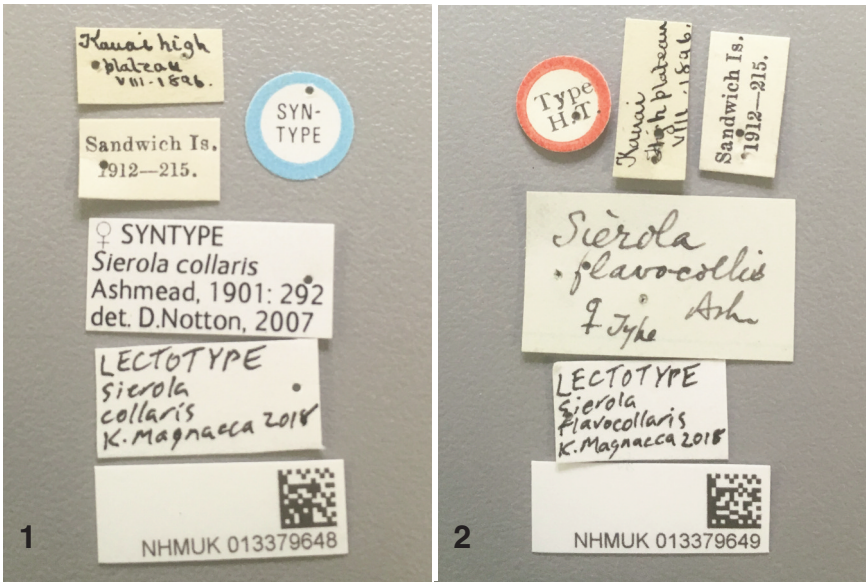
Sierola collaris Ashmead

Sierola collaris Ashmead, 1901:292.

Type series. There are six specimens in the type series at the NHMUK, five of which appear to be the same species, although one is missing its head and cannot be properly evaluated. The sixth differs from the others by having the mesosoma almost entirely dark brown, with the pronotum light brown anteriorly and grading into dark brown posteriorly. It bears a recent label which says "Not a syntype of *Sierola collaris* Ashmead, 1901. Does not agree with description, mesonotum is black. det. D. Notton 2007." However, this refers to its relationship to the other specimens; it is in fact part of the syntype series (it may also be conspecific, as color can be variable and all other characters appear to be the same). A specimen in the NMNH type collection has a paratype label but is distinctly different, with a more flattened head resembling *S. gracilis* Fullaway of O'ahu. Three additional specimens in the regular collection do not have paratype labels but have the same collection data as the NHMUK specimens. These appear to match the lectotype here designated, but will need to be examined further.

Lectotype designated. ♀ specimen mounted on its right side on card; left wing broken off and glued separately on card. All characters are clearly visible including the clypeus and mandibles. Label data (Fig. 1): Kauai high / plateau / VIII-1896 // Sandwich Is. / 1912—215. // SYNTYPE [round blue-ringed label] // ♀ SYNTYPE / *Sierola collaris* / Ashmead, 1901: 292 / det. D. Notton, 2007 // LECTOTYPE / Sierola / collaris / K. Magnacca 2018 // NHMUK 013379648 [barcode] (NHMUK).

Notes. This species is endemic to Kaua'i. The four described species from the island are each distinctively colored, unlike most species on the other islands, but many undescribed all-black species have also been collected from Kaua'i.



Figures 1–2. *Sierola* lectotype labels. **1**. *S. collaris* Ashmead; **2**. *S. flavocollaris* Ashmead.

Sierola flavocollaris Ashmead

Sierola flavocollaris Ashmead, 1901: 291.

Type series. The description in *Fauna Hawaiiensis* states that this species is based on five specimens, including one from Maui. Two are present at the NHMUK and two at the NMNH; all are from Kaua‘i. One of the NHMUK specimens is missing its head, which bears most of the defining characters; the body coloration of both is very similar to that of the aberrant *S. collaris* syntype. The other, intact specimen is designated as the lectotype. The headless specimen is also much smaller and has granulate sculpturing on the propodeum, which suggests it belongs to the same species as the aberrant syntype of *S. collaris*, as do both of the NMNH specimens, which have small heads.

Lectotype designated. ♀ specimen mounted on its left side on card. All characters are clearly visible including the clypeus and mandibles. The four terminal segments of the left antenna are missing but it is otherwise in excellent condition. Label data (Fig. 2): Type / H.T. [round red-ringed label] // Kauai / high plateau / VIII-1896 // Sandwich Is. / 1912—215. // Sierola / flavocollis [note misspelling] / ♀ type Ashm // LECTOTYPE / Sierola / flavocollaris / K. Magnacca 2018 // NHMUK 013379649 [barcode] (NHMUK).

Notes. The enormous head of this species is striking. The fact that a Maui specimen was grouped with it suggests that a similar species is present there; however, it has not been located. Although the majority of the specimens are of a small-headed species, Ashmead clearly describes it as having a large head, indicating that the large one should be the lectotype. The name of the species is spelled “flavocollis” on the type label and in section 5 of Ashmead’s (1901) key, but in section 10 of the key and in the description itself it is

Figures 3–4. *Sierola* type labels. **3**. *S. kauaiensis*, syntype labels; **4**. *S. leuconeura*, holotype labels.

given as "flavocollaris"; the latter was fixed as the correct original spelling by Kieffer (1914). It is remarkably similar to *S. leeuwinensis* Turner from Western Australia, differing in the coloration and details of the head characters.

Sierola kauaiensis Ashmead

Sierola kauaiensis Ashmead, 1901: 292.

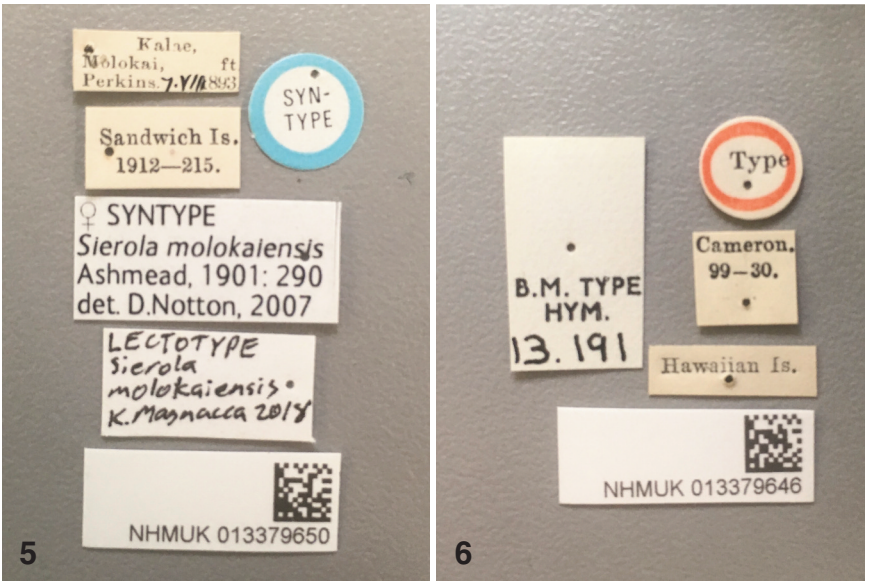
Syntype series. Described from three female specimens; two are at the NHMUK, and one at the NMNH. All represent the same species. Label data (Fig. 3): Kaholuamano [sic: Kahōluamanu] / Kauai / IV.95 [handwritten on card with specimens] // Sandwich Is. 1912—215. // Sierola / Kauiensis [sic] / ♀ Ashm // NHMUK 013379645 [barcode] (two specimens on one card, NHMUK). Kaholuamano / Kauai / IV.95 // ParatypeNo / 40421 / U.S.N.M. // Sierola / Kauiensis [sic] / ♀ type Ashm (one specimen on a point, NMNH).

Notes. One of the NHMUK specimens is more intact, but is glued in such a way that the important characters of the clypeus and mandibles are obscured. The other has the head detached and glued on the card next to the body. Since there is no confusion about the taxonomy and no one specimen shows all the characters, no lectotype is designated.

Sierola leuconeura Blackburn & Cameron

Sierola leuconeura Blackburn & Cameron, 1886: 177.

Holotype. ♀ specimen mounted ventral side down on card. The specimen is in good condition and all characters are visible, albeit with some difficulty because the head is flat against the card. Label data (Fig. 4): "Sierola / leuconeura / Cam / Hawaii / 112 [written at end of card perpendicular to other text]" [underside of card with specimen] // Type [round red-ringed label] // Cameron. / 99–30. // "Hawaiian Is." // NHMUK 013379647 [barcode] (NHMUK).



Figures 5–6. *Sierola* type labels. **5**. *S. molokaiensis*, lecotype labels; **6**. *S. monticola*, holotype labels.

Notes. This species was described from a single specimen, which is the holotype by monotypy. The description states that it came from Lāna‘i, presumably derived from the collection code “112” written on the card. No other species are currently described from Lāna‘i, but many are present in collections. None of the 24 Perkins specimens from various islands at NHMUK identified by Ashmead as *S. leuconeura* actually are this species.

***Sierola molokaiensis* Ashmead**

Sierola molokaiensis Ashmead, 1901: 290.

Type series. Only one of the 13 specimens in the type series at NHMUK is actually from Moloka‘i. The remaining specimens are from other islands, and each represents a separate species; only one from Hawaii, probably *S. kilauea*, resembles it. Likewise, at NMNH only the female in the type collection and one male in the regular collection are from Moloka‘i; the remainder represent a variety of species, including several of the distinctive *S. blackburni* and *S. sima* from Hawai‘i. The NMNH Moloka‘i specimen is close to *S. obscura* Fullaway of O‘ahu and may be conspecific; it is clearly different from the illustration of *S. molokaiensis* in *Fauna Hawaiiensis* (Plate VIII, Fig. 1), and hence was excluded from consideration as lectotype.

Lectotype designated. ♀ specimen mounted ventral-side down on card. The mandibles are partially concealed due to the gluing position but the carinate clypeus is visible; the apicodorsal margin of the clypeal carina is nearly straight in lateral view and appears to be broken off. The antennae are intact but also embedded in glue. Label data (Fig. 5): Kalae / Molokai, [blank area for hand-writing elevation] ft. / Perkins. 7.VIII.1893 //

Sandwich Is. 1912—215. // SYNTYPE [round blue-ringed label] // ♀ SYNTYPE / *Sierola molokaiensis* / Ashmead, 1901: 290 / det. D. Notton, 2007 // LECTOTYPE / Sierola / molokaiensis / K. Magnacca 2018 // NHMUK 013379650 [barcode] (NHMUK).

Notes. The description states that this specimen came from an elevation of 4000 ft.; however, Kala‘e is at about 1600 ft., and the label does not have an elevation on it. Perkins’ journal entry for the date says “Collected from Kalae upwards...right up to Kalamaula....” (Evenhuis 2007b). The spot Perkins refers to is unknown, but since the ahupua‘a of Kalama‘ula extends only to about 3000 ft. elevation, it is likely to have come from below this. The only other species described from Moloka‘i, *S. pilosa* Fullaway, is distinctly different by having the gena strongly produced ventrally so that the head is triangular in lateral view, but a large number of undescribed species are known to occur there. *Sierola molokaiensis* is similar to *S. hirticeps* Fullaway and *S. usitata* Fullaway of O‘ahu, differing in the extremely broad fore femora and high OOL/WOT ratio. Prior to Fullaway’s work, several papers used the name *S. molokaiensis* for various other species. For example, Swezey’s (1909) account of it parasitizing the sugarcane bud moth refers to *S. acuta* Fullaway.

Sierola monticola Blackburn & Cameron

Sierola monticola Blackburn & Cameron, 1886:177.

Holotype. Label data (Fig. 6): “Sierola / monticola / Cam / Hawaii” [underside of card with specimen] // Type [round red-ringed label] // Cameron. / 99–30. // B.M. TYPE / HYM. / 13.191 // NHMUK 013379646 [barcode] (NHMUK).

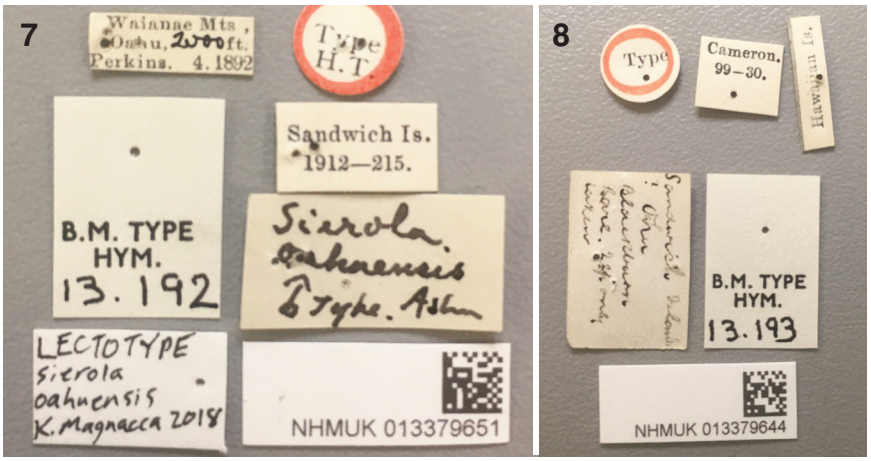
Notes. This species was described from a single specimen, which is the holotype by monotypy. The label does not contain any locality data (not even collection codes), but the description states that it comes from “Mountains of Hawaii (no. 134)”. It is almost unique in the genus in having the metasomal tergites distinctly coriaceous all over and distinctly punctate. None of the 11 specimens at NHMUK identified as this species by Ashmead are it (three are missing from cards), but recent specimens have been taken from the Mauna Loa–Mauna Kea saddle area.

Sierola oahuensis Ashmead

Sierola oahuensis Ashmead, 1901: 290.

Type series. At least two specimens from Kīlauea are supposed to be in the type series. The pin of one is in the NHMUK collection, but the specimen is missing from its point. The remaining specimen at NHMUK, from O‘ahu, is designated as the lectotype. One specimen is in the regular collection at NMNH, but is missing its head.

Lectotype designated. ♂ specimen mounted on its left side on card. The mandibles are concealed due to the gluing position but the non-carinate clypeus is visible. The antennae are intact but also embedded in glue. Label data (Fig. 7): Waianae Mts , / Oahu, 2000 ft. / Perkins. 4.1892 // Type / H.T. [round red-ringed label] // Sandwich Is. 1912—215. // Sierola / oahuensis / ♂ type Ashm // B.M. TYPE / HYM. / 13.192 // LECTOTYPE / Sierola / oahuensis / K. Magnacca 2018 // NHMUK 013379651 [barcode] (NHMUK).



Figures 7–8. *Sierola* type labels. **7**. *S. oahuensis*, lecotype labels; **8**. *S. testaceipes*, holotype labels.

Notes. Males are generally difficult to associate with females, but the unusual morphology of the head suggests that it is conspecific with *S. distincta* Fullaway. Males of this form are regularly collected in company with "*S. distincta*" females. Formal determination of synonymy will await revision of the O'ahu species.

Sierola testaceipes Cameron

Sierola testaceipes Cameron, 1881: 556.

Holotype. Label data (Fig. 8): [Blackburn symbol for O'ahu, on card with specimen] 94 // Type [round red-ringed label] // Cameron. / 99–30. // (Hawaiian Is.) // Sierola / testaceipes Cam / (type) / "Sandwich Islands / ? Oahu / Blackburn / Rare. 2 sp only / taken" // B.M. TYPE / HYM. / 13.193 // NHMUK 013379644 [barcode] (NHMUK).

Notes. This species was described from a single specimen, which is the holotype by monotypy. It is a senior synonym of several species described by Fullaway; it is the only broad-mandible species to have the median and submedian wing cells glabrous, although the key character of the ventral head setation is obscured in the type of *S. testaceipes*. The overwhelming majority of Perkins's specimens were placed under this name by Ashmead, but only one of the 79 identified as such at NHMUK is actually *S. testaceipes*.

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