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Three new species of Hawaiian moths from Kahoolawe island (Lepidoptera: Crambidae & Coleophoridae)

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Abstract

Three new species of Hawaiian Lepidoptera are described herein: *Pigritia uuku* **sp. nov.** (Coleophoridae: Blastobasinae), *Orthomecyna keoniae* **sp. nov.** (Crambidae), and *Tamsica kawikae* **sp. nov.** (Crambidae) from Kahoolawe Island.

Key words: Blastobasini, endemic species, Hawai'i, Kaho'olawe, morphology, taxonomy

Introduction

Many species of Lepidoptera within the Hawaiian Islands remain undescribed, particularly in areas that are difficult to access such as Kahoolawe Island, which has no permanent inhabitants. While the Hawaiian Islands as a whole are in a state of environmental distress, with numerous documented extinctions of the endemic flora and fauna, Kahoolawe Island may have suffered the most from human activity. Not only have introduced grazers and predators long decimated the native plant, bird, and insect populations (Zimmerman 1978), the island was used as a bombing range by the United States military from World War II until recently. Large-scale fires burned much of the vegetation, and subsequent erosion on Kahoolawe removed most of the topsoil. In 1990, the US military ceased using the island for target practice, and the Kahoolawe Island Reserve Commission (KIRC) was set up to oversee current efforts to restore the island's natural and cultural heritage (http://kahoolawe.hawaii.gov). Remarkably, some plants and animals endemic to Kahoolawe have survived through the grazing, bombing, and burning (e.g. Starr, Starr & Loope 2006). Here, we describe three new species of Lepidoptera from Kahoolawe.

Material and methods

Two collecting trips to Kahoolawe were made, one in October 2008 and one in July 2011, for the purpose of documenting Lepidoptera on the island. Specimens were collected at night with use of a blacklight and sheet, and were pinned shortly after collecting. All holotypes and paratypes are deposited in the Bernice P. Bishop Museum, Honolulu, HI, U.S.A.

Abbreviations:

BPBM	Bernice P. Bishop Museum, Honolulu, U.S.A.
UHIM	University of Hawaii Insect Museum, Manoa, U.S.A.

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***Pigritia uuku* Adamski sp. nov.**
(Figs. 1.1 & 2.1)

Diagnosis. *Pigritia uuku* is closely related to two North American *Pigritia* Clemens (1860) species, *P. laticapitella* Clemens and *P. murtfeldtella* (Chambers). All three species share a similar forewing pattern with a pale basal 1/3 and darker distal 2/3, an uncus that is absent, a divided juxta, a basally hinged apical process to the lower part of valva, a densely setose proximal flange, and an anellus with sclerotized elements. It differs from the latter two species by having tergal setae extending beyond midlength of tegumen, an apically spinose juxta, asymmetric proximal flanges, outwardly twisted apical processes of the lower part of the valva, an anellus with elongate, posterior pointed processes with basally spined inner margins, and a laterally-curved, spinelike apical process arising from an ovoid basal lobe.

Description. *Head*: Vertex and frontoclypeus with dark-brown scales tipped with pale brownish orange; labial palpi diminutive, not extending beyond middle of frontoclypeus (lost when head detached from body during transport); outer surface and inner surfaces of labial palpus dark brown; scape dark brown intermixed with few brownish-orange scales, flagellum dark brown; proboscis pale brownish orange.

Thorax: Tegula and mesonotum pale brownish orange. Legs dark brown intermixed with brown, and brownish-orange scales along all midsegments and apical margins of all segments and tarsomeres. Forewing (Fig. 1.1): Length 4.9 mm (n = 1), brownish orange intermixed with brown and dark-brown scales; basal 1/3 brownish orange intermixed with dark-brown scales along costa and CuP; submedian fascia transversely juxtaposed to a paler basal part; basal region of submedian fascia dark brown gradually intermixed with pale brownish-orange scales to crossvein; cell with three small, dark-brown spots, one near middle, nearly obliterated by surrounding dark scales, two spots on distal part along crossvein; distal part brownish orange intermixed with brown and dark-brown scales, many dark scales tipped with pale brownish orange, submarginal spots faint; fringe scales brown intermixed with dark-brown scales each tipped with pale brownish-orange. Undersurface dark brown. Hindwing pale grayish brown.

Abdomen: Male Genitalia (Fig. 2.1): Uncus and gnathos absent; tegumen widely emarginate dorsomedially, partially supplanted by tuba analis. Tergal setae extending beyond midlength of tegumen. Valva divided; lower part basally protracted inwardly, broadly rounded apicoventrally, extending to base of a large, apical process; process hinged basally, constricted beyond base, broadened to middle, gradually narrowing to an acuminate apex, outer surface setose, inner surface planate, bearing a densely setose ridge at base; upper part with costa extending from dorsal articulation to 3/4, forming a dorsally produced digitate process; basal ridge of digital process extending ventrally fusing with dorsal part of proximal flange; proximal flanges asymmetric, left flange subelliptical, right flange subquadrate and larger, both densely setose, margins entire. Juxta divided medially forming two elongate, apically spinose, plates. Vinculum U-shape. Phallus slightly curved from a widened base; sclerite of phallus acutely curved basally, shallowly curved apically; anellus with two elongate, basally pointing processes, processes spinose along inner margin, apically produced into elongate lobes, each bearing a laterally curved spinelike process.

Female Genitalia: Unknown.

Holotype ♂: UNITED STATES: Hawaii: **Kahoolawe:** Hakioawa, D4 Planting Area, 20 Oct 2008, M.J. Medeiros (genitalia slide by D. Adamski, No. 6189) (BPBM).

Etymology. The species epithet, *uuku*, is derived from the Hawaiian language meaning, tiny, and referring to the size of this moth species.

Remarks. *Pigritia uuku* is the second species of Blastobasinae described from the Hawaiian Islands. The other species, *Blastobasis inana* (Butler), which was described from Hawaii but is widespread and considered non-native, can be differentiated from *P. uuku* by the presence of a dilated first flagellomere of the antenna. Consult Adamski & Brown (1989) and Hodges (1999) for information on the monophyly of Blastobasinae. It is not known whether *P. uuku* is endemic to Hawaii. If it is endemic, *P. uuku* would represent a new lineage not previously known from the Hawaiian Islands, and the fact that it is known from the heavily impacted island of Kahoolawe would be remarkable. However, the possibility exists that *P. uuku* is a widespread, possibly introduced, species in Hawaii that has simply been overlooked on other islands.

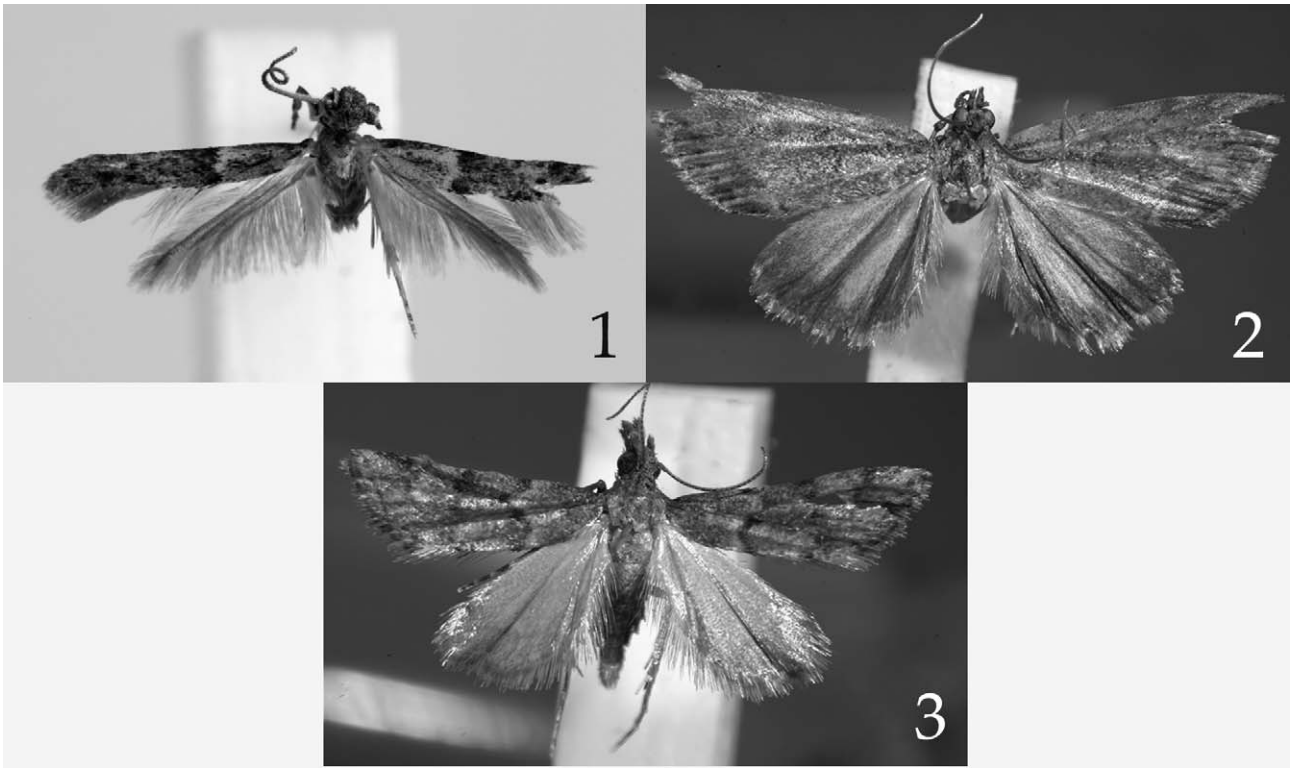

FIGURE 1. New Lepidoptera of Kahoolawe Island, imagos: 1. *Pigritia uuku*, holotype; 2. *Orthomecyna keoniae* holotype; 3. *Tamsica kawikae*, paratype.

***Orthomecyna keoniae* Medeiros, sp. nov.**
(Figs. 1.2 & 2.2)

Diagnosis. *Orthomecyna* Butler (1883) is endemic to the Hawaiian Islands. *Orthomecyna keoniae* is similar to *O. metalycia* Meyrick, a species from Hawaii Island, but the costal lobe of the valva in *O. metalycia* has two concave indentations near the sledgehammer-like distal process, while only one concave indentation is present in *O. keoniae*; *O. keoniae* with a more slender and tapering main lobe of the valva than in *O. metalycia*.

Description. *Head*: Vertex and frontoclypeus smooth, mottled brown and dusky brown. Labial palpi upturned, scales pale brown with dusky tips; maxillary palpi upturned, ca. 0.3x length of labial palpi. Ocelli present. Antennae ca. 0.6x length of forewing; dense, very short cilia present on ventral side of flagellomere. Proboscis brown.

Thorax: Tegula and mesonotum mottled light brown and brown. Legs mostly brown but with apical portion of each segment ringed with very pale brown. Forewing length = 10 mm (n = 1); ground color brown, with a mix of pale brown and darker brown scales, becoming darker near termen; a very faint transverse line present near proximal portion of discal cell; fringe brown. Hindwing brown, becoming dark brown along termen and anal margin.

Abdomen: Male genitalia (Fig 2.2): Uncus and gnathos slightly curved inwardly, both slender and tapering. Tegumen narrow, elongate. Costal lobe of valva completely separate from rest of valva, widening near apex to form a sledgehammer-like process. Main lobe of valva nearly the length of tegumen + uncus, slender and tapering, with several prominent setae near apex. Vinculum V-shaped. Phallus cylindrical near base; sclerite of phallus bifurcated at apex.

Female genitalia: Unknown.

Holotype ♂: UNITED STATES: Hawaii: **Kahoolawe:** Kealaikahiki, Keana Keiki beach, 21 Oct 2008, M.J. Medeiros (genitalia slide 10A64) (BPBM).

Etymology. *O. keoniae* is named in honor of my father, Dr. John Medeiros. “Keoni” is a Hawaiian-language translation of “John” and *O. keoniae* means “John’s *Orthomecyna*”. Dr. Medeiros is a prior resident of Paia, Hawaii, and a scientist himself who has encouraged my studies and been a role model for me.

Remarks. No new *Orthomecyna* species have been described since 1899 (Zimerman, 1958); fourteen species are previously described in this genus. Although *O. keoniae* is currently known from only one individual, the fact that it is from Kahoolawe, which is difficult to access and is undergoing environmental restoration, warrants its description.

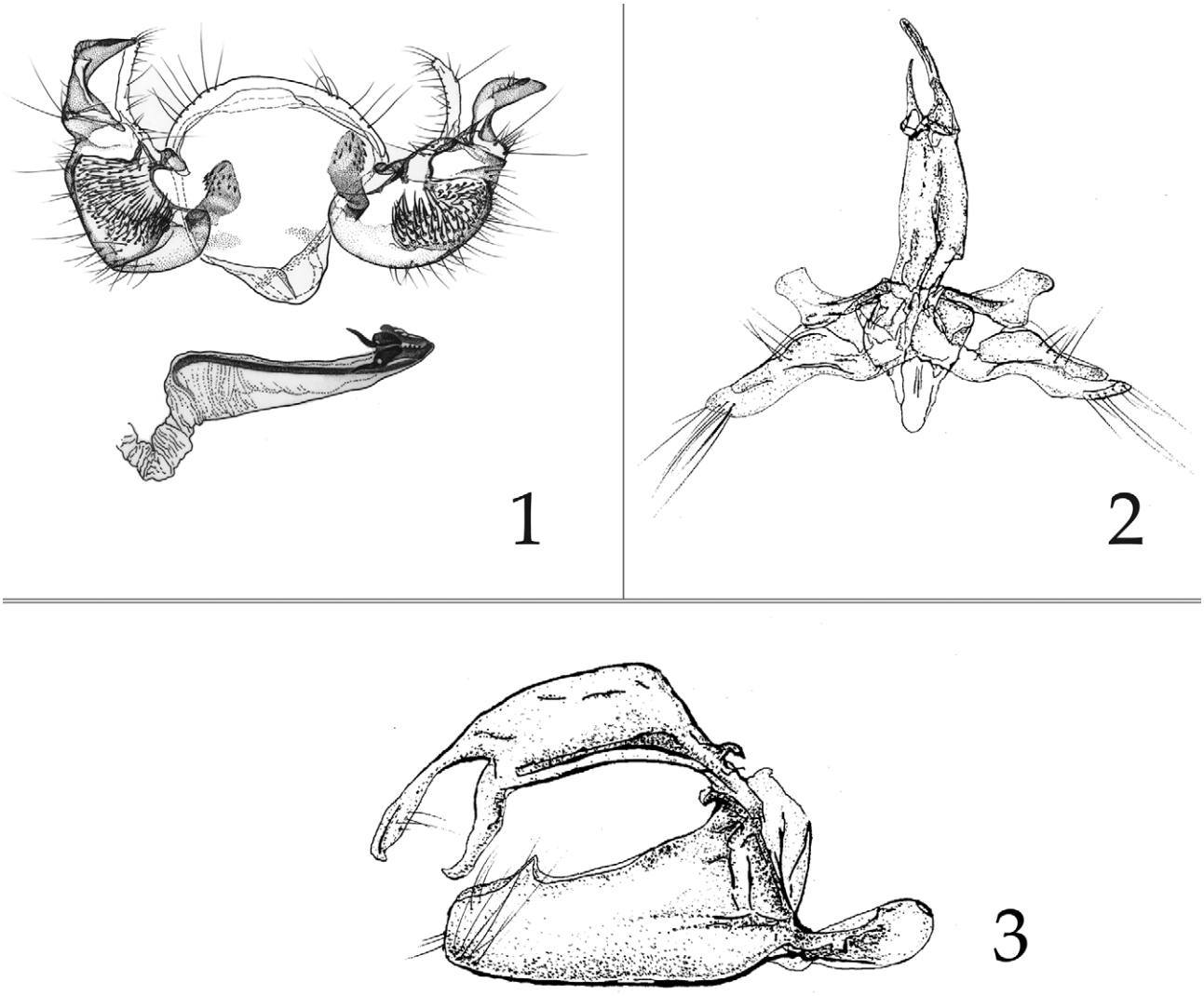

FIGURE 2. New Lepidoptera of Kahoolawe Island, male genitalia: 1. *Pigritia uuku*, slide 6189; 2. *Orthomecyna keoniae*, slide 10A64; 3. *Tamsica kawikae*, slide 11A10.

***Tamsica kawikae* Medeiros, sp. nov.**
(Figs. 1.3 & 2.3)

Diagnosis. *Tamsica* Zimmerman (1958) is endemic to the Hawaiian Islands. *T. kawikae* is similar to *T. floricolans* (Butler), a species occurring on Oahu, Molokai, and Lanai. *T. kawikae* has a more slender uncus and gnathos than *T. floricolans*.

Description. *Head*. Vertex and frontoclypeus somewhat roughly scaled, mottled light brown to brown or nearly black in some specimens. Labial palpi semi-porrect, maxiary palpi upturned, ca. 0.3x length of labial palpi. Ocelli present. Antennae ca. 0.7x length of forewing; dense, very short, piliform cilia on ventral side of flagellomere. Proboscis scaled proximally, very pale light brown.

Thorax: Tegula and mesonotum brown. Legs light brown to nearly black, with apical portion of each segment ringed in lighter scales. Forewing length = 4 - 5.5 mm (n = 17); ground color pale brown to dark brown, with faint transverse medial and antemedial lines present; a postmedial line terminating in a larger dark spot near the costal margin present in most specimens; several spots near ends of veins present along termen; fringe brown to light brown. Hindwing brown to light brown.

Abdomen: Male genitalia (Fig. 2.3): Uncus and gnathos both slender and ending in sharp, pointed apices, uncus with several setae ventrally. Tegumen cylindrical. Valvae simple and unornamented, broad and narrowing only slightly to a blunt apex, with only a small, triangular spur projecting dorsally from valva and several setae near apex. Vinculum rounded. Phallus cylindrical and slightly curved along entire length.

Female genitalia: Unknown.

Holotype ♂: UNITED STATES: Hawaii: **Kahoolawe:** Hakioawa, D4 planting area, 19 Jul 2011, M.J. Medeiros (BPBM).

Paratypes 16 ♂: UNITED STATES: Hawaii: **Kahoolawe:** Hakioawa, D4 planting area, 19–20 Jul 2011, M.J. Medeiros (genitalia slides 11A05, 11A10, 11A17, & 11A20) (BPBM & UHIM).

Etymology. *T. kawikae* is named in honor of my brother, David Medeiros. "Kawika" is a phonetic Hawaiian-language translation of "David" and *T. kawikae* means "David's *Tamsica*". David, a linguist who has spent years studying the Hawaiian language, has not only helped me to properly name Lepidoptera over the years, but has been a cheerful and able field assistant on several collecting trips (including my first, in 2003) to the Hawaiian Islands.

Remarks. *T. kawikae* occurs in great numbers on Kahoolawe. Perkins (1913) noted of *Tamsica* moths in general, "They are able to flourish in the driest localities near the coast..." *T. kawikae* is the seventh species to be described from this genus.

Discussion

Despite the environmental degradation of Kahoolawe, undescribed endemic species continue to be discovered there. These species have persisted while nearly all native plants (with the exception of some widespread and disturbance-tolerant costal species) from their ranges have been lost; it seems likely that many endemic extant Lepidoptera from Kahoolawe are generalists. Observations suggest that *Orthomecyna* and *Tamsica* larvae may feed on grasses; the only record of an *Orthomecyna* larva was in sugarcane on Kauai, a *Tamsica floricolans* larva was also reared from sugarcane, and *T. hyacinthina* was reared from a pupa "found among grass roots" on Oahu (Zimmerman 1958). No hosts are known for any *Pigritia* species, and it is unknown whether *P. uuku* is endemic to the Hawaiian Islands.

Acknowledgements

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