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## New moss records for the Hawaiian Islands<sup>1</sup>

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Moss collections from the islands of O'ahu and Kaua'i have revealed a range extension for one indigenous species, *Neckeropsis obtusata* (Mont.) M. Fleisch., and two newly naturalized taxa, *Callicostella papillata* (Mont.) Mitt. var. *papillata* and *Cyclodictyon blumeanum* (Müll.Hal.) Kuntze. The latter two taxa are most likely non-native, probably having arrived either accidentally or deliberately via the horticultural trade. All specimens cited here are deposited in the *Herbarium Pacificum* (BISH).

### Neckeraceae

*Neckeropsis obtusata* (Mont.) M. Fleisch. **New island record**

In the *Manual of Hawaiian Mosses* (Bartram 1933) and in the Staples *et al.* (2004) checklist of Hawaiian mosses, *Neckeropsis obtusata* was listed as occurring only on Kaua'i. In 2022, a collection was made from Mākaha Valley on the island of O'ahu. While this taxon is currently listed as naturalized in the Hawaiian Islands (Olson 1999), its abundance in gullies in the back of Mākaha and Wai'anae (pers. obs.) in remnant native mesic forest leads me to believe that it is probably an indigenous species overlooked by early botanists. Typically, alien mosses in Hawai'i (e.g., *Hypnum plumiforme* Wilson, *Sematophyllum subpinnatum* (Brid.) E.Britton, etc.) are abundant in or around households, roads, or garden areas, whereas these plants are confined to gulch bottoms not adjacent to habitation. Olson (1999) stated that the original record by d'Alté Welch cited by Bartram was misidentified (reannotated as *Neckeropsis lepineana* (Mont.) M.Fleisch.), but my inspection of the plant shows that it is identical with other specimens of *Neckeropsis obtusata*.

*Material examined:* **KAUAI:** Waimea Canyon, Koai'e River, ½ mile [0.8 km] below waterfall, Sep 1931, *d'A. Welch s.n.* (BISH 653567). **O'AHU:** Ahupua'a of Mākaha, northern Wai'anae Mountains, abundant on boulders in gulch bottom in remnant mesic forest, 548 m, 21 Sep 2022, *M.K. Thomas 455*.

### Pilotrichaceae

*Callicostella papillata* (Mont.) Mitt.

var. *papillata*

**New state record**

In 2022, a species of moss was collected at the Harold L. Lyon Arboretum on the island of O'ahu that did not match any of the genera in *Manual of Hawaiian Mosses* (Bartram

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1. Contribution No. 2026-006 to the Hawaii Biological Survey.

1933), nor any species in the Hawaiian bryophyte collection at the *Herbarium Pacificum* (BISH). Using a key available in *Prodromus Florae Muscorum Polynesiae* (Miller *et al.* 1978), this specimen was identified as belonging to the genus *Callicostella* (Müll.Hal.) Mitt., a genus not previously reported from the Hawaiian Islands. In Miller's 1978 book and in past publications of *Flora of Australia* (Streimann 1997), *Callicostella* was treated as a member of the Hookeriaceae, but genetic and morphological evidence has now transferred this genus to the family Pilotrichaceae (Goffinet & Buck 2004). The key to the family Hookeriaceae provided by Streimann (1997) showed a perfect match for the genus *Callicostella* by its unbordered leaves and unipapillose quadrate cells. The papillose leaf cells, costae extending near the tip of the leaf, smooth reddish seta, and lanceolate ventral rows of leaves seem to agree most with the description and illustration of *Callicostella papillata* var. *papillata* (see Streimann 1997). Herbarium specimens of *C. papillata* var. *papillata* were also compared to the Hawai'i material. In some of the Philippine specimens the papillae are larger, but otherwise not different from the Hawai'i material. This genus was not listed in the 2004 checklist for Hawaiian mosses (Staples *et al.* 2004) and is considered new to the Hawaiian archipelago.

The current distribution of this species is in Mānoa and 'Āhuimanu on the island of O'ahu, and in Wailua on the island of Kaua'i in lowland secondary wet forests. It will most likely be found on other Hawaiian Islands with similar habitats, especially next to gardens and in plant nurseries. This species is widespread in lowland wet forests in Australia, Southeast Asia, Malesia, and the South Pacific. Its presence in Hawai'i is most likely attributable to contaminated pots via the horticulture industry or as a deliberate introduction for aquariums and terrariums, where a similar species, *Callicostella papillata* var. *prabaktiana* (Müll.Hal.) Streimann, is often sold on the internet for those purposes.

*Material examined.* **HAWAII:** **Kaua'i:** Wailua Valley, Keahua Arboretum area, dominant moss on soft rotting wood in wet, invasive-dominated rainforest, 176 m, 04 Mar 2026, *K. Faccenda 4414*; **O'ahu:** Ahupua'a of Waikīkī, 'ili of Mānoa, Haukulu section of Lyon Arboretum, growing on soil and rock along "first valley" trail of arboretum, 121 m, 20 Jul 2022, *M.K. Thomas 415*; Ahupua'a of Kahalu'u, 'ili of 'Āhuimanu, growing on rocks along valley trail, 91 m, 09 Oct 2024, *M.K. Thomas 787*. **PHILIPPINES:** Luzon, trail to Peak 1 and 2, Mt. Makiling, College, Laguna, 28 Jan 1978, *A.R. Alvarez Jr. O-78014*. **FRENCH POLYNESIA:** **Moorea:** Vai'are, vallee de Vaipohe, in *Inocarpus edulis* forest on wet talus slope, 120 m, 22 Jul 1975, *J.L. De Sloover 21082*. **POHNPEI:** Below Mount Namulek, Nanpili district, 500–700 ft [150–215 m], 20 Jun 1960, *H.A. Miller 6800*. **SAMOA:** **Savai'i:** Above Sili, tree trunk in wet forest, 400 m, 13 Nov 1931 *E. Christophersen 3214*.

***Cyclodictyon blumeanum* (Müll.Hal.) Kuntze    New state record**

In 2024, another member of the family Pilotrichaceae was found along the roadside on 'Ualaka'a in the southern Ko'olau Mountains. Morphologically similar to *Callicostella* but differing in the smooth cells and short-acuminate apex, the leaves are also often bordered by 2–3 rows of linear cells. *Cyclodictyon* is a genus of roughly 90 species, many of which are Neotropical (Streimann 1997). In the flora of Australia (Streimann 1997), *Cyclodictyon blumeanum* is the only species occurring across Australasia and the Pacific.

The material collected on O‘ahu was compared to that from Australia, along with comparison of the description and illustration provided by Streimann (1997) and *Flora of New Zealand* (Fife 2016). However, the possibility that the plants in the Hawaiian Islands could be another similar Neotropical species is not out of the question. Currently, no monographs of the genus exist and it would take a larger study to compare all known species around the globe. Like *Callicostella papillata*, the current distribution of *Cyclodictyon blumeianum* is exclusively in lowland wet forests below 460 m elevation, often near freshwater seeps or in gulch bottoms. It will most likely be found across the Hawaiian Islands under similar conditions.

*Material examined.* O‘AHU: Maunawili contour trail, on cinder bank next to a small waterfall, 180 m, 21 Feb 2025, *M.K. Thomas 1061*; Pu‘u ‘Ualaka‘a, Tantalus Road, about 400 m down road from Pu‘u ‘Ōhi‘a trailhead, on roadcut, from cindery, wet, fully shaded area, water dripping on this plant from a small spring, small patch seen, 458 m, 28 Apr 2024, *K. Faccenda 3397*; Makiki, Makiki Loop, Makiki Valley Trail spanning the valley, about 300 m N of intersection with Maunalaha Trail, 312 m, 15 Jun 2024, *K. Faccenda & M. Doore 3487*; Nu‘uanu Valley, upper valley on slopes of Kōnāhuanui, from rock in dark, shady understory, 457 m, 27 Jun 2025, *K. Faccenda 4143*.

#### ACKNOWLEDGMENTS

I thank the people who collected and submitted material to the Bishop Museum Herbarium, and to the folks who work with the Hawai‘i Biological Survey for providing a place to publish open access articles. A special thanks goes out to Barb Kennedy and the staff that maintain the collection at *Herbarium Pacificum*.

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