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New Hawaiian plant records for 2007

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Ongoing fieldwork, collections, and research continue to produce new, previously unpublished distributional records for the Hawaiian flora. In this paper, 4 state or new naturalized records, 48 new island records, 3 notable rediscoveries, and 3 range extensions are reported. Additionally, there are notes on 2 recently described species in the endemic Hawaiian genus *Cyanea*. A total of 59 taxa (11 indigenous) in 30 plant families are discussed. Seven are pteridophytes, 3 are gymnosperms, 27 are dicotyledonous angiosperms, and 22 are monocots. Information regarding the formerly known distribution of flowering plants is based on the *Manual of Flowering Plants of Hawai'i* (Wagner *et al*. 1999a) and information subsequently published in the *Records of the Hawaii Biological Survey* from 1995 through 2007. Distribution and taxonomy of ferns follows *Hawai'i's Ferns and Fern Allies* (Palmer 2003). Voucher specimens are deposited at B.P. 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 facility; only in these cases will the herbarium acronym be cited.

Araceae

Philodendron scandens K. Koch & Sello **New naturalized record**

One of the most widespread species of Araceae, native from Mexico to the West Indies and much of South America, this is also one of the most common houseplants (Staples & Herbst 2005: 610). The leaves are heart shaped, smooth; stems with long internodes; the axillary flowers have a green spathe, red at the base internally, and a white spadix. Fruit has not been observed but the species easily propagates from even short sections of discarded stem. On windward East Maui at low elevations in secondary forest it is naturalized in several areas, sprawling on the ground when younger and eventually climbing high into alien tree canopy. It is tolerant of shade.

There are now four species of *Philodendron* Schott reported as naturalized on two islands, Kaua‘i and Maui (Lorence & Flynn 2002: 14–15; Oppenheimer 2004: 9; Oppenheimer 2007: 19); a key to the most commonly cultivated species is provided by Staples & Herbst (2005: 607–608). There are likely to be other species and/or islands with naturalized occurrences in Hawai‘i.

Material examined. **KAUA‘I**: Nāwiliwili, naturalized, 6 Apr 1988, *T. Flynn 2895* (BISH). **MAUI**: East Maui, Hāna Dist, Ka‘eho‘eho, naturalized, climbing 12 m or more in *Ficus* and Java plum trees, 37 m, 28 May 2007, *Oppenheimer H50735.*

Araucariaceae

Araucaria columnaris (Forst.) Hook. **New island record**

A widely planted forestry tree, the Cook pine was previously documented outside of cultivation from West Maui (Oppenheimer 2002: 20) and Moloka‘i (Oppenheimer 2007: 19). This tree has become a symbol of the island of Lāna‘i, and is widely planted as an ornamental, street tree, for reforestation, and to increase fog drip and groundwater recharge. Small plants appear to be browsed by axis deer. Randomly spaced spontaneous plants also occur near the southern ascent of the Munro trail near Waiakeakua.

Material examined. **LĀNA‘I**: Ho‘okio Ridge, 790 m, 5 Feb 2007, *Oppenheimer H20707*.

Asclepiadaceae

Calotropis procera (Aiton) W.T. Aiton **New island record**

In the family notes on Asclepiadaceae, Wagner *et al.* (1999a: 238) mention a report of *Calotropis procera* escaping cultivation in the vicinity of Keāhole Airport on Hawai‘i Island. Wood & LeGrande (2006: 19–20) reported it from Lehua Islet, which they considered a part of Ni‘ihau, where it had not been previously documented. Wood (2006: 15) also reported it from Kaua‘i. On Lāna‘i it is sparingly naturalized along Keomuku Road, in sandy soil. Staples *et al*. (2000: 16) reported the species to be wind dispersed, and possibly also by vegetative means.

Material examined. **LĀNA‘I**: N of Makaīwa, 5 m, 4 Jan 2007, *Oppenheimer, Perlman & Tangalin H10705*.

Aspleniaceae

Asplenium x***flagrum*** W.H. Wagner & D.D. Palmer **New island record**

Palmer (2003: 76) and Wagner *et al*. (1999: 166) noted this spontaneous natural hybrid of *A. hobdyi* W.H. Wagner and *A. normale* D. Don only from near the Pihea Trail in the Kōke‘e area of Kaua‘i. Recently it was collected in montane wet forest on East Maui, where both parents are common. This hybrid seems to be rare, however.

Material examined. **MAUI**: East Maui, Hāna Dist, slopes of Kuiki between Kīpahulu and Kaupō, 1899 m, 3 Jun 2006, *Oppenheimer H60605* (BISH, HALE).

Asteraceae

Artemisia vulgaris L. **New island record**

Mugwort is sparingly naturalized in disturbed areas on Kauaʻi, Oʻahu, East and West Maui, and Hawaiʻi (Wagner *et al*. 1999a: 265; Wagner & Herbst 1995: 15; Oppenheimer 2004: 9). Now it is known from Lānaʻi, where it also grows in disturbed areas.

Material examined. **LĀNAʻI**: Lānaʻi City, locally common in yards & waste areas, 495 m, 4 Sep 2007, *Oppenheimer & Perlman H90701*.

Emilia sonchifolia (L.) DC **New island record**

var. ***japonica*** (N.L. Burm.) Mattf.

Known from Kauaʻi, Oʻahu (Wagner *et al*. 1999a: 312), and East Maui (Wagner *et al*. 1997: 52), this weedy herb also occurs on Lānaʻi.

Material examined. **LĀNAʻI**: Kānepuʻu, uncommon in open, sunny, grassy areas, 460 m, 21 Dec 2006, *Oppenheimer H120646*.

Erigeron bellioides DC **New island record**

This diminutive herb seems to have spread rapidly since first observed on Oʻahu in 1977, being documented from Kauaʻi, Oʻahu, Molokaʻi, Maui, and Hawaiʻi (Wagner *et al*. 1999a: 314; Nagata 1995: 11; Oppenheimer & Bartlett 2000: 2; Oppenheimer 2003: 7; Staples *et al*. 2003: 8–9; Starr *et al*. 2004: 21). It is not surprising that it now occurs on Lānaʻi as well.

Material examined. **LĀNAʻI**: Hulopoʻe, in lawn, 50 m, 5 Jan 2007, *Oppenheimer, Perlman & Tangalin H10712*.

Galinsoga parviflora Cav. **New island record**

An annual herb known from Kauaʻi, Oʻahu, Maui, Kahoʻolawe, and Hawaiʻi (Wagner *et al*. 1999a: 320), this species was recently collected on Lānaʻi. It is locally common in gulches in remnant dry forest and shrubland along the windward side of the island, germinating after winter rains.

Material examined. **LĀNAʻI**: Lōpā Gulch headwaters, 430 m, 4 Jan 2007, *Oppenheimer, Perlman & Tangalin H10706*.

Picris hieracioides L. **New island record**

Known in Hawaiʻi from the islands of Lānaʻi and Hawaiʻi (Wagner *et al*. 1999a: 350), this Eurasian hawkweed is well established on Molokaʻi. Besides the collections cited here, it was also observed in the Molokaʻi Forest Reserve along a disturbed, unpaved roadside. Many plants on the leeward south side of the island appeared to have been browsed by feral goats but not devoured, and this species is apparently unpalatable and possibly poisonous to them.

Material examined. **MOLOKAʻI**: Kawela drainage, along switchback trail W of Kawela tunnel, 1100 m, 29 Aug 2007, *Oppenheimer & Perlman H80705*; Waiakuilani Gulch, eastern headwaters, 940 m, 30 Aug 2007, *Oppenheimer & Perlman H80708*.

Bignoniaceae

Jacaranda mimosifolia D. Don **New island record**

A popular ornamental tree, Wagner *et al*. (1999a: 387) speculated it was naturalized on all of the main islands but documented only from Oʻahu, Maui, and Hawaiʻi. On Lānaʻi it is

forming local thickets in alien, secondary forest outside Lāna‘i City and was also observed near Kō‘ele and at Kanepu‘u.

Material examined. **LĀNA‘I**: Kea‘aku Gulch, 440 m, 5 Jan 2007, *Oppenheimer, Perlman & Tangalin H10709.*

Cactaceae

Cereus uruguayanus Ritter ex R. Kiesling **New island record**

A widely cultivated ornamental, hedge cactus is naturalized on southern Kaua‘i (Wagner *et al.* 1999a: 417). On leeward East Maui this arborescent cactus is found scattered on rocky substrate in dry pastures dominated by *Prosopis*, *Leucaena*, and *Cenchrus* with remnant native elements such as *Erythrina, Chamaesyce, Myoporum, Hibiscus,* and *Sida.*

Material examined. **MAUI**: East Maui, Wailuku Dist, Paeahu, in pasture, 232 m, 10 Jul 2007, *Oppenheimer & D. Crow H70702*.

Campanulaceae

Cyanea duvalliorum Lammers & H. Oppenh.

Endemic to mesic forests on Haleakalā, East Maui, this species was recently described from flowering material collected in October 2000. Previously it was collected in a vegetative state by both C.N. Forbes and J.F. Rock in Ke‘anae, Wailua Iki, and Kīpahulu; near the type locality by G.C. Munro; and more recently in 1980 by F.R. Warshauer and H. McEldowney. A few plants persist at the latter site, but the other populations have not been relocated. Presently there are fewer than 75 mature individuals and 60 seedlings and saplings known mainly in a single, degraded area; it has already declined noticeably since its discovery in early 2000 and several plants are known to have died in the past year. Threats are severe and include feral pigs and possibly axis deer; rats; slugs such as *Derocerus* and *Limax*; and alien vegetation including quinine *(Cinchona pubescens),* strawberry guava *(Psidium cattleianum),* palmgrass *(Setaria palmifolia),* blackberry *(Rubus argutus), Clidemia hirta*, *Tibouchina herbacea*, Australian tree fern *(Sphaeropteris cooperi),* night-blooming cestrum *(Cestrum nocturnum),* tropical ash *(Fraxinus uhdei),* and eucalyptus (*Eucalyptus* spp.). It should be considered as a candidate for listing as Endangered. Currently it is a target of the Plant Extinction Prevention Program, with seeds collected for propagation and outplanting into suitable, secure habitat within its former range. A complete description and discussion can be found in Lammers (2004).

Cyanea maritae Lammers & H. Oppenh.

This species is also endemic to Haleakalā, East Maui in mesic to lowland wet forests and occurs with *Cyanea duvalliorum* (*q.v.*) in the type locality. Previously both C.N Forbes and J.F. Rock collected material without flowers in Honomanū, Ke‘anae, and Kīpahulu; flowering material was finally collected in 2000. Approximately 50 adults are known in five populations; four of these are represented by only 1–4 individual plants. Reproduction and recruitment of new individuals is infrequent and many of the seedlings that have been observed occur on streambanks and become dislodged during high stormwater episodes. Except for the Kīpahulu population, which is under management by Haleakalā National Park, the threats are the same as for *C. duvalliorum* (*q.v.)*. It should be considered as a candidate for listing as Endangered. Currently it is a target of the Plant Extinction Prevention Program, with seeds collected for propagation and outplanting into suitable, secure habitat within its former range. A complete description and discussion can be found in Lammers (2004).

Wahlenbergia marginata (Thunb.) A. DC **New island record**

In a recent article, Herbst *et al*. (2004: 4–5) reassessed the status of the genus *Wahlenbergia* Schrad. ex Roth in the Hawaiian Islands, reporting a second naturalized species. *Wahlenbergia marginata* was previously collected only on Hawai‘i Island. Judging from the material examined, it apparently occurs at higher elevations. This is consistent with the collection cited below.

Material examined. **MAUI**: East Maui, Makawao Dist, Pu‘u Makua, common in cindery substrate, 1585 m, 1 Jul 2006, *Oppenheimer H70601*.

Casuarinaceae

Casuarina glauca Siebold ex Spreng. **New island record**

Wagner *et al*. (1999a: 529) reported this Australian tree to have been planted on all the main islands except Ni‘ihau but spreading via root suckers only on O‘ahu and Lāna‘i. It has also been documented from Maui and Hawai‘i (Oppenheimer & Bartlett 2000: 3) and Midway Atoll (Starr *et al*. 2002: 19). On Moloka‘i it was found mixed with *C. equisetifolia* and producing thickets from root suckers and possibly also by seed.

Material examined. **MOLOKA‘I**: Kalae, naturalized trees, 500 m, 2 Nov 2006, *Oppenheimer H110608*.

Combretaceae

Terminalia catappa L. **New island record**

Tropical almond is a common littoral tree and has been previously documented from Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al*. 1999a: 547–8; Oppenheimer 2003: 9). On Lāna‘i trees are scattered along the windward, eastern shore amongst *Prosopis* and *Thespesia,* but is less abundant. Seedlings are sometimes observed near cultivated plants at Mānele Bay.

Material examined. **LĀNA‘I**: Keōmuku Rd between Halepalaoa Landing and Kahe‘a, near sea level, 21 Mar 2007, *Oppenheimer, Perlman & Tangalin H30717*.

Cupressaceae

Juniperus bermudiana L. **New island record**

Planted in forest reserves on all islands (Little & Skolmen 1989: 74; Neal 1965: 45), Bermuda juniper is naturalized in dry to mesic areas on West Maui (Oppenheimer 2002: 21). On Lāna‘i it was noted to have escaped from what appears to be deliberate plantings. Unlike many gymnosperms, it has small, fleshy seeds and is bird dispersed.

Material examined. **LĀNA‘I**: between Hulopo‘e and Ho‘okio Gulches, sparingly naturalized trees in alien forest dominated by *Schinus, Psidium*, and *Ficus*, 600 m, 20 Dec 2006, *Oppenheimer H120641*.

Cyatheaceae

Sphaeropteris cooperi (Hook. ex F. Muell.) R.M. Tryon **New island record**

Popular in the local horticultural trade, Australian tree fern is also a serious weed species, yet it is still sold at many nurseries. It has been documented outside of cultivation on Kaua‘i, O‘ahu, Maui, and Hawai‘i (Palmer 2003: 245). On Lāna‘i it is common in yards in Lāna‘i City, and the wind-dispersed spores could have blown over Lāna‘ihale to the collection site. Alternately, the spores could have come in on the tradewinds across the channel from West Maui, where it is common in resort, commercial, and residential landscaping. All wild plants observed were destroyed.

Material examined. **LĀNA‘I**: Wai‘opa Gulch, 810 m, 5 Sep 2007, *Oppenheimer & Perlman H90705*.

Cyperaceae

Cyperus haspan L. **New island record**

Widespread in wet areas of tropical and subtropical regions worldwide, and previously naturalized in the Hawaiian Islands on Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al*. 1999a: 1398; Hughes 1995: 4; Wood 2006: 17). Hughes also discussed the confusion regarding the spelling of the specific epithet *(haspan* vs. *halpan)*.

Material examined. **LĀNA‘I**: W of Hau‘ola Gulch, N of Pu‘u ‘A‘ali‘i, along fenceline on ridgetop, common in degraded shrubland, with *Juncus planifolius*, 900 m, 10 May 2006, *Oppenheimer & J. Penniman H50614*.

Cyperus sphacelatus Rottb. **New state record**

Roadside flatsedge is native to tropical America and tropical Africa, and introduced to Ceylon (Sri Lanka), Malesia, Queensland, Australia, and Tahiti (Koyama 1983: 186). It is also naturalized in Florida (USDA Plants website, accessed January 2008). This species is similar to *C. rotundus* L. but differs in the characters of the glumes. On Moloka‘i it is common in pastures on the east end of the island.

Material examined. **MOLOKA‘I**: E end, Pu‘u O Hoku Ranch, vicinity Honokoi Gulch, uncommon in pasture, 260 m, 18 May 2006, *Oppenheimer et al. H50643*; Keōpukaloa, between Honokoi and Pāpio Gulches, common in pastures and waste areas, 295 m, 6 Nov 2007, *Oppenheimer H110707*.

Rhynchospora tenuis Willd. ex Link **New island record**

Only recently collected in Hawai‘i and reported from Kaua‘i (Imada 2007: 36), this sedge also occurs on Moloka‘i. Imada provided a detailed description and distribution data.

Material examined. **MOLOKA‘I**: Honoulimalo‘o, S of Pahualo‘o, naturalized in pasture, but localized, 485 m, 25 Nov 2007, *Oppenheimer H110739*.

Scleria testacea Nees **New island record**

This indigenous sedge is presently known from low-elevation wet sites near Hilo, Hawai‘i, but reported by Hillebrand from higher elevations near Kīlauea, Hawai‘i, and West Maui (Wagner *et al*. 1999a: 1434; Hillebrand 1888: 484–5). Hillebrand reported it from “Eeka,” presumably a misspelling of ‘Eke, and it is generally believed he was not actually on ‘Eke but on the West Maui summit at Pu‘u Kukui. Degener & Degener (1962) thought Hillebrand to be in error and considered the local range to be limited to below 610 m (2000 ft) elevation in the vicinity of Hilo. On Moloka‘i it was found locally common in a pasture and apparently unbrowsed by domestic cattle, horses, or feral axis deer.

Material examined. **MOLOKA‘I**: S of Pōhakupili Gulch, naturalized in pasture but localized, 385 m, 25 Nov 2007, *Oppenheimer H110738*.

Dennstaedtiaceae

Hypolepis hawaiiensis Brownsey **Range extension**

var. ***mauiensis*** (Hillebr.) D.D. Palmer

A rare fern known only from a few collections made on West Maui (Palmer 2003: 169), this taxon is usually found on mossy ground in forest and shrubland surrounding bogs, rarely on rocky gulch headwalls. On East Maui it was collected on mossy, narrow, shady intermittent streambanks with other ferns and herbs such as *Asplenium, Arachniodes,*

Polystichum, Athyrium, Grammitis, Dryopteris, Peperomia, and *Pilea*. It was noted to be rare in the collection localities, and although there are many similar sites on windward Haleakalā, this taxon has not been previously documented there.

Material examined. **MAUI**: East Maui, Hāna Dist, Hanawī, E of the W fork of Hanawī Stream, rare, 1768 m, 12 Oct 2006, *Oppenheimer & L. Fox H100619* (BISH); Hanawī Stream headwaters, 1653 m,16 Nov 2006, *Oppenheimer H110613*.

Microlepia speluncae (L.) T. Moore **New island record**

Widespread in Asia, Japan, Taiwan, and the Philippines to Polynesia, this large fern is indigenous in the Hawaiian Islands and known from Kaua‘i, O‘ahu, West Maui, and Hawai‘i (Palmer 2003: 184; Oppenheimer 2004: 11). The following collection documents its occurrence on Moloka‘i, where it was found to be locally common in degraded mesic forest. *Microlepia* x*adulterina* W.H. Wagner, a known hybrid between this species and *M. strigosa* (Thunb.) C. Presl (Wagner *et al.* 1999: 153), was not observed but with more careful searching it may be found, as both parents are locally common.

Material examined. **MOLOKA‘I**: Kuhua‘awi Gulch, 600 m, 17 Dec 2007, *Oppenheimer & Perlman H120712.*

Fabaceae

Albizia lebbeck (L.) Benth. **New island record**

Siris tree has been documented outside of cultivation in low-elevation, disturbed areas on Midway Atoll, Ni‘ihau, Kaua‘i, O‘ahu, Maui, and Hawai‘i (Wagner *et al*. 1999a: 645; Oppenheimer & Bartlett 2002: 7; Oppenheimer 2007: 23). Besides the collection from Moloka‘i cited below, plants were also observed at Mana‘e.

Material examined. **MOLOKA‘I**: S side of Wailoku Gulch, 90 m, 7 Nov 2007, *Oppenheimer H110713*.

Macroptilium atropurpureum (DC) Urb. **New island record**

This widespread Neotropical herb is naturalized on Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al*. 1999a: 682–683; Oppenheimer 2003: 13; Lorence & Flynn 2006: 3). The following collection documents its occurrence on Lāna‘i.

Material examined. **LĀNA‘I**: Lāna‘i City, along roadside ca 1.6 km (1 mi) outside town on Kaumalapau Hwy., 450 m, 1 Nov 2007, *Oppenheimer H110704.*

Trifolium repens L. **New island record**

Introduced worldwide as pasturage and naturalized in Hawai‘i on Kaua‘i, Maui, and Hawai‘i (Wagner *et al*. 1999a: 714), white clover is also naturalized on Lāna‘i. It may be escaping from a nearby horse stable.

Material examined. **LĀNA‘I**: Kō‘ele, creeping plants in grassy area along side of road to Keahikawelo, near stables, 515 m, 3 Feb 2007, *Oppenheimer H20703*.

Zornia gemella (Willd.) Vog. **New island record**

Recently *Zornia gemella* has been documented growing outside of cultivation in the Hawaiian Islands, on O‘ahu (Staples *et al*. 2006: 7–8). On Moloka‘i *Z. gemella* is naturalized in the area between Pu‘u O Hoku and Hālawa Valley, growing in short-statured grasslands with relictual native elements.

Material examined. **MOLOKA‘I**: S of Honoko‘i Gulch, in open area near roadside, 220 m, 9 Dec 2006, *Oppenheimer H120629*; vicinity of Honoko‘i Gulch, 270 m, 8 Nov 2007, *Oppenheimer H110725*.

Hydrocharitaceae

Vallisneria americana Michx. **New island record**

Reported by Wagner *et al.* (1999a: 1442) under the Hydrocharitaceae discussion as tentative specimens collected from Kaua‘i and Hilo, Hawai‘i; it was later confirmed that this species was indeed naturalized, at least on Kaua‘i (Staples *et al*. 2003: 13). On Maui it was found growing in an irrigation ditch, where it grows with *Potamogeton* and occurs sporadically but is locally dense over at least several hundred meters. It is occasionally harvested as a vegetable by people of Filipino descent.

Material examined. **MAUI**: West Maui, Wailuku Dist, N of O‘oawa Kilika Gulch, growing in Waihe‘e Ditch in shallow, flowing water, locally common, 125 m, 21 Dec 2005, *Oppenheimer & C. Brosius H120514.*

Lamiaceae

Hyptis suaveolens (L.) Poit. **New island record**

Cultivated by Filipino laborers for medicinal use and as a food flavoring and sparingly naturalized in dry, disturbed areas on Hawai‘i (Wagner *et al*. 1999a: 802), *H. suaveolens* was more recently reported from O‘ahu (Wagner & Herbst 1995: 22) and East Maui (Starr *et al*. 2006: 36). Now it is known from Moloka‘i as well, also growing in dry, disturbed areas.

Material examined. **MOLOKA‘I**: Keāina Gulch, occasional along unimproved road in pasture, 60 m, 9 Dec 2006, *Oppenheimer H120625*.

Liliaceae

Asparagus plumosus J.G. Baker **New island record**

A fairly recent addition to the naturalized flora of Hawai‘i, this cultivated species has been found beyond plantings on the islands of Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Lorence *et al*. 1995: 40; Imada *et al*. 2000: 13; Oppenheimer & Bartlett 2000: 6; Oppenheimer & Bartlett 2002: 9; Starr *et al*. 2002: 21). Imada *et al*. also reported the change in name for the naturalized plants in Hawai‘i; it was formerly confused with *A. setaceus* (Kunth) Jessop.

Material examined. **LĀNA‘I**: Lāna‘i City, occasional in waste areas, 510 m, 5 Jan 2007, *Oppenheimer, Perlman & Tangalin H10710.*

Hippeastrum striatum (Lam.) H.E. Moore **New island records**

This ornamental herb has been documented outside of cultivation on the islands of Kaua‘i, Maui, and Hawai‘i (Wagner *et al*. 1999a: 1463; Oppenheimer & Bartlett 2002: 9). The species was previously misidentified in Hawai‘i as *H. puniceum* (Lam.) Vahl (Herbst & Wagner 1999: 23). Plants are commonly seen in disturbed and waste areas, as well as in old yards and areas of neglect, where it does not appear to be under cultivation. Its dispersal mechanism is perplexing, as seeds have not yet been observed, but the underground onion-like bulbs produce smaller bulblets that could be moved around with soil and yard waste. Staples *et al*. (2000: 23) listed an unknown dispersal syndrome but possibly vegetative.

Material examined. **MOLOKA‘I**: S bank of Pāpio Gulch, sparingly naturalized, 200 m, 7 Nov 2007, *Oppenheimer H110721*. **LĀNA‘I**: Lāna‘i City, 500 m, 20 Mar 2007, *Oppenheimer, Perlman & Tangalin H30713.*

Lindsaeaceae

Lindsaea ensifolia Sw. **New island record**

First collected in Hawai‘i in 1969, and naturalized on Kaua‘i, O‘ahu, Maui, and Hawai‘i (Palmer 2003: 174), on Moloka‘i this alien fern was found growing in a pasture. Although

the indigenous *Sphenomeris chinensis* (L.) Maxon was also noted to occur nearby, the interesting intergeneric hybrid x*Lindsaeosoria flynnii* W.H. Wagner (W.H. Wagner 1993: 72–3) was not found.

Material examined. **MOLOKA'I**: S of Pōhakupili Gulch, naturalized in pasture but localized, 385 m, 25 Nov 2007, *Oppenheimer H110737*.

Malvaceae

Sida ciliaris L. **New island record**

Only recently found as a naturalized species in Hawai'i but already documented from Kaua'i (Staples *et al.* 2003: 14–15), O'ahu (Wagner *et al*. 1997: 59), Lāna'i (Oppenheimer 2007: 26), Maui (Oppenheimer & Bartlett 2000: 6; Starr *et al*. 2004: 24), and Kaho'olawe (Starr *et al*. 2006: 36). With the following voucher specimen collected on Moloka'i, this species is now known from all of the main islands except Ni'ihau.

Material examined. **MOLOKA'I**: Kaunakakai, growing in waste areas around town, 15 m, 20 Feb 2007, *Oppenheimer H20712*.

Sidastrum micranthum (A. St. Hil.) Fryxell **New island record**

Naturalized on O'ahu, Moloka'i, East Maui, and Hawai'i (Wagner *et al*. 1999a: 901; Starr *et al*. 2003: 28; Oppenheimer 2007: 27), this species has been recently collected on Lāna'i.

Material examined. **LĀNA'I**: WSW of Pu'u Māhana, uncommon in remnant dry forest, 530 m, 3 Jan 2007, *Oppenheimer, Perlman & Tangalin H10704*.

Moraceae

Ficus rubiginosa Desf. **New island record**

Previously documented as naturalized on West Maui (Oppenheimer 2003: 15), this species was recently collected on Lāna'i. As on Maui, trees were exclusively terrestrial; this may or may not be an ecological character useful in distinguishing this species from the similar *F. platypoda*, which usually starts as an epiphyte. The two species share the same pollinating wasp (Staples & Herbst 2005: 410), *Pleisodontes imperialis* (Wagner *et al*. 1999a: 924), which was reared from fruits collected on Lāna'i, supporting its status as being capable of reproduction and naturalization. It is likely both bird and mammal dispersed. Another area of forestry plantings including this species exists near the Ko'ele end of the Munro Trail; this was not investigated for reproduction and spread, but occasional trees were noted in deep gulches near the old fog drip station.

Material examined. **LĀNA'I**: vicinity of Ha'alelepa'akai, naturalized, terrestrial, small trees in wet *Metrosideros/Dicranopteris* forest, 995 m, 17 Aug 2006, *Oppenheimer & K.R. Wood H80628*.

Myrtaceae

Eucalyptus creba F. Muell. **New island record**

Native to eastern Queensland and New South Wales, Australia, with over 33,000 trees planted in Hawai'i between 1911 and 1941 on Kaua'i, O'ahu, and Moloka'i, where it is regenerating within the plantations (Wagner *et al.* 1999a: 953). On Lāna'i the narrow-leaved ironbark was found on a dry ridge mixed with *E. robusta*; both were locally common.

Material examined. **LĀNA'I**: Puhielelu Ridge, naturalized, common with *E. robusta* on dry ridge, 740 m, 16 Aug 2006, *Oppenheimer & K.R. Wood H80625*.

Eucalyptus pilularis Sm. **New island record**

Wagner *et al.* (1999a: 957) report this species as widely planted and regenerating on

Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i. On Lāna‘i this tree is common on the slopes above Lāna‘i City.

Material examined. **LĀNA‘I**: above Lāna‘i City, 540 m, 5 Feb 2007, *Oppenheimer H20709*.

Orchidaceae

Phaius tankarvilliae (Banks ex L’Hér.) Blume **Range extension**

Chinese ground orchid has been documented outside of cultivation on Kaua‘i, O‘ahu, Moloka‘i, Lāna‘i, West Maui, and Hawai‘i (Wagner *et al.* 1999a: 1474; Oppenheimer *et al.* 1999a: 9; Oppenheimer 2007: 28). Since the seeds are wind dispersed (Staples *et al*. 2000: 26) and there are no apparent obligate soil fungus associations, it is not surprising that it now occurs on all major islands where suitable wet habitat exists. It is still offered for sale in garden shops on Maui and probably elsewhere.

Material examined. **MAUI**: East Maui, Makawao Dist, Kailua Stream, E tributary, uncommon along pipeline, 866 m, 28 Mar 2007, *Oppenheimer, Perlman & Tangalin H30725.*

Pinaceae

Pinus taeda L. **New naturalized record**

No species of pine tree have been previously reported as naturalized on Lāna‘i, and this species has not been documented as naturalized elsewhere in Hawai‘i (Oppenheimer 2002: 21; 2003: 18–19; Wysong *et al*. 2007: 6). *Pinus taeda*, loblolly pine, is native to the eastern and southern United States, from New Jersey to Texas and Oklahoma, and has been planted on Kaua‘i, Moloka‘i, Maui, and Hawai‘i (Little & Skolmen 1989: 64). The needles are usually in bundles of three, with the sheath nearly 25 mm long and persisting; the cones have a stout prickle at the end of the scale; seed wings are up to 25 mm long (Little & Skolmen 1989: 60, 62). Different size classes have been observed in steep gulches, but the smallest and presumably most recently germinated plants seem to be in open, disturbed areas such as roadsides and landslides. The larger trees in the steep, nearly inaccessible terrain may have become established at those sites before other, more aggressive woody taxa, such as strawberry guava or ironwood, invaded and formed dense thickets. Richardson & Rejmánek (2004) reported the Pinaceae to have an exceptionally high percentage of invasive and naturalized species compared to many angiosperm families that are predominately shrubs and trees.

Material examined. **LĀNA‘I**: Ho‘okio Gulch, escaping from old forestry plantings into wet and mesic areas, 800 m, 5 Feb 2007, *Oppenheimer H20708*.

Poaceae

Brachiaria brizantha (Hochst. ex Rich.) Stapf **New island record**

Only recently documented in the Hawaiian Islands from Kaho‘olawe (Starr *et al*. 2006: 39), this grass also occurs on East Maui. The key to the species of *Brachiaria* by Herbst & Clayton (1998: 19) includes *B. brizantha*.

Material examined. **MAUI**: East Maui, Hāna Dist, Pāpa‘a‘eanui, growing near Hana Hwy., 244 m, 7 Sep 2004, *Oppenheimer & Hansen H90403* (BISH).

Bromus catharticus Vahl **New island record**

Naturalized and common in Hawai‘i on the islands of Midway Atoll, Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al*. 1999a: 1508; Lorence & Flynn 1997: 11), rescue grass is now known from Lāna‘i, where it is found in lawns and waste areas in the Lāna‘i City area. The change in name from *B. willdenowii* Kunth was reported by Herbst & Clayton (1998: 20).

Material examined. **LĀNA‘I**: Lāna‘i City, naturalized in lawns and waste areas, 500 m, 26 Apr 2007, *Oppenheimer H40733*.

Bromus diandrus Roth **New island record**
[syn. *B. rigidus* Roth]
Ripgut grass has been documented in Hawai‘i from Kaua‘i, East Maui, and Hawai‘i (Wagner *et al*. 1999a: 1508; Herbarium Pacificum Staff 1999: 7). On Lāna‘i it is locally common during wet seasons and definitely naturalized. Pavlick & Anderton (2007: 224) considered *B. rigidus* conspecific with *B. diandrus*.

Material examined. **LĀNA‘I**: ‘Āwehi Rd, in the *Gardenia brighamii* outplanting exclosure, locally common, 760 m, 21 Mar 2007, *Oppenheimer, Perlman & Tangalin H30714.*

Bromus sterilis L. **New island records**
There is a brief discussion of this species in the generic notes of *Bromus* (Wagner *et al*. 1999a: 1507). It had been known from 2 collections made in Hāmākua, Hawai‘i, the earliest in 1936; its status in the Hawaiian flora had remained unknown. The following collections confirm it as naturalized on 2 additional islands. Herbst & Clayton include it in their key (1998: 20).

Material examined. **MOLOKA‘I**: Waiakuilani Gulch, scattered to locally common on steep slopes in mesic forest and dry shrubland, 920 m, 5 Apr 2007, *Oppenheimer, Perlman & Tangalin H40711*. **MAUI**: West Maui, Lāhaina Dist, slopes of Helu, Kaua‘ula Valley, S side, locally common grass on steep rocky mid-slope, 1000 m, 11 May 2007, *Oppenheimer H50715*.

Eragrostis tenuifolia (A. Rich.) Steud. **New island record**
This non-native grass has been previously reported from O‘ahu, Maui, and Hawai‘i (Herbst & Clayton 1998: 28; Oppenheimer 2004: 15). The following collection documents its occurrence on Lāna‘i.

Material examined. **LĀNA‘I**: Keōmuku Rd, roadside weed, common, 460 m, 19 Oct 2006, *Oppenheimer H100631*.

Eragrostis unioloides (Retz.) Steud. **New island record**
Although originally believed to be an adventive species in Hawai‘i (Wagner *et al*. 1999a: 1538), Herbst & Clayton (1998: 26) considered it to be truly naturalized, citing several specimens collected on the Big Island. The following specimen, collected in a remote area on leeward Haleakalā, documents its occurrence and naturalized status on Maui.

Material examined. **MAUI**: East Maui, Hāna Dist, Kahikinui, Wailaulau drainage basin, uncommon in grassland dominated by *Deschampsia, Anthoxanthum, Holcus,* and *Axonopus*, in degraded *Acacia/Metrosideros* montane mesic forest, 1634 m, 29 Sep 2006, *Oppenheimer H90639* (BISH).

Eriochloa procera (Retz.) C.E. Hubb. **New state record**
Whistler (1995: 170) reported this species to be native to the Old World tropics, and that it was first collected in the tropical Pacific in Fiji in 1944. It also occurs in Samoa, Tonga, and Guam, where it is occasional to locally common in lowland roadsides, gardens, lawns, and other disturbed places. It was expected to spread rapidly once established. It differs from *E. punctata* (L.) Desv. ex W. Ham. by the number of racemes, and its smaller, lanceolate spikelets.

Material examined. **MOLOKA‘I**: Kaunakakai Wharf, weedy grass in small lawn plot, near sea level, 15 May 2006, *Oppenheimer H50627*.

Festuca rubra L. **New island record**

Red fescue is sparingly naturalized on the islands of Kaua‘i (Wagner *et al*. 1997: 60), Maui, and Hawai‘i (Wagner *et al*. 1999a: 1548). The following specimen documents its occurrence on the island of Moloka‘i.

Material examined. **MOLOKA‘I**: Kūpā‘ia Gulch, occasional clumping grass on steep slopes in mesic forest, 880 m, 3 Apr 2007, *Oppenheimer, Perlman & Tangalin H40704.*

Oplismenus compositus (L.) P. Beauv. **Range extension**

Naturalized in Hawai‘i on Kaua‘i, O‘ahu, Moloka‘i, West Maui, and Hawai‘i (Wagner *et al*. 1999a: 1565; Oppenheimer 2003: 21), the following specimen represents a significant range extension to East Maui.

Material examined. **MAUI**: East Maui, Hāna Dist, Pu‘uhaoa, between Wailua and ‘Ohe‘o Gulches, common grass in old pasture and along stream, 31 m, 4 Dec 2005, *Oppenheimer H120501*.

Paspalum fimbriatum Kunth **New island record**

Naturalized in moist, disturbed, open sites on Kure Atoll, Kaua‘i, O‘ahu, Moloka‘i, East & West Maui (Wagner *et al*. 1999a: 1576; Starr *et al*. 2002: 23; Oppenheimer 2003: 21), this grass was collected recently on Lāna‘i, where it was growing under similar conditions.

Material examined. **LĀNA‘I**: Lāna‘i City, weed at edge of lawn, 505 m, 3 Feb 2007, *Oppenheimer H20702*.

Paspalum notatum Flüggé **New island record**

Documented from Kaua‘i (Lorence & Flynn 1999: 6), and Maui (Oppenheimer 2007: 29), this grass is also naturalized on Moloka‘i.

Material examined. **MOLOKA‘I**: Pūniu‘ōhua 1, common in pastures, 370 m, 10 Aug 2006, *Oppenheimer H80605*.

Trisetum inaequale Whitney **Notable rediscovery**

Occurring on open, grassy slopes and steep ridges and slopes in dry forest at 730–1000 m on Lāna‘i and Maui (Wagner *et al*. 1999a:1602), this species was last collected on Lāna‘i in 1938. Although it is still locally common on leeward West Maui, this species is apparently rare on Lāna‘i; there are no specimens from East Maui.

Material examined. **LĀNA‘I**: very rare on open grassy slope, semi-dry place, Kapua, Kaohai, 15 Apr 1938, *E.Y. Hosaka & H. St. John 1974* (BISH); gulch N of Kaonohiokala Ridge, uncommon, few plants observed in severely degraded area of dry shrubland & forest, 400 m, 25 Apr 2007, *Oppenheimer H40732* (PTBG).

Pteridaceae

Pteris lidgatei (Baker) Christ **Notable rediscovery**

Federally listed as Endangered, this fern is known from the Ko‘olau Mountains of O‘ahu, Moloka‘i, and West Maui (Palmer 2003: 229; USF&WS 1997). Its occurrence on Moloka‘i is documented by a single collection from the Oloku‘i plateau made in September 1912 by C.N. Forbes. No data regarding its abundance or rarity is on the collection label, but Forbes’s field notes (at BISH) may contain more details. A recent assessment of Hawaiian vascular plants considered *Pteris lidgatei* extinct on Moloka‘i (Wagner *et al*. 1999b: 58). Only three locations have been documented from Maui in the past two decades, with a total of 27 plants, but one was probably destroyed in a recent landslide. On O‘ahu six populations are known (J.Q.C. Lau, pers. comm.). The Moloka‘i population

cited here is comprised of six reproductive sporophytes, plus two young plants; gametophytes were not searched for, and viable spores were not available for propagation and restoration. The small population size is consistent with most historic and current observations of this species. Since its discovery by Hillebrand in the mid-1800s, this species has always been considered rare with collections lacking for decades on O‘ahu (Wagner 1949: 448), and well over a century on Maui.

Material examined. **MOLOKA‘I**: slopes of Oloku‘i, bank of stream above Wai‘ehu, 915 m (3000 ft), Sep 1912, *Forbes 556Mo* (BISH, 2 sheets); Kumu‘eli Gulch, W bank of stream near waterfall, 1.5–7.0 m above streambed on mossy vertical wall along overflow channel, 1030 m, 22 Feb 2007, *Oppenheimer, Perlman & Tangalin H20721*.

Pteris vittata L. **New island record**

Naturalized in Hawai‘i since at least 1887 and now known from Kaua‘i, O‘ahu, Lāna‘i, Maui, and Hawai‘i (Palmer 2003: 229–230; Oppenheimer 2004: 17), this weedy fern is documented here from Moloka‘i. Spores are easily wind dispersed, with plants commonly observed on rock walls, cliffs, and road cuts.

Material examined. **MOLOKA‘I**: Kalaupapa, W end of peninsula, N bank of Waihānau Stream, nursery weed, 10 m, 30 June 2007, *Oppenheimer & B. Garnett H60728*.

Rubiaceae

Sherardia arvensis L. **New island record**

These small annual herbs are naturalized on East Maui and Hawai‘i in dry, open, disturbed sites (Wagner *et al*. 1999a: 1171). The following collection was made on Moloka‘i in wet, shady forest; all plants observed were removed.

Material examined. **MOLOKA‘I**: Kawela, Pu‘u Kolekole Cabin, naturalized sprawling herbs around cabin in wet forest, 1200 m, 4 Apr 2007, *Oppenheimer, Perlman & Tangalin H30706*.

Rutaceae

Melicope volcanica (A. Gray) T.G. Hartley & B.C. Stone **New island record**

Previously known from Lāna‘i, East Maui, and Hawai‘i, where it is still common in mesic to wet forests from 610–2060 m elevation (Wagner *et al*. 1999a: 1205–1206), *M. volcanica* has not been previously reported from Moloka‘i.

Material examined. **MOLOKA‘I**: Wailau Valley, Kukuinui Ridge, 841 m, 18 Sep 1997, *Oppenheimer 239* (PTBG).

Santalaceae

Santalum freycinetianum Gaud. var. ***freycinetianum*** **New island record**

Three varieties of *S. freycinetianum* are currently recognized, with the nominate taxon occurring on O‘ahu and Moloka‘i (Wagner *et al*. 1999a: 1221). The following collection documents it from West Maui, where the Endangered *S. f.* var. *lanaiense* Rock also occurs. The distribution of the latter is restricted to the leeward, drier, southern half of the West Maui massif, with the typical variety occurring in the northwestern quadrant. Genetic analysis of the *S. freycinetianum-S. haleakalae* complex by Danica Harbaugh at Smithsonian Institution is in progress and preliminary results support this distribution pattern. More study is needed to assess the extent and overlap, if any, of each of these taxa.

Material examined. **MAUI**: West Maui, Lāhaina Dist, Honokōwai, Haenanui Gulch, 890 m, 29 Aug 2006, *Oppenheimer H80640.*

Urticaceae

Neraudia melastomifolia Gaud. **Notable rediscovery**

A member of a genus of five species endemic to Hawai‘i, *N. melastomifolia* is known from Kaua‘i, O‘ahu, Moloka‘i, and West Maui (Wagner *et al*. 1999a: 1304). Its occurrence on Moloka‘i is documented by a single collection from the Oloku‘i plateau made in 1948. In a recent assessment of Hawaiian vascular plants, it was considered extinct on Moloka‘i (Wagner *et al*. 1999b: 51), with no other collections or recent observations made.

Material examined. **MOLOKA‘I**: Oloku‘i, 550 m (1800 ft), 6 Feb 1948, *St. John & R.L. Wilbur 23281* (BISH); Wāwā‘ia Gulch, rare, single 3m tall shrub on steep slope, W side of large waterfall, 1000 m, 23 Feb 2007, *Oppenheimer, Perlman & Tangalin H20724.*

Zingiberaceae

Alpinia zerumbet (Pers.) B.L. Burtt & R.M. Sm. **New island record**

A popular, widely cultivated ornamental, shell ginger was recently reported to be naturalized on Kaua‘i (Flynn & Lorence 2002: 16). The collector’s notes indicate the voucher specimen cited was made in lowland secondary forest composed of mainly naturalized tree species near sea level. The following vouchers document this species outside of cultivation on West Maui, and were collected in areas dominated by native vegetation. Although not yet widespread, this is a serious weed where it occurs, forming dense monotypic thickets like other naturalized species in this family. Its use as an ornamental should be strongly discouraged, and removal of cultivated plants should also be considered if they occur near suitable habitats in natural areas. Its dispersal mechanism is unknown, but Staples *et al.* (2000: 31) listed other *Alpinia* species as vegetatively propagating or possibly bird dispersed. Both methods are likely in this case since plants were observed growing on seemingly inaccessible ledges. Aquatic dispersal is also apparently occurring along streams.

Material examined. **MAUI**: West Maui, Lāhaina Dist, Pu‘uki, Ke‘ali‘i Gulch, 732 m, 14 Mar 2007, *Oppenheimer H30709*; Kahoma Stream, locally common, forming thickets on stream banks, shady slopes, and open sunny ledges, 658 m, 19 Jun 2007, *Oppenheimer H60718.*

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Notes on grasses (Poaceae) in Hawai‘i

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Recent collecting in Hawai‘i and curatorial activities involving grasses in the *Herbarium Pacificum* (BISH) have revealed three new naturalized state and five new island records, and one nonpersisting waif identified to species for the first time seventy years after its collection. Taxonomic and nomenclatural notes are indicated for some previously reported taxa. All identifications were made by the author; supporting voucher specimens are all deposited at BISH.

Agrostis exarata Trin. var. ***monolepis***
(Torr.) Hitchc. **Taxonomic note**

This infraspecific taxon and several others attributed to *A. exarata* are no longer recognized by many recent publications (e.g., Soreng. & Peterson 2003; Harvey 2007a). As such, BISH is no longer recognizing *A. exarata* var. *monolepis* (Torr.) Hitchc. but rather a single polymorphic species.

Bothriochloa bladhii (Retz.) S.T. Blake **New island record**

This is a widespread species in Australia and the Pacific. Prior to this record for O’ahu, *B. bladhii* was known from Kaua‘i, Moloka‘i, Maui, and Hawai‘i.

Material examined: **O‘AHU**: Ka‘ala Natural Area Reserve, ridge between Kaimuhola and Alaiheihe, gulches between access road, 396 m (1300 ft), 11 Feb 2008, *US Army 79.*

Bromus diandrus Roth **Taxonomic note**

Herbst and Clayton (1998) discussed the taxonomic disagreement over the status of *Bromus rigidus* Roth at the specific or infraspecific level, and whether that name should be placed in the generic segregate *Anisantha* K. Koch. Preliminary studies provide no cladistic support in favor of segregating *Anisantha* from *Bromus* (Pillay & Hilu 1995; Catalán *et al.* 1997) and few authors presently recognize *Anisantha* (e.g., Weber & Wittman 1992). However, a consensus has emerged that *B. rigidus* should be considered conspecific with *B. diandrus* Roth (Weber & Wittman 1992; Sales 1993; Wilken & Painter 1993; Liang *et al*. 2006; Pavlick & Anderton 2007; Snow 2007; but see Pavlick *et al*. 2003). Simon (1993: 80) maintained these taxa at the subspecific level, but his key to *Bromus* in Australia (where the taxa are nonnative), and studies carried out in their native ranges (Sales 1993), together reflect their (at best) tenuous morphological differences. As such, it seems best to reduce *B. rigidus* to synonymy under *B. diandrus*.