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PART 2: NOTES

NEAL L. EVENHUIS
AND
LUCIUS G. ELDREDGE, EDITORS

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Cover: *Erinna newcombi* (Newcomb's snail) rediscovered on Kaua‘i (see p. 52) (Photo: David Boynton).

This issue is dedicated to the memories of
David Boynton and Alistair Ramsdale,
two of our colleagues who will be sorely missed.

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RECORDS OF THE HAWAII BIOLOGICAL SURVEY FOR 2006
Part 2: Notes[1]

This is the second of 2 parts to the *Records of the Hawaii Biological Survey for 2006* and contains the notes on Hawaiian species of plants and animals including new state and island records, range extensions, rediscoveries, possible extinctions, and other information. Larger, more comprehensive treatments are found in the first "Articles" part of this *Records* [*Bishop Museum Occasional Papers* 95].

New Hawaiian plant records for the Island of Moloka'i

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The following contributions include 5 new naturalized records and 21 new island records of plants located on the island of Moloka'i. Twenty-five of the records are collected from within or very near the boundary of Kalaupapa National Historical Park (KALA). All but two records, *Coprosma montana* and *Canavalia galeata*, are for nonnatives. Voucher specimens are housed in the Bishop Museum's *Herbarium Pacificum* (BISH), Honolulu, Hawai'i, unless otherwise noted.

Aloeaceae

Aloe vera (L.) Burm. f. **New island record**

Native to North Africa, *A. vera* (aloe) is widely cultivated in tropical regions. It has found commercial use in shampoos and as an ornamental and has long been used as a medicinal plant both to treat burns and as a purgative (Whistler 2000). In Hawai'i it has previously been reported as naturalized on Kaua'i in Hanapīpī and Kekaha, on O'ahu at Makapu'u, and on Maui in the Lahaina district (Wagner *et al.* 2005). On Kalaupapa peninsula it is known from two populations near the lighthouse. One population, behind the lighthouse cabins, is perhaps persisting from cultivation. The other population exists in mixed *Sida fallax–Lantana camara* rocky scrub about 100 m north of the lighthouse off of the coastal road and appears to be naturalized, as it is not near any home site or structure.

Material examined. **MOLOKA'I**: Kalaupapa peninsula, small patch near lighthouse cottages, 12 m, 9 Aug 2005, *Wysong 765*.

1. All notes in this issue constitute Contribution No. 2007-013 to the Hawaii Biological Survey.

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Annonaceae

Annona muricata L. **New naturalized record**

Native to tropical America (possibly the West Indies), *A. muricata* (soursop) is widely cultivated and naturalized (GRIN 2005). In Hawai‘i it is widely cultivated for its edible fruit. It is probably the most abundant species of *Annona* in Hawai‘i, due to its popularity with Filipino and Southeast Asian communities (Staples & Herbst 2005). On Kalaupapa peninsula, it is often associated with old cultural sites near the base of the cliffs, where it was probably intentionally planted. However, it appears that this species has naturalized, as there are often young trees and seedlings associated with mature plants at these sites, and seedlings can often been found outside of these sites. Seed dispersal of this species is likely by pigs, which are numerous in these areas.

Material examined. **MOLOKA‘I**: Kalaupapa peninsula, small population of several dozen mature trees located around old house site above the black sand beach, ca. 100 m above the second bridge, in mixed nonnative, dry to mesic forest dominated by *Syzygium cumini*, 27 m, 17 Nov 2004, *Wysong 446*.

Apocynaceae

Thevetia peruviana (Pers.) K. Schum. **New island record**

Native to the Neotropics, *T. peruviana* (be-still tree, yellow oleander, lucky nut, *nohomālie*) was first introduced to Hawai‘i around 1900. In Hawai‘i it is commonly grown as an ornamental and was previously known to be naturalized on Midway, Kaua‘i, O‘ahu, and Maui (Wagner *et al.* 1999). In Kalaupapa settlement it was historically grown as an ornamental and has since become commonly naturalized in weedy areas behind the settlement and at the base of the Kalaupapa historic trail, where it can be found in abundance, sometimes forming pure stands with no plants in the understory other than *T. peruviana* seedlings.

Material examined. **MOLOKA‘I**: Kalaupapa settlement, southeast corner of settlement in weedy area behind houses dominated by *Leucaena leucocephala* and *Panicum maximum*, 29 m, 10 Aug 2005, *Wysong 800*.

Asclepiadaceae

Calotropis gigantea (L.) W.T. Aiton **New island record**

Native to the region from India and Sri Lanka eastward to China and Indonesia, *C. gigantea* (crown flower) is cultivated as an ornamental in tropical regions worldwide. In Hawai‘i the lavender color form was apparently introduced before 1871 and the white form by about 1920, although possibly earlier (Staples & Herbst 2005). It has been previously recorded as naturalized on Kaua‘i and Maui, and has been collected on Moloka‘i as early as 1928 from a planted individual at Kalua‘aha (*Degener 3524*, BISH). In Kalaupapa it is an uncommon ornamental and is known to be naturalizing at one location on the south side of the lighthouse cottages.

Material examined. **MOLOKA‘I**: Kalaupapa peninsula, cultivated plant in lawn on north side of lighthouse cottages; plantings on south side of cottages appear to be naturalizing, 30 m, 9 Aug 2005, *Wysong 763*.

Stapelia gigantea N.E. Br. **New island record**

Native to tropical and southern Africa and Mozambique (Wagner *et al.* 1999), *S. gigantea* (Zulu-giant, giant toad plant) was probably first introduced to Hawai‘i prior to 1871 (Hillebrand 1888). Previously documented as naturalized on O‘ahu (Diamond Head

Crater) and West Maui (Ukumehame Valley) (Wagner *et al.* 1999), on Kalaupapa peninsula it has been found in various open and rocky sites north of the settlement.

Material examined. **MOLOKA'I**: Kalaupapa peninsula, near the old baseball field in rocky, open scrub dominated by *Lantana camara* and *Schinus terebinthifolius,* 15 m, 9 Dec 2004, *Wysong 537*.

Betulaceae

Alnus nepalensis D. Don **New naturalized record**

Native to temperate and tropical Asia from China, the Indian subcontinent, and Indochina (GRIN 2005), *A. nepalensis* (Nepal alder) has been planted by state foresters on a number of the main islands. A large planting of nearly 1,500 trees, among the largest in the state, exists on Moloka'i at the Kamakou Forest Reserve (Wagner *et al.* 1999). A collection outside the forest reserve was made in 1998 (*Annable 3797*, BISH) in the Nature Conservancy preserve. Young plants have also been observed within the National Park boundary in areas below the plantation.

Material examined. **MOLOKA'I**: Kahanui forest reserve, forest road on western rim of Waikolu Valley adjacent to park boundary, 838 m, 22 Nov 2004, *Wysong 473*.

Brassicaceae

Nasturtium microphyllum Boenn. ex Rchb. **New island record**

Native to western Europe, *N. microphyllum* (*lēkō*) was first collected on Kaua'i in 1917 (*Forbes 773.K*, BISH). It is widely cultivated as a food plant. In Hawai'i naturalized collections have previously been made on Kaua'i, O'ahu, Maui, and Hawai'i (Wagner *et al.* 1999). In Kalaupapa National Historical Park it has been reported by Kalaupapa residents from Waikolu and Wai'ale'ia Valleys.

Material examined. **MOLOKA'I**: Wai'ale'ia Valley, mouth of valley on east side of stream, growing in seepages from cliff face, 15 m, 4 Jan 2005, *Wysong 557*.

Sisymbrium altissimum L **New island record**

Native to Eurasia, *S. altissimum* (tumble mustard) was first collected on the Big Island of Hawai'i in 1943 (*Fagerlund & Mitchell 767*, BISH). In Hawai'i it is widely naturalized and has been previously known in dry, disturbed sites from 15 to 3050 m on Kaua'i, Maui, Kaho'olawe, and Hawai'i, where it is relatively uncommon (Wagner *et al*. 1999). On Moloka'i it has been found at Lā'au Point on the west side of the island.

Material examined. **MOLOKA'I**: southwest side, Kaupoa Road to Kamāka'ipō and Lā'au Point, Moloka'i Ranch road dominated by nonnative herbs and grasses and connected to a coastal dry mixed community with *Prosopis pallida* and *Verbesina encelioides,* 6 m, 26 Apr 2004*, K.R. Wood & Hughes 10677* (PTBG).

Clusiaceae

Clusia rosea Jacq. **New island record**

Native to the West Indies and Florida, *C. rosea* was first collected on O'ahu in 1934 (*Grant 7507*, BISH). In Hawai'i it is commonly cultivated as an ornamental but has become widely naturalized in low-elevation disturbed areas, as the seeds are eaten and spread by birds. It has been previously known from Kaua'i, O'ahu, Maui, and Hawai'i (Wagner *et al.* 1999, 2005). On Kalaupapa peninsula there are several ornamental plantings inside the settlement. However, it has become sparingly naturalized in highly disturbed areas behind the settlement.

Material examined. **MOLOKA‘I**: Kalaupapa peninsula, behind Oceanview pavilion bathrooms in mixed, nonnative, rocky scrub dominated by *Prosopis pallida*, *Lantana camara*, and *Schinus terebinthifolius*, 12 m, 9 Aug 2005, *Wysong 759*.

Cucurbitaceae

Cucumis dipsaceus Ehrenb. ex Spach **New island record**

Native to eastern Africa, *C. dipsaceus* (hedgehog or teasel gourd) was first collected on O‘ahu in 1903 (*Bryan s.n.*, BISH 47819). In Hawai‘i it has been previously known to be widely naturalized in dry, disturbed sites on all the main islands except Moloka‘i (Wagner *et al.* 1999).

Material examined. **MOLOKA‘I**: Kalaupapa peninsula, along the fence behind the state quonset hut, single plant found and subsequently treated with a foliar herbicide, 12 m, 7 Apr 2005, *Wysong 753*.

Cyperaceae

Rhynchospora caduca Elliott **New island record**

Native to the southern United States from southern Virginia southwest to Texas and Florida, *R. caduca* was first collected on Hawai‘i in 1972 (*Shinbara H110*, BISH). In Hawai‘i it has previously been reported as sparingly naturalized in wet, disturbed areas from 320 to 1400 m on Kaua‘i, O‘ahu, Maui, and Hawai‘i (Wagner *et al.* 1999; Wagner *et al.* 2005).

Material examined. **MOLOKA‘I**: road to Kapuna Spring, 800 m, 4 Feb 2004, *K.R. Wood & Hughes 10563* (PTBG).

Fabaceae

Canavalia galeata (Gaudich.) Vogel **New island record**

Previously collected only on O‘ahu in native mesic or degraded forest dominated by guava or other alien vegetation, or occasionally in *Lantana* shrubland from 180 to 800 m, the following collection represents a new island endemic record for *C. galeata* from Moloka‘i.

Material examined. **MOLOKA‘I**: Waikolu Valley, ca. 1 mi up from mouth of valley on small ridge above forest bird transect 2 in degraded mesic forest dominated by guava and *kukui*, single medium-sized patch encountered growing on several guava trees and through understory, 300 m, 28 Mar 2005, *Wysong 724*.

Senna alata (L.) Roxb. **New island record**

Native to South America, *S. alata* (candle bush) was known to be cultivated prior to 1871 (Hillebrand 1888). In Hawai‘i it is widely cultivated and known to have escaped cultivation on Kaua‘i, O‘ahu, and Maui. On Kalaupapa peninsula it has been observed from 2 populations, including one near the old baseball field and one near the rock quarry.

Material examined. **MOLOKA‘I**: Kalaupapa peninsula, near the old baseball field, just behind the heli LZ in rocky open scrub dominated by *Lantana camara* and *Schinus terebinthifolius*, ca. 25 mature individuals together with young plants and seedlings, 15 m, 9 Dec 2004, *Wysong 536*.

Tamarindus indica L. **New naturalized record**

Possibly native to Africa, but under cultivation from tropical Asia to Africa for so long that its origin is uncertain (Whistler 2000), *T. indica* (tamarind) has been collected as early as 1928 from Moloka‘i (*Degener 3330*, BISH). These earlier vouchers represent roadside collections. In Kalaupapa it is seen at the base of the cliffs in highly disturbed alien forest, often in association with old cultural sites. However, it is believed that this species has naturalized,

as there frequently are young trees and seedlings associated with these populations.

Material examined. **MOLOKA'I**: Kalaupapa peninsula, around old *heiau* site referred to as Kalawao Area A (Kirch 2002) in highly disturbed, mixed dry/mesic alien forest dominated by *Syzygium cumini*, 30 m, 10 Aug 2005, *Wysong 778*.

Lamiaceae

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

Native to tropical America, *H. pectinata* (comb hyptis) was first collected on O'ahu in 1931 (*Wilder s.n.*, BISH 53251). In Hawai'i it is widely naturalized in low-elevation, dry to mesic, disturbed habitats on Kaua'i , O'ahu, Maui, and Hawai'i (Wagner *et al.* 1999). On Kalaupapa peninsula it is a common weed in open, disturbed, mixed nonnative sites in and around Kauhakō Crater. Its presence there was previous cited by Medeiros *et al.* (1996) and Linney (1987).

Material examined. **MOLOKA'I**: Kauhakō Crater, southwest aspect of the crater just below crater rim in dry, open, mixed nonnative shrubland, 73 m, 7 Dec 2004, *Wysong 498*.

Lamium amplexicaule L. **New island record**

Native to Eurasia and northern Africa, *L. amplexicaule* (henbit) was previously known from a single collection made at the margin of Haleakalā National Park headquarters parking lot, Maui, 2140 m, in 1981 (*R. Nagata 81-6*, BISH), where it seemed to be slowly naturalizing into adjacent disturbed areas (Wagner *et al.* 1999). The following represents the first naturalized record for Moloka'i.

Material examined. **MOLOKA'I**: Nihoa Pali, north-facing gray-white basalt cliffs, *Schinus terebinthifolius* alien mixed shrub/herb cliff with *Ageratum conyzoides* and *Ageratina riparia*, 350 m, 8 Mar 2004, *K.R. Wood & Hughes 10599* (PTBG).

Leonurus japonicus Houtt. **New island record**

Native to temperate Asia, *L. japonicus* was first collected on O'ahu in 1909 (*Faurie 891*, BISH). In Hawai'i it was previously reported naturalized in dry areas and pastures, 40–600 m, on Kaua'i, O'ahu, Maui, and Hawai'i (Wagner *et al.* 1999). In Kalaupapa one small population of less then 10 individuals was found near the quarry. All plants were subsequently pulled.

Material examined. **MOLOKA'I**: Kalaupapa peninsula, south of settlement in open, disturbed field on opposite side of Waihānau Stream, near the old quarry, 26 m, 7 Apr 2005, *Wysong 754*.

Melastomataceae

Tibouchina herbacea (DC.) Cogn. **New island record**

Native to southern Brazil, Uruguay, and Paraguay, *T. herbacea* was first collected on Hawai'i in 1979 (*Akee s.n.*, BISH 578093), though an earlier collection on Hawai'i may have been made in 1977 (*Warshauer 1486*, US?). In Hawai'i it has been previously reported as naturalized and locally abundant in disturbed mesic to wet forest on Lāna'i, Maui, and Hawai'i (Wagner *et al.* 1999). On Moloka'i the earliest collection is from Hālawa Valley, Hīpuapua Falls, 7 Jun 2003 (*Lau s.n.*, BISH 695198).

Material examined. **MOLOKA'I**: Wai'ale'ia rim, west of Waimanu Falls, relict *Metrosideros polymorpha* mixed lowland wet forest and windswept shrubland, 720 m, 29 Apr 2004, *K.R. Wood & Hughes 10685* (PTBG).

Papaveraceae

Argemone mexicana L. **New island record**

Native to the West Indies and Mexico, *A. mexicana* (Mexican poppy), was cultivated as early as 1934 (*Caum s.n.*, BISH 61360). In Hawai‘i it is previously documented from dry, disturbed habitats on Kaua‘i, O‘ahu, and Maui (Wagner *et al.* 1999). On Kalaupapa peninsula it is considered a priority incipient weed and has been found near the dump, the slaughterhouse, and on the side of Damien Road, near the old bakery.

Material examined. **MOLOKA‘I**: Kalaupapa peninsula, near the slaughterhouse in open maintained grass field, small population found, all plants hand-pulled, 15 m, 1 Apr 2004, *B. Garnett s.n.* (BISH 718652)

Pinaceae

Pinus elliottii Engelm. **New naturalized record**

Pinus elliottii (slash pine) is native to the southeastern United States. In Hawai‘i it has been planted in forest reserves on Kaua‘i, O‘ahu, Moloka‘i, Lāna‘i, Maui, and Hawai‘i. On Moloka‘i it was introduced as a forestry tree for the Moloka‘i Forest Reserve at Makakupa‘ia, Kamiloloa, and Kapa‘akea, where over 52,000 individuals were planted between 1954 and 1960 (Skolmen 1980). Today it is infrequently seen naturalizing into the mixed mesic native forest zone below the original plantings.

Material examined. **MOLOKA‘I**: upper Waikolu Valley, upper western edge of valley just inside the boundary of the national park from a young tree escaping cultivation, in mixed, mesic, semi-open forest dominated by *Metrosideros polymorpha*, 863 m, 22 Nov 2004, *Wysong 480*.

Poaceae

Bromus hordeaceus L. ssp. ***hordeaceus*** **New island record**

Native to the Old World, *B. hordeaceus* ssp. *hordeaceus* (soft chess) was first collected on Kaua‘i in 1909 (*Rock 5128*, BISH). In Hawai‘i it has been previously naturalized in disturbed, often dry areas such as pastures and along roadsides and trails from 610 to 2290 m on Kaua‘i, O‘ahu, Maui, and Hawai‘i (Wagner *et al.* 1999).

Material examined. **MOLOKA‘I**: Nihoa, north-facing grey-white basalt cliffs, in *Schinus terebinthifolius* alien mixed shrub/herb cliff with *Ageratum conyzoides* and *Ageratina riparia*, 350 m, 8 Mar 2004, *K.R. Wood & Hughes 10600.001* (PTBG).

Ehrharta stipoides Labill. **New island record**

Native to Australia, New Zealand, and the Philippines, *E. stipoides* (meadow ricegrass) was first collected on Hawai‘i in 1916 (*Hitchcock 14465*, BISH). In Hawai‘i it has previously been reported as naturalized in openings in wet forest and other moist sites from 20 to 1400 m on Kaua‘i, O‘ahu, Maui, Kaho‘olawe, and Hawai‘i (Wagner *et al.* 1999).

Material examined. **MOLOKA‘I**: Pu‘u Ali‘i NAR, collected in wet *‘ōhi‘a* native tree and shrub forest near Landing Zone 3, 1073 m, 17 Aug 2005, *Hughes 1132*.

Polygonaceae

Coccoloba uvifera (L.) L. **New island record**

Native to tropical America, *C. uvifera* (sea grape) has been widely cultivated in Hawai‘i as a shade tree, hedge, or groundcover in coastal areas, where it is extremely salt tolerant. Its date of introduction to Hawai‘i is unknown, although J.F. Rock mentioned the location of a cultivated specimen in Honolulu in 1917 (Staples & Herbst 2005). It has been previously reported as naturalized on O‘ahu, Maui, and Hawai‘i. On Kalaupapa peninsula it can be found sparingly from the airport to Oceanview pavilion, where it has naturalized from ornamental plantings at both these locations.

Material examined. **MOLOKA‘I**: Kalaupapa peninsula, near Oceanview pavilion, 4 m, 11 Nov 2004, *Wysong 437*.

Rubiaceae

Coprosma montana Hillebr. **New island record**

Coprosma montana occurs in subalpine shrubland, where it can be a dominant component of the vegetation in subalpine woodland and occasionally in mesic forest from 1830 to 3050 m on East Maui and Hawai‘i. The following collection represents a new island endemic record for this species on Moloka‘i.

Material examined. **MOLOKA‘I**: Pu‘u Ali‘i NAR, small bog in southwestern section of reserve, open, 1–2 m tall stunted *Metrosideros polymorpha–Machaerina angustifolia* community, occasional on southern margin of bog, 1228 m, 26 Apr 2005, *K.R. Wood 11249*.

Tiliaceae

Triumfetta semitriloba Jacq. **New island record**

Native to North America from Baja California and Mexico to South America and the West Indies, *T. semitriloba* (Sacramento bur) was first collected on O‘ahu in 1895 (*Heller 2293*, BISH). In Hawai‘i it has been previously known to be naturalized in dry, disturbed sites from 30 to 860 m on Kaua‘i, O‘ahu, Maui, and Hawai‘i (Wagner *et al.* 1999). The following represent the first record of naturalization on Moloka‘i.

Material examined. **MOLOKA‘I**: Waikolu west rim, collected in native lowland wet forest dominated by *Metrosideros polymorpha*, *Cheirodendron trigynum*, and *Dicranopteris linearis*, from a small, disturbed pig wallow, 686 m, 2 Feb 2004, *Hughes 1137*.

Verbenaceae

Vitex trifolia L. **New naturalized record**

Native from Madagascar and eastern South Africa throughout Asia, New Guinea, northern Australia, and the Pacific, *V. trifolia* is commonly cultivated in Hawai‘i and often used as a windbreak (Staples & Herbst 2005). In Kalaupapa it is known from 2 naturalized populations; one behind the old rock quarry and the other just past the turnoff to Kauhakō Crater on Damien road.

Material examined. **MOLOKA‘I**: Kalaupapa peninsula, at back of old rock quarry in mixed, open, nonnative scrub, 2 patches containing several plants each, up to 3 m tall, 15 m, 12 Oct 2005, *Wysong 804*.

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New plant records from O'ahu for 2006

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The Invasive Species Committees of Hawai'i (ISCs) are island-based partnerships of government agencies, non-government organizations, and private businesses working to protect each island from the most threatening invasive pests. The ISCs were formed to address the need for rapid response and control work on new invasive pests that have the potential to severely impact the economy, ecosystem, watersheds, human health, and quality of life. A driving objective of the ISCs is to control the most threatening pests while populations are still relatively small and it is economically feasible to control or eliminate them; however, historically, the ISCs have lacked a comprehensive early detection program for ensuring the greatest possibility of identifying potential new invaders. In response to this ongoing issue, the O'ahu Early Detection (OED) program was initiated during the summer of 2006.

We document 4 new naturalized records, 6 new island records, and 2 notable species showing signs of naturalization (i.e., adventive). The last case involves situations where one or more individuals have been noted spreading into a new locality without human

assistance. Despite the uncertainty of the permanent survival of the species in these areas, we feel our observations of this behavior would be a helpful tool for botanists and managers, providing a record for potential studies of invasion from its inception. Most species were noted during surveys of botanical gardens and other sites of introduction, as well as along roadsides. Additionally, we report on records of naturalization vouchered by other agencies. A total of 10 plant families are discussed. Information regarding the distribution of flowering plants is based on Wagner *et al.* (1999) and information subsequently published in the *Records of the Hawaii Biological Survey*. Voucher specimens are deposited in Bishop Museum's *Herbarium Pacificum* (BISH), Honolulu.

Acanthaceae

Odontonema cuspidatum (Nees) Kuntze **New island record**

Previously documented from Kaua'i, Maui, and Hawai'i (Lorence & Wagner 1995; Oppenheimer & Bartlett 2002; Staples *et al.* 2002), fire-spike is also naturalized on O'ahu along the Old Pali Road in Nu'uanu, apparently having escaped from ornamental plantings in nearby residential areas. Although fruit is rarely seen in Hawai'i, this species has been found in several seemingly wild localities (Staples & Herbst 2005).

Material examined. **O'AHU**: Along side of road, wet forest, 1.5 m tall, around 20+ plants, 10 Aug 2006, *D. Frohlich, A. Lau, F. & K. Starr 0608102*.

Arecaceae

Roystonea regia (Kunth) O.F. Cook **New naturalized record**

Only previously suspected as naturalized in Kalihi and Nu'uanu Valleys, as well as Kāne'ohe, O'ahu (Wagner *et al.* 1999), *R. regia* is confirmed as naturalized, and throughout Waimānalo, where it has been described as "a serious pest" by nursery owners, who must control the seedlings. For these reasons, the continuing use of this species as an ornamental should be discouraged.

Material examined. **O'AHU**: Waimānalo, thousands of seedlings found downslope from mature trees, 26 Aug 2006, *G. Staples 1234;* Waimānalo, seedlings collected from garden, 3–15 m from parent trees, 28 Aug 2006, *G. Staples 1236.*

Tillandsia usneoides (L.) L. **New naturalized record**

A species introduced to Hawai'i around 1920, Spanish moss is cultivated in many home gardens throughout the state. It does not flower often, and may rely primarily on strong winds or nest-building birds for dispersal, as it can be propagated easily by breaking off a piece of stem and attaching it to a substrate (Staples & Herbst 2005). The following voucher was collected in a large garden, where the grounds manager says the 4 m long masses of *Tillandsia usneoides* volunteered in a large *kamani* tree. The species has also been noted dominating the mid-level branches of an 18 m tall tree in Nu'uanu.

Material examined. **O'AHU**: Waimea Botanical Garden, naturalized, forming large draping masses on a *Calophyllum inophyllum* tree, mass about 4 m long of small, gray-green bromeliads, no flowers seen on collected material, 7 Dec 2006, *A. Lau & D. Frohlich s.n.* (BISH 725948).

Fabaceae

Acacia auriculiformis A. Cunn. ex Benth. **New naturalized record**

A rarely cultivated species in Hawai'i, most *A. auriculiformis* collections are from agricultural experiment sites and botanical gardens. Native to Australia, it is a glabrous tree to 35 m, with phyllodes that are light green, linear to elliptic, falcate, 10–20 cm long, with 3

subprominent longitudinal veins that remain distinct from one another to near the base. Its inflorescences are yellow spikes 5.0–8.5 cm long, distinguishing it from many of the native and naturalized acacias in Hawai‘i. Its pods coil at maturity, revealing brown to black flattened seeds which are encircled by a bright yellow funicle (Orchard & Wilson 2001). This specimen was collected as one of five 8-m tall trees naturalized in an agricultural experiment station. According to the land manager, the trees volunteered in the area.

Material examined. **O‘AHU**: UH CTAHR site in Waimānalo, 41-698 Ahiki St, 30 m, tree to about 8 m, naturalized, 5 large mature trees and many seedlings in vicinity, 29 Nov 2006, *A. Lau & D. Frohlich 0611292*.

Melastomataceae

Medinilla magnifica Lindl. **New naturalized record**

Cultivated in Hawai‘i since at least 1940, this showy, popular ornamental was not known to escape cultivation until several naturalizing individuals were noted in Lyon Arboretum in 2005 (Daehler & Baker 2006). Propagated by seed in Hawai‘i (Staples & Herbst 2005), with small fleshy fruits likely dispersed by birds, it has recently been discovered as naturalized on O‘ahu usually in wet, shaded gulches of the Ko‘olau, but 2 large plants were also reported near the Ko‘olau summit ridge in a gulch above Mānoa Falls. Known as an epiphytic plant, large individuals of this species often climb the surrounding vegetation, but smaller individuals were found sprouting from disturbed soil near pali headwalls or in *Pandanus* root buttresses. Substantial effort by the O‘ahu Invasive Species Committee has been made to control naturalized populations on the island and further cultivation of this species in Hawai‘i should be discouraged.

Material examined. **O‘AHU**: Nu‘uanu Valley (UTM 621920, 2360758), established in wet forest gulch climbing *hau,* guava, fiddlewood, *Schefflera,* 30 Jun 2006, *J. Fisher OISCA8*.

Tibouchina herbacea (DC.) Cogn. **New island record**

Previously known from Hawai‘i and Maui (Wagner *et al.* 1999), and Lāna‘i (Herbarium Pacificum Staff 1999), cane tibouchina is a serious pest capable of establishing thick stands in mesic and wet forests. Several immature plants were located above the H-3 tunnels in Hālawa Valley, which was apparently landscaped after construction of the tunnels. Several *hāpu‘u* ferns arranged in rows as well as the presence of *Rubus ellipticus* var. *obcordatus* (another new island record) suggest that *T. herbacea* (as well as *R. ellipticus*) arrived on *hāpu‘u* brought in from an off-island area infested with one or both species. Care should be taken to use clean propagative material and proper species selection when landscaping and/or revegetating areas, especially those abutting native forest. All plants located were controlled after identification.

Material examined. **O‘AHU**: Hālawa Valley, east side of H-3 access road, herbaceous shrub 0.6 m tall, sterile, 25 Oct 2005, *R. Smith OISC 003*.

Rosaceae

Rubus ellipticus Sm. var. ***obcordatus*** Focke **New island record**

A very serious invasive pest, at least in the Volcano and Laupāhoehoe areas of Hawai‘i (Wagner *et al.* 1999), yellow Himalayan raspberry was recently found on a revegetated site above the H-3 tunnels as well as on a landscaped, terraced area beside the tunnels in Hālawa Valley. Several immature plants were located, as well as one sterile individual of potentially mature size and age. The terraced area contained evenly spaced *hāpu‘u* ferns,

suggesting they were planted. Dead *hāpu'u* trunks were found below plants above the tunnels, suggesting the species may have arrived with *hāpu'u* brought in from an area infested with *R. ellipticus*. *Tibouchina herbacea* was also in the vicinity (*q.v.*). This species poses a serious threat to Oahu's remaining native forest. The surrounding area was surveyed and all located plants were controlled. Care should be taken to use clean propagative material and proper species selection when landscaping and/or revegetating areas, especially those abutting native forest.

Material examined. **O'AHU**: Hālawa Valley, east side of H-3 access road, herbaceous shrub 0.6 m tall, sterile, 25 Oct 2005, *R. Smith OISC 004*.

Sterculiaceae

Melochia umbellata (Houtt.) Stapf **New island record**

Previously recorded as naturalized on Hawai'i (Wagner *et al.* 1999) and Maui (Oppenheimer 2004), this tree is cultivated and planted for forestry. Skolmen (1980) lists Oahu's 'Ewa Forest Reserve as the only forestry planting on the island. Due to its invasive behavior on the other islands, this species is being managed on Army lands by Army Natural Resources Staff.

Material examined. **O'AHU**: Kahuku Training Area, roadside in ridge near summit between 'Ō'io and 'Ōhi'a gulches, 457 m, tree up to 10 m tall, about 10–20 mature trees with up to 400 smaller immature plants, 28 Jan 2003, *M. Keir s.n.* (BISH 695025).

Turneraceae

Turnera ulmifolia L. **New island record**

Turnera ulmifolia has been cultivated in Hawai'i since the late 1800s and has recently undergone a resurgence in popularity in cultivation, being sold under the common name "sundrops" (Staples & Herbst 2005). It is spread readily by ants and has been collected as naturalized on Kaua'i, Moloka'i, Maui, and Hawai'i (Oppenheimer 2004). On O'ahu, it is commonly found both tolerated and cultivated in neighborhood areas, and was collected growing out of the side of a wall.

Material examined. **O'AHU**: Honolulu, growing out of rock wall near entrance to Bishop Museum, dry urban habitat, herb about 40 cm high, common in neighborhood area, 7 Nov 2006, *D. Frohlich s.n.* (BISH 725947).

Verbenaceae

Clerodendrum buchananii (Roxb.) Walp. var. ***fallax*** (Lindl.) Bakh. **New island record**

A popular ornamental and widely cultivated worldwide, pagoda flower has been collected as naturalized on Maui (Starr *et al.* 2006). Because of its ease of cultivation, shade tolerance, persistent suckers, bird-dispersed fruit, and invasiveness elsewhere in the Pacific, this species has a high potential for becoming a common invasive statewide. Its use as an ornamental should be discouraged. The voucher specimen was collected as naturalized in Waimea Botanical Garden, far from the original planting.

Material examined. **O'AHU**: Waimea Botanical Garden, shrub 1 m tall, many fruits seen, 2 m, 7 Dec 2006, *A. Lau & D. Frohlich s.n.* (BISH 725944).

Adventive Species Showing Signs of Naturalization

Menispermaceae

Stephania japonica (Thunb.) Miers

An herbaceous to woody climber native to eastern Asia, Australia, Malesia, and areas of Polynesia, this species was not previously vouchered at BISH. The genus can be distinguished from other Menispermaceae by its peltate leaves in combination with flowers in umbelliform cymes. *Stephania japonica* has tubers; petioles are 3–12 cm; leaves are triangular-ovate, 6–12 cm by 4–10 cm, and usually finely reticulate; both the male and female inflorescences are axillary, compound umbelliform cymes; male flowers are sessile or subsessile; and the fruit is a red, 4–8 mm drupe (Van Steenis & De Wilde 1986). The species has spread well beyond the original planting at Waimea Botanical Garden and is reportedly established beyond the garden's ability to control, given current resources. Its method of dispersal in the garden is unknown, but park staff believe it is being spread by pigs, which are seen running through the plantings and dragging pieces of the vine upslope.

Material examined. **O'AHU**: Waimea Botanical Garden, vining up side slope, vine with small, white and pink flowers in an umbel, leaves light green below, darker green on top, 7 Dec 2006, *D. Frohlich & A. Lau s.n.* (BISH 725945).

Vitaceae

Tetrastigma voinieranum (Baltet) Pierre ex Gagnep.

No female plants of this species have been observed in Hawai'i (Staples & Herbst 2005), preventing seed production. However, if it continues to be cultivated here, lizard plant will likely become part of the Hawaiian flora by vegetative means. Although there are no vouchers at BISH to confirm the observation, Staples and Herbst (2005) reported that *T. voinieranum* has escaped cultivation near Onomea Bay on the Big Island, blanketing roadside trees. The following collection is from Waimea Botanical Garden on O'ahu, where park staff are working to remove the species. It has spread through the understory and has been difficult to control, often resprouting from root suckers. It is easily recognized by its alternate, compound leaves with 3–5 broadly ovate, 15–25 cm long fleshy leaflets that are rusty brown-hairy on the underside, and wavy to broadly toothed on their margins. Inflorescences are axillary, crowded clusters. Male flowers have 4 stamens and a reduced stigma, while female flowers (not yet seen in Hawai'i) have 4 sterile stamens and a relatively large conical ovary and a 4-lobed stigma (Staples & Herbst 2005).

Material examined. **O'AHU**: Waimea Botanical Garden, moist area frequented by feral pigs, spreading vegetatively, leaves and stem pubescent; no reproductive parts seen, 7 Dec 2006, *D. Frohlich & A. Lau s.n.* (BISH 725949).

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New plant records, rediscoveries, range extensions, and possible extinctions within the Hawaiian Islands

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Recent botanical field research conducted within the Hawaiian archipelago have brought to light 4 rediscoveries of taxa previously thought extinct, 4 new vascular plant island records, 1 range rediscovery, and 1 range extension. Two possible extinctions are also hereby reported: the Kaua‘i species *Dubautia kenwoodii* (Asteraceae) and *Cyanea kuhihewa* (Campanulaceae), were both discovered in 1991 in only a single location, only to decline into extinction after the devastation of Hurricane ‘Iniki hit Kaua‘i on 11 September 1992.

Aspleniaceae

Diellia mannii (D.C. Eaton) W.J. Rob. **Rediscovery**

Previously listed as extinct (Palmer 2003), the last known collections of this Kaua‘i sin-

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gle-island endemic were made by V. Knudsen during the period 1871–1886 (Aguraiuja & Wood 2003). Recent research conducted in northwestern Kaua‘i has documented 2 individuals growing together in Halemanu, Kōke‘e. At this time only a single individual is living and biologists are working to cultivate plants from spores.

Material examined. **KAUA‘I**: Halemanu, degraded *Corynocarpus laevigatus* forest, with relic native components, 1050 m, 1 Apr 2002, *L Arnold s.n.* (PTBG); *loc. cit.*, 12 Jun 2002, *K.R. Wood et al. 9849* (PTBG).

Asteraceae

Dubautia kenwoodii G.D. Carr **Possibly extinct**

Apparently restricted to steep slopes within the northwestern valley of Kalalau, Kaua‘i, *D. kenwoodii* was discovered on 4 July 1991 and known only from a single collection (Carr 1998). No other individuals have since been discovered and the single plant known from the holotype locality was never relocated after the devastation of Hurricane ‘Iniki in September 1992.

Material examined. **KAUA‘I**: Hanalei district, Kalalau rim, north of Kahuama‘a flat, steep diverse lowland mesic forest of *Kadua, Chamaesyce, Hibiscadelphus, Nototrichium, Stenogyne, Poa, Melicope, Lysimachia, Lobelia*, in cliff area collected with ropes, area above cliffs severely degraded by goats and pigs, 800 m, 4 Jul 1991, *K.R. Wood & M. Query 1004* (Holotype, PTBG).

Sigesbeckia orientalis L. **New island record**

Previously recorded from all the main Hawaiian Islands except Ni‘ihau and Lāna‘i, the following collection from Lehua Islet represents a new island record for Ni‘ihau.

Material examined. **NI‘IHAU**: Lehua Islet; outer crescent, *Cenchrus ciliaris-Setaria verticillata-Portulaca oleracea-Jacquemontia ovalifolia* association, herb 40 cm tall, uncommon, naturalized on south side, 15 m, 29 Apr 2006, *K.R. Wood 11864* (BISH, PTBG, US).

Athyriaceae

Diplazium molokaiense W.J. Rob. **Range rediscovery**

Diplazium molokaiense was historically recorded from 5 of the main Hawaiian Islands: Kaua‘i, O‘ahu, Lāna‘i, Moloka‘i, and Maui. Currently, botanists are aware of only two extant populations on East Maui (i.e., Honomanū Stream and Kula Forest Reserve) with island extinctions apparently occurring on Kaua‘i, O‘ahu, Lāna‘i, and Moloka‘i (Wood 2006b). Previously documented on West Maui by E. Bailey in ‘Īao Valley and by C. Forbes in Waikapū, *D. molokaiense* has not been observed on West Maui for over 95 years. Recent botanical research around Pūehuehu Nui, West Maui, has documented 5 plants of *D. molokaiense* in the first drainage north of Luako‘i Ridge.

Material examined. **WEST MAUI**: Pūehuehu Nui, first drainage north of Luako‘i Ridge, mesic to wet forest and shrubland, associated with *Cheirodendron, Metrosideros, Dodonaea, Nestegis, Coprosma, Kadua, Cyrtandra,* rich in ferns with *Pneumatopteris, Selaginella, Tectaria, Pteris,* 2 clusters of plants, one rhizome creeping and branching with 5 separate plants, other plant 10 m up stream with single head on rhizome, on concave wall of 3 m wide drainage ca. 35–50 cm above gulch bottom, 320° aspect, just below small waterfall, 1070 m, 6 Dec 2006, *K.R. Wood & H. Oppenheimer 12227* (PTBG).

Campanulaceae

Cyanea kuhihewa Lammers **Possibly extinct**

In 1991, *C. kuhihewa* was discovered in Limahuli, Kaua‘i, where around 12 individuals occurred along the headwater banks of Limahuli Stream (Lammers 1996; Wichman 1992). In September 1992 the lowland wet *Metrosideros* forest habitat where *C. kuhihe-*

wa occurred was seriously damaged as a result of Hurricane ʻIniki. Subsequently, the population slowly declined and no living individuals remain of this taxon.

Material examined. **KAUAʻI**: Hanalei Distr, Limahuli Valley, east side of ridge separating Limahuli and Hanakāpīʻai Valleys, above major waterfall, along main stream, and climbing above numerous small waterfalls, lowland wet mixed forest, undisturbed, plants on NW-facing aspect above flood zone, 520 m, 10 May 1991, *K.R. Wood et al. 820* (Holotype, PTBG; Isotypes, BISH, F, PTBG, US); *loc. cit.*, 24 Jun 1994, *S. Perlman et al. 14257* (F, PTBG); *loc. cit.*, 6 Aug 1991, *K.R. Wood 1105–A,* seeds only (PTBG).

Cyanea lobata H. Mann subsp. ***baldwinii*** (C.N. Forbes & G.C. Munro) H. St. John **Rediscovery**

Previously known from a single plant documented and monitored by G.C. Munro on Lānaʻihale, Lānaʻi between the years 1919 and 1934 (Degener 1936), *C. lobata* subsp. *baldwinii* was recently rediscovered around the Hauola headwaters after not being observed for over 70 years. Two plants are being monitored for seed.

Material examined. **LĀNAʻI**: Hauola headwaters, just NW of Haʻalelepaʻakai, 70% open canopy with riparian vegetation, canopy trees of *Metrosideros*, understory trees of *Pittosporum, Scaevola, Pipturus, Clermontia, Freycinetia, Melicope, Cyrtandra, Dubautia*, slopes dominated with 80% cover of matting ferns *Diplopterygium* and *Dicranopteris*, 1 plant 50 cm tall, second plant 20 cm, both plants vigorous, vegetative, 970 m, 17 Aug 2006, *K.R. Wood & H. Oppenheimer 12050* (PTBG).

Cyanea profuga C.N. Forbes **Rediscovery**

Previously listed as extinct after not being observed since 1912 (Wagner *et al.* 1990), *Cyanea profuga* was rediscovered in Wāwāʻia and Kumuʻeli Gulch, Molokaʻi. This single-island endemic species in now known from 10 plants in Wāwāʻia and 6 plants in Kumuʻeli. Plants range between 0.5–3.0 m in height and occur from 1000 to 1200 m. (Perlman & Oppenheimer, pers. comm.).

Material examined. **MOLOKAʻI**: Wāwāʻia Gulch, 1120–1200 m, 11 Sep 2002, *S. Perlman 18253* (PTBG); *loc. cit.*, closed canopy *Metrosideros* riparian mesic to wet forest, pockets of silty soil, associates include *Cyrtandra, Kadua, Tetraplasandra, Pipturus, Boehmeria, Urera, Dubautia, Cyanea, Lobelia, Clermontia, Peperomia, Perrottetia, Eragrostis, Lysimachia,* waterfalls periodic and dominated by *Deschampsia*, 22 Nov 2002, *K.R. Wood & S. Perlman 10023* (PTBG).

Fabaceae

Crotalaria pallida Aiton **New island record**

Previously known from Midway and all the main Hawaiian Islands except Niʻihau and Kahoʻolawe, the smooth rattlepod is now documented from Lehua Islet and the following collection represents a new island record for Niʻihau.

Material examined. **NIʻIHAU**: Lehua Islet; outer crescent, *Cenchrus ciliaris-Setaria verticillata-Portulaca oleracea-Jacquemontia ovalifolia* association, herb 40 cm tall, naturalized, 122 m, 30 Apr 2006, *K.R. Wood 11868* (BISH, PTBG, US).

Vicia sativa L. subsp. ***nigra*** (L.) Ehrh. **New island record**

Previously recorded from East Maui and Hawaiʻi, the spring or common vetch has recently been recorded as naturalized along the Mōhihi Road of Kōkeʻe.

Material examined. **KAUAʻI**: Kōkeʻe, Mōhihi Rd near Elekeninui Stream, *Metrosideros* montane forest, scandent herb, naturalized along roadside, 1109 m, 5 Jun 2006, *K.R. Wood & D. Boynton 11915* (BISH, PTBG, US).

Lamiaceae

Phyllostegia waimeae Wawra **Rediscovery**

Phyllostegia is composed of 34 species, with 32 Hawaiian and one species each from Tahiti and Tonga. Of the Hawaiian species, 14 taxa have been listed as endangered since 1987 (Wagner 1999). On Kaua‘i there are 7 recognized species, and until recently 4 of those were thought to be extinct (Wagner *et al.* 1990; Wagner 1999). Recent botanical field research on Kaua‘i has resulted in the rediscovery of all 4 of those species, 3 of which were reported in previous publications, namely *P. helleri, P. knudsenii,* and *P. wawrana* (Lorence *et al.* 1995; Wood 2006a). The fourth missing Kaua‘i single-island endemic species was *P. waimeae,* which was last observed in 1969 and known from only western Kaua‘i, including sites in Waimea Canyon, Halemanu, Ka‘aha, Kahōluamanu, and Kawai‘iki. The following vouchers represent the rediscovery of *Phyllostegia waimeae.*

Material examined. **KAUA‘I**: Kawai‘iki, off Kaluahā‘ulu Ridge, upper forest and drainage south of Koai‘e and north of Wai‘alae, *Metrosideros polymorpha* mixed mesic forest with *Dubautia, Kadua, Cheirodendron, Dianella, Poa, Bidens, Peperomia*, erect subshrub, becoming scandent 2 m tall, 50 m above drainage, ca 5 plants with seedlings, 1075 m, 23 Aug 2000, *K.R. Wood & S. Perlman 8617A* (PTBG); *loc. cit.*, 23 Aug 2000, *S. Perlman & K.R. Wood 17306* (PTBG); *loc. cit.*, 27 Jun 2001, *K.R. Wood & S. Perlman 9000* (BISH, PTBG).

Onagraceae

Epilobium ciliatum Raf. **New island record**

A member of the evening primrose family and native to regions of North and South America, Japan, Korea, northeastern China, and eastern Siberia, this perennial herb has been previously recorded as naturalized on the Big Island of Hawai‘i. The following collections indicate that this willow herb is becoming naturalized on Maui.

Material examined. **EAST MAUI**: East Honomanū, *Metrosideros polymorpha* montane wet forest with riparian vegetation dominated by *Rubus hawaiensis*, *Coprosma*, 70% open canopy with occasional emergent 15 m tall *Metrosideros* along with 8–10 m tall *Cheirodendron*, 1615 m, perennial herb, terrestrial in drainage, uncommon, 12 Apr 2006, *K.R. Wood & P. Bily 11827* (PTBG).

Rutaceae

Zanthoxylum hawaiiense Hillebr. **Range extension**

This rare endemic species was previously recorded from Kaua‘i, Moloka‘i, Lāna‘i, East Maui, and Hawai‘i (Lorence *et al.* 1995). Botanical research along the steep slopes of Kaua‘ula Valley has extended the distribution of *Z. hawaiiense* to include West Maui, where 4 mature and 5 juvenile plants were recently discovered.

Material examined. **WEST MAUI**: Kaua‘ula, southeastern rim, mixed mesic shrubland/grassland with steep to vertical rocky slopes and ridges dominated by native plant species with *Leptecophylla, Dodonaea, Dianella, Morelotia, Dicranopteris, Bidens*, occasional *Neraudia, Melicope*, 2 mature trees, 5 m tall, additional 2 mature trees to the east ca 200 m with 5 juvenile, 1005 m, 20 Jun 2006, *K.R. Wood & H. Oppenheimer 11926* (BISH, PTBG, US); *loc. cit.*, 21 Jun 2006, *K.R. Wood & H. Oppenheimer 11940* (BISH, PTBG, US); *loc. cit.*, 20 Jun 2006, *H. Oppenheimer & K.R. Wood H60620* (BISH, PTBG); *loc. cit.*, 21 Jun 2006, *H. Oppenheimer & K.R. Wood H60625* (BISH, PTBG); *loc. cit.*, 23 Aug 2006, *H. Oppenheimer & K.R. Wood H80636* (BISH, PTBG).

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New plant records from Moloka‘i, Lāna‘i, Maui, and Hawai‘i for 2006

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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, 2 new naturalized records, 60 new island records, and 9 range extensions are documented. A total of 71 taxa in 36 plant families are discussed. Information regarding the formerly known distribution of flowering plants is based on Wagner *et al*. (1999) and information subsequently published in the *Records of the Hawaii Biological Survey* series since 1995. Distribution and taxon-

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omy of ferns follows Palmer (2003); and for gymnosperms, Oppenheimer (2002). Voucher specimens were collected on the islands of Molokaʻi, Lānaʻi, Maui, and Hawaiʻi, and are deposited in the Bishop Museum *Herbarium Pacificum* (BISH), Honolulu, with duplicates at the National Tropical Botanical Garden (PTBG), Lāwaʻi, Kauaʻi. A few specimens may be at only one facility; only in these cases will the herbarium acronym be cited.

Acanthaceae

Asystasia gangetica (L.) T. Anderson **New island record**

Previously documented from Midway Atoll, Kauaʻi, Oʻahu, Molokaʻi, Maui, and Hawaiʻi (Wagner *et al*. 1999: 168; Oppenheimer & Bartlett 2000: 1), Chinese violet is also naturalized on Lānaʻi in the Hulopoʻe and Mānele area of the south shore. It appears to have escaped from ornamental plantings in a relatively new residential development nearby. Smith (1985: 185) reported it from dry habitats on all islands at low elevation but there have been no voucher specimens from Lānaʻi to support this.

Material examined. **LĀNAʻI**: Kaluakoʻi Pt, occasional along coastal trail, 15 m, white-flowered form also observed, 20 Oct 2006, *Oppenheimer H100636*.

Dicliptera chinensis (L.) Juss. **New island record**

Naturalized primarily in urban areas on Kauaʻi, Oʻahu (Wagner *et al*. 1999: 171), Maui (Oppenheimer 2003: 3–4, 2004: 8), and Hawaiʻi (Staples *et al*. 2002: 3), this herbaceous species was recently collected on Molokaʻi, where it was noted to be uncommon. Compared to many other attractive species in this family, it has inconspicuous flowers and bracts and is not likely cultivated.

Material examined. **MOLOKAʻI**: Kalaʻe, 500 m, naturalized in lawn at base of *Casuarina*, 2 Nov 2006, *Oppenheimer H110605*.

Araceae

Alocasia cucullata (Lour.) G. Don **New island record**

Chinese taro was reported to be naturalized on 2 islands, Maui and Hawaiʻi (Staples *et al*. 2003: 8). It has been recently collected on Molokaʻi where it spreads by rhizomes and forms patches wherever small pieces have been moved, intentionally or not. The species is apparently salt tolerant since it was observed in several locations exposed to sea spray during high winter surf episodes on windward shores. It was also noted to be naturalized in Hālawa Valley, also at low elevation.

Material examined. **MOLOKAʻI**: Wailau Valley, 3 m, 12 Aug 2005, *Oppenheimer H80502*.

Dieffenbachia maculata (Lodd.) G. Don **New island record**

Lorence & Flynn (2006: 2) recently documented this widely cultivated species as sparingly naturalized on Kauaʻi. Their observations of plants along a stream in secondary lowland forest are consistent with observations of the species outside of cultivation on West Maui. Like many aroids, it will propagate easily from small pieces of vegetative material, intentionally or not. Although flowering plants have been noted, fruits have yet to be collected.

Material examined. **MAUI**: West Maui, Lahaina Distr, 48 m, spreading locally and forming patches on shady slopes and along roadside, 8 Oct 2003, *Oppenheimer & G. Hansen H100303*.

Epipremnum pinnatum (L.) Engl. **New island record**

Taro vine is probably the most common climbing aroid in Hawaiʻi, but vouchered only from Kauaʻi, Oʻahu, Maui, and Hawaiʻi (Wagner *et al*. 1999: 1359). On Molokaʻi it is com-

mon in Hālawa Valley and in the Pālāʻau Park area. Fruit has not been observed in Hawaiʻi, and Staples *et al.* (2000: 16) reported the species to be dispersed by vegetative means.

Material examined. **MOLOKAʻI**: Hālawa Valley, 6 m, climbing or sprawling, with variegated leaves, 19 Aug 2005, *Oppenheimer H80513*.

Philodendron erubescens K. Koch & Augustin **New island record**

Previously reported as sparingly naturalized on Kauaʻi (Flynn & Lorence 2002: 14–15), this climbing aroid is common along the Hāna Highway on East Maui. It can be found between Huelo and Kīpahulu in several areas, climbing trees or sprawling on the ground, sometimes forming dense mats. It seems to be spreading from pieces of stem; flowers become fragrant in the evening but no fruit has been observed to date.

Material examined. **MAUI**: East Maui, Hāna Distr, vicinity of Haipuaʻena Stream, 183 m, 7 Oct 2006, *Oppenheimer & Duvall H100607*.

Araliaceae

Schefflera actinophylla (Endl.) Harms **New island record**

A common ornamental tree, and naturalized on Kauaʻi, Oʻahu, Molokaʻi, Maui, and Hawaiʻi (Wagner *et al*. 1999: 232; Staples *et al*. 2002: 5), the octopus tree was observed to be sparingly naturalized in widely separated areas on Lānaʻi, including as an epiphyte high out of a person's reach. Smith (1985: 187) had reported it from wet lowland habitats on all islands. The lack of a diverse and dense avifauna on Lānaʻi may be responsible for the sparse occurrence of this bird-dispersed, weedy species (Staples *et al*. 2000: 17).

Material examined. **LĀNAʻI**: Lānaʻi City, occasional in waste areas and yards, 510 m, 19 Oct 2006, *Oppenheimer H100634*.

Araucariaceae

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

A widely planted forestry tree, the Cook pine was previously documented outside of cultivation only from West Maui (Oppenheimer 2002: 20). The collections cited here were made from populations with all size classes represented, randomly spaced, and growing on steep to gentle, shady to sunny slopes. It also appears to be reproducing in the Molokaʻi Forest Reserve. Not all areas are reproducing, probably due to variability in seed viability, as reported for *A. heterophylla* (Salisb.) Franco (Shigeura & McCall 1972: 11). Small plants appear to be browsed by cattle, goats, and/or axis deer. Similar to *Eucalyptus*, the stands reseed themselves, often in dense numbers, but do not seem to spread great distances.

Material examined. **MOLOKAʻI**: Pūniuʻōhua, 440 m, spreading from historic forestry plantings into degraded mesic forest and pasture, 10 Aug 2006, *Oppenheimer H80607*.

Aristolochiaceae

Aristolochia littoralis Parodi **Range extension**

This vining species is cultivated in Hawaiʻi and occasionally escapes, becoming sparingly naturalized so far at least on Kauaʻi, Oʻahu, and East Maui (Wagner *et al.* 1999: 237–238; Imada *et al.* 2000: 10; Starr *et al*. 2003: 25). The following collection documents a significant range extension to include West Maui, where it climbs alien vegetation in secondary lowland forest.

Material examined. **MAUI**: West Maui, Wailuku Distr, Waiheʻe dunes, 11 m, 25 Dec 2006, *Oppenheimer, Duvall, & Sherrill H120651* (PTBG).

Asclepiadaceae

Asclepias physocarpa (E. Mey.) Schlechter **New island record**

Naturalized on all the main islands except Niʻihau and Molokaʻi (Wagner *et al.* 1999: 240), it is not surprising that the wind-dispersed seeds of this species should reach the latter island. Individual plants were also observed on the west end and the central south slope.

Material examined. **MOLOKAʻI**: Wailau Valley, ʻEleʻaliʻi, 91 m, uncommon in open areas, 16 Aug 2005, *Oppenheimer H80507*.

Asteraceae

Bidens alba (L.) DC. var. ***radiata*** **New island record**
(Schultz-Bip.) Ballard ex Melchert

Rapidly spreading in lowland disturbed areas on Kure Atoll, Midway Atoll, Kauaʻi, Oʻahu, Maui, Molokaʻi, Kahoʻolawe, and Hawaiʻi (Wagner *et al*. 1999: 270; Hughes 1995: 2), it is not surprising to have been collected recently on Lānaʻi. Although Erickson & Puttock (2006: 148) listed it from Kure and Midway Atolls plus 7 of the main islands but not Niʻihau, there has been no previously published documentation of this species on Lānaʻi.

Material examined. **LĀNAʻI**: airport access road, 390 m, occasional roadside weed, 19 Oct 2006, *Oppenheimer H100625*.

Calyptocarpus vialis Less. **New island record**

Probably on all of the main islands but documented only from Midway Atoll, Kauaʻi, Oʻahu, Molokaʻi, Lānaʻi, Kahoʻolawe, and Maui (Wagner *et al*. 1999: 284; Bruegmann 1999: 1; Oppenheimer 2006: 10–11), this common perennial herb is now known from Hawaiʻi Island.

Material examined. **HAWAIʻI**: Hilo, near sea level, in waste areas near roads and parks, 26 Apr 2005, *Oppenheimer H40508*.

Sigesbeckia orientalis L. **New island record**

Naturalized on all the main islands except Niʻihau and Lānaʻi (Wagner *et al.* 1999: 357), this species is not uncommon in yards and waste areas on Lānaʻi.

Material examined. **LĀNAʻI**: 510 m, common in yard in Lānaʻi City, 10 May 2006, *Oppenheimer & J. Penniman H50613;* Kānepuʻu, 545 m, locally common in cleared, open and sunny areas, 21 Dec 2006, *Oppenheimer H120645*.

Sphagneticola trilobata (L.) Pruski **New island records**

[syn. *Wedelia trilobata* (L.) Hitchc.]

A common groundcover that easily escapes via vegetative reproduction, wedelia was previously known to be naturalized in Hawaiʻi on the islands of Midway Atoll, Kauaʻi, Oʻahu, Maui, and Hawaiʻi (Wagner *et al.* 1999: 374–5; Oppenheimer & Bartlett 2002: 4; Imada *et al*. 2000: 10). On Molokaʻi it was found in one area where it appears to be spreading from discarded waste along with *Tradescantia zebrina* (*q.v.*) in a *Casuarina* thicket. Other locations were near sea level near stream estuaries. On Lānaʻi it was found in several sites where it appeared to have spread from unauthorized dumping of garden waste into open areas and sunny margins of *Eucalyptus, Casuarina,* and *Schinus* thickets. The change in taxonomy was reported by Wagner *et al*. (1997: 55).

Material examined. **MOLOKAʻI**: Kalaʻe, 500 m, escaping from discarded waste into *Casuarina* thicket, 2 Nov 2006, *Oppenheimer H110606*; Pōhakupili, 2 m, 8 Dec 2006, *Oppenheimer H120616*; Hālawa, 3 m, 9 Dec 2006, *Oppenheimer H120630*. **LĀNAʻI**: Kōʻele, spreading from ille-

gal dump sites, 520 m, 19 Oct 2006, *Oppenheimer H100633*; woods near Kō‘ele, occasional in open areas of *Eucalyptus* forest, 610 m, 21 Dec 2006, *Oppenheimer H120650.*

Synedrella nodiflora (L.) Gaertn. **New island record**

Documented from all of the main islands except Ni‘ihau and Lāna‘i (Wagner *et al*. 1999: 360), nodeweed is widespread at low densities on the latter island in most developed areas.

Material examined. **LĀNA‘I**: Kaumālapa‘u, 20 m, occasional upright herbs, 19 Oct 2006, *Oppenheimer H100624*.

Athyriaceae

Diplazium esculentum (Retz.) Sw. **New island record**

Reported from Kaua‘i, O‘ahu, Lāna‘i, Maui, and Hawai‘i, Palmer (2003: 125) suspected it also occurred on Moloka‘i but remained undocumented. Wilson (1996: 132), also assumed it occurred on Moloka‘i, and considered its undocumented presence there as simply the failure of collectors to take a specimen of this weedy fern. Since it is wind dispersed (Staples *et al*. 2000: 18) it is not surprising that it is also established on Moloka‘i.

Material examined. **MOLOKA‘I**: Wailau Valley, large clump along Kahawaiiki Stream, 6 m, 12 Aug 2005, *Oppenheimer H80503*.

Bignoniaceae

Spathodea campanulata P. Beauv. **New island record**

African tulip tree is a commonly planted ornamental tree, naturalized on the islands of Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al*. 1999: 388). It has been observed to be cultivated on Lāna‘i in several areas, so it is not surprising that spontaneous plants occur under favorable conditions, since it produces abundant wind-dispersed seeds capable of traveling long distances (Staples *et al*. 2000: 4, 18). In some areas it appears that routine landscaping maintenance is preventing seedling establishment.

Material examined. **LĀNA‘I**: vicinity Hulopo‘e Gulch, 510 m, sparingly naturalized in *Toona* thicket, with *Schinus* and *Psidium*, 20 Dec 2006, *Oppenheimer H120642*.

Boraginaceae

Cordia subcordata Lam. **New island record**

Long thought to be introduced by the voyaging Polynesians, recently subfossil remains from Kaua‘i have confirmed its status as indigenous (Burney *et al*. 2001). It has been previously documented from all the main islands except Moloka‘i and Kaho‘olawe (Wagner *et al*. 1999: 394). The population cited here was undoubtedly under cultivation at one time, since there is a pre-contact archaeological site complex nearby.

Material examined. **MOLOKA‘I**: Pōhakupili Stream, 10 m, small naturalized population on N side, 8 Dec 2006, *Oppenheimer H120618*.

Caryophyllaceae

Drymaria cordata (L.) Willd. ex Roem. & Schult. var. ***pacifica*** Mizush. **New island record**

Documented as naturalized on Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al.* 1999: 505), this herbaceous species was recently collected in a damp, neglected garden area on Lāna‘i.

Material examined. **LĀNA‘I**: 510 m, common in yard in Lāna‘i City, 10 May 2006, *Oppenheimer & J. Penniman H50612.*

Commelinaceae

Tradescantia zebrina Hort. ex Bosse **New island record**

Only recently reported as naturalized in Hawai‘i and documented from Kaua‘i (Lorence & Flynn 1997: 10) and Maui (Oppenheimer & Bartlett 2000: 4), this species was collected on Moloka‘i along with *Sphagneticola trilobata* (see above), spreading at least vegetatively from apparently discarded yard waste into secondary forest. It is the same color form as reported from Kaua‘i and Maui, with leaves purple abaxially and green with 2 grayish or silvery stripes on both sides of the midrib on the upper surface.

Material examined. **MOLOKA‘I**: Kala‘e, 500 m, rooting at nodes, escaping from discarded waste into *Casuarina* thicket, 2 Nov 2006, *Oppenheimer H110607*.

Convolvulaceae

Ipomoea obscura (L.) Ker-Gawl. **New island record**

Naturalized in dry, disturbed areas at low elevation on the islands of Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al*. 1999: 559; Oppenheimer 2003: 10), this vining morning glory was recently found on Lāna‘i growing under identical conditions. It was also observed in the Pālāwai Basin along an old road in a former pineapple field.

Material examined. **LĀNA‘I**: Hulopo‘e, 15 m, occasional in waste areas, 20 Oct 2006, *Oppenheimer H100641*.

Ipomoea triloba L. **New island record**

Another commonly naturalized morning glory in Hawai‘i, little bell was previously documented from the islands of Midway Atoll, Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al*. 1999: 560; Oppenheimer & Bartlett 2002: 6; Oppenheimer 2006 : 11). It is a true morning glory, with flowers closing by mid-day. In addition to the collection cited here, it was also observed growing on fences and in hedges near Lāna‘i City.

Material examined. **LĀNA‘I**: Hulopo‘e, 15 m, occasional landscape weed and in waste areas, 20 Oct 2006, *Oppenheimer H100644*.

Merremia tuberosa (L.) Rendle **New island record**

Wood rose has been previously collected on Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al.* 1999: 564; Oppenheimer 2006: 11). Now it is known from Lāna‘i, where it grows in dump sites and waste areas in the Lāna‘i City area. Staples *et al*. (2000: 20) reported a possible aquatic dispersal mechanism, which seems unlikely to be its sole means of spread; Smith (1985: 195) attributed its spread almost exclusively by man.

Material examined. **LĀNA‘I**: Lāna‘i City, in waste areas, 450 m, flowers yellow, 12 May 2006, *Oppenheimer & J. Penniman H50624*.

Cucurbitaceae

Coccinia grandis (L.) Voigt **New island record**

Considered a serious weed of lowland habitats and documented from the islands of O‘ahu, Maui, and Hawai‘i (Wagner *et al*. 1999: 570; Starr *et al*. 1999: 11–13; Oppenheimer & Bartlett 2000: 4), ivy gourd had been previously known but undocumented from Lāna‘i in a single small and sterile site near Kaumālapa‘u Harbor, which was eradicated (MISC, pers. comm.). Recently it was observed in a fertile state in at least 5 locations in the Hulopo‘e region. The Maui Invasive Species Committee was notified and shown these sites; control efforts have begun, and it can hopefully be eradicated.

Material examined. **LĀNA‘I**: Hulopo‘e, 390 m, vines climbing adjacent vegetation at several locations in this area, 20 Oct 2006, *Oppenheimer H100638*.

Cyperaceae

Cyperus involucratus Roxb. **New island record**

Reported as naturalized in marshy areas and along streams on Midway Atoll, Kaua‘i, O‘ahu, Maui, and Hawai‘i (Wagner *et al.* 1999: 1395; Imada *et al.* 2000: 11), this alien species occurs in similar habitat on Moloka‘i. Staples *et al*. (2000: 20) reported the species to be dispersed vegetatively, and possibly via birds and aquatic means; the latter method seems quite probable.

Material examined. **MOLOKA‘I**: Wailau Valley, along stream nr Keahou, 31 m, 13 Aug 2005, *Oppenheimer H80506*.

Fimbristylis dichotoma (L.) Vahl **New island record**

Widespread in tropical and subtropical areas worldwide, and indigenous in Hawai‘i on the islands of Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al*. 1999: 1406), this sedge was not previously documented from Lāna‘i. In addition to the collections cited below, a few plants were also observed at Ho‘okio Ridge.

Material examined. **LĀNA‘I**: W of Hauola Gulch, N of Pu‘u Ali‘i, along fence line on ridgetop, uncommon, 900 m, in degraded shrubland, 10 May 2006, *Oppenheimer & J. Penniman H50615;* Ha‘alelepa‘akai Ridge, 1000 m, couple of plants in muddy trail in open, sunny *Metrosideros/ Dicranopteris* forest, 20 Dec 2006, *Oppenheimer H120639*.

Euphorbiaceae

Phyllanthus tenellus Roxb. **New island record**

This weedy herb has been collected on Kaua‘i, O‘ahu, Lāna‘i, Maui, and Hawai‘i (Wagner *et al*. 1999: 628; Oppenheimer *et al*. 1999: 8; Oppenheimer & Bartlett 2000: 5; 2002: 7). It is not surprising that it occurs on Moloka‘i as well.

Material examined. **MOLOKA‘I**: Moloka‘i FR, in yard of barracks, 640 m, 17 May 2006, *Oppenheimer, Tangalin, & Perlman H50638*; Pauwalu, near sea level, common garden weed, 10 Aug 2006, *Oppenheimer H80615*.

Fabaceae

Albizia lebbeck (L.) Benth. **Range extension**

Naturalized in disturbed, low elevation areas on Midway Atoll, Ni‘ihau, Kaua‘i, O‘ahu, West Maui, and Hawai‘i (Wagner *et al.* 1999: 644; Oppenheimer & Bartlett 2002: 7), the following specimen represents a significant range extension to East Maui.

Material examined. **MAUI**: East Maui, Hāna Distr, Mikimiki, between Kaupō and Kīpahulu, 55 m, trees, naturalized and spreading locally, 16 Oct 2005, *Oppenheimer H100510.*

Alysicarpus vaginalis (L.) DC **New island record**

Wagner *et al*. (1999: 646) reported this herbaceous perennial from Kaua‘i, O‘ahu, Maui, and probably Hawai‘i, where it apparently has not been documented with a voucher specimen. On Moloka‘i it was noted to be occasional in lawns and waste areas at low elevation.

Material examined. **MOLOKA‘I**: Pauwalu, near sea level, occasional in lawn, 11 Aug 2006, *Oppenheimer H80619*; Oneali‘i Park, near sea level, weed in lawn, 29 Nov 2006, *Oppenheimer & Perlman H110626* (BISH).

Falcataria moluccana (Miq.) Barneby & J.W. Grimes **New island record**

[syn. *Paraserianthes falcataria* (L.)I. Nielsen]

A large tree with a spreading crown and smooth gray bark, this species has been widely used in forestry plantings and has been documented as naturalized on Kaua‘i, O‘ahu,

Moloka‘i, Maui, and Hawai‘i (Wagner *et al*. 1999: 690; Oppenheimer & Bartlett 2002: 8; Starr *et al*. 2003: 27). On Lāna‘i it is spreading onto the leeward benchlands in gulches outside of Lāna‘i City near Kō‘ele, and was observed in at least one of the windward canyon headwaters in the Puhi‘elelū area. The change in taxonomy was reported by Herbarium Pacificum Staff (1998: 10). Staples *et al*. (2000: 21) reported the species to be wind dispersed and possibly by aquatic means as well.

Material examined. **LĀNA‘I**: Kea‘aku Gulch, 430 m, 16 Aug 2006, *Oppenheimer & K.R. Wood H80622*.

Medicago rugosa Desr. **New island records**

Known from Kaua‘i, O‘ahu, Maui, and Hawai‘i (Wagner *et al*. 1999: 686; Lorence & Flynn 1997: 10; Oppenheimer & Bartlett 2002: 8), *M. rugosa* has been recently collected on both Moloka‘i and Lāna‘i.

Material examined. **MOLOKA‘I**: Moloka‘i FR, in yard of barracks, 640 m, 17 May 2006, *Oppenheimer, Tangalin, & Perlman H50639*. **LĀNA‘I**: Lāna‘i City, in waste areas, scattered, 450 m, 12 May 2006, *Oppenheimer & J. Penniman H50623*.

Neonotonia wightii (Wight & Arn.) Lackey **New island record**

[*Glycine wightii* (Wight & Arn.) Verdc.]

Occurring on roadsides, in pastures, and other disturbed areas at low elevations on Kaua‘i, O‘ahu, Moloka‘i, Maui, Kaho‘olawe, and Hawai‘i (Wagner *et al*. 1999: 674; Hughes 1995: 6; Herbarium Pacificum Staff 1996: 4–5), this aggressive vine is also on Lāna‘i. It has the potential to spread rapidly and smother dry forest species.

Material examined. **LĀNA‘I**: Keōmoku Rd, 420 m, near 3-mile marker, local, vines climbing *Eucalyptus, Schinus, Panicum, Leucaena,* 19 Oct 2006, *Oppenheimer H100632*.

Prosopis juliflora (Sw.) DC **New island record**

Long-thorn *kiawe* has been documented from O‘ahu (Wagner *et al*. 1999: 692) and Kaua‘i (Imada *et al.* 2000: 12). It is a target for eradication on both islands. The extent of the infestation on Lāna‘i is presently unknown but extends as sporadic individuals as far north as Lae Hī on the windward coast. The Maui Invasive Species Committee has been notified, with more plants subsequently discovered and destroyed (MISC, pers. comm.).

Material examined. **LĀNA‘I**: sea level, between Hauola and Nāhoko at Kaikena, single plant observed among *Prosopis pallida,* 10 May 2006, *Oppenheimer & J. Penniman H50621*.

Samanea saman (Jacq.) Merr. **New island record**

Wagner *et al*. (1999: 696) stated that monkeypod was probably naturalized on all the main islands, but it was only documented from O‘ahu and Hawai‘i. It has since been vouchered and reported from Kaua‘i (Lorence & Wagner 1995: 37) and Maui (Oppenheimer & Bartlett 2002: 8–9). On Moloka‘i, trees are scattered along the south side in low-elevation sites dominated by Java plum (*Syzygium cumini*), *kiawe* (*Prosopis pallida*), and mangrove (*Rhizophora mangle*). The large seeds could be spread by feral axis deer and domestic cattle, and the sticky pulp helps it to adhere to boots and vehicle tires.

Material examined. **MOLOKA‘I**: Kawela, 20 m, sparingly naturalized, 10 Dec 2006, *Oppenheimer H120636.*

Senna alata (L.) Roxb. **New island record**

Persisting after cultivation or perhaps escaping at least on Kaua‘i and O‘ahu (Wagner *et al*. 1999: 698), and Maui (Oppenheimer & Bartlett 2000: 5; Starr *et al*. 2003: 28), this

species was recently collected on Lāna‘i. Irrigation overspray and runoff is creating wetter conditions than normal, which contributes to the species occurrence. Elsewhere in these *Records,* Wysong *et al*. document this species from Moloka‘i.

Material examined. **LĀNA‘I**: Hulopo‘e, 15 m, occasional in waste areas, 20 Oct 2006, *Oppenheimer H100643*.

Senna surattensis (N.L. Burm.) H. Irwin & Barneby **New island record**

Persisting and at least sparingly naturalized on Kaua‘i, O‘ahu, Moloka‘i, and Maui (Wagner *et al*. 1999: 702; Staples *et al*: 2002: 10), this taxon was recently found on Lāna‘i in areas where it was obviously not under cultivation. It is a common ornamental on the island but has apparently only escaped in a few locations.

Material examined. **LĀNA‘I**: Hulopo‘e, 20 m, in rocky gully, 20 Oct 2006, *Oppenheimer H100637;* woods near Kō‘ele, 610 m, sparingly naturalized small trees or shrubs in alien forest of *Eucalyptus* and *Falcataria,* 21 Dec 2006, *Oppenheimer H120648.*

Iridaceae

Gladiolus dalenii Van Geel **Range extension**

Recently reported from East Maui and Hawai‘i (Starr *et al*. 2004: 23), this species has been widely cultivated, mostly in older plantings in cooler, upland areas. There are a variety of flower color forms from yellow to red.

Material examined. **MAUI**: West Maui, Wailuku Distr, pasture between Pōhākea and Manawainui Gulches, 1021 m, terrestrial in open grassland, flowers orange/yellow, 20 Oct 2005, *Oppenheimer H100513.*

Lamiaceae

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

Known from the islands of Kaua‘i, O‘ahu, Maui, and Hawai‘i in dry to mesic disturbed habitats, especially roadsides, pastures, and abandoned fields (Wagner *et al*. 1999: 802), this species was recently found on Lāna‘i growing under similar conditions. Elsewhere in these *Records,* Wysong *et al*. document this species from Moloka‘i.

Material examined. **LĀNA‘I**: Hulopo‘e, 390 m, occasional in waste areas, 20 Oct 2006, *Oppenheimer H100639*; woods near Kō‘ele, 610 m, uncommon weed in open area of *Eucalyptus* plantings, 21 Dec 2006, *Oppenheimer H120649.*

Lauraceae

Cinnamomum burmanni (Nees) Blume **New island record**

Potentially a serious pest tree species, Padang cassia has been documented outside of cultivation on the Hawaiian Islands of Kaua‘i, O‘ahu, Maui, and Hawai‘i (Wagner *et al*. 1999: 846; Wagner *et al.* 1997: 57; Wagner & Herbst 1995: 22; Meidell *et al*. 1997: 18; Starr *et al*. 2004: 23–4). On Lāna‘i seedlings to large mature trees were found in a rare plant exclosure (where control measures have begun), and scattered seedlings and saplings were later pulled up in several headwater drainages of Hauola Gulch. Larger individuals have also been observed in adjacent gulches, and plants have been noted in the heights above Lāna‘i City and the leeward benchlands. Staples *et al*. (2000: 23) reported the species to be bird dispersed, and this may be a limiting factor in the species spread on Lāna‘i. It has the potential to form dense monotypic stands, with only seedlings in the understory.

Material examined. **LĀNA‘I**: **‘**Āwehi Gulch headwaters, 910 m, 16 Aug 2006, *Oppenheimer & K.R. Wood H80623.*

Liliaceae

Asparagus densiflorus (Kunth) Jessop **New island record**

Popular in cultivation and recently documented as a naturalized element of the Hawaiian flora from the islands of Kauaʻi (Lorence & Flynn 1999: 4–5), Oʻahu (Kraus 2003: 76), Maui (Oppenheimer & Bartlett 2000: 6), and Hawaiʻi (Oppenheimer 2003: 14), *A. densiflorus* was observed at least as early as 2000 to be escaping from cultivation on Lānaʻi, and can now be considered naturalized there. The species was noted to be volunteering in the Lānaʻi City area as well where it is also under cultivation

Material examined. **LĀNAʻI**: Hulopoʻe, 15 m, locally common near rock walls and under hedges, 20 Oct 2006, *Oppenheimer H100642*.

Malvaceae

Malvaviscus penduliflorus DC **New island record**

Cultivated in Hawaiʻi and sparingly naturalized in disturbed mesic sites from sea level to 330 m elevation on Kauaʻi, Maui, and Hawaiʻi (Wagner *et al*. 1999: 895), Turk's cap was found on Molokaʻi under the same conditions.

Material examined. **MOLOKAʻI**: Hālawa Valley, 10 m, 9 Dec 2006, *Oppenheimer H120632.*

Sida ciliaris L. **New island record**

While only recently found as a naturalized species in Hawaiʻi, *S. ciliaris* was already documented from Kauaʻi (Staples *et al.* 2003: 14–15), Oʻahu (Wagner *et al*. 1997: 59), Maui (Oppenheimer & Bartlett 2000: 6; Starr *et al*. 2004: 24), and Kahoʻolawe (Starr *et al*. 2006: 36). With the following voucher specimen collected on Lānaʻi, it is now known from all the main islands except Niʻihau and Molokaʻi.

Material examined. **LĀNAʻI**: Mānele, 5 m, common along road from harbor to Hulopoʻe, and in lawns at Hulopoʻe Beach Park, 20 Oct 2006, *Oppenheimer H100640*.

Sida cordifolia L. **New island records**; **Range extension**

Sida cordifolia was previously known to be naturalized on Kauaʻi (Lorence & Wagner 1995: 41); at Kaupō, East Maui; and the Kona coast, Hawaiʻi (Wagner *et al.* 1999: 897). More recently it was documented from Oʻahu (Herbst *et al*. 2004: 9). On Molokaʻi it is common in pastures on the east end, on Lānaʻi it was found along a roadside, while on West Maui it was collected growing in a remote area at an old campsite, which may explain its occurrence there.

Material examined. **MOLOKAʻI**: Pōhakupili, 70 m, locally common in pastures, 8 Dec 2006, *Oppenheimer H120619*, *H120620*. **LĀNAʻI**: Keōmoku Rd, occasional small shrub on roadside, 460 m, 19 Oct 2006, *Oppenheimer H100630*. **MAUI**: West Maui, Lahaina Distr, Honokōwai, S side of valley, 818 m, 26 Oct 2005, *Oppenheimer, M. Chimera, & F. Quitazol H100520.*

Sida spinosa L. **New island record**

Prickly sida was previously known from the islands of Kauaʻi, Oʻahu, Lānaʻi, Maui, and Hawaiʻi (Wagner *et al*. 1999: 899; Lorence & Flynn 1997: 10–11; Oppenheimer *et al*. 1999: 8–9; Staples *et al*. 2002: 12–13). It was recently collected on Molokaʻi, where it is widespread.

Material examined. **MOLOKAʻI**: Molokaʻi FR, in yard of barracks, 640 m, 17 May 2006, *Oppenheimer, Tangalin, & Perlman H50640;* Pūniuʻōhua 1, 30 m, occasional to locally common in dry pastures, roadsides, and waste areas, 10 Aug 2006, *Oppenheimer H80612* (BISH); Keāina Gulch, 80 m, locally common in pasture, 9 Dec 2006, *Oppenheimer H120628*.

Sida urens L. **Range extension**

Documented from North Kona, Hawai‘i (Wagner *et al*. 1999: 899) and East Maui (Starr *et al.* 2002: 21), the following specimen represents a significant range extension to West Maui. It is common along disturbed roads and trails near Honokōwai in a *Eucalyptus* planting bordering native shrubland dominated by *Dodonaea, Wikstroemia, Osteomeles,* and *Leptecophylla.*

Material examined. **MAUI**: West Maui, Lahaina Distr, 585 m, 27 Oct 2005, *Oppenheimer H100521*.

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

Naturalized on Kaua‘i, O‘ahu, East Maui, and Hawai‘i (Wagner *et al*. 1999: 901; Lorence & Flynn 2006: 3; Starr *et al*. 2003: 28), this species has been recently collected on 1 additional island.

Material examined. **MOLOKA‘I**: Pōhakupili, 70 m, locally common in pastures, 8 Dec 2006, *Oppenheimer H120619*.

Thespesia populnea (L.) Sol. ex Corrêa **New island record**

Possibly indigenous or a Polynesian introduction, probably on all the main islands but documented only from Ni‘ihau, Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al.* 1999: 902), *milo* is commonly seen along the east side of Lāna‘i, where it occurs along the shoreline among *Prosopis* thickets and has also been noted to grow in dry gulches along the north coast near Polihua. Recent plantings near Hulopo‘e Bay on the south side have also been observed with seedlings beneath the mature trees. Staples *et al*. (2000: 24) reported the species to be dispersed by aquatic means.

Material examined. **LĀNA‘I**: sea level, between ‘Āwehi and Lōpā, scattered along eastern shore of Lāna‘i among *Prosopis* thickets, 11 May 2006, *Oppenheimer & J. Penniman H50619*.

Melastomataceae

Clidemia hirta (L.) D. Don var. ***hirta*** **New island record**

Koster’s curse is a serious pest species on Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al*. 1999: 906). On Lāna‘i it was found scattered along watercourses in the vicinity of Lāna‘ihale, and has also been observed on Ho‘okio Ridge (J. Penniman, pers. comm.). All plants encountered were removed, and the large and dense thickets typical of *Clidemia* infestations have not yet been observed on Lāna‘i.

Material examined. **LĀNA‘I**: headwaters of Hauola Gulch, 980 m, 17 Aug 2006, *Oppenheimer & K.R. Wood H80626*.

Meliaceae

Toona ciliata M. Roem. **New island record**

Extensively planted in forestry areas and at least sparingly naturalized on Kaua‘i, O‘ahu, Lāna‘i, Maui, and Hawai‘i (Wagner *et al*. 1999: 920), Australian red cedar is also sparingly naturalized on Moloka‘i. Its occurrence among tall and dense stands of *Eucalyptus* in the forest reserve may be hindering its spread, or at least its detection.

Material examined. **MOLOKA‘I**: vicinity of Maunahui, 900 m, naturalized but uncommon trees, 27 Nov 2006, *Oppenheimer & Perlman H110620*.

Moraceae

Ficus microcarpa L. f. **New island record**

Chinese banyan is naturalized on O‘ahu, Maui, and Hawai‘i, but probably on all of the main islands (Wagner *et al*. 1999: 926). Subsequently it was reported from Kaua‘i (Lorence & Wagner 1995: 41), Moloka‘i (Hughes 1995: 7), and Kaho‘olawe (Warren & Herbst 1994: 2). Smith (1985: 190) reported it from all the major islands on cliffs and rocky outcrops, in all but the wettest and driest habitats. The following collection documents its occurrence on Lāna‘i, where it is growing in a very dry area.

Material examined. **LĀNA‘I**: Kaumālapa‘u, 20 m, trees occasional on rock faces and in gulches, *Oppenheimer H100623*.

Myrtaceae

Eucalyptus robusta Sm. **New island record**

Although Wagner *et al.* (1999: 957) mentioned that the earliest Hawaiian collection seen of this species was from Lāna‘i, they only reported it to be regenerating on Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i. It is widespread and the most common species of *Eucalyptus* on Lāna‘i, where it is naturalized in most locations where previously planted.

Material examined. **LĀNA‘I**: head of ‘Āwehi Gulch 950 m, naturalized trees, common, 15 Aug 2006, *Oppenheimer & K.R. Wood H80621*.

Lophostemon confertus (R. Br.) **New island record**
Peter G. Wilson & Waterhouse

Naturalized on O‘ahu (Wagner *et al*. 1999: 964) and East Maui (Oppenheimer 2004: 14), *L. confertus* was apparently planted as a forestry tree on most of the main islands but not listed from Lāna‘i (Wagner *et al*. 1999: 964), where it is reproducing and spreading locally in several areas where planted.

Material examined. **LĀNA‘I**: vicinity of Hi‘i Flats, 700 m, naturalized trees in waste areas, degraded *Dodonaea* shrubland, and among old forestry plantings, 11 May 2006, *Oppenheimer & J. Penniman H50616.*

Orchidaceae

Phaius tankarvilliae (Banks ex L’Hér.) Blume **New island record**

Chinese ground orchid has been documented outside of cultivation on Kaua‘i, O‘ahu, Lāna‘i, West Maui, and Hawai‘i (Wagner *et al.* 1999: 1474; Oppenheimer *et al.* 1999: 9). 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. **MOLOKA‘I**: Wailau Valley, 61–122 m, uncommon, terrestrial, in shade, 18 Aug 2005, *Oppenheimer H80512*.

Phytolaccaceae

Rivina humilis L. **Range extension**

Naturalized on Kaua‘i, O‘ahu, Moloka‘i, West Maui, and Hawai‘i (Wagner *et al*. 1999: 1017; Meidell *et al*. 1997: 17; Oppenheimer 2003: 18), coral berry was recently collected on East Maui.

Material examined. **MAUI**: East Maui, Wailuku Distr, Paeahu ahupua‘a, 213 m, naturalized in small intermittent stream channel in *Prosopis/Cenchrus* dry forest with relict native elements, 7 May 2006, *Oppenheimer H50608*.

Poaceae

Axonopus compressus (Sw.) Beauv. **New island record**

Recently documented from Kaua‘i, O‘ahu, Moloka‘i, and Maui (Oppenheimer 2003: 19; 2004: 15; Starr *et al*. 2004: 26), this species of carpetgrass is also common around Hilo, Hawai‘i.

Material examined. **HAWAI‘I**: Hilo, near sea level, common in lawns with *A. fissifolius*, 26 Apr 2005, *Oppenheimer H40507*.

Dactyloctenium aegyptium (L.) Willd. **New island record**

Known from the islands of Midway Atoll, Kaua‘i, O‘ahu, Moloka‘i, Maui, Kaho‘olawe, and Hawai‘i (Wagner *et al*. 1999: 1522; Wagner *et al*. 1997: 60; Lorence & Flynn 1997: 11), it is not surprising that this species is also naturalized on Lāna‘i.

Material examined. **LĀNA‘I**: sea level, between Hauola and Nāhoko at Kaikena, uncommon in open, sandy areas between *Prosopis* thickets, 11 May 2006, *Oppenheimer & J. Penniman H50622*.

Paspalum notatum Fluggé **New island record**

The first naturalized record for *P. notatum* from Hawai‘i was reported by Lorence & Flynn (1999: 6), who cited specimens from Kaua‘i. Although it currently appears that this species is not aggressive and only spreading in disturbed or developed areas, it bears watching lest it become a pest like other species of *Paspalum*.

Material examined. **MAUI**: West Maui, Lahaina Distr, Honokahua, 23 m, growing near Hāwea Pt. at edge of lawn w/*Paspalum conjugatum, Digitaria ciliaris,* and *Axonopus compressus*, 8 Oct 2002, *Oppenheimer & Bartlett H100203*; ‘Alaeloa, 15 m, a recent invader of lawn, 13 Jul 2004, *Oppenheimer H70401* (BISH); East Maui, Makawao Dist., Pi‘iholo, 640 m, in large grassy field and edges of old experimental plantings, 12 Jun 2003, *Oppenheimer, Bily, & Michailidis H60312* (BISH).

Paspalum paniculatum L. **Range extension**

Herbst & Wagner (1999: 28) considered this species naturalized and cited collections from O‘ahu and Hawai‘i. Later it was found on West Maui (Oppenheimer 2004: 16). The following specimen represent a significant range extension to East Maui.

Material examined. **MAUI**: East Maui, Hāna Distr, Kīpahulu, in pastures between Koukouai and ‘Ōpelu, Ma‘ulili ahupua‘a, 207 m, 16 Oct 2005, *Oppenheimer H100509*.

Paspalum setaceum Michx. **New island record**

Widespread in the Pacific Basin, but not documented from the Hawaiian Islands until recently when it was reported from Midway Atoll (Starr & Martz 2000: 11–12). Since it now occurs on East Maui, it should be expected to continue to spread.

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

Pennisetum glaucum (L.) R. Br. **New naturalized record**

In the most recent update on the naturalized species of *Pennisetum* in Hawai‘i, Herbst & Clayton (1998: 32) did not include this species in their key. It differs from other species of *Pennisetum* in Hawai‘i in being an annual (vs. perennial), and having the bristles about as long as the spikelet (vs. much longer) (Hitchcock 1971: 727). According to the Hawai‘i Ecosystems At Risk website (www.hear.org, accessed 2006.07.02), this species, commonly known as pearl millet, is naturalized throughout the tropical Pacific in American Samoa, Fiji, French Polynesia, New Caledonia, Samoa, and Tonga. The USDA does not list this taxon from Hawai‘i, although it is widespread in the continental U.S. It is cultivated as a grain in India and Africa and has been reported as an escape from trials in Fiji

(as *Pennisetum americanum,* Smith 1991: 359), and has also been collected from a trial plot at the old Hawai‘i Agricultural Experiment Station at Poamoho, O‘ahu (*Hosaka 2539*, 17 Oct 1940, BISH).

Material examined. **MAUI**: West Maui, Lahaina Distr, Māhinahina, 366 m, volunteer in trial plot in former pineapple field, 1 Oct 2004, *Oppenheimer, R. Bartlett, & G. Hansen H100402* (BISH); Honokōhau, Kula o Kalālāloa, 134 m, locally common, possibly planted as forage grass trial, 2 Dec 2004, *Oppenheimer & G. Hansen H120401*.

Polygalaceae

Polygala paniculata L. **New island record**

Naturalized in disturbed areas on Kaua‘i, O‘ahu, Moloka‘i, East & West Maui, and Hawai‘i (Wagner *et al*. 1999: 1058; Lorence *et al*. 1995: 48; Oppenheimer *et al*. 1999: 10; Oppenheimer 2006: 13), this small herb is now known from Lāna‘i as well. Besides the collection cited here, it was also observed growing in waste areas near Lāna‘i City.

Material examined. **LĀNA‘I**: between Hi‘i Flats and Pu‘u Ali‘i, 700 m, uncommon along unpaved road and fenceline in degraded *Dodonaea* shrubland, flowers white, roots scented, 10 May 2006, *Oppenheimer & J. Penniman H50610.*

Pteridaceae

Cheilanthes viridis (Forssk.) Sw. **New island record**

Occurring in diverse habitats, most often in dry exposed areas of Kaua‘i, O‘ahu, Maui, and Hawai‘i, and probably present, but not yet reported, on other islands (Palmer 2003: 85), this alien fern is now known from Lāna‘i.

Material examined. **LĀNA‘I**: W of Ho‘okio Gulch, 480 m, uncommon in dense *Schinus* thicket, with *Adiantum hispidulum*, 20 Dec 2006, *Oppenheimer H120640*.

Pteris tremula R. Br. **New naturalized record**

Native to New Zealand and Australia (Bailey & Bailey 1941: 605), and also Tasmania, Lord Howe Island, Kermadec Islands, and Fiji (D. Lorence, pers. comm.), Australian or trembling brake has not been documented outside of cultivation in Hawai‘i. It is also naturalized in California (A.R. Smith, pers. comm.). This is a large fern with many erect fronds nearly a meter long, blades 2–4 times pinnate, with linear, toothed pinnules. At least a dozen plants were found volunteering and were scattered across a few acres, growing out of rock walls and wood chips. It is becoming widespread in the central Kula area from 914 to 1220 m elevation, in pastures and rock walls (R. Hobdy, pers. comm.).

Material examined. **MAUI**: East Maui, Makawao Distr, Waiohuli, 914 m, 25 Jan 2003, *Oppenheimer & Romanchak H10304.*

Rhamnaceae

Colubrina asiatica (L.) Brongn. **New island record**

This indigenous species has been reported in Hawai‘i from Ni‘ihau, Kaua‘i, O‘ahu, Moloka‘i and recently Maui (Wagner *et al*. 1999: 1093; Starr *et al*. 2003: 31). Now it is known from Lāna‘i as well, but has apparently existed there for quite some time (R. Hobdy, pers. comm.).

Material examined. **LĀNA‘I**: along Keōmoku Rd between Kahe‘a and Wai‘ōpae, 3 m, scattered along this stretch of coast, covering 10 m tall *Prosopis pallida*, 11 May 2006, *Oppenheimer & J. Penniman H50620.*

Rosaceae

Eriobotrya japonica (Thunb.) Lindl. **New island record**

Wagner *et al*. (1999: 1100) considered loquat an occasional escape from cultivation on the Big Island, but Lorence *et al*. (1995: 49) later documented it as clearly naturalized on Kaua‘i. It also occurs outside of cultivation on East Maui (Herbarium Pacificum Staff 1999: 8–9). What is likely this species has also been observed growing in a naturalized state on the Big Island, but only vegetative voucher specimens were obtained, precluding a definitive determination. On Lāna‘i it is sparingly naturalized locally, but with more extensive survey is expected to be more widespread, since axis deer could easily disperse the seeds, along with humans unintentionally discarding the seeds in new areas. Trees were also observed to be under cultivation in Lāna‘i City.

Material examined. **LĀNA‘I**: vicinity of Hulopo‘e Gulch, 510 m, sparingly naturalized in *Schinus* and *Psidium* forest, 20 Dec 2006, *Oppenheimer H120644*.

Scrophulariaceae

Antirrhinum orontium L. **Range extension**

Naturalized on O‘ahu, East Maui, and Kaho‘olawe (Wagner *et al*. 1999: 1237; Staples *et al*. 2002: 15; Starr *et al*. 2006: 41), lesser snapdragon was recently collected on West Maui, where it was abundant along a newly regraded, unpaved road.

Material examined. **MAUI**: West Maui, Wailuku Distr, 244 m, 25 Apr 2006, *Oppenheimer, Brosius, Miller, & Wright H40606.*

Castilleja arvensis Cham. & Schltdl. **New island record**

Reported from Kaua‘i, O‘ahu, Maui, and Hawai‘i (Wagner *et al*. 1999: 1239–40; Staples *et al*. 2003: 19), Indian paintbrush is now also known from Lāna‘i.

Material examined. **LĀNA‘I**: head of Hauola Gulch, 980 m, uncommon and scattered on steep, open slopes in *Metrosideros/Dicranopteris* forest, 17 Aug 2006, *Oppenheimer & K.R. Wood H80627*.

Solanaceae

Cestrum nocturnum L. **Range extension**

Cultivated in Hawai‘i and naturalized on Kaua‘i, O‘ahu (Wagner *et al*. 1999: 1254–1255), East Maui (Oppenheimer & Bartlett 2000: 8), and Hawai‘i (Starr *et al.* 2003: 32), this species also occurs on West Maui. It has the potential to form dense thickets in riparian areas, based on recent observations in Makawao and Ko‘olau Forest Reserves on East Maui. Staples *et al*. (2000: 30) reported the species to be bird dispersed, and aquatic means also seems likely.

Material examined. **MAUI**: West Maui, Wailuku Distr, ‘Īao Valley, A‘e Stream 335 m, common shrub along intermittent stream, 10 Jul 2006, *Oppenheimer & Tangalin H70603.*

Tiliaceae

Heliocarpus popayanensis Kunth **New island record**

Cultivated and naturalized on Kaua‘i, O‘ahu, and Hawai‘i (Wagner *et al*. 1999: 1292), *moho* was recently collected on Lāna‘i where it appears to be spreading locally. Apparently this species is not palatable to axis deer, since many seedlings and saplings seemed unbrowsed despite obvious evidence of deer activity in the area.

Material examined. **LĀNA‘I**: vicinity of Hulopo‘e Gulch, 510 m, locally naturalized trees in alien forest, 20 Dec 2006, *Oppenheimer H120644.*

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New Hawaiian plant records for 2005–2006

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These previously unpublished Hawaiian plant records report 2 new state records, 14 new island records, 1 new naturalized record, and 2 name changes affecting the flora of Hawai'i. All identification were made by Herbarium Pacificum staff, except where noted in the acknowledgments, and all supporting voucher specimens are on deposit at BISH, except as otherwise noted.

Amaranthaceae

Alternanthera sessilis (L.) R. Br. ex DC. **New island record**

Previously reported as naturalized on Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i (Wagner *et al.* 1999; Lorence *et al.* 1995), *A. sessilis* is now recorded from Lāna'i. Sessile joyweed is a widespread herbaceous weed in tropical and subtropical areas, and is included by the U.S. Department of Agriculture on their federal noxious weed list (http: //www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/weedlist2006.pdf).

Material examined. **LĀNA'I**: Mānele Bay Hotel parking lot, emerging from cement curbside, 7 Jul 2005, *Lāna'i Conservation Internship Program s.n.* (BISH 717390).

Araceae

Aglaonema commutatum Schott **New naturalized record**

The genus *Aglaonema* includes many popular indoor ornamental foliage species, but this voucher represents the first record of naturalization for this genus in Hawai'i. Small colonies were noted scattered along roadsides in the back part of Waimānalo Valley, O'ahu, perhaps spread by bird dispersal of its yellow to bright red fruit from nearby plant nurseries. Nicolson (1969) reported the ability of this species to naturalize. *Aglaonema commutatum* can be identified by its erect herbaceous stem 0.2–1.8 m long; leaf petiole basically green; leaf blade usually oblong-elliptic to lanceolate, variegated around the veins; spathe oblong; and spadix short-stalked and usually shorter than the spathe (Staples

& Herbst 2005). The voucher matches var. *maculatum* (Hook. f.) Nicolson, native to central Luzon in the Philippines, which has leaves more than 5 cm wide, variegated with blotchy bars along the primary lateral veins.

Material examined. **O'AHU**: Waimānalo, Kakaina St, roadside in wet disturbed forest area, adjacent to large nursery, 12 Apr 2005, *G. Staples 1227.*

Alocasia cucullata (Lour.) G. Don **New island record**

Previously reported as naturalized on Maui and Hawai'i (Staples *et al.* 2003), *A. cucullata* is now recorded from O'ahu. Chinese taro rarely forms fruit in Hawai'i, and it apparently spreads vegetatively by offsets or broken bits of rhizome or root (Staples & Herbst 2005). In Waimānalo, small clumps were noted occasionally along a stream.

Material examined. **O'AHU**: Waimānalo, Kakaina St, shaded understory along stream, growing on banks in deep shade on moist red clay soil, 17 Feb 2005, *G. Staples 1223.*

Begoniaceae

Begonia foliosa Kunth **New island record**

Previously reported as naturalized on Hawai'i (Wagner *et al.* 1999), *B. foliosa* is now recorded from O'ahu in very wet native-dominated habitat at Mount Ka'ala. This mat-forming herb is described as having brittle stems, making it difficult to remove. The fragmenting stems probably allow it to spread vegetatively. *Begonia foliosa* var. *miniata,* the name originally applied to this taxon in Hawai'i (Wagner *et al.* 1999), has subsequently been determined to be a misapplied name (Staples & Herbst 2005).

Material examined. **O'AHU**: Wai'anae Mts, slopes on SE side of Mt Ka'ala, 1040 m, wet walls just south of stream and waterfall, localized, 4 Jul 1999, *S. Perlman & B. Garnett 16703.*

Cyperaceae

Fimbristylis littoralis Gaud. **Name change**

[syn. *F. miliacea* (L.) Vahl, nom. rej.]

Strong & Wagner (1997) reported *Fimbristylis miliacea* (L.) Vahl from Kaua'i as a new naturalized wetland sedge in the Hawaiian Islands, and it has since been vouchered from Hawai'i and Maui (Imada *et al.* 2000; Oppenheimer 2003). The name, based on the basionym *Scirpus miliaceus* L., has long had a confusing dual identity (Strong 2004). Linnaeus never designated a type, and the two sheets (#s 71.40 & 71.41) comprising the original material were subsequently treated as different entities, *Fimbristylis quinquangularis* (Vahl) Kunth and *F. miliacea* (L.) Vahl, respectively. One obvious character difference between the two is in the shape of the spikelets, *F. quinquangularis* being ovoid and acute, *F. miliacea* being globose or globose-ovoid, the tip rounded or obtuse (Strong & Kral 1999). In order to fix the identity of *Scirpus miliaceus,* S.T. Blake in 1954 lectotypified sheet 71.40, an unfortunate designation since by then material represented by that sheet was consistently being treated as *Fimbristylis quinquangularis.* In response, J.H. Kern later that year lectotypified sheet 71.41 as *Scirpus miliaceus.* Subsequently, the name *Fimbristylis miliacea* has become totally ambiguous, being used almost equally as an accepted name in two different senses in major floras. In 2005 (Brummitt 2005) the name *Scirpus miliaceus* L. was rejected; specimens representing 71.40 will be treated as *Fimbristylis quinquangularis* (Vahl) Kunth, while those representing 71.41 (e.g., all Hawaiian vouchers) will henceforth be called *F. littoralis* Gaud., the next available name.

Rhynchospora tenuis Willd. ex Link subsp. ***tenuis*** **New state record**

Mark Strong, Cyperaceae specialist at Smithsonian Institution, was able to identify this 30–36 cm tall, narrow-leaved sedge collected on Kaua‘i. *Rhynchospora tenuis* ssp. *tenuis* is a neotropical sedge distributed from Mexico, Central America, Bahamas, Greater and Lesser Antilles, Trinidad, and South America (Strong 2006). Its preferred lower elevation habitats include wet sand, sandy soils, rocky savanna slopes, sedge meadows, wet pastures, stream slopes, bog, and seepages (Strong 2000). This is apparently the first record of the taxon outside its native range (M. Strong, pers. comm.). The following description is adapted from Strong (2006): Caespitose perenniel (10–)14–40(–50) cm tall; rhizome short, culms and numerous basal leaves forming dense clumps. Culms ascending, 0.4–0.9 mm wide, obtusely trigonous to compressed-trigonous or subterete, soft, flexuous, finely ribbed, channeled along one side distally, pale green, glabrous. Leaves ascending, numerous, primarily basal, 1–3 cauline, 6–40 cm long; sheaths quite long, particularly cauline ones, closely clasping culm, essentially eligulate, herbaceous, finely ribbed, pale brown to stramineous proximally, glabrous; blades narrowly linear, 0.3–1.1 mm wide (unfolded), V-shaped to subfolded or sometimes involute, firm, herbaceous, light green or pale brown below, green above, margins smooth proximally, antrorsely scabrous distally, the apex long-acuminate, triquetrous near tip. Inflorescence a series of 1–3(4) corymbose partial panicles from the upper leaflike bracts, panicles somewhat strict, the terminal panicle 1–5 x 1–2 cm, with 10–50 spikelets; bracts shorter and a little narrower than leaf blades, to 20 cm long; branches very slender and filiform, obtusely trigonous, flattened-trigonous or subterete in cross section; spikelets ovoid-ellipsoid, 3–5 x 0.6–1.3 mm, narrowly acute to acuminate at apex, straight, becoming slightly falcate with age, the scales spreading with maturing achenes; scales dorsally obtuse to rounded, herbaceous, distal scales of spikelet thinly herbaceous to submembranous, minutely cellular-striate, semi-glossy, reddish brown with slightly darker brown lineations, glabrous, margins narrowly scarious, slightly crisped, midcosta very fine, indistinct except at apex, prolonged beyond the narrowly acute to acuminate apex as a short mucro; fertile scales 3 or 4, ovate-elliptic or widely ovate-elliptic to ovate-lanceolate, 2.2–3.8 x 0.9–1.6 mm; sterile scales 2 or 3 at base of spikelet, ovate-elliptic, 0.7–1.7 x 0.3–1.2 mm. Style 2-branched, equalling 2/3 length of unbranched portion, long-exserted from subtending scale, one branch often shorter than the other. Achene biconvex, obovate, 1–1.4 x 0.8–1.0 mm, truncate at apex, cuneate at base, transversely rugulose with 6–8 rugae per face, narrowly cellular-reticulate along margins and at base, shining, glossy, reddish brown or brown; epidermal cells linear, vertically oriented; style base shallowly triangular, 0.2–0.6 x 0.5–0.7 mm, 2-lobed at base, the lobes extending along shoulders of achene, brown or blackish.

Material examined. **KAUA‘I**: Hanalei Distr, Kāhili ahupua‘a, on margin of Pu‘u Ka ‘Ele Reservoir, open grassy slope back of pond margin, uncommon thin-bladed sedge, 128 m, 27 Sep 2001, *C. Imada 2001-59.*

Dryopteridaceae

Tectaria incisa Cav. **New island record**

Previously reported as naturalized on Kaua‘i, O‘ahu, and Hawai‘i (Palmer 2003), *T. incisa* is now also recorded from East Maui. It was originally collected in 1985 in Waimanu Valley on the Big Island. Label data on BISH specimens suggest a habitat preference for the understory of moist lowland forest, along streams or on talus slopes.

Material examined. **MAUI**: East Maui, Waimoku Trail above the two bridges crossing Palikea and Pipiwai Streams, 150 m, 28 Dec 2005, *P. Welton, B. Haus, & M. Vacek 2221.*

Fabaceae

Crotalaria lanceolata E. Mey. **New island record**

Previously reported as naturalized on Maui and Hawai‘i (Wagner *et al.* 1999; Oppenheimer 2004), *C. lanceolata* is now recorded from O‘ahu. Voucher localities indicate it is a lowland wayside weed of roadsides and waste sites.

Material examined. **O‘AHU**: Wai‘anae Mts, Pahole, Peacock Flats road by NIKE site, roadside weed, 550 m, 15 Feb 2005, *K. Kawelo USARMY 11.*

Mimosa pudica L. var. ***unijuga*** (Duchass. & Walp.) Griseb. **New island record**

Previously reported as naturalized on all the main islands except Ni‘ihau and Kaho‘olawe (Wagner *et al.* 1999), an overlooked naturalized record of *M. pudica var. unijuga* from Ni‘ihau made in 1947 was recently uncovered in Herbarium Pacificum.

Material examined. **NI‘IHAU**: ridge 1 mi E of Ka‘eo, 230 m, by trail in pasture, 14 Aug 1947, *H. St. John 22798.*

Juncaceae

Juncus effusus L. **New island record**

Previously reported as naturalized on Moloka‘i, Maui, and Hawai‘i (Wagner *et al.* 1999), bog rush is now recorded from O‘ahu in a suitably boggy habitat for this obligate wetland species.

Material examined. **O‘AHU**: Wai‘anae Mts, Mt Ka‘ala, 1220 m, on edge of drainage depression, 22 Nov 2005, *L.M. Crago, C. Imada & C. McGuire 2005-238.*

Lythraceae

Cuphea hyssopifolia Kunth **New island record**

False heather is commonly cultivated in Hawai‘i as a landscape bedding plant. It has been documented as naturalized from the island of Hawai‘i in mesic, open, disturbed sites and streambeds (Wagner *et al*. 1999). On East Maui, it has been recorded growing along streambeds. Staples *et al*. (2000) reported the species to be possibly spread via mechanical means, but aquatic dispersal seems to be more likely at these sites. Mahalo to Hank Oppenheimer for providing most of the text for this entry.

Material examined. **MAUI**: East Maui, Pokaekane Stream above Ke‘anae, common along streambank under alien lowland riparian forest, 3 Sep 2000, *P. Welton 2093;* Hāna Distr, Kīpahulu, sparingly naturalized subshrubs along banks of Kaukau‘ai Stream, 213 m, 29 Oct 2005, *H. Oppenheimer H100523.*

Najadaceae

Najas guadalupensis (Spreng.) Magnus **New island record**

Previously reported as a naturalized submerged aquatic on Hawai‘i (Herbst & Wagner 1996), southern naiad is now recorded from O‘ahu. Although naturalized sightings so far have been sporadic, the species has potential for more spread because of its use as an aquarium and water garden plant. The stems are brittle, and the plant is readily propagated by plant fragments.

Material examined. **O‘AHU**: Kailua, garden at 209 Oneawa Kai Pl, aquatic weed introduced with new lily, soon proliferating and filling small container, 1 Jul 1994, *G. Staples 940;* Makiki Str, in channelized section at intersection of Kalākaua Ave & South King St, submerged aquatic, 19 Jul 2001, *C. Imada 2001-53.*

Nephrolepidaceae

Nephrolepis brownii (Desv.) Hovenkamp & Miyam. **Name change, new island record**

[syn. *N. multiflora* (Roxb.) F.M. Jarrett ex C.V. Morton]

Hovenkamp & Miyamoto (2005) published a worldwide review of the genus *Nephrolepis,* in which they recognized 19 species. The authors proposed a name change for the widely distributed weedy tropical and subtropical *N. multiflora* (Roxb.) F.M. Jarrett ex C.V. Morton. The new epithet is based on *Nephrodium brownii* Desv., published in 1827; the epithet *multiflorum* is based on *Davallia multiflora* Roxb., published later, in 1844. By the law of priority, *brownii* becomes the epithet applied to the species. Previously reported as naturalized on Nihoa, Lehua, and all the main islands except Ni‘ihau and Kaho‘olawe (Palmer 2003), an overlooked naturalized record of *N. brownii* from Ni‘ihau made in 1947 was recently uncovered in Herbarium Pacificum.

Material examined. **NI‘IHAU**: near Halulu Lake, in crevices of basalt in shaded gully, rare, 15 m, 12 Aug 1947, *H. St. John 22721.*

Oleaceae

Jasminum polyanthum Franch. **New state record**

David Clausnitzer of the U.S. Department of Agriculture, Natural Resources Conservation Service in Waimea (Big Island) brought this naturalizing vining jasmine species to our attention in late 2004, located along the trail at Manukā State Park between 550 and 610 m elevation. He noted 5 or 6 stands ranging from 9–230 square meters, crawling on the ground and climbing up onto shrubs and trees, up to 12 m into the canopy. At that time no flowers or fruit were noted. The plants have flowered since then, but no fruit has been noted. In the summer of 2007, Clausnitzer reported the plants still present and probably expanding their range vegetatively along their margins (D. Clausnitzer, pers. comm.). A website for the Blue Mountains in New South Wales, Australia profiles the weediness of *J. polyanthum* in the region. [http://www.weedsbluemountains.org.au/jasmine.asp]. There, white jasmine is characterized as a vigorous evergreen twining climber from China with tough, wiry stems that travel long distances along the ground, often rooting at the leaf nodes and suckering from the roots, but rarely producing fruit. The stems reportedly climb vigorously into the tree canopy, blanketing vegetation. The following plant description is modified from the Flora of China (Chang *et al.* 1996): leaves opposite, pinnately compound with 5–7 leaflets; petiole 0.4–2.0 cm long; leaflets papery or thin-leathery, glabrous or with tufts of hair in vein axils on underside; terminal leaflet lanceolate or ovate, usually 2.5–9.5 x 1.0–3.5 cm, lateral leaflets ovate, 1.5–8.5 x 1.0–2.7 cm; racemes or panicles terminal or axillary, 5–50-flowered; calyx lobes 5, deltate or subulate-linear, >2 mm long; corolla white, red outside and in bud, tube 1.3–2.5 cm long, lobes 5, narrowly ovate to oblong, 0.9–1.5 cm long; berry black, subglobose, 6–11 mm diam. Chang *et al.* (1996) record the habitat as “valleys, thickets, woods” from 1400 to 3000 m in Guizhou, Sichuan, and Yunnan, and its cultivation as an ornamental and for its aromatic oil.

Material examined. **HAWAI‘I**: Manukā State Park trail, naturalizing in forest with *Metrosideros, Psydrax, Nestegis, Hedyotis, Psychotria,* 5 Apr 2005, *D. Clausnitzer s.n.* (BISH 718780).

Poaceae

Panicum fauriei Hitchc. var. ***latius*** (H. St. John) Davidse **Clarification**

This endemic grass was previously reported from all the main islands except Ni‘ihau (Wagner *et al.* 1999), and recently as a new island record from Lehua (Wood & LeGrande

2006). An older collection of *P. fauriei* var. *latius* from Lehua made in 1931 was recently uncovered in the Herbarium Pacificum.

Material examined. **NI'IHAU**: Lehua Islet: 19 Apr 1931, *E.L. Caum 23.*

Portulacaceae

Portulaca lutea Sol. ex G. Forst. **New island record**

Previously reported as native on all of the Northwestern Hawaiian Islands except Kure and Pearl & Hermes, and all the main islands except Ni'ihau and Kaho'olawe (Wagner *et al.* 1999; Wood 2006), two previously overlooked collections of *P. lutea* from Ka'ula Rock made in 1932 were recently uncovered in the Herbarium Pacificum.

Material examined. **NI'IHAU**: Ka'ula Rock: 17 Aug 1932, *E.L. Caum 4, 6.*

Pteridaceae

Ceratopteris thalictroides (L.) Brongn. **New island record**

Previously reported as naturalized on Kaua'i and O'ahu (Palmer 2003), *C. thalictroides* has now been recorded from the North Kohala area of Hawai'i, where it was localized and uncommon. This obligate wetland fern, called swamp fern or water fern, is thought to have been introduced in the early 1900s by Chinese rice farmers. Formerly common, its range has been much reduced by the loss of much of its obligate wetland habitat in the past century.

Material examined. **HAWAI'I**: North Kohala, Bond Estate, Kalāhikiola Reservoir, in muddy channelized stream with shallow running water, 10 Jul 2002, *K. Uyehara s.n.* (BISH 710691).

Thelypteridaceae

Christella dentata (Forssk.) Brownsey & Jermy **New island record**

Previously reported as naturalized on all the main islands except Ni'ihau and Kaho'olawe (Palmer 2003), an overlooked naturalized record of *C. dentata* from Ni'ihau made in 1912 was recently uncovered in Herbarium Pacificum.

Material examined. **NI'IHAU**: foot of plateau, S.E., Jan 1912, *J.F.G. Stokes s.n.* (BISH 3846).

Violaceae

Viola odorata L. **New island record**

Previously reported as naturalized on Lāna'i and Hawai'i (Wagner *et al.* 1999; Shannon & Wagner 1996), Wagner *et al.* (1999) also mentioned an observation of several apparently naturalized plants along a stream and in wet forest on southwestern Kaua'i, from which no collections were made. The following voucher represents the first naturalized record for Kaua'i.

Material examined. **KAUA'I**: Kōke'e State Park, along Halemanu Road between Hwy 550 and Halemanu Stream, *Acacia koa* mesic forest invaded by *Corynocarpus, Myrica, Rubus, Passiflora,* stoloniferous, forming dense colonies in shade along roadside, ca 1060 m, 30 Dec 1999, *D. Lorence et al. 8455*.

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New records of Coleoptera for the Island of Maui from the Bishop Museum arthropod survey of Kahului Airport

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Bishop Museum’s Kahului Airport Survey was conducted from 1999–2002, marking the initial active sampling period in which all land arthropods were collected. Beetles were prominent in these samples and included a number of new state and island records. Many of these species were tabulated in a report to the Hawaiian Department of Transportation (Howarth & Preston 2002). Now we are treating additional records, including more recently collected specimens (into 2003), and/or updating their names where necessary. These entries are anchored to vouchered specimens with complete collection data. Additional beetles still await definitive identification and they will be treated eventually; these include Corylophidae, Laemophloeidae, Latridiidae, Scolytidae, and Staphylinidae.

Island abbreviations used in the text are the same as those used in the Hawaiian Terrestrial Arthropod Checklist (Nishida 2002): *e.g.* Oa = O‘ahu. Collectors’ abbreviations are indicated JED = John E. Dockall, RAE = R.A. Englund, FGH = F.G. Howarth, DJP = D.J. Preston, GAS = G.A. Samuelson, FS = Forest Starr, and KMS = Kim Martz Starr. GIS map datum is Old Hawaiian.

Determinations for most species were made by GAS and/or A.S. Ramsdale. Voucher specimens will be divided mostly between Bishop Museum (BPBM) and Hawaii Department of Agriculture (HDOA). These codens are not indicated in the lists unless another institution is also involved.

Anthicidae

Anthicus tobias Marseul **New island record**

Adventive. S Asia, W Pacific; also N America. Early O‘ahu records from the late 1940s include specimens from the ‘Ewa and Waipi‘o region near airports and harbors. (Ka, Oa; now Ma)

Material examined. **MAUI**: Kahului Airport: *keawe* woodland, 20°53'35"N, 156°26'38"W, 5 Mar 2000, MV bulb at sheet, JED, FGH, DJP, FS, KMS (1 ex).

Formicomus imperator (LaFerte) **New island record**

Adventive. S Asia, W Pacific. First taken on O’ahu in 1968 from the Honolulu International Airport. (Oa; now Ma)

Material examined. **MAUI**: Kahului Airport: Wet Spot #3, near end of runway, 20°54'34"N, 156°25'40"W, 26 Jun 2003, gas aspirator, daytime, over *Heliotropum-Sesuvium* association, FGH, DJP (1 ex).

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Anthribidae

Exillus lepidus Jordan **Island record**

Adventive. Pacific? First collected on O‘ahu in 1917 and thought to be an immigrant species; then described in 1922 by Jordan from O‘ahu specimens. (Ka, Oa, Mi; now Ma)

Material examined. **MAUI**: Kahului Airport: *Leucaena* shrubland, 20°54'22"N, 156°25'56"W, Malaise trap, 1 May 2000, JED, FGH, DJP (1 ex).

Bostrichidae

Dinoderus minutus (Fabricius) **New island record**

Adventive. Tropics, including W Pacific. Reported from bamboo furniture on O‘ahu in the early 1900s. (Ka, Oa; now Ma)

Material examined **MAUI**: Kahului Airport: near Wet Spot #3, 20°54'30"N, 156°25'50"W, 27–31 Mar 2000, Lindgren funnels in hau overstory near MV Site, FGH, DJP, GAS (1 ex).

Buprestidae

Aphanisticus cochinchinae seminulum Obenberger **New island record**

[*Agrilus* species A: Howarth & Preston, 2002, table 2. Misidentification.]

Adventive. SE Asia. First reported on O‘ahu in mid 1980s. It is a borer of sugar cane, and thus an important, potential pest. This Oriental species has been detected and spreading in the warmer parts of the New World (Wellso 1995: 287–288; C.L. Bellamy, pers. comm.). The Kahului specimens were determined by Charles L. Bellamy of the California State Collection of Arthropods, Sacramento (CSCA). (Oa; now Ma)

Material examined. **MAUI**: Kahului Airport: drainage ditch pan (Site #9), 20°53'58"N, 156°26'38"W, 8 Sep 1999, gas aspirator, daytime, RAE, FGH, DJP (1 ex); Wet Spot #3, near end of runway, 20°58'57"N, 156°27'14"W, 26 Jun 2003, gas aspirator, daytime, over *Cynodon dactylon* and associates, FGH, DJP (3 ex BPBM, 3 ex HDOA, 2 ex CSCA).

Coccinellidae

Scymnus (Pullus) horni Gorham **New island record**

[*Scymnus?* species A: Howarth & Preston, 2002, table 2. Incomplete identification.]

Adventive. N America. First taken on O‘ahu in the early 1990s. (Oa; now Ma)

Material examined. **MAUI**: Kahului Airport: drainage ditch pan (Site #9), 20°53'58"N, 156°26'38"W, 8 Sep 1999, gas aspirator, daytime, RAE, FGH, DJP (1 ex); Wetland #2 (Site #12), 20°54'24"N, 156°26'00"W, 10 Sep 1999, gas aspirator, *Chenopodium*, RAE, FGH, DJP (1 ex); near Malaise trap #2, 20°54'18"N, 156°25'42"W, 31 Mar 2000, sweeping hairy *Abutilon* near taxiway, GAS (1 ex); *Leucaena* shrubland, 20°54'22"N, 156°25'56"W, 26 Apr 2000, Malaise trap, RAE, FGH, DJP, GAS (1 ex); Kanahā Res., near culvert, 20°53'52"N, 156°26'52"W, 26 Jul 2000, MV bulb at sheet, FGH, DJP (3 ex).

Corylophidae

Anisomeristes basalis (Sharp) **New island record**

Adventive. Described from O‘ahu in 1885 and later thought to be an adventive. (Ka, Oa; now Ma)

Material examined. **MAUI**: Kahului Airport: Kanaha Pond, 20°53'56"N, 156°27'22"W, 2 Dec 2000, gas aspirator, night, on *Dodonaea viscosa*, FGH, DJP (1 ex).

Dermestidae

Attagenus undulatus (Motschulsky) **New island record**

Adventive. Asia, W Pacific; also Madagscar, Mauritius. First collected on O‘ahu in late 1908. (Ka, Oa; now Ma)

Material examined. **MAUI**: Kahului Airport: Terminal Site, 20°53'47"N, 156°26'27"W, 3 Jun 2000, night, swept from spider lily flowers, FGH, GAS (1 ex).

Nitidulidae

Ewing (2003) and Ewing & Cline (2004, 2005) updated the status and distribution of certain adventive species of Nitidulidae in Hawai‘i, including a new island record (Maui) for *Phenolia (Lasiodites*) *limbatus tibialis* (Boheman) that involved Kahului Survey specimens.

Carpophilus mutilatus Erichson **New island record**

Adventive. Widespread, including W Pacific. Established on O‘ahu by 1952. (Oa; now Ma)

Material examined. **MAUI**: Kahului Airport: Terminal Site, 20°53'47"N, 156°26'27"W, 3 Jun 2000, night, swept from orchid tree flowers, FGH, GAS (3 ex).

Acknowledgements

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New records of *Hylaeus (Nesoprosopis)* and *Ceratina* bees in Hawai‘i

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During recent survey work, several new records for native *Hylaeus (Nesoprosopis)* were found. These include a significant new record for *H. facilis*, a formerly common species that has become extremely rare. The continued discovery of new records gives hope that the ten remaining species that have not been collected in over 50 years (Magnacca in press) will also be rediscovered. In addition to native species, a recently-introduced exotic species is recorded for the first time outside O‘ahu. All specimens have been deposited at the Hawai‘i Volcanoes National Park insect collection (HAVO).

Hymenoptera: **Colletidae**

Hylaeus (Nesoprosopis) angustulus (Perkins) **New island record**

This species has been relatively rarely collected but is probably more common than it appears from records; it inhabits wet forests that are generally difficult to collect bees in. It is previously known from Maui and Lāna‘i. The female collected at West Kawela Stream and recorded as “*Hylaeus (Nesoprosopis)* species A” in Daly & Magnacca (2003) is a melanic specimen of this species, a diagnosis confirmed by mtDNA sequencing (GenBank no. AY914036; compare to *H. angustulus* from Maui, AY913973).

Material examined. **MOLOKA‘I**: 3♂, West Kawela Gulch, 1140 m, 27 Aug 2005, around *Cheirodendron trigynum* flowers, K. Magnacca.

Hylaeus (Nesoprosopis) anthracinus (F. Smith) **New populations**

Formerly widespread in coastal areas, this species has become extremely restricted since Perkins’s time. It is now known from only one or two localities on each island. Previously, the only known populations on Hawai‘i and Moloka‘i were at Ka Lae (South Point) and Mo‘omomi, respectively. It is noteworthy that, unlike Ka Lae specimens, many of the individuals from Kona have expanded face marks similar to those of *H. flavifrons*. A single individual was also collected at Pōhakuloa Training Area. This is the first record of *H. anthracinus* away from the coast. However, it is not entirely unexpected as two other primarily coastal species (*H. flavipes* and *H. ombrias*) regularly occur in the vicinity. The bee fauna of montane dry forest appears to have more in common with that of coastal areas than montane dry shrubland.

Material examined. **HAWAI‘I**: 12♂, 3♀, North Kona, nr Pūhili Point, nr sea level, 5 Sep 2003, around *Tournefortia argentea* flowers, K. Magnacca. 1♂, Pōhakuloa Training Area, 1 Apr 2004, in *Hedyotis* fruit capsule, E. Wascher. **MOLOKA‘I**: 3♂, Kalaupapa, Ho‘olehua beach, nr sea level, 2 Sep 2005, around *Tournefortia argentea* flowers, K. Magnacca. 1♂, Kalaupapa, Kaupikiawa, nr. sea level, 2 Sep 2005, around *Heliotropium anomalum* flowers, K. Magnacca.

Hylaeus (Nesoprosopis) facilis (F. Smith) **Rediscovery/new population**

This was the most common dryland species on Maui Nui and O‘ahu through the 1930s, and there are dozens of specimens in the Bishop Museum collections. Since that time it has been virtually eliminated from all islands, and this is only the third specimen (and the first from Moloka‘i) collected since 1970. The previous records were from Poamoho, O‘ahu in 1975 and Kokomo, Maui in 1993. Previous records from Moloka‘i have come from mid-elevation areas, though the species formerly occurred at the Wailuku sand dunes

on Maui. This individual was collected on an isolated *Tournefortia*, some distance from better-quality bee habitat. It was also a poor time of year, with relatively little flowering, and it may be more abundant under better conditions.

Material examined. **MOLOKA'I**: 1♂, Kalaupapa, Kuololimu Point, nr sea level, 3 Sep 2005, around *Tournefortia argentea* flowers, K. Magnacca.

Hylaeus (Nesoprosopis) kukui Magnacca & Daly **New island record**

This species was recently described from specimens from both East and West Maui. It is here recorded from the island of Hawai'i for the first time. The Hawai'i male lacks the distinctive orange markings of the Maui specimens, but the genitalia and physical characters are identical.

Material examined. **HAWAI'I**: 1♂, 3♀, Hawai'i Volcanoes National Park, Kahuku, nr reservoir, 1070 m, 1 Aug 2005, around *Cheirodendron trigynum* flowers, K. Magnacca.

Hylaeus (Nesoprosopis) specularis (Perkins) **New island record**

This is another rarely-collected wet forest species. It is unusual among such species in occurring widely across the islands: it has previously been collected on Hawai'i, O'ahu, and Kaua'i. With such a distribution, it is not surprising to find it on Moloka'i as well. Two females in the Bishop Museum collection from West Maui are probably *H. specularis* as well, but there are no males from Maui.

Material examined. **MOLOKA'I**: 1♂, West Kawela Gulch, 1140 m, 27 Aug 2005, around *Cheirodendron trigynum* flowers, K. Magnacca.

Hymenoptera: **Apidae**

Ceratina (Pithitis) smaragdula (Fabricius) **New island record**

Discovered on O'ahu in 1998, this immigrant species from east Asia had not been previously recorded from other islands (Snelling 2003). It is of similar size to the native *Hylaeus* and a potential competitor (Hopper 2002), and will likely spread to all of the islands (Snelling 2003). At present, it appears to be restricted to coastal habitats.

Material examined. **HAWAI'I**: 2♀, North Kona, nr Pūhili Point, nr sea level, 5 Sep 2003, around *Tournefortia argentea* flowers, K. Magnacca.

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New records for arthropods from Kaho‘olawe Island, Hawai‘i

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The following includes 6 new island records of nonnative arthropods located on the island of Kaho'olawe. Specimens were opportunistically collected by the authors in the course of doing volunteer restoration work for the Kahoolawe Island Reserve Commission. All specimens were determined by the authors, with the exception of *Vanduzeea segmentata* which was determined by Mach Fukada (Hawaii Department of Agriculture). All specimens collected are housed in Bishop Museum, Honolulu. Species not known from (Nishida 2002) are published here.

Homoptera: **Membracidae**

Vanduzeea segmentata (Fowler) **New island record**

The Van Duzee treehopper was previously known in the Hawaiian archipelago from Midway Atoll and all the main islands except Ni‘ihau and Kaho‘olawe (Nishida 2002).

Material examined. **KAHO‘OLAWE**: Lua Makika, south rim of crater, vegetation sweeps, 1300 ft [396 m], 7 Feb 2005, *Starr & Starr 050207-01* (2 specimens).

Hymenoptera: **Formicidae**

Monomorium destructor (Jerdon) **New island record**

In Hawai‘i, *M. destructor* (destructive trailing ant) was previously known from Laysan, French Frigate Shoals, Kaua‘i, O‘ahu, and Hawai‘i (Nishida 2002).

Material examined. **KAHO‘OLAWE**: Honokanaia (base camp) vegetation sweeps, 25 ft [8 m], 11 Oct 2004, *Starr & Starr 041011-02* (9 specimens). Honokanaia, on hau (*Hibiscus tiliaceus*), 25 ft [8 m], 19 Oct 2005 *Starr & Starr 051019-01* (20 specimens).

Tapinoma melanocepahalum (Fabricius) **New island record**

Tapinoma melanocepahalum (little yellow house ant) was previously known in (Nishida 2002) from the islands of Kure Atoll, Midway Atoll, Laysan, Nihoa, and all the main islands except Moloka‘i and Kaho‘olawe. This common tramp ant was observed in leaf litter beneath a tree planted at the Honokanaia base camp barracks in 1997 (D. Foote, pers. comm.) and still persists in this same general area.

Material examined. **KAHO‘OLAWE**: Honokanaia, vegetation sweeps near human habitation at the main base camp, 25 ft [8 m], 11 Oct 2004, *Starr & Starr 041011-01* (1 specimen).

Lepidoptera: **Nymphalidae**

Danaus plexippus (Linnaeus) **New island record**

Danaus plexippus (monarch butterfly) was previously known from all the main islands except Kaho‘olawe (Nishida 2002). Noted as abundant at Lua Makika (Lindsey *et al*. 1997), this cosmopolitan butterfly is still common in this area, especially where the host plant *Asclepias physocarpa* (balloon plant) is abundant.

Material examined. **KAHO‘OLAWE**: Lua Makika, north rim of crater, flitting about vegetation, 1300 ft [396 m], 8 Feb 2005, *Starr & Starr 050208-01* (1 specimen).

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Odonata: **Coenagrionidae**

Ischnura ramburii (Sélys-Longchamps) **New island record**

Ischnura ramburii (Rambur's forktail) was previously known from all the main islands except Ni'ihau and Kaho'olawe (Nishida 2002). Noted from Lua Kealiālalo (Lindsey *et al*. 1997), this damselfly was subsequently collected near coastal wetlands on the northwest portion of the island.

Material examined. **KAHO'OLAWE**: Kaukaukapapa, gliding about near coastal wetlands, 15 ft [5 m], 16 Feb 2004, *Starr & Starr 040216-01* (2 specimens).

Odonata: **Libellulidae**

Orthemis ferruginea (Fabricius) **New island record**

Orthemis ferruginea (roseate skimmer) was previously known from all the main islands except Ni'ihau, Maui, and Kaho'olawe (Nishida 2002). Noted from Lua Kealiālalo (Lindsey *et al*. 1997), this skimmer was subsequently collected near coastal wetlands on the northwest portion of the island.

Material examined. **KAHO'OLAWE**: Kaukaukapapa, gliding about near coastal wetlands, 15 ft [5 m], 16 Feb 2004, *Starr & Starr 040216-02* (1 specimen).

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Distribution of the invasive apple snail *Pomacea canaliculata* (Lamarck) in the Hawaiian Islands (Gastropoda: Ampullariidae)

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South American freshwater apple snails (Ampullariidae) were introduced to Asia in about 1980 as a potential human food resource, both for local consumption and as a possible gourmet export item (Mochida 1991). They were not a great success as a food item but soon escaped or were released, rapidly becoming major pests in rice and other wetland crops (Cowie 2002). They are now widespread in Asia and the subject of intense control efforts (Lai *et al*. 2005; Joshi & Sebastian 2006). Four species have been introduced: *Pomacea canaliculata*, *P. insularum* (d'Orbigny), *P. scalaris* (d'Orbigny), *P. diffusa* Blume (Cowie *et al*. 2006).

Apple snails were brought to the Hawaiian Islands both as a potential food resource and as domestic aquarium snails. They were released or escaped, as in Asia. Three species have been recorded in the Islands. *Pomacea diffusa* was probably introduced via the domestic aquarium trade, perhaps from the U.S. mainland. It is native to South America, is popular in the aquarium trade (Perera & Walls, 1996), usually referred to incorrectly as *Pomacea bridgesii* (Reeve) (see Cowie *et al*. 2006; Rawlings *et al*. 2007), and has become widely distributed in many parts of the world as a result. *Pila conica*, native to southeast Asia, including the Philippines, was almost certainly introduced from the Philippines by members of the Filipino community in Hawai'i as a human food resource (Levin *et al*. 2006). *Pomacea canaliculata* was probably also introduced via this route, subsequent to its introduction to southeast Asia from its native South America (Levin *et al*. 2006). These introductions of *P. canaliculata*, initially to Asia and subsequently to Hawaii, were not only intended as a local source of food but also as a potentially lucrative source of money through sale of the snails as exotic "escargot" to gourmet restaurants both locally and overseas (Lai *et al*. 2005). *Pomacea canaliculata* has also been present in the aquarium trade in Hawaii but molecular genetics evidence suggests that this has not been a pathway of introduction to the wild (Tran *et al*. unpubl.). An additional species, *Pomacea paludosa* (Say) was reported by Cowie (1995) but this record is now known to have been a misidentification of *Pila conica* (Hayes, unpubl).

The first vouchered record of an ampullariid in the Hawaiian Islands was of *Pomacea diffusa* [reported as *P. bridgesii*] from an unrecorded location in 1962 (Cowie 1995). Two additional ampullariid species have been recorded in the Hawaiian Islands: *Pila conica* (Gray), first recorded in 1966, and *Pomacea canaliculata* (Lamarck) in 1989, both at Ke'anae, Maui (Cowie 1995). There are also anecdotal accounts from farmers that *P. canaliculata* was present on Maui as early as 1983 or 1984 (Levin 2006). The island-by-island distributions of these species, as known up to 1992, were reported by Cowie (1995): *Pomacea diffusa* on Hawai'i, O'ahu and Kaua'i; *Pila conica* on Maui, Moloka'i and O'ahu; *Pomacea canaliculata* on Hawai'i, Maui, O'ahu and Kaua'i, and subsequently on Lāna'i (Cowie 1996).

Pomacea diffusa has not become a pest; *Pila conica*, which is the only apple snail recorded on Moloka'i, has become a relatively minor pest in taro fields on that island;

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Pomacea canaliculata has been transported to and become established on all the main islands except Moloka‘i, and is now a widespread and major pest of taro and an established alien species in many natural bodies of water. Control measures have met with mixed success and support for such efforts has also been mixed (Levin *et al*. 2006).

Here, we report the results of surveys undertaken primarily in 2004, 2005, and 2006 to ascertain the current distribution of these species in the Hawaiian Islands. A few additional earlier records, as yet unreported, are also included. On all islands except O‘ahu we attempted to visit most of the bodies of water that we thought suitable for apple snails. Since O‘ahu was thoroughly surveyed in 1998 (Lach & Cowie 1999), we only investigated nine sites (including five new sites) on that island during the present survey. In total, 50 sites were investigated across the Hawaiian Islands.

We confirmed the continued presence of *Pila conica* as the only species of apple snail on Moloka‘i but did not find it on Maui or O‘ahu, where it had been recorded previously; it may have failed to become established on those islands (perhaps outcompeted by *Pomacea canaliculata*). *Pomacea diffusa*, previously recorded (as *P. bridgesii*) from Kaua‘i, O‘ahu and Hawai‘i, may be declining also, as it was not seen during the survey, nor in other recent surveys of the known localities (Cowie & Hayes, unpubl.). *Pomacea canaliculata*, however, has become more widespread since previous surveys and is the subject of this note.

Ampullariidae

Pomacea canaliculata **Expanded distribution**

Since previous surveys (Cowie 1995, 1996; Lach & Cowie 1999), *Pomacea canaliculata* has expanded its distribution, notably in a number of new localities on Maui and in particular in the Hanalei National Wildlife Refuge on Kaua‘i. In 2005, it was also found in a canal leading to Kanahā pond on Maui (Levin, unpubl.), but no vouchers from that location have been deposited. Its distribution on the island of Hawai‘i has not expanded from its main locality, Waipi‘o Valley, probably because there is little additional suitable habitat (bodies of still or slow-flowing water, usually with a muddy bottom substrate) on that island. Its presence on Lāna‘i (Cowie 1996) was confirmed.

On O‘ahu, it continues to spread. In 1992, it was present at five locations (Cowie 1995) and by 1998 it was present in 28 of 139 sites surveyed by Lach & Cowie (1999). Of the five new sites investigated on O‘ahu, snails were present at two; and snails were also found at one 1998 survey site at which they had not previously been found. Thus, *P. canaliculata* has been recorded at 31 of 144 sites investigated in the combined 1998–2006 surveys. One of the sites (University of Hawai‘i at Mānoa Campus, Quarry Pond) at which snails were present in 2003-2006, did not contain snails or their eggs as of May 2007, probably as a result of environmental clean-up of the site following its identification as a source of leptospirosis.

Analysis of DNA sequences suggests that the *P. canaliculata* in the Hawaiian Islands resulted from a single introduction or a small number of introductions from the Philippines (Tran *et al*., unpubl.). There are also anecdotal reports that the local Filipino community has been especially involved in the movement of the snails around the islands.

Material examined: Collections were made by Robert H. Cowie (RHC), Kenneth A. Hayes (KAH), Penny Levin (PL) and Chuong T. Tran (CTT). All catalog numbers are Bishop Museum (BPBM) Malacology Collection numbers. **KAUA‘I**: Hanalei taro fields, N22°02.153' W159°45.438', KAH, CTT, 20 Mar 2005 (283004) (eggs only); Hanalei center, N22°12.173' W159°29.710', KAH, CTT, 20 Mar 2005 (283005); Kūhiō Highway, Hā‘ena State Park, N22°13.235' W159°34.833', KAH,

CTT, 20 Mar 2005 (283006); Hanalei Highway, taro patch alongside road, N22°12.242' W159°29.385', KAH, CTT, 20 Mar 2005 (283007). **O'AHU**: University of Hawai'i at Mānoa Campus, Quarry Pond, N21°17.733' W157°48.917', RHC, KAH, 18 Aug 2003 (283008), KAH, 22 Sep 2003 (283009), KAH, CTT, 18 Oct 2004 (283010); outside Campbell Wildlife Refuge, in ditch, N21°41.152' W157°57.583', RHC, KAH, 11 Jun 2004 (283011); Punalu'u area, ditch along side of taro field, N21°34.583' W157°52.883', RHC, KAH, 11 Jun 2004 (283012); Waialua Florist, N21 36.817' W158 05.148', KAH, CTT, 20 Jan 2005; Hawai'i Kai, stream near Hawai'i Landscape Nursery, N21°18.127' W157°41.728', KAH, CTT, 26 Feb 2005 (283013); Kawai Nui Marsh, Kailua, N21º23.443' W157º44.891', KAH, 11 Nov 2006 (283014); Waihe'e Stream, Kahalu'u, N21°27.900' W157°50.767', KAH, CTT, 26 Feb 2006 (283015). **MOLOKA'I**: J. Callahan's taro patch, N21°06.017',W156°44.737', RHC, KAH, PL, 4 Oct 2004 (283016); downstream from J. Callahan's taro patch, edge of the sea, N21°06.623' W156°44.725', RHC, PL, KAH, 4 Oct 2004 (283017); Cowboy's taro patch, N21°03.415' W156°51.492', RHC, KAH, PL, 4 Oct 2004 (283018); A. Bacon's spring, N21°04.390' W156°47.908', RHC, KAH, PL, 4 Oct 2004 (283019); ditch across from A. Bacon's spring, N21°04.388' W156°47.912', RHC, KAH, PL, 4 Oct 2004 (283020), KAH, CTT, 27 Jun 2006 (283021); Waialua taro patch, N21°05.803' W156°45.658' PL, 5 Oct 2004 (283022). **LĀNA'I**: K''ele Golf Course, N20°49.405' W156°54.527', RHC, KAH, 5 Feb 2005 (283023). **MAUI**: Kahakuloa, below O. Dukelow taro patch, N20°59.573' W156°32.952', RHC, KAH, PL, 14 Dec 2004 (283024); Honokahua Valley, valley entrance, taro patch, N21°01.003' W156°36.482', RHC, KAH, PL, 14 Dec 2004 (283025); Wailua, taro patch, N20°50.478' W156°08.033', RHC, KAH, PL, 15 Dec 2004 (283026); Ke'anae, the Kanoa family taro patches, N20°51.498' W156°08.845', RHC, KAH, PL, 15 Dec 2004 (283027); Waihe'e River, N20°56.673' W156°31.102', RHC, KAH, PL, 16 Dec 2004 (283028); W. Wong's taro patch, N20°54.845' W156°29.603', RHC, KAH, PL, 16 Dec 2004 (283029); Waiehu Beach Road, Paukūkalo 182 m [600 ft] elevation, N20°54.573' W156°29.33', RHC, KAH, PL, 16 Dec 2004 (283030); 2555 Kahekili Highway, N20°56.667' W156°30.985', RHC, KAH, PL, 16 Dec 2004 (283031). **HAWAI'I**: Waipi'o, the Kawashima family taro farm, N20°06.763' W155°35.970', KAH, 21 Nov 2004 (283032).

Sites where no snails were found. **KAUA'I**: Kekaha ditch near Polihale State Park, N22°02.153' W159°45.438', 22 Mar 2005; Stream running under Niumalu Road past Kaua'i Inn, Niumalu, N21°57.165' W159°21.732', 28 Jan 2006; Irrigation ditch/canal, Kekaha-Waimea, N21°58.433' W159°42.887', 28 Jan 2006; Irrigation ditch along Kaumuali'i Highway before Polihale State Park, across from missile radar station, N22°01.970' W159°46.622', 28 Jan 2006; Irrigation ditch running under Kaumualii Highway, past Waimea, N22°01.202' W159°46.573', 28 Jan 2006; Kawaiele Sand Mine Bird Sanctuary, N22°00.695' W159°46.355', 28 Jan 2006. **O'AHU**: Pond on the way to Nu'uanu Reservoir, N21º21.014' W157º49.153', Feb 2004; Kaupuni Stream, Wai'anae, N21°28.150' W158°09.767', 21 Jan 2006; Mā'ili'ili Stream, Lualualei Homestead, N21°26.683' W158°09.767', 21 Jan 2006; Enchanted Lake, N21º23.017' W157º44.238', Jul 2006; Enchanted Lake, N21º22.914' W157º43.756', Jul 2006; Enchanted Lake, N21º22.646' W157º43.928', Jul 2006; Enchanted Lake, N21º22.613' W157º44.390', Jul 2006; Ho'omaluhia Botanical Garden reservoir, N 21º23.284', W157º48.239', 15 Oct 2006. **MOLOKA'I**: P. Rochland taro patch, N21°09.5',W156°44.473', 4 Oct 2004; Kualapu'u Reservoir, N21°09.025',W157°02.878', 4 Oct 2004. **LĀNA'I**: Water treatment ponds off Kaumalapau Highway, headed toward airport, N20°48.873' W156°55.412', 5 Feb 2005. **MAUI**: Ke'anae, N20°50.180' W156°08.727', 15 Dec 2004; taro patches, N20°50.738' W156°08.345', 15 Dec 2004; Ke'anae Arboretum, N20°51.068' W156°09.028', 15 Dec 2004; Wailua Valley taro patch, N20°41.013' W156°01.768', 15 Dec 2004; Kīpahulu Valley, N20°40.008' W156°02.927', 15 Dec 2004; Waiehu Stream, N20°55.072' W156°29.603', 16 Dec 2004; Mālaihi Road, N20°54.89' W156°30.707', 16 Dec 2004; Waihe'e Valley Road towards Waihe'e farms, N20°56.533' W156°31.142', 16 Dec 2004; 'Īao Valley State Park and Heritage Gardens, N20°53.000' W156°33.008', 16 Dec 2004. **HAWAI'I**: west Hilo, stream, N19°44.903' W155°07.473', 21 Nov 2004; Kurtistown, animal sanctuary, N19°34.658' W154°59.697', 21 Nov 2004; Waiākea fish pond, Hilo fishing park, N19°42.983' W155°04.567', 21 Nov 2004; Pololū Valley, past Hāwī, N20°12.185' W155°43.958', 11 Feb 2006.

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Erinna newcombi Adams & Adams (Mollusca: Lymnaeidae): a rediscovered population in Hanakoa, Kaua'i, Hawai'i

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Erinna newcombi Adams & Adams (Newcomb's snail) is endemic to the island of Kaua'i and is currently federally listed as threatened by the U.S. Fish and Wildlife Service (USFWS). It occurs around freshwater springs where it apparently feeds on algae that grow on submerged rocks. Recent field research indicates that the habitat preferences for *E. newcombi* include fast-flowing perennial streams and their nearby springs, seeps, and waterfalls (U.S. Fish & Wildlife Service 2004). At the time of publication of the draft recovery plan for Newcomb's snail (2004), its known range included very small riparian sites found in Kalalau Stream, Lumaha'i River, Hanalei River (4 subpopulations), Waipahe'e tributary of Keālia Stream, Makaleha Stream (2 subpopulations), and the north fork of the Wailua River.

The USFWS Draft Recovery Plan for *Erinna newcombi* includes the primary goal of establishing baseline population numbers for the species. In addition, the plan calls for field research specifically within the historical ranges of Hanakoa, Wainiha, and Hanakāpī'ai to confirm if the snails are present or not. In order to help facilitate the USFWS in its recovery efforts, we present the following data on our observations of *E. newcombi,* which was historically recorded around the falls of Hanakoa on 16 Jul 1907 (Hawai'i Biodiversity & Mapping Program 2006) and most recently observed there by the authors on 25 September 2006.

Lymnaeidae

Erinna newcombi Adams & Adams **Rediscovered population**

Seven individuals of *E. newcombi* were observed in Hanakoa Valley at the base of a waterfall seep after turning only a few small algae-covered rocks, and they most likely occur in much higher numbers. The site is on the margin of the falls and plunge pool, near the base of the cliff face under wet rocks, fed by a continuous flow of spring water. Currently, the falls are dominated by nonnative vegetation, including *Ageratina riparia, Melinus minutiflora, Sacciolepis, Blechnum, Setaria palmifolia, Cyperus meyenianus, Bryophyllum pinnatum,* and *Pluchea carolinensis*; native riparian elements include *Kadua cookiana, K. elatior, Plantago princeps* var. *longibracteata, Deparia cataracticola, Isachne pallens, Asplenium unilaterale, Lipochaeta connata, Selaginella, Eragrostis variabilis, Carex meyenii, Machaerina angustifolia,* and *Sphenomeris*. The ecological components just below the falls are dominated by nonnative invasive plant species of varying densities along the Hanakoa Falls stream trail, including an overstory of *kukui* and mango, and an understory *of* common guava, shampoo ginger, basketgrass, *Christella dentata,* and Arabian coffee. Other threats to native species in this region include recent pig signs, abundant goats, *Euglandina rosea*, marsh flies, and the American bullfrog *(Rana catesbiana).*

Material examined. **KAUA'I**: Hā'ena Distr, Hanakoa Valley west falls, end of main trail, seeping vertical basalt with waterfall and plunge-pool, 340º aspect by east side of main running fall, 366 m [1200 ft], 25 Sep 2006, *K.R. Wood & D. Boynton 12171* (Photo voucher).

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Figure 1. *Erinna newcombi* in Hanakoa (Photo D. Boynton).

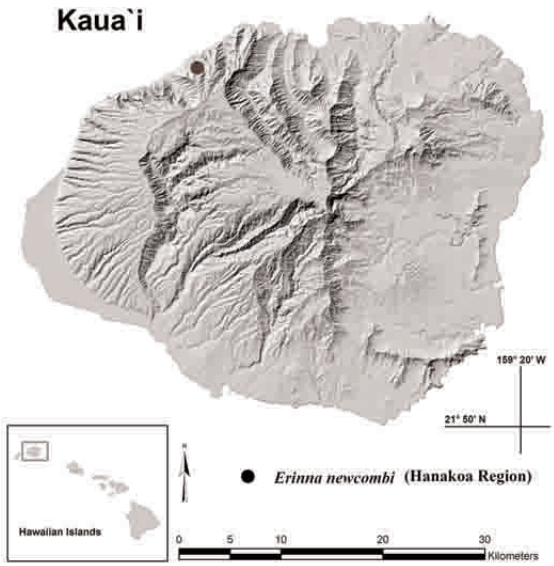

Figure 2. Rediscovered population of *Erinna newcombi* in Hanakoa, Kaua‘i.

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New records of alien Mollusca in the Hawaiian Islands: nonmarine snails and slugs (Gastropoda) associated with the horticultural trade

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The nonmarine snails of the Hawaiian Islands have been cataloged by Cowie (1997), reviewed by Cowie (1998a), and subsequent new records reported by Cowie (1998b, 1999, 2000). The horticultural industry has been implicated in the transport and introduction of snails and slugs in various parts of the world (e.g., Robinson 1999; Barrientos 2000; Cowie & Robinson 2003; Robinson & Slapcinsky 2005), including Hawai'i (e.g., Cowie 1998b, 1999, 2000). Therefore, between 2004 and 2006 we undertook field surveys of nurseries, botanical gardens, and other similar facilities involved in the cultivation of plants, including aquatic plants, for sale, recreation or research on the six largest of the main Hawaiian Islands, with the objective of documenting the species of snails and slugs present in these facilities. Selection of facilities to be surveyed attempted to cover each island broadly, although most nurseries are on the wetter, windward (northern and eastern) sides of the islands. We surveyed 7 locations on Kaua'i, 13 on O'ahu, 1 on Moloka'i (the only nursery on that island), 5 on Maui, 1 on Lāna'i (the only one), and 13 on Hawai'i.

We document here the new state and island records. A more comprehensive analysis and discussion of all records will be published elsewhere. Collections were made by Kenneth A. Hayes (KAH), Chuong T. Tran (CTT), Robert H. Cowie (RHC) and others, as indicated. All collected material, not only that reported here, is deposited in the Bishop Museum (BPBM) Malacology Collection. Catalog numbers are BPBM Malacology Collection numbers. Assignments to families follow Robinson (1999) if applicable. Families are treated alphabetically. All latitude and longitude coordinates were recorded by GPS using the WGS 84 map datum.

Assimineidae

Cyclotropis bedaliensis (Rensch) **New state record**

This species was described by Rensch (1934) from Java and reported from that island by van Benthem Jutting (1956). Brandt (1974) redescribed it based on specimens from Thailand and considered it to be introduced in that country. In Japan it has been found in the Ryukyu islands of Ishigaki and Okinawa, probably introduced in the late 1990s or later, and in hothouses in botanical gardens in Tokyo and Fukushima Prefecture; it was found in Guam in 2007; and it has been found in the Northern Territory of Australia (H.

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Fukuda, pers. comm.). Robinson (1999) included it in a list of taxa intercepted by quarantine officials between 1993 and 1998 entering the USA Until this report it had not been reported in the wild in the USA.

We recorded this species at 19 of our 40 survey locations: 3 of 7 on Kaua‘i, 10 of 13 on O‘ahu, the single sites surveyed on Moloka‘i and Lāna‘i, 2 of 5 on Maui, and 2 of 13 on Hawai‘i. It has since been found at only one location outside horticultural facilities, despite extensive survey work (Hayes, Tran & Cowie, unpubl.). It is thus widespread in horticultural facilities on all islands despite having only recently been discovered, yet so far it appears to be almost entirely confined to these facilities.

Material examined: **KAUA‘I**: Kaua‘i Nursery and Landscaping, Līhu‘e, N21°57'45.7", W159°24'16.8", KAH, CTT, 21 Mar 2005 (281341); Growing Green Nursery, Līhu‘e, N22°05'49.9", W159°22'06.7", KAH, CTT, 22 Mar 2005 (281361); Kaua‘i Seascape Nursery, Princeville, N22°12'24.0", W159°25'30.3", KAH, CTT, 23 Mar 2005 (281390). **O‘AHU**: Ko‘olau Farmers Nursery, Kailua, N21°23'08.3", W157°45'04.2", KAH, CTT, 7 Jan 2005 (281259); Country Garden Nursery, Kahalu‘u, N21°29'08.8", W157°50'56.8", KAH, CTT, 20 Jan 2005 (281271); Glenn’s Flowers and Plants, Waimānalo, N21°20'59.2", W157°43'40.5", KAH, CTT, 19 Feb 2005 (281294); Hawai‘i Landscape, Hawai‘i Kai, N21°18'07.6", W157°41'43.7", KAH, CTT, 26 Feb 2005 (281295); Hawai‘i Kai Nursery, Hawai‘i Kai, N21°18'17.9", W157°41'42.2", KAH, CTT, 26 Feb 2005 (281309); Charles Nii Nursery, Hawai‘i Kai, N21°18'16.8", W157°41'43.1", KAH, CTT, 26 Feb 2005 (281325); Family Tree Nursery, Wai‘anae, N20°24'16.7", W158°8'59.3", KAH, CTT, 21 Jan 2006 (281417); University of Hawai‘i, College of Tropical Agriculture and Human Resources, Urban Garden Center, Pearl City, N21°23'35.84", W157°58'30.51", KAH, CTT, W.M. Meyer, 4 Feb 2006 (282508); New Mililani Nursery, Mililani, N21°25'46.6", W158°00'54.9", KAH, W.M. Meyer, 6 Feb 2006 (281426); Nalo Farms and Nursery, Waimānalo, N17°05'54.4", W153°37'00.5", RHC, KAH, W.M. Meyer, 14 Mar 2006 (281483). **MOLOKA‘I**: Oasis of Mahana Nursery, Ho‘olehua, N21°08'38.4", W157°07'52.6", RHC, KAH, 6 Oct 2004 (281208). **LĀNA‘I**: Lāna‘i Co. Nursery, N20°49'19.8", W156°55'28.0", KAH, W.M. Meyer, M.E. Parker, 8 May 2006 (281498). **MAUI**: Ho‘olawa Nursery, Ha‘ikū, N20°55'52.5", W156°19'04.4", RHC, KAH, P. Levin, 15 Dec 2004 (281233); Ke‘anae Arboretum, N20°50'44.3", W156°08'02.0", RHC, KAH, 15 Dec 2004 (281238). **HAWAI‘I**: Sunrise Nursery, Kona, N19°41'20.6", W156°00'58.1", KAH, CTT, 11 Feb 2006 (281446); Kona Outdoor Circle, Kona, N19°36'48.8", W155°58'5.7", KAH, W.M. Meyer, 6 Mar 2006 (281463).

Chronidae

Ovachlamys fulgens (Gude) **New island records**

Identification of this species still remains tentative (see Cowie 2000). However, it appears to be spreading rapidly after being first reported in the Hawaiian Islands, from O‘ahu and Hawai‘i (at two widely separated locations), in 1999, when it was placed in the family Helicarionidae (Cowie 2000). It seems to be strongly associated with the horticultural trade (Robinson 1999; Barrientos 2000; Cowie 2000), although by no means confined to horticultural facilities. These are the first records from Kaua‘i and Maui. We also re-confirmed its presence on O‘ahu and Hawai‘i (material not listed here but deposited in the BPBM Malacology collections).

Material examined: **KAUA‘I**: Lāwa‘i Valley Nursery, Lāwa‘i, N21°56'12.0", W159°30'26.4", KAH, CTT, 21 Mar 2005 (281351); Alexander’s Nursery, Kuamo‘o, N22°03'25.2", W159°22'52.7", KAH, CTT, 21 Mar 2005 (281359); Growing Green Nursery, Līhu‘e, N22°05'49.9", W159°22'06.7", KAH, CTT, 22 Mar 2005 (28136); Kaua‘i Seascape Nursery, Princeville, N22°12'24.0", W159°25'30.3", KAH, CTT, 23 Mar 2005 (281389). **MAUI**: Ke‘anae Arboretum, N20°50'44.3", W156°08'02.0", RHC, KAH,15 Dec 2004 (281239); Aloha O‘ka Aina Farm, Makawao, N20°49'13.2", W156°17'01.6", KAH, CTT, 12 Mar 2005 (281335).

Euconulidae

Liardetia doliolum (Pfeiffer) **New island record**

This species has been present in the Hawaiian Islands since at least 1989; it has been intercepted by inspection officials on the U.S. mainland on shipments of cut plants from the island of Hawai‘i; and it has been recorded on O‘ahu on greenhouse plants supplied by a nursery (Cowie 1999). The likelihood of its further spread is high because of its small size (3 mm) and because of the strong association of this and other species of *Liardetia* with the horticultural trade (Robinson 1999). This is the first record for Kaua‘i. We also report material from Hawai‘i, confirming its presence there since the only other documented record of its presence on that island is from its interception on the U.S. mainland. Also, we re-confirmed its presence on O‘ahu at an additional locality (material not listed here but deposited in the BPBM Malacology collections). Being very small, it may be present but yet undetected on other islands.

Material examined: **KAUA‘I**: Growing Green Nursery, Līhu‘e, N22°05'49.9", W159°22'06.7", KAH, CTT, 22 Mar 2005 (281363). **HAWAI‘I**: Rise and Shine Nursery, Kea‘au, N19°33'23.3", W154°59'17.8", KAH, 22 Nov 2004 (281216); Kona Outdoor Circle, Kona, N19°36'48.8", W155°58'5.7", KAH, W.M. Meyer, 6 Mar 2006 (281462).

Philomycidae

Undetermined species **New state record**

This bright orange slug was collected from one location on O‘ahu. No expertise is available to identify it, but it is distinct from any other phylomycid recorded in the Hawaiian Islands and is therefore worth reporting here.

Material examined: **O‘AHU**: Nalo Farms and Nursery, Waimānalo, N17°05'54.4", W153°37'00.5", RHC, KAH, W.M. Meyer, 14 Mar 2006 (281490).

Planorbidae

Planorbella duryi (Wetherby) **New island record**

This freshwater snail was previously recorded only from O‘ahu (as the subspecies *normale* Pilsbry) and Kaua‘i (Cowie 1997). These are the first records from Maui and Hawai‘i.

Material examined: **MAUI**: Ho‘olawa Nursery, Ha‘ikū, N20°55'52.5", W156°19'04.4", RHC, KAH, P. Levin, 15 Dec 2004 (281234). **HAWAI‘I**: Kainaliu Gardens, N19°32'02.4", W155°55'37.7", KAH, CTT, 8 May 2005 (281402).

Polygyridae

Polygyra cereolus (Mühlfeld) **New island records**

This species, native to Florida, was first recorded in the Hawaiian Islands in 1995 on O‘ahu (Cowie 1996), in 1997 on Kaua‘i and Hawai‘i (Cowie 1998), and in 2001 from Maui (Kraus 2003). The present records extend its known distribution in the Hawaiian Islands to Moloka‘i and Lāna‘i, on both islands being found at the single location surveyed. We also recorded it at additional horticultural locations on Kaua‘i (2) and O‘ahu (8) (material not listed here but deposited in the BPBM Malacology collections), indicating that it has spread rapidly on those islands. The previous records in 1995, 1997, and 2001 were from gardens and a horticultural retail outlet, and combined with the present records, strongly implicate the horticultural trade in the spread of this species through the islands.

Material examined: **MOLOKA‘I**: Oasis of Mahana Nursery, Ho‘olehua, N21°08'38.4", W157°07'52.6", RHC, KAH, 6 Oct 2004 (281203). **LĀNA‘I**: Lāna‘i Co Nursery, N20°49'19.8", W156°55'28.0", KAH, W.M. Meyer, M.E. Parker, 8 May 2006 (281492).

Spiraxidae

Euglandina rosea (Férussac) **New island record**

The "cannibal snail" or "rosy wolf snail" was first introduced to the Hawaiian Islands from its native Florida in 1955 as a potential biological control agent against *Achatina fulica* Bowdich, the giant African snail (Cowie 1997). While some have argued that *E. rosea* has been successful in controlling *A. fulica* (Davis & Butler 1964; Nishida & Napompeth 1975), there remains no convincing evidence that this is the case (Christensen 1984; Civeyrel & Simberloff 1996; Cowie 1992); and the use of generalist predatory snails in biological control programs has been severely criticized by Cowie (2001a) not only because of the lack of evidence of their efficacy but also, in the case of *E. rosea*, because of ample evidence of its devastating effects on native Mascarene (Griffiths *et al*.1993) and Pacific Island land snail faunas (e.g., Murray *et al*. 1988; Hadfield 1986; Hadfield *et al*. 1993; Coote & Loève 2003). It will even go under water to attack freshwater snails (Kinzie 1992).

It was previously recorded from Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i (Cowie 1997), and was re-confirmed on all those islands during the present survey, in the case of Moloka'i only outside the surveyed nursery (material not listed here but deposited in the BPBM Malacology collections). This new record (shells only) extends its known distribution to Lāna'i. How long it has been on Lāna'i is not known, as very little land snail survey work has been undertaken on that island since the 1950s. Whether it was introduced to Lāna'i deliberately or accidentally is not known. Nor is it known whether it is established there.

Material examined: **LĀNA'I**: Lanai Co Nursery, N20°49'19.8", W156°55'28.0", KAH, W.M. Meyer, M.E. Parker, 8 May 2006 (281495).

Subulinidae

Allopeas kyotoense (Pilsbry) **New state record**

Pilsbry (1906-1907) treated this taxon as a variety of *Allopeas clavulinum* (Potiez & Michaud) [as "*Opeas*"], along with an additional variety, *hawaiiense* Sykes. Many subulinid species exhibit considerable intraspecific conchological variation, especially in the breadth of the shell, making them extremely difficult to identify. Comparison with material in the Bishop Museum collections, including specimens identified by Pilsbry, indicated that the new material was not referable to any of the taxa, including *hawaiiense*, previously reported from or collected in the Hawaiian Islands. We tentatively identify it as *Allopeas kyotoense*, originally described from Japan (Pilsbry 1906-1907). It is the same species as that previously identified, probably incorrectly, as *Lamellaxis micra* in American Samoa by Cowie (2001b, c).

Material examined: **KAUA'I**: Lāwa'i Valley Nursery, Lāwa'i, N21°56'12.0", W159°30'26.4", KAH, CTT, 21 Mar 2005 (281353); Kaua'i Seascape Nursery, Princeville, N22°12'24.0", W159°25'30.3", KAH, CTT, 23 Mar 2005 (270636). **O'AHU**: Wally's Garden Center, Honolulu, N21°17'48.2", W157°49'49.2", KAH, CTT, 2 April 2005 (270637). **HAWAI'I**: Kona Outdoor Circle, Kona, N19°36'48.8", W155°58'5.7", KAH, W.M. Meyer, 6 Mar 2006 (270641); Kohala Nursery, Kapa'au, N20°14'10.1", W155°48'32.5", KAH, W.M. Meyer, 7 Mar 2006 (270642).

Paropeas achatinaceum (Pfeiffer) **New island record**

This species is widespread and abundant on many Pacific islands (Cowie 2001c), and, with *Subulina octona* (below) these two species are probably the most widespread and abundant land snails in the Hawaiian Islands, especially in disturbed habitats. First record-

ed in the Islands in 1904, it has previously been recorded from Kauaʻi, Oʻahu, Molokaʻi, Maui, and Hawaiʻi (Cowie 1997). It has probably been present on Lānaʻi for a long time but simply not collected or formally recorded. This report constitutes the first formal record of this species from Lānaʻi. It was also found on all other islands surveyed (material not listed here but deposited in the BPBM Malacology collections).

Material examined: **LĀNAʻI**: Lānaʻi Co Nursery, N20°49'19.8",W156°55'28.0", KAH, WMM, MEP, 8 May 2006 (281494).

Subulina octona (Bruguière) **New island records**

This species is one of the most widely dispersed land snails in the world (Pilsbry 1906-1907) and is common in most disturbed habitats in the Hawaiian Islands. Present in the Islands by 1903 and perhaps introduced as early as about 1870, prior to this report it had been recorded from Kauaʻi, Oʻahu, Molokaʻi, and Hawaiʻi (Cowie 1997). As for *Paropeas achatinaceum* (above), it has probably been present on Lānaʻi and Maui for a long time but simply not collected or formally recorded. This report constitutes the first formal record of this species on these two islands. It was also found on all other islands surveyed (material not listed here but deposited in the BPBM Malacology collections).

Material examined: **LĀNAʻI**: Lānaʻi Co. Nursery, N20°49'19.8", W156°55'28.0", KAH, W.M. Meyer, M.E. Parker, 8 May 2006 (281493). **MAUI**: Hoʻolawa Nursery, Haʻikū, N20°55'52.5", W156°19'04.4", RHC, KAH, P. Levin, 15 Dec 2004 (281229); Keʻanae Arboretum, N20°50'44.3", W156°08'02.0", RHC, KAH, 15 Dec 2004 (281240); Tropical Gardens of Maui, Wailuku, N20°52'57.9", W156°31'01.3", RHC, KAH, P. Levin, 16 Dec 2004 (281247).

Succineidae

Succinea tenella Morelet **New state record**

There is a native evolutionary radiation of Succineidae in the Hawaiian Islands (Rundell *et al*. 2004), but the records of these two species are the first records of nonnative succineids in the Islands.

Morphologically succineids are extremely difficult to identify (Robinson 1999), especially if they have been collected from locations beyond their native range and without knowledge of their native provenance. The identification of this and the following species are based in part, therefore, on molecular genetic analysis (B.S. Holland, pers. comm.) but nevertheless remain somewhat tentative.

Originally described from Vietnam, *S. tenella* is increasingly found in horticultural facilities around the world. Holland & Cowie (2006) reported it from nurseries in California and Florida, and, in error, from Washington State. It may be in nurseries in Australia (G.M. Barker, pers. comm.), and it is frequently intercepted on horticultural products from Thailand and elsewhere (D.G. Robinson, pers. comm.). It was particularly widespread in the survey.

Material examined: **KAUAʻI**: Kauaʻi Nursery and Landscaping, Līhuʻe, N21°57'45.7", W159°24'16.8", KAH, CTT, 21 Mar 2005 (281339); Lāwaʻi Valley Nursery, Lāwaʻi, N21°56'12.0", W159°30'26.4", KAH, CTT, 21 Mar 2005 (281350); Growing Green Nursery, Līhuʻe, N22°05'49.9", W159°22'06.7", KAH, CTT, 22 Mar 2005 (281362); Kauaʻi Seascape Nursery, Princeville, N22°12'24.0", W159°25'30.3", KAH, CTT, 23 Mar 2005 (281379). **OʻAHU**: Country Garden Nursery, Kahaluʻu, N21°29'08.8", W157°50'56.8", KAH, CTT, 20 Jan 2005 (281261); Koʻolau Farmers Nursery, Kailua, N21°23'08.3", W157°45'04.2", KAH, CTT, 7 Jan 2005 (281258); Waialua Florist, Haleʻiwa, N21°36'49.0", W158°05'08.9", RHC, KAH, 20 Jan 2005 (281278); Glenn's Flowers and Plants, Waimānalo, N21°20'59.2", W157°43'40.5", KAH, CTT, 19 Feb 2005 (281285); Hawaiʻi Landscape, Hawaiʻi Kai, N21°18'07.6", W157°41'43.7", KAH, CTT, 26 Feb 2005 (281301); Wally's Garden Center, Honolulu, N21°17'48.2", W157°49'49.2", KAH, CTT, 2 April 2005

(281393); Family Tree Nursery, Wai‘anae, N20°24'16.7", W158°8'59.3", KAH, CTT, 21 Jan 2006 (281414); University of Hawai‘i, College of Tropical Agriculture and Human Resources, Urban Garden Center, Pearl City, N21°23'35.84", W157°58'30.51", KAH, CTT, W.M. Meyer, 4 Feb 2006 (282511); Nalo Farms and Nursery, Waimānalo, N17°05'54.4", W153°37'00.5", RHC, KAH, W.M. Meyer, 14 Mar 2006 (281488). **MOLOKA‘I**: Oasis of Mahana Nursery, Ho‘olehua, N21°08'38.4", W157°07'52.6", RHC, KAH, 6 Oct 2004 (281206). **MAUI**: Ho‘olawa Nursery, Ha‘ikū, N20°55'52.5", W156°19'04.4", RHC, KAH, P. Levin, 15 Dec 2004 (281231); Tropical Gardens of Maui, Wailuku, N20°52'57.9", W156°31'01.3", RHC, KAH, P. Levin, 16 Dec 2004 (281250); Kihana Nursery, Kīhei, N20°44'14.9", W156°27'14.2", KAH, CTT, 12 Mar 2005 (281332). **HAWAI‘I**: Rise and Shine Nursery, Kea‘au, N19°33'23.3", W154°59'17.8", KAH, 22 Nov 2004 (281215); Rozett’s Nursery, Kea‘au, N19°34'30.3", W154°59'46.0", KAH, 22 Nov 2004 (281226); Kainaliu Gardens, N19°32'02.4", W155°55'37.7", KAH, CTT, 8 May 2005 (281404); Sunrise Nursery, Kona, N19°41'20.6", W156°00'58.1", KAH, CTT, 11 Feb 2006 (281447); Mohala Pua Garden Center, Honoka‘a, N20°04'19.1", W155°27'50.8", KAH, CTT, 12 Feb 2006 (281450); Kohala Nursery, Kapa‘au, N20°14'10.1", W155°48'32.5", KAH, W.M. Meyer, 7 Mar 2006 (281473).

Succinea costaricana Martens **New state record**

This Central American species has been intercepted entering the USA associated with the cut flower trade (Robinson 1999), which has been expanding in Costa Rica (Barrientos 2000). This appears to be the first report of this species outside its native Central America (cf. Robinson 1999).

Material examined: **O‘AHU**: Country Garden Nursery, Kahalu‘u, N21°29'08.8", W157°50'56.8", KAH, CTT, 20 Jan 2005 (270643).

Thiaridae

Melanoides tuberculata **(Müller) New island record**

Cowie (1997) recorded this species only from Kaua‘i. However, he provisionally listed other thiarid species in *Thiara*, most originally described from Hawaiian material, collectively recording them from Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i. Some, if not all of these taxa may be synonyms of *M. tuberculata*. However, determining this is beyond the scope of this report and will require comprehensive revision of the Hawaiian Thiaridae. The material collected during the 2004-2006 survey is referable to *M. tuberculata* and thus constitutes the basis for this the first published record of the species from O‘ahu and Maui, while recognizing that future systematic revision and correct taxonomic placement of earlier Bishop Museum material will probably result in much earlier dates for the presence of this species on these and the other main Hawaiian Islands.

Material examined: **O‘AHU**: Ko‘olau Farmers Nursery, Kailua, N21°23'08.3", W157°45'04.2", KAH, CTT, 7 Jan 2005 (281253); Country Garden Nursery, Kahalu‘u, N21°29'08.8", W157°50'56.8", KAH, CTT, 20 Jan 2005 (281268); Charles Nii Nursery, Hawai‘i Kai, N21°18'16.8", W157°41'43.1", KAH, CTT, 26 Feb 2005 (281321); Wally’s Garden Center, Honolulu, N21°17'48.2", W157°49'49.2", KAH, CTT, 2 Apr 2005 (281399); Family Tree Nursery, Wai‘anae, N20°24'16.7", W158°8'59.3", KAH, CTT, 21 Jan 2006 (281412). **MAUI**: Tropical Gardens of Maui, Wailuku, N20°52'57.9", W156°31'01.3", RHC, KAH, P. Levin, 16 Dec 2004 (281249).

Veronicellidae

Veronicella cubensis (Pfeiffer) **New island records**

The abundant brown veronicellid slugs of primarily disturbed locations, especially on O‘ahu, have been identified as two species, *Veronicella cubensis* and *Sarasinula plebeia* (Fischer), the latter often placed in the genus *Vaginulus* (or *Vaginula*). However, they have probably been consistently mutually misidentified in the Hawaiian Islands. Prior to this

report, *V. cubensis* had only been recorded from O‘ahu, the first record being in 1985, and *S. plebeia* from O‘ahu and Hawai‘i, the first record in 1978 (Cowie 1997). More of the records have referred to the latter than to the former but in the absence of voucher material substantiating many of these records it may not be possible to verify them.

Most of the brown veronicellid slugs collected during this survey were referred to *V. cubensis*. It is possible that *V. cubensis* has out-competed *S. plebeia*, such that the latter's populations have dwindled, but it could also be that the majority of the previous records of *S. plebeia* were misidentifications of *V. cubensis*. These new island records of *V. cubensis* from Kaua‘i, Moloka‘i, Lāna‘i, Maui, and Hawai‘i, may not represent very recent introductions to those islands but may simply reflect a lack of sufficient survey work since the species' introduction. It was widespread on O‘ahu (material not listed here but deposited in the BPBM Malacology collections).

Material examined: **KAUA‘I**: Kaua‘i Nursery and Landscaping, Līhu‘e, N21°57'45.7", W159°24'16.8", KAH, CTT, 21 Mar 2005 (281334); Kaua‘i Hog and Ground Cover, Līhu‘e, N21°55'51.3", W159°28'59.0", KAH, CTT, 21 Mar 2005 (281347); Lāwa‘i Valley Nursery, Lāwa‘i, N21°56'12.0", W159°30'26.4", KAH, CTT, 21 Mar 2005 (281356); Growing Green Nursery, Līhu‘e, N22°05'49.9", W159°22'06.7", KAH, CTT, 22 Mar 2005 (281369); Permaculture Kaua‘i Nursery, N22°12'37.3", W159°24'54.0", KAH, CTT, 22 Mar 2005 (281376); Kaua‘i Seascape Nursery, Princeville, N22°12'24.0", W159°25'30.3", KAH, CTT, 23 Mar 2005 (281388). **MOLOKA‘I**: Oasis of Mahana Nursery, Ho‘olehua, N21°08'38.4", W157°07'52.6", RHC, KAH, 6 Oct 2004 (281210). **LĀNA‘I**: Lāna‘i Co Nursery, N20°49'19.8", W156°55'28.0", KAH, WMM, MEP, 8 May 2006 (281491). **MAUI**: Ho‘olawa Nursery, Ha‘ikū, N20°55'52.5", W156°19'04.4", RHC, KAH, PL, 15 Dec 2004 (270623); Tropical Gardens of Maui, Wailuku. N20°52'57.9", W156°31'01.3", RHC, KAH, PL, 16 Dec 2004 (270624); Ki-hana Nursery, Kīhei, N20°44'14.9", W156°27'14.2", KAH, CTT, 12 Mar 2005 (281330). **HAWAI‘I**: Hawaii Tropical Botanical Garden, Pāpa‘ikou, N19°48'39.2", W155°05'45.9", RHC, KAH, 21 Nov 2004 (281214); Rise and Shine Nursery, Kea‘au, N19°33'23.3", W154°59'17.8", KAH, 22 Nov 2004 (281219); U.S. Department of Agriculture Research Station, Hilo, N19°38'36.8", W155°04'45.2", KAH, 22 Nov 2004 (281225); Rozett's Nursery, Kea‘au, N19°34'30.3", W154°59'46.0", KAH, 22 Nov 2004 (281227); Hawai‘i Flower Gardens, Mountain View, N19°33'08.7", W155°06'17.3", KAH, 23 Nov 2004 (281228); Kainaliu Gardens, N19°32'02.4", W155°55'37.7", KAH, CTT, 8 May 2005 (281408); Kay's Plants, Hāwī, N20°14'00.0", W155°48'26.2", KAH, CTT, 11 Feb 2006 (281436); Pua Mau Place Botanic and Sculpture Garden, Kawaihae, N20°04'19.2", W155°50'42.7", KAH, CTT, 11 Feb 2006 (281439); Mohala Pua Garden Center, Honoka‘a, N20°04'19.1", W155°27'50.8", KAH, CTT, 12 Feb 2006 (281449); Amy B. Greenwell Ethnobotanical Garden, Kona, N19°29'29.2", W155°54'42.5", KAH, WMM, 6 Mar 2006 (281454); Kona Outdoor Circle, Kona, N19°36'48.8", W155°58'5.7", KAH, WMM, 6 Mar 2006 (281465); Kohala Nursery, Kapa‘au, N20°14'10.1", W155°48'32.5", KAH, WMM, 7 Mar 2006 (281468).

Laevicaulis alte (Férussac) **New island records**

This black or dark gray veronicellid slug was first recorded in the Hawaiian Islands in about 1900 and was known prior to this report from O‘ahu, Moloka‘i, and Hawai‘i, as well as Midway (Cowie 1997). It is here reported for the first time from Kaua‘i and Maui. We also collected it on O‘ahu and Hawai‘i (material not listed here but deposited in the BPBM Malacology collections). Although not part of the formal survey of horticultural facilities, we also recorded this species on Lāna‘i for the first time.

Material examined: **KAUA‘I**: Permaculture Kaua‘i Nursery, N22°12'37.3", W159°24'54.0", KAH, CTT, 22 Mar 2005 (281375). **LĀNA‘I**: Golf course at the Lodge at Kō‘ele, N20°49'24.3", W156°54'31.6", RHC, KAH, 5 Feb 2005 (270644). **MAUI**: Ki-hana Nursery, Kīhei, N20°44'14.9", W156°27'14.2", KAH, CTT, 12 Mar 2005 (281329).

Vertiginidae

Gastrocopta servilis (Gould) **New island record**

Previously recorded from Kauaʻi, Oʻahu, Molokaʻi, Maui, and Hawaiʻi, as well as from Midway, Pearl and Hermes, and Laysan, and present in the Hawaiian Islands since at least 1892 (Cowie 1997), this is the first record for Lānaʻi. As for a number of species reported here for the first time from Lānaʻi, it may have been present on the island for a long time but simply not recorded.

Material examined: **LĀNAʻI**: Lānaʻi Co Nursery, N20°49'19.8", W156°55'28.0", KAH, W.M. Meyer, M.E. Parker, 8 May 2006 (281499).

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Charles Howard Edmondson: Hawaii's first marine biologist

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Charles Howard Edmondson was born 14 October 1876 in Milton, Iowa. He received his B.A. (1903), M.A. (1904), and Ph.D. (1906) from the University of Iowa. He taught biology at Ohio Wesleyan University, 1906–1907, natural history and zoology at Washburn University (Topeka, Kansas), 1906–1913, and zoology at the University of Oregon until his departure in 1920.

On 1 February 1920, Edmondson arrived in Honolulu from Oregon to teach zoology at the College of Hawaii (now University of Hawai'i at Mānoa), direct its marine laboratory (the Cooke Memorial Marine Laboratory located on the grounds of the old Waikiki Aquarium), and take care of the invertebrate zoology collection at the Bishop Museum. As director of the marine laboratory he encouraged visiting scientists to use the facilities and sent specimens to specialists around the world. He was active in the organization of the First Pan-Pacific Conference (later the Pacific Science Association and Congress) in 1920.

Edmondson traveled extensively and took part in the *Whipporwill* (1924), *Tanager* (1923), and *Kaimiloa* (1924) expeditions bringing his studies into a broader Pacific experience. When he retired from the University of Hawai'i in 1942, as Professor Emeritus and joined the Bishop Museum as full-time curator of the marine zoology collections for another 20 years. He retired from the Museum in 1962 at which time Edmondson Hall at the University of Hawai'i was named in his honor. He died in Hawai'i in 1970 at age 93.

His research interests were most varied. His doctoral dissertation was on the Protozoa of Iowa followed by four additional papers on protozoans. Edmondson's life-long studies were on crustaceans extended over some 41 years beginning with stomatopods (1921) and ending with xanthid crabs (1962). He described 66 new species of shrimps and crabs. His works on ecology and growth of reef corals (1928–1929) are classics. During 1940s and 1950s he undertook research on shipworms, describing ten new species and conducted field studies on marine fouling organisms. He also described five new species of creeping and stalked medusae.

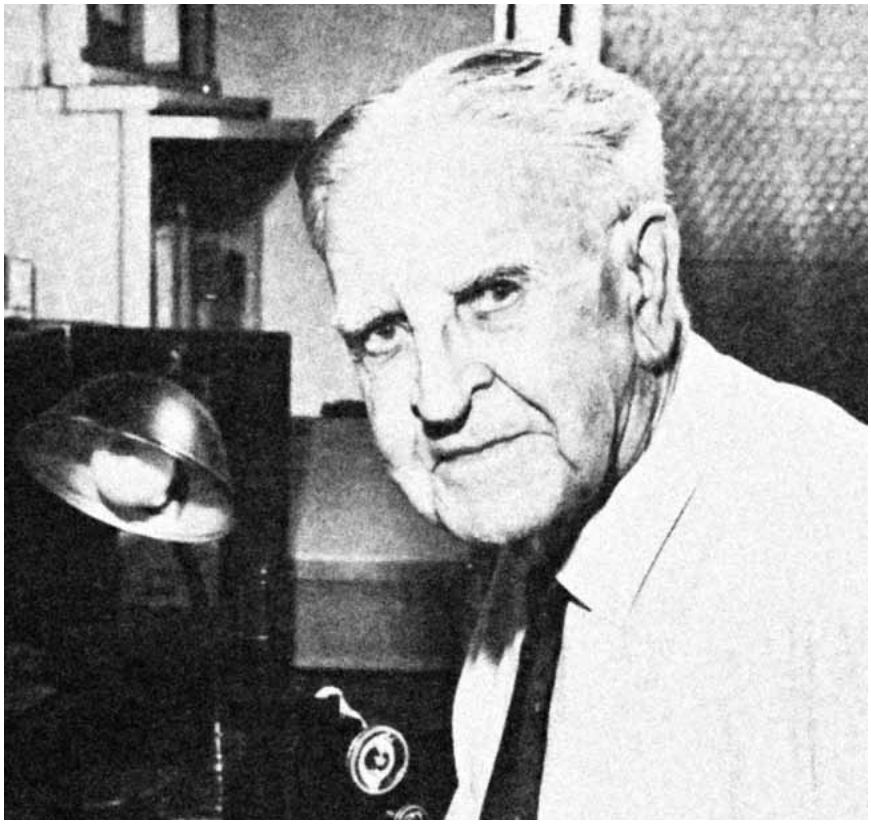
His milestone publication was *Reef and Shore Fauna of Hawaii* first published in 1933 and revised to include fishes in 1946. This work still constitutes an important background for marine studies in Hawaiian waters.

Invertebrates named by C.H. Edmondson [The names in brackets are those currently accepted names; full citations can be found in the list of scientific publications by C.H. Edmondson below]

Protozoa
Peritricha
Gerda annulata Edmondson, 1920 (Edmondson 1920b: 188)
Ciliata
Holotricha
Urotricha labiata Edmondson, 1920 (Edmondson, 1920b: 178) [= *Chilophyra labiata* (Edmondson, 1920)]
Rhizopoda
Amoebidae
Campascus dentatus Edmondson & Kingman, 1913 (Edmondson & Kingman, 1913: 96; 1914: 535)

Cnidaria
Anthozoa
Anthomedusae
Eleutheria oahuensis Edmondson, 1930 (Edmondson, 1930c: 3) [= *Staurocladida oahuensis* (Edmondson, 1930)]
Eleutheria bilateralis Edmondson, 1930 (Edmondson 1930c: 8) [= *Staurocladida bilateralis* (Edmondson, 1930)]
Eleutheria acuminata Edmondson, 1930 (Edmondson, 1930c: 9) [= *Staurocladida acuminata* (Edmondson, 1930)]
Eleutheria alternata Edmondson, 1930 (Edmondson, 1930c: 10) [= *Staurocladida alternata* (Edmondson, 1930)]
Schyphozoa
Stauromedusae (or Staurozoa, cf. Claudia Mills)
Kishinouyea hawaiiensis Edmondson, 1930 (Edmondson, 1930c: 14)

Mollusca
Bivalvia
Teredinidae
Bankia (*Neobankia*) *hawaiiensis* Edmondson, 1942 (Edmondson, 1942: 126, [= *Bankia bipalmata* (Lamarck, 1801)
Bankia (*Neobankia*) *konaensis* Edmondson, 1942 (Edmondson, 194: 134) [= *Bankia bipalmata* (Lamarck, 1801)]
Bankia (*Neobankia*) *oahuensis* Edmondson, 1942 (Edmondson, 1942: 134) [= *Neobankia* young specimen]
Teredo (*Cornuteredo*) *medilobata* Edmondson, 1942 (Edmondson, 1942: 19) [= *Lyrodus medilobata* Edmondson, 1942)]
Teredo (*Teredo*) *bensoni* Edmondson, 1946 (Edmondson, 1946b: 214) [= *Teredo furcifera* von Martens, 1894]
Teredo (*Teredo*) *hiloensis* Edmondson, 1942 (Edmondson, 194: 113) [= *Teredo bartsch* Clapp,1923)]
Teredo (*Teredo*) *honoluluensis* Edmondson, 1946 (Edmondson, 1946b: 222) [= *Lyrodus pedicellatus* Quatrefages, 1849)]
Teredo (*Teredothyra*) *palauensis* Edmondson, 1959 (Edmondson, 1959b: 203) [= *Teredothyra excavata* Jeffreys, 1860)]
Teredo (*Teredothyra subicensis* Edmondson, 1959 (Edmondson, 1959b: 205) [= *Teredothyra excavata* (Jeffreys, 1860)]
Teredo (*Zopoteredo*) *triangularis* Edmondson, 1942 (Edmondson, 1942: 26, [= *Zopoteredo triangularis* (Edmondson, 1942)]



Charles Howard Edmondson (1876–1970).

Crustacea

Infraclass Cirripedia

Family Lepadidae [= Koleolepadidae]

Koleolepas tinkeri Edmondson, 1951 (Edmondson, 1951: 185)

Order Amphipoda

Family Gammaridae

Elasmopus calliactis Edmondson,1951 (Edmondson, 1951: 189)

Order Isopoda

Family Ligiidae

Ligyda kauaiensis Edmondson, 1931 (Edmondson, 1931a: 3) [= *Ligia hawaiensis* (Dana, 1853)]

Order Stomatopoda

Family Coronididae

Coronida sinuosa Edmondson, 1921 (Edmondson, 1921: 295) [= *Paravisquilla sinuosa* (Edmondson, 1921)]

Order Decapoda
InfraorderThalassinidea
Family Axiidae
Axiopsis (Axiopsis) irregularis Edmondson, 1930 (Edmondson, 1930b: 10) [= *Axiopsis irregularis* Edmondson, 1930]
Axiopsis (Paraxiopsis) johnstoni Edmondson, 1925 (Edmondson, 1925: 20) [= *Paraxiopsis johnstoni* (Edmondson, 1930)]
Family Callianassidae
Callianassa (*Calliactites) parva* Edmondson, 1944 (Edmondson, 1944a: 45)
Callianassa (*Callichirus) lanceolata* Edmondson, 1944 (Edmondson, 1944a: 52 [= *Glypturus lanceolatus* (Edmondson, 1944]
Callinassa (*Callichirus*) *oahuensis* Edmondson, 1944 (Edmondson, 1944a: 56)
Callianassa (*Callichirus*) *winslowi* Edmondson, 1944 (Edmondson, 1944a: 59) [= *Glypturus winslowi* Edmondson, 1944]
Callianassa (*Cheramus*) *variabilis* Edmondson, 1944 (Edmondson, 1944a: 47) [= *Neocallichirus indicus* DeMan, 1905]
Infraorder Caridea
Family Alpheidae
Crangon hawaiiensis Edmondson, 1925 (Edmondson, 1925: 14) [= *Metalphaeus hawaiiensis* (Edmondson, 1925)]
Crangon laysani, Edmondson, 1925 (Edmondson, 1925: 17) [= *Alpheus paralcyone* Coutiere, 1905]
Jousseaumea brevirostris Edmondson, 1930 (Edmondson, 1930b: 7) [= *Salmoneus brevirostris* (Edmondson,1930)]
Jousseaumea mauiensis Edmondson, 1930 (Edmondson, 1930b: 5) [= *Salmoneus mauiensis* (Edmondson, 1930)]
Synalpheus macromanus Edmondson, 1925 (Edmondson, 1925: 9)
Family Atyidae
Mesocaris lauensis Edmondson, 1935 (Edmondson, 1935a: 13) [= *Antecaridina lauensis* (Edmondson,1935)]
Family Gnathophyllidae
Coralliocaris mammillata Edmondson, 1931 (Edmondson, 1931a: 5) [= *Levicaris mammillata* (Edmondson, 1931)
Family Palaeminidae-Pontoniinae
Periclimenes bicolor Edmondson, 1935 (Edmondson, 1935c: 10) [= *Periclimenes soror* Nobili, 1904]
Pontonia medipacifica Edmondson, 1935 (Edmondson, 1935: 6) [= *Cainonia medipacifica* (Edmondson, 1935)]
Family Pandalidae
Plesionika pacificus Edmondson, 1952 (Edmondson, 1952a: 67)
Family Processidae
Processa paucirostris Edmondson, 1930 (Edmondson, 1930b: 3)
Processa steinii Edmondson, 1935 (Edmondson, 1935c: 3) [= *Nikoides steinii* (Edmondson, 1935)]
Family Rhynchocinetidae
Rhynchocinetes intermedius Edmondson, 1952 (Edmondson, 1952a: 72) [= *Cinetorhynchus hendersoni* (Kemp, 1925)]
Rhynchocinetes marshallensis Edmondson, 1952 (Edmondson, 1952a: 75) [= *Cinetorhynchus hendersoni* (Kemp, 1925)]
Infraorder Anomura
Family Diogenidae
Dardanus sulcatus Edmondson, 1925 (Edmondson, 1925: 27)
Dardanus sanguinocarpus Degener *in* Edmondson, 1925: 24 [This species has been previously attributed to Edmondson; however, it was noted in the Introduction (p. 4) that the species was described by O. Degener]

Family Paguridae
Aniculus maximus Edmondson, 1952 (Edmondson 1952a: 79)
Catapagurus granulatus Edmondson, 1951 (Edmondson, 1951: 198)
Cestopagurus setosus Edmondson, 1951 (Edmondson 1951: 200) [= *Catapaguroides setosus* (Edmondson, 1951)]
Family Parapaguridae
Sympagurus pacificus Edmondson, 1925 (Edmondson, 1925: 28) [= *Paragiopagurus pacificus* (Edmondson, 1925)]
Infraorder Brachyura
Family Aethridae
Actaeomorpha punctata Edmondson, 1935 (Edmondson, 1935c: 20)
Family Cryptochiridae
Cryptochirus crescentus Edmondson, 1925 (Edmondson, 1925: 33) [= *Opecarcinus crescentus* (Edmondson, 1925)]
Cryptochirus minutus Edmondson, 1933 Edmondson, 1933a: 12) [= *Pelycomaia minuta* (Edmondson, 1933)]
Cryptochirus pacificus Edmondson, 1933 (Edmondson, 1933a: 8) [= *Lithoscaptus pacificus* (Edmondson, 1933)]
Cryptochirus pyriformis Edmondson, 1933 (Edmondson 1933a: 10) [= *Sphenomaia pyriforma* (Edmondson, 1933)]
Cryptochirus rugosus Edmondson, 1933 (Edmondson, 1933a: 6) [= *Cryptochirus coralliodytes* Heller,1861]
Family Eriphiidae
Nullicrinus amplifrons Edmondson, 1935 (Edmondson, 1935c: 32) [= *Dacryopilumnus rathbunae* Balss,1932]
Family Grapsidae
Clistocoeloma suvaense Edmondson, 1951 (Edmondson, 1951: 238)
Family Homolidae
Latreillopsis hawaiiensis Edmondson, 1932 (Edmondson, 1932b: 5) [= *Paromola japonica* Parisi, 1915]
Family Majidae
Trigonothir samoaensis Edmondson, 1951 (Edmondson, 1951: 207 [= *Simocarcinus samoaensis* (Edmondson, 1951)]
Family Palicidae
Cymopolia medipacifica Edmondson, 1962 (Edmondson, 1962a: 9, [= *Exopalicus maculatus* (Edmondson, 1930)]
Palicus maculatus Edmondson, 1930 (Edmondson, 1930b: 15) [= *Exopalicus maculatus* (Edmondson, 1930)]
Palicus tuberculatus Edmondson, 1925 (Edmondson, 1925: 57) [= *Exopalicus maculatus* (Edmondson, 1930)]
Family Panopeidae
Panopeus pacificus Edmondson, 1931 (Edmondson, 1931a: 12) [=*Acantholobulus pacificus* (Edmondson, 1931)]
Family Parthenopidae [= Aethridae]
Aethra edentata Edmondson, 1951 (Edmondson, 1951: 214)
Family Pilumnidae
Pilumnus oahuensis Edmondson, 1931 (Edmondson, 1931a: 7)
Family Portunidae
Caphyra suvaensis Edmondson, 1935 (Edmondson, 1935c: 24) [=*Caphyra laevis* (A. MilneEdwards,1869)]
Coelocarcinus foliatus Edmondson, 1930 (Edmondson, 1930b: 13)
Portunus (*Portunus*) *oahuensis* Edmondson, 1954 *(*Edmondson, 1954: 243) [= *Laleonectes nipponensis* (Sakai, 1938)]

Thalamita medipacifica Edmondson, 1954 (Edmondson, 1954: 260) [= *Thalamita dakini* Montgomery, 1931]
Thalamita spiceri Edmondson, 1954 (Edmondson, 1954: 258)
Thalamita wakensis Edmondson, 1925 (Edmondson, 1925: 38) [= *Thalamita seurati* (Nobili, 1906)]

Family Xanthidae
Actaea dentata Edmondson, 1935 (Edmondson, 1935c: 29) [= *Pilumnus vespertilio* (Fabricius, 1793)]
Carpilodes medipacificus Edmondson, 1951 (Edmondson, 1951: 226) [= *Liomera medipacificus* (Edmondson, 1951)]
Chlorodiella asper Edmondson, 1925 (Edmondson, 1952: 44) [= *Liocarpilodes integerrimus* (Dana, 1852)]
Chlorodopsis hawaiiensis Edmondson, 1962 (Edmondson, 1962c: 273) [= *Pilodius flavus* Rathbun, 1894]
Chlorodopsis kauaiensis Edmondson, 1962 (Edmondson, 1962c: 272) [= *Pilodius? kauaiensis* (Edmondson, 1962
Chlorodopsis oahuensis Edmondson, 1962 (Edmondson, 1962c: 270) [= *Pilodius paumotensis* Rathbun, 1907]
Etisodes bifrontalis Edmondson, 1935 (Edmondson, 1935c: 35) [= *Etisus bifrontalis* (Edmondson, 1935)]
Euxanthus minutus Edmondson, 1925 (Edmondson, 1925: 46) [= *Neoxanthops cavatus* (Rathbun, 1907)]
Megametope sulcatus Edmondson, 1931 (Edmondson, 1931: 11) [= *Jacforus cavatus* (Rathbun, 1907)]
Neoliomera immigrans Edmondson, 1962 (Edmondson, 1962c: 253) [= *Atergatopsis immigrans* Edmondson,1962)]
Pilumnus planus Edmondson, 1931 (Edmondson, 1931a: 8) [= *Forestia depressa* (White, 1847)] [Edmondson used "*planus*" in the original description, "*planes*" [(sic) in future work.]
Pseudocryptocoeloma symmetrinudus Edmondson, 1951 (Edmondson, 1951: 233)
Xanthias glabrous Edmondson, 1951 (Edmondson, 1951: 230)
Xanthias oahuensis Edmondson, 1951 (Edmondson, 1951: 251)

Species named in honor of Charles Howard Edmondson

Protozoa
Ciliata
Thecacineta edmondsoni King, 1933: 241 [= *Loricophyra edmondsoni* King, 1933)]
King, R.L. 1933. Two new infusoria (Protozoa) from Iowa. *Proceedings of the Iowa Academy of Science* 38: 241–243.

Cnidaria
Alcyonacea
Xeniidae
Sarcothelia edmondsoni Verrill, 1928: 5 [= *Anthelia edmondsoni* (Verrill, 1928)]
Verrill, A.E. 1928. Hawaii shallow water Anthozoa. *B.P. Bishop Museum Bulletin* **49**: 1–30.

Arthropoda
Crustacea
Harpacticoida
Harpacticoidae
Tegastes edmondsoni Pesta, 1932: 150.
Pesta, O. 1932. Marine Harpacticicen aus den hawaiischen Inselgebeit. *Zoologische Jahrbücher Systematik* **63**(2): 145–162.

Isopoda
Idoteidae
Colidotea edmonsoni Miller, 1940: 318.
Miller, M. 1940. The isopod Crustacea of the Hawaiian Islands (Chelifera and Valvifera). *Bishop Museum Occasional Papers* **15**(26): 295–321.
Decapoda
Pinnotheridae
Aphanodactylus edmondsoni Rathbun, 1932: 181.
Rathbun, M.J. 1932. A new pinnotherid crab from the Hawaiian Islands. *Journal of the Washington Academy of Sciences* **22**(7): 181.
Xanthidae
Lybia edmondsoni Takeda & Miyake, 1970: 11.
Takeda, M. & Miyake, S. 1970. *Lybia edmondsoni* sp. nov., a new anemone crab from the Hawaiian Islands. *Proceedings of the Japanese Society for Systematic Zoology* **6**: 11–15.
Hippolytidae
Hippolyte edmondsoni Hayashi, 1982: 185.
Hayashi, K.I. 1982. The central Pacific shrimps of the genus *Hippolyte*, with a decription of two new species (Decapoda, Caridea, Hippolytidae). *Pacific Science* **35**(3): 185–196.
Alpheidae
Crangon edmondsoni Banner, 1953: 78. [= *Alpheus edmondsoni* (Banner,1953); *Alpheus coevtivensis* Coutiere, 1908]
Banner, A.H. 1953. The Crangonidae, or snapping shrimps, of Hawaii. *Pacific Science* **7**(1): 3–144.
Cryptochiridae
Cryptochirus edmonsoni Fize & Serene, 1956: 379. [= *Dacryomaia edmonsoni* (Fize & Serene, 1956)]
Fize, A. & Serene, R. 1956. Note préliminaire sur quatre espèces nouvelles d'hapalocarcinides avec quelques rémarques au sujet du *Cryptochirus rugosus* Edmonson [sic]. *Bulletin de la Société Zoologique de France* **89**(5–6): 379–382.

Bryozoa
Watersiporidae
Watersipora edmondsoni Soule & Soule, 1968: 215.
Soule, D.F.& Soule, J.D.1968. Bryozoan fouling organisms from Oahu, Hawaii with a new species of *Watrsipora*. *Bulletin of the Southern California Academy of Science* **67**(4): 203–208.

Mollusca
Bivalvia
Veneridae
Periglypta edmondsoni Dall, Bartsch & Rehder, 1938: 133. [= *Periglypta reticulata* (Linnaeus, 1758)]
Dall, W.H., Bartsch, P. & Rehder, H.A. 1938. A manual of therecent and fossil marine pelecypods of the Hawaiian Islands. *B.P. Bishop Museum Bulletin* **153**: 1–23.
Teredinidae
Bankia (Bankiella) edmondsoni Nair, 1956: 396. [= *Bankia carinata* (J.E. Gray, 1827)]
Nair, N.B. 1956. Shipworms from India. 1. Report of ten species of shipworms from the Madras Coast. *Records of the Indian Museum* **52**: 387–414.
Nudibranchia
Cuthonidae
Aeolidia edmonsoni Ostergaard, 1955: 133. [= *Phestilla sibogae* Bergh,1905]
Ostergaard, J.M. 1955. Some opisthobranchiate Mollusca from Hawaii. *Pacific Science* **9**(2): 110–136.

Nemertea
Baseodiscidae
Baseodiscus edmondsoni Coe, 1934: 3.
Coe, W. 1934. New nemerteans from Hawaii. *Bishop Museum Occasional Papers* **10**(18): 3–9.

Echinodermata
Ophiuroidea
Asteroschematidae
Asteroschema edmondsoni Clark, 1949: 10.
Clark, A.H. 1949. Ophiuroidea of the Hawaiian Islands. *B.P.Bishop Museum Bulletin* **195**: 1–133.

Chordata
Ascidiacea
Didemnidae
Didemnum edmondsoni Eldredge, 1967: 208.
Eldredge, L.G. 1967. A taxonomic review of Indo-Pacific didemnid ascidians and descriptions of twenty-three central Pacific species. *Micronesica* **2**(2): 161–261.

Pisces
Pomacentridae
Dascyllus edmondsoni Pietschmann, 1934: 100. [= *Dascyllus albisella* Gill, 1862]
Pietschmann, V. 1934. Drei neue fische aus den Hawaiischen Küstengewassern. *Anzeiger der Akademie für Wissenschaftlichen, Wien* **71**: 99–100.
Blennidae
Enchelyurus edmondsoni Fowler, 1923: 389. [= *Enchelyurus brunneolus* (Jenkins, 1903)]
Fowler, H. W. 1923. New or little-known Hawaiian fishes.*Occasional Papers of the Bernice P. Bishop Museum* **8**(7): 373–392.
Syngnathidae
Ichthyocampus edmondsoni Pietschmann, 1928: 298. [= *Halicampus edmondsoni* (Pietschmann, 1928)]
Pietschmann, V. 1928. Neue Fischarten aus dem pazifischen Ozean. *Anzeiger der Akademie für Wissenschaftliche, Wien* **65**: 297–298. [Also in: Pietschmann, V. 1930. Remarks on Pacific fishes. *Bulletin of the Bishop Museum* 73: 1–244.]

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———. 1906b. A variety of *Anisonema vitrea*. *Publication of the Carnegie Institute of Washingtion* **102**: 191.
———. 1910. A report on the fresh-water Protozoa of Tahiti. *Science* (n.s.) **32**(819): 349–351.
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———. 1918a. Amoeboid protozoa. *Fresh water biology*. New York, John Wiley & Sons: 210–237.
———. 1918b. Flagellate and ciliate protozoa. *Fresh water biology*. New York, John Wiley & Sons: 238–300.
———. 1920a. Edible Mollusca of the Oregon coast. *Occasional Papers of the Bernice P. Bishop Museum* **7**(9): 179–201.
———. 1920b. Protozoa of Devil's Lake complex, North Dakota. *Transactions of the American Microscopical Society* **39**(3): 167–198.
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———. 1921. Stomatopoda in the Bernice P. Bishop Museum. *Occasional Papers of the Bernice P. Bishop Museum* **7**: 281–302.
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———. 1922b. The shellfish resources of the northwest coast of the United States. *Report of U.S. Commissioner of Fisheries for 1922* (Appendix III): 1–21.
———. 1923a. Crustacea of Palmyra and Fanning Islands. *Bernice P. Bishop Museum Bulletin* **5**: 1–40.

———. 1923b. Notes on the rate of growth of coral in Hawaii. *Proceedings of the Pan-Pacific Science Congress* (Australia) **2**: 1553–1555.
———. 1923c. A preliminary comparison between Hawaiian and Australian Crustacea. *Proceedings of the Pan-Pacific Science Congress* (Australia) **2**: 1548–1553.
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———. 1929a. Effects of ultraviolet rays on regeneration of appendages of *Atya bisulcata*. *Bernice P. Bishop Museum Special Publication* **15**: 13.
———. 1929b. Growth of Hawaiian corals. *Bernice P. Bishop Museum Bulletin* **58**: 1–38.
———. 1929c. Hawaiian Atyidae. *Bernice P. Bishop Museum Bulletin* **66**: 1–36.
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———. 1930a. Effectof ultraviolet ray in regeneration of chelipods. *Bernice P. Bishop Museum Special Publication* **9**: 1–17.
———. 1930b. New Hawaiian Crustacea. *Occasional Papers of the Bernice P. Bishop Museum* **9**: 1–18.
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———. 1932b. A giant *Latreillopsis* from Hawaii. *Occasional Papers of the Bernice P. Bishop Museum* **9**(24): 1–9.
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———. 1941b. The relation of the marine fauna of Hawaii to that of other sections of the Pacific area. *Proceedings of the 6th Pacific Science Congress* **3**: 593–598.
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———. 1944d. Vertical distribution of shipworms in Hawaiian waters. *The Nautilus* **58**(2): 55–56.
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Records of the Hawaii Biological Survey for 2006
Part 2: Notes

Table of Contents

New Hawaiian plants records for the Island of Moloka'i—*Wysong, M., Hughes, G. & Wood, K.R.* 1
New plants records from O'ahu for 2006—*Frohlich, D. & Lau, A.* 8
New plant records, rediscoveries, range extensions, and possible extensions within the Hawaiian Islands—*Wood, K.R.* 13
New plant records from Moloka'i, Lana'i, Maui, and Hawai'i for 2006 —*Oppenheimer, H.* 17
New Hawaiian plant records for 2005–2006—*Imada, C.* 34
New records for Coleoptera for the Island of Maui from the Bishop Museum arthropod survey of Kahului Airport—*Samuelson, G.A., Ramsdale, A.S., Howarth, F.G. & Preston, D.J.* 41
New records of *Hylaeus* (*Nesoprosopis*) and *Ceratina* bees in Hawai'i —*Magnacca, K.N.* 44
New records of arthropods from Kaho'olawe Island, Hawai'i —*Starr, F. & Starr, K.* 46
Distribution of the invasive apple snail *Pomacea canaliculata* (Lamarck) in the Hawaiian Islands—*Cowie, R.H., Hayes, K.A. & Tran, C.T.* . . . 48
Erinna newcombi Adams & Adams (Mollusca:Lymnaeidae): a rediscovered population in Hanakoa, Kaua'i, Hawai'i—*Boynton, D. & Wood, K.R.* 52
New records of alien Mollusca in the Hawaiian Islands: nonmarine snails and slugs (Gastropoda) associated with the horticultural trade—*Hayes, K.A., Tran, C.T. & Cowie, R.H.* 54
Charles Howard Edmondson: Hawaii's first marine biologist —*Eldredge, L.G.* 64

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