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Cover: *Metrosideros polymorpha*, native *ʻōhiʻa lehua.* Photo: Clyde T. Imada.

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RECORDS OF THE HAWAII BIOLOGICAL SURVEY FOR 2000
Part 2: Notes[1]

This is the second of 2 parts to the *Records of the Hawaii Biological Survey for 2000* and contains the notes on Hawaiian species of plants and animals including new state and island records, range extensions, and other information. Larger, more comprehensive treatments are treated in the first part of this *Records* [*Bishop Museum Occasional Papers* 68].

New plant records from the main Hawaiian Islands

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In this article we report 55 new records for the Hawaiian flora; there are 5 new naturalized records for the state, 37 new island records, and 13 significant range extensions. A total of 52 taxa in 30 plant families are discussed. Additionally, there is a single correction of a previously reported record. Collections were made on the islands of O‘ahu, Lāna‘i, Maui, & Hawai‘i. Previous knowledge of their distribution is based on Wagner *et al*. (1990, 1999) and information published in the *Records of the Hawaii Biological Survey* for 1994–1999. The greater part of the specimens examined are deposited in the Herbarium Pacificum, Bishop Museum, Honolulu (BISH); any specimen cited in the materials examined without an acronym was seen in BISH. a few specimens are in other herbaria and a few specimens have duplicates in more than one herbarium. in these cases the acronyms for all herbaria are listed after the specimen for sake of clarity.

Acanthaceae

Barleria cristata L. **New island record**

According to Wagner *et al.* (1999: 170) *Barleria cristata* is known from the islands of Kaua‘i, O‘ahu, and Hawai‘i. On West Maui, *B. cristata* was first observed by Pu‘u Kukui Watershed field staff in 1996 in Kahana Valley, but no specimens were collected. Recently, several populations have been located in gulches further south.

Material examined. **MAUI**: West Maui, Lahaina Distr., Mo‘omoku, in gully, 280 m, 9 Mar 2000, *Oppenheimer H30003*; Kahana Iki Gulch, along dirt road on S side, 226 m, 10 Mar 2000, *Oppenheimer H30005*; Māhinahina, 207 m, forming dense stands under *Leucaena leucocephala*, 7 Apr 2000, *Oppenheimer & J. Kunna H40009*.

Hemigraphis reptans (G. Forst.) T. Anderson **Range extension**

Wagner *et al.* (1999: 172) reported this taxon as naturalized on Kaua‘i, O‘ahu, and Hawai‘i. Pu‘u Kukui Watershed staff later documented it from Maui, citing collections from Hāna District, East Maui (Oppenheimer *et al.*, 1999: 7). The following collections represent a significant range extension to West Maui.

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1. All notes in this issue constitute Contribution No. 2002-009 to the Hawaii Biological Survey.

Material examined. **MAUI**: West Maui, Lahaina Distr., Lahaina Town, growing in lawn and rock wall, 22 Oct 1999, *Oppenheimer H109909*; Honokahua, lawn weed at Kapalua Resort, 24 m, 13 Aug 2000, *Oppenheimer H80019* (PTBG).

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

In their discussion of Acanthaceae, Wagner *et al.* (1999: 167) did not consider this species (as *O. strictum* (Nees) Kuntze) to be naturalized in Hawai'i. Lorence *et al.* (1995: 20) later reported naturalized populations on Kaua'i, and noted the change in name. The following collections document its occurrence on Maui, where it forms small but solid stands in low elevation, wet sites in secondary forest away from homes and parks.

Material examined. **MAUI**: East Maui, Hāna Distr., Maka'alae, 0–100 ft (0-31 m), 27 Oct 1987, *Flynn & Sidler 2577*; Kāki'o, near roadside in dense shade, 27 m, 27 Nov 1999, *Oppenheimer H119920*; Wailua, Honolewa Stream, near the road, 104 m, 28 Nov 1999, *Oppenheimer H119923*.

Ruellia brittoniana Leonard **New island record**

Easily escaping from cultivation and naturalized on Midway Atoll, Kaua'i, and O'ahu (Wagner *et al*., 1999: 174), *R. brittoniana* has recently been observed on Maui volunteering in a yard and at the edge of an adjacent paved road. The tenant complained that plants appeared randomly and frequently throughout the property, and that he couldn't seem to get rid of it. Another large population has been observed in an old reservoir in Wailuku District, also on West Maui (F. Duvall, pers. comm.).

Material examined. **MAUI**: West Maui, Lahaina Distr., Lahaina Town, 6 m, 17 Jul 2000, *Oppenheimer H70094* (BISH, PTBG).

Amaranthaceae

Alternanthera pungens Kunth **New island record**

Khaki weed was previously known from O'ahu, Moloka'i and Hawai'i (Wagner *et al.*, 1999: 185). It was later documented from Kaua'i by Lorence & Flynn (1999: 3), and from Maui by Pu'u Kukui Watershed staff (Oppenheimer & Bartlett 2000: 1) Elsewhere in this years *Records* a range extension to East Maui is reported (F. Starr & K. Martz, in press). We now report a collection from the island of Lāna'i.

Material examined. **LĀNA'I**: Kaumalapau Harbor, 6 m, 24 Oct 1999, *Oppenheimer H109916*.

Apiaceae

Hydrocotyle bowlesioides Mathias & Constance **New island records**

The distribution of this taxon was known to be Kaua'i, O'ahu , and Hawai'i (Wagner *et al.,* 1999: 205). The following collections document it's occurrence on the islands of Lāna'i and Maui.

Material examined. **LĀNA'I**: Kō'ele, 518 m, growing under *Bougainvillea*, 24 Oct 1999, *Oppenheimer H109910*; **MAUI**: West Maui, Lahaina Distr., Honokahua, Kapalua Village Golf Course, 110 m, common at edges of fairways, 4 Mar 2000, *Oppenheimer H30001*; Kapalua Bay Golf Course, 49 m, common at edges of fairways, 7 Mar 2000, *Oppenheimer H30002*; edge of lawn near intersection of lower Honoapi'ilani Rd. & Office Rd., 24 m, 19 Jul 2000, *Oppenheimer, R. Bartlett, & J. Kunna H70098* (PTBG).

Arecaceae

Washingtonia H. Wendl.

There was no mention of the genus *Washingtonia* in the treatment of the Arecaceae by

Read & Hodel (1999: 1361). The genus name honors George Washington, first president of the United States (Little, 1980: 325). There are 2 species recognized (L.H. Bailey Hortorium, 1976: 1167–1168), and allegedly a hybrid, *Washingtonia* ×*filibusta*. Both species are grown as ornamentals and are now naturalized in the area between Ukumehame and Nāpili, West Maui. Specimens of both taxa growing at Hale Paʻahaʻo, Lahaina, are on the Maui Exceptional Tree list (Outdoor Circle, 1991). Plants have been observed in hot, dry areas, as well as along the shoreline, and at the margins of streams. Numerous seedlings can sometimes be seen far from mature trees, and it is not always possible to assign young plants to species (i.e., *Oppenheimer H69808*). *Washingtonia* are tall palms with solitary trunks, commonly growing to heights of 80 ft. or more, and collecting complete, mature specimens is difficult. The following key will help distinguish between the two species; both have spines along the petioles. Flowers are on pendant clusters up to 12 ft. long; the fruits are dark, ovoid drupes about one-quarter inch long, and are edible raw or cooked (Roberts, 1989: 94). Undoubtedly, collectors will find other naturalized populations.

KEY TO THE SPECIES OF *WASHINGTONIA*

1. Trunk slender, tapered from a stout base; leaf blades bright green, hastula tawny beneath ..... *W. robusta*

1. Trunk stout without a broader base; leaf blades gray-green, lacking a tawny patch beneath the hastula..... *W. filifera*

Washingtonia filifera (L. Linden) H. Wendl. **New naturalized record**

The Desert, Northern, or California Fan Palm, native to the American Southwest (L.H. Bailey Hortorium, 1976: 1168), is the largest native palm in the continental United States (Little, 1980: 325). The old, dried out leaves can persist for years as an evenly thatched "petticoat" that tapers inward somewhat at the base when the lower trunk is bare. Loope (1992: 17) reported the need for localized control of *W. filifera* at Death Valley National Monument, where it has apparently been introduced.

Material examined. **MAUI**: West Maui, Lahaina Distr., Olowalu, near sea level, 27 Mar 2000, *Oppenheimer H30016*.

Washingtonia robusta H. Wendl. **New naturalized record**

The Thread, Skyduster, or Mexican Fan Palm is endemic to Mexico. It frequently volunteers in sidewalk cracks, and between walls, power poles, and fences. Old petiole bases sometimes form a crisscross pattern at the base of the trunk, and the old leaves can persist as a ragged, uneven shag. The leaf blades have less divided segments with fewer filaments than *W. filifera* (L.H. Bailey Hortorium, 1976: 1168; Roberts, 1989: 94); it is also more salt-tolerant (Little, 1980: 326).

Material examined. **MAUI**: West Maui, Lahaina Distr., Lahaina Town, along Honoapiʻilani Hwy. near Lahaina Aquatic Center, 11 m, 25 Jul 1998, *Oppenheimer H79808*.

Asteraceae

Ageratina riparia (Regel) R. King & H. Rob. **New island record**

Wagner *et al*. (1999: 255) reported this species as being naturalized on Oʻahu, Molokaʻi, Maui, and Hawaiʻi. Later, Herbst & Wagner (1996: 9) documented it from Kauaʻi. Now it has been collected on Lānaʻi as well.

Material examined. **LĀNAʻI**: N side of Lānaʻihale, 817 m, 25 Oct 1999, *Oppenheimer H109924*.

Elaphantopus mollis Kunth **New island record**

This taxon was previously known to be naturalized on Kauaʻi, Oʻahu, Molokaʻi, Maui, and Hawaiʻi (Wagner *et al*., 1999: 310). We now report a collection from the island of Lānaʻi.

Material examined. **LĀNAʻI**: woods near Kōʻele, 519 m, 25 Oct 1999, *Oppenheimer H109931*.

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

Occurring on Kauaʻi, Oʻahu, and Maui, (Wagner *et al.*, 1999: 312), this taxon has now been collected on the Big Island.

Material examined. **HAWAIʻI**: South Hilo Distr., Waiākea, common on roadsides and in empty lots, 31 m, 21 Apr 2000, *Oppenheimer H40019*.

Pluchea indica (L.) Less. **New island record**

Indian fleabane is "naturalized . . . on Midway Atoll, Laysan, and probably all of the main islands but not documented from Hawaiʻi" (Wagner *et al*., 1999: 351). The following collection documents its occurrence there.

Material examined. **HAWAIʻI**: South Hilo Distr., Keaukaha, E of Loko Waka Pond, near sea level, in degraded *Scaevola* coastal shrubland, 23 Apr 2000, *Oppenheimer H40023*.

Senecio madagascariensis Poir. **Range extension**

The first record of *S. madagascariensis* naturalized in the Hawaiian Islands was made by Lorence *et al*. (1995: 24), who cited populations on both Kauaʻi and Hawaiʻi. Starr *et al*. (1999: 11) later documented it from Maui, reporting populations and a collection made on East Maui. The following West Maui collection represents a significant range extension.

Material examined. **MAUI**: West Maui, Lahaina Distr., Kahana Valley, S side, on road to Honokōhau Tunnel, 238 m, 10 Mar 2000, *Oppenheimer H30004*.

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

Commonly cultivated as a groundcover, but reported (as *Wedelia trilobata* (L.) Hitchc.) by Wagner *et al.* (1999: 373, 375) to have escaped on Midway Atoll and probably all the main islands, although naturalized collections at BISH were only from Kauaʻi and Oʻahu. Wagner *et al.* later discussed the change in taxonomy (1997: 55). Imada *et al*. (2000: 10) subsequently documented it from the Big Island. The following specimens represent naturalized populations on both West and East Maui.

Material examined. **MAUI**: West Maui, Lahaina Distr., Moʻomoku, N of Honokōwai Valley, along the road to Haelaʻau Cabin (Kaulalewelewe), 640 m, 30 Sep 1999, *Oppenheimer H99927*; Honokahua, dense mats in abandoned pineapple field, 85 m, 11 Aug 2000, *Oppenheimer H80013* (PTBG); East Maui, Hāna Distr., coastal pastures SE of Kaʻuiki, Kaihalulu Bay to Ka iwi o Pele, 0–120 ft [0–37 m], 22 Oct 1987, *Flynn & From 2543*; Nāhiku, Hanawī Stream, 3 m, 11 Mar 2000, *Oppenheimer & J. Price H30007*.

Brassicaceae

Brassica rapa L. **Range extension**

Wagner *et al*. (1999: 400) reported the distribution (as *B. campestris* L.) of field mustard in the Hawaiian Islands as Pearl and Hermes Atoll, Kauaʻi, Oʻahu, Molokaʻi, Lānaʻi, and Hawaiʻi. Wagner & Herbst (1995:17) later cited a collection from East Maui, as well as the change in name. The following specimen represents a significant range extension to West Maui.

Material examined. **MAUI**: West Maui, Wailuku Distr., Kahakuloa, N of Makamakaʻole Stream, 366 m, roadside weed in new subdivision, 26 Dec 1999, *Oppenheimer H129905*.

Buddleiaceae

Buddleia asiatica Lour. **New island record**

Naturalized on Oʻahu, Molokaʻi, Maui, and Hawaiʻi (Wagner *et al*., 1999: 416), this species is now known to occur on Lānaʻi as well.

Material examined. **LĀNAʻI**: Munro Trail, 1006 m, 25 Oct 1999, *Oppenheimer H109929.*

Cactaceae

Opuntia ficus-indica (L.) Mill. **New island record**

This taxon was reported by Wagner *et al*. (1999: 420) as naturalized on Kauaʻi, Oʻahu, Maui, Kahoʻolawe, and Hawaiʻi. Hughes (1995: 2–3) later documented it from the island of Molokaʻi. The following specimen represents a new record for Lānaʻi.

Material examined. **LĀNAʻI**: Keōmoku Rd., 364 m, in *Dodonaea* shrubland, 24 Oct 1999, *Oppenheimer H109914.*

Caprifoliaceae

Sambucus mexicana K. Presl ex DC. **Range extension**

Previously known from Kauaʻi, Oʻahu, East Maui, and Hawaiʻi (Wagner *et al.* 1999: 495), a small population on West Maui has recently been documented.

Material examined. **MAUI**: West Maui, Lahaina Distr., Paunau, Kahoma Stream, at the water intake, 588 m, 6 Apr 2000, *Oppenheimer et al. H40006*.

Casuarinaceae

Casuarina cunninghamia Miq. ×***glauca*** Sieber ex Spreng. **New island record**

Lorence *et al*. (1995: 31) first reported this hybrid as naturalized in the Hawaiian Islands, citing a collection from Kauaʻi. Little & Skolmen (1989: 88) stated that many of the ironwoods planted in Hawaiʻi may be of hybrid origin. The following collection displays features of both species and represents a new record for the island of Maui, where it is reproducing vegetatively via root suckers.

Material examined. **MAUI**: West Maui, Lahaina Distr., ʻAlaeloa, S side of Kaʻōpala Gulch, 91 m, forming dense stands at edge of pineapple fields, 25 Aug 1999, *Oppenheimer H89937*.

Ceratophyllaceae

Ceratophyllum demersum L. **Range extension**

Wagner *et al*. (1999: 533) stated that this aquatic has been collected at Kanahā Pond, Maui, and Hilo and Waipiʻo Valley on the island of Hawaiʻi. The following collection extends the known range of this species to West Maui, where it dominates the bottom of a lagoon in a resort golf course.

Material examined. **MAUI**: West Maui, Lahaina Distr., Hanakaʻōʻō, 6 m, S end of lagoon, Kāʻanapali Resort, 14 Oct 1999, *Oppenheimer H109906*.

Chenopodiaceae

Salsola tragus L. **New island record**

Pat Bily of The Nature Conservancy of Hawaiʻi (pers. comm.) first brought our attention to the presence of this taxon on Maui. Wagner *et al.* (1999: 541) reported it only from Waimea, Hawaiʻi, as *S. kali* L. The reidentification was made by Wagner *et al*. (1997: 55-

56); and it was later documented by Herbst & Wagner (1999: 19) from Kahoʻolawe.

Material examined. **MAUI**: East Maui, Makawao Distr., Pūlehu Nui, roadside weed on Holopuni Rd., 274 m, 13 May 2000, *Oppenheimer H50014*.

Convolvulaceae

Dichondra micrantha Urban **New naturalized record**

There was no mention of the genus *Dichondra* in the discussion of the Convolvulaceae by Austin (1999: 549). Along with the genus *Falkia*, it comprises the tribe Dichondreae; both genera are sometimes separated as a distinct family, the Dichondraceae (Heywood, 1993: 230). This small, creeping herb superficially resembles, and on Maui sometimes grows with, *Centella asiatica* (L.) Urb., or *Hydrocotyle sibthorpioides* Lam., and the similarity is likely responsible for it escaping detection. Compared with these taxa, *Dichondra micrantha*, a native of the West Indies, has darker green leaves with entire margins; the flowers are solitary. It seems to thrive in sunny or shaded lawns and pastures where it forms dense mats. Collectors will probably find populations naturalized on other islands as well.

Material examined. **Oʻahu**: Honolulu, University of Hawaii campus, Mānoa, in wet areas of lawn in medial strip, across St. John Hall, 8 Jun 2000, *Oppenheimer & J. Kunna H60038*; **MAUI**: West Maui, Wailuku Distr., Waikapū, 122 m, forming dense mats in lawn with *Calyptocarpus vialis, Erigeron bellioides, & Centella asiatica*, 10 Apr 2000, *Oppenheimer H40011*; East Maui, Makawao Distr., NW slope of Haleakalā, mat forming, node-rooting herb, weeds in pasture, 3700 ft [1128 m], 4 Aug 1967, *Iltis H444-A*; Aʻapueo, 689 m, creeping herb forming dense mats in lawn and under trees, 2 Apr 2000, *Oppenheimer H40003;* 4 Jun 2000, *Oppenheimer H60024* (PTBG).

Ipomoea triloba L. **New island record**

According to Wagner *et al.* (1999: 560), this species has been collected on Midway Atoll, Kauaʻi, Oʻahu, and Maui. The following collections document a new record for the Big Island.

Material examined. **HAWAIʻI**: South Hilo Distr., Waiākea, 31 m, locally common roadside weed, 21 Apr 2000, *Oppenheimer H40021*; Hilo, at edge of lawn, near sea level, 24 Apr 2000, *Oppenheimer H40025*.

Crassulaceae

Bryophyllum daigremontianum **New island record**

(Raym.-Hamet & H. Perrier) A. Berger

This succulent species was first documented from Kauaʻi by Lorence *et al*. (1995: 33) as *Kalanchoë daigremontiana* Raym.-Hamet & H. Perrier. On Lānaʻi, it has apparently escaped from a nearby residence, and grows on dry cliffs and roadcuts in the Kaumalapau Harbor area. Elsewhere in this year's *Records* (Staples *et al*., 2002: 9) the change in name is reported, as well as a new record for the island of Oʻahu.

Material examined. **LĀNAʻI**: Kaumalapau, 24 m, on roadcut and cliffs, 24 Oct 1999, *Oppenheimer H109919*.

Cucurbitaceae

Sicyos hispidus Hillebr. **Range extension**

Previously reported from Molokaʻi, Lānaʻi, Maui in the valley area from Kahului and Kīhei, and in the North Kona area, Hawaiʻi (Wagner *et al*., 1999: 577), this taxon is locally and seasonally abundant in gulches at lower elevations in the Līhau Section of the West Maui Natural Area Reserve.

Material examined. **MAUI**: West Maui, Lahaina Distr., Kanahā Gulch, 274 m, 2 Feb 1986, *R. Hobdy 2498*; Olowalu, West Maui Natural Area Reserve-Līhau Section, gulch N of middle ridge, 335 m, 2 Apr 1999, *Oppenheimer & J. Price H49901*.

Cyperaceae

Cyperus gracilis R. Br. **New island record**

Known from Kauaʻi, Oʻahu, and Maui (Wagner *et al*., 1999: 1396), McCoy grass is not uncommon in lawns around Lānaʻi City and Kōʻele.

Material examined. **LĀNAʻI**: Lānaʻi City, 488 m, 24 Oct 1999, *Oppenheimer H109912***.**

Fimbristylis aestivalis (Retz.) Vahl **New island record**

Naturalized only on Kauaʻi (Wagner *et al*., 1999: 1404), this taxon is now known from the Big Island, where it was locally abundant at the collection locality.

Material examined. **HAWAIʻI**: South Hilo Distr., Waiākea, 31 m, roadside weed, 21 Apr 2000, *Oppenheimer H40020*.

Euphorbiaceae

Phyllanthus tenellus Roxb. **New island record**

Wagner *et al.* (1999: 628) stated that the distribution of this taxon was Kauaʻi, Oʻahu, and perhaps other islands. Puʻu Kukui Watershed staff subsequently documented it from Maui (Oppenheimer *et al.*, 1999: 8) and Hawaiʻi Island (Oppenheimer & Bartlett, 2000: 5). Now we report a collection from Lānaʻi.

Material examined. **LĀNAʻI**: Kōʻele, 518 m, 24 Oct 1999, *Oppenheimer H109911*.

Fabaceae

Acacia farnesiana (L.) Willd. **New island record**

Widespread in the Hawaiian Islands, Wagner *et al*. (1999: 641) reported *klu* from Midway Atoll, and all the main islands except Niʻihau and Lānaʻi. However, Smith (1985: 183) had earlier reported dense infestations in some overgrazed areas on Lānaʻi. The following collections document its occurrence there, where it is a common element of the *Prosopis* Coastal Forest.

Material examined. **LĀNAʻI**: Polihua Rd., 31 m, 24 Oct 1999, *Oppenheimer H109913*; along road above Mānele Bay, 122 m, 25 Oct 1999, *Oppenheimer H109920.*

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

Naturalized in low-elevation disturbed areas, at least on Midway Atoll, Kauaʻi, Oʻahu, and Hawaiʻi (Wagner *et al*., 1999: 644), siris tree is now known from West Maui. As this manuscript was being prepared (October 2000), more than half of this naturalized population was being bulldozed as the property was being developed.

Material examined. **MAUI**: West Maui, Lahaina Distr., Puʻunoa, S of Kahoma Stream, 6 m, different size classes in vacant lot, 7 Jul 2000, *Oppenheimer H70060* (BISH, PTBG).

Canavalia sericea A. Gray **Range extension**

According to Wagner *et al.* (1999: 655) silky jackbean is naturalized on Oʻahu and between Waiheʻe Beach and Kahului on Maui. The collections cited here represent a significant range extension to Hāna in East Maui, where it forms locally dense mats in strand vegetation. Wagner & Herbst also reported it from Kauaʻi (1995: 19).

Material examined. **MAUI**: East Maui, Hāna Distr., Hāmoa, 0–100 ft [0–31 m], 27 Oct 1987, *Flynn & Sidler 2562*; Haneoʻo, S of Koki, 1 m, 27 Nov 1999, *Oppenheimer H119922*.

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

Previously known to be naturalized (as *Paraserianthes falcataria* (L.) I. Nielsen) on the islands of Kauaʻi, Oʻahu, Molokaʻi and Hawaiʻi (Wagner *et al.*, 1999: 690), the change in taxonomy was reported by Herbarium Pacificum Staff (1998: 10). Little & Skolmen (1989: 136) reported that plants become established naturally wherever there are seed trees. So far, it is only known from one population on West Maui, spreading from what was a single tree 20 years ago (W. Nohara, pers. comm.).

Material examined. **MAUI**: West Maui, Lahaina Distr., Honokōhau, Pōhakupule Gulch, 183 m, 2 May 2000, *Oppenheimer H50003*.

Medicago rugosa Desr. **New island record**

Originally reported from Oʻahu and Hawaiʻi (Wagner *et al.*, 1999: 686), this species was later documented from Kauaʻi by Lorence & Flynn (1997: 10). Now it is naturalized on Maui, as well.

Material examined. **MAUI**: West Maui, Lahaina Distr., Honokahua, near Makāluapuna Pt., 6 m, at edge of golf course near coastal bluffs, 3 May 2000, *Oppenheimer H50004*.

Paraserianthes lophantha (Willd.) I. Nielsen subsp. ***montana*** (Jungh.) I. Nielsen **New naturalized record**

In their discussion of the genus *Paraserianthes*, Geesink *et al.* (1999: 690) reported that this taxon had been planted by state foresters and was now extensively reproducing at several sites on Maui, but not spreading. As such, they did not treat it as naturalized. In Kula Forest Reserve, there are a number of places where different size classes can be observed colonizing available gaps in areas surrounded by tall, dense forestry plantings. It is well established and locally abundant, and should be considered a naturalized component of the Hawaiian flora. The genus is now considered monotypic, with four varieties (Barneby & Grimes, 1996: 256). The nominate subspecies *lophantha* is invasive in New Zealand (Atkinson, 1997: 31; C. Buddenhagen, pers. comm.).

Material examined. **MAUI**: East Maui, Makawao Distr., Kamaʻole, Kula Forest Reserve, along the Plum Trail, 1707 m, 7 Jul 2000, *Oppenheimer H70074* (BISH, PTBG), Haleakalā Ridge Trail, 1920 m, 7 Jul 2000, *Oppenheimer H70077* (BISH, PTBG).

Pithecellobium dulce (Roxb.) Benth. **New island record**

Known from all of the main islands except Lānaʻi and Kahoʻolawe (Wagner *et al*., 1999: 692), opiuma is here documented as occurring on Lānaʻi.

Material examined. **LĀNAʻI**: Kaumalapau Harbor, 12 m, 24 Oct 1999, *Oppenheimer H109917*.

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

Previously recorded as naturalized on the islands of Oʻahu and Hawaiʻi (Wagner *et al.*, 1999: 696), monkeypod was later reported to occur on Kauaʻi by Lorence *et al.* (1995: 37). A popular and widely planted ornamental tree, *Samanea saman* produces copious amounts of viable seed, and young plants can be seen beneath mature trees in urban, roadside, and resort areas. Most of these seedlings are destroyed during routine landscaping maintenance.

Material examined. **MAUI**: West Maui, Lahaina Distr., Kahana Valley, 37 m, along valley bottom, 5 Apr 2000, *Oppenheimer & J. Kunna H40004*.

Iridaceae

Watsonia borbonica (Pourr.) Goldblatt **Range extension**

Wagner *et al*. (1999: 1449) gave Olinda, East Maui as the naturalized range of this South African species. Lorence *et al*. (1995: 39) later documented its occurrence on Kaua‘i. We now report that it is also locally naturalized on West Maui, where it was introduced sometime after Haela‘au Cabin was built in 1928. This taxon spreads vegetatively and also produces viable seed, which has been collected and germinated in approximately 90 days.

Material examined. **MAUI**: West Maui, Lahaina Distr., Haela‘au, 18 Feb 1999, *C. R. Annable, H. Oppenheimer & G. Ray 3923*; Kaulalewelewe, 908 m, 5 Feb 2000, *Oppenheimer H20003*.

Juncaceae

Juncus planifolius R. Br. **New island record**

Naturalized on Kaua‘i, O‘ahu, Molokai, Maui, and Hawai‘i (Wagner *et al.* 1999: 1454), *Juncus planifolius* has recently been collected on Lāna‘i.

Material examined. **LĀNA‘I**: Munro Trail, N side of Lāna‘ihale, 823 m, 25 Oct 1999, *Oppenheimer H109925.*

Liliaceae

Asparagus plumosus J.G. Baker **Range extension**

First documented as naturalized in Hawai‘i (as *A. setaceus* (Kunth) Jessop) by Lorence *et al*. (1995: 40), the change in name was later reported by Imada *et al*. (2000: 13) as well as a new record for O‘ahu. Pu‘u Kukui Watershed staff have also reported it from West Maui (Oppenheimer & Bartlett, 2000: 6) as a new island record. The following collection represents a significant range extension to East Maui. Elsewhere in this year’s *Records* Starr *et al.* (2002) report a new record for the island of Hawai‘i.

Material examined. **MAUI**: East Maui, Hāna Distr., Naholokū, Kaupō Gap, 299 m, on rock walls, 3 Jun 2000, *Oppenheimer, B. Haus, & P. Welton H60023*.

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

Previously documented from the islands of Kaua‘i and Hawai‘i (Wagner *et al.*, 1999: 1463) as *H. puniceum* (Lam.) Voss, the change in name was later reported by Herbst & Wagner (1999: 23).

Material examined. **MAUI**: West Maui, Lahaina Distr., Kahana, near the confluence of Kahana & Kahana iki Gulches, on steep slope and in *Leucaena* thicket, adjacent to pineapple fields, 61 m, 5 Apr 2000, *Oppenheimer & J. Kunna H40005*; East Maui, Hāna Distr., Naholokū, Kepi‘o, along road to Kaupō Gap Trail, 189m, 26 Nov 1999, *Oppenheimer H119918*; Kaumakani, in pasture E of ‘Ohe‘o, 31 m, 26 Nov 1999, *Oppenheimer H119919*; Kāki‘o, near the road on a steep, rocky slope, 27 m, 27 Nov 1999, *Oppenheimer H119921*

Lythraceae

Cuphea carthagenensis (Jacq.) J. Macbr. **New island record**

According to Wagner *et al.* (1999: 866), this taxon is naturalized on Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i. The following collections document its occurrence on Lāna‘i also.

Material examined. **LĀNA‘I**: Munro Trail, N side of Lāna‘ihale, 817 m, 25 Oct 1999, *Oppenheimer H109923*; same loc., 1000 m, *Oppenheimer H109925*.

Myrtaceae

Metrosideros polymorpha Gaud. **New island record**

var. ***macrophylla*** (Rock) H. St. John

This variety was previously thought to be endemic to the island of Hawai‘i (Wagner *et al*., 1999: 969). It is now known to occur along summit ridges of West Maui in windswept wet forests and shrublands, as well as wet forests on East Maui.

Material examined. **MAUI**: West Maui, Lahaina Distr., ridgetop dividing Honokōhau and Waihe‘e Valleys, 1585 m, 27 Jan 1998, *Oppenheimer & S. Perlman 301*; Wailuku Distr., ‘Īao Valley, along upper rim SW of Pu‘u Kukui, 1737m, 16 Feb 2000, *Oppenheimer H20004*; East Maui, Hāna Distr., Waiho‘i Valley, S fork of Waiohonu, 625 m, 15 Jun 1972, *B. Harrison 32*.

Nyctaginaceae

Boerhavia coccinia Mill. **New island record**

Documented from Kaua‘i, O‘ahu, Maui, Kaho‘olawe, and Hawai‘i (Wagner *et al*., 1999: 978), the following collection is a new record for Lāna‘i.

Material examined. **LĀNA‘I**: Kaumalapau Harbor, 6 m, 24 Oct 1999, *Oppenheimer H109915.*

Passifloraceae

Passiflora foetida L. **New island record**

Wagner *et al.* (1999: 1011) reported this taxon as naturalized on Ni‘ihau, Kaua‘i, O‘ahu, Maui, and Hawai‘i. It was later reported from Moloka‘i by Herbarium Pacificum Staff (1996: 6). Now it is also known from Lāna‘i.

Material examined. **LĀNA‘I**: Along road above Mānele Bay, 122 m, 25 Oct 1999, *Oppenheimer H109921*.

Piperaceae

Peperomia obovatilimba C. DC **Correction**

Reported by Wagner & Herbst (1995: 23) as a range extension to West Maui, this taxon should still be considered endemic to East Maui and the Kohala Mountains of Hawai‘i. Apparently the specimen label for *Hobdy 2648* (BISH) is in error; both the Ko‘olau Forest Reserve and Halehaku Gulch are on East Maui.

Poaceae

Brachiaria plantaginea (Link) Hitchc. **New island record**

First reported in Hawai‘i by Wagner & Herbst (1995: 23-4); they cited collections from O‘ahu and Moloka‘i. It is now known from Maui as well.

Material examined. **MAUI**: West Maui, Wailuku Distr., Waikapū, near S end of golf course, vicinity Ka‘onohua Gulch, 122 m, 16 Oct 1999, *Oppenheimer H109908*.

Dichanthium annulatum (Forssk.) Stapf **New island record**

Angleton grass was known to be naturalized on O‘ahu (Wagner *et al.*, 1999: 1528). It was later documented from Moloka‘i by Hughes (1995: 8). On West Maui, it was not uncommon in the collection locality, and was observed to be colonizing potholes and cracks in old asphalt, along with other alien vegetation.

Material examined. **MAUI**: West Maui, Lahaina Distr., Hanaka‘ō‘ō, near sea level at the old Kā‘anapali Airport, 29 Apr 2000, *Oppenheimer H40028*.

Stenotaphrum secundatum (Walter) Kuntze **Range extension**

Previously documented from Midway Atoll, Kaua‘i, O‘ahu, Moloka‘i, Lāna‘i, and Hawai‘i (Wagner *et al*., 1999: 1598), Pu‘u Kukui Watershed staff recently reported naturalized populations on East Maui (Oppenheimer & Bartlett, 2000: 7–8). The following collection represents a range extension to West Maui.

Material examined. **MAUI**: West Maui, Lahaina Distr., Honokahua, Oneloa, near sea level, on dunes in *Scaevola* coastal shrubland, 3 May 2000, *Oppenheimer H50005*.

Polygonaceae

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

In the notes under Polygonaceae, Wagner *et al.* (1999: 1059) stated that although sea grape produces abundant fruit, seedlings had not been observed, and it was therefore not considered a naturalized taxon in the Hawaiian Islands. Herbst (1998: 3) later reported that it was indeed naturalized, at least on O‘ahu. Little & Skolmen (1989: 116) stated that *C. uvifera* “ in Hawai‘i…escapes and becomes naturalized locally…and may be seen along most shorelines”. Trees are producing viable seed at several sites where this species has been planted on Maui, with abundant seedlings beneath mature trees (*Oppenheimer H89912*, *H89920*, *H99912*). These do not represent truly naturalized populations, as most seedlings are destroyed during routine landscaping maintenance. However, at least one location is well established; it probably represents escapes from nearby resort plantings. Seedlings have also been observed at the mouth of Honokōhau Stream. Elsewhere in this year’s *Records* it is documented from Midway Atoll and the island of Hawai‘i (Starr et al., 2002: 24).

Material examined. **MAUI**: West Maui, Lahaina Distr., Nāpili, vicinity of Namalu Bay, in *Scaevola* coastal shrubland, 18–21 m, 28 Mar 2000, *Oppenheimer H30017, H30018*.

Persicaria capitata (Buch.-Ham. ex D. Don) Masam. **New island record**

Wagner *et al*. (1999: 1063) stated that this species was cultivated on O‘ahu, Maui, and Hawai‘i (as *Polygonum capitatum* Buch.-Ham.), but was only naturalized on the latter island. The change in taxonomy was by Ronse Decraene & Akeroyd (1988). The specimen cited here was collected from a small population in an area miles away from any homes or parks and cannot be considered to be under cultivation.

Material examined. **MAUI**: East Maui, Makawao Distr., Ka‘ono‘ulu, along Waipoli Rd., in pasture, 1725 m, 7 Jul 2000, *Oppenheimer H70069* (BISH, PTBG).

Rosaceae

Rosa ×damascena Mill. **New naturalized record**

Maui’s official island flower, the *lokelani*, is native to Eurasia and was first introduced to Hawai‘i by missionaries in the 1820s (Kepler, 1995: 50). The flowers are pink, double, and fragrant. It is now known to be naturalized in one location on West Maui, in an area over a mile away from Kahoma Cabin, the nearest sign of civilization, where it was not observed to be under cultivation. Until the relatively recent invasion by feral pigs, the area of infestation was pristine *Metrosideros/Dicranopteris* Forest. Plants were noted to be sprawling over *uluhe* and emerging from bare ground created by pig activity, growing with *Rubus rosifolius*, *Tibouchina herbacea*, and *Buddleia asiatica*.

Material examined. **MAUI**: West Maui, Lahaina Distr., ridgetop between Keali‘i and Hahakea Gulches, 945 m, 11 Apr 2000, *Oppenheimer, M. Collins, & J. Kunna H40012*.

Rubiaceae

Hedyotis callitrichoides (Griseb.) W. Lewis **Range extension**

Recently naturalized on Oʻahu and at Kahului, Maui (Wagner *et al.*, 1999: 1139), the following collection represents a significant range extension to West Maui. It has also been observed in Nāpili.

Material examined. **MAUI**: West Maui, Lahaina Distr., ʻAlaeloa, in lawn and spreading onto sidewalk, 26 m, 16 Jul 2000, *Oppenheimer H70092* (BISH, PTBG).

Hedyotis corymbosa (L.) Lam. **Range extension**

Naturalized at Honolulu, Oʻahu, Waiʻanapanapa, East Maui, and Hilo to Volcano, Hawaiʻi (Wagner *et al*., 1999: 1141), the following collections document its occurrence on West Maui. It has also been reported from Kauaʻi by Lorence *et al.* (1995: 50). Elsewhere in this years *Records* a range extension to Kona, Hawaiʻi is reported (Starr *et al*., 2002: 24).

Material examined. **MAUI**: West Maui, Lahaina Distr., Lahaina Town, in sidewalk landscaping, 6 m, 29 Mar 2000, *Oppenheimer H30019*; Hanakaʻōʻō, in lawn in Kāʻanapali, 3 m, 17 Apr 2000, *Oppenheimer H40018*; Moaliʻi, near bathrooms at Mala Wharf, 3 m, 24 Jul 2000, *Oppenheimer H700108* (PTBG).

Urticaceae

Pilea microphylla (L.) Liebm. **New island record**

Occurring on Kauaʻi, Oʻahu, Maui, and Hawaiʻi, but probably all of the main islands (Wagner *et al*., 1999: 1306), this taxon has also been documented from Midway Atoll: first from Sand Island by Wagner & Herbst (1995: 26), and later from Eastern Island by Shannon & Wagner (1996: 14). The following specimen is a new record for the island of Lānaʻi.

Material examined. **LĀNAʻI**: Kōʻele, on rocks with *Youngia, Portulaca* , and *Calyptocarpus*, 518 m, 25 Oct 1999, *Oppenheimer H109930*.

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Additions to the flora of the Hawaiian Islands

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The following collections represent new additions to the flora of the Hawaiian Islands or new range extensions for previously documented species. The first set of the authors' collections is deposited in the herbarium of the National Tropical Botanical Garden (PTBG). The disposition of duplicates and other specimens cited is noted after the collector's number under material examined.

Agavaceae

Sansevieria trifasciata Prain **New island record**

This is a new island record for this species. Imada *et al*. (2000: 9) reported the first record of *Sansevieria* naturalizing in the Hawaiian Islands with a single collection from Sunset Beach on O‘ahu. As they noted, a number of other populations on the island of O‘ahu appear to have spread from ornamental plantings. This collection from secondary vegetation near coffee fields along Niho Road in Kalāheo appears to have naturalized from discarded yard trimmings. At this time it seems to be spreading only by vegetative means and has not yet been found with flowers or fruit.

Material examined. **KAUA‘I**: Kōloa Distr., Kalāheo, lower Kalāheo along Niho Road above Kauai Coffee fields, naturalized locally from yard trimmings, ca 130 m, 22 Nov 2000, *D. Lorence 8507* (BISH, NY, US).

Araceae

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

This species as well as the following species represent new naturalized state records for the genus *Philodendron* Schott. *P. erubescens* has become sparingly naturalized along

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Pu‘u Road in Kalāheo. Found in secondary vegetation along the roadside, it has presumably established from discarded garden clippings and seems to be spreading at least vegetatively. It is quite conspicuous in the Pu‘u Road area where it climbs into the tree canopy and the bright pinkish-bronze new leaves and bracts are readily visible.

Material examined. **KAUA‘I**: Kōloa Distr., Kalāheo, along Pu‘u Road ca 0.8 mi from the northernmost junction with Papalina Road, secondary vegetation of *Syzygium cuminii, Leucaena leucocephala, Ficus microcarpa, Schefflera actinophylla, Syngonium sp*., and *Scindapsus aureus*, ca 189 m, 14 Nov 2000, *T. Flynn 6761*.

Philodendron pinnatifidum (Jacq.) Schott **New naturalized record**

This collection represents a new naturalized state record for the species. As with most of the other naturalized aroids that are grown primarily as landscape plants, it appears that *P. pinnatifidum* has spread from discarded garden clippings. Further supporting this scenario is the fact that it was collected at the margin of an illegal dump along Pu‘u Road in Kalāheo that contained a wide variety of garden refuse.

Material examined. **KAUA’I**: Kōloa Distr., Kalāheo, along Pu‘u Road ca 0.9 mi from the northernmost junction with Papalina road, secondary vegetation of *Syzygium cuminii, Leucaena leucocephala, Grevillea robusta, Panicum maximum*, and *Scindapsus aureus*, ca 189 m, 14 Nov 2000, *T. Flynn 6762*.

Hypoxidaceae

Molineria capitulata (Lour.) Herb. **New naturalized record**

Syn. *Curculigo capitulata* (Lour.) Kuntze; *Molineria recurvata* (Dryand.) W.T. Aiton

Native to a wide region across India and Southeast Asia as far as northern Queensland, Australia, *M. capitulata* has been cultivated as an ornamental in the Hawaiian Islands for a very long time. These collections represent the first evidence that it has naturalized in at least three localities on Kaua‘i. It would be interesting to observe how this species is reproducing, as it rarely produces seed in cultivation.

Plants are coarse, acaulescent herbs with distinctive palm-like foliage, the leaves 2–4.5 ft long, the blades elliptic, lengthwise-pleated, concealing the inflorescences, which are head-like and hidden among the leaf bases. Flowers are 6-tepalled, yellow, less than 1*”* across, sweetly-scented, and (rarely) followed by white berries about 0.25*”* long.

Material examined. **KAUA‘I**: Līhu‘e Distr., Kīpū Road, near entrance to Rice Ranch around Kīpū, on roadside bank, ca 150 m, 4 Mar 1988, *D. Lorence et al. 5838*; Hanalei Distr., Ha‘ena, abundantly naturalized along Limahuli Stream *mauka* of Kūhiō Hwy., ca 20 ft, 29 May 1988, *K. Nagata 3857*(BISH), Hanalei Distr., Mānoa Stream, lowland secondary mesic forest of *Aleurites, Syzygium cuminii, Mangifera, Terminalia catappa*, and *Schefflera*; naturalized locally on stream banks forming dense clumps, ca 6 m, 18 Mar 2000, *D. Lorence & T. Flynn 8467* (BISH, NY, US).

Oleaceae

Noronhia emarginata (Lam.) Poir. **New naturalized record**

These collections represent a new state naturalized record for the genus *Noronhia* Stadman ex Thouars. Madagascar olive is not uncommonly cultivated in the Hawaiian Islands, and in fact often seems to be confused with the true *kamani*, *Calophyllum inophyllum*, to which it bears a superficial resemblance. The former has duller, thicker leaves with rolled margins and is without the striking parallel veins and luminescent yellowish sap so characteristic of *kamani*. On the north shore of Kaua‘i, *Noronhia* has naturalized extensively

from Kalihiwai and ʻAnini northwest to Mānoa Stream. It can form rather dense stands and seems to reseed freely in the shade of those stands.

Material examined. **KAUAʻI**: Hanalei Distr., ʻAnini Beach Road ca 1/2 mile from the junction with Kalihiwai Road, ca. 6 m, 23 Apr 1986, *T. Flynn & L. Hume 1664* (BISH); *mauka* side of ʻAnini Beach Road, 4 Sep 1987, *L. Hume 275*; Mānoa Stream near the Dry Cave, secondary vegetation of *Noronhia, Terminalia, Aleurites*, and *Mangifera*, ca 6 m,18 Mar 2000, *T. Flynn & D. Lorence 6663* (NTBG); along access road to "Tunnels" from Hwy 560, secondary vegetation of *Noronhia, Terminalia, Ficus, Casuarina*, and *Pothos*, ca 6 m, 18 Mar 2000, *T. Flynn & D. Lorence 6665* (BISH, NY, US).

Zingiberaceae

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

This collection represents the first documented record of this widely cultivated species as having naturalized in the state of Hawaiʻi. *Alpinia zerumbet* or shell ginger is common in Hawaiian gardens and on Kauaʻi has been planted extensively along Hwy 50 between Līhuʻe and Lawaʻi on the south side of the island. It is easily recognized by the pendant inflorescences of white, pink, and yellow colored flowers that are often visited by the solitary, black carpenter bees.

Material examined. **KAUAʻI**: Hanalei Distr., Mānoa Stream, lowland secondary mesic forest of *Aleurites, Syzygium cuminii, Mangifera, Terminalia catappa*, and *Schefflera*; naturalized on stream banks forming scattered clumps, ca 6 m, 18 Mar 2000, *D. Lorence & T. Flynn 8468* (BISH, US).

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George Staples (BISH) kindly assisted with the description and exsiccatae for *Molineria*.

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New plant records from the Hawaiian Archipelago

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The following contributions include new island records, new state records, and range extensions of plants located on Midway Atoll, Pearl and Hermes Reef, Oʻahu, Maui, and Hawaiʻi, State of Hawaiʻi. Voucher specimens are housed in the Bishop Museum, Honolulu (BISH).

Acanthaceae

Thunbergia grandiflora Roxb. **New island record**

Thunbergia grandiflora (trumpet vine) is cultivated and sparingly adventive on at least Kauaʻi, Oʻahu, and Hawaiʻi (Wagner *et al.*, 1999: 175). On Maui, it appears to be doing the same, in at least the Makawao area. This collection represents a new island record for Maui.

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Material examined. **MAUI**: E. Maui, Makawao Distr., near Maliko Gulch in undeveloped lot, 1250 ft [381 m], 8 Apr 1998, *Starr & Martz 980408-130.*

Amaranthaceae

Alternanthera pungens Kunth **Range extension**

Wagner *et al.* (1999: 183) reported *A. pungens* (khaki weed) to be a common weed of beach parks and other low elevation, dry, disturbed areas on O‘ahu, Moloka‘i, and Hawai‘i, but probably also on the other main islands. Recently collected from West Maui (Oppenheimer & Bartlett, 2000: 1) and Lāna‘i (Oppenheimer & Bartlett, 2002), this collection confirms its presence on East Maui, where it is widespread, and represents a range extension for Maui.

Material examined. **MAUI**: E. Maui, near fire station at the Kahului Airport, 40 ft. [12 m], 23 Mar 2000, *Starr & Martz 000323-1*; E. Maui, Hāli‘imaile, near Maui Land & Pineapple buildings, 1100 ft [335 m], 8 Jun 2000, *Starr & Martz 000608-1*.

Amaranthus spinosus L. **New island record**

Amaranthus spinosus (spiny amaranth) is naturalized and often common in low elevation, disturbed sites on Kure Atoll and documented from all the main islands except Ni‘ihau and Lāna‘i (Wagner *et al.,* 1999: 188). On Midway, it was observed growing out of open fields in two distinct localities on Sand Island. This collection represents a new island record for Midway Atoll.

Material examined. **MIDWAY ATOLL**: Sand I, cemetery by demolished 6000 housing, small patch of plants growing out of occasionally mowed area, near sea level, 7 May 1999, *Starr & Martz 990507-2.*

Apiaceae

Anethum graveolens L. **New island recordl**

Anethum graveolens (dill) is cultivated and occasionally escapes on at least O‘ahu and Maui (Wagner *et al.,* 1999: 200). On Midway, it does the same, volunteering in settled areas of Sand Island. This collection represents a new island record for Midway Atoll.

Material examined. **MIDWAY ATOLL**: Sand I, volunteering in recently cleared garden, near sea level, 5 May 1999, *Starr & Martz 990505-1*.

Apocynaceae

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

Thevetia peruviana [*Cascabela thevetia* (L.) Lippold] (be-still tree) has been grown as an ornamental since its introduction ca 1900, and is now naturalized in disturbed mesic sites on Kaua‘i, O‘ahu, Maui, and probably on the other main islands (Wagner *et al.,* 1999: 215, 1858). On Midway, *T. peruviana* is also naturalized in disturbed areas of Sand Island. This collection represents a new island record for Midway Atoll.

Material examined. **MIDWAY ATOLL**: Sand I, south of cemetery by abandoned 6000 housing, suckering in recently cleared area, near sea level, 11 May 1999, *Starr & Martz 990511-1*.

Vinca major L. **New state record**

Native to the W. Mediterranean and widely cultivated as a ground cover, *V. major* (greater periwinkle, blue buttons) is naturalized in at least the Kula area of East Maui where it can be found trailing through brush and over steep banks. This collection represents a new state record for Hawai‘i. *Vinca* is a genus of about 12 species native to the Old World with

leaves opposite, entire; flowers solitary, axillary, 5-merous, bisexual, corolla more or less funnelform, stamens borne at middle of tube, anthers short, with prominent, spreading appendages, style broadened toward apex; fruit a pair of erect or spreading, cylindrical follicles, each 6-8 seeded. *Vinca major* is a prostrate, evergreen, trailing subshrub with arching shoots to several meters long with ovate, obtuse, lance-shaped or acute, dark green leaves, to 9 cm long, truncate to subcordate at base, ciliate, short-petioled. Corolla blue-violet or dark violet, to 5 cm across, tube .5 in [1.3 cm] long; follicles to 2 in [5 cm] long. There are many named cultivars (Brickell & Zuk, 1996; L.H. Bailey Hortorium, 1976). *Vinca major* can be distinguished from other naturalized Apocynaceae in Hawai‘i by opposite leaves and white to blue flowers with rounded stigmas (Neal, 1965: 604).

Material examined. **MAUI**: E. Maui, Kula, Crater Rd., 4000 ft [1219 m], 5 Jan 1999, *Starr & Martz 990105-2*.

Asteraceae

Dyssodia tenuiloba (DC.) B.L. Rob. **New naturalized record**

Native to south central Texas and adjacent Mexico, and naturalized in other warm parts of the world where cultivated primarily as a bedding plant *D. tenuiloba* [*Thymophylla tenuiloba* (DC.) Small] (Dahlberg daisy, golden fleece) is a recent ornamental introduction to Hawai‘i which tends to readily naturalize where it is planted on both Maui and O‘ahu. On Maui, we collected this yellow aster in sandy sites in Kīhei and Waiehu. On O‘ahu, B. Gagne collected it along the Pali Highway in lower Nu‘uanu Valley. These collections represent a new state record for Hawai‘i. *Dyssodia* (dog weed, fetid marigold) is a genus of about 32 species of strongly scented herbs native to the southwestern United States and northern Mexico. *Dyssodia tenuiloba* is an erect to spreading, bushy annual or short lived perennial, to 1 ft; leaves opposite in lower part, alternate above, to 3/4 in long, pinnately parted into 7–11 linear filiform, bristle-tipped segments, margins glandular; heads to 1/2 in across, involucre turbinate-campanulate, involucral bracts united 3/4 their length, glandular; disc flowers yellow, ray flowers golden yellow-orange (L.H. Bailey Hortorium, 1976).

Material examined. **MAUI**: W. Maui, Waiehu, scattered at base of large sand dune behind residential area, 100 ft [30 m], 26 Apr. 2000, *Starr & Martz 000426-1;* E. Maui, Kīhei, Kīhei Rd. and Līpoa, spreading down road from initial planting at condominium, 5 ft [1.5 m], 26 Jan. 2000, *Starr & Martz 000126-1*. **O‘AHU**: Honolulu, lower Nu‘uanu Valley, along Pali Hwy between the scenic overlook above Chinese cemetery and Pauoa Road exit, 100 ft [30 m], 3 May 2000, *B.H. Gagne 3150*.

Verbesina encelioides (Cav.) Benth. & Hook. **New island record**

Verbesina encelioides (golden crown-beard) was previously known to be naturalized on Kure Atoll, Midway Atoll, and all of the main islands except Ni‘ihau (Wagner *et al.*, 1999: 372). On Pearl and Hermes Atoll, *V. encelioides* was collected on Southeast Island where it is currently restricted to the east side of the island. This collection represents a new island record for Pearl and Hermes Atoll.

Material examined. **PEARL AND HERMES ATOLL**: Southeast I, from large patch in center of east part of island, near sea level, 14 Jun 1999, *Starr & Martz 990614-1*.

Bignoniaceae

Macfadyena unguis-cati (L.) A.H. Gentry **Range extension**

Previously known from Kaua‘i, O‘ahu, Lāna‘i, and Maui (Wagner *et al.*, 1999: 388, Oppenheimer & Bartlett, 2000: 2–3), this species was recently collected from the North Kohala

area of Hawai‘i (Imada *et al*., 2000: 10) where it formed locally dense mats on the ground and twined around trees in disturbed secondary forest. This collection documents *M. unguiscati* doing the same in the Hōnaunau / Kealakekua area and extends the known range to include the Hōnaunau area of Hawai‘i.

Material examined. **HAWAI‘I**: Hōnaunau, near painted church, 780 ft [238 m], 20 June 2000, *Starr & Martz 000620-1*.

Caprifoliaceae

Lonicera japonica Thunb. **New island record**

Lonicera japonica (Japanese honeysuckle) is widely cultivated and now escaping and becoming naturalized on Kaua‘i and Hawai‘i (Wagner *et al.*, 1999: 495). On Maui, *Lonicera* is also widely planted, producing viable fruit from sea-level to at least 4000 ft, spreading beyond initial plantings, and becoming naturalized. These collections represent a new island record for Maui.

Material examined. **MAUI**: E. Maui, Kula, near Pony Express, climbing into and over eucalyptus trees, 4000 ft [1219 m], 26 Aug 1998, *Starr & Martz 980826-17*; E. Maui, Kula, crest of Kekaulike Ave., sprawling into gulch, 3750 ft [1143 m], 9 Dec 1998, *Starr & Martz 981209-1*.

Casuarinaceae

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

Casuarina glauca (longleaf ironwood) is known to be planted on all the main islands except Ni‘ihau, persisting and extensively spreading by root suckers after cultivation on at least Lāna‘i, O‘ahu, (Wagner *et al.*, 1999: 529, 1872) and Maui (Oppenheimer & Bartlett, 2000). On Midway, it was collected by Bruegmann and published in Wagner *et al.*, (1999: 329), but not in Bruegmann (1999: 2). More recently this ironwood species was collected by the authors persisting and spreading in the southwest corner of the antennae field in the center of Sand Island. This collection represent a new island record for Midway Atoll.

Material examined. **MIDWAY ATOLL**: Sand I, SW corner of antennae field, suckering away from main patch into nearby field and woods, near sea level, 11 May 1999, *Starr & Martz 990511-1*.

Chenopodiaceae

Bassia hyssopifolia (Pall.) Kuntze **Range extension**

Bassia hyssopifolia (bassia) was previously known only from alkaline soil, Kuapā Pond, O‘ahu, and near Kanahā Pond, central Maui (Wagner *et al.*, 1999: 536). On Maui, bassia has now also been collected from an undeveloped lot in the Kīhei area, and has been observed by the authors at Kakahai‘a National Wildlife Refuge on the island of Moloka‘i. The soils in these areas were also apparently alkaline in nature. This collection represents a range extension to Kīhei, Maui. Elsewhere in these *Records*, Staples *et al*. (2002: 5) record this species from Moloka‘i.

Material examined. **MAUI**: E. Maui, Kīhei, coming up in undeveloped lot adjacent and *makai* of S. Kīhei Rd., 10 ft [3 m], 22 Aug 1999, *Starr & Martz 990822-1*.

Cyperaceae

Cyperus difformis L. **New island record**

Cyperus difformis was previously known from wet sites and cultivated fields on Kaua‘i and O‘ahu, presumably in connection with rice cultivation (Wagner *et al.*, 1999: 1395). This collection documents a new island record for this species on Maui.

Material examined. **MAUI**: W. Maui, Ukumehame Valley, common in cultivated *kalo lo'i*, 200 ft [61 m], 24 Jul 1999, *Starr & Martz 990724-1*.

Fabaceae

Crotalaria assamica Benth. **New island record**

Crotalaria assamica (rattlepod) was previously known from disturbed mesic sites on O'ahu and Hawai'i (Wagner *et al.*, 1999: 657). The collections below represent a new island record for Maui, where the species can be found in similar sites.

Material examined. **MAUI**: near old airport, side of road off Mokulele Hwy, *mauka* of Humane Society, 130 ft [43 m], 9 Mar 2001, *Starr & Martz 010309-2;* E. Maui, Kīhei, Mokulele Hwy, junction with upper Kīhei Hwy, growing as a weed in a seedcorn field, 12 Sep 1993, *R. Hobdy 3593*.

Indigofera hendecaphylla Jacq. **New island record**

Indigofera hendecaphylla [syn. *I. spicata* Forssk.] (creeping indigo) was previously known from Kaua'i, O'ahu, and Maui (Wagner *et al.*, 1999: 675). This collection represents a new island record for Hawai'i.

Material examined. **HAWAI'I**: Captain Cook, growing in parking lot of Amy Greenwell Ethnobotanical Garden, 1640 ft [500 m], 9 Apr 2000, *Starr & Martz 000409-5*.

Lathyrus latifolius L. **Range extension**

Lathyrus latifolius (perennial pea) was previously known from a single collection by R. Hobdy in the Olinda area of East Maui (Wagner *et al.*, 1999: 678). These collections document a range extension of this species to at least the Kula area where it can occasionally be seen in pastures and waste areas.

Material examined. **MAUI**: E. Maui, Kula, naturalized on *makai* side of rd. near mile marker 13, 2800 ft [853 m], 24 Dec 1997, *Starr & Martz 981223-111*; (same loc.), 3 Jun 2000, *H. Oppenheimer H60014*.

Hydrangeaceae

Philadelphus karvinskyanus Koehne **New island record**

Philadelphus karvinskyanus (philadelphus) has been cultivated in Hawai'i since 1944. Planted on at least Kaua'i, O'ahu, and Maui, it is now escaping by spreading vegetatively and blanketing large areas, and has become naturalized on Kaua'i (Lorence *et al.*, 1995: 38). On Maui, *Philadelphus* is widely planted in the Kula area, and though not noted to be producing viable fruit, is spreading well beyond initial plantings in the Kula area. This collection represents a new island record for Maui.

Material examined. **MAUI**: E. Maui, Kula, above Sunrise Market, sprawling along Crater Rd., 3900 ft [1189 m], 26 Aug 1998, *Starr & Martz 980129-1*.

Liliaceae

Asparagus asparagoides (Forssk.) Deflers **New state record**

Native to tropical and south Africa, and introduced to New Zealand and Australia where it has become a weed, *A. asparagoides* (bridal creeper, smilax) is naturalized on Maui in the Kula area, and has been observed from Wai'ale Gulch in Kula through lower Poli Poli to Kē'ōkea where it twines in and amongst vegetation and cascades down steep banks. Previously collected in pastures in Kula by D. Herbst, these collections represent a new state record for Hawai'i. Tuberous rooted branching vine, cladophylls alternate, ovate, to 2 in long, leathery, with many longitudinal veins, flowers bisexual, greenish, solitary or

paired, stamens orange, fruit red (L.H. Bailey Hortorium, 1976: 118; Bay of Plenty Regional Council, 1996).

Material examined. **MAUI**: E. Maui, Kula, on side of Crater Rd, 4000 ft [1219 m], 18 Feb 1999, *Starr & Martz 990218-1*; E. Maui, Kula, on side of Crater Rd, 4000 ft [1219 m], 26 Mar 1999, *Starr & Martz 990326-1*; E. Maui, Kula, cascading down side of Wai‘ale gulch, 2800 ft [853 m], 15 Jan 1998, *Starr & Martz 980115-8*.

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

Asparagus plumosus (common asparagus fern) was previously known from Kaua‘i (Lorence *et al.*, 1995: 40), O‘ahu (Imada *et al.*, 2000: 13), and Maui (Oppenheimer & Bartlett, 2000). *Asparagus plumosus* is now also known from Hawai‘i in at least the Hōnaunau / Kealakekua area. This collection represents a new island record for Hawai‘i.

Material examined. **HAWAI‘I**: Hōnaunau, on side of rd. near painted church, 780 ft [238 m], 20 Jun 2000, *Starr & Martz 000620-2*.

Malvaceae

Gossypium hirsutum L. **New island record**

Gossypium hirsutum (upland cotton) was previously known from Hale‘iwa, O‘ahu where it was collected by Degener in 1956 (Wagner *et al.*, 1999: 876). More recently, it was collected at La Pérouse Bay in leeward East Maui. This collection represents a new island record for Maui.

Material examined. **MAUI**: E. Maui, La Pérouse, stands growing in and near *kiawe* forest, 10 ft [3 m], 15 Apr 2000, *Starr & Martz 000415-1*.

Sida urens L. **New island record**

Sida urens was previously known from a single naturalized collection made in 1980 in North Kona, Hawai‘i by Nagata & Park (Wagner *et al.*, 1999: 899). It is now also known from Maui, having been collected twice on East Maui by R. Hobdy in 1985 and 1993, and more recently by the authors near the same spot in 1999. These collections represent a new island record for Maui.

Material examined. **MAUI**: E. Maui, Kaupō, just off side of rd. where Hāna Hwy turns into Pi‘ilani Hwy, 100 ft [30 m], 6 Jan 1999, *Starr & Martz 990106-5*; Kaupō, Nuanualoa, in disturbed homestead, 246 ft [75 m], 8 Sep. 1993, *Hobdy & Baker 3592*; Naopu‘u, just W. of Kālepa Stream between Kīpahulu and Kaupō, 300 ft [91 m], 26 Dec 1985, *Hobdy 2474*.

Moraceae

Ficus macrophylla Desf. ex Pers. **New island record**

Previously known from Maui (Oppenheimer & Bartlett, 2000: 6–7), *F. macrophylla* (Moreton Bay fig) is naturalized in at least the Kailua-Kona area of Hawai‘i. This collection represent a new island record for Hawai‘i.

Material examined. **HAWAI‘I**: Kailua-Kona, Ali‘i Dr., coming up in bare lava and lowland coastal forest, more abundant towards mature trees in downtown, near sea level, 9 Apr 2000, *Starr & Martz 000409-4*.

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

Ficus microcarpa (Chinese banyan) is cultivated and naturalized in low elevation habitats on Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al.*, 1999: 924, 1885). On Midway Atoll, it can be seen spreading from initial plantings in settled areas on Sand

Island into cracks on sidewalks, buildings, and trees. This collection represents a new island record for Midway Atoll.

Material examined. **MIDWAY ATOLL**: Sand I, near Midway Mall, near sea level, 28 Apr 1999, *Starr & Martz 990428-5*.

Oleaceae

Jasminum fluminense Vell. **New island record**

Jasminum fluminense (star jasmine) is widely cultivated and was known to be naturalized in at least the Hoʻokena Beach area on Hawaiʻi (Wagner *et al.*, 1999: 990, 1886). It is now naturalized on Maui, where it is established in the Spreckelsville area. This collection represents a new island record for Maui.

Material examined. **MAUI**: E. Maui, Spreckelsville, climbing in vegetation along Hāna Hwy, 20 ft [6 m], 3 Apr 1998, *Starr & Martz 980403-30*.

Poaceae

Andropogon virginicus L. **New island record**

Andropogon virginicus (broomsedge) was known to be common and often dominant along roadsides and in disturbed dry to mesic shrubland on Kauaʻi, Oʻahu, Molokaʻi, Lānaʻi, Maui, and Hawaiʻi (Hughes, 1995: 8; Oppenheimer *et al.*, 1999: 9; Wagner *et al.*, 1999: 1497, 1904; Herbarium Pacificum Staff, 1999: 7; Imada *et al.*, 2000: 14). It has now also been found on Midway Atoll, scattered throughout and on the margins of the ironwood forest by west beach on Sand Island. This collection represent a new island record for Midway Atoll.

Material examined. **MIDWAY ATOLL**: Sand I, west beach trail cart path, growing in *Casuarina* forest border, near sea level, 5 May 1999, *Starr & Martz 990407-1*.

Cenchrus echinatus L. **New island record**

Cenchrus echinatus (sandbur) was previously known to be naturalized in arid, disturbed habitats on Kure and Midway Atolls, Lisianski, Laysan, French Frigate Shoals, Nihoa, and all of the main islands (Wagner *et al.*, 1999: 1513, 1904). On Pearl and Hermes Atoll, *C. echinatus* was collected on both North and Southeast Islands. These collections represent a new island record for Pearl and Hermes Atoll.

Material examined. **PEARL AND HERMES ATOLL**: North I, center of island, 14 Jun 1999, *Starr & Martz 990614-3*; Southeast I, center of east part of island, 14 Jun 1999, *Starr & Martz 990614-2*.

Echinochloa crus-galli (L.) P. Beauv. **New island record**

Echinochloa crus-galli (barnyard grass) is naturalized in wet sites such as ditches or stream beds, and in cultivated fields on all of the main islands except Niʻihau and Kahoʻolawe (Wagner *et al.*, 1999: 1535). On Midway, it is localized on Sand Island in the mowed fields near the seaplane ramp on the north part of the island. This collection represents a new island record for Midway Atoll.

Material examined. **MIDWAY ATOLL**: Sand I, coming up in field near seaplane ramp, near sea level, 20 Jun 1999, *Starr & Martz 990620-1*.

Panicum maximum Jacq. **New island record**

Panicum maximum (Guinea grass) is naturalized and common on all the main islands (Wagner *et al.*, 1999: 1569). On Midway, a lone patch persists in an ironwood grove and

grass field border on Sand Island. This collection represents a new island record for Midway Atoll.

Material examined. **MIDWAY ATOLL**: Sand I, W of boat harbor, growing in *Casuarina* forest border, near sea level, 5 May 1999, *Starr & Martz 990505-11*.

Panicum repens L. **New island record**

Panicum repens (torpedo grass) was previously known from usually moist, disturbed habitats on Oʻahu, Lānaʻi, and Hawaiʻi (Wagner *et al.*, 1999: 1571), and is now also known from moist areas on Maui, at least in the Līpoa area of Kīhei. This collection represents a new island record for Maui.

Material examined. **MAUI**: E. Maui, Līpoa, widespread in moist areas near the coast, 10 ft [3 m], 27 Sep 1998, *Starr & Martz 980927-1*.

Paspalum fimbriatum Kunth **New island record**

Previously known from Kure Atoll, Kauaʻi, and Oʻahu (Wagner *et al.*, 1999: 1576), *P. fimbriatum* (Panama or fimbriate paspalum) is now also known from Maui where it is widespread in disturbed areas at least on East Maui. This collection represents a new island record for Maui.

Material examined. **MAUI**: E. Maui, Makawao, Makawao Elementary School, growing on schoolyard, 1640 ft [500 m], 24 May 2000, *Starr & Martz 000524-1*; Haʻikū, Haʻikū Elementary School, growing out of crack in sidewalk, 328 ft [100 m], 29 May 2000, *Starr & Martz 000529-1*.

Pennisetum polystachion (L.) Schult. **New island record**

Pennisetum polystachion (blue buffel grass) was previously noted from Oʻahu, Lānaʻi, and Hawaiʻi (Wagner *et al.*, 1999: 1579), and has recently been observed on Maui in sandy areas of Kahului and Wailuku. This collection represents a new island record for Maui.

Material examined. **MAUI**: E. Maui, Kahului, naturalized around Kahului airport in areas where *Cenchrus ciliaris* grows, 50 ft [15 m], 6 May 1998, *Starr & Martz 980506-135*.

Setaria sphacelata Stapf & Hubb. ex M.B. Moss **New naturalized record**

Native to Africa, *S. sphacelata* is cultivated in experiment stations and escaped along irrigation ditches in California (Hitchcock, 1971: 720). In Hawaiʻi, it has recently been found in mesic pastures in Kokomo, Maui. R. Hobdy recalls collecting this species near the Piʻiholo experimental station in the 1980s, about one mile from the Kokomo site. This collection documents the naturalized status on Maui and represents a new state record. Tufted perennial, glabrous or nearly so, often with stout rhizomes; culms 0.5–1.5 m tall, flattened; blades flat, rather lax, 4–10 mm wide; panicle dense, cylindric, 8–15 cm long, usually orange to purple, bristles mostly 5 or more, 3–6 mm long; spikelets 2.5–3 mm long; fruit finely rugose (Hitchcock, 1971: 720).

Material examined. **MAUI**: E. Maui, Kokomo, pastures on Kaupakulua Rd, 1500 ft [457 m], 4 Aug 1999, *Starr & Martz 990804-1*.

Polygonaceae

Antigonon leptopus Hook. & Arnott **New island record**

Antigonon leptopus (Mexican creeper) was previously known from disturbed areas on at least Kauaʻi, Oʻahu, Lānaʻi, Maui, and Hawaiʻi (Wagner *et al.*, 1999: 1060). It was also recently collected from Midway Atoll by M. Bruegmann and originally published in

Wagner *et al.* (1999: 1888), but not in Bruegmann (1999: 2). On Midway, this plant is indeed sparingly naturalized on Sand Island. This collection confirms the naturalized status and represents a new island record for Midway Atoll.

Material examined. **MIDWAY ATOLL**: Sand I, sprawling out of ironwood forest into adjacent field areas near harbor, near sea level, 5 May 1999, *Starr & Martz 990505-10*.

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

Coccoloba uvifera (sea grape) has recently been noted to germinate and spread at least on Oʻahu (Herbst, 1998: 3; Wagner *et al.*, 1999: 1060, 1888) and Maui (Oppenheimer & Bartlett, 2002: 11). On Midway and Hawaiʻi, *C. uvifera* is displaying the same tendencies. These collections represent new island records for Midway Atoll and Hawaiʻi Island.

Material examined. **MIDWAY ATOLL**: Spit I, S end, a few plants were germinating and growing out of the coral rubble, sea level, 1 April 1999, *Starr & Martz 990401-1*. **MAUI**: E. Maui, Kanahā Beach, germinating from beach flotsam, sea level, 5 May 2000, *Starr & Martz 000505-1*. **HAWAIʻI**: Kona, germinating out of beach flotsam and forming sea-side stands, sea level, 9 Apr 2000, *Starr & Martz 000409-2*.

Rubiaceae

Hedyotis corymbosa (L.) Lam. **Range extension**

Hedyotis corymbosa was previously known from Kauaʻi, Oʻahu, East Maui, and in the vicinity of Hilo to Volcano, Hawaiʻi, (Wagner *et al.*, 1999: 1141, 1891; Lorence *et al.*, 1995: 50). It is now also known from the Kona area of Hawaiʻi.

Material examined: **HAWAIʻI**: Kona, in cinder at Keauhou Kona Aston Resort, near sea level, 9 Apr 1999, *Starr & Martz 000409-1*.

Pentas lanceolata (Forssk.) Deflers **New island record**

Native to forest margins and scrub from Yemen to tropical East Africa (Brickell & Zuk 1996: 770); in Hawaiʻi, *P. lanceolata* (star cluster) has recently been noted spreading at least on the Hāmākua coast of the Big Island (Nagata, 1995: 12; Wagner *et al.*, 1999: 1160). On Maui, *P. lanceolata* volunteers in scrub areas and steep banks from Haʻikū to Makawao. These collections represent a new island record for Maui.

Material examined. **MAUI**: E. Maui, Haʻikū, growing on side of road, 400 ft [122 m], 10 Nov 1998, *Starr & Martz 981110-3*; E. Maui, Makawao, volunteering in unmaintained portions of lawn, 1600 ft [488 m], 16 Jan 2000, *Starr & Martz 000116-1*.

Sapotaceae

Sideroxylon persimile (Hemsl.) T.D. Penn. **New naturalized record**

Previously known under the misapplied name *Bumelia buxifolia* (*sensu* Neal, 1965) (Staples & Herbst, in press), large trees of *Sideroxylon persimile* (bully, bumelia) were apparently originally cultivated on Maui near the Mauna'olu Campus (old Baldwin Estate) on Baldwin Avenue, where it was collected as early as 1967. Now this thorny species occurs in gulches and along roadsides from Hāliʻimaile to near Pāʻia. There are also specimens from Oʻahu and Lānaʻi, mostly from ornamental street trees. These collections represent a new state record for Hawaiʻi. *Sideroxylon persimile* is native from Mexico through Central America to northern South America (Pennington, 1990). Large trees, round-topped to 20 m tall, trunk vertically fluted, 1 m thick, bark rough (ex Fosberg 27116), sometimes armed with painful and irritating thorns (1–3 cm long), with obvious sticky white sap, and stems occasionally bearing red hairs. Leaves dark green, glossy ovate, entire (3–4 cm long). Flowers are sweetly fragrant, greenish (ex Brown 1246, sheet

69020b). Fruit is round to subglobose, about 1 cm, and green turning black or deep blue with maturity during June-July (ex Brown 1246, sheet 69020a). Fruits eaten by birds (ex Neal s.n.). The species has been used as a street tree in Honolulu and has been planted for reforestation.

To focus efforts in better understanding the biology of *S. persimile* as a naturalized species, we include all voucher specimens examined. We hope these locality data will assist field collectors and managers in identifying the places where this tree is likely to be escaping from cultivation.

Material examined: **MAUI**: E. Maui, cultivated near Mauna'olu College, ca 800 ft, 24 Dec 1967, *D. Herbst 820;* same loc., planted along Baldwin Ave. and on Mauna'olu campus, 16 Feb 1987, *R. Hobdy 2729.* E. Maui, Hāli'imaile, on east side of gulch bordering pineapple field on east side of town, 1100 ft [335 m], 20 Feb 1998, *Starr & Martz 980220-1*; E. Maui, Hāli'imaile, Mauna'olu Campus, Baldwin Ave., spreading from trees planted in this area, 900 ft [247 m], 27 Apr 2000, *Starr & Martz 000427-1*. **O'AHU**: Honolulu, Kalihi St., corner at Beckley St., in fruit, 1 Jun 1925, *F.B.H. Brown 1246* (BISH 69020a), same location, in flower, 15 Dec 1925, *F.B.H. Brown 1246* (BISH 69020b), same loc., 7 Feb 1941, *M.C. Neal s.n.* (BISH 419662, 419663); Honolulu, Capitol grounds, near burial mound, 16 Sep 1939, *M.C. Neal s.n.* (BISH 69021); Makiki, at corner Makiki and Kīna'u Sts., 19 Oct 1946, *F.R. Fosberg 27116;* Waiāhole, Water Reserve, project for reforesting by Oahu Sugar Co., 13 Apr 1962, *F. Saito 10* (two sheets); Waimānalo, sterile shrub with long spines growing on private horse farm, 10 Jan 1990, *N. Matayoshi s.n.* (BISH 580943); **LANA'I**: north (*mauka*) of Lāna'i City, planted in forest reserve, 2 Mar 1952, *O. Degener 21990.*

Scrophulariaceae

Antirrhinum orontium L. **Range extension**

Antirrhinum orontium (lesser snapdragon) was previously known from Diamond Head, O'ahu, and Pu'u o Kali, Maui (Wagner *et al.*, 1999: 1237). Recent collections extend the known range on Maui to include Lualaʻilua Hills and Makawao.

Material examined. **MAUI**: E. Maui, Makawao, corner of Makawao Ave. and Pi'iholo Rd, on side of road adjacent to pineapple field, 1600 ft [488 m], 2 May 2000, *Starr & Martz 000502-4*; Lualaʻilua Hills, on side of road in county cinder pit, 1500 ft [457 m], 18 Mar 2000, *Starr & Martz 000318-1*.

Linaria canadensis *var.* ***texana*** (Scheele) Pennell **New island record**

In the state since at least 1911, *L. canadensis* (blue toadflax) was previously known from dry slopes and ridges on O'ahu and Hawai'i (Wagner *et al.*, 1999: 1241). It is now also found in wayside areas of Makawao, Maui. This collection represents a new island record for Maui.

Material examined. **MAUI**: E. Maui, Makawao, adjacent to pineapple field between 'A'ala Rd. and the veteran's cemetery, 1640 ft [500 m], 11 Apr 2000, *Starr & Martz 000411-1*.

Veronica peregrina L. **New island record**

Veronica peregrina (necklace weed, purslane speedwell) was previously known from Hawai'i Volcanoes National Park on Hawai'i where it was collected by K. Nagata in 1984 (Wagner *et al.*, 1999: 1250) and from Kaua'i (Lorence *et al.*, 1995: 54). It is also naturalized in the Makawao area of Maui. This collection represents a new island record for Maui.

Material examined. **MAUI**: E. Maui, Makawao, coming up as weed in lawn on corner of 'Ūkiu and Baldwin Ave., 1640 ft [500 m], 31 Mar 2000, *Starr & Martz 000331-1*.

Verbenaceae

Citharexylum spinosum L. **New island record**

Citharexylum spinosum (fiddlewood) was recently documented to be naturalized on O‘ahu (Herbarium Pacificum Staff, 1998: 13; Wagner *et al.*, 1999: 1317, 1895) where the known distribution is rapidly growing. On Maui it is displaying a similar tendency and is naturalized in at least the Ha‘ikū and Kīhei areas. These collections represent a new island record for Maui.

Material examined. **MAUI**: E. Maui, Ha‘ikū, Pololei St., coming up along fences and in pastures, 1400 ft [427 m], 10 Mar 1998, *Starr & Martz 980310-1*; Kīhei, High Tech Center, spreading from mature trees into landscape and waste areas, 1 Apr 1998, *Starr & Martz 980401-42*.

Phyla nodiflora (L.) Greene **New naturalized record**

Phyla nodiflora was previously reported to be cultivated as a ground cover that may occasionally escape cultivation (Wagner *et al.*, 1999: 1316). On Midway, *P. nodiflora* was observed to be widely naturalized on Sand Island, especially in moist areas. On Maui, this low groundcover that roots at the nodes was collected near the ocean on leeward West Maui. These collections represent a new state record for Hawai‘i.

Material examined. **MIDWAY ATOLL**: Sand I, near drainage ditch along runway north of water catchment basin, near sea level, 12 May 1999, *Starr & Martz 990512-2*; Sand I, 29 Jun 1980, *D. Herbst & W. Takeuchi 6364*. **MAUI**: W. Maui, Launiupoko Beach Park, just above high tide line on berm between sand and grass, sea level, 11 Jun 2000, *Starr & Martz 000611-1*.

Vitaceae

Cissus rotundifolia (Forssk.) Vahl **New island record**

Cissus rotundifolia (Arabian wax cissus) has been recently reported to be naturalized on Kaua‘i (Lorence & Flynn, 1997: 12) and O‘ahu (Herbst, 1998: 4; Wagner *et al.*, 1999: 1895). On Maui, *C. rotundifolia* is volunteering in yards in at least Kīhei. This collection represents a new island record for Maui.

Material examined. **MAUI**: E. Maui, Kīhei, coming up in yard, 20 ft [6 m], 13 Sep. 1999, *Starr & Martz 990913-1*.

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Polynesian collections of platynine Carabidae (Coleoptera) from the voyage of the Danish corvette *Galathea*, 1845–1847

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From 1845–1847, the Danish naval corvette *Galathea* circumnavigated the globe in support of efforts to develop the Danish spice trade (Wolff, 1967). The ship and its crew were also charged by King Christian VIII to collect zoological specimens, as the king was an ardent zoologist. After traveling through the East Indies and along the China coast, the ship anchored off Japan, where the crew was not permitted to land. The next landfall was the Hawaiian Island of O'ahu, where the ship spent one month while the crew recovered from scurvy. The *Galathea* then called on the Island of Hawai'i for one week before heading south to the Society Islands of Tahiti and Bora Bora. Thence its route led to the South

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American coast, to what is now northern Chile.

Entomological specimens were collected throughout the worldwide trip. However, due to the death of Christian VIII and war in Schleswig-Holstein, funding necessary for publishing the results of the voyage were withdrawn. With few exceptions (e.g., Schiødte, 1855) the specimens have never been cited, much less included in any systematic treatment of the collected species. This report presents records of native carabid beetle species collected in the Hawaiian Islands and Tahiti, and serves to alert the entomological community to this source of historical specimens made during the first half of the 19th Century. All specimens from the *Galathea* voyage are deposited in the Zoological Museum, University of Copenhagen.

O‘ahu

Blackburnia (***Metromenus***) ***muscicola*** (Blackburn): Oahu / Galatea / In loco hu / mido sub la- / pide (1 ♂).

Based on the captain’s published log (Bille, 1849-51), this insect was collected between 5 October and 1 November 1846 when the *Galathea* was in port at Honolulu.

Hawai‘i Island

Blackburnia (***Blackburnia***) ***lucipetens*** (Blackburn): Hawaii / Galatea / Dr. Wood d. / in humidis mon / tosis sub la- / pidibus (2 ♀♀).

These specimens were acquired from a Dr. Wood, who was not employed by the *Galathea* expedition (Bille, 1849-51), so the actual date of collection cannot be ascertained. However, the *Galathea* visited Hawai‘i Island from 7–13 November 1846.

Tahiti

Colpodes anachoreta (Fairmaire): Tahiti / Galatea / Pradier d. / in montosis humidis (1 ♂).

Colpodes eremita (Fairmaire): Tahiti / in montosis / humidos / Vesco d. / Galatea (2 ♂♂).

Fairmaire (1849a) first described these 2 species in short diagnoses, then redescribed them by diagnoses accompanied by full descriptions (Fairmaire, 1849b; Perrault, 1990). In the latter publication he cites Mons. Vesco, a marine surgeon as the source of specimens. Fairmaire also received Tahitian specimens collected by the marine officer Mons. E. Pradier, who had sent the specimens first to Achille Deyrolle, specimen dealer in Paris. Therefore Fairmaire’s sources for Tahitian material included those utilized by the zoologists traveling on the *Galathea*. Based on Bille’s (1849–51) log, the *Galathea* called on Tahiti from 5–11 December 1846.

The Hawaiian specimens from the *Galathea* expedition represent the second earliest known collection of carabid beetles from the Hawaiian Islands (Liebherr & Zimmerman, 2000). Based on specimens with known localities, the elevational distribution of *B. muscicola* ranges from 240–1200 m, whereas *B. lucipetens* has been recorded from habitats 365–1800 m elevation. These lower elevational limits are among the lowest elevations from which native platynine Carabidae have been collected on O‘ahu and Hawai‘i Island respectively, suggesting that the seafaring zoologists need not have ventured far into the Hawaiian mountains to obtain these specimens. In the 20th Century, *B.muscicola* was collected at 240 m elevation at Maunawili, southern Ko‘olau Mountains in 1906 and 1908 by W.M. Giffard. Since 1912, no *B. muscicola* have been collected below 545 m elevation (Liebherr & Zimmerman, 2000: Appendix 1).

We have very poor representation of the lowland O‘ahu fauna that may have been present before the great spasm of extinction of the late 19th Century (Perkins, 1906,

Liebherr & Polhemus, 1997). The earliest collections of platynine Carabidae—4 specimens of the O‘ahu species *Blackburnia corrusca* (Erichson)—were made by F.J.F. Meyen in 1830 (Liebherr & Zimmerman, 2000). Perkins subsequently collected this species in 1901 on the coast near Waialua, showing that Meyen could have obtained his specimens in a lowland habitat. Only one other O‘ahu species—*B. epicurus* (Blackburn)—is known to have been collected below 300 m elevation. Like *B. muscicola*, it was found by Giffard at 150 m elevation in Moanalua Valley, and at Maunawili at 240 m elevation, both in 1906. Therefore, the O‘ahu *Galathea* specimen of *B. muscicola*, provides another small glimpse of a native species that occupied lowland habitats from the mid-19th Century to the beginning of the 20th Century.

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A new generic combination and Hawaiian Island record for *Adelocera beardsleyi* (Ôhira & Becker) (Coleoptera: Elateridae)

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Brachylacon beardsleyi Ôhira and Becker (1978) was first described and recorded from Ewa, O‘ahu. No specimens of this species have since been reported from O‘ahu or else-

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where, until now. Here, we provide a generic transfer of this species to *Adelocera* Latreille and report this species from the island of Hawai`i.

Ôhira and Becker (1978) provided the original generic attribution of *Brachylacon beardsleyi* without discussion beyond remarking that it was "somewhat allied to *Brachylacon (Brachylacon) perraudieri* Fleutiaux" from Cambodia. Von Hayek (1973, 1979) reviewed the generic concepts of the genera of Elateridae assigned to the subfamily Agrypninae and reduced many generic names to synonymy, including the synonymy of *Brachylacon* Motschulsky with *Adelocera*. *Adelocera* was redescribed and *B. perraudieri* was assigned to this genus by von Hayek (1973). The holotype of *B. beardsleyi* is in the Bishop Museum, Honolulu, and was previously studied and photographed by Johnson. The holotype and the specimen reported above possess the salient characteristics given by von Hayek (1973, 1979) for *Adelocera* and will easily trace to this genus in her keys. Notable traits for assignment to *Adelocera* and possessed by *B. beardsleyi* include the antennal grooves being half the length of the pronotosternal grooves, antennal segment 3 longer than segment 2, metasternal tarsal grooves are transverse, tibial spurs absent, tarsal claws with ventral setae near base, and the mesepimeron forming part of the mesocoxal cavity. Since the holotype and the specimen reported below possess these characters, we propose the **new combination** of *Adelocera beardsleyi*.

Coleoptera: Elateridae

Adelocera beardsleyi (Ôhira & Becker) **New island record; Rediscovery; Name change**

Between 11 April and 17 May 2000, a single specimen of *Adelocera beardsleyi* was collected from a recently established National Wildlife refuge in the district of South Kona. The specimen, which has been deposited in the invertebrate collection of Hawaii Volcanoes National Park (HVNP), was collected by staff of the Pacific Island Ecosystem Research Center, U.S. Geological Survey, as part of a rapid assessment of invertebrate species of concern at the Kona Forest Unit of the Hakalau National Wildlife Refuge. The female specimen (length 6.3 mm) was recovered from a yellow sticky trap (manufactured by Seabright Laboratories to control and monitor flying insect pests) at an elevation of 579m. Sticky traps were hung from the branches of trees and shrubs at forty-nine stations along the southern boundary of the refuge, ranging in elevation from 579 to 1830m, and were replaced monthly or bi-monthly between November 17, 1999 and October 12, 2000. *A. beardsleyi* was collected from the southwest corner of the refuge at the lowest elevation present on the refuge. Other elaterids recovered from sticky traps during the survey included 62 specimens of endemic *Anchastus swezeyi* Van Zwaluwenburg from elevations from 579 to 792m, and 39 specimens of the adventive *Conoderus exsul* (Sharp) from elevations from 579 to 1737m.

The collection site of *A. beardsleyi* is abandoned ranchland with vegetation dominated by alien invasive plant species (nomenclature for flowering plants follows Wagner *et al.,* 1990; and for ferns follows Wagner, 1981). Dominant plants include guava (*Psidium guajava* L.), Christmas berry (*Schinus trebinthifolius* Raddi), and the indigenous uluhe fern (*Dicranopteris linearis* [Burm.] Underw.). Historically, prior to disturbance by humans and ungulates, the collection site was most likely dominated by *ʻōhiʻa* (*Metrosideros polymorpha* Gaud.).

Material examined. **HAWAIʻI**: Hakalau National Wildlife Refuge, Kona Forest Unit, along southern boundary at 579 m elev., yellow sticky trap, 11 Apr–17 May 2000, W. Haines. *HVNP003049* (HVNP).

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New generic records of Hawaiian Chironomidae (Diptera)

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Six new state records of Chironomidae for the Hawaiian Islands were found as part of the U.S. Geological Survey's National Water-Quality Assessment (NAWQA) survey of benthic invertebrates in nine streams on the island of O'ahu during the summers of 1999 and 2000. Following standard NAWQA protocol (Cuffney *et al*., 1993), two collection methods were used to sample invertebrate communities along a minimum 100-m reach in each stream. Semi-quantitative samples were collected by using a modified-Surber (Slack) sampler with a 0.25 m^2 delineated sampling area. Each semi-quantitative sample consisted of five discrete samples that were collected from riffle habitats and then composited (total sampling area of 1.25 m^2). Qualitative multi-habitat samples were collected by using a D-frame net and sampling all available aquatic habitats to document the presence of other invertebrate taxa found in the sampling reach. Samples were preserved in 10% buffered formalin and sent to the U.S. Geological Survey's National Water Quality Laboratory (NWQL) Biological Group for identification and enumeration using the laboratory methods described by Moulton *et al*. (2000). Chironomid larvae were mounted on slides in CMC-10™ mounting medium, and are currently vouchered in the invertebrate collection of the NWQL Biological Group in Denver, Colorado and the Bishop Museum, Honolulu, Hawai'i.

Studies by Williams (1944) and Hardy (1960) contributed to the knowledge of Hawaiian Chironomidae, and Wirth (1947a,b) reviewed the taxonomy of the primarily marine genera, *Telmatogeton* and *Thalassomyia*, some species of which occur in freshwater in the Hawaiian islands. However, there is no recent comprehensive treatment of the Hawaiian Chironomidae, nor are there keys to the immature stages. The types of known adults endemic to Hawai'i have been listed in Evenhuis & Stoaks (1982), while the most recent list of Chironomidae known from Hawai'i is in Nishida (1997). The benthic collections provided by the NAWQA surveys primarily contain larval stages, allowing for

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identification to the genus level. Six new generic records of Chironomidae for the Hawaiian islands which were not listed in Nishida (1997) were found during the NAWQA surveys. Larvae were identified by A.B. Richards, using the taxonomic works of Coffman & Ferrington (1996) and Wiederholm (1983). Members of these genera occur on the western coast of North America and it can be speculated that some species are relatively recent immigrants to the islands via aircraft. Three of the 6 new genera were only found at one site each and three were widespread around Oʻahu. In Waikakalaua, a highly degraded stream, we found 5 of the 6 new genera, with two genera exclusive to this site. Subsequent work, including light trapping and rearing of larvae to the adult stage, will be necessary to identify these taxa to species. We hope this report will stimulate future studies of Hawaiian Chironomidae which might lead to a more comprehensive understanding of midge zoogeography.

Chironominae

Apedilum sp. (Chironomini) **New state record**

Larvae of this Holarctic and Neotropical genus were collected at 3 sites on Oʻahu.

Material examined: **Oʻ AHU**: Kaneʻohe Str, 40 ft [12 m], 17.viii.1999 (A.M. Brasher & R.H. Wolff); Waiheʻe Str, 170 ft [52 m], 3.v.2000 (A.M. Brasher & R.H. Wolff); Waikakalaua Str, 600 ft [183 m], 13.vii.1999 (A.M. Brasher & R.H. Wolff).

Paratanytarsus sp. (Tanytarsini) **New state record**

Larval specimens of this worldwide genus were collected at 3 sites on Oʻahu. This is the first published record of this genus from the Hawaiian islands although several species are known from adults (unpubl., J.E. Sublette, pers. com.).

Material examined: **Oʻ AHU**: Mānoa Str, 22 ft [7 m], 10.v.1999 (A.M. Brasher & R.H. Wolff); Waiheʻe Str, 170 ft [52 m], 8.vi.1999 (A.M. Brasher & R.H. Wolff); Waikakalaua Str, 600 ft [183 m], 13.vii.1999 (A.M. Brasher & R.H. Wolff).

Stempellinella sp. (Tanytarsini) **New state record**

A larval specimen of this Holarctic genus was collected in the qualitative samples at Waikakalaua Stream on Oʻahu.

Material examined: **Oʻ AHU**: Waikakalaua Str, 600 ft [183 m], 13.vii.1999 (A.M. Brasher & R.H. Wolff).

Orthocladiinae

Eukiefferiella sp. (Orthocladiini) **New state record**

A number of larval specimens of this worldwide genus were collected at 6 localities on Oʻahu. This is the first record of this genus from the Hawaiian islands.

Material examined. **Oʻ AHU**: Kaluanui Str, 110 ft [34 m], 31.viii.1999 (A.M. Brasher & R.H. Wolff); Punaluʻu Str, above the weir, 212 ft [56 m], 16.vi.1999 (A.M. Brasher & R.H. Wolff); Punaluʻu Str, below the weir, 212 ft [56 m], 14.vi.1999 (A.M. Brasher & R.H. Wolff); Waiahole Str, 210 ft [64 m], 29.vi.1999 (A.M. Brasher & R.H. Wolff); Waiheʻe Str, 170 ft [52 m], 8.vi.1999 (A.M. Brasher & R.H. Wolff); Waikakalaua Str, 600 ft [183 m], 13.vii.1999 (A.M. Brasher & R.H. Wolff).

Parakiefferiella sp. (Orthocladiini) **New state record**

Larval specimens of this widespread genus were collected at Waiahole Stream.

Material examined. **Oʻ AHU**: Waiahole Str, 210 ft [64 m], 29.vi.1999 (A.M. Brasher & R.H. Wolff).

Tanypodinae

Ablabesmyia sp. (Pentaneurini) **New state record**

Larval specimens of this cosmopolitan genus were collected at Waikakalaua Stream.

Material examined. **O'AHU**: Waikakalaua Str, 600 ft [183 m], 13.vii.1999 (A.M. Brasher & R.H. Wolff).

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New records for introduced Drosophilidae (Diptera) in Hawai‘i

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This note reports 4 new state and 2 new island records for the family Drosophilidae. All species reported here are introduced to the Hawaiian Islands. Methods involved baiting with rotting bananas and mushrooms, general sweeping of vegetation, light trapping, aspirating flies from substrates, and rearing specimens. It is significant to note that the introduced *Stegana* species has been reared from wood of a native *Pisonia* species on O‘ahu. This is an important host plant for native Drosophilidae (Heed, 1968; Montgomery, 1975) and may eventually place a stress on the endemic drosophilid populations. Additional unpublished records from specimens present in the University of Hawaii Entomology collection are also included here.

Museum and collector abbreviations used in this note are: AMNH (American Museum of Natural History, New York), UHM (University of Hawai'i at Mānoa, Entomology Collection, Honolulu), EMC (Elysse M. Craddock), JPM (J. P. Murphy), JS (Julian Stark), JWB (J.W. Beardsley), MM (M. Muraoka), MPK (Michael P. Kambysellis), PMO (Patrick M. O'Grady), SLM (Steven L. Montgomery), and WDP (William D. Perreira).

Drosophila carbonaria Patterson & Wheeler **New state record**

This species is commonly found in the southwest United States and northern Mexico (Patterson & Stone, 1952). It is known to use sap fluxes on mesquite (*Prosopis sp*.). Although *Prosopis* has been widely introduced in Hawai‘i (Wagner *et al.*, 1990), all specimens of this species have been collected in association with sap fluxes on monkeypod, *Samanea saman* (Fabaecae), trees.

Material examined. **MOLOKA‘I**: Kakahahai County Park, 3 ft, on monkeypod flux, 14.iv.1995, WDP (UHM). **O‘AHU**: Keehi Lagoon Beach Park, 5 ft, on monkeypod flux, 1.i.1998, WDP (UHM). **HAWAI'I**: Kealakekua, 5 ft, on monkeypod flux, 19.v.1999, WDP (UHM).

Drosophila floricola Sturtevant **New island record**

The traditional range of this species extends along the Pacific coast from the southwest United States to Colombia. It is a flower breeding species and in Hawai‘i can be found in *Ipomea* species, sometimes sympatrically with the endemic species of *Exalloscaptomyza*. This species has been previoulsy recorded from Hawai‘i and O‘ahu (Nishida, 1997).

Material examined. **MAUI**: Haleakalā Highway, 16.iii.1999, on *Ipomea* flowers, PMO & JS (AMNH).

Drosophila suzukii (Matsumura) **New island record**

This species is known from Kaua‘i, O‘ahu, Moloka‘i, and Hawai‘i (Nishida, 1997). It was described from Japan, China, Korea and Thailand, although it has become cosmopolitan in the past few decades. Recent collections on Maui and Moloka‘i have also found this species, even at higher elevations in mostly pristine rainforest.

Material examined. **MAUI**: Waikamoi Forest Preserve, 4000 ft, 8.iii.1999, MPK, EMC, & PMO (AMNH). Other collections at the same site: 16-18.iii.1999, PMO & JS; 2.vi.1999, PMO (AMNH); 4.ii.2000, PMO (AMNH).

Mycodrosophila sp **New state record**

Mycodrosophila is a mycophagous genus of primarily circumtropical distribution, although some representatives are found in the Nearctic and Palearctic regions (Wheeler, 1981). Based on the material on hand, we were not able to identify the exact species. It is possible that these may represent one or more new species from southeast Asia or the Pacific.

Material examined. **O'AHU**: Makaleha Valley, 1.vii.1969, MM (UHM). Keālia Trail, Wai'anae Mountains, 800 ft, 26.iii.1992, WDP (UHM). **MAUI**: Waikamoi, JPM (UHM). Upper Waikamoi Foreset Preserve, 6.vii.1998, on fungus, SLM & PMO (AMNH).

Stegana coleoptrata (Scopoli) **New state record**

The ecology of the genus *Stegana* is not well understood. Few rearing records exist, although they are often collected in association with leaf litter, rotting bark and other plant material (Wheeler, 1954). In Hawai'i, this species has been reared from *Pisonia*, a native member of the Nyctaginaceae.

Material examined. **O'AHU**: Pearl City, light trap, 10.xi.1976, JWB (UHM). Makiki Stream, Makiki, 300 ft, 23.vii.1983, WDP (UHM). Makiki Stream, Makiki, 250 ft., 29.i.1991, WDP (UHM). Wiliwilinui Ridge,1800 ft, 21.v.1992, on fluxing *Acacia koa* tree, WDP (UHM). Pūpūkea, 11.iv.1999, reared from *Pisonia* stems, MPK, SLM & PMO (AMNH). **MOLOKA'I**: Mapulehu, near Ili'ili'ōpae Heiau, ca 40 ft, 5.i.1996, WDP (UHM).

Zaprionus ghesquierei Collart **New state record**

This species is is known from central Africa, where it is widespread (Wheeler, 1981). The Moloka'i record suggests that this species has spread into the lower elevation rainforest.

Material examined. **O'AHU**: Honolulu International Airport, light trap, 26.iv.1978, JWB (UHM). **MOLOKA'I**: Pāpio Stream, 600 ft, yellow sticky board trap, 16–30.ix.1994, WDP (UHM).

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Notes on the nomenclature of the endemic Hawaiian Drosophilidae

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Hardy's revision of the Hawaiian Drosophilidae included 9 genera, *Antopocerus, Ateledrosophila, Celidosoma, Drosophila, Grimshawomyia, Idiomyia, Nudidrosophila, Scaptomyza*, and *Titanochaeta* (Hardy, 1965). These were considered to be part of two major lineages, "drosophiloids" and "scaptomyzoids," based on a number of morphological synapomorphies (Throckmorton, 1966). The drosophiloid, or Hawaiian *Drosophila*, lineage contained the *Drosophila* species endemic to Hawai'i, as well as the endemic genera *Antopocerus*, *Ateledrosophila*, *Idiomyia*, and *Nudidrosophila*. The scaptomyzoid lineage included all the Hawaiian *Scaptomyza*, as well as members of the genera *Celidosoma*, *Grimshawomyia*, and *Titanochaeta*.

Table 1. Taxonomic History of the Hawaiian *Drosophila* Lineage

clade	Hardy (1965)	Carson et al. (1968)	Kaneshiro (1976)	Hardy (1978)	Grimaldi[1] (1990)
Antopocerus	genus		*Drosophila*, in part	*Drosophila*, as subgenus	*Idiomyia*, as subgenus
Ateledrosophila	genus		*Drosophila*, in part		*Idiomyia*, as subgenus
Drosophila	genus				*Idiomyia*
Idiomyia	genus	*Drosophila*, in part			*Idiomyia*
Nudidrosophila	genus		*Drosophila*, in part		*Idiomyia*, as subgenus

1. In part. Only the 19 taxa Grimaldi (1990) used were formally moved into the genus *Idiomyia*. The remaining taxa remain in the genus *Drosophila*.

The status of the genera within the Hawaiian *Drosophila* lineage has been changed several times since Hardy's initial treatment 7 years ago (Table 1). Carson *et al*., (1967) sank the genus *Idiomyia* into the genus *Drosophila* based on polytene chromosome banding patterns. Kaneshiro's work on male genitalic morphology (Kaneshiro, 1976) supported the notion that *Idiomyia* was a synonym of *Drosophila*. He also considered *Antopocerus, Ateledrosophila*, and *Nudidrosophila* to be species groups within the genus *Drosophila*, rather than distinct genera, and sank them accordingly (Kaneshiro, 1976). Hardy (1977) published a revision of *antopocerus* and treated this group as a subgenus of *Drosophila*, even though he states that "these characters found only in males are probably not more than species group importance" even though he concludes "for convenience sake, to treat *Antopocerus* as a subgenus" of *Drosophila* (Hardy, 1977: 83). The subgeneric status of *antopocerus* was maintained by Wheeler (1981) in his world catalog of Drosophilidae.

In his revision of the family Drosophilidae, Grimaldi (1990) resurrected the genus *Idiomyia* to contain all endemic Hawaiian *Drosophila*. This concept included the *Drosophila* endemic to Hawai'i, *Idiomyia* (*sensu* Hardy, 1965), and the species placed in the *antopocerus*,

ateledrosophila, and *nudidrosophila* species groups (*sensu* Kaneshiro, 1976). These latter groups were originally considered subgenera of *Idiomyia*. Only those species formally combined with *Idiomyia* in Grimaldi's (1990) phylogenetic study were included in *Idiomyia* in the most recent checklist of Hawaiian terrestrial arthropods, which was based solely on published information (Nishida, 1997). The result is that 19 species in various *Drosophila* species groups (Table 2) are listed in the genus *Idiomyia* in Nishida (1997).

Table 2. Redesignation of Hawaiian *Drosophila* species

Grimaldi (1990)	This Study	Species group
Idiomyia achyla	Drosophila achyla Hardy	unplaced
Idiomyia adiastola	Drosophila adiastola Hardy	adiastola
Idiomyia adunca	Drosophila adunca (Hardy)	antopocerus
Idiomyia aenicta	Drosophila aenicta Hardy	nudidrosophila
Idiomyia araiotrichia	Drosophila araiotrichia Hardy	modified mouthpart
Idiomyia atroscutellata	Drosophila atroscutellata Hardy	modified tarsus
Idiomyia attigua	Drosophila attigua Hardy and Kaneshiro	primaeva
Idiomyia basimacula	Drosophila basimacula Hardy	modified tarsus
Idiomyia bipolita	Drosophila bipolita Hardy	haleakalae
Idiomyia crucigera	Drosophila crucigera Grimshaw	grimshawi
Idiomyia dissita	Drosophila dissita Hardy	modified mouthpart
Idiomyia engyochracea	Drosophila engyochracea Hardy	grimshawi
Idiomyia fungiperda	Drosophila fungiperda Hardy	haleakalae
Idiomyia perissopoda	Drosophila perissopoda Hardy	modified tarsus
Idiomyia perkinsi	Drosophila neoperkinsi (Grimshaw)	planitibia
Idiomyia preapiculata	Drosophila preapiculata (Hardy)	ateledrosophila
Idiomyia primaeva	Drosophila primaeva Hardy	primaeva
Idiomyia scolostoma	Drosophila scolostoma Hardy	modified mouthpart
Idiomyia spectabilis	Drosophila spectabilis Hardy	adiastola

Grimaldi (1990: 118) argued that "it is biologically and scientifically preferable to have a classification reflecting phylogenetic relationships". However, recent phylogenetic analyses indicate that the use of the genus *Idiomyia* for any or all Hawaiian *Drosophila* is misleading because (1) there are no synapomorphies defining this clade, (2) it is not supported as monophyletic in phylogenetic analyses of any character set (including that used in Grimaldi, 1990), and (3) it does not have precedence over *Drosophila* as a genus name.

Hardy (1965) stated that *Idiomyia* "is very close to *Drosophila*, and the only reliable character I have found separating it is the extra crossvein present in cell R_5" (Hardy, 1965: 539). However, this extra crossvein is present in several other Hawaiian taxa, rendering its use as a synapomorphy to define *Idiomyia* invalid. No other synapomorphies are exclusive to the group of taxa listed under *Idiomyia* in Nishida (1997). Reanalysis of Grimaldi's (1990) data, as well as a number of molecular loci (Remsen & O'Grady, 2002), show that the Hawaiian *Drosophila* are nested within the genus *Drosophila* as it is presently defined (Fig. 1). Furthermore, based on a number of recent taxonomic (Hardy *et al*., 2001; O'Grady *et al*., 2001; 2002) and molecular phylogenetic studies (Bonacum 2001; Remsen & O'Grady, 2002), the Hawaiian *Drosophila* species all form a single, well-supported

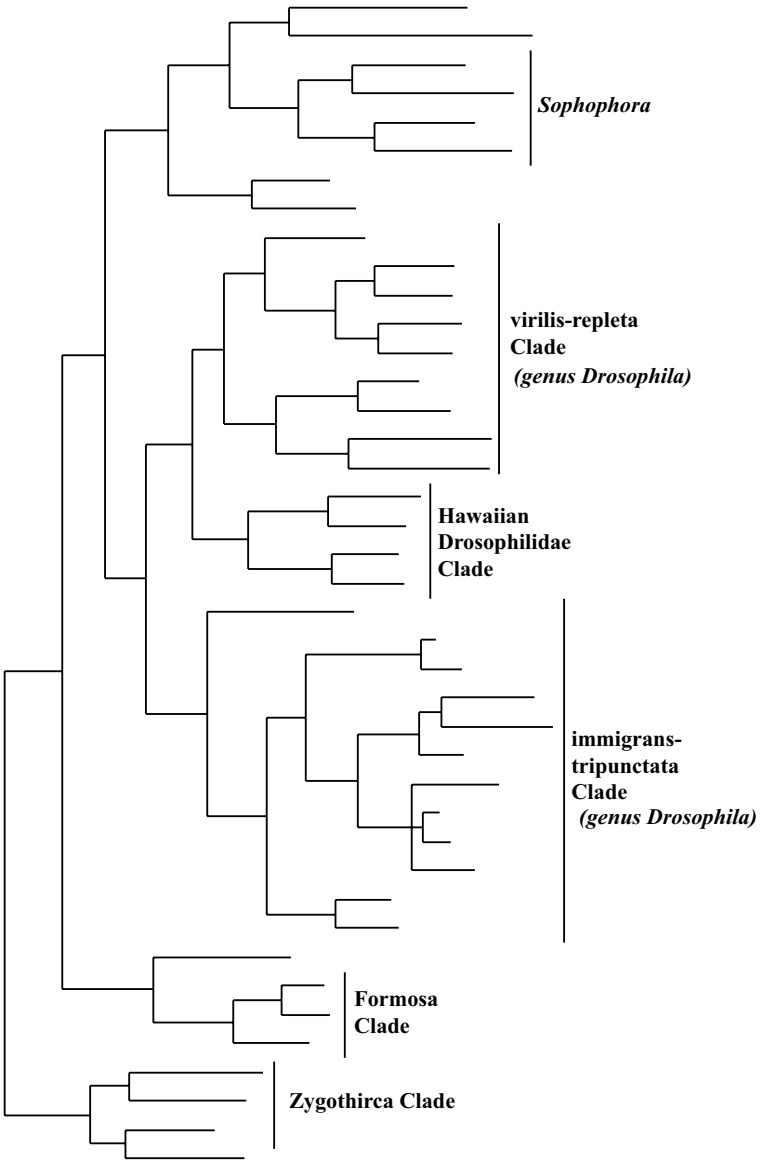

Figure 1. Phylogeny of the genus *Drosophila* and related groups showing the placement of the endemic Hawaiian *Drosophila* (Remsen & O'Grady, 2002). The Hawaiian *Drosophila* clade is nested within the genus *Drosophila*.

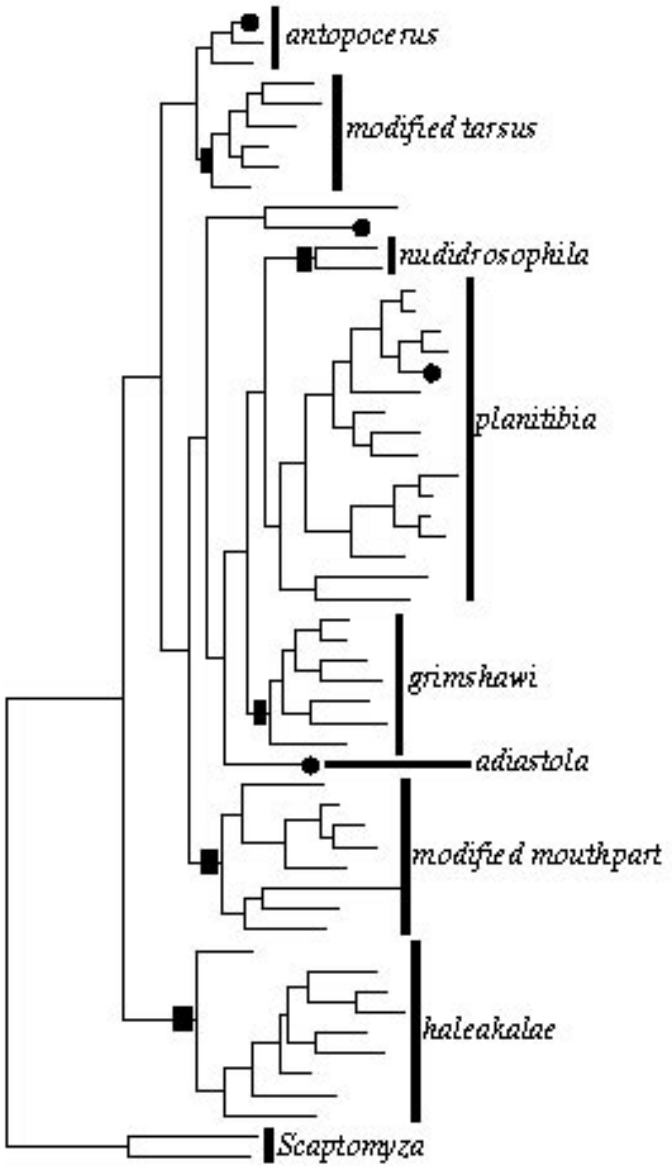

Figure 2. Phylogeny of the major lineages within the endemic Hawaiian *Drosophila* (Bonacum 2001). Circles indicate taxa placed in *Idiomyia* by Grimaldi (1990). Some species that were moved to *Idiomyia* by Grimaldi (1990) were not available for sampling, although the sister taxa were sampled. These clades are indicated by squares.

clade (Fig. 2). Although several taxonomically defined species groups are monophyletic, *Idiomyia*, as defined by Grimaldi (1990), is not. Finally, Grimaldi states that in choosing *Idiomyia*, he was merely selecting "the name with date precedence" (Grimaldi, 1990: 118). However, since *Idiomyia* is nested within the genus *Drosophila* and not monophyletic (as discussed above), and because several species in the Hawaiian *Drosophila* lineage were described in the genus *Drosophila* at the same time *Idiomyia* was erected, this name does not have precedence over *Drosophila*. Based on these arguments, we propose that the species placed in *Idiomyia* by Grimaldi (1990) be reinstated as members of the genus *Drosophila*, providing a firm taxonomic and phylogenetic framework for further evolutionary and systematic studies.

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First report of a water mite in the family Pionidae (Acari: Parasitengona: Hygrobatoidea) in the Hawaiian Islands

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Species of water mites can be found in over 100 families and subfamilies and are known to occur in great abundance and diversity throughout the world (Smith & Cook, 1991). Not surprisingly, few fresh-water mites occur in the Hawaiian Islands (Nishida, 1994). Imamura (1981) reported two halacrid mites from O'ahu and a fresh-water oribatid has been recently reported from O'ahu and Moloka'i (Swift & Norton, 1998). An, as yet, undescribed species of the aquatic mite family Pionidae is reported for the first time in the Hawaiian Islands from material collected on O'ahu and the Island of Hawai'i. Mites were collected during surveys of ephemeral lentic habitat for larvae of the Southern House Mosquito, *Culex quinquefasciatus*.

***Piona* sp.** **New state record**

The first specimen was a single adult collected from flower vases associated with a coastal cemetery in lower Puna on the Island of Hawai'i. Larval *Culex quinquefasciatus* and *Aedes albopictus* were also present. Adults and deutonymphs were next collected on Oahu from a water lily tub in the Makiki area of Honolulu and a bathtub basin in Lyon Arboretum, Honolulu. Both habitats contained larvae of *Culex quinquefasciatus, Aedes albopictus* and an unidentified chironomid. These three sites have since been destroyed. The most recent collection of this mite was made in Hawaii Volcanoes National Park on the Island of Hawaii. Larvae, deutonymphs and adults have been collected from the abandoned cisterns associated with the historic Ainahou Ranch. *Culex quinquefasciatus*, ostracods and *Chironomus hawaiiensis* were also present in good number. Nematocera larvae and ostracods are believed to be prey items for deutonymphal and adult water mites (Smith & Cook, 1991) and the larvae are known parasites of Chironomidae (Smith and Oliver, 1976). *Chironomus hawaiiensis* adults, that had been reared in and emerged from water and sediment taken from the Ainahou Ranch site, were parasitized by larval mites. Larvae were restricted to the intersternal membranes of the midge abdomen.

Specimens collected from Lyon Arboretum, Honolulu were identified by the author as belonging to the *Piona coccinea* species group (Smith, 1976) and deposited in the Bishop Museum. Additional specimens from Lyon Arboretum and Hawaii Volcanoes National Park were sent for identification to Dr. Ian Smith of the Biosystematics Research Centre, Agriculture Canada, Ottawa, Ontario, Canada (CNC). Dr. Smith identified the mites as an undescribed species of the genus *Piona.* He is currently working on a full species description.

Material examined. **O'AHU**: Lyon Arboretum, Honolulu, 20.ii.1997, aquatic in outdoor bathtub basin, (Dennis LaPointe), 3 adults (BPBM); **HAWAI'I**: Ainahou Ranch, Hawaii Volcanoes National Park, Kīlauea, 23.iv.1999, all stages aquatic in abandoned cisterns, parasitic larva ex *Chironomus hawaiiensis*, (Dennis LaPointe), 6 larvae, 6 deutonymphs and 6 adults (CNC)

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First record of the reef coral *Montipora hoffmeisteri* Wells at Johnston Atoll (Cnidaria: Anthozoa: Scleractinia)

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Johnston Atoll lies approximately 1325 km southwest of Honolulu, Hawai'i in the vicinity of 16°45' N, 169°31' W in the north central Pacific Ocean. The nearest other landfalls are French Frigate Shoals, over 800 km to the north-northeast, and the Line Islands, over 1500 km to the southeast. Johnston Atoll is thus one of the most isolated landmasses in the world. During sampling conducted in June, 2000 I observed the reef coral *Montipora hoffmeisteri* Wells, 1954 at Johnston Atoll and returned samples to the Bishop Museum for identification. This coral is characterized by its encrusting growth form and nodular protrusions with a spongy, finely spined reticulum. This species was noted only at one of eleven sites sampled in the Johnston Atoll docking area, lagoon and reef slope. It occurred at the base of a coral outcrop at 16°45'29.5" N, 169°21'29.3" W in the outer lagoon approximately 1 km N of the Johnston Island docking area in about 3 m depth. Other corals at the site which were much more common were *Montipora ?capitata* (Dana), *Montipora patula* Verrill, *Acropora cythera* (Dana), *Acropora humilis* (Dana), *Acropora valida* (Dana), *Pocillopora meandrina* Dana, *Pocillopora eydouxi* (Milne Edwards & Haime) and *Cyphastrea ocellina* (Dana). Reef coral species observed elsewhere in the Johnston Atoll. Lagoon or on the reef slope were *Pocillopora damicornis* (Linnaeus), *Porites lobata* (Dana), *Porites lutea* (Milne Edwards & Haim), *Pavona duerdeni* (Vaughan), *Pavona varians* Verrill and *Fungia scutaria* Lamarck, for a total of 14 species observed during the survey. This may be compared to the 28 named species of reef corals listed by Maragos & Jokiel (1986) and ten species listed by Jokiel & Tyler (1992) for previous surveys of corals at Johnston Atoll.

Montipora hoffmeisteri Wells, 1954 **New Johnston Atoll record**

Montipora hoffmeistei was not reported from any previous studies at Johnston Atoll that included reports of reef corals (Wells, 1954; Brock *et al*., 1965; Maragos & Jokiel, 1986); Jokiel & Tyler, 1992; Cohen, 1997; Chave & Malahoff, 1998), nor are any specimens from Johnston Atoll in the Bishop Museum collection. The nearest reported location to Johnston where this species has been observed and collected is Fanning Island in the Line Islands, approximately 2000 km southeast of Johnston Atoll. A specimen in the Bishop

Museum collection (BPBM-SC 1579) was collected by J.E. Maragos in August 1972 in the Fanning Island lagoon in turbid water at 1-m depth and is listed among the 70 reef coral species reported by Maragos (1974) from Fanning Island. Few other reports for this species could be determined using a variety of literature search sources. Wells (1954) originally described *Montipora hoffmeisteri* from specimens from Bikini Atoll lagoon, Marshall Islands, and Randall (1995) reported it from Palau and the Southern and Northern Mariana Islands. Veron & Wallace (1984) and Veron (1986) reported it from the Marshall Islands and around Australia from the Great Barrier Reef to the Houtman Abrolhos Islands on the west Australian coast. Veron (1992, 1993) extended its range northward to Indonesia, the Philippines, Vietnam and the southern islands of Japan, and eastward to the islands of Vanuatu. The present report marks the furthest penetration of this species into the northern-central Pacific Ocean of this inconspicuous species, suggesting that it is more widespread than formerly known.

Johnston Atoll lies near the southern edge of the North Pacific gyre and is in the zone of the North Pacific Equatorial Current, which moves water past the southern Hawaiian Islands to the atoll (Amerson & Shelton, 1976; Maragos & Jokiel, 1986). The atoll is also probably affected by the eastward flowing North Equatorial Countercurrent, which brings water from more tropical regions. Unlike the Hawaiian Islands where *Acropora* corals are absent from all of the main islands except Kaua‘i and vary in abundance from Necker to Laysan in the Northwest Hawaiian Islands (J.E. Maragos, unpubl. and pers. comm.), *Acropora* comprises most of the coral coverage at Johnston Atoll. Eight species of *Acropora* were reported by Maragos & Jokiel (1986) and an additional species (*Acropora nasuta*) was later identified by C. Wallace (BPBM-SC 3270, 3278, 3279, 3280, 3286). This abundance and diversity of *Acropora*, along with the presence o*f Montipora hoffmeisteri*, substantiates the influence of currents bringing larvae from lower latitudes in the tropics that compete with organisms from Hawai‘i to produce the coral reef biota of Johnston Atoll.

Material examined. **JOHNSTON ATOLL**: 3 small colonies “Station 9” northern Johnston Atoll lagoon, 3 m depth, 19.vi.2000, S.L. Coles (BPBM SC3979)

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Discovery of the cubomedusa *Carybdea sivickisi* (Cubozoa: Carybdeidae) in the Hawaiian Islands

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Each year thousands of ocean visitors worldwide are stung by jellyfish (Fenner & Williamson, 1996). During 1994, 800 beachgoers at Waikīkī on O'ahu required treatment following swarms of the cubomedusae *Carybdea alata* (Thomas & Scott, 1977). These envenomations have resulted in detailed examinations of the venom of *C. alata* in Hawai'i (Nagai *et al*., 2000). Two species of cubozoans were previously collected and described from Hawai'i: *Carybdea alata* (= *Charybdea moseri*) and *Carybdea rastoni* (= *Charybdea rastonii*) (Mayer, 1906). Recent observations have revealed a third species of cubomedusae on O'ahu.

Carybdea sivickisi (Stiasny) **New state record**

Night lighting observations were conducted and cubomedusae collected at two locations: off the south coast of O'ahu in the Natatorium (a closed-to-the-public, salt-water swimming pool fronting Mamala Bay, Sans Souci Beach, Waikīkī) from 8 July 1996 until the present time; and off the west coast of O'ahu outside Yokohama Bay on 20 March 1998. In both cases, the jellies were collected at or near the surface by net. At the Natatorium, cubomedusae were attracted using dive lights and at Yokohama Bay, using a seal beam truck light on a boat. Cubomedusae were observed feeding on zooplankton.

Carybdea sivickisi was originally described from Puerto Galera, Philippines (Stiasny, 1926) and has since been described in the Indo-Pacific from Thailand, Japan, Vietnam, and New Zealand (Hoverd, 1985; Hartwick, 1991). *Carybdea sivickisi* was con-

sidered to be the smallest (less than or equal to 14 mm) and least known of the 4-tentacled cubomedusae (Hoverd, 1985). This species was reported by Hoverd (1985) and Hartwick (1991): bell cuboidal, narrowing slightly towards the apex; rhopalar niches lack a flap-like cover; pigmented areas in the gonads, gastric region and tentacles; dense accumulations of nematocysts on the bell; and adhesive pads present at the apex of the bell (these pads are difficult to see in preserved specimens).

Material examined. **O'AHU**: South coast in the Natatorium 3 Dec 2001, over 1.5-2.5 m of water (BPBM D1068, 5 spms); west coast near Yokohama Bay 20 Mar 1998, 1.3 km offshore at the surface over 180–550 m of water (BPBM D1069, 1 spm).

Carybdea sivickisi is phototropic with adhesive pads that help it cling to the substratum during the daytime. This species has been observed feeding on polychaete heteronerids, gammarid amphipods, isopods, and cumaceans (Hartwick, 1991). Despite its small size, *C. sivickisi* is reported to cause a painful sting to the exposed skin of divers. Erythema and blistering persisted for hours, but no systemic effect was noted (Hartwick, 1991).

This note adds a third species to the cubozoan diversity in Hawaiian waters. The co-occurrence of these three species suggests partitioning of prey items. This is further supported by the presence of novel venom proteins described for *C. alata* and *C. rastoni* (Nagai *et al*., 2000). Because of its small size, *C. sivickisi* may have been previously overlooked or assumed to be a juvenile of the previously described cubomedusae in Hawaii. As a result, it fits the designation of a cryptogenic species as described by Carlton (1996). Despite the abundance of cubomedusae (density and diversity) in Hawaiian waters and their socioeconomic importance, very little is known about their preferred habitat or ecological significance.

Acknowledgments

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Discovery of a second species of introduced leech (Hirudinea: Piscicolidae) parasitizing native stream fishes on the Island of Hawai‘i

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Parasitic infestations of Hawaiian stream fishes by the introduced fish leech *Myzobdella lugubris* Leidy have been well documented (Font, 1998). This North American leech co-occurs in Hawaiian streams with poeciliid fishes which have been introduced for mosquito control and as aquarium releases and now parasitizes 4 of the 5 species of native stream fishes. Ironically, because these native gobioid fishes are sedentary bottom dwellers, they are more vulnerable to infestation and show higher prevalences and abundances of leeches when compared to levels of infestations on the nektonic fish hosts that first introduced *M. lugubris* to Hawaiian streams. The geographic range of *M. lugubris* spans the archipelago from Hawai‘i to Kaua‘i. While examining native fishes near Hilo, Hawai‘i for leech infestations, we discovered a piscicolid leech that was anatomically distinct from specimens of *M. lugubris.* We report here a second species of introduced fish leech that infests native Hawaiian stream fishes.

Hirudinea: Piscicolidae

Piscicola geometra (Linnaeus) **New state record; New host records**

We collected fishes in unbaited minnow traps from the estuary formed by Wailoa River in Hilo, as well its freshwater tributaries, Waiakea Stream and Alenaio Stream feeding into the estuary. Fishes were also collected with traps, handlines, dipnets, and seines from adjacent streams and aquatic habitats along the Hamakua coast. Fishes were placed alive in aerated buckets or on ice and immediately examined for leeches upon return to the research station in Hilo. Salinity was recorded at the site of fish capture. Leeches were detected by visual inspection of the fins, skin, opercula, and mouths of fish hosts and removed with forceps. Microscopic examination of live leeches, formalin-fixed opaque specimens, and cleared, mounted specimens stained with Semichon’s aceto-carmine was conducted to determine specific identification of parasitic leeches. Voucher specimens of leeches have been deposited in the Bishop Museum, American Museum of Natural History, and the Smithsonian Institution.

The two species of leeches that parasitized fishes of the Wailoa River estuary, *Myzobdella lugubris* and *Piscicola geometra*, were easily distinguishable by pigmentation patterns and especially by the relative proportions of oral and caudal suckers. In *M. lugubris*, suckers do not exceed maximum body width, whereas in *P. geometra*, sucker diameters are conspicuously greater than the width of the body. Specimens of *P. geometra* possess 2 pairs of cephalic ocelli, alternating bands of dark and light pigment cells, 14 pairs of ocelli along the body, and 15 pigmented rays extending from the center of the cau-

dal sucker. These morphological characteristics are consistent with descriptions of *Piscicola geometra*, a parasitic fish leech that is native to Eurasia. We consider our identification to be tentative, however, in that our specimens did not exceed 15 mm body length, whereas European specimens 30 mm long have been reported (Klemm, 1985).

We have collected over 1300 specimens of *P. geometra* mainly from specimens of the native sleeper (Eleotridae) *Eleotris sandwicensis* Vaillant and Sauvage (n = 171). The sleeper typically occurs near stream mouths where estuarine conditions may occur (Kinzie, 1990). Intensity of infestation of sleepers ranged from 1-79 leeches. Two other native Hawaiian stream fishes, both gobiids, *Stenogobius hawaiiensis* Watson and *Awaous guamensis* (Vallenciennes) caught in Wailoa estuary were also infested. These native fishes are also common in lower stream reaches, typically in freshwater habitats, but occasionally encountering oligohaline conditions. We caught one stripebelly pufferfish, *Arothron hispidus* (Linnaeus) infested with *P. geometra*. This marine species commonly ventures into estuaries. We examined fishes monthly from September 1998 through October 2000 and found leeches on sleepers in all months. Furthermore, in every month we found both juvenile and mature leeches on sleepers, indicating that year-around reproduction and recruitment of new leeches into the population is occurring in the estuary. The continuous reproduction of this leech in Hawai‘i may be an example of ecological release from a more restricted period of reproduction in the temperate climate where *P. geometra* occurs naturally. Fishes infested with *P. geometra* were caught in oligohaline habitats where salinities briefly dropped to 0 ppt after heavy rainfalls, to 7 ppt during drier periods. No specimens of *P. geometra* parasitized sleepers collected in strictly freshwater upstream in Waiakea Stream and Alenaio Stream where salinities of 0 ppt were consistently recorded. In those strictly freshwater habitats, only specimens of *M. lugubris* infested sleepers. We found a few sleepers concurrently infested with both *P. geometra* and *M. lugubris* at salinities of 1 to 2 ppt. In the laboratory, sleepers were transferred from 4 ppt water in which they were collected to streamwater at 0 ppt. Specimens of *P. geometra* detached from sleepers within 1 day and died within 3 days of exposure to freshwater.

Piscicola geometra has been reported from a broad range of freshwater fish hosts in Europe and Asia. However, specimens identified as *P. geometra* have also been reported from brackish water habitats by Johansson (1896), and Sawyer, Lawler, and Overstreet (1975) cite additional reports of brackish water leeches that are allied with freshwater populations. Because of the uncertainty of the taxonomic relationships between these freshwater and brackish water populations in Europe, we must regard our identification of anatomically similar specimens from Hawai‘i as provisional. The mode of introduction of this leech into the archipelago is unknown. Cyprinid fishes are common hosts of *P. geometra* in Eurasia. At least 3 species of cyprinids, carp, koi, and goldfish are established in Wailoa River, but infestations of these hosts have not yet been studied. Our caution in assigning a definitive identification to this leech in no way diminishes the reality of its introduction or the potential threat of this leech to spread throughout the archipelago.

The upper salinity tolerance of *P. geometra* in Hawai‘i is unknown. Our discovery of this leech on stripebelly pufferfish, a fish species that readily moves between estuaries and marine habitats raises concern. If this leech can tolerate marine salinities, then it may be transported by euryhaline fish hosts from Wailoa estuary to the mouths of other streams along the Hamakua coast. At this time, this natural transport has not been documented, although we find *M. lugubris* to be a common parasite of stream fishes of windward Hawai’i (Font, 1997). We have found *P. geometra* in one other aquatic habitat outside of Wailoa estuary. Sleepers collected in Loko Waka Pond harbored specimens of *P. geome-*

tra. This spring fed, oligohaline pond is connected to Hilo Bay approximately 3 miles east of the mouth of Wailoa River. There have been many instances of human transfer of fishes between Loko Waka Pond and the Wailoa River, and we regard these transfers as the most probable reason that the leech presently occurs in both of these habitats. This initial spread of *P. geometra* to a second aquatic habitat on the island of Hawai'i serves as fair warning of the harm that may result from further fish translocations from Wailoa estuary by man, introducing a parasite that may be detrimental to native fishes elsewhere in the Hawaiian islands.

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New records of alien reptiles in Hawai'i

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In recent decades, the number of introductions of alien reptiles and amphibians to Hawai'i has increased significantly, with most of that increase due to animals deliberately introduced to the state to serve as pets (Fig. 1). Indeed, the only reptiles or amphibians to establish populations in Hawaii in the past 50 years that were not associated with the pet trade were two species of *Eleutherodactylus* frogs introduced as unintentional hitch-hikers on nursery plants (Kraus *et al*., 1999). Most of these introduced pet-trade animals were never legally permitted by the State and, hence, were intentionally smuggled. Herein I report yet another smuggled lizard now established in the state, evidence for separate introductions of a second lizard recently added to the state's fauna (also smuggled), and new island records for additional reptiles of longer-standing residence.

1. Present address: Hawaii Biological Survey, Department of Natural Sciences, Bishop Museum, 1525 Bernice Street, Honolulu, Hawai'i 96817-2704, USA.

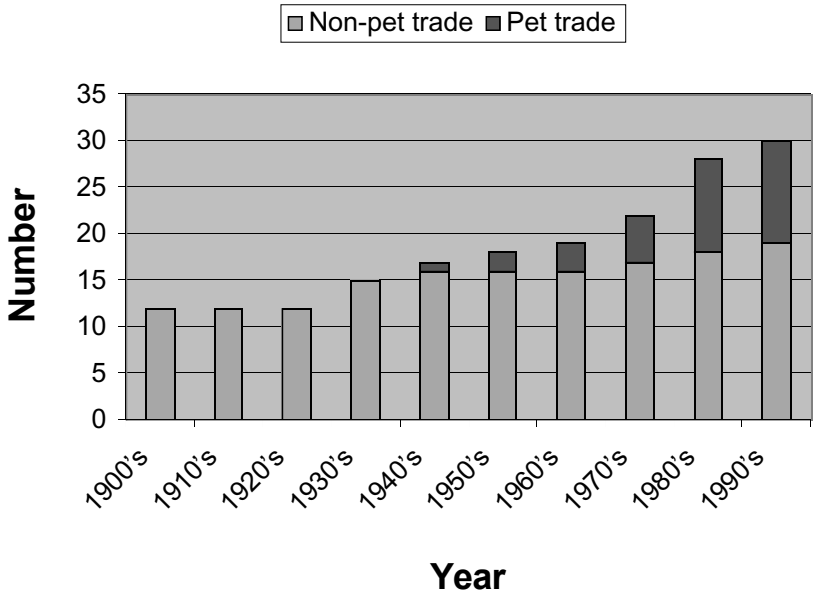

Figure 1. Cumulative plot of numbers of alien reptiles and amphibians established in Hawai‘i since 1900, indicating that most newly established species in the past 50 years have arrived as pets, most illegally.

Gekkonidae

Phelsuma madagascariensis (Gray) **New state record**

This species is now established in a small area of Mānoa Valley, O‘ahu. The first specimen was collected in December 1996 and another was taken in January 2001 only two blocks away from the first, suggesting the persistence and expansion of a reproducing population in the area. A third specimen, taken in February 2001 from the Pearl Harbor area, may represent a second population, but that is uncertain at this time. As the name implies, this species is native to Madagascar.

This is the third species of *Phelsuma* smuggled into and intentionally established in the state, and additional species not currently reported from the wild have been confiscated from smugglers. The exact localities of the specimens reported above are not provided in order to hinder their intentional spread around the state by ignorant lizard fanciers – the primary route by which *Phelsuma laticauda* has become widely distributed around the state in the past few decades.

Unlike the other two established *Phelsuma* in Hawai‘i, which are approximately the size of most of the other introduced geckos and anoles, *P. madagascariensis* can attain a length of 20-30 cm. Its larger size is likely to make this species less welcome by many homeowners and may result in population reductions of microsympatric diurnal lizards via predation. It is uncertain to what extent this species may be capable of invading native forest, but its size could make it problematic for a wide array of native invertebrates.

Material examined: **O'AHU**: Mānoa Valley, 18.xii.1996, A. Freudenberg (BPBM 13285); Mānoa Valley, 25.i.2001, F. Kraus & D. Cravalho (BPBM 14089); Hālawa Heights, 8.ii.2001, L. Iseke & R. Uyesato (BPBM 14092).

Iguanidae

Anolis sagrei Duméril & Bibron **Additional introduction**

This Caribbean species is currently known only from Oahu, where specimens were first collected in 1992 (Kishinami and Kishinami 1996) although the claim is made the lizard was introduced around 1980 (McKeown, 1996). This species forms dense populations in the Kailua and Lanikai areas and is rapidly establishing numerous satellite populations around the island via hitch-hiking on nursery materials and automobiles.

In September 1999, my attention was brought to another population of this lizard in the Pearl Harbor area which exhibits the unique feature that all specimens have rusty orange heads. This attribute is stated by Schwartz and Henderson (1991) to be a frequent polymorphism in *A. sagrei* but they do not state whether it characterizes entire populations in its native range. In the Oahu population, the vividness of the orange head may vary seasonally: specimens captured in September all had conspicuously orange heads, but a large number of those captured in December had largely brown heads, although orange could still be seen in many specimens upon close inspection.

The fixed nature of this coloration feature in the Pearl Harbor population and my failure to see it in any of the hundreds of *A. sagrei* I've collected from windward Oahu or numerous satellite populations on leeward Oahu suggests that this population is descended from a separate introduction of *A. sagrei* to Oahu. The first introduction of this species, which apparently led to all other populations on Oahu, was credited by McKeown (1996) to escaped pets. This is a feasible entry route, though not certain because this species also travels easily in nursery materials. In contrast, the orange-headed population, because of its apparently uncommon occurrence in Florida and the attractive nature of its color pattern, is likely to represent a deliberate introduction for pet purposes. This serves to underscore the fact that alien reptiles and amphibians, as for other alien species, may be arriving into Hawaii from independent sources and multiple pathways.

The high densities this species can attain and its ability to tolerate open, hot habitats make it a likely threat to invertebrate pollinators when it reaches native strand habitats and dry forest remnants. Because of its pest potential, every effort should be made to keep this lizard from reaching the outer islands. For the same reasons discussed earlier, exact locality information is not provided for this new population of *A. sagrei*.

Material examined: **O'AHU**: Foster Village, 23.ix.1999, F. Kraus & H. Barnoff (UMMZ 226792-805), Foster Village, 4.xii.1999, F. Kraus & J. Lazell (UMMZ 226860-71).

Anolis carolinensis (Voight) **New island record**

This lizard is native to the southeastern United States and was first discovered in 1950 in a small area of Honolulu (Shaw & Breese, 1951), became widespread on O'ahu within two decades (Hunsaker & Breese, 1967), and has subsequently been reported to occur on Kaua'i, Maui, Moloka'i, and Big Island (McKeown, 1996). I herein document its presence on Lāna'i in 1999, where it occured in hedges in the residential part of town.

Like *A. sagrei*, this species travels in nursery materials and on personal vehicles; it is also probably transported intentionally for amenity purposes. Which mode is responsible for its transport to Lāna'i is uncertain but the last named seems most likely.

Material examined: **LĀNA‘I**: Lāna‘i City, 20.viii.1999 (BPBM 13843-44; UMMZ 225263), F. Kraus; Lāna‘i City, 21.viii.1999, F. Kraus & R. Crombie (UMMZ 22564-67).

Scincidae

Lampropholis delicata (de Vis) **New island record**

This Australian skink arrived on O‘ahu around the year 1917 (Oliver & Shaw, 1953), presumably as a cargo stowaway, and was still known only from that island until at least the late 1960s (Hunsaker & Breese, 1967). Subsequently, it has been reported from Kaua‘i, Maui, Moloka‘i, and Big Island (McKeown, 1996). I herein document its occurrence on Lāna‘i in 1999, where it was found in dense populations in residential areas in town and was common all the way to the top of Lāna‘ihale (1010 m). This species probably arrived on Lanai in nursery or construction material transported from one of the neighbor islands.

This species’ dense populations and ability to live at moderately high elevations (up to at least 1345 m on Kaua‘i; 1235 m on O‘ahu) may make it a threat to native leaf-litter invertebrates in bogs and disturbed areas of native forest. It’s entry into upper elevation bogs on Kaua‘i may have been allowed by forest canopy opening by Hurricanes Iwa and Iniki, and its presence on Mt. Ka‘ala is probably due to the opening of the access road. This species has failed to penetrate similar habitats on Pu‘u Kukui, West Maui, where no corridor of opened habitat has allowed it to reach that region’s bogs.

Material examined: **LĀNA‘I**: Lāna‘ihale, 20.viii.1999, F. Kraus & E. Teodoro (BPBM 13833-36; UMMZ 225270-75); Lāna‘i City, 20.viii.1999, F. Kraus (BPBM 13837-42, UMMZ 225276-89).

Trionychidae

Pelodiscus sinensis (Siebenrock) **New island record**

This eastern Asian turtle was probably introduced to Hawai‘i in the late 1800s for human consumption and has been recorded from Kaua‘i and O‘ahu (Webb, 1980; McKeown & Webb, 1982). I herein document its occurrence on Maui, with a Wailuku specimen retrieved in late 2000 after a flooding event. For the past several years, specimens of what are probably this species have been observed, though not captured, in Kanahā Pond, Kahului as well. Transport among islands seems largely to have been for ornamental stocking of fish ponds (McKeown & Webb, 1982) and may account for this species’ arrival on Maui.

Material examined: **MAUI**: Wailea, 3.xi.2000, T. Haas (BPBM 14091).

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NOTICES OF PUBLICATIONS

Compiled by Neal L. Evenhuis

The following are new or recent publications dealing with Hawaiian biota that may be of interest to our readers. Authors and publishers of new books or reports that pertain to Hawaii's environment and rich natural heritage are encouraged to submit them to the editors of the HBS Records for inclusion on these pages. In addition to these titles, readers are directed to the website listing the publications of the Hawaii Biological Survey for further works: http://hbs.bishopmuseum.org/hbs.pubs.html

Cousins, **K**. **& J**. **Cooper**. 2000. The population biology of the Black-footed albatross in relation to mortality caused by longline fishing: report of a workshop held in Honolulu, Hawaii, 8-10 October 1998 under the auspices of the Western Pacific Regional Fishery Management Council. x + 120 p.

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