

## New plant records from O‘ahu for 2008<sup>1</sup>

DANIELLE FROHLICH<sup>2</sup> & ALEX LAU<sup>2</sup> (O‘ahu Early Detection, Bishop Museum,  
1525 Bernice Street, Honolulu, Hawai‘i 96817-2704, USA;  
emails: danielle.frohlich@bishopmuseum.org, alex.lau@bishopmuseum.org)

We document 19 new naturalized records, 8 new state records, and 14 new island records in 23 families. In addition to our own collections, we report on records of naturalization noted by other agencies during 2008.

This article documents 10 naturalizing species in the Bromeliaceae, a previously underrepresented group in the naturalized flora of Hawai‘i. Also included are three species in the Orchidaceae. In the past, both families were believed to be less likely to naturalize in Hawai‘i, based upon their general tendency to rely on specialist pollinators not documented as present here. However, it is important to note that both these families contain species that are self-fertile and wind-dispersed. As indicated by the naturalized records documented here, these biological characteristics have imparted an advantage to these species and increased the possibility of their naturalization. For this reason, home growers are encouraged to monitor their plants for signs of naturalization and to avoid species that are known to be, or appear to be, self-compatible and easily dispersed.

Information regarding the formerly known distribution of flowering plants is based on the *Manual of the flowering plants of Hawai‘i* (Wagner *et al.* 1999) and information subsequently published in the Records of the Hawaii Biological Survey. Voucher specimens are deposited at Bishop Museum’s *Herbarium Pacificum* (BISH), Honolulu, Hawai‘i.

### Acanthaceae

#### *Megaskepasma erythrochlamys* Lindau

#### New naturalized record

*Megaskepasma erythrochlamys*, a 2.4–4.6 m tall, attractive shrub native to Costa Rica, Nicaragua, El Salvador, and Venezuela, is a popular ornamental in Hawai‘i and other tropical locales. It is cultivated by cuttings and seed and is the only species in its genus. Distinguishing features are ovate leaf blades 30.5–40.6 cm long with deep green upper-sides and prominent veins, short-petiolate. Inflorescence is a terminal conical spike with ovate to ovate-lanceolate, burgundy red bracts 2.5–5.1 cm long, and veined from the base. Flowers have a five-parted calyx with unequal lobes. Corollas are up to 7.6 cm long and tubular, 2-lipped, white, pubescent, and sharply curved at the tip. There are 2 fertile stamens; fruit is ca 1.27 cm long and oblong, containing 4 seeds. This specimen was collected from a roadside gulch in Schofield Barracks, where it made up the majority of the understory.

*Material examined.* O‘AHU: Schofield Barracks, herb ca 2 m tall, spreading throughout gulch on side of road, making up almost all of understory, growing among *Justicia*, *Spathodea*, fruits immature, green, 29 Apr 2008, OED & J. Beachy 2008042901.

1. Contribution No. 2010-002 to the Hawaii Biological Survey.

2. Research Associate, Hawaii Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, Hawai‘i, 96817-207, USA.

**Annonaceae*****Polyalthia suberosa* (Roxb.) Thwaites****New naturalized record**

*Polyalthia suberosa*, which is native to India, Sri Lanka, and Southeast Asia, is widely planted throughout the tropics as an ornamental and for its edible fruit (Staples & Herbst 2005). The specimen examined for this new naturalized record was brought to the museum by a woman who found it in her yard in Waipahu, presumably dispersed by birds. *Polyalthia suberosa* is a 1.8–3.7 m tall shrub with thick, corky, ridged bark. Its narrowly obovate to oblong leaves are 2.0–10.8 cm long by 1–3.6 cm wide, sessile, rounded at the apex, and have undulate margins. Flowers are 0.635 cm long and solitary; petals are pale yellow and somewhat downy. The copious purple fruits are 0.635 cm in diameter and borne in clusters (Staples & Herbst 2005).

*Material examined.* O'AHU: Waipahu, growing in yard with *Carmona retusa*, *Ochna thomasiiana*, *Trema orientalis*, no other plants noted in neighborhood, leaves glossy above, paler below with wavy margins, fruits ripening to dark purple/black, 26 Apr 2008, A. Lau & D. Frohlich 2008042601.

**Apocynaceae*****Tabernaemontana pandacaqui* Poir.****New naturalized record**

*Tabernaemontana pandacaqui*, a tree with a broad native range extending west to east from Thailand to the Tuamotu Archipelago, and north to south from Taiwan, Micronesia, and the Philippines to Sydney, Australia, is a commonly seen tree in O'ahu's landscape. Similar to *T. divaricata*, this shrub or treelet, which ranges from 1–14 m tall, is used in Hawai'i as a hedge, feature plant, container specimen, bonsai, or street tree. Leaf petioles are 2.54–20.00 mm; blades are elliptic to narrowly elliptic and 3.2–25.4 cm long by 1–10 cm wide, herbaceous, glabrous, or pubescent, with a wedge-shaped base. Tertiary veins are usually prominent and reticulate. Flowers are faintly scented or odorless, with 1.0–3.8 mm long greenish sepals. Corolla is white or pale yellow with a 7.0–31.8 mm twisted tube, greenish inside, with a yellow throat. Stamens are attached above the middle of the tube. Fruit is orange, red, or yellow, and seed aril is orange or red.

*Material examined.* O'AHU: Makiki, Birch St (UTM 619919, 2355421), dry lowland suburban setting, shrub ca 2.5 m tall; relatively infrequently planted in the area as a street tree, found sparingly naturalizing in 3 locations, usually growing out of hedges, 16 Sep 2008, OED 2008091601.

**Araliaceae*****Schefflera arboricola* (Hayata) Merr.****New island record**

Since its introduction to horticulture around 40 years ago, this plant has become very common in Hawai'i's cultivated flora. This species was recently collected as naturalized on Maui (Starr *et al.* 2003) and was previously found growing adventively out of the cracks in a sidewalk on O'ahu (Frohlich & Lau 2008). This collection was from an individual found growing epiphytically on a street tree and represents the first naturalized specimen for O'ahu.

*Material examined.* O'AHU: Mililani, Kuaie St and Melehu St. (UTM 603402, 2372122), sapling ca 30 cm tall, growing with a *Clusia rosea* sapling in notch of *Ilex cassine* street tree, no flowers or fruit, 7 Feb 2008, A. Lau & D. Frohlich 2008020703.

***Schefflera elegantissima* (Veitch ex Mast.)****New naturalized record**

Lowry &amp; Frodin

Native to southeastern New Caledonia, *Schefflera elegantissima* is a commonly seen ornamental in Oahu's landscape. Although it received a score of 0 (Low) on the

Hawai'i-Pacific Weed Risk Assessment (HPWRA), this species appears capable of reproducing in Hawai'i without human assistance, as evidenced by this new naturalized record. *Schefflera elegantissima* is distinguished by its unbranched, mostly leafy stems to 1.8 m long; dark green, spotted white leaf petioles; 7–11 linear juvenile leaflets 22.9–27.9 cm long, tapering at both ends, with coarsely and more or less deeply toothed margins; and larger, more broadly-toothed to entire-margined mature leaves to 25.4 cm long. Inflorescences are terminal panicles of umbels with 5-parted flowers. The fruit is round and black, and more or less inferior at maturity (Staples & Herbst 2005). Fruit is dispersed by birds in its native range (Daehler 2008). On O'ahu, a sapling was found growing out of a mature *Ligustrum japonicum* hedge.

*Material examined.* O'AHU: Mililani (UTM 602227, 2372228), gangly sapling ca 2 m tall, growing out of mature *Ligustrum japonicum* hedge on edge of sidewalk area, no flowers or fruit seen, 8 Feb 2008, OED 2008020802.

### Arecaceae

*Washingtonia filifera* (Linden ex André)

**New island record**

H. Wendl.

California *Washingtonia* was previously collected as naturalized on Maui (Oppenheimer & Bartlett 2002) and is now known to be naturalized on O'ahu as well. It is most frequently encountered in dry, open lowland areas, spreading from large grouped plantings to home gardens, landscaped areas, roadsides, and coral-fill construction areas.

*Material examined.* O'AHU: Hickam Air Force Base, juvenile ca 1.25 m tall, several individuals growing more than 15 m (50 ft) away from mature plants in lowland coastal area, no flowers or fruit, 24 Jul 2008, D. Frohlich & A. Lau 2008072401.

*Washingtonia robusta* H. Wendl.

**New island record**

Mexican *Washingtonia* was previously collected as naturalized on Maui (Oppenheimer & Bartlett 2002) and is now known to be naturalized on O'ahu as well. Much like *W. filifera*, it is sometimes planted in large groupings at entrances to subdivisions or other similar landscaped areas to be featured. Also like *W. filifera*, it readily spreads from these plantings to home gardens, landscaped areas, roadsides, and construction areas.

*Material examined.* O'AHU: Hickam Air Force Base, juvenile ca 1.25 m tall, sparingly naturalized in a landscaped area, growing out of a *Strelitzia*, no flowers or fruit seen, 23 Jul 2008, D. Frohlich & A. Lau 2008072303.

### Bignoniaceae

*Tabebuia aurea* Benth. & Hook.f. ex S. Moore **New naturalized record**

*Tabebuia aurea*, native to Brazil, is a commonly cultivated tree along O'ahu roadsides (Staples & Herbst 2005). It can be distinguished by its 5–7 palmately-compound, oblong-elliptic to narrowly elliptic silvery leaflets up to 12.7 cm long, with rounded bases and apices. The inflorescence is a many-flowered panicle lacking an elongate central rachis. Leathery, scaly flower calyxes are bell-shaped, irregularly 2-lipped, and 0.7–1.7 cm long. Corollas are 5–9 cm long and yellow. Fruit is oblong, 9–15 cm long and densely scaly (Staples & Herbst 2005). This new naturalized record was collected along a roadside in the Punchbowl area of O'ahu.

*Material examined.* O'AHU: Punchbowl area, off Lunalilo St near Ward Ave., lowland residential roadside area, single naturalized individual, wind-dispersed from unknown location, this species noted in several other areas occasionally escaping from plantings, 21 Aug 2008, OED 2008082102.

*Tabebuia rosea* (Bertol.) DC.

**New naturalized record**

Native from Mexico to Venezuela and coastal Ecuador (Staples & Herbst 2005), *Tabebuia rosea* is a much-used street tree on the island of O‘ahu. This attractive ornamental is distinguished from other species in its genus by its palmately compound leaves with 5 leaflets 7.5–45.5 cm long with a sharply acute to tapering apex. The inflorescence is a many-flowered panicle. Calyxes are leathery, scaly, cup-shaped, 1–2 cm long, and 2-lipped. Lavender to pale magenta corollas have a yellow throat that fades to white. Fruits are 21.5–38.0 cm long and cylindrical (Staples & Herbst 2005). *Tabebuia rosea* has been cited by Staples *et al.* (2000) as one species very likely to become invasive in Hawai‘i. A sapling was found growing in a yard in the Punchbowl area of O‘ahu.

*Material examined.* O‘AHU: Punchbowl area, on Prospect Pl, single individual in a yard, wind-dispersed to area presumably from planted trees at Stevenson Intermediate School; this species encountered sparingly naturalized in Pauoa as well, 22 Aug 2008, OED 2008082201.

**Brassicaceae**

*Lepidium africanum* (Burm.f.) DC.

**New island record**

Described from Kaua‘i, Maui, and the Big Island (Wagner & Herbst 1995; Oppenheimer 2003; Wood 2006), *Lepidium africanum* was first recorded in the Hawaiian Islands as *L. hysopifolium* (Wagner & Herbst 1995). It was recently collected on O‘ahu in a quarry in Schofield Barracks and was reported to be fairly common in the area.

*Material examined.* O‘AHU: Schofield Barracks, quarry near Kolekole Pass, somewhat woody erect shrub 40–100 cm tall, many seen around area, primarily in open, sunny, disturbed locations, growing among *Panicum maximum*, *Acacia confusa*, *Grevillea robusta*, *Leucaena leucocephala* and a variety of mixed weedy pioneer species, 6 May 2008, K. Kawelo USARMY 91.

**Bromeliaceae**

*Guzmania lindenii* (André) Mez

**New state record**

A native of northern Peru, where it grows as a low epiphyte but also terrestrially in shady wet forest between 1000–1500 m elevation, *G. lindenii* is rare in cultivation and in the wild. It is not known to be naturalized anywhere else in the world. It is highly sought after by bromeliad enthusiasts, and notoriously difficult to grow (H. Luther, pers. comm., 2008), possibly due to a poor habitat match in most home gardens compared to the species’ native habitat.

This species grows to ca 1 m tall (3.00–4.35 m when flowering) and is most easily recognized by its spineless, 70 cm long, 7–8 cm wide linear leaves, which are reddish at the base, green toward the apex, and are crossbanded with irregular greenish lines. The scape is stout and erect, and its bracts are imbricate and patterned as the leaves. The inflorescence is compound, 2.00–3.35 m tall, tripinnate at base and bipinnate above, the axes green, striate, and glabrous. The petals are white, the tube exceeding the sepals, the stamens shorter than the petals but exserted from the tube (Smith & Downs 1977). The fruit is a capsule, containing small seeds with a brown plumose appendage, which are easily wind dispersed.

Originally located by the Hawaiian Trail and Mountain Club during a scheduled hike on the Bowman Trail (Kalihi Valley), *G. lindenii* was noted in only one population near the summit ridge at ca 800 m elevation, within about a 20 m radius, in lowland wet ‘ōhi‘a forest. Over 150 plants of all size classes were observed, mostly growing epiphytically, occasionally forming dense coverings on tree branches. Four mature plants were found, all growing on or near ground level, each weighing roughly 20 pounds. It is possible that plants were weighing down branches, ending up on the ground by the time they were

mature. Mature plants in this population were heavily set with fruits, and we estimate one plant can produce greater than 30,000 seeds per inflorescence. This species is likely moth- or nectar-feeding bat-pollinated in its native range but are self-fertile as well. Due to the heavy fruit set it is likely this population is self-fertile (H. Luther, pers. comm., 2008). Because of its potential for further environmental impact in Hawai‘i, as well as its relative rarity in cultivation, this species is a good candidate for addition to the state noxious weed list.

*Material examined.* O‘AHU: Kalihi Valley, Bowman Trail, 240 m from Pu‘u Kahua‘uli (UTM 621803, 2365128), 2.5 m tall bromeliad growing near soil level, area dominated by 3–4 m tall *Metrosideros polymorpha*, trees loaded with native mosses, ferns, and liverworts, 800 m, 9 Nov 2008, A. Lau & C. Imada 2008110902.

***Guzmania monostachia* (L.) Rusby ex Mez      New state record**

Native from southern Florida to northern Brazil and Peru, where it grows epiphytically or terrestrially from near sea level to 2000 m elevation, *G. monostachia* was previously uncollected in Hawai‘i, although it has probably been in cultivation (albeit, rarely used) for some time. It can be distinguished by its flat green, spineless leaves and an inflorescence of a single, polystichous-flowered spike with only one flower per node, the fertile floral bracts green with brown longitudinal stripes, the sterile, upper floral bracts red to orange (or rarely white). The fruit is a 2–3 cm long capsule, containing wind-dispersed seeds with a white tuft of hairs (Smith & Downs 1977). This species was found sparingly naturalized in two locations in Nu‘uanu, growing epiphytically on several different tree species, occasionally dominating major and minor branches of large trees up to 12 m tall.

*Material examined.* O‘AHU: Nu‘uanu Valley on Kā‘ohinani St, 0.5 m dia epiphyte, 14 Oct 2008, D. Frohlich & A. Lau 2008101403.

***Tillandsia balbisiana* Schult.f.      New naturalized record**

Native from Florida south to Colombia and Venezuela, where it grows from near sea level to 1500 m, this species is not well documented as naturalized worldwide, and is rare in cultivation in Hawai‘i. It ranges from 13–65 cm in height, and its leaves form a bulbous rosette. It can be distinguished from the similar *T. bulbosa* by its less pronounced, ovoid leaf sheaths that form an ovoid to elliptic pseudobulb (vs. very pronounced, obovoid leaf sheaths and ovoid pseudobulb in *T. bulbosa*), and its inflorescence that generally exceeds the recurved leaves (vs. the usually included inflorescence of *T. bulbosa*). Its inflorescence is usually compound, the floral bracts imbricate and 15–22 mm long. The petals are tubular and erect, 30–45 mm long, violet, with exerted stamens and pistil (Smith & Downs 1977). This epiphyte is apparently self-fertile, produces many easily wind-dispersed seeds and is sparingly naturalized in at least two neighborhoods on O‘ahu on a variety of tree species, occasionally forming a thick mat on branches.

*Material examined.* O‘AHU: Kahawalu St, Nu‘uanu (UTM 621479, 2360438), epiphyte ca 0.3 m tall, many individuals spreading in *Plumeria* tree, bracts and stalk reddish pink, only dehiscent flowers seen, no fruits, 14 Oct 2008, D. Frohlich & A. Lau 2008101405.

***Tillandsia bulbosa* Hook.      New state record**

This epiphyte is known to grow from sea level to 1350 m, and its native range includes much of tropical and subtropical America. It is not well documented as naturalized anywhere else in the world and is rare in cultivation, including in Hawai‘i. Variable in size and color, it ranges from 7–22 cm in height. It typically has 8–15 leaves per plant, which are covered in fine scales. The best character for identifying this species is the dense,

large, ovoid, greenish pseudobulb formed by the orbicular, 2–5 cm long, greatly inflated leaf sheaths, which may form internal chambers that can house ants. The leaf blades are involute-subulate, often appearing round in cross section, contorted, and up to 30 cm long. Its erect inflorescence is usually shorter than the leaves, the floral bracts 13 mm long. The petals are linear, 3–4 cm long, blue or violet, the stamens and pistil exserted. The capsules are 4 cm long (Smith & Downs 1977). This species is apparently self-fertile, producing many plumose, easily wind-dispersed seeds. It was found establishing in one location, sparingly naturalized on *Lagerstroemia*, *Plumeria*, and rock walls.

*Material examined.* O'AHU: Mānoa Valley (UTM 624203, 2357330), epiphyte with twisted, thick, green-and-maroon leaves, 17 Oct 2008, A. Lau & D. Frohlich 2008101701.

***Tillandsia fasciculata* Sw.**

**New state record**

This species is native to tropical America from Florida to northern South America, where it grows from sea level to at least 1750 m. It is variable, and several varieties are recognized. None are documented as naturalized, and it is considered rare in its native range. *Tillandsia fasciculata* has not previously been collected in Hawai'i and is rare in cultivation here. This species can be recognized by its many 30–70 cm long leaves formed into a crateriform rosette, the blades narrowly triangular, rigid, 2–3 cm wide, and keeled on the underside. The scape is stout, erect to ascending, the inflorescence either simple or compound (Smith & Downs 1977). The specimen collected here was tentatively given the varietal name *densispica* Mez, which has a compound inflorescence and coriaceous, glabrous floral bracts. This variety has some self-fertile populations, which this collection seems to represent. This species is sparingly naturalized in several neighborhoods on O'ahu, spreading by readily wind-dispersed seeds.

*Material examined.* O'AHU: Lower Pauoa Valley, Booth Rd (UTM 620817, 2358523), mesic lowland residential area, mature individuals to 40 cm tall, inflorescence bracts yellow, papery and brown after fruiting, 14 Aug 2008, OED 2008081402.

***Tillandsia gardneri* Lindl.**

**New state record**

A native of northern South America, where it grows from near sea level to 1600 m, this *Tillandsia* is rare in cultivation in Hawai'i. It ranges from 12–25 cm high when flowering, and is most easily recognized by its 10–27 cm long, narrowly triangular leaves covered in coarse, spreading silver scales, the basal leaves often recurving around the supporting branch. Also characteristic is the stout, pendulous, compact, globose, 4–6 cm long inflorescence and rose or pale lavender petals with included stamens and pistil (Smith & Downs 1977). The naturalizing *T. gardneri* on O'ahu are self-fertile and easily wind dispersed and have been observed forming thick coverings on tree branches, tops of fences, and rock walls in several neighborhoods here.

*Material examined.* O'AHU: Lower Tantalus, silvery rosette ca 30 cm (1 ft) dia, inflorescence a drooping head, fruit a dehiscent capsule, growing primarily in *Plumeria*, spreading to mock orange, *Bucida*, 4 Sep 2008, A. Lau & D. Frohlich 2008090402.

***Tillandsia juncea* (Ruiz & Pav.) Poir.**

**New state record**

Native from Mexico south to Bolivia, growing from near sea level to 2416 m elevation, this terrestrial or epiphytic species is previously uncollected and rare in cultivation in Hawai'i and elsewhere and has not previously been documented as naturalized. It can be recognized by its often rhizomatous habit, and many leaves arranged in a fasciculate

rosette. The inflorescence may be densely digitate or reduced to a single spike, and is rarely more than 7 cm long. The fruit is a capsule 25–35 mm long containing many small, wind-dispersed seeds (Smith & Downs 1977). It is self-fertile, and was noted sparingly naturalized in a *Plumeria* tree in one neighborhood, although it likely is naturalized in other locations as well.

*Material examined.* O‘AHU: Mānoa Valley, on Cooper Rd (UTM 622928, 2356978), single naturalized individual at top of *Plumeria* tree, 30 cm tall epiphyte, leaves green with reddish tips, inflorescence red tinged, 3 Nov 2008, OED 2008110301.

***Tillandsia polystachia* (L.) L.**

**New state record**

Native from Florida south to Brazil and Bolivia, this usually epiphytic plant is known to grow from near sea level to 1800 m elevation. It has likely been in cultivation on O‘ahu for a number of years, and is somewhat rare in cultivation in general. It can be recognized by its many narrowly triangular, usually flat leaves in a dense, spreading rosette that are usually yellow-green, flushing red when exposed to sun. The inflorescence is 30 cm long and can be pinnately or subdigitately compound. The petals are tubular-erect, 3 cm long, and violet, with the stamens and stigma exerted. The fruit is a capsule containing many small, wind-dispersed seeds (Smith & Downs 1977). This species has been observed in several neighborhoods establishing on various surfaces including trees, fences, rock walls, and gravel beds. It may form very dense coverings on branches and trunks, making photosynthesis for the “host” tree impossible anywhere but at the very tips of major branches. This species shows good potential for becoming a problematic species in Hawai‘i.

*Material examined.* O‘AHU: Lower Pauoa Valley, off Booth Rd, in yard (UTM 620780, 2358473), blanketing main branches on a 20 ft tall cypress, no flowers noted, seeds with long, silky coma, occasional to locally abundant in the neighborhood and producing copious seeds, 14 Aug 2008, D. Frohlich & A. Lau 2008081401.

***Tillandsia recurvata* (L.) L.**

**New naturalized record**

Native to the southern United States south to Argentina, this epiphyte may grow from near sea level to 3000 m elevation. It is relatively rare in cultivation, and was first collected in Hawai‘i in 2007, where it was noted spreading adventively to nearby plants within the garden. A rather variable species in terms of indument and dimensions of leaf and stem, *T. recurvata* can be recognized by having densely massed stems 1–10 cm long. Its leaves are distichous, 3–17 cm long, and densely scaled. The scape is terminal, to 13 cm long, and only ca 0.5 mm thick, the inflorescence only 1–2-flowered. The fruit is a capsule to 3 cm, consisting of many wind-dispersed seeds.

This species is one of the few tillandsias with documented environmental impacts. It is known for nutritional piracy in areas with poor soil, weakening host trees and breaking branches during wet or windy conditions (Benzing 1990; H. Luther, pers. comm., 2008). This species has been noted as sparingly naturalized in Pauoa Valley and adventively spreading in ‘Aiea, and is likely spreading in other places where it is grown.

*Material examined.* O‘AHU: Pauoa (UTM 620207, 2357934), abundant in hedge away from nearby houses in area, individuals of various sizes, no flowers seen, wispy seeds coming out of brown, twisted pods, 19 Aug 2008, D. Frohlich & A. Lau 2008081901; ‘Aiea home garden, attached to potted *Bougainvillea*, smaller plantlets spreading to surrounding potted plants by “webbing,” 13 Jul 2007, L. Shiraishi s.n. (BISH 731421).

***Tillandsia stricta* Sol.****New state record**

Native to northern South America and Trinidad, where it grows from near sea level to 1680 m, this is another rarely cultivated species of *Tillandsia* spreading from planted sites and is probably self-fertile. It is a very short-stemmed species, flowering to 10–22 cm high, the leaf blades very narrowly triangular and 4–11 mm wide at the base. This species is best recognized by the inflorescence, which is unbranched and polystichous, the floral bracts elliptic, membranous, yellowish white to rose in flower, brown-papery in fruit. The capsule is slenderly cylindrical, and up to 4 cm long (Smith & Downs 1977). The seeds are wind dispersed. This species is very sparingly naturalized in a residential area in upper Mānoa Valley.

*Material examined.* O'AHU: Lower Mānoa Valley residential area (UTM 624391, 2358288), epiphytic, ball-forming bromeliad growing in notch of cypress tree in front yard, spreading from cultivated individuals, ca 10 in dia, 21 Oct 2008, OED 2008102103.

**Commelinaceae*****Callisia repens* L.****New naturalized record**

*Callisia repens*, a mat-forming herb, abundant and weedy in its native range throughout tropical America, can be distinguished from other *Callisia* by its mat-forming habit; reddish, creeping stems rooting at the nodes; ovate leaf blades 7.62–19 mm long, often with red along the margins; erect, terminal or lateral inflorescences with sheathing bracts; tiny green flowers barely protruding from bracts; and tiny, beaked fruit (Staples & Herbst 2005). This species was found sparingly naturalized along a rocky roadcut area in the Punchbowl area of O'ahu.

*Material examined.* O'AHU: Lower Punchbowl area, Prospect St, rocky road cut area, creeping herb to ca 5 cm tall forming dense mats in patches, no flowers or fruits seen, 21 Aug 2008, OED 2008082102.

***Tradescantia spathacea* Sw.****New naturalized record**

*Tradescantia spathacea*, a bromeliad-like, low-maintenance species popular in cultivation as a ground cover, is native to southern Mexico, Guatemala, and Belize (Staples & Herbst 2005). It has been recorded as naturalized in the West Indies (Staples & Herbst 2005) and Florida, where it has invaded and disrupted native plant communities by forming a dense cover on the forest floor, preventing other plants from growing (Global Invasive Species Database 2005). This species is typified by its unique bromeliad-like habit and stiffly ascending, spirally-arranged, linear-lanceolate leaves with green upper sides and usually purple undersides. Inflorescences are axillary and usually sessile, with many flowers. Bracts are boat-shaped and nearly enclose the flowers, and are 2–4.5 cm x 2.54–5.6 cm. On O'ahu, an individual was collected growing out of a storm drain, and others were seen growing adventively and naturalized on several roadside surveys.

*Material examined.* O'AHU: Makiki (UTM 620318 2357383), scraggly, etiolated herb ca 0.5 m tall, growing in sewer drain with *Spathodea*, obviously not planted, no flowers or fruit, 4 Sep 2008, OED 2008090401.

**Fabaceae*****Acacia catechu* (L.f.) Willd.****New naturalized record**

*Acacia catechu*, or Cutch tree, has been planted in Hawai'i primarily as a forestry tree. According to planting records, over 1500 individuals have been planted in O'ahu's forests alone (Skolmen 1980). An economically important tree used in dyeing, tanning, and in the



preparation of fishing nets, catch tree can be distinguished from other commonly seen species of *Acacia* by its spines; compound, non-glaucous leaves with 10–30 pairs of pinnae, each pinna comprising 30–50 pairs of leaflets; and cylindrical inflorescences 10–13 cm long (Staples & Herbst 2005).

*Material examined.* O'AHU: Lower Pearl City/Waiiau, 12 m tall tree, ca 40 large trees growing in concrete-walled ditch, some keiki underneath parents, most leaves looking nutrient-deficient, growing with *Syzygium cumini*, *Leucaena leucocephala*, *Panicum maximum*, *Trema orientalis*, 1 May 2008, A. Lau & D. Frohlich 2008050101a & 2008050101b.

### Grossulariaceae

***Brexia madagascariensis* (Lam.) Thouars**      **New island record**  
ex Ker Gawl.

This plant, which in Hawai'i produces copious amounts of seed, is tolerant of a wide range of soil types and is resistant to disease (Staples & Herbst 2005), was previously found naturalized on Maui (Starr *et al.* 2003). Because of these characteristics, it was listed as one of the species in Hawai'i very likely to become invasive (Staples *et al.* 2000). It was found on O'ahu growing outside the boundaries of Lyon Arboretum and is occasionally found naturalizing within the garden.

*Material examined.* O'AHU: Lower Mānoa Valley just outside Lyon Arboretum (UTM 624371, 2359857), wet lowland secondary forest; found occasionally naturalizing in Lyon Arboretum, 16 Apr 2008, OISC/OED 2008041601.

### Liliaceae

***Asparagus falcatus* L.**      **New naturalized record**

Previously uncollected as naturalized in the state, *Asparagus falcatus* is native to Sri Lanka and tropical and southern Africa. It is a rambling, clambering, much-branched shrub with dark green, terete branches; spines are recurved and 2–6 mm long. Cladophylls can be solitary or in fascicles of 2–7, ranging from 2.5–15 cm long by 2–5 cm wide, narrowly ensiform, falcate, flat, and costate, narrowing at the tip. Inflorescence a 2–3 cm long raceme, lax, with 4–12 flowers; peduncle filiform. Bracts are 0.5–1 mm long and curved. Pedicel is 4–8 mm long, very thin, with a joint below the middle. Perianth segments are 3 x 1 mm, spatulate, obtuse, and white. Filaments are ca 2.5 mm long and white. Anthers are gray-brown, ca 0.5 mm long. Ovary is subglobose to turbinate, 3-lobed, light yellowish green; style is ca 0.5 mm long. Berry bright red when ripe; seeds 1–3 per fruit, 5–6 mm across, and globose with black, slightly rough seed coat. In its native range, it can be found in moist, dry, and mesic areas below 1500 m (Dassanayake & Clayton 2000). This specimen was brought into the *Herbarium Pacificum* by county extension agent Ed Mersino of the University of Hawai'i after having volunteered in a landscaped area. It was being considered for a hedge planting.

*Material examined.* O'AHU: Wahiawā, shrub with reduced flowers, popped up as a volunteer in landscaped area, 25 Jul 2008, D. Frohlich & A. Lau s.n. (BISH 734202).

### Melastomataceae

***Medinilla cumingii* Naudin**      **New island record**

Listed as one of the species in Hawai'i very likely to become invasive (Staples *et al.* 2000), *Medinilla cumingii* has been documented as naturalized on Maui (Oppenheimer

2004) and Hawai'i (Parker & Parsons 2010), and was listed in a survey of Lyon Arboretum on O'ahu by Daehler & Baker (2006) as "showing signs of naturalization." This collection is from a small population that is establishing in an area north of Lyon Arboretum, which is one of 13 other sites on O'ahu where this species has been noted and is currently being controlled by the O'ahu Invasive Species Committee (OISC). The continued cultivation of this epiphytic, bird-dispersed species is not recommended.

*Material examined.* O'AHU: Mānoa Valley, north side of Lyon Arboretum (UTM 623722, 2359852), 1.5 m in diameter, growing on fallen tree, 3 other individuals in area, 14 Apr 2008, C. Sousa & J. Fujikawa 20080414.

***Medinilla heterophylla* A. Gray**

**New naturalized record**

This species, which is a common forest vine in its native range of Fiji, has only been previously collected in Hawai'i from a cultivated specimen at Lyon Arboretum. A small patch of this species was recently found by an OISC field crew on a survey for *Miconia calvescens* above the arboretum, approximately 350 m from the original planting site, suggesting fruit dispersal by birds. This species can be identified by its vining habit, pairs of leaves of markedly different sizes, and flowers with deep pink petals and white calyxes (Parham 1972).

*Material examined.* O'AHU: Mānoa Valley just outside Lyon Arboretum (UTM 624372, 2359857), sprawling vine forming loose mats on ground level as well as climbing bamboo in dense shade, no flowers or fruit present, sparingly naturalized, ca 10 individuals in immediate area, 16 Apr 2007, OED/OISC 2008041602.

**Myrtaceae**

***Eugenia uniflora* L.**

**New island record**

*Eugenia uniflora*, or Surinam cherry, has been collected as naturalized on Kaua'i, Moloka'i, Maui (Wagner *et al.* 1999), Lāna'i (Starr *et al.* 2010), and now on O'ahu. This new record comes as little surprise, given the popularity of this plant in cultivation; its juicy, bird-dispersed fruit; and the facility of its propagation by seed (Staples & Herbst 2005). On O'ahu, it was found making up the greater part of the understory in an *Enterolobium/Casuarina* forest.

*Material examined.* O'AHU: Pearl City, Waimalu Valley, 2 m tall shrub, 40–50 mature individuals, over 200 seedlings growing among *Enterolobium/Casuarina* overstory, 2 May 2008, A. Lau & D. Frohlich 2008050201.

**Oleaceae**

***Olea europaea* L. subsp. *cuspidata***

**New island record**

(Wall. ex G. Don) Cif.

*Olea europaea* ssp. *cuspidata*, which is the wild form of the cultivated olive (Staples & Herbst 2005), is a frequently cultivated hedge and feature plant in the O'ahu urban landscape. Already, it has been collected as naturalized on Kaua'i, Lāna'i, Maui, and the Big Island (Lorence & Wagner 1995; Herbst & Wagner 1999; Starr *et al.* 1999, 2010). Birds are the most likely disperser of this plant, which produces abundant, fleshy fruit (Staples & Herbst 2005).

*Material examined.* O'AHU: Pālehua Rd at second gate before alphabetical driveways begin, roadside vegetation, 535 m (1760 ft), 14 May 2008, K. Kawelo USARMY 92.

**Onagraceae*****Oenothera kunthiana*** (Spach) Munz**New island record**

*Oenothera kunthiana*, an inconspicuous roadside weed sometimes used as a groundcover, was first found on Pu‘u o Kali on Maui in 2002 (Starr *et al.* 2004). On O‘ahu, it was found at a quarry near Kolekole Pass.

*Material examined.* O‘AHU: Schofield Barracks, quarry near Kolekole Pass, wimpy, non-branching herbs 5–30 cm tall, fruits dry capsules in cups, no flowers seen, growing with *Panicum maximum*, *Acacia confusa*, *Grevillea robusta*, *Leucaena leucocephala*, and a variety of mixed weedy pioneers, 6 May 2008, K. Kawelo & J. Beachy USARMY 88.

**Orchidaceae*****Dendrobium antennatum*** L.**New naturalized record**

*Dendrobium antennatum*, a native of New Guinea to northeastern Australia and the Solomon Islands (Kamemoto *et al.* 1999), was recently found in a backyard in Nu‘uanu. This species was first collected as cultivated in Hawai‘i at the National Tropical Botanical Garden on Kaua‘i. No prior collections have been made on O‘ahu; however, “antennatum type” orchids were cited as one of the preferred orchids for O‘ahu orchid growers in a 2003 study (Kuehnle *et al.* 2003) and the species is widely used in hybridization (Staples & Herbst 2005). *Dendrobium antennatum* is described in Cribb (1986) as follows: “An epiphytic herb. Stems clustered on a short rhizome, 15–75 cm tall, 1–1.5 cm diameter, somewhat fusiform, usually dilated slightly and rhombic in cross section in the lower half. Leaves distichous, coriaceous to fleshy, oblong-lanceolate to ovate-elliptic, unequally bilobed at acute apex, 4–15 x 0–5–4 cm, articulated at base to grey sheaths 2.2–9 cm long. Inflorescences one to several, 15–35 cm long, 3–15-flowered; bracts tubular, 3–4 mm long. Flowers fragrant, white with green or yellow-green petals and a purple- or violet-veined lip; pedicel and ovary 2.2–3.5 cm long, emerging 4–7 mm above the axil of the bract. Dorsal sepal oblong-lanceolate, acute or acuminate, 1.6–2.3 x 0.6–0.7 cm, recurved and often spirally twisted; lateral sepals oblong-lanceolate, acute or acuminate, 1.6–2.5 x 0.7 cm, recurved; mentum narrowly conical, 8–10 mm long. Petals linear, acute, 2.5–5 x 0.2–0.35 cm, once- to twice-twisted. Lip 3-lobed, 1.5–2.3 x 0.9–1.15 cm; side-lobes elliptic, rounded in front; mid-lobe circular to ovate, acute or apiculate, not recurved; callus of 5 longitudinal ridges, slightly dilated towards apex at base of mid-lobe. Column 5–6 mm long.”

*Material examined.* O‘AHU: Nu‘uanu, backyard at 132 Ragsdale Pl (UTM 621794, 2360591), lowland mesic residential setting, epiphyte, stems growing to 0.5 m, several individuals naturalized in this and adjoining yard, 14 Oct 2008, D. Frohlich & A. Lau 2008101401.

***Dendrobium crumenatum*** Sw.**New naturalized record**

This species, which is native to Sri Lanka, Burma, Indochina, throughout Malesia and the Philippines to Taiwan, was found spreading in the notches of Plumeria and other trees on surveys of Nu‘uanu and Mānoa Valleys. The description of *Dendrobium crumenatum* is as follows: “Stems closely spaced from short rhizome, 40–60 cm long, rigid, apically slender, leafless, middle part leafy, base swollen, forming a pseudobulb. Pseudobulb yellowish green, fusiform, 5–8 cm long, 1.5–2 cm in diameter, internodes 3 or 4, furrowed in age. Leaves distichous, ovate-oblong, stiff, 6 cm long, 2.5 cm wide, apex more or less obliquely 2-lobed, base contracted, articulated with sheath. Racemes 1- or rarely few flowered, from internodes of leafless stem; bracts cylindrical, 6 mm long. Flowers white

or sometimes tinged with pink, fragrant, lasting only 1 or 2 days; dorsal sepal ovate-lanceolate, 17–22 mm long, 5–6 mm wide, apex obtuse, sometimes incurved; lateral sepals lanceolate-triangular, 22–35 mm long, 7–8 mm wide, apex sometimes incurved, base oblique, adnate to foot of column forming conic and curved mentum ca 1.5 cm long; petals ovate-oblong, 12–18 mm long, 6–7 mm wide, apex obtuse, contracted at base; lip obovate-oblong, 20–24 mm long, 13–18 mm wide, 3-lobed, lateral lobes erect, semi-oblong, nearly entire, terminal lobe ovate, 1 cm long, crenulate-denticulate, disc with yellowish crenulate keel; column 2 mm long, 3 mm wide, foot 1.4 cm long, with yellow fan-shaped gland at base; anther cup-like, whitish; pollinia ovate-oblong, 1.5 mm long. Capsule ellipsoid, 2.5 cm long” (eFloras 2008).

*Material examined.* O’AHU: Mānoa Valley, on Cooper Rd (UTM 622927, 2356977), 0.5 m tall epiphyte when flowering, plants spreading throughout *Plumeria* trees, 30 Oct 2008, A. Lau & D. Frohlich 2008103001.

***Vanda tricolor* Lindl.**

**New island record**

*Vanda tricolor*, a native of Java, is a large, rock-dwelling, epiphytic or terrestrial orchid commonly used in horticulture (Staples & Herbst 2005). It was first collected as naturalized on Maui in 2004 (Oppenheimer 2006). This collection from O’ahu was from an individual found growing several feet off the ground in a large tree. Many small clumps of this species can be seen in higher-elevation neighborhoods; however, it was most obvious that this particular individual was not planted in its location.

*Material examined.* O’AHU: Pālolo Valley (UTM 625527, 2356767), epiphyte growing ca 4 m up in a tree, ca 1.5 m tall with equitant leaves, flowers white, flecked magenta, fruits large dehiscent capsules, many clumps of this species seen growing throughout the neighborhood, 2 Oct 2008, D. Frohlich & A. Lau 2008100201.

**Piperaceae**

***Piper aduncum* L.**

**New island record**

First collected in Hawai’i in 1986 and a state noxious weed, this rapidly growing tree is infrequently cultivated in O’ahu as a feature plant in botanical gardens. The Maui collection was from a large population that was observed spreading in open and recently cleared areas in Nāhiku (Starr & Starr 2003). On O’ahu, this species is sparingly naturalized at Waimea Valley on the north shore, and saplings are being controlled by park staff. This species scored an 18 (High) on the Hawai’i Weed Risk Assessment and its continued cultivation is not advised.

*Material examined.* O’AHU: Waimea Valley Botanical Garden, just makai of 3rd bridge, sapling ca 1.5 m tall on steep rocky lowland slope, found more than 200 m away from the original planting, no flowers or fruit present, 46 m (150 ft), 3 Jul 2008, A. Lau & D. Orr 2008070301.

**Poaceae**

***Bothriochloa bladhii* (Retz.) S.T.Blake**

**New island record**

Australian bluestem was previously known from Moloka’i, Hawai’i (Wagner *et al.* 1999) Kaua’i (Herbarium Pacificum Staff 1997) and Maui (Starr *et al.* 2003). A forage grass and colonizer of rangeland pastures, waste areas, and other disturbed sites (Barkworth *et al.* 2003), this species was first collected on O’ahu at the Hawaii Agricultural Experiment Station in 1940.

*Material examined.* O’AHU: Ridge between Kaimuhole and Alaiheihe, on ridge crest 1300 ft [396 m], K. Kawelo USARMY 79.

***Cortaderia selloana* (Schult. & Schult.f.)**      **New naturalized record**

Asch. &amp; Graebn.

Native to southern Brazil, Argentina, and Paraguay, Pampas grass is widely cultivated worldwide as an ornamental. In several areas of introduction, this species has escaped cultivation and become a serious pest (Global Compendium of Weeds 2008). The description from Staples & Herbst (2005) is as follows: “Clumps to 10 feet tall; stems stout. Leaf sheaths glabrous; blades 4–6 feet long, wiry, recurved, glaucous, margins sharp-edged. Inflorescences to 3 feet tall, whitish, cream, pink, to purplish; spikelets ca 0.6 inches long, silvery to pinkish. Floret bracts lanceolate, upper with long bristle.” On O‘ahu, several small individuals were found at the entrance to a trailhead. It is believed that this species has been spreading on Maui as well; however, no specimens or reports have yet been sent to the *Herbarium Pacificum*.

*Material examined.* O‘AHU: Access road to Kīpapa Trail, right side going mauka between house and trailhead, in *Melaleuca* forested area, sprouting through ‘uluhe, 2 m tall bunchgrass with one dehiscent inflorescence, two other plants in vicinity, 30 Oct 2008, *D. Clark 01*.

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

Masamune

Native to the Himalayan region of Asia, *P. capitata* is widely cultivated in Hawai‘i and previously reported as naturalized on Maui and the Big Island (Herbst & Wagner 1999; Oppenheimer & Bartlett 2002). On Hawai‘i island, it can be seen colonizing open roadsides and lava fields from 600–1770 m. It can be distinguished from other commonly seen members of its genus by its mat-forming habit, globose flowering heads, and distinctive purple V-shaped bands on the leaves (Wagner *et al.* 1999; Staples & Herbst 2005).

*Material examined.* O‘AHU: Nu‘uanu Valley, on Sherman Park Pl (UTM 619795, 2359724), wet to mesic lowland roadside, prostrate herb with pink-tinged stems and leaves, rooting at nodes, sparingly naturalized in this location, 18 Jul 2008, *OED 200807180*.

**Rhamnaceae*****Ziziphus mauritiana* (Sw.) Griseb.**      **New naturalized record**

Previously uncollected as naturalized in the state, *Ziziphus mauritiana*, or Indian jujube, is an evergreen tree up to 11 m tall. It is characterized by pendulous branches bearing leaves that are dark green on the upper surface and silver-hairy below. Tiny greenish flowers are borne in axillary clusters, and edible fruit is yellowish to red-brown, spherical to ovoid. Indian jujube is tolerant of a variety of soil types and requires no special care. Propagation is from seed (Staples & Herbst 2005). One individual was found in tall grass on an access road on O‘ahu’s north shore.

*Material examined.* O‘AHU: Kahuku, along Charlie Rd (UTM 608016, 2397732), one individual 1 m tall with stout spines, growing amongst Guinea grass, *Schinus*, *haole koa*, 29 Nov 2007, *D. Frohlich & A. Lau 2007112901*.

**Sapindaceae*****Cupaniopsis anacardioides* (A. Rich.) Radlk.**      **New naturalized record**

Native to Australia, this species was previously uncollected as naturalized in the state. It is an evergreen tree up to 12 m tall, with compound leaves having 8 ovate to obovate, blunt-tipped, leathery leaflets; inconspicuous whitish flowers; and short-stalked fruit,

golden yellow tinged red, 1.30–2.54 cm in diameter, containing brown seeds covered by a yellow to red-orange aril. Although it has been recommended as a street tree by the City and County of Honolulu, this tree has begun to spread in southern Florida by way of its bird-dispersed seeds (Staples & Herbst 2005), and its further cultivation in Hawai‘i should be discouraged. Several individuals were found naturalizing in hedges around Mililani.

*Material examined.* O‘AHU: Mililani (UTM 2373214, 603010), sapling ca 1.5 m tall, growing in *Breynia disticha* hedge in yard, no flowers or fruit, no mature individuals seen in area, 8 Feb 2008, D. Frohlich & A. Lau 2008020801.

***Koelreuteria elegans*** (Seem.) A.C. Sm.

**New island record**

subsp. ***formosana*** (Hayata) F.G. Mey.

The native range of *Koelreuteria elegans* subsp. *formosana* is in Taiwan. It was introduced to the mainland U.S. in 1915 and reached Hawai‘i soon afterward. In southern Florida (Staples & Herbst 2005), as well as in Hawai‘i, it has escaped cultivation and become sparingly naturalized. It was previously collected on Maui (Oppenheimer 2003). On O‘ahu, it was found occasionally naturalized in a neighborhood in Makakilo.

*Material examined.* O‘AHU: Makakilo, 1.5 m tall tree growing out of storm drain, street tree occasionally naturalized in neighborhood, all size classes seen, no flowers or fruit seen, 11 Apr 2008, D. Frohlich & A. Lau 2008041101.

## Sterculiaceae

***Sterculia foetida*** L.

**New naturalized record**

Native to dry regions of the Old World tropics, *Sterculia foetida* is occasionally found cultivated in Hawai‘i as a street tree and featured landscape tree (Staples & Herbst 2005). The foul odor of the flowers, reminiscent of raw sewage, is instantly recognizable. This species has not been previously documented as naturalized in Hawai‘i. On O‘ahu, individuals of various size classes were found spreading in a downtown neighborhood in several locations, including one small seedling on a store roof.

*Material examined.* O‘AHU: Nu‘uanu, Kukui St area, lowland urban setting, 3 m tall tree, one of several saplings in the area seen growing in hedges, near fenceposts, and on a rooftop, no flowers or fruit seen, 7 Aug 2008, A. Lau & D. Frohlich 2008080701.

## Acknowledgments

We thank Clyde Imada for help with plant identification and document editing. Also, many thanks to the staff and volunteers at BISH, especially Amanda Harbottle and Barbara Kennedy. Thank you to David Orr for showing us around Waimea Botanical Garden; your help has been invaluable. Thanks to everyone at O‘ahu Invasive Species Committee and Army Natural Resources for field collections and support. Thanks also to the Hawaiian Trail and Mountain Club for their report on *Guzmania lindenii*, Peter Demellow for the tour of naturalizing Nu‘uanu bromeliads, and Dr. Neil Snow (Poaceae) and Drs. Harry Luther and Eric Gouda (Bromeliaceae) for plant identifications.

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