Records of the Hawaii Biological Survey for 2011. Edited by
Neal L. Evenhuis & Lucius G. Eldredge. *Bishop Museum*
Occasional Papers 113: 7–26 (2012)

New plant records from O‘ahu for 2009[1]

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O‘ahu Early Detection here documents 31 new naturalized records, 6 new state records, and 12 new island records. In addition to our own collections, we report on records of naturalization noted by other agencies during 2009. A total of 34 plant families are discussed. The majority of these records are the result of surveys of public roadside areas and therefore often document naturalization of ornamental plants escaping cultivation. Several others however are collections made by natural resource management agencies doing surveys well away from general cultivation, and represent escapes from plant introductions for the purposes of forestry as well as escaped ornamentals. A few accidental introductions are also noted.

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.

Apocynaceae

Carissa macrocarpa (Eckl.) A. DC. **New naturalized record**

Carissa macrocarpa, a commonly cultivated plant in Hawai‘i first collected in the early 1990s, is a multiple-stemmed shrub from 3–18 ft tall with y-shaped thorns, leaf petioles 0.25–0.38 cm long; blades broadly to narrowly ovate or subcircular, 2.54–7.00 cm by 1.65–5.08 cm, thick, shiny, and glabrous. Inflorescence is one to few-flowered; flowers are jasmine-scented, sepals triangular, corolla white, with pinwheel-shaped limb. Fruit is ellipsoid and red (Staples & Herbst 2005). One individual of this species was found in a *Leucaena*-dominated coastal habitat, having possibly spread from a nearby neighborhood.

Material examined. **O‘AHU**: Marine Corps Base Hawai‘i. Dry coastal zone habitat. 4 ft tall sprawling sapling in dense *Leucaena* overstory; no flowers or fruits seen - one individual. This species is common in cultivation and produces viable seed, 5 Aug 2009, *OED 2009080502.*

Stemmadenia litoralis (Kunth) L. Allorge **New naturalized record**

Also known as Lechoso, this species is native from Mexico to Colombia and is occasional to common in cultivation in Hawai‘i. First collected in Hawai‘i in 1940, introduced as an ornamental shade and street tree, it is a small tree to 20 ft tall with usually glabrous, elliptic, 2.0–10.5" by 0.8–4.5" leaves; 1–10-flowered inflorescences; fragrant white flowers to about 3" with a yellow throat. The fruit is a paired, curved-ellipsoid, thick walled, orange to yellow capsule containing seeds which are embedded in a pulpy red aril. It is usually propagated by seed (Staples & Herbst 2005). This species is not well documented as naturalized anywhere else in the world but here was noted naturalizing in roadside

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mesic secondary forest in the Tantalus area of O‘ahu, where individuals of all size classes were scattered in a somewhat localized area, growing in shady understory as well as more exposed roadside locations, spreading by apparently bird dispersed seed. It is unclear whether it had originally been planted in the area or if it had spread from cultivated trees in home gardens downslope from the naturalization site. Parker & Parsons (this volume) report this species as naturalized on Hawai‘i Island.

Material examined. **O‘AHU**: Tantalus (UTM 2359020, 622051). Tree about 8 ft tall with milky white sap, no flowers; fruit orange, dehiscent, seeds covered in red aril. One mature, many smaller individuals of varying sizes in the understory, 8 Jan 2009, *OED 2009010802*.

Araliaceae

Tetrapanax papyrifer (Hook.) K. Koch **New naturalized record**

Rice-paper plant is native to Taiwan and possibly China, though it is widely cultivated throughout Asia both for its white stem pith to produce such things as artificial flowers and for its ornamental value. First collected in Hawai‘i in 1927, this species is a clump-forming shrub with upright stems to 20 ft tall arising from rhizomes. The large, 5–11 lobed, petiolate, soft leaves are dull green above and whitish hairy below, the central lobe and midvein Y-forked at the apex. The brownish hairy inflorescences are 3–4 branched with small umbels of 4- or 5-parted flowers (Staples & Herbst 2005). *Tetrapanax papyrifer* was observed occasionally in the Tantalus area of O‘ahu near trailheads, roadside locations, home gardens with mixed ornamentals and naturalized secondary forest species, and as very small individuals sprouting out of gravel driveways. Parker & Parsons (this volume) report this species as naturalized on Hawai‘i Island.

Material examined. **O‘AHU**: Tantalus on Round Top Drive (UTM 2358758, 622883). Wet lowland residential area, 0.4 m tall sapling, producing suckers at base. No flowers or fruit. Several saplings growing out of gravel driveway, as well as across the street along roadside. Occasional in neighborhood, 9 Jan 2009, *OED 2009010901.*

Arecaceae

Licuala spinosa Wurmb **New naturalized record**

This species, native to Indonesia, is a clump-forming fan palm to 10 feet tall with fronds more or less circular in outline. It looks similar to the more common *Licuala grandis* but differs in having its fronds divided nearly to the base. This species was first collected in Hawai‘i from Foster Botanical Garden in 1949. It was noted here very sparingly naturalized sprouting from a hedged row of adventive and naturalized *Tabebuia heterophylla* saplings, as well as other naturalized species and garden escapes near Foster Botanical Garden (Henderson 2009; Hodel 2009).

Material examined. **O‘AHU**: Vineyard Blvd, across from Foster Garden. Growing in mixed *Tabebuia* hedge in lowland urban setting. Juvenile about 2 ft tall, no flowers or fruit, 8 Aug 2008, *OED 2008080801*.

Asclepiadaceae

Cryptostegia grandiflora Roxb. ex R. Br. **New naturalized record**

This species is endemic to the dry southwestern portion of Madagascar and was first collected in Hawai‘i in 1930. A related species more common in cultivation in Hawai‘i, *Cryptostegia madagascariensis*, had long been misidentified in Hawai‘i as *C. grandiflora*. True *C. grandiflora* differs in having smaller, more numerous lenticels, larger corollas from 2.0–2.5" long, distinctive 2 lobed corona filaments, and larger fruit from 4.00–6.25"

long (Staples & Herbst 2005). This species is rarely cultivated on O‘ahu. It is considered one of Australia’s worst weeds and invades native ecosystems, riparian areas and pastures, forming impenetrable thickets and smothering vegetation. It was noted as well distributed and established in dry lowland kiawe forest and shrubland in Kalaeloa, O‘ahu. Its seeds are easily wind and water-dispersed in riparian areas.

Material examined. **O‘AHU**: Kalaeloa (UTM 0596880, 2355735), dry coastal mixed alien shrubland. Vine, sprawling over *Leucaena* up to 12 ft tall. Corollas whitish pink inside, striated medium lavender outside, corona filaments bilobed. No scent. Seen naturalized widely in area, 16 Jun 2009, *OED 2009061601.*

Asteraceae

Centratherum punctatum Cass.

subsp. ***punctatum*** **New island record**

This garden escape has been collected on most of the main islands, including Kaua‘i, Moloka‘i, Lāna‘i, Maui, Hawai‘i, and now O‘ahu. It was found growing between cracks in a sidewalk in a well-populated urban setting. Due to its ornamental nature, this species likely is more commonly naturalized and tolerated where it spreads.

Material examined. **O‘AHU**: Wai‘alae Iki, lowland residential area. One individual growing out of crack in sidewalk. Semi-woody herb about 0.5 m tall with bright purple flowers. Many fruiting heads seen, with small, dark brown achenes, 19 Mar 2009, *OED 2009031901.*

Delairea odorata Lem. **New island record**

Delairea odorata is a popular ornamental vine native to South America which has escaped cultivation in many parts of the world, including California, New Zealand, Australia, and Hawai‘i. In the Hawaiian Islands, it was previously collected on Maui, Lāna‘i, and Hawai‘i. It was recently found on O‘ahu spreading down a residential road in the understory of a dense lowland secondary forest. Efforts to control this population are underway.

Material examined. **O‘AHU**: Pālehua, UTM 2365720, 593333. Climbing up nearby shrub in mixed naturalized *Plectranthus verticillatus* groundcover. Vine patch 10 × 10 ft. Flowers yellow, in axillary and terminal cymes. Copious seeds, 12 May 2009, *OED 2009051206.*

Vernonia elliptica DC. **New naturalized record**

Vernonia elliptica, a vining plant native to India, Myanmar, and Thailand, is occasionally cultivated in Hawai‘i. Although a local newspaper article in the 1970s suggested this plant be cultivated along roads and highways as a privacy screen, it is unclear how many plantings of this species occurred here as a result (Staples & Herbst 2005). This species can be distinguished by its straggling, vining habit, silvery leaves, and axillary clusters of sweetly scented discoid flower heads (Peng 2004; Staples & Herbst 2005). It was found spreading from its original planting on a side road close to a main highway.

Material examined. **O‘AHU**: Keolu, UTM 2363599, 631210. Climbing over *Leucaena* in lowland residential setting. Vine 10 × 20 ft, numerous small achenes, 6 May 2009, *OED 2009050605.*

Bignoniaceae

Catalpa longissima (Jacq.) Dum. Cours. **New naturalized record**

The species’ ease of cultivation, fast growth, and adaptability make it a popular species in many parts of the world, including Hawai‘i (Staples & Herbst 2005). This is the first naturalized collection of this species in the state, where it was found sparingly naturalized in roadside areas, having spread from abundant street tree plantings in the area. Dis-

tinguishing features of *Catalpa longissima* include elliptic-lanceolate leaves arranged opposite each other or in whorls of three and few-flowered inflorescences with bell-shaped, inch long flowers with yellow and sometimes purple markings in the throat.

Material examined. **O'AHU**: Kaimukī neighborhood, near 12th and Harding Avenue, UTM 2353760, 624445. Dry lowland residential area. Growing under a water heater within a narrow fenced area near restaurant. Tree about 6 m tall, flowers white with purple streaks in inner corolla, petals ruffled. Fruit about 12 in long, tapered at tip. This species is used as a street tree in the neighborhood and is occasionally seen naturalized here, 5 Mar 2009, *OED 2009030501.*

Mansoa hymenaea (DC.) A.H. Gentry **New naturalized record**

Mansoa hymenaea, a plant native to Central and South America, is a moderately popular species in cultivation in Hawai'i (first collected in 1938). This plant can be distinguished by its strong garlic odor (which gives it the common name "Garlic vine"), compound leaves with two leaflets, three-forked tendrils, and lavender to magenta corollas (Staples & Herbst 2005). Several seedlings were found naturalized near an abandoned homesite.

Material examined. **O'AHU**: 'Ewa Beach, UTM 2359503, 599362. In weedy abandoned field with *Spathodea, Mangifera, Bouganvillea*. Seedling about 0.5 m tall. Flowers magenta, bell-shaped, terminal. No fruits. Several scattered seedlings, one medium-sized individual in area, 19 Jun 2009, *OED 2009061901.*

Blechnaceae

Blechnum orientale L. **New state record**

This fern, which is native to tropical Asia, Australia, and some Pacific Islands, was found in two separate locations on the island of O'ahu. This species was previously unknown from Hawai'i, either naturalized or in cultivation. It is unclear how it may have arrived here, although some gardening sites have mentioned its cultivation in the Philippines and other tropical locales (Dave's Garden 2005; Carter 2010). It is documented here as sparingly naturalized in mostly open but also partially shaded areas of a lowland mesic windward O'ahu ridge in mixed native and nonnative vegetation. The description of this species, taken from the *Flora of Taiwan*:

> "Caudex short, erect, densely covered with linear-lanceolate, dark brown scales. Stipes tufted, shorter than laminae, 30–60 cm long, scaly at base when young; fronds pinnate; pinnae linear-lanceolate, wide spreading, glabrous; median pinnae 10 to 40 cm long, to 1.8 cm wide, base of pinnae adnate on lower side, free on upper side; veins free, parallel, simple or forking from near costa. Sori costal, linear, reaching from base nearly to apex; indusia very narrow"(Peng 2004).

Material examined. **O'AHU**: Kahalu'u-'Āhuimanu dividing ridge. Along ridge crest trail about 50 ft above a dilapidated hogwire fence. The surrounding vegetation: *Sphenomeris chinensis*, *Wikstroemia oahuensis*, *Rhodomyrtus tomentosa*, and *Psidium cattleianum*, 1 Jan 2009, *K. Kawelo USArmy 104.*

Boraginaceae

Cordia alliodora (Ruiz & Pav.) Oken **New naturalized record**

Cordia alliodora, a plant native to Central America, is valued as a tree crop in many areas for its dark, easy-to-work wood (Burns & Honkala 1990). However, on many of the Pacific islands where this species was introduced, it has become a serious invasive pest (Bakeo & Qarani 2003). As their report from Vanuatu stated:

> "The introduction of this Central American tree is a classic example of an aid programme gone wrong, especially now that there is no lucrative market to sell the 800 hectares of stock planted. *Cordia alliodora* was introduced with the best intentions, but failed to live up to expectations for various reasons, probably linked to climatic differences between Central America and Vanuatu. It is becoming a nuisance as it slowly penetrates natural forests. It is a species that is multiplying at a faster rate than it is being harvested. Communities on a number of islands, particularly, Eromango and Maewo, have made formal complaints. *Cordia alliodora* is widely distributed, meaning that if unchecked it could trigger an immense biodiversity problem" (Bakeo & Qarani 2003).

This collection of *Cordia alliodora* represents the first record of naturalization for this species in the state. It is unclear how the species was introduced to the area. It was locally common within a 200 m radius. Individuals of varying sizes were seen, many established in deep shade, growing in riparian areas including in the bed of a seasonal stream, valley floors and slopes, as well as seedlings and saplings growing among the stones of a maintained heiau. It is also reported to be naturalized in Waimea Botanical Garden. *Cordia alliodora* can be distinguished by its oblong or lanceolate to elliptic leaf blades, 10–20 × 3–8 cm, stellate-pilose or glabrate on both surfaces; loosely-branched inflorescences, 10–30 cm across; cylindric, densely stellate-tomentose calyx, 4–6 mm long with 10 prominent ribs; white (drying to brown and persisting) corolla with lobes 5–7 mm long; and cylindrical fruit about 5 mm long, enveloped by the persistent corolla and calyx tube (Smith 1991).

Material examined. **O'AHU**: Mākaha Valley, along road to Kāne'ākī Heiau, UTM 584242, 2376748. Mesic lowland secondary forest. Tree about 15 ft tall, branch nodes swollen and hollow, ant domatia. Fruits within a dry, persistent corolla which is both wind dispersed and buoyant. Species is very common within about 200 m radius, there may be more further up the valley. Individuals of various sizes seen; grows to a height of 50–70 ft. Has been planted as a forestry species in Hawai'i (from Skolman.), 10 Feb 2009, *OED 2009021001.*

Bromeliaceae

Werauhia sanguinolenta (Cogn. & Marchal) J.R. Grant **New state record**

Werauhia sanguinolenta (a name which is sometimes considered to be a synonym of *Vriesea sanguinolenta* Cogn. & Marchal) grows from around sea level to 1200 m in its native range, which extends from Costa Rica to Ecuador and the Greater Antilles. One individual of this epiphytic species, which has never been collected (either naturalized or cultivated) in the state, was found growing in a *Citharexylum caudatum* thicket several hundred meters from the nearest home site. In addition, several individuals (2–5 matures, and 6–10 immature) were found apparently reproducing and spreading in a yard down the road from the naturalization site. The description for this species, from Flora Neotropica, is as follows:

> "Plant flowering 1–2 m high. Leaves about 10 in a dense rosette, suberect, 6–7 dm long, green, usually with large irregular spots of deep red especially near the base, obscurely punctulate-lepidote; sheaths ovate-elliptic, the same color as the blades but slightly broader; blades ligulate, acute or subrounded with a long apiculus, 8–10 cm wide. Scape erect, greatly exceeding the leaves, well over 1 cm in diameter at the summit, glabrous; scape-bracts erect, imbricate, very broadly ovate, acute or the lower ones triangular-laminate, glabrous, even, thick, coriaceous. Inflorescence simple or few-branched, to 4 dm long; primary bracts suberect, like the upper scape-bracts, covering only the sterile bases of the branches; branches suberect, secundly 11–15-flowered, the lateral ones 25 cm long with 1 or 2 sterile bracts at the base, the terminal one nearly 4 dm long with a sterile base as long

as the fertile part and appearing like a continuation of the scape; rhachis to 10 mm in diameter, flexuous, strongly 4-angled, glabrous, dark, its internodes narrowly obconical. Floral bracts becoming secund with the flowers, broadly elliptic to suborbicular, abruptly acute, to 5 cm long, some and usually all more than twice as long as the internodes, glabrous, even, rigid, coriaceous, green, drying to light brown, incurved and carinate toward apex; flowers spreading and downwardly secund; pedicels very stout, to 12 mm long. Sepals very broadly elliptic or ovate, obtuse or broadly acute, 30–45 mm long, rigid, coriaceous, even and glabrous outside, striate and punctulate-lepidote within; petals white, slightly exceeding the stamens, bearing 2 scales at base"(Smith & Downs 1977).

Material examined. **O'AHU**: Ka'alaea Valley, left side. Mesic streamside. Primary vegetation: *Citharexylum caudatum* and *Hibiscus tiliaceus*. Epiphytic bromeliad growing on *Citharexylum caudatum* about 5 ft from ground level. Rosette about 1.5 m across and tall. Blades burgundy red, becoming greenish at ligulate base. Apex apiculate, the tip curling to form a "spine." Single individual in this area, among a dense *Citharexylum caudatum* thicket, several hundred m from nearest house. This species was also seen reproducing/spreading (2–5 matures, 6–10 immatures) in a yard at the end of Kamakoi Road, where it may have been originally planted, 17 Jul 2009, *OED s.n.* (BISH 741558).

Campanulaceae

Platycodon grandiflorus (Jacq.) A. DC. **New naturalized record**

Platycodon grandiflorus, a native of northeastern Asia, has been a popular ornamental since its introduction to horticulture in the late 1700s (Staples & Herbst 2005). Despite its long-time cultivation elsewhere, the first collection of this species from Hawai'i was in 1951. Distinguishing features for this species include thick, fleshy rhizomes, erect solitary flowers on long stalks with greatly inflated purple, blue, pink, or white buds (lending this species its common name of "Balloon flower") and capsule fruit which opens at the apex by 5 valves (Staples & Herbst 2005).

Material examined. **O'AHU**: Mānoa, UTM 2357198, 622786. Growing with *Vinca* out of rock wall near drainage pipe. Herb about 25 cm tall. Flowers campanulate, open, bright purple, fruit a beaked capsule, 31 Oct 2008, *OED 2008103101.*

Capparaceae

Capparis mollicella Standl. **New naturalized record**

Capparis mollicella, an attractive tree native to Mexico and Central America (Zamora *et al.* 2000), is known to have been planted at two sites on O'ahu- at Schofield Barracks, between buildings 672 and 673 (*Staples & Ching 1179,* 15 Apr 1999, BISH) and at the foot of Diamond Head, near Kapi'olani Park (*Neal 1239,* 7 Aug 1947, BISH). This collection was from a sparingly naturalized population of around 18 individuals of various size classes found outside the fence bordering Wheeler Air Force Base. *Capparis mollicella* is a tree species that reaches 5–8 m high. Branches are glabrous; leaves are simple, alternate, and glabrous, usually rounded-ovate, (6–) 12–30 by (2.5–) 5.5–27.5 cm, leaf apices are acute to apiculate, bases are cordate, truncate or obtuse, and petioles vary in size from 1 to 25 cm long. Terminal inflorescences are corymbose, with 12 to 20 flowers. Flowers are pink to purple, large, on pedicels from 7.0–10.5 cm long, stamens numerous. Fruits are a pendulous berry, from 4 to 12 cm long (Zamora *et al*. 2000).

Material examined. **O'AHU**: Kunia Rd, UTM 2357198, 622786. Growing in weedy hillside along outside of Wheeler AFB fence. Tree about 18 ft tall. Flowers with thick white petals, lavender in center, citrusy scent. Fruits seemingly immature, smell like body odor. Several individuals (about 19) of varying size classes in localized area, 1 Oct 2009, *OED 2009100101.*

Chrysobalanaceae

Chrysobalanus icaco L. **New naturalized record**

Chrysobalanus icaco, or Coco-plum, is native to coastal areas of southern Florida and the Bahamas throughout the Caribbean, as well as Mexico, Central America, and northern South America (Francis 2011). It has become a serious invader in the Seychelles, where it was planted for erosion control (Meyer 2000). It is reported to form dense thickets that prevent native plant regeneration (Smith 1991). It is unclear how popular this plant is in cultivation in Hawai‘i, but its further use in horticulture should be discouraged. Distinguishing characters for this species include alternate leaves, inflorescences in a panicle with 5-parted flowers, with a basal style. The fruit is a fleshy drupe with a hard pit.

Material examined. **O‘AHU**: Lower Lā‘ie Falls Trail, on eroded slope mauka of *Casuarina* forestry planting. Dry lowland eroded red dirt slope, nonnative secondary forest. Shrub about a meter tall. Fruits round, green, maturing from white to bluish pink. Sparingly naturalized in area, spreading downslope in wash areas from presumed erosion control plantings. About 50 individuals of various sizes in area, 15 Dec 2009, *OED 2009121501.*

Convolvulaceae

Argyreia nervosa (Burm. f.) Bojer **New island record**

This expansive vining climber, with its distinctive densely pubescent leaves, is occasional in cultivation in Hawai‘i. It has been previously collected as naturalized on both Kaua‘i and Maui. On O‘ahu, it was found along a roadside in the understory of a mixed nonnative forest in a residential area. This species is often seen growing along roadsides where its planting status is unclear, so the extent of its naturalized range on O‘ahu is also unclear.

Material examined. **O‘AHU**: Keolu, UTM 2363799, 630103. Lowland mixed forest. Vine seedling about 0.25 m tall, no flowers or fruit, 6 May 2009, *OED 2009050603.*

Ipomoea carnea Jacq. subsp. ***fistulosa*** (Mart. ex Choisy) D.F. Austin **New naturalized record**

This shrubby member of the Morning glory family, popular in cultivation worldwide for its large, showy flowers and ease of cultivation (Staples & Herbst 2005), has become a problem species in many places it has been introduced. In India it has become a pest of littoral areas, ponds, and other aquatic sites (Chaudhurp *et al.* 1994). *Ipomoea carnea* subsp. *fistulosa* is adaptable to a variety of soil types and is resistant to neglect and drought (Staples and Herbst 2005). All plant parts have been observed to be poisonous to livestock (de Balogh *et al.* 1999; Staples & Herbst 2005). Distinguishing features of this subspecies include its shrubby habit, hollow, erect stems, and deep pink to rose purple, funnel-shaped corollas (Herbst *et al*. 2004). It was found naturalizing in several locations in a dry lowland residential area on O‘ahu and collected growing out of a crack in a sidewalk.

Material examined. **O‘AHU**: Kaimukī, UTM 2353659, 623809. Dry lowland residential area. Growing out of crack in driveway- repeatedly cut back to base. Shrub about a meter tall, sparingly branched, corollas lavender, darker towards the center. Species is occasional in the neighborhood, presumably both cultivated and naturalized, 6 Mar 2009, *OED 2009030601.*

Crassulaceae

Crassula multicava Lem. **New island record**

Crassula multicava, an attractive plant used as a groundcover, grows better in Hawai‘i at higher elevations. It was first collected as cultivated in Hawai‘i in 1940 and was first

found naturalizing in Waimea Canyon State Park on Kauaʻi in 1994. On Oʻahu, it was found spreading down a road in the understory of an upcountry residential area.

Material examined. **OʻAHU**: Pālehua Road, 2400 ft. Primary groundcover in *Eucalyptus* forest. Low-growing herb, about 10–20 cm, immature flowers with pink buds. Fruits not yet present. Potential escaped yard plant across the road from cabin, 16 Mar 2009, *J. Beachy US Army 134.*

Kalanchoe beharensis Drake **New naturalized record**

Kalanchoe beharensis, which is grown as a specimen plant for its unusual, felt-like wooly-hairy foliage and long-lasting flowers (Staples & Herbst 2005) does not appear to have been collected as naturalized anywhere else in the world (Randall 2007). Nonetheless, this species is easily propagated by cuttings, and fallen leaves root easily (Staples & Herbst 2005). It is very likely this collection of a naturalized individual came from discarded yard clippings tossed onto a dry hillside. Several individuals of varying size classes were seen. Distinguishing characteristics of this species include wooly leaves, knobby trunk, and triangular, strongly concave leaves.

Material examined. **OʻAHU**: Pālolo Valley, near intersection of Kaʻau St and Mokuna Pl. Lowland mesic/dry residential setting. 1.5 m shrub, no flowers or fruit on specimen. Several individuals growing on dry, rocky slope, 3 Oct 2008, *D. Frohlich and A. Lau OED 2008100301.*

Cupressaceae

Callitris endlicheri (Parl.) F.M. Bailey **New naturalized record**

Callitris endlicheri, or Black cypress, a gymnosperm that grows widely in shallow soils on rocky sites in its native range of southeastern Australia (McCarthy 1998), has begun to spread in central Oʻahu. Though it was planted on Kauaʻi, Maui, and Hawaiʻi Island for forestry, there are no records of Oʻahu plantings of this species between 1910 and 1960 (Skolmen 1980). *Callitris endlicheri* has been collected from large monotypic patches in the Schofield Barracks West Range; one collection came from the south ridge of Mohiākea Gulch and the other from near a firebreak in the vicinity of the gulch (collected in January 2012 and not accessioned.) Distinguishing features for this tree include strongly keeled leaves and female cones with a small dorsal point near the apex (McCarthy 1998).

Material examined. **OʻAHU**: Schofield Barracks West Range, South Ridge of Mohiākea. Mixed alien koa forest. Evergreen tree about 10 m tall. Actively spreading in the area, forming dense patches and excluding other species. New naturalized record, 28 Jan 2009, *J. Rohrer US Army 107.*

Fabaceae

Albizia niopoides (Benth.) Burkart **New naturalized record**

Albizia niopoides is a rarely planted, introduced species in Hawaiʻi, known only from two locations on Oʻahu. It was first collected in 1999 from Schofield Barracks, although the tree height at the time was estimated to be 80 ft, so the date of introduction would have been much earlier. It is also known from Makiki Heights, perhaps originally planted and now spreading, forming a dense thicket under the largest tree where saplings grow in dense shade. Smaller trees were also located in the area. It may grow to a large size (30 m), often with very light grey bark. It is further characterized by bipinnately compound leaves with 6 or more pairs of pinnae. The leaflets are closely spaced, 7–9 mm long by 1 (up to 2) mm wide. The leaf rachis is channeled, with a nectary at the distal end. Stipules are 6–7 mm long, setiform, and deciduous. Young twigs are greenish or yellowish with sparse lenticels (Flores 2002).

Material examined. **O'AHU**: Makiki Heights on left side of road heading up to DOFAW baseyard. Lowland mesic secondary forest, growing with forestry species. 12–14 m tall tree. Hundreds of saplings growing in dense shade, forming a dense thicket, 25 Aug 2009, *OED 2000082501.*

Albizia saponaria (Lour.) Blume ex Miq. **New island record**

Albizia saponaria is a rarely cultivated tree, first collected in Hawai'i in 1915, grown primarily on large estates in Honolulu. It was also planted in the Waimānalo Forest Reserve on O'ahu (Skolmen 1980). It has been collected as naturalized on Kaua'i in one location, where about 100 plants were found spread over several acres (Lorence & Wagner 1995). On O'ahu, a population covering a 30 × 50 m area was found in Schofield Barracks.

Material examined. **O'AHU**: Schofield Barracks East Range at Pineapple Gate, north side of gate. Tree about 5–7 m tall. Whitish truck about 15 cm dia. Root suckers forming as a result of weed whacker damage. About 50 × 30 m infestation, 26 May 2009, *J. Beachy & K. Kawelo US Army 157.*

Erythrina crista-galli L. **New naturalized record**

A native of South America, *Erythrina crista-galli* has been widely planted throughout the tropics and subtropics worldwide, often as a shade or street tree. It was introduced to Hawai'i by 1913, and is now a commonly planted tree on O'ahu. It can be distinguished from other *Erythrina* species in Hawai'i by its glabrous leaves with usually spiny petioles, its terminal, drooping inflorescences that appear with the leaves, and dark red corollas (Staples & Herbst 2005). It is commonly cultivated and is becoming widely naturalized in riparian areas in New South Wales (Harden 1991). It was found very sparingly naturalized in a dry lowland gulch in Wai'alae Iki. Because this tree is so common in cultivation, it should be monitored for signs of further spread, particularly into natural areas. in this Parker & Parsons (this volume) report this species as naturalized on Hawai'i Island.

Material examined. **O'AHU**: Wai'alae Iki, UTM 628569, 2353925, 2.5 m tall sapling growing in a dry stream bed just before a concrete drainage ditch. Seen this species in several roadside growing situations where planting status unclear. 19 Mar 2009, *OED 2009031903.*

Glycine microphylla Tindale **New state record**

This species is native to Australia, where it is has been given the appropriate common name Small-leaf glycine. It can be distinguished from other species of *Glycine* in Hawai'i, as well as many other vining members of the Fabaceae family in Hawai'i, by the following characters: "a scrambling habit; stems stoloniferous, ± glabrous or hairy with weak white or light brown hairs; leaves weakly pinnately 3-foliate, leaflets of upper leaves narrow-lanceolate to lanceolate, 1.5–5.0 cm long, 1–6 mm wide; leaflets of lower leaves ± obovate to ± elliptic, 0.4–5.0 cm long, mostly 2–9 mm wide; hairy with short, white, appressed hairs; stipels present on terminal petiolule; racemes 5–13-flowered, 2.0–2.5 times as long as leaves; calyx glabrous or sparsely hairy, 3 lower sepals shorter than the tube; standard 4.5–8.0 mm long, usually pinkish to purple; pod straight, ± linear, 1.5–2.7 cm long, 2.5–3.5 mm wide, without purple flecks, sparsely strigose; seeds 3–6" (Harden 1992). Plants in the field were particularly small statured, climbing no higher than a half meter, and usually forming mats along the ground in partially shaded areas. However, floras do not describe the variability in height or stem length.

Small-leaf glycine does not appear to have been purposefully or even accidentally introduced anywhere outside its native range prior to the collection referred to here. It was found sparingly naturalized, forming a small patch at the revegetated site at Castle Junction near Kailua, O'ahu. The most likely means of introduction seems to be acciden-

tal, where seeds of this species got into shipments of hydromulch (sourced from Australia) used for revegetating the slope.

Material examined. **O'AHU**: Castle Junction along Kalaniana'ole Hwy, on east side of revegetated hill. Mesic lowland roadside. Open, revegetated area. Prostrate vine with trifoliate leaves. This possibly arrived as hydromulch contaminant when area was recently landscaped/revegetated. Seed mix came from Australia, 7 Nov 2008, *B. Azama s.n* (BISH 736233).

Kummerowia striata (Thunb.) Schindl. **New island record**

This species from China, a low growing (up to 18") herb, was first collected on the Big Island in a Parker Ranch pasture in 1923. It escaped notice, or at least collection, until being found again on Maui in 2000 (Oppenheimer 2003). It is documented here as sparingly naturalized in a roadside lawn area on Schofield Barracks, O'ahu.

Material examined. **O'AHU**: Schofield Barracks, herb about 6 in tall. Flower standard pink, striated, keel white with pink tip. Pods about 2 mm long, with one seed, 25 Aug 2009, *OED 2009082501*.

Piscidia piscipula (L.) Sarg. **New naturalized record**

This tree is native to parts of Central America and the Caribbean, where its bark has traditionally been used to stun fish, earning it the common name Fish-poison tree. It was first collected in Hawai'i in 1918, in Honolulu, where it is occasional to rare in cultivation. A total of 83 have been planted in the Waimānalo Forest reserve (Skolmen 1980). It can be distinguished from other papilionoid trees in Hawai'i by its 7–9 odd-pinnately-compound leaflets, with lavender-white to reddish tinged, 0.5" long corollas combined with pale green, 0.75–3.50" long pods that have 4 large, lengthwise papery wings (Staples & Herbst 2005). This species was found sparingly naturalized in dry lowland scrub near the base of Koko Crater, probably spreading from nearby plantings.

Material examined. **O'AHU**: Along road on side of Koko Crater, UTM 635685, 2353749. Dry lowland scrub dominated by *Prosopis*. Tree about 3 m tall. Keel pinkish, banner mostly white with green stripe running vertically down middle. Several individuals of various sizes seen, 9 Apr 2009, *OED 2009060904.*

Senna siamea (Lam.) H.S. Irwin & Barneby **New naturalized record**

Also known as Kassod tree, this species from areas of Southeast Asia has been introduced throughout the tropics worldwide for use as a reforestation tree, windbreak, shade tree for coffee, and as an ornamental. It has commonly become naturalized in areas where it has been introduced (Staples & Herbst 2005). It has been in Hawai'i since the 1870s, and has been planted both for forestry and as a street tree. In total, 1,461 were planted in forest reserves throughout the state (Skolmen 1980). *Senna siamea* can be distinguished from other species of *Senna* in Hawai'i by the following characters: tree growing to 60 ft with leaves to 1 ft long which lack petiolar glands; leaves symmetrical at base; inflorescences to about 1 ft long, racemose to pyramidal; and flattened fruits 8–12" long, with leathery valves. It fruits heavily in Hawai'i, and fruits persist a long time on the tree (Staples & Herbst 2005).

Senna siamea was seen sparingly naturalized on Wheeler Air Force Base, growing in small gulches of mixed nonnative secondary forest and scrub. It was a common street tree in the surrounding area, but not the immediate vicinity.

Material examined. **O'AHU**: Wheeler AFB, near corner of Wright Ave and Airdrome Rd. 6 m tall tree, flowering profusely. Commonly planted in Schofield/Wheeler roadside areas and sparingly naturalized on base, 4 Sep 2009, *OED 2009090403*.

Senna spectabilis (DC.) H.S. Irwin & Barneby **New naturalized record**

Senna spectabilis is a tropical American shrub or tree to 50 ft tall, which is rarely planted in Hawai‘i. It can be distinguished from other *Senna* in Hawai‘i by the combination of the following characters: Leaves without petiolar glands, flowers irregularly symmetrical where 1 petal is folded in over the stamens, 7 stamens per flower, and more or less cylindrical fruits (Staples & Herbst 2005). It is documented here as sparingly naturalized, spreading from planting sites into mesic gulches and roadside residential areas at Schofield Barracks.

Material examined: **O‘AHU**: Schofield Barracks, UTM 597310, 2377278. Seedlings of various sizes in *Falcataria* understory, sapling about 15 ft tall, no flowers seen. Fruits cylindrical, 18 Aug 2009, *OED 2009081801*.

Tamarindus indica L. **New island record**

Commonly cultivated worldwide, and long cultivated in Hawai‘i, Tamarind has been collected as naturalized in Kalaupapa, Moloka‘i, spreading from planted sites. It is documented here as sparingly naturalized on O‘ahu, in Lualualei, also spreading from plantings. It has been noted occasionally spreading in other dry areas of the island as well.

Material examined: **O‘AHU**: Lualualei watershed, off Hakimo road. UTM 2366948, 588143. Dry lowland residential/agricultural roadside. 8-ft tall tree with many fruits. This species is rarely to occasionally naturalized in the area spreading from cultivated trees which are common here, 17 Feb 2009, *OED 2009021701*.

Flacourtiaceae

Flacourtia indica (Burm. f.) Merr. **New naturalized record**

The taxonomy of *Flacourtia indica,* or Governor’s plum, is complex. Many sources describe this species as a cultigen since its place of origin is unknown, and it is widely cultivated throughout the Old World tropics and into Polynesia (Staples & Herbst 2005). This species is highly variable, broadly defined, and includes several synonymous names previously described as distinct taxa (Staples & Herbst 2005). *Flacourtia indica* thrives in seasonally dry, sunny areas, in all soil types. This species was found on O‘ahu in the understory of a *Casuarina*-dominated lowland secondary forest in sandy soil. The description for this species (taken from the Flora of China) is as follows:

> “Shrubs or small trees, 2–4 m tall, deciduous; bark gray-yellow, fissured, flaky; old branches usually not spiny; young branches with axillary, simple spines; branchlets puberulous or subglabrous. Petiole red, short, 3–5 mm, puberulous; leaf blade greenish abaxially, deep green adaxially, rose red when young, obovate to oblong-obovate, 2–4 × 1.5–3 cm, thickly papery, abaxially glabrous or sparsely pubescent, hairs spreading and short, adaxially glabrous, midvein raised abaxially, flat adaxially, lateral veins 5–7 pairs, reticulate veins conspicuous, base mostly acute to obtuse, margin serrulate above middle, apex rounded, sometimes retuse. Inflorescences axillary or terminating short lateral twigs, racemose, short; rachis 0.5–2 cm, puberulous. Pedicels 3–5 mm, puberulous, hairs spreading. Sepals 5 or 6, ovate, ca. 1.5 mm, outside glabrous or with a few scattered short hairs, inside sparsely to densely pubescent, margin white ciliate in dried material, apex obtuse. Staminate flowers: stamen filaments 2–2.5 mm, pubescent or less often glabrous. Pistillate flowers: ovary globose, placentas 5 or 6; styles 5 or 6, united only at base, radiating, 1–2 mm, slender. Fruit dull to blackish red, globose, 8–10 mm in diam., longitudinally 5- or 6-angled, styles persistent. Seeds 5 or 6” (Yang & Zmarzty 2007).

Material examined. **O‘AHU**: Bellows AFB, around campsite near golf area, mauka side of Tinker Road. UTM 2363960, 633402. 15 or more individuals scattered in coastal lowland secondary

forest dominated by Casuarina. 2-m tall shrub with reddish-brown lenticillate bark. New leaves pink-tinged, new stems reddish. Older plants with few noticeable spines, younger plants spiny. Fruits ripening red, 24 Sep 2009, *OED 2009092401.*

Lamiaceae

Plectranthus neochilus Schltr. **New naturalized record**

Plectranthus neochilus, a plant native to southern Africa, is occasionally planted as an ornamental, both for its attractiveness and for its purported ability to repel deer, snakes, and dogs (owing to its unpleasant odor). This description of the species comes from the *Flora of New South Wales*:

> "Unpleasantly aromatic, decumbent to erect, perennial herb 12–50 cm high; branches succulent, finely and minutely hairy, or sparsely to densely covered with short and long hairs and scattered orange-red sessile glands. Leaves with lamina succulent, viscid, obovate to elliptic-ovate, 2–5 cm long, 1.5–3.5 cm wide; apex obtuse to rounded; base cuneate to attenuate; margins obscurely crenate with 4–6 pairs of teeth; both surfaces sparsely to densely hairy with shortly appressed hairs, especially on veins below, with orange sessile glands below; petiole 0.5–1.5 cm long. Calyx c. 3 mm long, to 6 mm long in fruit. Corolla 12–20 mm long, mauve-purple, rarely whitish, the upper lip paler and bluish, slightly hairy; tube slightly decurved; lobes with scattered sessile glands" (Harden 1992).

This species has spread from planted areas in other regions and is documented here as very sparingly naturalized in a lowland residential roadside area of O'ahu, also spreading from planted individuals.

Material examined. **O'AHU**: Keolu, on Uluhaku Rd. In roadside lawn habitat, growing against utility pole. Herb about 40 cm tall, flowers purple, zygomorphic. Malodorous, sometimes used to repel dogs, 6 May 2009, *OED 2009050602.*

Liliaceae

Dianella caerulea Sims **New naturalized record**

This species of *Dianella* is cultivated occasionally as an ornamental and is a native of Australia. The species *D. caerula* was first collected on O'ahu from Wahiawā Botanical Garden in 1986. This collection documented here is from the understory of a *Psidium cattleianum* and *Acacia koa* forest in Pālehua. The taxon collected here was identified as *D. caerulea* var. *assera* R.J.F. Hend. The description for this variety (taken from the *Flora of Australia*) is as follows:

> "Plant tufted, solitary, to 1.8 m tall. Stems elongating, with scales for most (sometimes all) of their length, touching or up to 30 cm apart, arching or ascending; extravaginal branching rapidly developing. Leaf sheaths +/- completely occluded distally. Inflorescence from narrowly conical to narrowly cylindrical in outline, continuous or interrupted; cymules open or contracted, few-flowered. Perianth pale blue to mid-blue with green streaking externally" (Henderson 1987).

Material examined. **O'AHU**: Pālehua. In strawberry guava, *Acacia koa* understory. Climbing herb, 1.0–1.5 m tall. Flowers small, purple, zygomorphic. Fruits small, green (immature), 0.5 cm diameter. Leaves with serrate margins, equitant on stems of varying heights, 13 May 2009, *J. Beachy US Army 152.*

Melastomataceae

Tibouchina granulosa (Desr.) Cogn. **New naturalized record**

Tibouchina granulosa, a species not frequently cultivated as an ornamental in Hawai'i and

not previously collected as naturalized in the state, has now been spotted spreading 20–30 m from a planted tree. The original planting had been uprooted, and then cut into logs, which were resprouting. Several saplings and seedlings of various sizes were seen growing uphill from the original planting. This species can be distinguished from other commonly seen *Tibouchina* species by its 4-winged branchlets, leathery, elliptic to ovate-lanceolate leaves, evenly purple flowers, wooly filaments, and floral bracts and calyx lobes with broad, smooth marginal bands (Staples & Herbst 2005)

Material examined. **O'AHU**: Mānoa Valley, mauka of currently managed portions of Lyon Arboretum. UTM 623840, 2359941. 1 m tall sapling, no fruits or flowers seen. Sapling was found about 50 m from an uprooted, resprouting tree that had apparently been cut into pieces, which were also sprouting. Seedlings of this species less than 20 cm tall were found on a ridge nearby, about 20–30 m from original tree. 2 Sep 2008, *OED 2008090201;* Mānoa Valley, mauka of currently managed portions of Lyon Arboretum. UTM 623840, 2359941. Lowland mesic secondary forest, 20 cm tall seedlings. This species widely believed not to reproduce by seedlings in Hawai'i. Four other naturalized saplings and small trees noted in the area, about 40 m from the original planted area, 5 Nov 2008, *OED 2008110501.*

Meliaceae

Azadirachta indica A. Juss. **New naturalized record**

Azadirachta indica, or Neem, has been promoted as an ornamental and as a source for Neem oil for Hawaiian gardens for several years (Staples & Herbst 2005). Neem is an evergreen tree from 30 to 50 feet tall that has odd-pinnately compound leaves with 9–18 narrowly ovate, curved, toothed leaflets. Fruits are a yellow drupe with thin flesh. This species is easily propagated by cuttings or by seed (Staples & Herbst 2005) and was found sparingly naturalized over a large area in Mā'ili, on the leeward coast of O'ahu.

Material examined. **O'AHU**: Mā'ili, off Kulaaupuni St. UTM 2369684, 585396. Dry lowland residential roadside area. 8 ft tall sapling, no flowers or fruit present. Spreading from apparently planted individuals in area. This species is occasionally noted naturalizing in roadside areas and large gardens, 13 Feb 2009, *OED 2009021302.*

Moraceae

Artocarpus heterophyllus Lam. **New naturalized record**

Artocarpus heterophyllus, or Jackfruit, is occasional in cultivation in Hawai'i, where it produces very large (12–40 in long) fruits with large, 1.25 in long seeds. Characteristics that distinguish it from other *Artocarpus* species grown in Hawai'i include simple adult leaves and cauliflorous inflorescences (Staples & Herbst 2005). It was noted as very sparingly naturalized in Mānoa Valley, where four seedlings were noted scattered along a trail in dense shade. No mature trees were seen in the vicinity. Parker & Parsons (this volume) report this species as naturalized on Hawai'i Island.

Material examined. **O'AHU**: Mānoa Valley, Waiakeakua. Wet secondary forest. 1.5 m tall, sparingly branched sapling with whit viscous sap, thickened taproot about 30 cm long. No flowers or fruit, not a root sucker. Four small seedlings noted along trail, no matures seen, 4 Nov 2008, *A. Lau 2008110401.*

Orchidaceae

Habenaria rodeiensis Barb. Rodr. **New island record**

Habenaria rodeiensis, an orchid previously only known from West and East Maui (Wagner *et al.* 1999; Oppenheimer 2006), was collected on O'ahu along the Mānana Trail,

located in the Koʻolau Mountain Range. This geophytic orchid does not appear to be common in general cultivation, and it is unclear how it was introduced to Hawaiʻi. Cultivation of this species in Hawaiʻi is unadvisable.

Material examined. **OʻAHU**: Mānana Trail, just on north side of trail UTM 611039, 2370601. Trailside, growing with *Psidium*, *Eucalyptus*, and *Psydrax odorata*. Herbaceous, erect ground orchid, 24 Dec 2009, *K. Kawelo & J. Rohrer US Army 102.*

Podocarpaceae

Podocarpus elatus R. Br. ex Endl. **New naturalized record**

This species is commonly planted in Hawaiʻi, usually as an ornamental tree, which can grow to a very large size (up to 125 ft). It is native to Australia and is widely cultivated throughout the rest of the tropics and subtropics (Staples & Herbst 2005). This species can be distinguished from other *Podocarpus* in Hawaiʻi by its leaf apices usually having a small, spine-tipped mucro, leaf margins usually not revolute, and pollen cones less than 2 mm wide (De Laubenfels 1985). Material in BISH is variable in these characters, and species documented here may easily be confused. This species is documented here as naturalized in usually open areas of windward lowland ridges of Oʻahu, occasionally forming dense stands. This species has a fleshy receptacle associated with the seed, an adaptation to dispersal by birds (Staples *et al.* 2000). It is likely naturalized in other areas as well, and further work could be done to document the extent of the naturalized range of this species on Oʻahu. It occurs on a ridge that is nearby a population of *Podocarpus macrophyllus* in ʻĀhuimanu (see below).

Material examined: **OʻAHU**: Ridge north of Ioleka'a. Along and off trail, females with many seedlings in several groups, with *Ardisia*, guava, *Rhodomyrtus*, *Schefflera*, silver oak, and *hala*. Female plant, tallest c. 18 ft tall, naturalized, 9 Feb 2000, *B. Waters s.n.* (BISH 662413, 662414); Kahaluʻu and ʻĀhuimanu ridge. Trees to 40 ft tall, many *keiki* under mother plant. Also growing in *uluhe* and *palaʻā*, 23 Apr 2008, *K. Metzler 20080423Podocar*.

Podocarpus macrophyllus (Thunb.) Sweet **New naturalized record**

Also known as Kusa-maki, this species is probably native to from southern Japan, though also known from Southern China to Taiwan where it is possibly an escape from cultivation (Staples & Herbst 2005). It is at least occasional in cultivation in Hawaiʻi where it us grown as a street tree, specimen, or hedge plant. It can be distinguished from other *Podocarpus* in Hawaiʻi by its linear leaves with usually revolute margins, the apices variable but usually lacking a sharp mucro, the leaves more than 6 mm wide, and less than 10 times as long as wide, and pollen cones usually greater than 2.5 mm in width (De Laubenfels 1985). It is documented here naturalized along a trail in the ʻĀhuimanu area, nearby a ridge where there is a population of *Podocarpus elatus*.

Material examined: **OʻAHU**: ʻĀhuimanu valley. Along trailside, in *uluhe*. Tree, 4–5 m. UTM 620226, 2370343, 27 Jan 2007, *K. Kawelo US Army 37*.

Polygonaceae

Triplaris weigeltiana (Rchb.) Kuntze **New naturalized record**

This species is from Central and South America, where it (and other species in the genus) are known by the common name Hormigo, probably in reference to the trees ability to harbor stinging and biting ants in its hollow stems ("hormiga" means "ant" in Spanish). They

are rarely cultivated as ornamental street and shade trees, or in botanical gardens. The species was first collected in Hawai‘i in 1945 and is rare in cultivation, at least on O‘ahu. It is distinguished from other Polygonaceae in Hawai‘i primarily by its habit as a large tree, and also by peeling bark forming patchy, multicolored trunks, and its fruits enclosed in a papery perianth, with 3 white to scarlet, winglike, extended lobes (Staples & Herbst 2005). This species is dioecious and may be planted in pairs to encourage the ornamental, wind dispersed fruits to be formed. It is listed as moderately invasive in Tahiti (Meyer 2000). It is here documented as naturalized in Hawai‘i, on O‘ahu spreading locally from a planting of a male and a female tree in Makiki, makai of the DOFAW O‘ahu branch baseyard. Naturalized plants were scattered sparingly across several acres, the saplings occasionally growing in dense shade.

Material examined. **O‘AHU**: Makiki valley, past first two gates on road to DOFAW baseyard (UTM 2357461, 621473) Wet/mesic lowland secondary roadside forest. 3 m tall sparingly branched sapling with peeling grey/tan bark. Growing in shaded understory, 12 Jan 2009, *OED 2209011203*.

Polypodiaceae

Pyrrosia piloselloides (L.) M.G. Price **New state record**

Native from northeastern India east to Hainan, China, and throughout Malesia, this species has not been previously documented in Hawai‘i, although it is reported to be grown in a botanical garden in Waimea, O‘ahu. In its native range it grows epiphytically and is common to very common where found, in primary and secondary forest, from sea level to 1000 m. It is one of the most common epiphytes in the lowlands of Malesia, and is capable of smothering entire trees, sometimes causing tree death (Hovencamp *et al.* 1998). It was found in an upper residential area of Mānoa Valley, growing to the tops of several species of trees, occasional to common within an area of about 2 to 3 acres, with some small outlier plants, apparently spreading both vegetatively and by spores. This species may best be distinguished from other ferns in Hawai‘i by its rhizomatous, colony forming habit, dimorphic fronds where the sterile fronds are entire, succulent, and 1–7 × 1–2 cm, at the collection site noted as circular in shape; fertile fronds linear, 4–16 × 0.3–1.5 cm. It also has spreading, peltate scales on the rhizome. The sori are apical or extending to the base of the frond submarginally (De Wilde *et al*. 1998).

Material examined. **O‘AHU**: Mānoa Valley, at the end of Woodlawn Terrace Place. UTM 624810, 2357826; Lowland mesic cultivated setting. Epiphytic succulent fern, entirely covering trunk and branches of large tree and surrounding vegetation. Origin is SE Asia. According to Dr. Smith, this species is “very likely to further escape and spread in Hawai‘i”, 17 Oct 2008, *OED 2008101703.*

Pteridaceae

***Adiantum* ‘Edwinii’** **New island record**

Adiantum ‘Edwinii’ is probably a cultivar of *A. raddianum*, or possibly a hybrid or cultivar of *A. concinnum.* It was first collected on Maui in 1981, and known from Lāna‘i, and now from O‘ahu, where it was found on a slope of Palikea Gulch. This plant can be distinguished from other *Adiantum* seen in Hawai‘i by its U-shaped sori, fronds up to 100 cm long and 60 cm wide, and the pinnules closest to the rachis overlapping the rachis on the side toward the frond tip (Palmer 2003).

Material examined. **O‘AHU**: Palikea Gulch, 1000 ft. On a lower slope in closed canopy. Smaller than one meter, but veins end in small marginal sinuses, 7 Jan 2009, *J. Gustine US Army 105.*

Rutaceae

Triphasia trifolia (Burm. f.) P. Wilson **New naturalized record**

Probably native to the Malay Peninsula, and also known as Limeberry, this species has been introduced in many tropical areas as an ornamental hedge plant, potted plant, or bonsai species. It was first collected in Hawai‘i in 1926, although it does not seem to be widely used at least on O‘ahu. It can be distinguished from other nonnative Rutaceae in Hawai‘i by its shrubby habit, trifoliate leaves with paired axillary spines, and fleshy, dull red, single seeded fruits containing sweet, edible, mucilaginous sap (Staples & Herbst 2005). Limeberry has escaped cultivation and become naturalized in many areas where it has been introduced, occasionally forming thickets in understory, especially on limestone soils in coastal areas of Pacific islands. It was collected as naturalized on O‘ahu in that habitat, locally and sparingly naturalized in the understory of *Prosopis pallida* near the coast. It is likely to continue spreading and may become more abundant without intervention.

Material examined. **O‘AHU**: Kāne‘ohe MCBH, next to Zombie’s beach. Dry coastal zone habitat. 4 ft tall shrub, leaves glossy green above, pale below. Fruit green ripening red, skin thin, containing clear, mucilaginous citrus smelling pulp. Single seed very sticky. About 21 plants of various sizes (from about 2–8 ft tall) seen in dense shade of *Prosopis pallida* understory, 5 Aug 2009, *OED 2009080501*.

Scrophulariaceae

Veronica serpyllifolia L. **New island record**

This nonnative herbaceous species has been collected previously on Kaua‘i, Moloka‘i, Lāna‘i, Maui, and Hawai‘i islands, but this is its first report for O‘ahu. Although it may be tolerated where it grows, it does not appear to be intentionally cultivated in Hawai‘i. It was found spreading in mesic forest in the northern Wai‘anae range. This genus is filed under Scrophulariaceae at BISH, although many specialists now include the genus in Plantaginaceae.

Material examined: **O‘AHU**: Kapuna Gulch, Pahole Natural Area Reserve, along Mokulē‘ia trail, 31 Mar 2009, *M. Elmore US Army 139*.

Sterculiaceae

Sterculia apetala (Jacq.) H. Karst. **New island record**

A large specimen tree growing to 30 m, this species was first collected in Hawai‘i in 1915. A particularly large tree planted at Queen’s Hospital may have been planted by Dr. W. Hillebrand around 1851 (Staples & Herbst 2005). Previously documented as naturalized, spreading from a planted specimen on Maui, this rarely planted tree was found spreading locally near Queen’s Hospital, where scattered saplings were found growing in dense shade. A medium-sized but mature tree of questionable planting status also occurs on the hospital grounds. This species’ further spread from this location has probably been limited by intensive landscape maintenance; however, long distance dispersal may be aided by its fruits with large seeds overhanging busy roadways.

Material examined. **O‘AHU**: Near Beretania and Punchbowl streets (UTM 618693, 2356737). Lowland urban landscaped area. 0.5 m tall sapling. Several naturalized saplings in the area, 4 Feb 2009, *OED 2009020401*.

Tiliaceae

Grewia micrantha Bojer **New state record**

This species from tropical Africa does not appear to have been introduced into general

cultivation very widely, if at all. In its native range it grows in an ecotype characterized in part by an extended dry season as well as dominance by species of *Brachystegia* (Fabaceae), or in mixed shrubland. A description from *Flora Zambesiaca* reads:

> "Shrub or small tree up to 8 m. tall; young branchlets ferruginously tomentose, becoming grey or brownish with paler lenticels. Leaf-lamina 2.5–9 × 1.2–4.8 cm., ovate-oblong or elliptic, apex rounded or acute, margins serrate, rounded or asymmetrically cordate at the base, sparsely stellate-pubescent above or glabrous, finely reticulate-rugose…closely appressed-whitish-tomentose between the nerves below… petiole up to 7 mm long, ferruginously pubescent; stipules c. 5 mm. long.... Inflorescences all axillary…pedicels normally 3 per peduncle… coarsely brown-hairy…Sepals up to 0.8 cm. long, linear-oblong, coarsely stellately hairy outside, yellow and glabrous within. Petals yellow, about half the length of the sepals, oblong to obovate, often 2-dentate at the apex, basal claw either with circumvillous nectary within, or often absent and replaced by a small tuft of hairs at the cuneate petal base...style c. 5 mm. long, glabrous; stigma with about 4 broad lobes. Fruit yellowish, deeply 2-lobed or 1-lobed by abortion, each lobe c. 7 mm. in diam., pubescent" (Royal Botanic Gardens- Kew 2011).

No prior collections of this species have been made in the state. It is possible this species was intentionally introduced near the collection site as an ornamental. It was seen here scattered in a dry lowland area dominated by *Prosopis pallida* and nonnative grasses, scattered locally with an abundance of approximately 10 or 12 plants of multiple size classes.

Material examined. **O'AHU**: Along road to Koko Crater trail (UTM 635687, 2353745). Dry lowland area dominated by *Prosopis*. Tree about 2.5 m tall. No flowers. Fruits small, fuzzy, green, drying to brown, 9 Apr 2009, *OED 2009040903*; Along road to Koko Crater trail (UTM 635687, 2353745) dry lowland area, near baseball diamond. Sprawling shrub about 5 m dia, 3 m tall. Flowers bright yellow with lobed stigmas. New growth reddish. Several individuals of various sizes in area, 30 Jun 2009, *OED 2009063001*.

Verbenaceae

Vitex trifolia L. **New island record**

This species is very commonly planted in Hawai'i as a hedge plant, wind break, and ornamental. It has been documented as naturalized in Kalaupapa, Moloka'i, spreading into dry rocky areas. It was found sparingly naturalized in Kalaeloa, O'ahu in dry, mixed alien scrubland along a road. Because of the adaptability of this species to dry lowland areas with poor soils (Staples & Herbst 2005) it likely persists at sites of former cultivation, making planting status of populations near roadsides in natural areas unclear. Because of this its naturalized status on O'ahu may well be much more extensive than the population documented here.

Material examined: **O'AHU**: Kalaeloa. Mixed alien scrubland, growing against a telephone pole. Shrub about 1 m, cut back, 18 Jun 2009, *OED 2009061802*.

Vitaceae

Cissus repens Lam. **New state record**

This species, which is native to Asia and Australia, has been collected from two locations in the Hawaiian Islands; at the "Makiki Forestry Nursery" in 1978, and in Mākaha Valley, along the road to Kāne'aki Heiau. Both locales are on O'ahu. It is uncertain why this species was brought to Hawai'i, since there is no clear evidence of it being used in horticulture (Chimera 2010). In any case, the use of this species in cultivation should be discouraged, as it is a shade-tolerant, bird-dispersed, smothering vine. The description of this species, taken from the *Flora of China*, is as follows:

"Vines, herbaceous. Branchlets terete, with longitudinal ridges, usually glaucous, glabrous; tendrils bifurcate. Leaves simple; stipules brownish, oblong, 5–6 × 2–3 mm, membranous, glabrous; petiole 2.5–7 cm, glabrous; leaf blade cordate-oval, 5–13 × 4–9 cm, glabrous, basal veins 3–5, lateral veins 3 or 4 pairs, veinlets inconspicuous, base cordate, margin with 9–12 sharp teeth on each side, apex acute or acuminate. Inflorescence umbelliform, terminal or leaf-opposed; peduncle 1–3 cm, glabrous. Pedicel 2–4 mm, nearly glabrous. Buds oval, ca. 4 mm, apex obtuse. Calyx entire or undulate. Petals triangular-ovate, ca. 3 mm, glabrous. Anthers ovoid-elliptic. Lower part of ovary adnate to disk; style conical; stigma slightly expanded. Berry 0.8–1.2 cm × 4–8 mm, 1-seeded. Seed surface smooth, with sparse ribs."(Ren & Jun 2007)

Material examined. **O'AHU**: Mākaha Valley, along road to Kāne'aki Heiau, UTM 584134, 2376668, 600 ft. Mesic lowland secondary forest. Vine with long stems to several meters, fruits ripening black, soft, fleshy. 2 individuals noted in the area. Long-time land manager unaware of its origin, 10 Feb 2009, *OED 2009021002*.

Zygophyllaceae

Guaiacum officinale L. **New naturalized record**

Lignum-vitae is native to tropical America and the Caribbean, where it typically grows in dry habitats. It has been introduced as an ornamental throughout the tropics, and is occasional in cultivation in Hawai'i where it was first collected in 1909. It can be distinguished by the following description: Tree to 25 ft tall, leaves 2–5 in long with 4 (–6) broadly obovate to orbicular leaflets, which are rounded at the apex; petals blue purple to nearly white, the upper surface hairy; fruits showy, obcordate, the lobes yellowish, splitting at maturity; seeds are brownish, enclosed in a showy reddish aril (Staples & Herbst 2005). Despite being planted in so many other places, it has apparently not been clearly documented as naturalized elsewhere. Though not thoroughly established, it is documented here as very sparingly naturalized along a roadside in dry open grassland in Kalaeloa, presumably having spread from a planted individual though none were seen in the immediate area. It has also been noted in West Loch, similarly growing along a roadside in dry kiawe forest.

Material examined: **O'AHU**: Kalaeloa, UTM 595313, 2358058. Dry lowland weedy shrubland. Sapling about 3 ft tall, corolla lobes persistent as young fruits develop, 12 Jun 2009, *OED 2009061201*.

Acknowledgments

We thank Clyde Imada for help with plant identification, support, and document editing. Also, many thanks to the staff and volunteers at BISH, especially Amanda Harbottle and Barbara Kennedy. Thanks to everyone at OISC and US Army Oahu Natural Resource Program for field collections and support. Thanks to Marine Corps Base Hawaii for access to their lands and survey support. Thanks to Becky Azama and Derek Arakaki with Hawaii Department of Agriculture for their work in the field and cooperation and support. Also, thanks to Jeff Preble, Joel Lau, and Kenji Suzuki for their report of *Crysobalanus icaco* in Lā'ie, and to Tony Rodd for identifying *Callitris endlicheri*.

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