Wagner, **W.L.**, **Herbst**, **D.R. & Sohmer**, **S.H**. 1999. *Manual of the flowering plants of Hawai'i*. Rev. ed. 2 vols. University of Hawai‘i Press and Bishop Museum Press, Honolulu. 1919 pp.

Zhang, **Z.-Y. & Santisuk**, **T**. 1994. Bignoniaceae, p. 218. *In*: Wu Z.-y. & Raven, P.H. (eds.), *Flora of China.* Vol. 18. Scrophulariaceae through Gesneriaceae. Science Press, Beijing & Missouri Botanical Garden, St. Louis. 449 pp.

New Hawaiian plant records from *Herbarium Pacificum* for 2007

CLYDE T. IMADA, SHELLEY A. JAMES, & BARBARA H. KENNEDY (Hawaii Biological Survey, Bishop Museum, 1525 Bernice St., Honolulu, Hawai‘i 96817-2704, USA; email: cimada@bishopmuseum.org)

These previously unpublished Hawaiian plant records report 1 new state record, 8 new island records, and 1 new naturalized record affecting the flora of Hawai‘i. All identification were made by the authors, except where noted in the acknowledgments, and all supporting voucher specimens are on deposit at BISH, except as otherwise noted.

Convolvulaceae

Convolvulus arvensis L. **New island record**

Previously reported as naturalized on O‘ahu and Maui (Wagner *et al.* 1990: 552), field bindweed is now recorded from Moloka‘i. Although on the Department of Agriculture noxious weed list for the State of Hawaii (Hawaii Administrative Rules, Title 4 Subtitle 6 Chapter 68) adopted in 1992, the species is still apparently only sparingly naturalized in the state in low elevation, dry areas. It is native to Eurasia and most commonly found as a weed in temperate areas.

Material examined. **MOLOKA‘I**: Ho‘olehua, on Moloka‘i High School track, 13 Jul 2007, *S. Dunbar 398.*

Cyperaceae

Cyperus involucratus Rottb. **New island record**

Previously reported as naturalized on Midway Atoll, Kaua‘i, O‘ahu, and Maui by Wagner *et al.* (1990: 1395) under the name *C. alternifolius* subsp. *flabelliformis,* this often-cultivated wetland ornamental sedge has since been reported as a weed on Hawai‘i (Imada *et al.* 2000: 11) and Moloka‘i (Oppenheimer 2007: 23). Umbrella sedge is now recorded from Lāna‘i growing in a seep area along a hot, dry coastal trail. It is native to tropical Africa, Madagascar, Mauritius, and the Mascarene Islands (Wagner *et al.* 1990: 1395).

Material examined. **LĀNA‘I**: Mānele Bay, along coastal trail heading west, 18 m, 9 Dec 2007, *C. Imada, S. James, & P. Imada 2007-18.*

Eleocharis geniculata (L.) Roem. & Schult. **New island record**

Wagner *et al.* (1990: 1402) reported this pantropical wetland sedge as naturalized on Kaua‘i, O‘ahu, and Moloka‘i; later, Oppenheimer (2003: 10) collected it on Maui. *Eleocharis geniculata* is now additionally recorded from Lāna‘i growing luxuriantly in the same seep area as the *Cyperus involucratus* vouchered above, along a hot, dry coastal trail.

Material examined. **LĀNA‘I**: Mānele Bay, along coastal trail heading west, 18 m, 9 Dec 2007, *C. Imada, S. James, & P. Imada 2007-16*.

Fabaceae

Calliandra houstoniana (Mill.) Standl.
var. ***calothyrsa*** (Meisn.) Barneby **New naturalized record**

Native to tropical forests of Central and northern South America (Staples & Herbst 2005: 309), this attractive powderpuff shrub has previously only been collected from cultivated specimens on Kaua‘i, O‘ahu, and Maui. The following collection was taken from one of a number of individuals spreading outwards from a cultivated specimen into adjacent undeveloped shrub and grasslands on Lāna‘i.

Material examined. **LĀNA‘I**: Lāna‘i City, southern end of Kaunaoa Rd, on grassy roadside bank, 538 m, 9 Dec 2007, *C. Imada, S. James & P. Imada 2007-15*.

Centrosema pubescens Benth. **New island record**

The first verified collection in Hawai‘i of this cultivated tropical American vine dates back to December 1985, when it was vouchered at the Mauka Field Laboratory of the Department of Agronomy & Soil Science, University of Hawai‘i at Mānoa *(Lau 1696).* The first record of naturalization was reported in 1997 on Kaua‘i (Flynn & Lorence 1998: 5), followed in 2000 by a report from East Maui (Starr *et al*. 2003: 27). In Waihe‘e Valley, windward O‘ahu, it was noted as a common roadside element in an alien-dominated forest of *Citharexylum*, java plum, and *Hibiscus tiliaceus,* growing with *Mimosa, Wedelia*, and other herbaceous roadside weeds.

Material examined. **O‘AHU**: Waihe‘e Valley, weedy vine clambering on alien shrubs and trees alongside main dirt road on Board of Water Supply property, ca 115 m, 21 May 2007, *C. Imada, B. Kennedy, G. Ragosta, & J. Preble 2007-10*.

Molluginaceae

Mollugo cerviana (L.) Ser. **New island record**

Previously reported as naturalized only from low, dry areas on the island of Hawai‘i (Wagner *et al.* 1990: 922) and from a single collection next to an abandoned airstrip on O‘ahu (Herbst *et al.* 2004: 9), threadstem carpetweed has recently been collected on Lāna‘i. The small population of low-statured but reproductive individuals was found in disturbed habitat resulting from the construction of a meteorological tower.

Material examined. **LĀNA‘I**: northwestern Lāna‘i, off Ka‘ena Trail, 168 m, 27 Nov 2007, *S.A. James & E. Guinther 2007-1*.

Polygonaceae

Persicaria chinensis (L.) Nakai **New island record**

Previously recorded only on Hawai‘i and called *Polygonum chinense* in Wagner *et al*. (1990: 1063), *Persicaria chinensis* is now known from O‘ahu. This native of tropical and subtropical eastern Asia was found as a lushly growing scandent subshrub in full flower growing with *Justicia betonica* under a tall canopy of *Trema* and *Paraserianthes,* along a country road in Kalihi Valley.

Material examined. **O‘AHU**: Kalihi Valley, near end of Kalihi Valley Rd at Kokua Kalihi Valley property, ca 150 m, 17 Apr 2007, *C. Imada 2007-09*.

Rubiaceae

Richardia scabra L. **Correction**, **New island records**

Wagner et al. (1990) recognized a single naturalized species of *Richardia* in Hawai‘i, *R. brasiliensis* Gomes. Previous Hawaiian botanists had identified the weed locally as *R. scabra* L. (Hillebrand 1888 [as *Richardsonia scabra* (L.) St. Hil.]; Degener 1937). Wagner *et al.* (1990) however, referred to this binomial as a misapplication to *R. brasiliensis,* whose distribution in the State was given as Kaua‘i, O‘ahu, Lāna‘i, Maui, and Hawai‘i [and later recorded from Moloka‘i as well (Oppenheimer 2006:13)]. Lorence *et al*. (1995: 50–51) subsequently reported true *R. scabra* naturalized on Kaua‘i, and Oppenheimer (2003: 23) added a new record for Maui. Lorence *et al.* (1995) described the essential differences between the two taxa: “*Richardia brasiliensis* . . . has mericarps that are adaxially broadly and openly concave with a slim median keel, whereas those of *R. scabra* are adaxially closed to a narrow groove or sulcus. These 2 species are otherwise similar in morphology.” Subsequent careful examination of specimens identified as *R. brasiliensis* in *Herbarium Pacificum* has led to the reidentification of some O‘ahu, Moloka‘i, and Maui vouchers as *R. scabra*. As a result, new island records of *R. scabra* are here reported for O‘ahu and Moloka‘i, and its current distribution now includes Kaua‘i, O‘ahu, Moloka‘i, and Maui. The single voucher of *R. brasiliensis* from Moloka‘i and all but one of those from Maui were reassigned to *R. scabra,* leaving the current distribution of *R. brasiliensis* as Kaua‘i, O‘ahu, Lāna‘i, Maui, and Hawai‘i.

The following BISH vouchers have been reassigned from *R. brasiliensis* to *R. scabra*:

Material examined. **O‘AHU**: Upper Makakilo, adjacent to developed subdivision at end of Pueonani St., open area in solid *Panicum maximum* grassland, with *Waltheria indica, Sida fallax, Eleusine indica, Verbesina encelioides, Sonchus oleraceus,* 205 m (670 ft), 9 Mar 2004, *C. Imada & L. Crago 2004-27.* **MOLOKA‘I**: Kaunakakai, along side of Forestry Rd, 500 m, 2 Apr 2004, *H. Oppenheimer H40404.* **MAUI**: East Maui, 26.7 km (16.6 mi) E of ‘Ulupalakua Ranch on Pi‘ilani Hwy. (Hwy. 31), 6 km (3.7 mi) E of Manawainui; rocky dry stream bed dominated by *Prosopis pallida* and *Leucaena leucocephala.* ca 20 m, 14 Jan 1983, *W. L. Wagner & S. Mill 4739;* East Maui, Hāwelewele Gulch, Kaupō, 12 m, 26 Jul 2001, *F. Starr & K. Martz 010726-3;* West Maui, Lahaina, 565 m (1850 ft); locally common along dirt roads, pasture, lawns and adjacent degraded areas in the vicinity of Kahoma Cabin, 13 Mar 2007, *H. Oppenheimer H30706.*

A single BISH voucher is representative of *R. brasiliensis* on Maui:

Material examined. **MAUI**: West Maui, Honokowai, S of Haenanui Gulch, 305 m, scattered to locally common in open areas along unpaved cane haul roads, 2 May 2007, *H. Oppenheimer H50702.*

Solanaceae

Solanum villosum Mill. **New state record**

This long overlooked specimen was collected by Derral Herbst in 1975 during a game bird survey on the dry subalpine slopes of Mauna Kea and positively identified by Dr. Lynn Bohs of the University of Utah in 1990. There is no documentation for any spread from this original locality. Closely related to and resembling a small-leaved form of glossy nightshade or *pōpolo* (*S. americanum* Mill.), *S. villosum* can be distinguished by its conspicuously and persistently villous or hirsute parts (vs. glabrous or glabrescent); berries reddish or yellow (vs. black); and seeds usually 1.8–2.2 mm long (vs. 1.2–1.8 mm long) (Correll & Johnston 1979). In Texas it occurs on rocky slopes and in waste places in the extreme western part of the state. Other American floras (e.g., *Intermountain Flora*, *A*

Flora of Utah), however, say that *S. villosum* is misapplied to *S. sarrachoides*. Zhang *et al.* (2004) cite its presence in Gansu, Qinghai, Shanxi, Xinjiang, China, on slopes, in valleys, near roads, and in shady places, from 100–1300 m. Its geographic range includes southwestern Asia and Europe.

Material examined. **HAWAI'I**: Pu'u Lā'au, weed growing near the hunter's cabin, 2270 m (7450 ft), 18 Jan 1975, *D. Herbst 5184*.

Acknowledgments

We thank Dr. Lynn Bohs (UT) for the *Solanum* identification; Hank Oppenheimer for assistance with the *Richardia* writeup; and field collectors Laura Crago, Stephanie Dunbar, Eric Guinther, Derral Herbst, Pumehana Imada, Kim Starr, Susan Mill, Hank Oppenheimer, Jeff Preble, Guy Ragosta, Forest Starr, and Warren L. Wagner.

Literature Cited

Correll, **D**.**S**. **& Johnston**, **M**.**C**. 1979. *Manual of the vascular plants of Texas.* Univ. Texas at Dallas, Richardson, Texas. 1881 pp.

Degener, **O**. 1937. Fl. Hawaiiensis, fam. 332. *Richardia scabra.* Publ. priv., 2 pp.

Flynn, **T**. **& Lorence**, **D**.**H**. 1998. New naturalized plant records for the Hawaiian Islands. *Bishop Museum Occasional Papers* **56**: 5–6.

Herbst, **D**.**R**., **Staples**, **G**.**W**. **& Imada**, **C**.**T**. 2004. New Hawaiian plant records for 2002–2003. *Bishop Museum Occasional Papers* **78**: 3–12.

Hillebrand, **W**. 1888. *Flora of the Hawaiian Islands: a description of their phanerogams and vascular cryptogams*. Carl Winter, Heidelberg, Germany; Williams & Norgate, London; B. Westermann & Co., New York, 673 pp.

Imada, **C**.**T**., **Staples**, **G**.**W**. **& Herbst**, **D**.**R**. 2000. New Hawaiian plants records for 1999. *Bishop Museum Occasional Papers* **63**: 9–16.

Lorence, **D**.**H**., **Flynn**, **T**.**W**. **& Wagner**, **W**.**L**. 1995. Contributions to the flora of Hawai`i. III. *Bishop Museum Occasional Papers* **41**: 19–58.

Oppenheimer, **H**.**L**. 2003. New plant records from Maui and Hawai'i counties. *Bishop Museum Occasional Papers* **73**: 3–30.

———. 2004. New Hawaiian plant records for 2003. *Bishop Museum Occasional Papers* **79**: 8–20.

———. 2006. New Hawai'i plant records for 2004. *Bishop Museum Occasional Papers* **88**: 10–15.

———. 2007. New plant records from Moloka'i, Lāna'i, Maui, and Hawai'i for 2006. *Bishop Museum Occasional Papers* **96**: 17–34.

Staples, **G**.**W**. **& Herbst**, **D**.**R**. 2005. *A tropical garden flora: plants cultivated in the Hawaiian Islands and other tropical places.* Bishop Museum Press, Honolulu. 908 pp.

———., **Imada**, **C**.**T**. **& Herbst**, **D**.**R**. 2003. New Hawaiian plant records for 2001. *Bishop Museum Occasional Papers* **74**: 7–21.

Starr, **F**., **Starr**, **K**. **& Loope**, **L**.**L**. 2003. New plant records from the Hawaiian Archipelago. *Bishop Museum Occasional Papers* **74**: 23–34.

———., **Starr**, **K**. **& Loope**, **L**.**L**. 2004. New plant records from the Hawaiian archipelago. *Bishop Museum Occasional Papers* **79**: 20–30.

Wagner, **W**.**L**., **Herbst**, **D**. **R**. **& Sohmer**, **S**.**H**. 1990. *Manual of the flowering plants of Hawai'i.* University of Hawai'i Press and Bishop Museum Press, Honolulu. 1853 pp.

Zhang, **Z.-y.**, **Lu**, **A.-m.**, **& D'Arcy**, **W**. 2004. Solanaceae in Wu, Z.-y. & Raven, P.H. (eds.), *Flora of China*. Vol. 17. Verbenaceae through Solanaceae. Science Press (Beijing) & Missouri Botanical Garden (St. Louis). 378 pp.

Genetic variation in the endemic Hawaiian *Gardenia brighamii*: conservation and horticultural implications

SHELLEY A. JAMES (Pacific Center for Molecular Biodiversity & Hawaii Biological Survey, Bishop Museum, Honolulu, Hawai'i 96817-2704, USA; email: sajames@bishopmuseum.org)

Introduction

Gardenia brighamii (Rubiaceae – *nanu* or *n'au*) is one of three endemic *Gardenia* species in the Hawaiian Islands. The species was federally listed as endangered in 1985 (U.S. Fish and Wildlife Service, 1985), and with three populations totaling 11 mature individuals remaining in the wild on leeward sides of Lāna'i, and O'ahu (U.S. Fish and Wildlife Service, 2008), is considered in immediate danger of extinction. On Maui, the species is considered extirpated, and the last trees on Molokai were confirmed dead in 2005 (Perlman, 2006). Once an important component of lowland dryland forests on all the main Hawaiian Islands, the species is threatened by the loss of dryland forest habitat, urbanization, invasive plant species, and grazing and browsing domestic and feral animals.

Concern has been raised recently by managers of living collections and horticulturalists as to the identity of a "robust" form of *Gardenia brighamii* in cultivation that has larger flowers and glossy leaves in comparison to herbarium specimens and wild collected individuals in cultivation. Plant propagators have indicated that the robust form of *G. brighamii* more readily takes from cuttings than typical *G. brighamii*. The introduced *Gardenia* species, *G. taitensis* has a superficial resemblance to *G. brighamii* (e.g.,U.S. Fish and Wildlife Service, 1993), and this may have resulted in some taxonomic confusion. *G. taitensis* is highly variable throughout its range (Smith, 1974; Wagner *et al*. 1999b). Indeed, H. St. John (1978, 1979) described a new species, *Gardenia weissichii*, collected from the Ko'olau Mountains, O'ahu, that was later determined to be *G. taitensis* (Wagner *et al*., 1999).

Given the status of *Gardenia brighamii* as endangered or extinct on most of the main Hawaiian Islands, it is essential that the genetic variation within extant individuals of *G. brighamii* be determined and the identity of the robust form be confirmed. *Gardenia brighamii* has significant ornamental and horticultural value, and the robust form is particularly appealing to horticulturalists and landscape architects. This form has been widely distributed and is located in several living collections and botanical gardens. This study uses molecular fingerprinting techniques to help resolve this issue.

Materials and Methods

An initial study of the genetic variation in wild and commonly cultivated *Gardenia* species found in Hawai'i was undertaken in 2002 using the fingerprinting technique known as Randomly Amplified Polymorphic DNAs (RAPDs) (Williams *et al*., 1990). This study, reported here, indicated that a specimen of the robust form was intermediate in genotype between *Gardenia taitensis* and *G. brighamii*. Specimens of the robust and typ-