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RECORDS OF THE HAWAII BIOLOGICAL SURVEY FOR 2004–2005 Part 2: Notes

This is the second of 2 parts to the *Records of the Hawaii Biological Survey for 2004–2005* and contains the notes on Hawaiian species of plants and animals including new state and island records, range extensions, and other information. Larger, more comprehensive treatments are found in the first "Articles" part of this *Records* [*Bishop Museum Occasional Papers* 87].

New naturalized plant records for Kaua‘i and Hawai‘i

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The following contribution presents new records for the Hawaiian flora resulting from ongoing field surveys and collections, primarily from Kaua‘i. The following notes include new island and new state records for naturalized plants, and a revised key to *Spermacoce* (Rubiaceae) in Hawai‘i. Voucher specimens are housed in the herbarium of the National Tropical Botanical Garden (PTBG), with duplicates to be distributed as noted.

Pteridophytes
Dicksoniaceae
Dicksonia fibrosa Col. **New naturalized record**

A number of recently naturalized alien pteridophytes have been reported from Hawai‘i (Palmer 2002; Wilson 2003). This is, however, the first record of the genus *Dicksonia* being naturalized in the Hawaiian Islands, although *D. antarctica* Labillard. and *D. squarrosa* (G. Forst.) Sw. are cultivated on the Big Island (data from specimens at BISH). The golden tree fern or *wheki-ponga* is a slow growing fern that may eventually reach 6 m tall. The stipe bases fall with the fronds and the stout caudex enlarges as it becomes covered with a dense mass of fibrous, brownish red aerial roots. The fronds are 1.5–4.0 m long with stipe and rachis light to yellowish brown and smooth or only faintly roughened by the scale bases. Native to New Zealand, it is occasionally cultivated in Hawai‘i and has escaped from cultivation in one locality on the Big Island. Like our native *Cibotium* species (also Dicksoniaceae), *Dicksonia fibrosa* has a bivalvate indusium but differs in having the outer indusium valve not sharply differentiated from the lamina as in *Cibotium*. In the field *D. fibrosa* can be distinguished from other native (*Cibotium* spp.) and naturalized (*Cyathea cooperi*, syn. *Sphaeropteris cooperi*) tree ferns in Hawai‘i by its massive trunk 30–60 cm dia., covered by a dense mass of fibrous roots, brown stipe hairs, and more numerous fronds (20–30 or more).

Material examined. **HAWAI‘I**: South Hilo Distr, Keolahou, remnant *koa-‘ōhi‘a* forest with

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alien plantings, 1750 m. Terrestrial fern, caudex erect, 30 x 30 cm, fronds densely clustered, to 2 m long, pinnae 25–30 pairs, stipe hairs brown. Naturalized locally from several cultivated plants, about 12 seen. 19 Mar 2005, *D. Lorence et al. 9445* (BISH, PTBG, US).

The following key separates the native and naturalized tree fern genera in Hawai‘i:

1. Stipe when young covered by scales of two types (larger and smaller) with red-brown marginal spines; indusium lacking ... *Cyathea (Sphaeropteris) cooperi*
1. Stipe when young covered with hairs; indusium present, bivalvate ... 2

2. Leaf blades scarcely or not tapered basally, the basal pinnae little or not reduced; outer valve of indusium distinctly differentiated from the lamina to which it is attached ... *Cibotium*
2. Leaf blades gradually narrowed and tapered basally, the pinnae gradually reduced; outer valve of indusium not sharply differentiated from the lamina to which it attached ... *Dicksonia*

Monocots

Araceae

Dieffenbachia maculata (Loddiges) G. Don **New naturalized record**

This species is commonly cultivated in Hawai‘i as a house or garden plant for its attractive spotted leaves. The common name “dumb cane” alludes to the fact that if the plant tissue is chewed, the sap makes the mouth and tongue swell, rendering speech impossible. It is sparingly naturalized along this region of the Lawa‘i Stream, reproducing vegetatively and possibly also from seed.

Material examined. **KAUA‘I**: Kōloa Distr, Lawa‘i Stream valley below old pineapple cannery on Lauoho Rd, at south end of Lehelehe Rd, upper NTBG property; secondary forest, 336–350 ft [110–115 m], 21º54'50"N, 159º30'27"W, *Lorence 9076* (BISH, PTBG), *Lorence 9456* (BISH, PTBG, US).

Dicots

Aizoaceae

Trianthema portulacastrum L. **New island record**

Previously recorded from O‘ahu (Honolulu International Airport to Honolulu) and West Maui (Launiupoko), this is the first record of this prostrate herbaceous species from Kaua‘i.

Material examined. **KAUA‘I**: Kōloa Distr, Coffee field below (S of) Niho Road. Abundantly naturalized from crushed cinder road fill, 22 Sep 2003, 120 m, 21º54'00"N, 159º31'00"W, *Lorence 9168* (BISH, BR, MO, NY, PTBG, US).

Asteraceae

Dyssodia tenuiloba **New island record**

Previously recorded from O‘ahu and West Maui, this annual herb with yellow flowers occurs as a roadside weed at this locality on eastern Kaua‘i.

Material examined. **KAUA‘I**: Kawaihau Distr, Kapa‘a bypass road, roadside weed, 1 Apr 2005, *E. Pickup s.n.* (BISH, NY, PTBG, US).

Fabaceae (Mimosoidae)

Inga sertulifera DC. subsp. ***leptopus*** (Benth.) T. D. Penn. **New naturalized record**

This is the first record of the genus *Inga* Miller being naturalized in the Hawaiian Islands. It differs from other native and naturalized mimosoid legumes in Hawai‘i by the following characters: once-pinnate leaves with 2(–3) pairs of elliptic leaflets to 11.5 x 6.5 cm,

the base with unequal sides; foliar nectaries on upper surface of narrowly winged rachis between the petiolules; thin-walled soft, fleshy pods 10–18 x 3 cm with expanded, longitudinally ribbed margins; soft, cottony white pulp surrounding the seeds; and ellipsoid seeds 25 x 15 mm with green cotyledons, often germinating in the fallen pods. This species was found to be abundantly naturalized locally in a valley covering about one acre, apparently spreading from a large parent tree. Efforts are currently underway to eradicate the population. *Inga sertulifera* subsp. *leptopus* is native to from Costa Rica and Panama to Peru (Pennington 1997).

Material examined. **KAUA'I**: Kōloa Distr, Lawa'i Stream valley below old pineapple cannery on Lauoho Rd, at south end of Lehelehe Rd, upper NTBG property; secondary forest along stream, 336–350 ft [110–115 m], 21º54'50"N, 159º30'27"W. Seedlings regenerating under tree 15 m tall, 1.8 m dbh, bark flaking, leaves glossy above, 5 May 2005, *Lorence et al. 9455* (PTBG); *Lorence 9072* (PTBG).

Macroptilium atropurpureum (DC) Urb. **New island record**

Previously reported as naturalized on O'ahu, Maui, Hawai'i, and Moloka'i (Wagner *et al.* 1990; Oppenheimer 2003), *M. atropurpureum* is now reported from Kaua'i. Despite no prior collections it is quite common in secondary, roadside vegetation across the island.

Material examined: **KAUA'I**: Kawaihau Distr, along Hwy 56 near mile marker 18. Secondary vegetation, 280 ft [92 m], 14 Apr 2005, *T. Flynn 7238* (PTBG)

Malvaceae

Heritiera littoralis Dryand. **New naturalized record**

Widely cultivated as a street tree in the Hawaiian Islands (Staples & Herbst 2005), the Looking-glass tree is found naturally throughout many parts of the tropics, growing in lowland coastal or mangrove forests. Usually small trees of no more than 20 ft [6 m], they are easily identified by the alternate leaves that are dark glossy green above and silvery-gold below with brownish peltate scales and by the distinctive woody fruit. The indehiscent, ovate-elliptic fruit are about 7 cm long, somewhat flattened dorsoventrally and bisected by a narrow wing (more prominent on the upper side) encircling the fruit.

Material examined: **KAUA'I**: Hanalei Distr, Haena State Park. Along Hwy 51 just past Limahuli Stream. Secondary forest *of Cinnamomum, Syzygium cumini, Syzygium jambos,* pothos, and *Alpinia* spp., ca 40 ft [13 m], 19 Jun 2004, *T. Flynn 7122* (BISH, NY, PTBG, US).

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

Previously reported as naturalized on the island of Hawai'i (Wagner *et al*. 1990), *S. micranthum* is now also known from the Māhā'ulepū area of southern Kaua'i.

Material examined: **KAUA'I**: Kōloa Distr, Māhā'ulepū, in pasture lands behind Haula Aweoweonui. "Wetland" depression, ca 80 ft [26 m], 8 Oct 2002, *T. Flynn 7108* (BISH, PTBG, US).

Malpighiaceae

Hiptage benghalensis (L.) Kurz **New naturalized record**

Although known to be naturalized on Kaua'i since at least 1995, when it was found in the Hoary Head range between Omoe and Lā'aukahi, no naturalized record has ever been published for this species. At present, *H. benghalensis* is estimated by the Kaua'i Invasive Species Committee (KISC) to cover some 500 acres [202 ha] of land along the Hulē'ia, Puhi, and Hoinakaunalehua streams in SE Kaua'i. It is also on the adjoining N flank of the Hoary Head range below Hōkūlei and Hokonui peaks. *Hiptage* was formerly cultivated at the National Tropical Botanical Garden and Olu Pua Botanic Garden, both in Kalāheo. Plants at the NTBG have long been removed, but *Hiptage* may still exist in and around Olu Pua, which is now a private estate.

Material examined: **KAUA'I**: Lihue Distr, Puhi, along Hwy 50 across from Kaua'i Nursery and Landscaping. Secondary vegetation, 280 ft [85 m], 2 Apr 2004, *T. Flynn 7117* (AD, BISH, MO, NY, PTBG, US).

Rosaceae

Prunus campanulata Maxim. **New naturalized record**

Prunus campanulata differs from other native and naturalized Rosaceae in Hawai'i in being a glabrous tree to 10 m tall with smooth purple-brown bark, leaves with elliptic blade to 11 x 8 cm with double serrate margins, petioles to 18 mm long with pair of glands distally, long lacinately divided stipules (especially on vegetative shoots), flowers campanulate, in 5–6-flowered umbels, pedicels to 3 cm long, calyx tube campanulate, rose or red, the lobes triangular-ovate, the petals purple-pink or scarlet, 8 x 7 mm, emarginated, and fruits ovoid, 15 mm long, red when ripe. Known as the Taiwan Cherry or Formosan Cherry, this species is becoming naturalized especially along roadsides in mesic *Acacia koa* forest areas of Kaua'i at ca 1000–1100 m, apparently spreading from cultivated trees.

Material examined. **KAUA'I**: Waimea Distr, Koke'e State Park, Faya Rd, numerous seedlings along roadside, 28 Apr 1997, *Flynn & Lorence 6149* (BISH, PTBG); Pu'u ka Pele lookout, tree with green fruits, naturalized, 11 Apr 2005, *J.H.R. Plews s.n. A* (PTBG); Halemanu Rd, second house along rd, Wayne Jacinto's yard, tree 15 ft [5 m] tall with shiny fissured bark, flowers bright purple pink, fruit dark red, 11 Apr 2005, *J.H.R. Plews s.n. B* (PTBG).

Rubiaceae

Spermacoce

Spermacoce L. is a taxonomically complex genus of herbs whose differentiating features are often found in minute but reliable characters of calyx lobes and mature seeds. However, a dissecting scope with micrometer is usually required to measure and differentiate these characters. As noted by Oppenheimer (2003: 23) misidentifications are common. For example, Lorence *et al*. (1995: 51–52) misidentified *S. prostrata* Aubl. as *S. ovalifolia* (M. Martens & Galeotti) Hemsl., a species that does not occur in Hawai'i. A specimen from Honaunau, Hawai'i (*Kami "a",* US) identified as *Spermacoce capitata* Ruiz & Pavon on the Flora of the Hawaiian Islands website is actually *S. exilis* (http://ravenel.si.edu/botany/pacificislandbiodiversity/hawaiianflora/index.htm).

Furthermore, a number of *Spermacoce* species are troublesome crop and garden weeds in the state. For these reasons a revised key to the species naturalized in Hawai'i is provided below to replace the key in Lorence *et al*. (1995).

A revised key to *Spermacoce* species naturalized in the Hawaiian Islands:

1. Mature seed surface with deep transverse grooves, the surface between grooves foveolate ... *S. assurgens*
1. Mature seeds with surface variously sculptured but not transversely grooved ... 2

2(1). Calyx lobes consistently 2 ... *S. exilis*
2. Calyx lobes 4 (occasionally 2–3 in some flowers of *S. prostrata*) ... 3
3(2). Leaves, at least the lower ones, distinctly petiolate with petioles 5–10 mm long; corolla tube c. 4–5 mm long; capsule (excluding calyx) 2.5–3.0 mm long; seeds 2.0–2.6 mm long ... *S. latifolia*
3. Leaves sessile or the lower ones with petioles 1–3 (5) mm long; corolla tube 0.5 mm long; capsule (excluding calyx) 1–2 mm long; seeds 0.7–1.8 mm long ... 4

4(3). Calyx lobes 4 (occasionally 2–3 in some flowers), 0.5–0.7 mm long, deltate to narrowly deltate with green midrib and broad pale margins; capsule 1.0–1.1 mm long; seeds 0.7–0.9 mm long, deep purplish-brown, dorsal surface with fewer than 8 vertical rows of deep, circular-rimmed pits ... *S. prostrata*

4. Calyx lobes 4, 0.4–1.1 mm long, narrowly deltate to linear-subulate with green midrib and narrow pale margins; capsule 1.2–2.0 mm long; seeds 1–1.8 mm long, chestnut to purplish-brown, dorsal surface with more than 10 vertical rows of minute, shallow pits ... *S. ovalifolia*

Theaceae

Camellia sinensis L. **New naturalized record**

The tea plant is the first record of a member of the Theaceae family being naturalized in Hawai‘i. At the Koke‘e site it is abundantly naturalized locally, apparently spread from plants cultivated in cabin lot yards. It differs from the only native (endemic) member of the family, *Eurya sandwicensis* A. Gray, in having much larger bisexual flowers opening to 20–25 mm dia., white petals and petaloid stamens, and brown capsular fruit 15–25 mm in dia. splitting to reveal 2–3 large seeds 10 mm long. Flowers in *Eurya sandwicensis* are unisexual, small, opening to 5–7 mm in dia. with white or yellow petals, and fruit a dark bluish black berry 7–10 mm dia. with numerous small seeds.

Material examined. **KAUA‘I**: Waimea Distr, Koke‘e State Park, along Pu‘u Ka ‘Ōhelo trail, near Camp 10/Mōhihi/Kumuwela Rd, near cabin house site 40 (TMK 1-4-04-5), 22º8'N, 159º39'W, degraded *Acacia koa* mesic forest. Shrubs to 2 m tall, abundantly naturalized locally, *J. Plews s.n. A* (PTBG), *J. Plews s.n. B* (PTBG), *J. Plews s.n. C* (PTBG).

Acknowledgments

We thank George Staples (Bishop Museum) for identifying the *Sidastrum* and Keren Gunderson of the Kaua‘i Invasive Species Committee (KISC) for supplying the acreage of the *Hiptage* population. Identification of *Inga* was kindly provided by Roy Gereau of the Missouri Botanical Garden and Carolina Romero of the Universidad Nacional de Colombia—Bogota.

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New Hawaiian Plant Records for 2004[1]

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These previously unpublished Hawaiian plant records report 3 new state records, 3 new island records, and 2 new naturalized records that affect the flora of Hawai'i. All identifications 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.

Asclepiadaceae

Cryptostegia madagascariensis Decaisne **New naturalized record**

Field surveys by Moloka'i Invasive Species Committee personnel discovered a naturalized population of this Madagascan native along the south shore of Moloka'i, near Kamalō. Widely cultivated throughout the Hawaiian Islands for over a century, this is the first documented report of the Madagascar rubber vine being naturalized here. The population is reported to cover three acres of disturbed secondary vegetation near sea level, with thousands of plants in all size classes from seedlings to mature specimens.

According to the most recent revision of *Cryptostegia* (Marohasy & Forster 1991), there are only 2 species, both endemic to Madagascar and widely cultivated elsewhere. Both species are usually identified as *C. grandiflora* R. Br., but nearly all Hawaiian cultivated plants proved on careful inspection to be *C. madagascariensis*. The latter species can be distinguished by: stems with few, prominent, light-colored lenticels; leaf blades with 14–16 pairs of secondary veins; flowers with corolla 3.0–3.5 cm long; corona filaments entire (not bifid); and fruits that are spindle-shaped, 5.5–9.5 cm long.

Material examined. **MOLOKA'I**: South shore, Kamalō, at bridge, just past KSBE Quarry on ocean side of Kamehameha V Hwy, ca 21°04'N, 156°53'W, 5 Feb 2004, *L. Buchanan s.n.* (BISH 705004).

Commelinaceae

Tradescantia fluminensis Vellozo **New naturalized record**

Variegated cultivars of *T. fluminensis* have been grown as ornamentals in the Hawaiian Islands for many years, but recently a form with dark green, non-variegated leaves has been found naturalized in sites on two islands. Plants have been found in shaded, moist situations along stream banks, and in shaded forest edges where they carpet the ground, forming a dense mat. The plants appear to be spreading vegetatively. This species was not listed as potentially invasive in the Hawaiian Islands (Staples *et al*. 2000) but 3 other taxa of Commelinaceae were included, all on the basis of their vegetative spread. It seems unlikely that *T. fluminensis* would be seriously invasive or capable of causing harm, but the naturalized plants should be eradicated before they spread.

Native to SE Brazil and N Argentina and widespread in cultivation, *T. fluminensis* is a sprawling herb with stems 1–2 m long that root at the nodes, the tips upturned, bearing alternate, dark green (or variegated white, pinkish, or golden yellow in cultivars) leaves

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with a sheathing base, fringed-hairy along the margin of the sheath, and paired inflorescences in the axils of the uppermost leaves. The inflorescences have 2 boat-shaped bracts from which a cluster of white, 3-parted flowers emerges; the 6 anthers have long-hairy filaments and the stigma is knob-shaped. The non-variegated form is more vigorous than the variegated ones, growing more rampantly and flowering more frequently. Like most Commelinaceae, the flowers of *T. fluminensis* are ephemeral, lasting but a few hours and liquefying as they fade.

Material examined. **MAUI**: Makawao Distr, Pu‘u Mahoe, 20°37'N, 156°23'W, 800 m, 6 Apr 2002, *H. Oppenheimer et al. H-40202*. **HAWAI‘I:** Kamuela, along banks of Waikoloa Stream near Waimea-Kawaihae Rd bridge, 20°01'N, 155°40'W, ca 650 m, 23 May 2000, *D. Herbst 9877;* North Kohala Distr, Bond Historical Distr E of Kapa‘au, adjoining Pali Akamoa Gulch, 20°13'N, 155°47'W, 200 m, 1 Sep 1999, *Imada & Arakaki 99-48.*

Fabaceae

Vigna hosei (Craib) Backer **New state record**

This is the first report for this legume in the state. It is believed that *V. hosei* was introduced to the Islands from Australia more than twenty years ago for testing as cover crops (G. Sakamoto, pers. comm.). Plants were observed in 1999 in a pineapple field off Kaukonahua Road, where the vines trailed along the ground and spread over the pineapple crop in the field. In January 2005 there were still thriving populations in the same location as well as in old pineapple fields past Schofield Barracks on Wilikina Rd, and possibly another location nearer Waialua in fields opposite Hukilau Loop. The species appears to be established and is now expanding its range, perhaps aided by farming machinery.

Vigna hosei is similar to *V. luteola* and *V. marina*; it can be distinguished by the following features: prostrate or twining perennial vine, all parts pubescent with spreading hairs; leaflets mostly rounded and obtuse (rarely acute); flowers 0.5–1.0 cm, yellow-orange; peduncles filiform; legumes short, 1- or 2-seeded; seeds ca 5 mm long (Howard 1988: 533–534). Although first described from plants cultivated in Indonesia, Verdcourt (1971: 621) theorized that *V. hosei* was actually of African origin. The species is cultivated in various tropical countries as a cover crop (Marechal *et al*. 1978) and that may be why it was introduced to the Hawaiian Islands.

Material examined. **O‘AHU**: Waialua Distr, SE of Poamoho Experiment Farm, off Kaukonahua Rd in pineapple field, 23 Jun 1999, *G. Taniguchi s.n.* (BISH 657223).

Zornia J. Gmelin

Two species of the genus *Zornia* have recently appeared in the Hawaiian Islands, the one reported here from O‘ahu and a second, as yet not conclusively identified, collected on Maui in 2000. There are no previous reports of the genus in cultivation (Neal 1965, St. John 1973) or as a naturalized element of the Hawaiian flora (Wagner *et al.* 1999).

The genus *Zornia* is taxonomically difficult and the keys for identification in the latest revision of the genus do not work particularly well (Mohlenbrock 1961). There is no one currently engaged in taxonomic study of the genus (G. Lewis, pers. comm. 2005). Collectors are urged to look out for taxa of *Zornia*, which may well be more widespread in the Hawaiian Islands than realized.

Zornia gemella (Willd.) Vog. **New state record**

Zornia gemella has been collected twice from O‘ahu. Both specimens were collected from open grasslands on rocky substrate. Plants are sprawling herbs with a deep taproot, occasional in mixed alien-dominated grasslands with *Panicum maximum.* A full description of

the species, with diagnostic features of the legume illustrated, can be found in Mohlenbrock (1961). It is native to tropical America from southern Texas to Paraguay (Mohlenbrock 1961). How it came to be present in a field in Makakilo is unknown.

Material examined. **O'AHU**: 'Ewa Distr, upper Makakilo, adjacent to Palehua Heights subdivision, at end of Pueonani St, 21°22.024'N, 158°04.588'W, 670 ft [185 m], 9 Mar 2004, *C. Imada & L. Crago 2004–29;* ibid., on slope above Kalo'i Gulch, 21°22.38'N, 158°05.013'W, 1007 ft [307 m], 30 Mar 2004, *C. Imada & L. Crago 2004–32*.

Piperaceae

Piper auritum Kunth **New state record**

False sakau is now a widespread weed in the Pacific and there is concern that it could become so in the Hawaiian Islands as well. *Piper auritum* is known to be cultivated in botanical gardens on Kaua'i and O'ahu and has also been documented in cultivation from Maui and Hawai'i islands. The following specimens document its spread out of cultivation and its naturalization on two islands; it is to be expected that it will become naturalized everywhere it has been planted. Vigorous control measures are in order to prevent this aggressive weed from spreading beyond the few places where it is now established. Both O'ahu populations are reported to be spreading rapidly from cultivated sources.

Native to tropical America, *P. auritum* is a vigorous herb that reaches 2 m or more in height from a suckering root system that spreads laterally through the soil. Leaves are large (to 50 cm long), horizontal and in 2 rows along the stem, the blades cordate with a deeply lobed, unequal-sided base and finely ciliate margins, on winged petioles to 6 cm long. Inflorescences are whitish or greenish spikes to 25 cm long, erect or drooping, borne singly opposite the leaves. Fruits are tiny, 3-angled, and densely packed on the fruiting axis. All parts of the plant have a sarsaparilla odor (smells like root beer) when bruised.

Material examined. **KAUA'I**: Kōloa Distr, Kahili Mountain Park, behind Cabin #11, 220 m, 4 Apr 2001, *D.H. Lorence & B. Stevens 8521*. **O'AHU**: Honolulu Distr, Kalihi Valley, lot at 3043 Numana Rd, 21 Jul 2004, *T. Takemoto s.n.* (BISH 712562); Ko'olau Poko Distr, Kahalu'u, residential backyard near highway, 15 Dec 2004, *N. Matayoshi s.n.* (BISH 713184, 713196).

Solanaceae

Physalis angulata L. **New island record**

First documented in the Hawaiian Islands in 1976 from Kaua'i (Wagner *et al*. 1999), this weedy alien species has quickly spread to other islands and become locally common in some places where it occurs. The following voucher documents its presence on Moloka'i.

Material examined. **MOLOKA'I**: locality not stated, in open pasture, ca 50 m, Feb 1997, *V. Caraway 150*.

Theaceae

Camellia sinensis (L.) Kuntze **New island record**

Tea has been cultivated in the Hawaiian Islands for over a century, experimentally as a commercial crop and as a home garden ornamental. Lorence & Flynn (this issue) recorded the first record of it being naturalized in the state (on Kaua'i). The record below marks the first naturalized record of *C. sinensis* on the island of Hawai'i. In Hauani Gulch *C. sinensis* is a dominant middle-story tree, with abundant plants present in all size classes.

Material examined. **HAWAI'I**: Kamuela, E of commercial center in Hauani Gulch above Pu'u Kakanihia, 20°2.08'N, 155°38.7'W, 900 m, 26 Sep 2004, *C. Imada et al. 2004-54.*

Zingiberaceae

Hedychium gardnerianum Ker-Gawler **New island record**

Although known to be established on the islands of Kaua‘i, Lāna‘i, Maui, and Hawai‘i (Wagner *et al*. 1999), kahili ginger has never been documented from O‘ahu as a naturalized plant. The following two specimens record its presence in Mānoa Valley in wet, mixed alien disturbed forest.

Material examined. **O‘AHU**: Honolulu Distr, Mānoa Valley, along Mānoa Cliff Trail, 13 Jan 1996, *B. Kennedy et al. 42;* ibid., 21°20.059'N, 157°48.61'W, 530 m, 15 Dec 2004, *C. Imada et al. 2004–58.*

Acknowledgments

We thank G.P. Lewis (K) for determination of the first *Zornia* specimen collected in the Hawaiian Islands. Hank Oppenheimer graciously allowed us to include his *Tradescantia* collection in this paper, making it possible to assemble all relevant voucher specimens for the taxon. Tina Lau, The Nature Conservancy, Moloka‘i Office, made the specimen of *Cryptostegia* and field observations available to us. Glen Taniguchi (University of Hawai‘i at Mānoa, Honolulu) collected the *Vigna hosei* voucher and Becky Azama (Hawaii Department of Agriculture, Plant Pest Control Branch) researched the history of its introduction and verified that it survives on the North Shore of O‘ahu.

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New Hawai‘i Plant Records for 2004

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Ongoing surveys, collections, and research continue to reveal new records for the Hawaiian flora. In this paper, 4 new naturalized records, 15 new island records, and 1 range extension are documented. A total of 20 taxa in 16 plant families are discussed. Collections were made on the islands of Moloka‘i, Maui, and Kaho‘olawe. Voucher specimens are deposited at the Bishop Museum *Herbarium Pacificum* (BISH), with duplicates at the National Tropical Botanical Garden (PTBG), Lawa‘i, Kaua‘i. In a few cases a specimen may be at only one facility; in only these cases will the herbarium acronym be cited.

Apocynaceae

Ochrosia compta K. Schum. **New island record**

Found years ago by Bob Hobdy, this single tree has never been observed in a fertile state. Recently, following his directions, it was relocated and flowering material collected. The tree does not appear to be setting fruit, as all flowers fall from the inflorescence; an extensive search of leaf litter for fruit or seeds also failed. The flowers were not at all fragrant (in late afternoon), which may possibly explain the lack of pollination and seed production. This species was previously recorded from O‘ahu and Moloka‘i (Wagner *et al*. 1999: 218).

Material examined. **MAUI**: West Maui, Wailuku Distr, Kahakuloa, N tributary of Waihali Gulch, 463 m, single 5-m tree, 6 Oct 2004, *Oppenheimer H100403*.

Araceae

Syngonium podophyllum Schott **New naturalized record**

One of the most common of the climbing aroids in Hawai‘i is often observed to be persisting around old home sites in areas where formerly cultivated. After years of such neglect, it is capable of smothering adjacent vegetation and sprawling across large areas, forming a dense patch. It is also found where discarded yard waste roots, as it is easily propagated, intentionally or not, from small pieces of stem. Neal (1965: 163) states that this tropical American species rarely or never flowers. Recently a population was found that not only flowered, but was producing copious fruit. Eighteen seeds were collected from just one of these fleshy fruits; 16 seedlings germinated in approximately 30 days. The young leaves are simple and variegated as opposed to mature plants with palmately divided, concolorous leaves, but these juvenile characteristics may possibly be attributed to a certain cultivar. The bright red fruit would be attractive to frugivorous birds, especially when up in the canopy. Staples *et al*. (2000: 16) listed this species as being dispersed vegetatively, and questionably also via birds. *Syngonium* is a genus of about 33 climbing tropical American species (Whistler 2000: 437).

Material examined. **Maui**: West Maui, Lahaina Distr, Honokohau Valley, 18m, climbing alien vegetation and sprawling on ground, 14 Aug 2003, *Oppenheimer, R. Bartlett, & G. Hansen H80307*.

Asteraceae

Calyptocarpus vialis Less. **New island record**

Probably on all of the main islands but documented only from Midway Atoll (Bruegmann 1999: 1), Kaua‘i, O‘ahu, Moloka‘i, Lāna‘i, and Maui (Wagner *et al*. 1999: 284), this common perennial herb is now known from Kaho‘olawe.

Material examined. **KAHO‘OLAWE**: Honokanaia, 3 m, at base camp, 20 Jan 2004, *Oppenheimer, G. Hansen, & J. Bruch H10402*.

Bromeliaceae

Tillandsia caput-medusae C. J. Morren **New naturalized record**

No Bromeliaceae (Liliopsida) have been previously reported as naturalized in the Hawaiian Islands. However, Staples *et al*. (2000: 19) listed *Tillandsia* species (there are 400 species plus hybrids) as potentially invasive, dispersing via wind and reproducing vegetatively as well. *T. caput-medusae* is native to Mexico and Central America. In 1995, a cultivated specimen of this species set fruit, and seeds were dispersed by wind (Fern Duvall, pers. comm.). Efforts have been made several times since then to remove all of the young plants, growing epiphytically on nearby cultivated *Acacia*, *Dodonaea*, and *Metrosideros*. Many species of *Tillandsia* are currently being sold in local stores, sometimes advertised as “Hawaiian air plants”. One major supplier is a nursery in Hāmākua on the Big Island, and escapes should be searched for in the area. Two other species have been reported to escape cultivation on O‘ahu (G. Staples, pers. comm; F. Duvall, pers. comm.) There are relatively few obligate epiphytes in the naturalized Hawaiian flora, but this seems to be changing (see also *Vanda* below).

Material examined: **MAUI**: East Maui, Makawao Distr, Olinda, 1082 m, 24 Mar 2001, *Oppenheimer & F. Duvall H30139*.

Convolvulaceae

Ipomoea triloba L. **New island record**

Naturalized at low elevations on Midway Atoll, Kaua‘i, O‘ahu, Maui (Wagner *et al*. 1999: 559–560), and Hawai‘i (Oppenheimer & Bartlett 2002: 6), little bell has recently been collected on Moloka‘i .

Material examined. **MOLOKA‘I**: Kaunakakai, in waste area west of town, 50 m; plants sprawling, flowers purple, closed in afternoon, 2 Apr 2004, *Oppenheimer H40405*.

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

Commonly cultivated and sparingly naturalized on Kaua‘i, O‘ahu, Maui, and Hawai‘i (Wagner *et al.* 1999: 564), wood rose also occurs on Moloka‘i. It was observed to be spreading into cleared areas between forestry plantings.

Material examined. **MOLOKA‘I**: Kaunakakai, 650 m, locally abundant in cleared area between *Eucalyptus* plantings at Forestry Barracks; plants climbing & sprawling, forming dense patches, 31 Mar 2004, *Oppenheimer H30417*.

Crassulaceae

Bryophyllum fedtshenkoi **New island record**

(Raym.-Hamet & H. Perrier) Lauz.-March.

Previously reported from Kaua‘i (Lorence *et al*. 1995: 34) this commonly cultivated succulent has also been found growing wild on Maui. The population vouchered seems to have started from discarded garden waste, along with *B. tubiflorum*. Although seeds have not yet been observed, it spreads vegetatively via plantlets on the leaf margin, and is able to propagate itself from even a single detached leaf or small piece of stem. The change in taxonomy from *Kalanchoë* was reported by Staples *et al*. (2002: 9).

Material examined. **MAUI**: West Maui, Wailuku Distr Wailuku, 61 m, sprawling, succulent plants on consolidated sand dunes, 4 Apr 2003, *Oppenheimer H40301* (BISH).

Cyperaceae

Cyperus compressus L. **New island record**

This pantropical species is naturalized in disturbed, moist sites on Hawai‘i Island (Wagner *et al*. 1999: 1395) and Maui (Wagner & Herbst 1995: 18). Now it is known from Moloka‘i as well.

Material examined. **MOLOKA‘I**: Kaunakakai, locally common in disturbed area near reservoir along Forestry Rd, 550 m, 2 Apr 2004, *Oppenheimer H40402.*

Cyperus meyenianus Kunth **New island record**

[syn. *Mariscus meyenianus* (Kunth) Nees]

Naturalized on the islands of Kaua‘i, O‘ahu (Wagner *et al*. 1999: 1420–1421), Moloka‘i (Hughes 1995: 4), and Hawai‘i (Oppenheimer 2003: 10), the change in taxonomy was reported by Wagner *et al*. (1999: 1900). This sedge was recently found on Maui growing in the shade of remnant trees in an area formerly grazed and trampled by feral cattle & pigs.

Material examined. **MAUI**: West Maui, Wailuku Distr, near rim of gulch E of Pohakea, 1036m, 14 May 2004, *Oppenheimer & G. Hansen H50406*.

Moraceae

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

First documented as naturalized on Maui (Oppenheimer & Bartlett 2000: 6) and subsequently found on the Big Island (Starr *et al*. 2002: 21) the Moreton Bay fig was noted to be growing epiphytically and terrestrially among forestry plantings on Moloka‘i.

Material examined. **MOLOKA‘I**: Kaunakakai, epiphytic on *Eucalyptus robusta* and germinating on mossy logs, 880m, 31 Mar 2004, *Oppenheimer H30415*.

Orchidaceae

Habenaria rodeiensis Barb. Rodr. **Range extension**

Originally known from a single collection made in a pasture in Kula, East Maui (Wagner *et al*. 1999: 1468); it was later identified as this species (Herbst & Wagner 1999: 24). Recent collections on West Maui confirm its naturalized status on the island and represent a significant range extension.

Material examined. **MAUI**: West Maui, Wailuku Distr, Kahakuloa, 594 m, uncommon & scattered in formerly bulldozed area now *Andropogon* grassland, 9 Sep 2003, *Oppenheimer, B. Stevens, J. Jokiel, & G. Hansen H90303*; Lahaina Distr, Honokohau/Manienie divide, 317 m, scattered plants, 7 Oct 2003, *Oppenheimer H100302* (BISH); Honokahua, S of Valley on open ridgetop in *Andropogon* grassland, 384 m, 10 Jun 2004, *Oppenheimer & G. Hansen H60402* (BISH).

Vanda tricolor Lindley **New naturalized record**

This species is native to Java (Bailey & Bailey 1930: 752), and used extensively by the orchid industry in Hawai‘i to make hybrids. *Vanda* is a genus of about 70 epiphytic Old World species. Recently this species was found nearly smothering an *Antidesma platyphyllum* tree, with masses of aerial roots. It is also sparingly naturalized in the Ha‘iku area of East Maui, where it grows on *Eucalyptus* (J. Parker, pers. comm.). The inflorescence is axillary, with fragrant flowers about 6 cm across, spotted white and purple.

Material examined. **MAUI**: West Maui, Lahaina Distr, E flank of Honolua peak, in *Metrosideros* Lowland Wet Forest, 616m, 30 Nov 2004, *Oppenheimer & G. Hansen H110413* (BISH).

Poaceae

Eragrostis pectinacea (Michx.) Nees **New island record**

Carolina lovegrass has been documented from O‘ahu, Moloka‘i, Maui, and Hawai‘i (Wagner *et al*. 1999: 1538; Lorence *et al*. 1995: 45; Herbst & Clayton 1998: 27). Recently it has been collected from Kaho‘olawe.

Material examined. **KAHO‘OLAWE**: Honokanaia, 6 m, at base camp, 20 Jan 2004, *Oppenheimer, G. Hansen, & J. Bruch H10404*.

Setaria palmifolia (J. König) Stapf **New island record**

Palmgrass was known from the islands of O‘ahu, Maui, and Hawai‘i (Wagner *et al.* 1999: 1592–1593). On Moloka‘i, it may be restricted to a small area; if so, it should be eradicated before it spreads.

Material examined. **MOLOKA‘I**: Kaunakakai, 900 m, at intersection of Forestry Rd and rd to Pu‘u Kauwa, couple of small patches in *Eucalyptus* plantings, 31 Mar 2004, *Oppenheimer H30414*.

Polygalaceae

Polygala paniculata L. **New island record**

Previously known to be naturalized on O‘ahu, East Maui, and Hawai‘i (Wagner *et al*. 1999: 1058), and subsequently reported from Kaua‘i (Lorence *et al*. 1995: 48) and West Maui (Oppenheimer *et al*. 1998: 10), *P. paniculata* has recently been collected on Moloka‘i.

Material examined. **MOLOKA‘I**: Kaunakakai, locally common along Forestry Rd, 600 m, 2 Apr 2004, *Oppenheimer H40401*.

Polypodiaceae

Phymatosorus scolopendria (Burm.f.)Pic. Serm. **New naturalized record**

Palmer (2003: 205), in his discussion regarding *Phymatosorus grossus* (Langsd. & Fisch.)Brownlie, noted that *P. scolopendria* had not been collected in the wild in Hawai‘i, implying that it is cultivated here. Recently, specimens from wild plants were collected, growing epiphytically on common guava in a gulch in disturbed Lowland Wet Forest. There was no terrestrial *P. grossus* anywhere nearby. Another population was later found growing in identical conditions.

Material examined. **MAUI**: West Maui, Lahaina Distr, Pohakupule Gulch, 366 m, epiphytic, leaves fragrant when crushed, uncommon in Lowland Wet Forest, 15 Aug 2003, *Oppenheimer & G. Hansen H80308* (BISH).

Portulacaceae

Portulaca oleracea L. **New island record**

In Hawai‘i, naturalized on Midway Atoll, Pearl and Hermes Atoll, Laysan, French Frigate Shoals, Nihoa, and all the main islands except Kaho‘olawe (Wagner *et al.* 1999: 1072), where it has recently been collected.

Material examined. **KAHO‘OLAWE**: Honokanaia, 3 m, at base camp, 20 Jan 2004, *Oppenheimer, G. Hansen, & J. Bruch H10403*.

Rubiaceae

Richardia brasiliensis Gomes **New island record**

Naturalized in the Hawaiian Islands on Kaua‘i, O‘ahu, Lāna‘i, East Maui, and Hawai‘i (Wagner *et al*. 1999: 1171), *Richardia brasiliensis* has been collected recently on Moloka‘i.

Material examined. **MOLOKA‘I**: Kaunakakai, 500 m, uncommon along Forestry Rd, 500 m, 2 Apr 2004, *Oppenheimer H40404*.

Scrophulariaceae

Veronica serpyllifolia L. **New island record**

Naturalized on the islands of Kaua‘i, Lāna‘i, Maui, and Hawai‘i (Wagner *et al*. 1999: 1250–1251; Nagata 1995: 13; Starr *et al*. 2003: 32), thyme leaved speedwell has recently been collected on Moloka‘i. It was noted to be scattered from the Forestry barracks to Pēpē‘ōpae trailhead and especially abundant near the Waikolu Valley overlook and picnic area.

Material examined. **MOLOKA‘I**: common herb in lawn at Waikolu overlook, 1100 m, 31 Mar 2004, *Oppenheimer H30413*.

Urticaceae

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

Known to be naturalized in Hawai‘i on Midway Atoll, Kaua‘i, O‘ahu, Lāna‘i, Maui, and Hawai‘i (Wagner *et al*. 1999: 1306; Wagner & Herbst 1995: 26; Shannon & Wagner 1996: 14; Oppenheimer & Bartlett 2002: 12), artillery plant was recently collected on Moloka‘i.

Material examined. **MOLOKA‘I**: west of Kaunakakai, nursery weed, 50 m, 2 Apr 2004, *Oppenheimer H40407*.

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New Plant Records and Rediscoveries within the Hawaiian Islands

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As the result of several relatively recent botanical field surveys conducted within the Hawaiian archipelago, 16 new vascular plant island records and 2 rediscoveries are presented in this paper. New island records include 12 nonnative naturalized plant taxa; 3 Hawaiian endemics, including *Dubautia laxa* (Asteraceae), *Gunnera petaloïdea* (Gunneraceae), and *Phyllostegia ambigua* (Lamiaceae); and 1 indigenous species, *Portulaca lutea* (Portulacaceae). Two additional records represent significant endemic rediscoveries in the Hawaiian Islands, including *Diellia erecta* f. *alexandri* (Aspleniaceae) which was thought to be extinct on Kaua‘i after not being observed since 1886; and *Phyllostegia helleri* (Lamiaceae), unrecorded since 1916.

Asclepiadaceae

Calotropis procera (Aiton) W. T. Aiton **New island record**

Previously recorded on the Big Island, and recently documented on Lehua, Ni‘ihau (Wood & LeGrande 2006) this is the first record of the small crown-flower naturalized on Kaua‘i. This species is apparently able to spread easily in harsh dry conditions.

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Material examined. **KAUA‘I**: Polihale, lower Saki Mana Rd to Polihale beach, 3.7 km [2.2 mi] in from paved rd, mauka side of rd in ditch, invasive grassland and shrubland, 3 m, 9 Nov 2005, *K.R. Wood 11614* (PTBG).

Aspleniaceae

Diellia erecta Brack. f. ***alexandri*** (Hillebr.) W.H. Wagner **Notable rediscovery**

Diellia Brack. is composed of 6 species which are restricted to the high islands of Hawai‘i. Although naturalist V. Knudsen made numerous collections of *Diellia erecta* f. *alexandri* on Kaua‘i from 1871–1886, this taxon has not been observed again on the island for well over 100 years. Palmer (2003), considered this taxon to be “probably extinct on Kaua‘i”, and at the time of his publication was aware of only a few small populations restricted to Maui and Moloka‘i. Currently we are aware of ca 49 mature fertile individuals, and ca 10 young sporophytes (R. Aguraiuja, pers. comm.) located within the interior forests of western Kaua‘i along the north facing slopes of Kawai‘iki Stream. A single mature individual is being grown at the National Tropical Botanical Garden (NTBG), and sowings from 10 separate individuals are being cultivated at the NTBG nursery laboratory. The following collections document the rediscovery of this endemic Hawaiian fern on Kaua‘i.

Material examined. **KAUA‘I**: Kawai‘iki, off Kaluahaulu ridge, upper forest and drainage to the south of Koai‘e and north of Waialae canyons, *Metrosideros polymorpha* mixed mesic forest, ca 1100 m, 28 Jun 2001, *K.R. Wood & S. Perlman 9010* (BISH, PTBG); Kawai‘iki, separate population just below rim, 1150 m, 14 Aug 2001, *K.R. Wood & S. Perlman 9060* (PTBG); Kawai‘iki, 100 m west of main population, 1076 m, 27 June 2001, *K.R. Wood & S. Perlman 9001* (PTBG).

Asteraceae

Dubautia laxa Hook. & Arnott. subsp. ***laxa*** **New island record**

A member of the Asteraceae, *Dubautia* Gaud. is restricted to the Hawaiian Islands with 35 taxa, including 23 at the species level. *Dubautia laxa* subsp. *laxa*, called *na‘ena‘e pua melemele* by the Hawaiians, was previously documented on the islands of O‘ahu, Moloka‘i, and Maui. Unpublished research on the southeastern summit of Ha‘upu (Wood 2005) has documented the first collection of this species on Kaua‘i.

Material examined. **KAUA‘I**: Ha‘upu summit region, open shrubland/herbland; shrub, 671 m, 4 Aug 2005, *K.R. Wood et al. 11425* (BISH, PTBG, US).

Brassicaceae

Lepidium africanum (Burm.f.) DC. **New island record**

A member of the mustard family and previously known from Maui and Hawai‘i, *Lepidium africanum* is recorded here as being naturalized on Kaua‘i.

Material examined. **KAUA‘I**: Waimea Distr, Hanapepe, Salt Pond Beach Park area, ancient salt pans and littoral vegetation, shrubland/grassland/herbland, 3 m, 14 Feb 2005, *K.R. Wood 11135* (BISH, PTBG, US).

Buddlejaceae

Buddleia asiatica Lour. **New island record**

Buddleia asiatica is a nonnative shrub that can quickly become highly invasive within the riparian ecosystems of Hawai‘i. Previously recorded on the islands of O‘ahu, Moloka‘i, Maui, and Hawai‘i, the following collection represents a new island record for Kaua‘i.

Material examined. **KAUA‘I**: Hanalei Distr, Wainiha Valley, very back below Hinalele Falls, *Metrosideros* mixed lowland wet forest, 640 m, 8 Sep 2004, *K.R. Wood & T. Menard 10922* (BISH, PTBG).

Cyperaceae

Cyperus compressus L. **New island records**

Cyperus compressus is a nonnative sedge that occurs on Maui and the Big Island of Hawai‘i. Representing new island records, collections of this species were made from moist coastal sites along the Nā Pali coast of Kaua‘i and the northern coast of Moloka‘i.

Material examined. **KAUA‘I**: Miloli‘i, from mouth of river and northeast to Makuaiki Pt, seacliffs, 21 m, 12 Jan 2000, *K.R. Wood et al. 8136* (PTBG); Hanakapi‘ai, around waterfall at end of valley trail, 275 m, 7 Aug 1996, *K.R. Wood et al. 5453,* (BISH, PTBG, US); **MOLOKA‘I**: Kuka‘iwa‘a, peninsula just to the east of Kalaupapa, coastal herb/shrubland, 21 m, 6 Jun 2002, *K.R. Wood & M. Legrande 9832* (BISH, PTBG, US).

Cyperus esculentus L. **New island record**

This collection represents a new island record of chufa for Kaua‘i. It is currently only recorded as naturalized on the Big Island of Hawai‘i.

Material examined. **KAUA‘I**: Hanalei Distr, Nā Pali coast, Kalalau trail, Ho‘olulu valley, at mouth of drainage above sea, 45 m, 10 Apr 1996, *K.R. Wood & S. Perlman 5103,* (AD, BISH, F, K, MO, NY, PTBG, US).

Cyperus haspan L. **New island record**

Cyperus haspan has been previously documented as naturalized on Kaua‘i, Moloka‘i, and Maui. This collection verifies that it is also naturalized in the Wai‘anae Mountains of O‘ahu.

Material examined. **O‘AHU**: Pu‘u Kaua Region, Lualualei, steep ridge just to south of Kaua, 853 m, 30 Mar 2004, *K.R. Wood & J. Lau 10637* (PTBG).

Gunneraceae

Gunnera petaloïdea Gaud. **New island record**

Gunnera is the sole genus in Gunneraceae. In Hawai‘i it is known as *‘ape‘ape* and is represented by two species, *Gunnera kauaiensis,* which only occurs on Kaua‘i, and *G. petaloïdea,* which has been previously recorded on O‘ahu, Moloka‘i, Maui, and the Big Island. Both species can grow up to 4 m long and have fantastically large leaves with long procumbent stems. They thrive around montane wet forests and windward wet cliffs and represent very unusual herbaceous angiosperms that have a symbiosis with blue-green algae. The following collection documents an island record for *G. petaloïdea* on Kaua‘i.

Material examined. **KAUA‘I**: Border of Lihue and Kawaihau Distr, Blue hole, below Wai‘ale‘ale and Kawaikini, headwaters of N Wailua River, *Metrosideros* lowland wet forest, 610–670 m [2000–2200 ft], 7 May 1991, *K. R. Wood et al. 0761* (PTBG).

Lamiaceae

Phyllostegia ambigua (A.Gray) Hillebr. **New island record**

Phyllostegia Benth. is a scentless member of the mint family with 32 endemic Hawaiian species. The only other members of this genus occur as single island endemics on Tahiti and Tonga (Wagner 1999). Twenty-one of the Hawaiian *Phyllostegia* are single island endemics. *Phyllostegia ambigua,* one of the 11 multi-island species, was previously recorded from the islands of Hawai‘i and Maui, and is now documented from south central Moloka‘i where it occurs in mesic to wet montane wet forest.

Material examined. **MOLOKA‘I**: Kapulei, transitional *Metrosideros-Dicranopteris* montane mesic to wet forest with riparian headwater drainages rich in pteridophytes along saturated basalt walls, small waterfalls and steep forested slopes above 1005 m [3300 ft], 1066 m [3500 ft], 25 Feb 1998, *K.R. Wood et al. 7202* (PTBG, US); same location, 1097–1127 m [3600–3700 ft], 25 Feb 1998, *K.R. Wood 7210* (BISH, NY, PTBG, US).

Phyllostegia helleri Sherff **Rediscovery**

Phyllostegia helleri was known from around the Koke'e Plateau of Kaua'i. It has not been documented since 1916 and has long been considered extinct (Wagner *et al.* 1990; Wagner 1999). A small population of approximately 10 plants was recently rediscovered on Kaua'i around the plunge pool of Hinalele Falls, Wainiha. This location lies around 17 kilometers inland from the sea, well below the Wainiha Pali and the Alaka'i plateau. *Phyllostegia helleri* exists within an extremely saturated talus zone of intense water-spray and wind.

Material examined. **KAUA'I**: Hanalei Distr, Wainiha Valley, very back below Hinalele falls, *Metrosideros* mixed lowland wet forest, 671 m, 9 Jan 1993; *K.R. Wood et al. 2250* (PTBG); same loc., 6 Feb 1998, *K.R. Wood et al. 7131* (PTBG); same loc., 1 Feb 2001, *S. Perlman & D. Liittschwager 16,486* (BISH, PTBG, US); same loc., 9 Sep 2004, *K.R. Wood & T. Menard 10938* (PTBG).

Marattiaceae

Angiopteris evecta (G. Forst.) Hoffm. **New island record**

Angiopteris evecta with its huge fronds that often exceed 4 m has been previously recorded on the islands of O'ahu, Lana'i, Maui, and Hawai'i. The following collection from around the headwaters of Wainiha Valley represents a new island record for the mule's-foot fern on Kaua'i.

Material examined. **KAUA'I**: Hanalei Distr, Wainiha Valley, very back below Hinalele Falls, *Metrosideros* mixed lowland wet forest, 732 m, 9 Sep 2004, *K. R. Wood & T. Menard 10933* (PTBG).

Melastomataceae

Pterolepis glomerata (Rottb.) Miq. **New island record**

Pterolepis glomerata has been previously recorded on the islands of Kaua'i, O'ahu, Moloka'i, and Hawai'i. The following collection documents this herb as being naturalized on Lāna'i along the Lāna'i Hale summit ridge.

Material examined. **LĀNA'I**: Palea region, between Palea and Kamiki, *Metrosideros* mixed mesic forest fringe, 930 m, 8 Oct 1998, *K.R. Wood 7531* (BISH, PTBG, F, K, MO, NY, US).

Plantaginaceae

Plantago australis Lam. subsp. ***hirtella*** (Kunth) Rahn **New island record**

Previously recorded from Maui and the Big Island of Hawai'i, the herbaceous dwarf plantain is now documented from Moloka'i where it occurs within a coastal herb/shrubland.

Material examined. **MOLOKA'I**: Kuka'iwa'a, peninsula just to the east of Kalaupapa, coastal herb/shrubland, 21 m, 6 Jun 2002, *K.R. Wood & M. Legrande 9831* (PTBG).

Poaceae

Aira caryophyllea L. **New island record**

This is the first record of silver hairgrass occurring on O'ahu**.** It has previously been recorded as naturalized on the islands of Kaua'i, Moloka'i, and Maui.

Material examined. **O'AHU**: Pu'u Kaua Region, Lualualei, steep ridge just to south of Kaua, 732 m, 30 Mar 2004, *K.R. Wood & J. Lau 10636* (BISH, PTBG, US).

Sporobolus pyramidatus Hitch. **New island record**

This species was previously recorded as being naturalized on Kure Atoll, Laysan, French Frigate Shoals, and O'ahu. On Kaua'i this small grass with low spreading leaves and erect culm has been recently documented along the coastal strand of Salt Pond Beach Park.

Material examined. **KAUA'I**: Waimea Distr, Hanapepe, Salt Pond Beach Park area, ancient salt pans and littoral vegetation, shrubland/grassland/herbland, 3 m, 10 May 2004, *K.R. Wood 10709* (BISH, PTBG, NY, US); 18 Aug 2004 *K.R. Wood 10914* (PTBG).

Polygonaceae

Persicaria punctata (Elliott) Small **New island record**

Persicaria punctata has previously been documented on the Big Island of Hawai‘i. It prefers drainages with standing or running water and disturbed wet forest. This terrestrial herb has been recently documented on Moloka‘i where it grows decumbent along the stream banks of Waihanau.

Material examined. **MOLOKA‘I**: Waihanau, hike up lower valley drainage from Kalaupapa, UTM: 234153–711300, large waterfall of 100 m, 335 m, 25 Jan 2005, *K. R. Wood & J. Espaniola 11110* (PTBG).

Portulacaceae

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

This indigenous species of *‘ihi* has been previously recorded on Midway, Lisianski, Laysan, Gardner Pinnacles, French Frigate Shoals, Necker, Nihoa, O‘ahu, Moloka‘i, Lāna‘i, Maui, and the Big Island of Hawai‘i. Recent research by the Offshore Islet Restoration Committee (OIRC) has documented this species on the islet of Moku‘ae‘ae which lies just offshore of Kīlauea Point, eastern Kaua‘i. Visual sittings of *P. lutea* have also been made by the author around several coastal stretches along Princeville and Hanalei.

Material examined. **KAUA‘I**: Hanalei Distr, Moku‘ae‘ae islet, Kīlauea National Wildlife Refuge, 3 Jun 2002, *K.R. Wood & D. Boynton 9808* (BISH, PTBG).

Acknowledgments

I express gratitude to all those who have helped conduct these biological inventories; and to those who have helped to disseminate the findings; a special *mahalo* to the National Tropical Botanical Garden; the Bishop Museum; and the National Museum of Natural History, Smithsonian Institution.

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The moss *Bryoerythrophyllum ferruginascens* (Stirt.) Giacom. (Musci, Pottiaceae) new for the Hawaiian Islands

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While working with identified and partially named Pottiales material in herbarium Leiden (L), I came across two collections of *Bryoerythrophyllum ferruginascens.* The general tinge of the plants is red-brown. The leafbase is sheathing. The leaves are recurved only to about half way up. There are no dentations at the leaf apex. The characteristic rhizoidal tubers are, in my experience always, present. They are nicely illustrated by Arts (1989) and Risse (1987). The points above lead me to the conclusion that the plants belong to *B. ferruginascens.*

Bryoerythrophyllum ferruginascens (Stirt.) Giacom. **New state record**

Native to North America, where it is widely distributed (Anderson *et al*. 1990), and also found in Belgium (Arts 1989), this marks the first record of this moss from Hawai‘i.

Material examined: **MAUI**: Haleakalā National Park, Ko‘olau Gap, on ground between rocks near Holua cabin, ca 2100 m, no fruits, with rhizoidal tubers, 11 May 1982, *Kortselius 781* (L); East Maui, east of Ukelele, with hepatic, no fruits, with rhizoidal tubers, Jul 1919, *C.N. Forbes 1472-M* (L).

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Fossil Leaf Galls Preserved in Honolulu Volcanic Series Rocks

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Leaf galls are common on the leaves of *Metrosideros polymorpha* (*‘ōhi‘a*) and often aid in field identification of this polymorphic species. We report here the occurrence of galls on a fossil *Metrosideros* leaf preserved in volcanic rocks near Salt Lake Crater on the island of O‘ahu.

The Salt Lake (Āliapa‘akai) tephras were created by rejuvenated volcanism that occurred well after the main period of shield formation and is responsible for numerous volcanic features in southeastern O‘ahu and within the city of Honolulu. Recent K-Ar dates have clarified the age relations of the Honolulu volcanics (Ozawa *et al*. 2005) and

show that the eruptions directly east of Pearl Harbor, which include the Salt Lake Crater eruptions, are part of the Pleistocene geologic history of the island, with dates of 250,000–474,000 B.P. (Middle Pleistocene).

The material described here is part of a fossil assemblage preserved in a lahar, or volcanic mudflow, overlying pyroclastic ashfall and surge deposits. The lahar, which undoubtedly occurred shortly after the volcanic eruptions when rain destabilized the nearby uplands, traveled some distance downslope, bringing along an assemblage of plant material, including mesophytic elements. Fossils in the underlying ash, in contrast, are preserved *in situ* and represent a xerophytic lowland association occurring not far from the coast; Woodcock *et al*. (1998) reported on fossil cotton (*Gossypium* sp.) from this deposit. The specimen described here is no. M723 in the collection of the Bishop Museum.

Figure 1 shows the fossil leaf, together with an outline showing the main features of the venation with the galls also outlined. The leaf is a compression fossil showing the abaxial (bottom, epidermal) surface of the leaf. It is identifiable as *Metrosideros* on the basis of the morphology and venation (pinnate venation, presence of marginal vein, punctate glands). The three leaf galls visible can be described as pit or spot galls. The galls are very similar in appearance to those that can be found on *Metrosideros* currently and are quite likely caused by the same insect, *Troiza* sp., a gall-forming psyllid.

Although there are many examples of plant galls in the fossil record (Larew 1992; Scott *et al*. 1994), establishing the exact taxonomic affinities of the represented taxa often

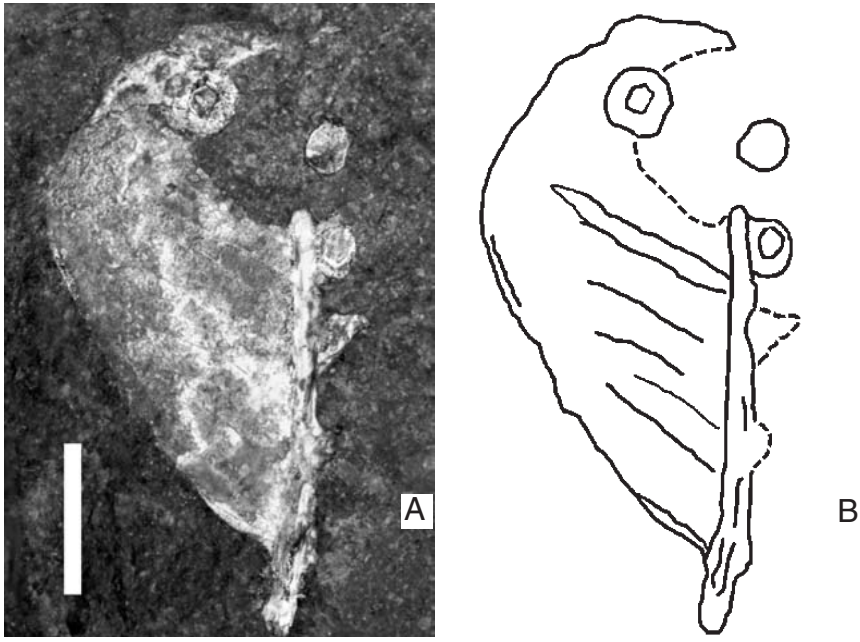

Figure 1. **A**. *Metrosideros* fossil leaf. Scale bar = 1 cm. **B.** Outline showing venation pattern and galls.

proves difficult. In this case, however, the identifications are fairly clear cut. The fossil material thus attests to the long-standing character of this insect-plant association and also suggests the stability over time of island food chains with sucking/piercing insects as important herbivores.

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Additions and notes to the Elateridae (Coleoptera) of the Hawaiian Islands[1]

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Coleoptera: Elateridae

Adelocera oblongus (Fleutiaux) **Revised identity**

Brachylacon beardsleyi Ôhira & Becker, 1978: 323. **New synonym**

Adelocera beardsleyi was described in the genus *Brachylacon* from specimens collected in ‘Ewa and nearby areas of O‘ahu. The authors correctly surmised that this species was not native to Hawai‘i, but they were unsure of its origin. Johnson *et al*. (2000) reported the species from the island of Hawai‘i.

During a recent visit to Bishop Museum by PJJ, we compared the holotype and additional specimens of *A. beardsleyi* with specimens, images, and notes of other *Adelocera* species and concluded that *A. beardsleyi* is a junior synonym of *A. oblongus* (Fleutiaux). This latter species was described from the Philippines, thus our determination provides the probable provenance for the Hawaiian population and gives support for recognizing the beetle as exotic to Hawai‘i.

The Manila specimen in BPBM listed below may well be an unrecognized paralectotype from the original syntype series: 1) it possesses a data label style and content suggesting that it was collected by C.F. Baker; 2) it was taken 2 years prior to the female type reported in Fleutiaux’s (1934) description; 3) Fleutiaux received considerable Philippine elaterid material from Baker, some of which was sent to Van Zwaluwenburg who maintained an extensive correspondence and specimen exchange with Fleutiaux (Van Zwaluwenburg 1936); and 4) Fleutiaux typically did not mention the study of multiple spec-

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imens in his early work and dispersed specimens to various collections. The BPBM specimen was not included by Hayek (1973), who designated the lectotype for *A. oblongus*.

Larvae of *Adelocera* species are poorly known but records for the tribe (Agrypinini) generally note larvae as opportunistic predators on and in loose soil, or in dead trees or logs. The O‘ahu records were from light traps in xeric and highly disturbed lowland areas where the predominant and naturalized tree is *Prosopis pallida,* or *kiawe*. The Hawai‘i specimen was collected on a sticky trap in a montane secondary forest within a wildlife refuge, a decidedly wetter and more botanically diverse environment than the collection sites from O‘ahu.

Material examined. **O‘AHU**: [type material as reported by Ôhira and Becker]. **HAWAI‘I**: Hakalau National Wildlife Refuge, Kona Forest Unit, along southern boundary at 579 m, yellow sticky trap, 11 Apr–17 May 2000, W. Haines, *HVNP003049* (1 ex, HAVO). **PHILIPPINES**: Manila, 17 May, *Brachylacon oblongus* Fleut., det. by RHVZ (1 ex, BPBM).

Melanotus punctosus (Walker) **New state record**

Athous punctosus Walker, 1858: 20.

During an arthropod survey of Kahului Airport, Maui (Howarth & Preston 2001), 3 specimens of *Melanotus punctosus* were collected. This species is native to India and Sri Lanka, and represents the first record for this genus in Hawai‘i. No other records for this species outside of its natural range are known to us.

The identity of this species was confirmed by PJJ through a comparison of these specimens with the holotype and other material in The Natural History Museum, London. This species is somewhat variable with regard to the relative coarseness of pronotal sculpture but as with most species of *Melanotus,* the aedeagus is diagnostic for species determination.

Melanotus is a widespread genus and some species within their natural ranges in Europe and North America are minor crop pests. Besides *M. punctosus*, reported here, there are 2 additional adventive species reported for the United States.

Material examined. **MAUI**: Kahului Airport, 20°54'22"N 156°25'56"W, Malaise trap #1, *Leucaena* shrubland, 16 Nov 1999, F.G. Howarth, D.J. Preston, J. Dockall (1 ex, BPBM); Kahului Airport, Kanaha Pond drainage canal area, 20°53'25"N 156°26'53"W, 4 Jun 2000, blacklight, *Pluchea, Chenopodium*/kiawe shrubland, Howarth, Preston, Dockall, & G.A. Samuelson (1 ex, BPBM); Kahului Airport, Malaise trap #2, 26 Apr 2000, Howarth, Preston, Dockall , K. Martz & F. Starr (1 ex, BPBM).

Rismethus

One species of *Rismethus* Fleutiaux is reported here for the Hawaiian Islands and another is noted as a quarantine record. Each is based on only a single specimen. Members of *Rismethus* tend to be associated with riparian and mesic ruderal habitats and are attracted to lights. Future use of light traps in favored habitats may confirm the naturalized status of these species.

Presently, there are 15 species of *Rismethus* described from Asia and the Pacific, with 2 species in the Neotropical Region (Hayek 1973).

Rismethus pistrinarius (Candèze) **Quarantine note**

Meristhus pistrinarius Candèze, 1857: 164.

Rismethus pistrinarius normally ranges from India and Myanmar across Indochina to the Philippines and is distinguished from other Pacific and SE Asian species by its relatively short and broad bristle-like integumental setae. The Hawaii Clipper was one of 3 Martin

C-130s operated by Pan American Airways over the Pacific. This particular clipper flew a standard route from San Francisco to Manila via Honolulu and the islands of Midway, Wake, and Guam. *Rismethus pistrinarius* did not appear in collections from an intensive Bishop Museum survey of Midway; also, we did not see this species in smaller collections from Wake or Guam in BPBM.

Material examined. **O'AHU**: Honolulu, T.H., 8-6-37 [6 Aug 1937], ex Hawaii Clipper from Orient, *Meristhus scobinula* Cand. det. by RHVZ [!] (BPBM).

***Rismethus scobinula* (Candèze)** **New state record**

Meristhus scobinula Candèze, 1857: 164, pl.2, fig. 26.

This species appears to be widespread, being distributed in both the Neotropical and Oriental regions. The Maui specimen most closely resembles examples from Costa Rica and Surinam by having a slightly more depressed aspect to the dorsal elytral surfaces, and slightly shorter and stouter bristle-like setae. The single specimen cited by Van Zwaluwenburg (1957) from Saipan appears to be a different species.

Material examined. **MAUI:** W Maui, Honakohau, 900 m, 19 Mar 1972, Malaise trap, J.L. Gressitt (BPBM).

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The Eucalyptus snout beetle, *Gonipterus scutellatus* (Coleoptera: Curculionidae) recently established in the Hawaiian Islands[1]

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The Eucalyptus snout beetle, *Gonipterus scutellatus* Gyllenhal, is here reported for Maui. This record appears to be the first report of *Gonipterus* in the state.

Coleoptera: Curculionidae

Gonipterus scutellatus Gyllenhal **New state record**

Adults and larvae were collected on the leaf-surface of *Eucalyptus robusta* Sm. in May 2004. Larvae had been noticed in this area in March 2004 but were not collected at that time. Larvae were present primarily on growing shoots and newly expanded or unexpanded leaves. In most cases, when larvae were found, several occurred on the same shoot or leaf. Larvae are very distinctive, being legless, slug-like and producing long, skinny filaments of frass. Adults were usually found on the edges of fully expanded leaves or petioles, gripping the stems or leaf margins very tightly.

Nearby stands of *Eucalyptus* in the Kokomo, Makawao, and Olinda area were searched for larvae and adults, but at this time no other populations have been confirmed. However, we consider it likely that the weevil is present at other locations on Maui, since it was abundant at the site of collection, and since adults of this species are strong fliers living 2–3 months (Hanks *et al*. 2000).

Schenkling & Marshall (1931) listed 24 species in *Goniopterus*, essentially an Australian genus, except for a single New Caledonian species. The range of *G. scutellatus* in Australia extends North into Queensland, South into Tasmania, and West into Victoria (CSIRO 2004). It has been spread by human activity to various other parts of the world where *Eucalyptus* is cultivated, including New Zealand, Africa, the Mediterranean, and South America. It was first recorded in the United States in 1994 in southern California (Seeno & Davidson 1994), a possible source of the Hawaiian introduction. This weevil is an important defoliator of various species of *Eucalyptus,* and therefore considered a major pest and the target of biological control programs. In Hawai'i, it may impact trees that were purposely planted, including rangeland shelterbelts, as well as naturalized populations of *Eucalyptus*. It remains to be seen whether *G. scutellatus* might limit reproduction of *Eucalyptus* in natural areas of Hawai'i where many species are considered weeds.

Gonipterus scutellatus is considered to be a specialist on the genus *Eucalyptus*, but prefers some species of *Eucalyptus* over others (Cordero Rivera & Santolamazza Carbone 2000). In other areas where it has been introduced, *G. scutellatus* has attacked several species that are widespread in Hawai'i, including *E. camaldulensis* Dehnh.*, E. globulus* Labill.*, E. robusta* Sm.*,* and *E. tereticornis* Sm. (Cordero Rivera & Santolamazza Carbone 2000).

An internet search shows that *G. scutellatus* is treated in many recent articles dealing with its biology, parasites, and serious impact as a pest. One such reference (Forestry Tasmania 2004), shows images of feeding patterns, general damage to host, and *in situ* views of egg, larva, and adult.

1. Contribution No. 2006-022 to the Hawaii Biological Survey..

Material examined: **MAUI**: Haiku Distr, Kokomo, Kailiʻili Rd, 1575 ft [487 m], 21 May 2004, on *Eucalyptus*, W.P. Haines (5 adults, 3 larvae; BPBM, HDOA).

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New records of invasive aphids in Hawaiʻi

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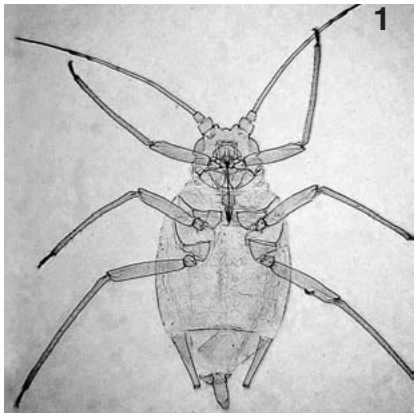
The last published review of the Hawaiian aphid fauna was conducted 27 years ago (Beardsley 1979), at which time 68 species of aphids were recorded in the islands, every one of which was an exotic invasive. Since then there have been several reports of additional aphid species invading the islands and establishing (i.e., Kumashiro *et al*. 2001), and the Bishop Museum Hawaii Biological Survey, online Hawaiian Terrestrial Arthropod Checklist (Nishida 2002) currently lists 81 species. With increasing tourism and air transport of agricultural and ornamental plants, aphids continue to invade and become established throughout the islands, where they often become economically and environmentally damaging pests. In a recent survey of plants on Kauaʻi, Oʻahu, Maui, Molokaʻi, and Hawaiʻi we have so far found evidence of 9 new aphid species that have become established in the state of Hawaiʻi, over a 10% increase in the known fauna. Identifications were made in the laboratories of Dr. R. Foottit and K. Pike. Biological data below are primarily from Blackman & Eastop (1984, 1994). Specimens are maintained in the insect collection of the Kauai Agricultural Research Center (KARC), Kapaʻa. Nomenclature follows Remaudiere & Remaudiere (1997).



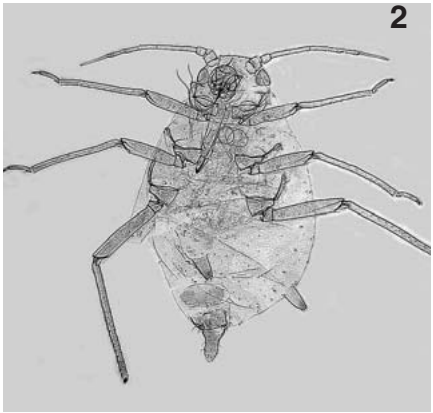


Figure 1. *Ericaphis fimbriata* (Richards), apterous adult. **Figure 2.** *Hyadaphis coriandri* (Das), apterous adult.

Homoptera: Aphididae:

Ericaphis fimbriata (Richards) **New state record**

Blueberry aphids are light colored and broadly spindle-shaped; alates have a dark abdominal patch. Known from Oregon, Washington, and British Columbia, and the eastern U.S. [a possible synonym of *E. scammelli* (Mason)] on strawberries and blueberries; it is an important vector of blueberry scorch virus.

Material examined: **MAUI:** Haleakalā National Park, 28 Jun 2003, on *Vaccinium reticulatum*, P. Krushelnycky (UH).

Hyadaphis coriandri (Das) **New state record**

Coriander aphids are yellowish green, often covered with greyish wax, with short legs and short, dusky, slightly swollen, siphunculi that are about twice as long as wide. Probably of Asian origin, coriander aphids were first found in North America in 1998 in Florida on fennel (*Foeniculum vulgare* Mill.), and soon thereafter on coriander (*Coriandrum sativum* L.) and dill (*Anethum graveolens* L.). Current distribution includes Central Asia, the Mediterranean region, the Middle East, India and Pakistan, Africa, California, Florida, and possibly Peru. Aphids live mainly within the umbels of the host plant, and are capable of colonizing many species of Umbelliferae. They are considered key pests of coriander in India.

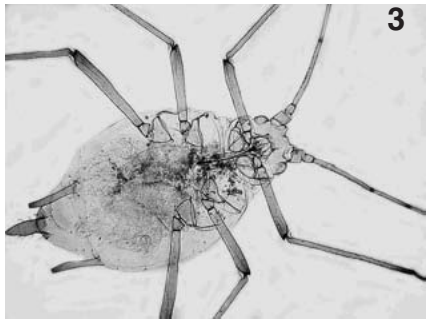
Material examined: **O'AHU:** 962 Second St, Pearl City Urban Garden Center, 22 May 2003, colony found on garden plants of coriander (*Coriandrum sativum*), M. Rhainds (KARC).

Hyperomyzus carduellinus (Theobald) **New state record**

The Asian sow thistle aphid is a relatively large aphid with very short antennal and dorsal body setae. It is found from Afghanistan to Korea and Taiwan, and has also been collected in Argentina, Bolivia, Australia, Africa, and in the year 2000 was first reported in Florida.

Halbert *et al*. (2000) state that it is specific to *Sonchus* and related plants and is not likely to become a pest, but it is a known vector of lettuce necrotic yellows virus.

Material examined: **MAUI:** Kealia Pond Beach, Kīhei, 19 Mar 2004. **HAWAI'I:** Whittington Beach Park, Ka'u, 22 Mar 2004, on *Sonchus oleraceus,* R. Miller, R. Foottit, K. Pike.



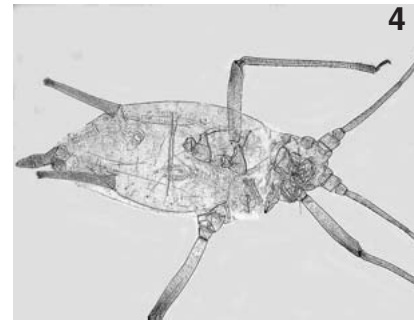


Figure 3. *Hyperomyzus carduellinus* (Theobald), apterous adult. **Figure 4.** *Metopolophium dirhodum* (Walker), apterous adult.

Metopolophium dirhodum (Walker) **New state record**

The rose-grain aphid is a large yellowish green species that often has a darker green longitudinal mid-dorsal stripe. The antennal joints are dark, and the antennae usually reach beyond the base of the siphunculi. Its origin is the western Palearctic, but it is now widely distributed in temperate regions, less so in the tropics. Its primary hosts are wild and cultivated *Rosa* spp.; secondary hosts include numerous grasses. Rose-grain aphid is a vector of barley yellow dwarf virus.

Material examined: **MAUI**: Kahului, 310 Ka‘ahumanu Avenue, University of Hawai‘i Garden Center, 14 Jul 2003, on roses, M. Rhainds (KARC). **KAUA‘I**: Puhi, 3–1550 Kaumuali‘i Hwy, Kauai Nursery, on roses 16 Apr 2003, R. Messing (KARC); Kapa‘a, 6660b Kawaihau Rd, Growing Greens Nursery, on roses, 5 May 2003, M. Rhainds.

Myzus hemerocallis Takahashi **New state record**

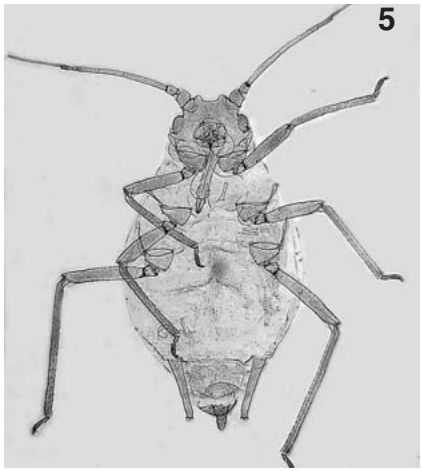
The day lily aphid is a close relative of the green peach aphid (*M. persicae*), but is distinguishable by the length of the terminal antennal process and shape of the siphunculi. It originated in East Asia but is now widely distributed throughout the world. It feeds primarily on *Hemerocallis* species, but also occasionally on *Agapanthhus umbellatus* (blue Nile lily). It forms dense colonies on the stems and flower heads of day lily.

Material examined: **KAUA‘I:** Kīlauea, 4101 Wailapa Rd, Na Aina Kai Botanical Garden, on *Hemerocallis sp.,* 13 Mar 2003, R. Messing (KARC).

Sitobion fragariae (Walker) **New state record**

Blackberry-cereal aphids are large, spindle shaped, dirty yellowish green with brown inter-segmental markings on the upper surface of the abdomen; siphunculi are long and usually entirely black. It is distributed throughout Europe, the Mediterranean, Pakistan, Nepal, and is invasive in South Africa, western North America, and Chile. Primary hosts are *Rubus* spp, secondary hosts include numerous grass species (more commonly wild grasses than crops). It is a vector of barley yellow dwarf virus.

*Material examined***: MAUI:** Haleakalā National Park, 9 Jul 2003, on *Anthoxanthum odoratum* L., *Deschampsia nubigena* Hillebr.*, Holcus lanatus* L.*,* and *Trisetum glomeratum* (Kunth), (Poaceae) ,and *Luzula hawaiiensis* Buch (Juncaceae), Koen van Elsen (UH).



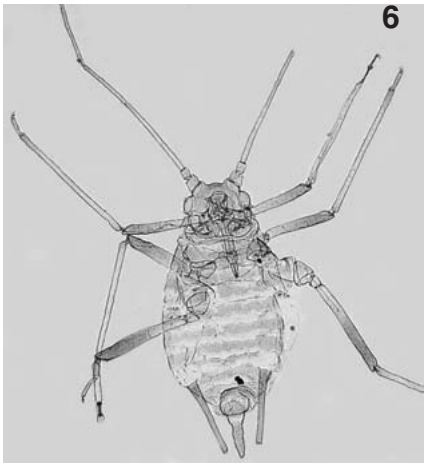


Figure 5. *Myzus hemerocallis* Takahashi, apterous adult. **Figure 6.** *Sitobion fragariae* (Walker), apterous adult.

Sitobion phyllanthi (Takahashi) **New state record**

Dirty olive green aphids with dark brown head and dorsal markings, appearing on preserved specimens as narrow cross-bands between dark marginal sclerites. Widely distributed in Africa on Euphorbiaceae. It has been barely studied, and its life cycle is unknown.

Material examined: **O'AHU:** Honolulu, Nu'uanu Avenue, Foster Botanical Garden, 28 May 2003, on *Chamaesyce hypericifolia* (L.) Millsp. (Euphorbiaceae), M. Rhainds (KARC); **HAWAI'I:** Hilo, 421 Makalika St 17 Jun 2003, on *Euphorbia prostrata* Aiton, M. Rhainds (KARC).

Toxoptera odinae (van der Goot) **New state record**

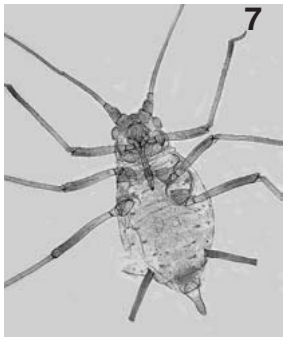
Small, grayish to reddish brown aphids with very short siphunculi (shorter than the cauda). They form dense colonies on young shoots and on the undersides of leaves along the veins. Native to India, Nepal, SE Asia, and Japan, and now widespread in Africa south of the Sahara. Polyphagous on tropical shrubs, especially in Anacardiaceae, Araliaceae, Caprifoliaceae, Ericaceae, Rubiaceae, and Rutaceae. Known to vector peanut green mosaic potyvirus and peanut stripe potyvirus.

Material examined: **HAWAI'I:** Na'alehu, S Point Rd, Ka'u Gold Orange Co., in citrus orchard, R. Messing (KARC). Only late instar nymphs were examined, siphunculi were much shorter than those of fourth instar *T. aurantii* and *T. citricidus*, so we assume it is *T. odinae,* but this must be confirmed with adult specimens.

Aphis coreopsidis (Thomas) **New state record**

Apterae are 1.5–1.8 mm in length, yellow to green with darker antennae, legs and siphunculi. In North America it host-alternates between *Nyssa* and secondary hosts in the Compositae (*Bidens, Clibadium, Eupatorium, Sonchus*) and Malvaceae (*Hibiscus, Sida*). Apparently anholocyclic populations on Compositae (especially *Bidens pilosa*) occur in Central and South America.

Material examined: **KAUA'I:** Pu'u Hina Lookout, Waimea Cyn, 13 Mar 2004, on *Bidens pilosa* (Spanish needle), R. Miller, R. Foottit, & K. Pike.



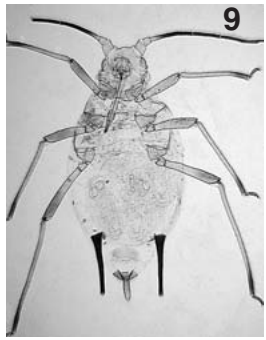


Figure 7. *Sitobion phyllanthi* (Takahashi), apterous adult. **Figure 8.** *Toxoptera odinae* (van der Goot), fourth instar nymph. **Figure 9.** *Aphis coreopsidis* (Thomas), apterous adult.

Acknowledgements

We thank Terri Moats for aphid slide mounting, M. Rhainds, R. Miller, K. van Elsen, D. Rubinoff, R. Frissant & P. Krushelnycky for field collections, and Eric Maw for identifications. This work was supported by USDA-CSREES-TSTAR grant no. 2002-34135-12762 to RHM.

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The Coleoptera of Lehua Islet, Hawai'i[1]

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Off-shore islets can be particularly interesting because the composition of their flora and fauna often differs substantially from that of the adjacent larger islands. The presence of

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large seabird colonies on several off-shore islets, and their absence in large numbers from the main Hawaiian Islands, serves as one conspicuous example of this phenomenon among vertebrates. Species of terrestrial invertebrates may well exhibit similar patterns of disparity as well, but, as off-shore islets are among the most poorly collected sites in the Hawaiian Islands, such patterns remain largely undocumented. Off-shore islets are also known to harbor endemic insect species, such as *Rhyncogonus kapapa* Samuelson, known only from Kapapa Islet off O‘ahu (Samuelson 2003). Additionally, the phenomenon of floral and faunal disparity is often most pronounced among alien species, which often seem to establish and thrive more readily and exist at greater levels of population density on off-shore islets than they do on adjacent larger islands. These factors combined should make off-shore islets a priority for intensified scientific collection and conservation efforts.

Lehua Islet is a volcanic tuff cone remnant with an area of approximately 1.1 km^2, a highest elevation of 213 m, and is located about 1.2 km off the northern tip of Ni‘ihau (Palmer 1936). For biologists, the principle interest in Lehua has traditionally been its avifauna, as it serves as an important nesting site for large numbers of a variety of species of seabirds (Caum 1936). Tragically, the native plant community on Lehua has been devastated due to the introduction of mammals, most significantly the rabbit *Oryctolagus cuniculus* (Linnaeus), and invasion by alien plant species (Wood *et al.* 2004). The extant vegetation of Lehua is dominated by alien grasses, herbs, and shrubs (Wood *et al.* 2004).

Alongside the fairly well documented extirpation of the native flora on Lehua has been the consequent, simultaneous, and undocumented extirpation of its more diverse native insect fauna. The flourishing population of the highly invasive alien ant species *Pheidole megacephala* (Fabricius) (Wood *et al.* 2004) has undoubtedly been another important factor in the decline of the islet’s native insect fauna.

This paper is the first to document the Coleoptera of Lehua Islet. Of the 12 species of beetles reported here, *Rhantus pseudopacificus* Balke is the only native species documented and the unidentified species of *Phalacrus* Paykull is the only species previously not reported from the Hawaiian Islands. *Aephinidius opaculus* (Zimmerman) and *Systena blanda* Melsheimer, both previously known only from O‘ahu, are here reported for the first time from a second island. The remaining species listed are all multi-island adventives. Vouchers of all the specimens reported below have been deposited at the Bishop Museum (BPBM).

The list below in no way reflects the entirety of the current beetle fauna of Lehua. Only 4 insect collection methods are known to have been used on Lehua: hand collecting, unbaited pitfall trapping, sweeping vegetation, and UV lighting. Additional collecting, especially with flight intercept traps set out for extended periods, the use or carrion, dung and fruit-baited pitfall traps, and the extraction of specimens from plant litter and bird nesting materials via sifting and/or processing with Berlese funnels, would undoubtedly produce additional species.

We hope that this report, preliminary as it is, will help to stimulate additional investigation of the insect fauna of off-shore islets.

ADEPHAGA

Dytiscidae

Rhantus pseudopacificus Balke **New island record**

Status: native (Balke 1993).

Species of *Rhantus* are predators that inhabit shallow freshwater pools as adults and lar-

vae (Zimmerman & Smith 1975) but leave the water to disperse by flight. The occurrence of this species on Lehua would seem to indicate that fresh water is available on the islet, at least on a semi-permanent basis. *Rhantus pseudopacificus* is also known to occur on Kaua‘i, O‘ahu, Moloka‘i, and Lāna‘i (Balke 1993).

One male specimen was relaxed in near boiling distilled water to permit the removal and extraction of the aedeagus. The specimen was then card mounted, and aedeagus was attached to the bottom right corner of the upper surface of the same card, using water-soluble glue, for permanent storage.

Material examined: **NI‘IHAU**: Lehua Islet: 10 m, 30–31 May 2003, S.L. Montgomery, UV light (3 BPBM).

Carabidae

Aephnidius opaculus (Zimmerman) **New island record**

Status: adventive (Zimmerman 1972).

This predator is native to southern and southeast Asia and has been previously reported in the Hawaiian Islands only from O‘ahu (Zimmerman 1972).

Material examined: **NI‘IHAU**: Lehua Islet: SW coast, 20–21 Dec 2001, pitfall trap, Chris Swenson (3 BPBM).

Gnathaphanus picipes (Macleay) **New island record**

Status: adventive (Samuelson *et al.* 1997).

This species is native to Australia and Papua New Guinea and was first collected in the Hawaiian Islands in 1989 (Samuelson *et al.* 1997). It has since spread rapidly and has been reported from all the main islands except Ni‘ihau (Samuelson *et al.* 1997, Nishida 2002), where its presence is now all but certain. Moore *et al.* (1987) categorized this species as a volant, terrestrial granivore and omnivore.

Material examined: **NI‘IHAU**: Lehua Islet: 200 m, 30–31 May 2003, S.L. Montgomery (2 BPBM), 10 m, 30–31 May 2003, S.L. Montgomerey, UV light (1 BPBM).

POLYPHAGA

Scarabaeidae

Adoretus sinicus Burmeister **New island record**

Status: adventive (Nishida 2002).

This species is native to China (Cartwright & Gordon 1971) and has been reported from all the main Hawaiian Islands except Ni‘ihau and Kaho‘olawe (Nishida 2002). Adults feed on the leaves of a variety of plants, including numerous agricultural species (Fullaway & Krauss 1945).

Material examined: **NI‘IHAU**: Lehua Islet: 200 m, 30–31 May 2003, S.L. Montgomery (2 BPBM).

Aphodius lividus (Olivier) **New island record**

Status: adventive (Nishida 2002).

This is a cosmopolitan anthropogenic species of dung beetle often associated with domesticated animals. Its presence has been documented on all the main Hawaiian Islands except Kaho‘olawe (Nishida 2002). The dung resource it uses on Lehua is likely that of the introduced rabbits, *Oryctolagus cuniculus* (Linnaeus) (*q.v.* Stebnicka 2001).

Material examined: **NI‘IHAU**: Lehua Islet: 200 m, 30–31 May 2003, S.L. Montgomery (1 BPBM).

Protaetia fusca (Herbst) **New island record**

Status: adventive (Nishida 2002).

This widespread species occurs across Asia and the Pacific from India to Polynesia. Adults of this species visit flowers and are also attracted to lights at night (Cartwright & Gordon 1971). *Protaetia fusca* has been reported from Midway Island and all the main Hawaiian Islands except Niʻihau and Kahoʻolawe (Nishida 2002).

Material examined: **NIʻIHAU**: Lehua Islet: 19–21 Feb 2002, south side, K.R. Wood, #9309 (2 BPBM). 200 m, 30–31 May 2003, S.L. Montgomery, swept (1 BPBM). 6–8 Jun 2003, K.R. Wood (3 BPBM).

Dermestidae

Dermestes frischii Kugelann **New island record**

Status: adventive (Nishida 2002).

This species is a cosmopolitan, anthropogenic saprophage (Hinton 1945). On Lehua, it is most likely associated with the carcasses and nest detritus of seabirds. *Dermestes frischii* has previously been reported only from Nihoa, Oʻahu, and Maui (Nishida 2002).

Material examined: **NIʻIHAU**: Lehua Islet: 19–21 Feb 2002, K.R. Wood, #9310 (6 BPBM).

Phalacridae

***Phalacrus* sp.** **New state record**

Status: adventive.

This represents the first record of the genus *Phalacrus* Paykull in Hawaiʻi and only the second documented species of Phalacridae for the entire archipelago (Nishida 2002). The confident establishment of the specific identity of this species of this species was not possible at this time, as the genus is so poorly known taxonomically (G. Lyubarsky, pers. comm.). In the key to the species of *Phalacrus* of the Oriental region (a likely source area for many introductions to the Hawaiian Islands) in Lyubarsky (1994), our specimens came out as *Phalacrus luteicornis* Champion, which is known from India, China, and Japan. While our specimens are no doubt related to this species, they differed from it by way of several significant characters, including coloration, pubescence, and sculpturing (*q.v.* Champion 1924). In our attempts to identify our specimens, the reviews of the *Phalacrus* species of the Australian and Papuan (Lea 1932), Nearctic (Casey 1916) and west Palaearctic (Vogt 1967) regions were also consulted. Our specimens were also compared with identified material of the widespread species *Phalacrus corrscus* (Panzer), with which it was found not to be conspecific. Despite our inability to identify our specimens, we are quite confident that it is not a native species to the Hawaiian Islands and speculate that it is most likely a recent immigrant, and is probably an undescribed species of eastern Asian origin.

Species of *Phalacrus* are associated with rust (Uredinales) and smut (Ustilaginales) fungi, the spores of which they feed on as both larvae and adults (Steiner 1984).

Material examined: **NIʻIHAU**: Lehua Islet: 200 m, 30–31 May 2003, S.L. Montgomery, swept (3 BPBM).

Coccinellidae

Cryptolaemus montrouzieri Mulsant **New island record**

Status: introduced (Funasaki *et al.* 1988).

This species is native to Australia and has been widely introduced as a biological control agent of various species of scale insects (Coccoidea) and other Sternorrhyncha (Funasaki *et al.* 1988). *Cryptolaemus montrouzieri* has been documented from all the main Hawaiian

Islands except Kaho‘olawe (Nishida 2002). While purposefully introduced to the main Hawaiian Islands, *C. montrouzieri* undoubtedly dispersed to Lehua by natural means.

Material examined: **NI‘IHAU**: Lehua Islet: 200 m, 30–31 May 2003, S.L. Montgomery, swept (1 BPBM).

Tenebrionidae

Gonocephalum adpressiforme Kazab **New island record**

Status: adventive (Nishida 2002).

Native to the Philippines, this species has spread to many islands in the Pacific, including Midway in the Northwestern Hawaiian Islands and to all the main Hawaiian Islands except Kaho‘olawe (Nishida 2002). Commonly found beneath stones or other ground debris, *G. adpressiforme* is thought to feed on decaying organic matter (Illingworth 1927).

Material examined: **NI‘IHAU**: Lehua Islet: 10 m, 30–31 May 2003, S.L. Montgomery (3 BPBM). SW coast, 20–21 Dec 2001, C. Swenson, pitfall trap (4 BPBM).

Chrysomelidae

Systena blanda Melsheimer **New island record**

Status: adventive (Samuelson 1988).

This species is native to North America and is known to feed on a wide range of plants, including several agricultural species (Samuelson 1988). Previously, this species has been reported only from O‘ahu (Nishida 2002).

Material examined: **NI‘IHAU**: Lehua Islet: 10 m, 30–31 May 2003, S.L. Montgomery, swept (4 BPBM).

Curculionidae

Hypurus betrandi (Perris) **New island record**

Status: adventive (Zimmerman 1957).

Native to Mediterranean coastal areas of Europe and Africa, adults and larvae of *H. betrandi* feed on plants in the genus *Portulaca,* two species of which are known to occur on Lehua (Wood *et al.* 2004). The presence of this specialized alien herbivore may pose a significant threat to *Portulaca villosa* Champion, a Hawaiian endemic considered to be of “vulnerable” status (Wagner *et al.* 1990). *Hypurus betrandi* is also known to occur on Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Nishida 2002).

Material examined: **NI‘IHAU**: Lehua Islet: SW coast, 20–21 Dec 2001, C. Swenson, pitfall trap (1 BPBM).

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Passandridae (Coleoptera), a new beetle family established in the Hawaiian Islands[1]

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We report the first record of a species of the family Passandridae (Coleoptera: Cucujoidea) from the Hawaiian Islands. Three specimens of *Passandra elongatula* Grouvelle have been collected on the island of O'ahu on three separate occasions. Each of the O'ahu specimens were collected in different years (1977, 1999, 2000) and at different localities, all in the Pearl Harbor-Barbers Point area. These data give us reason believe this species has established a naturalized, breeding population on O'ahu.

The material studied resides in three collections: BPBM (Bishop Museum, Honolulu), HDOA (Hawaii Department of Agriculture, Honolulu), CTAM (Department of Plant and Environmental Protection Services, University of Hawai'i at Mānoa, Honolulu).

Those few species of Passandridae for which we have any life history information at all are known to be ectoparasites of the larvae of other wood-boring species of Coleoptera, including those of the families Bostrichidae, Cerambycidae, and Curculionidae (including Scolytinae and Platypodinae), and Hymenoptera (Burckhardt & Slipinski 2003). One congener of our species, *Passandra trigemina* (Newman), has been associated with Cryptorhynchinae (Curculionidae) (Burckhardt & Slipinski 2003). The feeding habits of adults are unknown.

Passandrids have historically been treated as a subfamily of the family Cucujidae (Hetschko 1930) but are now widely recognized as distinct family (Lawrence & Newton 1995, Slipinski 1986, Burckhardt & Slipinski 2003).

Passandra elongatula Grouvelle **New state record**

Passandra elongatula is an Indo-Malayan species, previously known from Bhutan, Laos, peninsular Malaysia, Indonesia (Sumatra, Java, and Ambon Island), and the Philippines (Luzon) (Slipinski 1986, Burckhardt & Slipinski 2003, BPBM). Grouvelle (1874) based *P. elongatula* on Malayan material and later (Grouvelle 1876) added some further description and a line illustration of the habitus. The lectotype of *P. elongatula* (designated by Slipinski 1986) is from Malacca, Malaysia. The O'ahu specimens were determined using the revised key to the world species of *Passandra* presented by Burckhardt & Slipinski (2003) and were directly compared with material of *P. elongatula* determined by S.A.

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Slipinski, deposited in the BPBM. Excellent figures of several of the diagnostic features of *P. elongatula* were included in Slipinski (1986) and reprinted in Burckhardt & Slipinski (2003). It is considered adventive in Hawai'i.

Material examined: **O'AHU**: Pearl City, 13 Feb 1977, P. Tenzing via J.W. Beardsley Collection (1 female CTAM, University of Hawai'i at Mānoa); Barbers Point, 40 ft [16.5 m], 12 Aug 1999, W.D. Perreria (1 female BPBM); Kalaeloa, 40 ft [16.5 m], Oct 2000, Perreria (1 HDOA).

Acknowledgments

We thank Bernarr Kumashiro (HDOA) and Dick Tsuda (CTAM) for various help; and Neal Evenhuis (BPBM) and S.A. Slipinski (CSIRO, Canberra, Australia) for reviewing this paper.

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New species of plagithmysines from Maui and Hawai'i plus a significant new plant host record for a previously described species from Hawai'i (Coleoptera: Cerambycidae)[1]

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Three significant host-associated plagithmysines were collected during 2000–2001. Two are members of *Plagithmysus* (*Plagithmysus*) from the island of Hawai'i: the first is *kraussi* Gressitt & Davis, previously not associated with any host but now reared from *Sida* and marking the first association of any plagithmysine with Malvaceae; the second is described as new and extends the range for the *Pittosporum*-associated plagithmysines

1. Contribution No. 2006-025 to the Hawaii Biological Survey.

to that island; both beetles were reared from their respective hosts. A new species from Maui in the subgenus *Neoclytarlus* is described and fills a vacant niche for the *Chenopodium*-associated plagithmysines for that island. Holotypes of new species and vouchers are deposited in Bishop Museum, Honolulu (BPBM).

Plagithmysus (Plagithmysus) kraussi Gressitt & Davis
(Figs. 1–2)

Plagithmysus (Plagithmysus) kraussi Gressitt & Davis, 1969, *Proc. Hawaii. Entomol. Soc.* 20: 339–340, fig. 6 (Hawai'i: Kawaihae; Bishop type no. 8031).—Gressitt, 1978, *Pacific Insects* 18: 161, fig. 9 (diagram).

Variation. Derm of body surfaces ranging from reddish fuscous as in the holotype to dull pitch black overall; the paler fuscous specimens tend to have the prothorax darker than the elytra. In the darkest and least hirsute extreme (fig. 1), surfaces of the head lack any white but the black derm of the pronotum and elytra is strongly contrasted with white pubescence: pronotum with ± fine sublateral stripe on each side, elytron with a discal sutural stripe broken into spots along apical 2/3, the stripe gradually diverging from suture from preapex anteriad to mid disc, and elytral postbasal area with a few isolated white flecks. In the most hirsute extreme (fig. 2), the head surfaces, pronotum, and ventral surfaces are ± copiously clothed with white, the elytron is less copiously clothed but still with more white laterally and postbasally besides the sutural stripe. Body length 9.50–12.75 mm; body breadth 2.85–3.85 mm.

Material examined. **HAWAI'I**: S Kohala: Puakō, 45 m [800 ft], 24 Jun 2000, reared ex *Sida* stems, S.L. Montgomery (1 ♀); Ouli, E Kawaihae Rd, 305 m [1000 ft], 22–26 Jun 2000, reared ex *Sida*, Montgomery (1 ♀); same data except host collected on 12 Feb 2004, adult emerged 6 Mar 2004 (1 ♀); same data except adult emerged 12 May 2004 (1 ♀); Waiki'i, 1435 m 4700 ft), 24 Jul 1950, on apricot fruit, N.L.H. Krauss (1 ♀) [new citation]. Holotype also examined: Kawaihae, 500 m, ii.1950, Krauss (HT ♀). All in BPBM.

Remarks. This is the first plagithmysine to be reared from *Sida* and the Malvaceae. Gressitt (1978: 161) placed this species near the base of the plagithmysines in a diagrammatic tree, not knowing the host identity but guessing *Santalum*. The only plagithmysine reared from *Santalum* is *P. (P.) greenwelli* Gressitt & Davis, also from the island of Hawai'i but it appears far different from *kraussi* in having the pronotal tubercles very strongly elevated on the median ridge and the sublateral ridge fairly sharply elevated, instead of having the median ridge low and broad and the sublateral ridge weakly developed.

Plagithmysus (Plagithmysus) hoawae Samuelson, **n.sp.**
(Fig. 3)

Female (Holotype). Derm dull black throughout head, antenna, prothorax, and elytron mostly blackish but orangish fuscous on humeral area and side below humerus on basal 1/3, pterothorax reddish and abdomen reddish black, and legs entirely to partly reddish black, the pedicel of the mid- and hind femur yellow-testaceous on about the basal 2/5. Vestiture: frons subsparsely clothed with white on sides; interantennal space and eye-emargination with white patch; gena and occiput sparsely clothed with white; pronotum with faint sparse white sublateral stripe; scutellum glabrous; elytral base with scattered white flecks; elytral disc with white-spotted sutural stripe on apical 3/5, the anterior end turning obliquely outward; prosternum with fairly dense grouping of slender erect setae; pterothorax and abdomen with slender setae sparser; apex of metepisternum and sides of abdominal sternites

Figures 1–2. *Plagithmysus kraussi* Gressitt & Davis. **1**. Least hirsute extreme. **2**. Most hirsute extreme.

marked with dense patches of white; mid- and hind femur with slender setae on ventral edge, these usually not longer than breadth of pedicel; other surfaces with a few white flecks mixed in with dark; hind tibia with black raised bristles; hind basitarsus with whitish buff slightly raised bristles.

Head broadest at eyes where breadth is 2.07 x as broad as interocular space and distinctly broader than occiput; frons deeper than broad (27 : 23), median line extending from interantennal space to basal 3/10, the surface microgranulate-punctulate; antennal bases fairly swollen and obliquely declined to median line; eye 0.83 x as deep as interocular space and slightly deeper than gena to genal angle (19 : 18); vertex weakly convex across middle, no median line, the surface dull microgranulate with < 20 punctures on each side. Antenna extending a little past basal 2/5 of elytron; segments 3–5 slender but slightly thickened apically; 6–10 shorter and gradually but evenly thickened to apices; last with apex broadly acute on apical 1/3; relative lengths of segments: 24 : 8 : 25+ : 27 : 24+ : 19 : 16 : 12 : 12 : 11 : 12. Prothorax with length = to maximum breadth (27 : 27); side moderately convex and broadest at middle, the breadth narrower than elytra across humeri; anterior margin produced across middle; disc with moderately strong and broad median crest bearing tubercles and a low broad sublateral swelling, this slightly sharpened and highest prebasally; median tubercles: the anterior one well-produced but not exceeding anterior margin, the apex in frontal view rounded, posterior group with 2 transverse rather straight carinae, the intermediate area indistinctly roughened across middle; pronotal surface dull overall finely and closely roughened and punctulate. Scutellum rounded apically, the surface with rough microsculpture as on pronotum. Elytron 5.37 x as long as broad, broadest across humeri where breadth distinctly exceeds prothorax (35 : 27); side gradually and evenly narrowed to preapex; preapex obliquely continued from suture to acute apex. Ventral surfaces: thorax closely punctulate with dull microgranulose sculpture, this roughest on prosternum; abdominal sterna shining, almost smooth but with a fine isodiagrammatic microsculpture and small asperations associated with setae. Legs: mid- and hind femur pedunculate between basal 1/3 and 2/5, club gradually broadened, surface microgranulate with small aspirations associated with setae; hind femur just exceeding elytral

Figure 3. *Plagithmysus hoawae* Samuelson, n. sp.

apex; hind tibia flattened and arched apically, surface with sculpture similar to femoral club; hind basitarsus about 2.2 x as long as 2 + 3. Body length 10.75 mm; body breadth 3.02 mm.

Male (Allotype). Body surfaces largely orange-fuscous becoming blackish fuscous on vertex, pronotum, and narrowly along mid part of elytral suture: this elytral dark area beginning at basal 1/4 where it is broadest and then it gradually tapers into suture near apical 1/4; pedicels of femora paler orange-fuscous than darker reddish distal parts; tibiae dark reddish. White pubescence: frons moderately clothed on each side; pronotum with rather faintly clothed submedian stripe, this strongest at base but again becoming a little stronger at apex; side of prothorax faintly marked basally; elytron with basal flecks and again with heavier flecks across mid disc and along suture; ventral surfaces faintly marked excepting dense spot at apex of metepisternum. Antenna with ventral fringe moderate to sparse on segments 1–5. Legs with femoral pubescence rather short; hind tibial pubescence longest and most erect; hind basitarsus with pubescence slightly raised and partly whitish but not conspicuously so.

Resembles ♀, except that the anterior pronotal tubercle is stronger and ± vertical, the abdomen is far shorter than elytral apex vs. of subequal lengths, and the hind femur is much heavier and conspicuously longer, exceeding elytral apex vs. barely so. Body length 12.94 mm; body breadth 3.61 mm.

Variation (6 ♀, 3 ♂). Dorsal coloration: pronotum rather uniformly dull black with faint silvery submedian (1+1) stripes, 1 ♂ with central disc slightly paler, more reddish; elytral derm predominantly orangish or blackish in either sex, the paler orange with usually fuscescent shading along suture, the darker blackish with sometimes orangish areas basally near humerus; all specimens with the discal elytral line made up of white spots but the anterior branch tends to be more diffused and not so distinct; additional white spots present across the elytral base, and sometimes with a few in the postbasal area. The median line on the vertex tends to be completely obliterated by rough sculpture but the line is ± faintly visible in 1 specimen. The pronotal median tubercles of the anterior group and bicarinate posterior group are well-developed in all specimens with sometimes a hint of an additional transverse carina between the anterior and posterior groups.

Measurements: Female: BL 10.08–14.78 mm, BB 2.86–4.20. Male: BL 9.41–13.94 mm; B 2.68 3.61–3.78 mm.

Types. Holotype ♀ (BPBM 16,401): **HAWAI'I**: Kona Forest Unit, Hakalau Forest NWR [National Wildlife Reserve], 675 m [5500 ft], 25 Aug 2000, reared ex *Pittosporum*, W. Haines collector; same data but 1 Aug 2000 (allotype ♂, paratypes: 1 ♂, 2 ♀); same data but 5 Sep 2000 (♀ paratype); same data but 9 Nov 2000 (♀ paratype); same data but 19 Nov 2000, HVNP003854 (♂ paratype, HAVO); same data but 1 Aug 2000, HVNP003843 (♀ paratype, HAVO) Note: 2 ♀ paratypes preserved in alcohol.

Remarks. This new species appears to fit closely with its *Pittosporum*-associated congeners from Maui and Lāna'i, and more remotely to its counterpart from Kaua'i. Males tend to have the hind femur much heavier and longer than females, which have the hind femur rather slender and pedunculate, resembling *Neoclytarlus*.

Etymology. This new species takes its name from the Hawaiian *ho'awa* for *Pittosporum*, its host. This epithet may seem a bit unusual due to its Hawaiian pronunciation which should approximate in English to: ho-ava-e.

Key to *Pittosporum*-associated *Plagithmysus* in Hawai'i

1. Pronotum with anterior median tubercle not overhanging the anterior margin 2
–. Pronotum with anterior median tubercle distinctly overhanging the anterior margin ..... (Kaua'i) ..... **sugawai** Gressitt & Davis

2. Vertex with median line extending into at least basal part behind antennal tubercles 3
–. Vertex with median line nearly to completely obliterated, the surface with a dull rough microsculpture ... (Hawai'i) ..... **hoawae** Samuelson, **n.sp.**

3. Prothorax with side below the submedian ridge generally clothed with pale pubescence ... (Lāna'i) ..... **pittospori** Gressitt
–. Prothorax with the area laterad of the submedian ridge glabrous or scantily clothed ... (W Maui) ..... **rebeccae** Gressitt

Plagithmysus (Neoclytarlus) kahului Samuelson, **n.sp.**

(Figs. 4–5)

Male (Holotype). Body form with prothorax especially massive in this sex. Derm of body surfaces buffy fuscous to testaceous: the light differences in derm color offset by a rather uniform close clothing of whitish buff; antenna buff-testaceous; legs: femora brownish testaceous, tibiae and tarsi buff-testaceous. Vestiture: frons, gena, vertex, prothorax, ventral surfaces, and femora densely clothed with whitish buff; elytron slightly more thinly clothed in places but with an additional denser discal stripe which does not stand out so sharply due to the overall pubescence, the fairly stout stripe extends along the posterior 3/4 of the suture and gradually broadens basally where it obliquely terminates at the basal 1/4; femora supplemented by slender suberect setae along the ventral surface, the mid- and hind femur with these trailing setae slightly longer than the narrowest part of the pedicel; hind tibia submoderately clothed with slender raised pale setae, these rather short above and long below; mid- and hind basitarsus above with fine slightly raised setae, these mixed of black and white hairs.

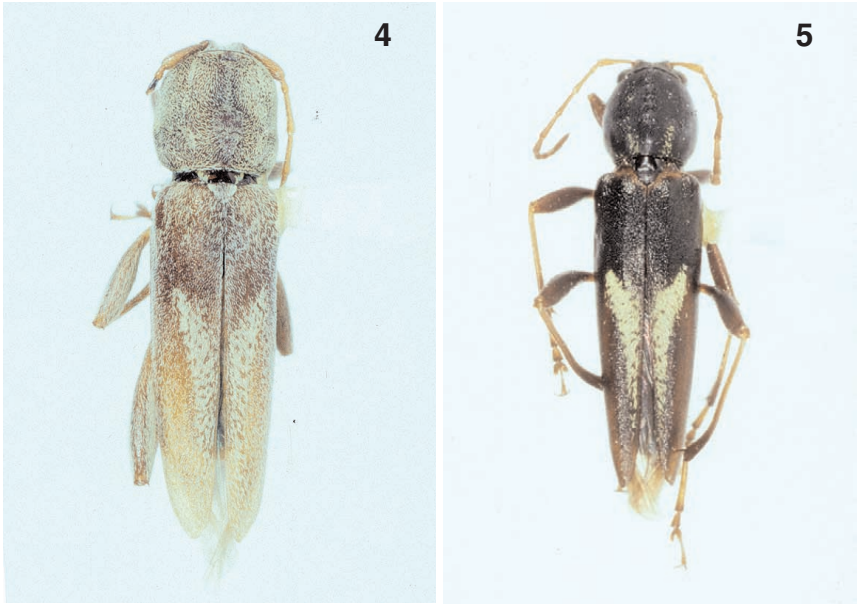
Head broadest at eyes but barely broader than occiput and distinctly narrower than the anterior part of the prothorax; frons with depth = to breadth across interocular space (25 : 25), sides ± parallel, surface ± flat above but anterior 3/10 bent obliquely upward; antennal bases weakly swollen, the surface obliquely depressed to median line which ends slightly above middle of frons; eye rather small: 0.68 x as deep as breadth of interocular space and barely longer than gena to genal angle (17 : 16); vertex barely convex and showing large, shallow punctures: approximately 15–20 punctures on each side of median line. Antenna extending to basal 1/4 of elytron near beginning of stripe; scape clavate, the apical area moderately thickened; segments 3–5 slender, gradually broadened to apices and fitted with

trailing hairs ventrally; remaining segments increasingly shorter (except last), these tending to be stout with apices obliquely but weakly produced; 11 with apex rather briefly rounded; relative lengths of segments: 23 : 6+ : 19 : 20 : 19 : 13 : 2 : 9 : 8 : 7 : 10. Prothorax robust: about 0.95 x as long as broad and slightly broader than elytra; anterior margin slightly convex; side moderately convex, more so at base; base straight; disc broadly and subevenly convex, the median ridge low and gradually concave in lateral profile between anterior tubercle and postmedian group; anterior tubercle low, narrow, subtruncate-rounded, not interrupting anterior margin; postmedian group low, with 1st a broad crescent about 1/7 as broad as prothorax, the 2nd a slightly narrower but a deeper crescent; submedian area swollen basally and subtuberculate prebasally. Scutellum with apex convex. Elytron about 2.9 x as long as pronotum and 6 x as long as broad, the breadth slightly decreasing to basal 2/5, then tapered a little more strongly to preapex; preapex suddenly narrowed to subacute-rounded apex; disc in reflected light punctulate, the punctures fine and central ones mostly 0.5 x as large as interspaces with intervals smooth-alutaceous (punctures appearing closer with intervals rougher in direct light). Ventral surfaces with derm somewhat obscured by close adpressed pubescence: prosternum in reflected light closely punctulate, the intervals somewhat raised; metasternum ± smooth-alutaceous with low asperations associated with seta bases; abdomen more finely punctulate; abdominal apex truncate. Legs fairly slender; mid femur clavate on apical 2/3; hind femur moderately arched, clavate on apical 3/5, the sides of the club somewhat flattened; hind tibia feebly arched and moderately flattened; hind basitarsus slender and distinctly longer than segments 2 + 3 (14+ : 10). Body length 10.08 mm; breadth 2.77 mm.

Female (Allotype). Body mass more normal for a *Neoclytarlus* in being more slender than in the male, thus with the prothorax not so massive and distinctly narrower than the elytra. Derm of body surfaces mostly subshining matt black, tinged with fuscous around antennal sockets, inner eye-margins, gena, mouthparts, and elytral bases (these areas black in other females); abdominal sternites smoother, shining; antenna yellow-testaceous; legs with femora largely fuscous but becoming yellowish on pedicels of the mid and hind; tibiae yellowish to fuscescent apically; tarsi yellowish to fuscescent. Dorsum glabrous to scantily clothed excepting feeble submedian stripe of whitish hairs on pronotal disc and densely clothed whitish discal stripe on elytral disc, similar to male; antenna with trailing setae on segments 3–5 and fine close golden pubescence on 6–11; ventral surfaces lacking the close adpressed pubescence of the male but with silvery raised setae moderate on thorax and sparse on abdomen; femora with trailing hairs short, mostly shorter than pedicel breadth of the mid and hind; tibiae also with short trailing hairs; mid- and hind basitarsus finely and rather thinly clothed with slender black setae.

Frons about as deep as broad (25 : 26), finely and closely punctulate, the punctures becoming larger at sides, surface ± dull, median line extending to about middle; eye about 0.73 x as deep as breadth of interocular space and deeper than gena (19 : 16); gena and vertex finely, closely punctulate, and generally dull but with a small number of larger shallow punctures. Antenna short as in male, with segment lengths also in a similar ratio. Prothorax 0.97 x as long as broad, broadest at middle, distinctly narrower than elytra; sides quite convex; disc irregularly convex; the median ridge low with tubercles not very strongly developed: the anterior- and posterior-most ones the largest with small dentations in saddle between them; sublateral ridge with a broad low prominence prebasally; surface finely and closely punctulate, the intervals finely raised and somewhat asperate in places, altogether producing a dull-shine. Elytron finely and closely punctulate, intervals smooth-alutaceous to microrugose, surface with a dull shine. Ventral surfaces rather smoother than dorsum; abdomen nearly as long as elytra. Legs: mid- and hind femur moderately arched with pedicels about 1/2 as long as club; hind tibia flattened and slightly arched apically; hind basitarsus much longer than 2 + 3 (16 : 10). Body length 11.09 mm; breadth 2.86 mm.

Variation (6 ♂, 4 ♀). Males generally pale buff and marked as in holotype; females generally blackish and marked as in allotype but the pronotal submedian whitish stripe sometimes more pronounced and complete than noted for the allotype. Males tend to be shorter than females (6.55–9.41 mm vs. 9.24–11.09 mm), with the body length/breadth ratio slenderer in males than females (3.9–4.0 vs. 2.4–3.0), the robust male prothorax notwithstanding. The pronotal length/breadth ratio broadly overlaps in both sexes 0.95–0.98 (discounting 1 ♀ at 0.86). Males tend to have the elytral length/pronotal length



Figures 4–5. *Plagithmysus kahului* Samuelson, n. sp. **4**. Male. **5**. Female.

shorter than females (2.91–3.26 vs. 3.19–3.62). Body length 6.55–11.09 mm; breadth 1.68–3.02 mm.

Types. Holotype ♂ (BPBM 16,402), allotype ♀, paratype ♂: **MAUI** (isthmus): Kahului Airport: Spreckelsville beach, on coastal sand dunes off E end of Kahului Airport runway, 20°53'56"N, 156°27'16"W, 2 m, 29 Mar 2000, on *Chenopodium oahuense*, F. Starr & G.A. Samuelson; same data, except G.A. Samuelson & R. Takumi (2 ♀ paratypes); same loc., 30 Mar 2000, D.J. Preston (1 ♀ paratype); same loc., wetland, 20°53'57"N, 156°26'53"W, 28 Apr 2000, on *Chenopodium*, Preston & J.E. Dockall (4 ♂ paratypes).

Remarks. The new species is close to *Plagithmysus chenopodii* Perkins from O‘ahu, and keys to that species in Gressitt & Davis (1969). Males tend to have the pronotal median ridge clothed with depressed pubescence while in *chenopodii* the median ridge is usually glabrous; females tend to have the side of the prothorax (laterad of the submedian stripe) glabrous while in *chenopodii* the lateral area is sometimes moderately clothed with adpressed pubescence. Both species are sexually dimorphic in vestiture and color, the males with a buff-colored derm plus a close pale pubescence and the females with a black derm, the general pubescence tending heavier in *chenopodii* while lighter to non-existent in the new species. In both species the short broad elytral stripe stands out dramatically against the blackish surface in females but in males the stripe is less conspicuous due to the general buff vestiture.

The discovery of this species was unexpected during the arthropod survey at Kahului Airport (Howarth & Preston 2001). Much of the land there is dominated by naturalized plants, but a strip of the native lowland plant community exists along the ocean end of the runway to the adjacent sand dunes above the beach. There the *Chenopodium* with its associated plagithmysine continue to this day, attesting to the reasonable health of the this rather limited community.

Etymology. The name for this species takes Kahului as a noun in apposition, as a dedication to its provenance.

Acknowledgments
I thank Will Haines, formerly with the US Geological Survey and David Foote, Volcano, Hawai‘i (HAVO); Steven L. Montgomery of Village Park, O‘ahu; Forrest Starr, Kim Martz Starr, and Raina Takumi of Makawao, Maui; Francis G. Howarth, David J. Preston, John E. Dockall, and Clyde Imada, Bishop Museum, Honolulu (BPBM) for providing the new collections and for various assistance.

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Callirhipidae, a new family to the Hawaiian beetle fauna[1]

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Coleoptera: Callirhipidae
Callirhipis robusta Waterhouse **New state record**

This species represents the first established member of Callirhipidae in Hawai‘i. *Callirhipis robusta* was described from a unique specimen from Thailand in the British Museum by Waterhouse (1877: 385).

Hawaiian specimens along with similar specimens from Laos were sent to R. Madge, Commonwealth Institute of Entomology, London, who made the identification in March 1990. The natural range of *C. robusta* embraces SE Asia. This species was first seen on O‘ahu over 15 years ago but is infrequently collected. The recent captures in Kahalu‘u Valley mark about an 8 km range extension from Kāne‘ohe and indicates the establishment and spread of this beetle. Larvae are woodborers, usually in decaying wood. The habitat of the Kahalu‘u location is lowland wet forest, with *Acacia koa* and *Pandanus tectorius*, and the possibly indigenous *Hibiscus tiliaceus* as the predominant native trees, plus a dense infusion of exotic species, including species of *Brassaia, Cecropia, Eugenia*, *Persea*, and *Psidium*.

Material examined. **O‘AHU**: Kāne‘ohe, 17 Nov 1989, attracted to house lights, C. Murdock (1 ex, CIE, London); Kāne‘ohe, 21 Nov 1994, Neil Reimer (1 ex, HDOA); Kāne‘ohe, 18 Jun 1996, in house, M. Braden (1 ex, BPBM); Kāne‘ohe, Kahalu‘u Val., near end of Ahuimanu Road, 100 m, 21

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Figure 1. Dorsal view of *Callirhipis robusta*. Body length of this specimen is 17.8 mm.

Apr 2004, alive on water surface in barrel, G.A. & S.L. Samuelson (1 ex, BPBM); same location, 7 May 2004, S.L. Samuelson (1 ex, BPBM).

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Specularius impressithorax, an adventive bean weevil on *Erythrina* new to the Hawaiian Islands (Coleoptera: Chrysomelidae: Bruchinae)[1]

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Specularius impressithorax (Pic), described from Africa, is now established in the Hawaiian Islands. Kingsolver & Decelle (1979) discussed the earlier distribution and host range of this species, it being essentially the only bruchine (together with the form *minor* Zacher) that has adapted to feeding on seeds of *Erythrina*. They reported it from a number of hosts, including 2 New World species planted in Africa. Its range was reported for parts of eastern and southern Africa, with apparent spread to India and Sumatra; and the form minor was reported for the subequatorial western part of Africa.

Specularius impressithorax (Pic) **New state record**
(Figs. 1–2)

The arrival of *Specularius impressithorax* to Hawai‘i must have been fairly recent, though we are uncertain of its point of introduction. The earliest record is an observation by Joel Lau, who noted extensive feeding damage to seeds of *wiliwili*, *Erythrina sandwicensis*, at

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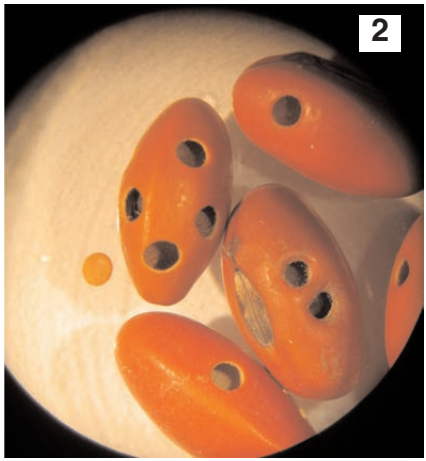

Figures 1–2. *Specularius impressithorax*, adult and host seeds. **1**. adult, lateral view (body length 4 mm); **2**. host seeds (length 14–16 mm) of *Erythrina sandwicensis* showing emergence holes of *Specularius*; note "lid" of seed integument on left.

Mākaha Valley, O'ahu in September 2001. By the beginning of 2004, *S. impressithroax* had been collected throughout the main Hawaiian islands, including Kaho'olawe. Because of the rather sudden appearence of this insect over the past two years, we may presume that its spread had been very rapid following its initial period of establishment. *Erythrina* has been frequently noted by field biologists and their sudden recent reports corroborate the rapid spread of this insect. Likewise, seed collectors have also noticed the sudden high incidence of destroyed seeds, thus this insect is impacting the local industry of seed lei making to some extent, as the bright red wiliwili seeds are sometimes made up into special leis.

Specimens were referred to the first author for identification, and that series, collected by Hank Oppenheimer, was sent to J.M. Kingsolver for identification. Kingsolver suggested looking at the article on the *Erythrina*-associated bruchid (Kingsolver & Decelle 1979), and consequently, we had a good idea of the identity of his adventive insect before the actual specimens were seen by him. The identity of this insect was then made by Kingsolver (FSCA: Florida State Collection of Arthropods, Gainesville). Other abbreviations used here are HDOA = the Hawaii State Department of Agriculture collection, Honolulu (Bernarr Kumashiro); BPBM = Bishop Museum, Honolulu; and NTBG = National Tropical Botanical Garden, Lawa'i, Kaua'i.

Eggs are laid on the seed surface from which the larvae issue and commence boring into the seed. Larvae continue to develop inside the seed where pupation occurs, followed by adult emergence, with each emerging adult cutting a perfect circular lid out of the seed integument. Seeds tend to be packed with individual larvae, so little remains of the original material. Parasitic hymenopterans have been reared from seeds but these remain unidentified. The family Bruchidae is listed in Nishida (2002) but it is now relegated as the subfamily Bruchinae of Chrysomelidae.

A number of *Erythrina* hosts have been reported for *Specularius* from the Hawaiian Islands but only one species, *Erythrina sandwicensis*, is endemic to these islands. Hawaiian host records include *Erythrina: americana*, *crista-galli, eudiphylla, humeane,*

lysistemon, microcarpa, sandwicensis, *sykesii* (as hybrid: *sykesii* x*variegata*), and *variegata*. All were present and positive for *Specularius* at the NTBG in Lawa‘i.

Material examined. **KAUA‘I**: Various series were taken by A.C. Medeiros and associates from NTBG, Lawa‘i, 7 Jan 2003, from seeds of various species of *Erythrina* (many ex.; hosts listed at end); Kekaha Road, 7 Jan 2003, ex *E. sandwicensis*, Medeiros (3 ex); same loc., 300 ft [100 m], 7 Jun 2003, *E. sandwicensis*, Arnold & Baynton (7 ex). All in BPBM. **O‘AHU**: Mākaha Valley, S side at 240–360 ft [80–120 m], 1 Sep 2001, ex infested seeds in *wiliwili* groves [*Erythrina sandwicensis*] J. Lau, heavy infestation noted; Nanakuli Valley, 70 m, 10 Nov 2001, host on valley floor, seeds showing many exit holes, some occupied by beetles, Lau (2 ex); Waipahu, Village Park, 300 ft [100 m], collected late 2003 to 5 Jan 2004, ex seeds *Erythrina sandwicensis*, 2003 crop, S.L. Montgomery (51 ex) (BPBM). **MAUI:** Maui (E): Pu‘u O Kali, ~800 ft [280 m], 15 Jun 2002, ex *Erythrina sandwicensis* seeds, F. & K. Starr collectors (series in HDOA); same loc., 9 Jul 2003, A.C. Medeiros *et al*. (8 ex, BPBM); Kanaio, 28 Jun 2003, ex seeds, *E. sandwicensis*, Medeiros *et al*. (21 ex, BPBM); Kahului Airport, 24 Aug 2003, ex *Erythrina* seeds, F.G. Howarth, F. & K. Starr (2 ex, + 1 larva, BPBM); Maui (W): Kaonohua Gulch, Alaloa subdivision, 9 Apr 2003, ex seeds on *Erythrina sandwicensis*, H. Oppenheimer (BPBM 5 ex, FSCA 4 ex). **KAHO‘OLAWE**: Moaulaiki, 23 Sep 2003, degraded dry forest, ex seeds of *Erythrina sandwicensis* (seeds were observed to have eggs on them; adult emergence from seeds: 28 Sep–4 Oct 2003), M. LeGrande (#1343), F.& K. Starr (>20 ex, BPBM). **HAWAI‘I**: Kona, Kaloko Rd, Jul 2003, *E. sandwicensis*, J. Wagner for Medeiros (8 ex, BPBM).

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New Arthropod Records from Kaho‘olawe

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The following contributions include 36 new island records of arthropods located on the island of Kaho‘olawe. Of these new records, 4 are endemic and the rest are nonnative. Voucher specimens were collected by the authors, and determined by either the authors or by Mach Fukada. A couple specimens (*Omiodes* spp.) were confirmed by Will Haines. All vouchers are housed in Bishop Museum, Honolulu.

Blattodea: Blaberidae

Diploptera punctata (Eschscholtz) **New island record**

Diploptera punctata (cypress cockroach) was previously known from all the main Hawaiian islands except Kaho‘olawe (Nishida 2002). This collection represents a new island record for Kaho‘olawe.

Material examined. **KAHO‘OLAWE**: Moa‘ulanui, under wood pile, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-8* (2 specimens).

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Pycnoscelus indicus (Fabricius) **New island record**

Pycnoscelus indicus (Surinam roach) was previously known from all the Northwestern Hawaiian islands except Lisianski, Gardner Pinnacles, and Necker and from all the main islands except Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Moaʻulanui, under wood pile, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-9* (1 specimen).

Blattodea: Blattidae

Periplaneta americana (Linnaeus) **New island record**

Periplaneta americana (American cockroach) was previously known from all the Northwestern Hawaiian islands except Kure atoll and Gardner Pinnacles and from all the main islands except Niʻihau and Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Moaʻulanui, under wood pile, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-10* (1 specimen).

Coleoptera: Anthribidae

Araecerus levipennis Jordan **New island record**

Araecerus levipennis (*koa haole* seed weevil) was previously known from Midway Atoll and all the main islands except Niʻihau and Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: LZ1, on *Leucaena leucocephala*, 1300 ft [396 m], 23 Sep 2003, *Starr, Starr, Abbott, LeGrande, & Busby 030923-14* (1 specimen); Lua Makika, vegetation sweeps, 1400 ft [425 m], 29 Mar 2004, *Starr, Starr, & Abbott 040329-1* (11 specimens).

Coleoptera: Bostrichidae

Xylopsocus castanoptera (Fairmaire) **New island record**

Xylopsocus castanoptera was previously known from Kauaʻi, Oʻahu, Molokaʻi, and Hawaiʻi (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Keanakeiki, vegetation sweeps, 10 ft [3 m], 15 Oct 2003, *Starr, Starr, King, Tokishi, & Busby 031015-13* (1 specimen); Moaʻulanui, vegetation sweeps, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-12* (1 specimen).

Coleoptera: Bruchidae

Acanthoscelides obtectus (Say) **New island record**

Acanthoscelides obtectus (bean weevil) was previously known from the islands of Niʻihau, Kauaʻi, Oʻahu, and Maui.

Material examined. **KAHOʻOLAWE**: Hakio'awa gulch, on rock, 200 ft [60 m], 23 Sep 2003, *Starr, Starr, Abbott, LeGrande, & Busby 030923-15* (1 specimen); LZ1, beaten from *Tamarix aphylla*, 1300 ft [396 m], 23 Sep 2003, *Starr, Starr, Abbott, LeGrande, & Busby 030923-16* (2 specimens); LZ1, beaten from *Chenopodium oahuense*, 1300 ft [396 m], 23 Sep 2003, *Starr, Starr, Abbott, LeGrande, & Busby 030923-17* (6 specimens); Moaʻulanui, vegetation sweeps, 1300 ft [396 m], 16 Oct 2003, *Starr & Starr 031016-11* (5 specimens); Lua Makika, vegetation sweeps, 1400 ft [427 m], 29 Mar 2004, *Starr & Starr 040329-2* (1 specimen).

Mimosestes nubigens (Motschulsky) **New island record**

Mimosestes nubigens (bean weevil) was previously known from Midway Atoll, Kauaʻi, Oʻahu, Molokaʻi, Maui, and Hawaiʻi (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Lua Kealialalo, near LZ quail, from *Prosopis pallida* pods, 850 ft [259 m], 23 Sep 2003, *Starr, Starr, Abbott, LeGrande, & Busby 030923-18* (1 specimen).

Stator limbatus (Horn) **New island record**

Stator limbatus (bean weevil) was previously known from Kauaʻi, Oʻahu, Molokaʻi, Maui, and Hawaiʻi (Nishida 2002).

Material examined. **KAHO‘OLAWE**: Moa‘ulanui, vegetation sweeps, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-13* (1 specimen).

Stator pruininus (Horn) **New island record**

Stator pruininus (pruinose bean weevil) was previously known from Midway atoll, Ni‘ihau, Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Nishida 2002).

Material examined. **KAHO‘OLAWE**: Moa‘ulanui, vegetation sweeps, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-14* (2 specimens); Lua Makika, vegetation sweeps, 1400 ft [425 m], 29 Mar 2004, *Starr, Starr, & Abbott 040329-3* (1 specimen).

Coleoptera: Carabidae

Notiobia purpurascens (Bates) **New island record**

Notiobia purpurascens was previously known from O‘ahu, Maui, and Hawai‘i (Nishida 2002).

Material examined. **KAHO‘OLAWE**: Hakio’awa gulch, on ground, 200 ft [60 m], 23 Sep 2003, *Starr, Starr, Abbott, LeGrande, & Busby 030923-19* (1 specimen); Moa‘ulanui, under wood pile, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-15* (1 specimen); Kaukaukapapa, near wetland, vegetation sweeps, 10 ft [3 m], 26 Feb 2004, *Starr, Starr, & Higashino 040216-2* (1 specimen).

Coleoptera: Cleridae

Tillus notatus Klug **New island record**

Tillus notatus was previously known from Kaua‘i, O‘ahu, and Maui (Nishida 2002).

Material examined. **KAHO‘OLAWE**: Kaukaukapapa, vegetation sweeps, 10 ft [3 m], 15 Oct 2003, *Starr, Starr, King, Tokishi, & Busby 031015-14* (1 specimen).

Coleoptera: Coccinellidae

Brumoides suturalis (Fabricius) **New island record**

Brumoides suturalis (three-striped lady beetle) was previously known from Ni‘ihau and O‘ahu (Nishida 2002).

Material examined. **KAHO‘OLAWE**: Honokanaia, 10 ft [3 m], 14 Oct 2003, *Starr, Starr, & King 031014-7* (1 specimen); Kaukaukapapa, on *Gossypium tomentosum*, 10 ft [3 m], 15 Oct 2003, *Starr, Starr, King, Tokishi, & Busby 031015-15* (1 specimen).

Coelophora inaequalis (Fabricius) **New island record**

Coelophora inaequalis (common Australian lady beetle) was previously known from Kure and Midway Atolls, Nihoa, and all the main islands except Kaho‘olawe (Nishida 2002).

Material examined. **KAHO‘OLAWE**: Honokanaia, grass sweeps, 15 ft [5 m], 16 Feb 2004, *Starr, Starr, & Higashino 040216-3* (2 specimens); Kaukaukapapa, vegetation sweeps, 10 ft [3 m], 16 Feb 2004, *Starr, Starr, & Higashino 040216-4* (1 specimen); Lua Makika, vegetation sweeps, 1400 ft [425 m], 29 Mar 2004, *Starr, Starr, & Abbott 040329-4* (2 specimens).

Curinus coeruleus (Mulsant) **New island record**

Curinus coeruleus (dark blue lady beetle) was previously known from Midway Atoll and all the main islands except Moloka‘i and Kaho‘olawe (Nishida 2002).

Material examined. **KAHO‘OLAWE**: Lua Makika, 1400 ft [425 m], 29 Mar 2004, *Starr, Starr, & Abbott 040329-5* (6 specimens).

Rodolia cardinalis (Mulsant) **New island record**

Rodolia cardinalis (vedalia beetle) was previously known from Midway Atoll and all the main islands except Moloka‘i and Kaho‘olawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Kaukaukapapa, vegetation sweeps, 10 ft [3 m], 15 Oct 2003, *Starr, Starr, King, Tokishi, & Busby 031015-16* (1 specimen).

Scymnus loewii Mulsant **New island record**

Scymnus loewii (Scymnus lady beetle) was previously known from all the Northwestern Hawaiian Islands except Midway atoll and Gardner Pinnacles and all the main islands except Kahoʻolawe.

Material examined. **KAHOʻOLAWE**: Puʻu Moaʻulaiki, on ground, 1200 ft [365 m], 22 Sep 2003, *Starr, Starr, Abbott, LeGrande, & Busby 030922-15* (1 specimen); Honokanaia, beaten from *Hibiscus tiliaceus*, 25 ft [8 m], 14 Oct 2003, *Starr, Starr, & King 031014-8* (7 specimens); Kaukaukapapa, vegetation sweeps, 10 ft [3 m], 15 Oct 2003, *Starr, Starr, King, Tokishi, & Busby 031015-17* (1 specimen); Lua Makika, vegetation sweeps, 1400 ft [425 m], 29 Mar 2004, *Starr, Starr, & Abbott 040329-6* (4 specimens).

Coleoptera: Chrysomellidae

Diachus auratus (Fabricius) **New island record**

Diachus auratus (bronze leaf beetle) was previously known from Midway Atoll and all the main islands except Lānaʻi and Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Kaukaukapapa, vegetation sweeps, 10 ft [3 m], 15 Oct 2003, *Starr, Starr, King, Tokishi, & Busby 031015-18* (1 specimen); Lua Makika, vegetation sweeps, 1400 ft [425 m], 29 Mar 2004, *Starr, Starr, & Abbott 040329-7* (3 specimens).

Coleoptera: Nitidulidae

Urophorus humeralis (Fabricius) **New island record**

Urophorus humeralis (sap beetle) was previously known from Kauaʻi, Oʻahu, Lānaʻi, and Maui (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Moaʻulanui, vegetation sweeps, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-16* (1 specimen).

Dermaptera: Carcinophoridae

Euborellia annulipes (Lucas) **New island record**

Euborellia annulipes (ring-legged earwig) was previously known from all the Northwestern Hawaiian Islands except Lisianski and Gardner Pinnacles and all the main islands except Niʻihau and Kahoʻolawe.

Material examined. **KAHOʻOLAWE**: Gunfire range, under wood pile, 600 ft [200 m], 30 Mar 2004, *Starr, Starr, & Abbott 040330-2* (1 specimen).

Euborellia eteronoma (Borelli) **New island record**

Euborellia eteronoma (Hawaiian earwig) was previously known from all the Northwestern Hawaiian Islands except Midway and Kure atolls, Necker, and Nihoa and all the main islands except Niʻihau and Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Gunfire range, under wood pile, 600 ft [200 m], 30 Mar 2004, *Starr, Starr, & Abbott 040330-3* (2 specimens).

Diptera: Syrphidae

Allograpta exotica (Wiedemann) **New island record**

Allograpta exotica (syrphid fly) was previously known from Kauaʻi, Oʻahu, Molokaʻi, Maui, and Hawaiʻi (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Moaʻulanui, vegetation sweeps, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-17* (1 specimen).

Simosyrphus grandicornis (Macquart) **New island record**

Simosyrphus grandicornis (hover fly) was previously known from all the Northwestern Hawaiian islands except Lisianski, Laysan, Gardner Pinnacles, and Necker and from all the main islands except Niʻihau, Lānaʻi, and Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Kaukaukapapa, vegetation sweeps, 10 ft [3 m], 16 Feb 2004, *Starr, Starr, & Higashino 040216-5* (8 specimens).

Embiidina: Ologotomidae

Oligotoma saundersii (Westwood) **New island record**

Oligotoma saundersii (Saunders embiid, webspinner) was previously known from all the Northwestern Hawaiian Islands except Kure Atoll, Lisianski, French Frigate Shoals, and Gardner Pinnacles, and all the main islands except Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Moaʻulanui, vegetation sweeps, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-18* (1 specimen).

Heteroptera: Lygaeidae

Graptostethus manillensis (Stål) **New island record**

Graptostethus manillensis (woodrose bug) was previously known from all the main islands except Molokaʻi and Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Honokanaia, beaten from *Hibiscus tiliaceus*, 25 ft [8 m], 14 Oct 2003, *Starr, Starr, & King 031014-9* (3 specimens).

Heteroptera: Pentatomidae

Nezara viridula (Linnaeus) **New island record**

Nezara viridula (southern green stink bug) was previously known from all the main islands except Niʻihau and Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Lua Makika, vegetation sweeps, 1400 ft [425 m], 29 Mar 2004, *Starr, Starr, & Abbott 040329-8* (1 specimen).

Oechalia pacifica (Stål) **New island record**

Oechalia pacifica (Hawaiian stink bug) was previously known from all the main islands except Niʻihau and Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Moaʻulanui, picked from *Tamarix aphylla*, 1300 ft [396 m], 29 Mar 2004, *Starr, Starr, & Abbott 040329-9* (6 specimens).

Homoptera: Cicadellidae

Planiocephalus flavicosta (Stål) **New island record**

Planiocephalus flavicosta (leafhopper) was previously known only from the island of Oʻahu (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Honokanaia, swept from *Cenchrus ciliaris*, 10 ft [3 m], 14 Oct 2003, *Starr, Starr, & King 031014-10* (2 specimens).

Hymenoptera: Evaniidae

Evania appendigaster (Linnaeus) **New island record**

Evania appendigaster (larger ensign wasp) was previously known from Midway Atoll, Niʻihau, Oʻahu, Maui, and Hawaiʻi (Nishida 2002; Howarth *et al.*, 2002).

Material examined. **KAHOʻOLAWE**: Moaʻulanui, on water tank, 1400 ft [425 m], 30 Mar 2004, *Starr, Starr, & Abbott 040330-4* (1 specimen).

Hymenoptera: Vespidae

Pachodynerus nasidens (Latreille) **New island record**

Pachodynerus nasidens (wasp) was previously known from Midway Atoll and all the main islands except Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Moaʻulanui, vegetation sweeps, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-19* (1 specimen).

Isoptera: Kalotermitidae

Cryptotermes brevis (Walker) **New island record**

Cryptotermes brevis (drywood termite) was previously known from Midway Atoll, Lisianski, Laysan, and French Frigate Shoals and all the main islands except Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Moaʻulanui, vegetation sweeps, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-20* (1 specimen).

Lepidoptera: Crambidae

Omiodes continuatalis (Wallengren) **New island record**

Omiodes continuatalis was previously known from all the main islands except Niʻihau and Kahoʻolawe. This species is a generalist on grasses and is one of the more common *Omiodes* species found in the main islands, even though it was previously thought to be extinct (W. Haines, pers. comm.).

Material examined. **KAHOʻOLAWE**: Honokania, basecamp, came to light at night, associated grasses in vicinity include *Sporobolus virginicus, Cenchrus ciliaris, and Chloris* spp., 15 ft [5 m], 16 Feb 2004, *Starr & Starr 040216-1* (1 specimen).

Omiodes demaratalis (Walker) **New island record**

Omiodes demaratalis (Hawaiian grass leaf roller moth) was previously known from all the main islands except Lānaʻi and Kahoʻolawe (Nishida 2002). It is now also known from Kahoʻolawe where it was found at Hakioʻawa, near the coast, on *Sporobolus virginicus* (*ʻaki*ʻ*aki*) that had been planted a few years prior for restoration purposes. Numerous (dozens) *O. demaratalis* flushed from the large patch of *S. virginicus* as we walked through sweeping with the net. This species is known to use grasses such as *Digitaria* sp. and *Panicum* sp., species which are abundant on Kahoʻolawe.

Material examined. **KAHOʻOLAWE**: Hakioʻawa, coastal strand, swept from *Sporobolus virginicus*, 10 ft [3 m], 30 Mar 2004, *Starr, Starr, & Tokishi 040330-1* (4 specimens).

Lepidoptera: Lycaenidae

Lampides boeticus (Linnaeus) **New island record**

Lampides boeticus (bean butterfly) was previously known from Necker, Nihoa, and all the main islands except Kahoʻolawe (Nishida 2002).

Material examined. **KAHOʻOLAWE**: Road to Puʻu Moaʻulaiki, swept from *Macroptilium* sp., 1200 ft [365 m], 30 Mar 2004, *Starr, Starr, & Tokishi 040330-5* (2 specimens).

Lepidoptera: Noctuidae

Eublemma accedens (Felder & Rogenhofer) **New island record**

Eublemma accedens (*ʻuhaloa* moth) was previously known from all the main islands except Niʻihau, Lānaʻi, and Kahoʻolawe (Nishida 2002; Howarth *et al*. 2002). On Kahoʻolawe it is common from sea level to the summit.

Material examined. **KAHOʻOLAWE**: Honokanaia, basecamp, KIRC hut, at light, 25 ft [8 m], 19 Jan 2004, *Starr, Starr, & Higashino 040119-1* (1 specimen); Honokanaia, basecamp, KIRC hut, at light, 25 ft [8 m], 16 Feb 2004, *Starr, Starr, & Higashino 040216-6* (1 specimen).

Lepidoptera: Sphingidae

Agrius cingulata (Fabricius) **New island record**

Agrius cingulata (sweet potato hornworm) was previously known from Midway Atoll, Laysan, and all the main islands except for Kahoʻolawe.

Material examined. **KAHO‘OLAWE**: Honokanaia, basecamp, KIRC hut, on floor, collected by L. Abbott, 25 ft [8 m], 28 Dec 2004, *Starr, Starr, & Abbott 041228-1* (1 specimen).

Orthoptera: Acrididae

Schistocerca nitens (Thunberg) **New island record**

Schistocerca nitens (vagrant grasshopper) was previously known from Necker, Nihoa, and all the main islands except Ni‘ihau and Kaho‘olawe (Nishida 2002).

Material examined. **KAHO‘OLAWE**: Moa‘ulanui, vegetation sweeps, 1300 ft [396 m], 16 Oct 2003, *Starr, Starr, & Mar 031016-21* (1 specimen).

Acknowledgements

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First record of coral crabs of the family Tetraliidae (Crustacea: Brachyura) from the Hawaiian Islands[1]

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Brachyuran crabs of the family Tetraliidae Castro *et al*. 2004, which comprises the genera *Tetralia* Dana and *Tetraloides* Galil are obligate symbionts of species of *Acropora*, scleractinian corals of circumtropical distribution. Tetraliids were formerly grouped with species of *Trapezia* Dana and other coral crabs in the family Trapeziidae Miers. All 8 described species of tetraliids are restricted to the Indo-West Pacific region (see Castro *et al*. 2004). Although 6 species of *Trapezia* are known from the Hawaiian Islands (Castro 1998), tetraliids have never been recorded from the archipelago until their recent discovery among collections made at French Frigate Shoals under the auspices of the Northwestern Hawaiian Islands Rapid Assessment and Monitoring Program 2000 (NOWRAMP 2000). The family had been previously recorded anywhere *Acropora* occurs

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throughout the Indo-West Pacific region, from the Red Sea and South Africa to French Polynesia, and Johnston Atoll (Castro 2000). French Frigate Shoals has the highest abundance and species diversity of *Acropora* (seven species) in the Hawaiian Archipelago (Maragos *et al*. 2004).

Tetraliidae

Tetralia glaberrima (Herbst) **New state record**

[syn. *Cancer glaberrimus* Herbst, 1790: 262, pl. 20, fig. 115; *Tetralia glaberrima fulva* Serène, 1984: 282; *Tetralia fulva* – Castro, 1997: 65; *Tetralia glaberrima* – Castro *et al*., 2004: 24 (synonymy, type material)].

This species is widely distributed throughout the Indo-West Pacific region wherever the coral *Acropora* is found, including southern Japan, Australia, Marshall Is., French Polynesia, and now the Hawaiian Islands.

Material examined: **FRENCH FRIGATE SHOALS:** west central lagoon, north side of La Perouse Pinnacle, site FFS-R-31, 23°46.280'N, 166°15.737'W, 10–15m, coll. S. Godwin, 26 Sep 2000 (1 male) (BPBM-S 12267, Marine Invertebrate Collection).

Tetralia muta (Linnaeus) **New state record**

[syn. *Cancer mutus* Linnaeus, 1758: 625; *Tetralia vanninii* Galil & Clark, 1988: 146, figs. 1C, 2B, 3C, 4C, 4H, 6C; *Tetralia muta* – Castro *et al.,* 2004: 29 (synonymy, type material)]

This species, like *T. glaberrima*, is widely distributed throughout the Indo-West Pacific region wherever the coral *Acropora* is found. It has been recorded from Christmas I., Johnston Atoll (P. Castro, unpubl. data), and now the Hawaiian Islands.

Material examined: **FRENCH FRIGATE SHOALS**: North central lagoon, submerged pinnacle 2 km south of Tern Island, site FFS-R-27, 23°50.907'N, 166°17.215'W, 2–9 m, coll. S. Godwin, 25 Sep 2000 (1 ovigerous female) (BPBM-S 12266, Marine Invertebrate Collection).

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Documentation of box jellyfish *Carybdea sivickisi* and *Carybdea rastoni* (Cubozoa: Carybdeidae) at Ma‘alaea Harbor, Maui

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Since the 1990s, box jellyfish have become high profile animals along beach shorelines of the island of O‘ahu. Due to powerful stings affecting ocean visitors, and corresponding beach closures, it has become increasingly important to document box jellies along Hawaiian coastlines. Three species have been described in Hawaiian waters: 1) *Charybdea arborifera* Maas that was synonymized with *Carybdea rastoni* by Mayer (1910); 2) *Charybdea moseri* Mayer, placed in *Carybdea alata* by Mayer (1910); 3) *Carybdea sivickisi* (Stiasny), reported in Hawaiian waters in 1996 (Matsumoto *et al.* 2002). Recent observations at Ma‘alaea Harbor, Maui, documented two species including one new location record and one new island record.

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

Night lighting observations were conducted from shore near the condominiums at the southern end of Ma‘alaea Boat Harbor on 23 July 2005, and 7 and 9 February 2006. Box jellies attracted to the light, were hand netted and placed in 86% ethanol. Specimens were all less than 12 mm in bell height. Some specimens will be used for future DNA research.

Carybdea sivickisi was originally observed from Hawai‘i in 1996 from the southern and western coastlines of O‘ahu (Matsumoto *et al*. 2002). This species appears to be wide-

spread throughout the Indo-Pacific. Specimens were present in summer and winter, suggesting that this species may not show a strong seasonal pattern in Hawaiian waters. The appearance of this species on both O‘ahu and Maui suggests that it may be widespread throughout the Hawaiian Islands.

Material examined. **MAUI:** southwest coast at Ma‘alaea Boat Harbor, 7 Feb 2006 (BPBM D1117, 1 spm) and 9 Feb 2006 (BPBM D1118, 5 spms).

Carybdea rastoni (Haacke) **Range extension**

Night lighting observations were conducted from shore near the condominiums at the southern end of Ma‘alaea Boat Harbor on 30 July 2004, 23 July 2005, 7 and 9 February 2006. Box jellies attracted to the light were hand netted and placed in 86% ethanol. Specimens were generally in the 20–25 mm range in bell height. Some specimens will be used for future DNA research. *Carybdea rastoni* was first described from Honolulu surface waters in 1891 (Maas 1897), and from Puni‘awa Pt, Maui, at three collections sites along the north shore; and from Honolulu Harbor, O‘ahu, and from Hanalei Bay, Kaua‘i in 1902 (Mayer 1906). *Carybdea rastoni* has been documented from the southwest portion of Maui and appears to be widespread throughout the Hawaiian Islands. This species does not show the 8–10 day pattern of appearance after the full moon that is seen in *Carybdea alata* (*moseri*) (Thomas *et al*. 2001). There is some taxonomic uncertainty as to the actual species of box jellyfish in Hawai‘i. Studies aimed at resolving the relationship of Hawaiian box jellyfish to other Pacific species are underway (Holland & Crow pers. comm.).

Material examined. **MAUI:** southwest coast at Ma‘alaea Boat Harbor, 7 Feb 2006 (BPBM D1119, 3 spms) and 9 Feb 2006 (BPBM D1120, 1 spm).

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Records of rare ground-dwelling land snails on O‘ahu

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Survey work conducted during 2005 led to the following records of two extant native ground-dwelling land snail species on the island of O‘ahu. These two species belong to two families that have been considered either extinct or extremely rare in the Hawaiian Islands (Lydeard *et al*. 2004; R.H. Cowie, pers. comm.).

Endodontidae

Cookeconcha hystricella (Pfeiffer) **Notable rediscovery**

The family Endodontidae was probably the most diverse and widespread Pacific island land snail family (Solem 1976). Now, however, most Pacific endodontid species are extinct, with those remaining being reduced to sparse, highly localized populations (Lydeard *et al*. 2004). Live endodontids have not been reported in the Hawaiian Islands for many years, and so the finding of this population of *Cookeconcha hystricella* in the Wai‘anae Mountains is of major significance. The population seems to be around a few hundred individuals, according to The Nature Conservancy, which has begun monitoring (D. Sailer pers. comm.).

Material Examined: **O‘AHU**: Wai‘anae Mountains, Pu‘u Hapapa ca 2200 ft [670 m], 23 Aug 2005, W.M. Meyer (BPBM Malacology 268775).

Helicinidae

Unidentified species **Notable rediscovery**

Land snail specialists have not reported seeing helicinids alive in the wild in the Hawaiian Islands for many years and the family has been considered probably extinct in the Islands (R.H. Cowie pers. comm.), although some species remain abundant elsewhere in the Pacific (Cowie 2001). Therefore, the finding of this population, in the same location as the endodontids above, is also of major significance. Hawaiian Helicinidae have been referred to two genera: *Orobophana* Wagner and *Pleuropoma* Möllendorff (see Neal 1934; Cowie *et al*. 1995). However, the taxonomy of the species remains extremely unclear and it is frequently not possible to place individual specimens in recognized species or even genera with certainty. This is the case for the present specimen, which is simply reported as an unidentified helicinid.

Material Examined: **O‘AHU**: Wai‘anae Mountains, Pu‘u Hapapa ca 2200 ft [670 m], 23 Aug 2005, W.M. Meyer (BPBM Malacology 268776).

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New island records of an endemic Hawaiian land snail species, *Succinea caduca* Mighels (Gastropoda: Pulmonata: Succineidae)

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Known island by island occurrences of native Hawaiian land snail species have been cataloged by Cowie *et al*. (1995). Almost 90 % of the more than 750 species endemic to the archipelago are single island endemics. This figure may be somewhat exaggerated because of a tendency in the past to name new species based solely on their occurrence on different islands, despite their being almost indistinguishable morphologically (e.g., Pilsbry & Cooke 1914–1916: 22–23).

Application of a molecular systematics approach to understanding evolutionary histories, biogeographic patterns, and taxonomic boundaries is a relatively recent endeavor with powerful potential to test morphologically and geographically based taxonomic designations objectively. In the few cases in which such work has been undertaken on the Hawaiian land snail fauna, traditional species designations have largely been confirmed whereas generic boundaries have been challenged (Thacker & Hadfield 2000; Holland & Hadfield 2002; Holland & Hadfield 2004; Rundell *et al*. 2004). Regarding the rather few species that have been considered as multi-island endemics, molecular approaches can either confirm that the different island populations do indeed belong to a single species or that they should be distinguished as separate taxa.

Because most native Hawaiian land snail species are single island endemics and because of the high level of extinctions and range reductions among these species (Solem 1990; Lydeard *et al*. 2004) it would be extremely unexpected to discover a species on an island from which it had not previously been reported. As part of our ongoing molecular study of the phylogenetics, historical biogeography, and systematics of the Pacific island land snail family Succineidae, we are focusing on the phylogeography of *Succinea caduca* Mighels, which was previously known from the islands of O‘ahu, Lāna‘i, and Moloka‘i. Here, we report its continued presence on these three islands, as well as the first documentation of live specimens on three additional islands: Kaua‘i, Maui, and Hawai‘i.

Succineidae

Succinea caduca (Mighels) **New island records**

Field surveys of *S. caduca* were undertaken throughout the Hawaiian Islands during 2004–2005. Molecular analyses based on two mtDNA genes (Holland and Cowie in

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review.) focusing on putative *Succinea caduca* populations from the islands of Kaua‘i, O‘ahu, Moloka‘i, Maui, Lāna‘i and Hawai‘i have confirmed that all specimens sequenced constitute a monophyletic clade and that the level of DNA sequence variation within the clade is consistent with them all belonging to a single species.

A number of the collection sites where *S. caduca* had been reported historically (e.g., Ka‘ena Point) had been searched intensively during the period 1998–2001 without finding *S. caduca* alive. However, in late February 2004, following unusually protracted rainfall, literally thousands of specimens were observed at a number of locations actively crawling across normally dry substrates, and amassing in puddles, ephemeral pools, and run-off in low-lying normally dry areas on O‘ahu (e.g., Makapu‘u Point and Ka‘ena Point). Subsequent searching elsewhere on O‘ahu and on other islands found them often, but not always, under overhangs and in cracks and crevices in vertical lava rock faces such as road cuts, and among leaf litter and at the bases of dense clumps of grass. In one particularly dry and dusty locality on the leeward side of Kaua‘i, almost all of the 28 specimens from two similar sites were collected on trunks of *kiawe* (*Prosopis pallida)* trees close to sea level, and within 10 m of the beach. The snails are not constrained to native vegetation but often occur in habitats highly modified by introduced plants, including grasses, cacti and *koa haole* (*Leucaena leucocephala*), and can be found in highly disturbed locations adjacent to urban development (e.g., within 50 m of Dole Street at the lower end of Wa‘ahila Ridge adjacent to the University of Hawai‘i campus). Exceptionally for a native Hawaiian land snail species, *S. caduca* appears not to be under threat. Because of its preference for dry areas, its distribution may only partially overlap with that of the introduced predatory snail *Euglandina rosea* (Férussac), one of the major causes of the decline of native Hawaiian land snails (Hadfield *et al*. 1993; Cowie 2001), which may thus be a factor in the continued survival of *S. caduca*.

Material examined: All catalog numbers are Bishop Museum (BPBM) Malacology Collection numbers. **KAUA‘I**: Port Allen, in dry grass directly across unpaved rd from beach, ca 30 ft [9 m] from high tide mark, B.S. Holland, H. Nagatsuka, 16 Apr 2005 (268700); Russian Fort, in *kiawe* trees ca 20 m from beach, B.S. Holland, H. Nagatsuka, 17 Apr 2005 (268701); **O‘AHU**: Makapu‘u Head, along lighthouse trail, multiple sites, ca 200–600 ft [62–182 m], B.S. Holland, H. Nagatsuka, 28 Feb 2004 (268702); Ka‘ena Point along unpaved rd, ca 100 ft [30 m] from shoreline, 2 sites, B.S. Holland, H. Nagatsuka, 29 Feb 2004 (268703); Lualualei Valley, dry bed of Ulehawa Stream near gate to Kolekole Pass Rd, B.S. Holland, 28 Mar 2004 (268704); Kalaniana‘ole Hwy, dry grass along rock faces, and roadcut, multiple sites, ca 100–500 ft [30–152 m], B.S. Holland, H. Nagatsuka, 18 Apr 2004 (268705); Koko Head, dry grass under rocks, B.S. Holland, H. Nagatsuka, ca 600 ft [182 m], 18 Apr 2004 (268706); inside Diamond Head Crater, along trail, ca 300–600 ft [91–182 m], K.A. Hayes, 5 Jan 2005 (268707); outside Diamond Head Crater, on rock face near tunnel, B.S. Holland, 13 Jan 2005 (268708); Mākua Valley, lower ‘Ōhikilolo Ridge, ca 1000 ft [305 m], V. Costello, 3 Feb 2005 (268709); Barbers Point, in leaf litter, on *kiawe* stumps and trees, B.S. Holland, H. Nagatsuka, 12 Mar 2005 (268710); cliffs above Farrington Hwy across from Mākaha Beach Park, ca 10–400 ft [3–122 m], multiple sites, B.S. Holland, 6 Apr 2005 (268711); Lualualei Valley, on cliffs above Lualualei Naval Rd, below Pu‘u Haleakalā, ca 200–400 ft [61–122 m], B.S. Holland, 6 Apr 2005 (268712); Wa‘ahila Ridge, ca 500 ft [152 m], B.S. Holland, 16 May 2005 (268713); S side of Kailua Road, opposite Kawainui Marsh levee trailhead, ca 200 ft [61 m], B.S. Holland, 30 May 2005 (268714); Koko Crater, Botanical Garden, inner and outer crater, multiple sites along loop trail, B.S. Holland, 6 Jun 2005 (268715); **MOLOKA‘I**: Mo‘omomi Preserve, near western boundary of preserve, alongside unpaved rd in dry grass, 200 ft [61 m], B.S. Holland, R.H. Cowie, K.A. Hayes, 10 Mar 2005 (268716); Maunaloa Hwy roadcut, 1038 ft [316 m], B.S. Holland, R.H. Cowie, K.A. Hayes, 10 Mar 2005 (268717); Kamehameha Hwy near Kawela, in dry grass, ca 30 ft [9 m], B.S.

Holland, R.H. Cowie, K.A. Hayes, 10 Mar 2005 (268718); **MAUI**: Apole Pt, along Pi‘ilani Hwy, in leaf litter and on dry grass, 300 ft [91 m], B.S. Holland, K.A. Hayes, C.E. Bird, 11 Apr 2005 (268719); **LĀNA‘I**: North side of Keōmuku Road, above Kahōkūnui, in dry rocky gulch, 500 ft [152 m], B.S. Holland, C.E. Bird, 5 Feb 2005 (268720); beside Kaumalapau Hwy, 3 sites, 200–1000 ft [60–305 m], B.S. Holland, R.H. Cowie, K.A. Hayes, W.M. Meyer, C.E. Bird, V.A. Cowie, 5 Feb 2005 (268721); **HAWAI‘I**: south of Kawaihae, in Makeāhua Gulch ca 1500 ft [~460 m] from the ocean, ca 10 ft [~3 m], B.S. Holland, N. Velasco, 8 Jun 2005 (281715).

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New Records of Alien Lizards from Maui County[1]

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Hawai‘i has seen an increase in recent years of new records of alien reptiles and amphibians brought into the state, largely via illegal trafficking but also via the nursery trade (Kraus *et al*. 1999; Kraus 2002; Kraus & Duvall 2004). As well, species long established on O‘ahu continue to have their ranges expanded to other islands with human assistance. I herein report new reptile records for Maui County.

Chamaeleonidae

Chamaeleo jacksonii Boulenger **New island record**

Established since the early 1970s on O‘ahu via illegally released pet-trade animals (McKeown 1996), this species has been spread throughout the state by pet owners and aficionados. Previously reported from every main island except Moloka‘i, this record now fills in that range gap. Apparently deliberately released in upper-elevation native forest.

Material examined: **MOLOKA‘I**: upper rim of Kalāupapa National Historical Park, 21.13058°N, 156.92122°W, 1062 m, 18 Aug 2005, F. Kraus (BPBM 21875).

Gekkonidae

Phelsuma laticauda (Boettger) **New island record**

Previously recorded on O‘ahu, Maui, and Hawai‘i Island (McKeown 1996), this species is deliberately spread by gaudy-lizard aficionados as well as moved unintentionally in nursery plants. The restriction of the present record to a stand of ornamental trees argues for their transportation to Moloka‘i via the latter pathway.

Material examined: **MOLOKA‘I**: Moloka‘i Airport, 18 Aug 2005, F. Kraus, G. Hughes & J. Bazzano (BPBM 21739).

Iguanidae

Iguana iguana (Linnaeus) **New island record**

Previously reported as established only on O‘ahu (McKeown 1996), and present since the late 1950s or early 1960s, this species was imported for use in the pet trade. Specimens have been reported on Maui for several years and recent sightings and a voucher specimen on the remote southern flank of Haleakalā confirm their establishment on that island.

Material examined: **MAUI**: on Kanaio Rd, 90 m mauka of junction with Pi‘ilani Hwy, 27 Dec 2005, M. Vacek (BPBM 23604).

Polychrotidae

Anolis sagrei Duméril & Bibron **New island record**

Previously reported from O‘ahu and Kaua‘i (McKeown 1996; Kraus 2003), this species has become widespread on the former island due to its common presence in traded nursery plants. Its presence on Maui is certainly due to the same pathway; in addition to the vouchered record below, I have seen the animals in the nursery at Home Depot in Kahului.

Material examined: **MAUI**: Whaler's Village, Ka‘anapali, 18 Mar 2005, L. Heron (BPBM 21130).

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Numbers of Hawaiian Species for 2003 – 2005[1]

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Background

This supplement is the first following a detailed assessment of the numbers of species in the Hawaiian Islands (Eldredge & Evenhuis 2003). The rich biodiversity of the Hawaiian Islands comprises 26,608 species (Table 1). Hawai‘i accounts for only about 0.2% of the land area of the United States yet it has 31% of the national federally endangered species and 42% of its endangered birds. Almost 75% of the historically documented extinctions of plants and animals in the United States have occurred in the Hawaiian Islands (Allison & Miller 2000).

Hawaii Biological Survey is continually posting species checklists (terrestrial arthropods, native and alien land and freshwater snails, marine invertebrates, flowering plants, fungi, amphibians, reptiles, birds, and mammals) in searchable interfaces for the Hawaiian biota on our website server [http://hbs.bishopmuseum.org]. These are being revised and updated on a regular basis.

Included in this report are the first records of halophilic bacteria from the saline lake at Laysan; addition of algae species following the recently published monographs on the red, green, and brown algae; a review of the revisionary genera of the black coral *Antipatharia*; updating of the scaphopod genera; and numerous new species of insects and crustaceans. Of note are the books: Natural History of Nihoa and Necker (Evenhuis & Eldredge 2004) and Checklist of the Fishes of the Hawaiian Archipelago (Mundy 2005).

Notes on the Taxa

Bacteria

New species *Idiomarina loihiensis*, a halophilic *γ-Proteobacterium* from Loihi Seamount (Donache *et al*. 2003). New species *Psychroflexus tropicus* from the hypersaline lake at Laysan Island in the Northwestern Hawaiian Islands (Donache *et al*. 2004a). The microbial diversity of five lakes, an anchialine pool, and the Lo‘ihi submarine volcano were studied and found that each had a distinct prokaryotic community dominated by Bacteria (Donache *et al*. 2004b). New species *Arcobacter halophilus* Donache *et al.* (2005), from Laysan Island, the first obligately halophilic member of the genus.

1. Contribution No. 2006-030 to the Hawaii Biological Survey.

Algae

Identification guide, color-illustrated, for the stream macroalgae of Hawai'i (Sherwood 2004a). Sherwood (2004b) reported 797 species of nonmarine algae (including 378 diatom species) from streams, terrestrial, airborne, taro patches, and hot spring habitats; brackish water forms were excluded. The filamentous diatom *Diprora haenaensis* Main, n.gen. and n.sp. was described (Main 2003). A monograph of the marine green and brown algae included 169 species (107 green, 62 brown) (Abbott & Huisman 2004). Following the publication of the monograph on the red algae (Abbott 1999), the following additions have been made: *Gloiotrichus factalis* Huisman & Kraft is reported from the first time from the island of Hawai'i (and the Pacific) (Huisman & Abbott 2003a); 2 new species (*Liagora donaldiana* and *L. julieae*) were described (Huisman & Abbott 2003b); *Ganonema yoshizaki*, new species, was added (Huisman *et al.* 2004); and the status of *Liagora hawaiiana* Butters was clarified (Huisman & Abbott 2003c). *Acrosymphyton brainardii* described as new by Vroom & Abbott (2004a); *Scinaia huismanii* also described as new by Vroom & Abbott (2004b); both species are known only from the Northwestern Hawaiian Islands. The total species of marine algae from Hawai'i is 522 species. Morphological variation in the deep ocean-dwelling cocolithophore *Florisphaera profunda* Okada & Honjo [Division Haptophyta] reported from specimens collected at 100–200 m at the Hawaiian Ocean Time series station (Quinn 2005).

Fungi

Metschnikowia santaceciliae, Candida hawaiiana, and *C. kipukae* are described as new species (Lachance *et al.* 2003). *Metschnikowia hamakuensis, M. kamakouana*, and *M. mauinuiana* described as new endemic species (Lachance *et al.* 2005); these 6 new species from the phylum Ascomycota are from yeasts from Hawaiian nitidulid beetles. New species *Candida leandrae* described from a drosophilid fly associated with a Convolvulaceae flower (Ruivo *et al.* 2004). The chytrid fungus *Batrachochytriuim dendrobatidis* is reported from the introduced frog *Eleutherodactylus coqui*; this is the first report from wild populations in Hawai'i (Beard & O'Neill 2005). New species *Opegrapha cladoniicola* [Family Roccellaceae] from *Cladonia ochrochlora* from Lāna'i (Ertz & Diederich 2003). New species *Phoma billsii* J. F. White described from soil from a sugarcane field on Maui (Torres *et al.* 2005).

Lichens

Two Hawaiian lichen species recently recognized: *Parmeliella cinerata* (Zahlbr.) P.M. Jorg. and *P. exornata* (Zahlbr.) P.M. Jorg. [Family Pannariaceae] (Jorgensen 2003). Two new endemic species: *Ramalina reptans* and *R. subrotunda* [Family Pamalinaceae] (Kashiwadani *et al.* 2002).

Bryophyta

A recently compiled checklist of the Hawaiian mosses includes a total of 273 named taxa (Staples *et al.* 2004); 14 of these are considered noninidgenous. One additional species, *Bryoerythrophyllum ferruginascens* (Stirt.) Giacom. is added in this HBS records.

Flowering Plants

Tetraplasandra lydgatei (Hillebr.) (Araliaceae) given recognition; the species was previously thought to be *T. oahuensis* (A.Gray) (Motley 2005). The genus *Kadua*, (Rubiaceae) previously considered to be *Hedyotis,* is reported with a list of *Kadua* names, including necessary new combinations and their *Hedyotis* synonyms (Terrell *et al.* 2005). The genus *Radula* (Radulaceae) is revised (So 2005). New species of Hawaiian silversword *Dubautia*

Table 1. Estimates of numbers of known species of Hawaiian biota (based on previous *HBS Records*, including this paper and other papers in this issue of the *Records*.

Taxon	Total	Endemic	NIS
Viruses (not surveyed)			
Bacteria (not surveyed)			
Algae	1359	128+	19+
Other protists	1237	?	?
Fungi (including) lichens	3220	983	12+
Flowering Plants	2868	902	1215
Other plants	637	294	55
Cnidarians	412	113	50
Insects	8282	3903	2814
Other arthropods	995	360	618
Crustaceans	1431	68+	99
Molluscs	2171	1105	133
Annelids	392	87+	47
Echinoderms	309	150	1
Other invertebrates	1776	443	89
Fishes	1253	159	55
Amphibians	6	0	6
Reptiles	30	0	24
Birds	186	65	55
Mammals	44	2	19
Totals	26,608	8762	5311

kalalauensis from northwestern Kaua‘i (Baldwin & Carr 2005). Chromosome counts for 90 collections (67 native Hawaiian angiosperm species and 8 hybrids) are reported (Kiehn 2005). The endemic genus *Schiedea* (Caryophyllaceae), including 34 species is reviewed in a monograph by Wagner *et al.* (2005). New palm species *Dypsis robusta*; not included in species numbers because it is in cultivation (Hodel *et al*. 2005).

Porifera

Two unidentified sponges have been shown to have new metabolites: poipuol from the genus *Hyrtios* (Sata *et al.* 2005a) and lehualides from the genus *Plakortis* (Sata *et al.* 2005b) [neither of these genera has been previously reported from Hawaiian waters]. Maldonado *et al.* (2005) reported on the silicon structure of the heretofore unreported sponge *Sericolophus hawaiicus* Tabachnick & Levi (2000).

Cnidaria: Hydrozoa

New species *Crossota millsae* Thuesen (Thuesen 2003). Four species of stylasterid hydrozoans are described from the Northwestern Hawaiian Islands, 3 new species *Disticophora asulcata, Stylaster griggi, S. infundibuliferus* are described*; Disticophora anceps* Cairns, was collected and known only from the northwestern slope of Laysan Island (Cairns 2005).

Cnidaria: Scyphozoa
New species *Tiburnia granrojo* Matsumoto, Raskoff, & Lindsay in new subfamily Tiburoninae (Matsumoto *et al.* 2003). Analysis of the introduced jellyfish *Cassiopea* supported at least two independent introductions to the Hawaiian Islands; one from the Indo-Pacific, another from the Atlantic/Red Sea areas (Holland *et al.* 2004). A global phylogeny of the moon jellyfish *Aurelia* reveals at least 16 phylogenetic species; *Aurelia labiata* of some Hawaiian authors should be reconsidered as *Aurelia* sp. 4 as an introduced species (Dawson *et al.* 2005). The well known "box jellyfish" *Carybdea alata* as been revised to become *Alatina moseri* (Mayer) in *Alatina* n. gen. and Alatininae n. subfam. (Gershwin 2005).

Cnidaria: Anthozoa: Antipatharia
New antipatharian family, Myriopathidae, new genus *Myriopathes* Opresko, new combination *M. ulux* [for *Antipathes ulux* Ellis & Solander] (Opresko 2001). New genus, new species *Stauropathes staurocrada* (Opresko 2002). New antipatharian genus *Trissopathes* Opresko, new species *T. pseudotristicha* (Opresko 2003). New antipatharian genus *Acanthopathes* Opresko, new combination *Acanthopathes undulata* [for *Antipathes undulata* van Pesch] (Opresko 2004). New species *Bathypathes seculata*, n. gen. n. sp. *Umbellapathes helioanthes*, new species *Dendropathes bacotaylorae* (Opresko 2005). *Antipathes dichotoma* Pallas, previous reports from Hawai'i are incorrect, "No specimen has yet been described in the literature from the western Atlantic or the Indo-Pacific that can conclusively be identified as *A. dichotoma*" (Opresko 2003).

Cnidaria: Anthozoa: Scleractinia
Eleven stony coral species reported from the Hawaiian Islands for the first time; 29 range extensions to the Northwestern Hawaiian Islands; the presence of 7 species of *Acropora,* not known from the Main Hawaiian Islands, are recorded from NWHI (Maragos *et al.* 2004).

Cnidaria: Anthozoa: Actiniaria
The sea anemone known in Hawai'i as *Actiniogeton sesere* should be properly termed *Gyractis sesere* (Haddon & Shackleton) (Fautin 2005). New record *Diadumene lineata* (Verrill) reported from Kāne'ohe Bay and Pearl and Hermes Reef (Zabin *et al.* 2004).

Platyhelminthes
In their color-illustrated book on marine flatworms of the world (Newman & Cannon 2003), they illustrate 6 species from Hawai'i, 2 of which are new records.

Nematomorpha
The two species previously reported from Hawai'i have been synonymized with *Gordius robustus* Leidy; two additional species, *Paragordius varius (*Leidy) and new species *Gordionus longistriatus* Schmidt-Rhaesa, are added to those from Hawai'i (Schmidt-Rhaesa *et al.* 2003; Schmidt-Rhaesa 2004).

Nematoda
Three parasitic species found in Hawaiian specimens of Jackson's chameleon (*Chamaeleo jacksoni*): *Physaloptera* sp., *Physocephalus* sp., and member of Acuariidae, all nematodes; there are no reports of these species in African chamaeleons; their occurrence in Hawaiian specimens represent an instance of an immigrant host capturing local nematodes (Goldberg *et al.* 2004). New species *Filenchus flagellicaudatus* and *Lelenchus schmitti* [Family Tylenchidae] described from Pēpē'ōpae bog on Moloka'i (Bernard 2005).

Acanthocephala
The acanthocephalan parasite *Acanthocephalus bufonis* reported for the first time in the introduced wrinkled frog, *Rana rugosa* (Goldberg *et al.* 2005).

Annelida: Polychaeta
New species *Saccocirrus alanhongi*, *S. oahuensis*, *S. waianaensis* Bailey-Brock, Dreyer, and Brock 2003. Five benthic species ecology detailed (Bailey-Brock *et al.* 2002). The genus *Hydroides* has been revised; Hawai'i now has 5 species: *Hydroides bannerorum* Bailey-Brock; *H. brachyacanthus* Rioja; *H. cruciger* Morch; *H. diramphus* Morch; *H. elegans* (Haswell) (Bastida-Zavala & ten Hove 2003). Name change *Myriaida pachycera* (Augener) for *Myriaida crassicirrata* Hartman-Schroder (Nygren 2004). Name change *Pseudobranchiomma punctata* (Treadwell) for *Laonome punctata* Treadwell; replacement name *Sabellastarte spectabilis* (Grube) for *S. indica*, including *S. sanctijosephi* ("may be confined to Red Sea") (Knight-Jones & Mackie 2003). New record *Micropadarke dubia* (Hessle) collected from sewage outfalls (Pleijel & Rouse 2005). New species *Progoniada oahuensis* Barrett & Bailey-Brock (2005).

Annelida: Oligochaeta
New species *Tubificoides calvescentis* Erseus *et al.* (2005).

Annelida: Hirudinea
New records of introduced leech—*Helobdella europaea* Kutschera, collected in 2003 (Siddall & Budinoff 2005). *Alboglossiphonia weberi* (Blanchard) replacement name for *Glossiphonia weberi* (Siddall *et al.* 2005) in a phylogenetic evaluation of the family Glossiphoniidae.

Mollusca: Gastropoda
New species [Pickworthiidae] *Reynellona bollandi* and *Sansonia alisonae* LeRenard & Bouchet (2003); also reported *Ampullosansonia hyalina* Kase and *Microliotia hawaiiensis* Kase. Newly reported family Aegiridae with *Aegires exeches* Fahey & Gosliner (2004). New species *Melibe engeli* Gosliner & Smith (2003). *Nassarius olomea* Kay, revalidated from its being synonymized with *N. crebrucostatus* (Kool 2004). New subspecies *Mauritia maculifera hawaiiensis* Heiman (2005). New species, *Conus mcbridei* (Lorenz 2005).

Mollusca: Scaphopoda
Previously reported scaphopod species (Heath 1911) have been revised: *Anatalis phanea* (= *Dentalium phaneum*), *Fissidentalium complexum* (= *Dentalium complexum*), and *Gadila honolululensis* (= *Cadulus honoluluensis*) (Steiner & Kabat 2001).

Mollusca: Cephalopoda
Generic designation change: *Pteroctopus hoylei* (Berry) for *Berrya hoylei*; *Macrotritopus defilippi* (Verany) for *Octopus defilippi*; *Callistoctupus ornatus* (Gould) for *O. ornatus* (Norman & Hochberg 2005).

Arthropoda: Insecta
Polhemus (2003) reviewed the Heteroptera genus *Orthotylus* (Miridae) and described 21 new species and redescribed 5 species. Sixty species of the native bee of the genus *Hylaeus* (*Nesopromsopis*) (Hymenoptera) are revised for the Hawaiian Islands including 10 new species (Daly & Magnacca 2003). The *Drosophila mimica* subgroup was revised, including description of 10 new species, and key to subgroup is provided (O'Grady *et al*. 2003). The

Hawaiian species of *Rhyncogonus* (Coleoptera) are revised, treating 47 species 15 proposed as new (Samuelson 2003). Wang & Messing (2002) reported *Diachasminmorpha kraussii* and *Fopius arisanus* [Hymenoptera] as introduced parasitic species effecting established parasites. New mosquito record: *Anopheles (Anopheles) punctipennis* (Say) reported for first time on O‘ahu, additional trapping indicated the populations of this species have not become established (Furumizo *et al*. 2005). New mosquito record: *Aedes (Finlaya) japonicus japonicus* (Theobald) has become established on the island of Hawai‘i (Larish & Savage 2005). The phylogeny and age of diversification of the *Drosophila planitibia* species group reported (Bonacum *et al.* 2005). New species *Encarsia dispersa* [Hymenoptera] described (Polaszek *et al.* 2004). Polhemus (2004) described 34 new species of *Orthotylus* [Heteroptera, Miridae] from the Hawaiian Islands. Invasive leafhopper *Sophonia orientalis* (Matsumura) identified (Webb & Viraktamath 2004). New record: *Hydroptila icona* Mosely and corrected identification: *Cheumatopsyche analis* (Banks) for *C. pettiti* (Banks) [Trichoptera] (Flint *et al*. 2003). New species *Xenasteia hardyi* and *X. lansburyi* [Diptera] (Ismay 2003). New genera and species *Anele ulia* and *Nanixipha nahoa* [Orthoptera] (Otte *et al.* 2003). New ant records: *Solenopsis* sp. and *Pheidole moerens* Wheeler [Hymenoptera] (Gruner *et al*. 2003). New record *Ulus hirsutus* Champion [Coleoptera] (Steiner 2003). New record *Thambemyia* sp. [Diptera] reported from Nihoa (Evenhuis 2003). New records *Libnotes* n. sp. nr. *trukensis* Alexander [Diptera], *Leiophron* sp., *Asecodes* sp., *Aphanomerus rufescens* Perkins, *Zolotarewskya* sp., *Trimorus* sp. [Hymenoptera], *Ectopsocidae briggsi* McLachlan, *Haplophallus* sp. [Psocoptera] found associated with *‘ōhi‘a lehua* (*Metrosideros polymorpha*) (Gruner 2004). Evenhuis (2004) gave a checklist of the families Limoniidae, Tipulidae, and Ulidiidae [Diptera], resulting in 7 new combinations. In a review work, Ewing (2004) placed the endemic *Nesopetinus* and *Nesopeplus* in the genus *Prosopeus* [Coleoptera Nitidulidae] creating 55 new combinations. New records *Phenolia* (*Aethinodes*) *attenuata* (Reiter) and *Stelidota geminata* (Say) [Coleoptera] (Ewing & Cline 2004). Ewing & Cline (2005) provided a key to the adventive sap beetles [Nitidulidae] in Hawai‘i. Two new records: *Dufouriellus ater* (Puton) and *Xylocoris (Arrostelus) flavipes* (Reuter) and one reidentification of *Macrotracelia nigronitens* (Stål) for previously introduced *M. thripiformis* Champion [Heteroptera] (Lattin 2005). Chandler (2005) revised *Cyclodinus* [Coleoptera] reporting *C. mundulus* from Hawai‘i. Eight species of *Hypergonatopus* [Hymenoptera] are transferred to *Cheiloneurus; C. americanus* synonymized with C. *flaccus* (Walker) (Guerrieri & Viggiani 2004). New species *Sigmatineurum puleloai* [Diptera] described from Moloka‘i (Englund & Evenhuis 2005). Evenhuis (2005) reviewed the endemic genus *Eurynogaster* [Dolichopodidae], establishing 4 new genera, 30 new combinations, and 1 new specific synonymy. New species *Hyposmocoma molluscivora* [Lepidoptera], the larvae of which feeds on native land snails (Rubinoff & Haines 2005).

Arthropoda: Crustacea

The cladoceran *Latonopsis australis* Sars is reported for the first time since 1905 (Korovchinsky 2001). New ostracod *Semicytherura challengerae* (Wilkinson & Williams 2004). New isopod species *Synidotea oahu* Moore (2004). New record *Nematopagurus kosiensis* McLaughlin (McLaughlin 2004). New species [Solenoceridae] *Hymenopenaeus fallax* [for *Haliporus equalis* auct not Rathbun] (Crosnier & Dall 2004). New combination *Marratha angusta* (Rathbun) [for *Cycloxanthops angustus*]; *Jacforus cavatus* (Rathbun) [for *Cycloxanthops cavatus*] (Ng & Clark 2003). New combination *Acantholobulus pacificus* (Edmondson) [for *Panopeus pacificus*]. New combination *Parascytoleptus tridens* (Rathbun) [for *Axius (Paraxius) tridens*] (Kensley 2003). *Furtipodia gemma* n. gen., n. sp.; new combination *Furtipodia petrosa* (Klunzinger) [for *Daldorfia horrida* of Hoover] (Tan & Ng

2003). New record *Sicyonia truncata* (Kubo) (Crosnier 2003). *Atoportunus pluto* new genus, new species (Ng & Takeda 2003). *Lewindroma unidentata* (Ruppell) new combination [for *Dromidia unidentata hawaiiensis* Edmondson]; *Stebbingdromia plumosa* (Lewinsohn) new combination [for *Dromidiopsis plumosa* Lewinsohn] (Guinot & Tavares 2003). *Lambrachaeus ramifer* Alcock, transferred from Majidae to Parthenopidae in n. subfam. Lambrachaeinae (Ng & McLay 2003). Revision of Trapeziidae, in Hawai'i, *Trapezia intermedia* Miers; *T. rufopunctata* (Herbst); *T. tigrina* Eydoux & Souleyet newly reported from Hawai'i (Castro *et al.* 2004). New species *Hymenopenaeus fallax* [Solenoceridae] (Crosnier & Dall 2004). Amphipod new combination *Liagoceradocus lonomaka* (Barnard) to *Hadzia lonomaka* (Barnard) (Sawicki *et al.* 2004). New species *Ethusina isolata* [Dorippidae, Ethusinae] (Castro 2005). *Pontonia medipacifica* Edmondson [Palaemonidae] n. comb. with n. gen. *Cainonia medipacifica* (Edmondson) (Bruce 2004). Mitochondrial DNA sequencing of introduced barnacle, *Chthamalus proteus*, confirms a multigeographical origin for Pacific populations and indicates that introductions have occurred at more than one locality (Zardus & Hadfield 2005). Hawaiian specimens of the alpheid shrimp *Alpheus gracilipes* Stimpson reevaluated and it and 5 others are now recognized (Nomura & Anker 2005). Two new species of ostracods: *Parasterope pacifica* and *Bruuniella beta* from Johnston Atoll (Kornicker & Harrison-Nelson 2005). New species of copepod *Tharybis shuheiella* (Ferrari & Markhaseva 2005). New species of benthopelagic copepod *Rythubis heptneri* (Markhaseva & Ferrari 2005).

Arthropoda: Araneae
Gillespie (2003) described 4 new species of *Tetragnatha* (Tetragnathidae) from Hawai'i. New gen., n. sp. *Tropizodium molokai* and *T. trispinosum* (Suman), transferred from genus *Zodarium* (Jocque & Churchill 2005).

Arthropoda: Acari
New species *Piona lapointei* collected from artificial lentic freshwater habitats (Smith & Cook 2004).

Arthropoda: Chilopoda
New record *Tygarrup javanicus* Attems considered an introduced species (Bonato *et al.* 2004).

Arthropoda: Pentastomida
New record, *Raillietiella indica* Gedoeist from the marine toad *Bufo marinus*; new host record, formally known only from *B. melanostictus* (Barton & Riley 2004).

Chordata: Pisces
James (2003) and Wright (2003) recorded a single specimen of the mottled eel, *Anguilla marmorata*, from a pond on Maui; the specimen was probably an introduction or, less likely, a waif. Harold & Lancaster (2003) established that *Argyripnus brocki* Strusaker is a Hawaiian endemic species, describing specimens identified as *A. brocki* from other localities as the new species, *Argyripnus pharos* Harold & Lancaster. *Centropyge fisheri* (Snyder) is no longer considered an endemic Hawaiian species because Pyle (2003) and Schindler & Scheidewind (2004) synonymized the Indo-Pacific *Centropyge flavicauda* Fraser-Brunner with it; the latter authors also included *C. acanthops* (Norman) of the western Indian Ocean as a junior synonym. An individual of the South Seas Devil, *Chrysiptera taupou* (Jordan & Seale), was photographed in about 1–2 m at Hanauma Bay, O'ahu in late 2002 (Scott 2003); this was likely an aquarium release because of the great distance of Hawai'i from the natu-

ral range of the species and the popularity of this aggressive species in the aquarium trade. The introduced snakehead identified in the past as *Channa striata* (Bloch) has been reidentified as *C. maculata* (Lacépède); the true *C. striata* is present in Hawai‘i only in enclosed aquaculture facilities and has not been recorded in the wild (Tummons 2003; Courtenay *et al.* 2004). The *Asterorhombus* species previously recorded from the Hawaiian Islands was described as *A. filifer* Hensley & Randall and is an Indo-Pacific species (Hensley & Randall 2003). A single silvertip shark, *Carcharhinus albimarginatus* (Rüppell) was recorded from the south shore of O‘ahu (Ford *et al.* 2004) and was probably a waif; the species has been mentioned previously in the literature on Hawaiian fishes but without confirmed records. Ho & Shao (2004) described a new species of deep-sea anglerfish, *Oneirodes pietschi*, from north of Necker Island. Sakai & Nakabo (2004) clarified the taxonomy of chubs previously identified as *Kyphosus bigibbus* Lacépède, describing 2 new species, *K. hawaiiensis* and *K. pacificus*, but Randall (2004) asserted that the latter species had previously been described and named as *K. sandwicensis* Sauvage. Mundy & Parrish (2004) documented the occurrence of the callanthiid *Grammatonotus macrophthalmus* Katayama, Yamamoto & Yamakawa in the Hawaiian Islands, recorded previously in an overlooked publication (Fujii 1986). Burridge (2004) documented that *Cheilodactylus* (*Goniistius*) *vittatus* Garrett is an endemic Hawaiian species, describing Southern Hemisphere specimens previously identified as that taxon as a new species, *C. francisi* Burridge; Burridge & White (2000) had previously demonstrated from a genetic analysis that *Goniistius* should be elevated to a full genus. Randall & Ford (2004) recorded a single powderblue tang, *Acanthurus leucosternon* Bennett, off the Honolulu Airport, and stated that this was undoubtedly an aquarium release. Ballauer & Settlemier (2004) documented the occurrence of the spotted-face surgeonfish *Acanthurus maculiceps* (Ahl) on the Kona coast of Hawai‘i Island; these records could have been of waifs. Greenfield & Randall (2004) described *Cabillus caudimacula*, a species previously recorded from the Hawaiian Islands as *C. tongarevae* Fowler or *Cabillus* species and *Pleurosicya larsonae*, previously recorded only as *Pleurosicya* species; both are Hawaiian endemic species as thus far known. Greenfield & Randall (2004) also recorded as *Favonigobius* species from O‘ahu and suggested that this was likely a nonindigenous species introduced from a ship source. Greenfield & Randall (2004) reidentified the goby previously recorded from the Hawaiian Islands as *Fasigobius neophytes*, *Fusibogius* species, or *Coryphopterus* species as *C. duospilus* Hoese & Reader; ichthyologists disagree as to whether *Fusigobius* should be recognized as distinct form *Coryphopterus*. Thacker (2004), Randall & Greenfield (2001), and Greenfiled & Randall (2004) recognized 2 goby species in the genus *Gnatholepis* in the Hawaiian Islands, but from genetic analysis Thacker (2004) concluded that Randall & Greenfield's (2001) *G. cauerensis hawaiiensis* is conspecific with *G. scapulostigma* Herre, and that their *G. anjerensis* (Bleeker) is replaced by the Hawaiian Islands sister species, *G. knighti* Jordan & Evermann; differences in methodology and presentation of results in the two papers indicate that further evaluation of this problem is needed. New record *Lophotus guntheri* Johnson recorded from Johnston Atoll, not recorded from the Hawaiian islands (Craig *et al.* 2004). New record *Lepidorhynchus denticulatus* Richardson collected in the stomach of an unidentified squid (Iwamoto 2005). New record *Antennarius maculatus* (Desjardins) reported without location (Randall 2005). New record *Symphysanodon katayama* Anderson reported from the stomach of *Epinephalus* (Anderson & Springer 2005). New species *Symbolophorus reversus* (Gago & Ricord 2005) collected near Kure. New records *Apterichtus klazingai* and *Ichthyapus vulturis* [Ophichthidae] (McCosker & Randall 2005). The checklist of fishes of the Hawaiian Archipelago contains information on all species found along the shores and in open ocean water (Mundy 2005).

Chordata: Reptilia
New record *Chamaeleo calyptrus* Dumeril & Dumeril from Maui (Kraus & Duvall 2004). The potential consequences of the impacts of the coqui frog detailed (Beard & Pitt 2005). The detailed behavior of the introduced green anole *Anolis carolinensis* reported in comparing it to species in its native range (Michael 2005).

Chordata: Aves
The white tern *Gygis microrhyncha* Saunders, reported from the Hawaiian island for the first time, found dead in April 1924 following a storm and probably should be considered a storm-driven migrant; this report is also a new record for the United States (Olson 2005). New fossil species of koa-finches *Rhodacanthis forfex* and *R. litotes* James & Olson, 2005 described from Quaternary fossil sites (James & Olson 2005).

Chordata: Mammalia
Sightings of dwarf (*Kogia sima*) and pygmy (*K. breviceps*) sperm whales in the wild are uncommon; numerous sightings between 2002 and 2003 are reported (Baird 2005)

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