

# RECORDS OF THE HAWAII BIOLOGICAL SURVEY FOR 1994 Part 2: Notes<sup>1</sup>

This is the second of two parts to the *Records of the Hawaii Biological Survey for 1994* 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 and papers describing new taxa are treated in the first part of this volume [*Bishop Museum Occasional Papers* 41].

## New Hawaiian Plant Records. I

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### Amaranthaceae

#### *Achyranthes mutica* A. Gray

*Significance.* Considered extinct and previously known from only 2 collections: supposedly from Hawaii Island 1779, *D. Nelson s.n.*; and from Kauai between 1851 and 1855, *J. Remy 208* (Wagner *et al.*, 1990, *Manual of the Flowering Plants of Hawai'i*, p. 181).

*Material examined.* HAWAII: South Kohala, Keawewai Gulch, 975 m, gulch with pasture and relict Koaie, 10 Nov 1991, *T.K. Pratt s.n.*; W of Kilohana fork, 1000 m, on sides of dry gulch ca. 20 plants seen above and below falls, 350 °N aspect, 16 Dec 1992, *K.R. Wood & S. Perlman 2177* (BISH).

### Caryophyllaceae

#### *Silene lanceolata* A. Gray

*Significance.* **New island record** for Oahu. Distribution in Wagner *et al.* (1990: 523, *loc. cit.*) limited to Kauai, Molokai, Hawaii, and Lanai. Several plants were later noted by Steve Perlman and Ken Wood from Makua, Oahu in 1993.

*Material examined.* OAHU: Waianae Range, Ohikilolo Ridge at ca. 700 m elevation, off ridge crest, growing on a vertical rock face, facing northward and generally shaded most of the day but in an open, exposed face, only 1 plant noted, 25 Sep 1992, *J. Obata & R. Fenstemacher s.n.* (BISH).

## New Hawaiian Plant Records. II

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All observations and identifications were made by the author unless otherwise noted.

### Amaranthaceae

#### *Amaranthus viridis* L.

*Previous knowledge:* First record in 1819 (St. John & Titcomb 1983). Hawaiian

1. All notes in this volume constitute Contribution No. 1995-006 to the Hawaii Biological Survey

Archipelago distribution Midway Atoll (Wagner & Herbst, this volume), Kure Atoll, Kaula, Kauai, Oahu, Lanai, Maui, Kahoolawe, and Hawaii. The world distribution is widespread in the tropics and subtropics (Wagner *et al.* 1990: 189).

*Significance:* First collection on Molokai at the USDA Plant Materials Center in Hoolehua in 1990 (Hughes *s.n.*, BISH). This naturalized species is common in disturbed lowland areas, roadsides, agricultural areas, and lawns on Molokai. Identification confirmed by D.R. Herbst.

#### Asteraceae

##### *Bidens alba* (L.) DC

*Previous knowledge:* First collected on Oahu in 1958 (Pearsall *s.n.*, BISH). Hawaiian Archipelago distribution Kure Atoll, Midway Atoll, Kauai, Oahu, Maui, Kahoolawe, and Hawaii. Native from Florida through South America and the West Indies (Wagner *et al.* 1990: 270).

*Significance:* **New island record** for Molokai in upper Kalamaula Game Management Area in 1992 (Hughes 42, BISH). This species is sparingly naturalized to at least 410 m elevation at least in the *Eucalyptus* plantations of Molokai Forest Reserve and in Mapulehu on the E end on disturbed, dry ridges in lowland areas. Identification confirmed by D.R. Herbst.

##### *Erigeron karvinskianus* DC

*Previous knowledge:* First collection was on Oahu in 1911 (Forbes 1700.O, BISH). Hawaiian Archipelago distribution Kauai, Oahu, Maui, and Hawaii. Native to neotropics from Mexico to Venezuela, Chile, and the Antilles (Wagner *et al.* 1990: 315).

*Significance:* **New island record** for Molokai in upper Makanalua Valley in 1992 (Hughes 36, BISH). This species was previously cultivated and has become sparingly naturalized in wet montane forest and along stream beds to at least 750 m elevation from Makanalua E into Kamakou Preserve. Identification confirmed by D.R. Herbst.

#### Brassicaceae

##### *Cardamine flexuosa* With.

*Previous knowledge:* First collected on Hawaii in 1840–1841 (*U.S. Expl. Exped.*, *s.n.*, US). Hawaiian Archipelago distribution Kauai, Oahu, Maui, and Hawaii. Native to Eurasia (Wagner *et al.* 1990:403).

*Significance:* **New island record** for Molokai in Makanalua Valley in 1992 (Hughes *s.n.*, BISH). This species was previously cultivated and has become sparingly naturalized in wet montane forest and along stream beds to at least 750 m elevation from Makanalua E into Kamakou Preserve.

#### Cactaceae

##### *Opuntia ficus-indica* (L.) Mill.

*Previous knowledge:* Pope (1929) indicated that this species, the most commonly encountered escaped cactus in Hawaii, probably was introduced from Acapulco, Mexico, by Don Francisco Paula de Marin prior to 1809. Hawaiian Archipelago distribution Kauai, Oahu, Maui, Kahoolawe, and Hawaii. Native range unknown (Wagner *et al.* 1990: 420).

*Significance:* First collected on Molokai in 1992 (Hughes *s.n.*, BISH). This natural-

ized species is common throughout the island in lowland dry to mesic communities and can be found up to 750 m elevation. According to old-timers, this species is in decline relative to its abundance earlier in this century.

### Campanulaceae

#### *Cyanea dunbarii* Rock

*Previous knowledge:* Known from the type [*Rock 13119* (coll. Dunbar), BISH, L] and 2 sterile specimens (*Rock 13115, 14038*, BISH) collected in 1918 at Waihanau, Molokai. Hawaiian Archipelago presumed extinct (Wagner *et al.* 1990:448).

*Significance:* This Molokai endemic species was **rediscovered** in Mokomoko Gulch in 1992 (*Hughes 109*, US) by G.D. Hughes, J.Q.C. Lau, and J.L. Perry. There were at least 5 individuals on a steep gulch wall in diverse mesic forest below the old Kapuna Springs dam at 650 m elevation.

#### *Cyanea procera* Hillebr.

*Previous knowledge:* Last collected in 1938 (*Cranwell 3514*, BISH, GB). Hawaiian Archipelago presumed extinct (Wagner *et al.* 1990: 460).

*Significance:* At least 4 separate populations of this Molokai endemic survive from 900–1100 m elevation: One individual in upper Waikolu Falls (E. Misaki & E. Pawn, pers. comm.); 2 in a gulch below the W side of Puu o Kaeha found in 1987 (*Lorence 5646*, PTBG); 5 in a spur gulch off of the Kawela intake trail in 1992; and 3 in an upper tributary of E Kawela gulch found in 1992 (*Hughes 431*, US). Three of the populations occur on the sides of stream beds in wet montane forest. Identification confirmed by T. Lammers.

### Caryophyllaceae

#### *Vaccaria hispanica* (Mill.) Rauschert

*Previous knowledge:* Native to southern Europe, and naturalized in the eastern United States. Apparently, its seeds can be included in wild bird seed mixtures and spread in that manner.

*Significance:* **New state record.** First collected on Molokai in 1992 (*Hughes 42*, BISH). Collected in *Bidens menziesii* lowland mesic shrubland at 700 m elevation, Kamiloloa Heights. This collection was of the only observed individual along a roadside, and should not presently be considered naturalized. Specimen identified by G. Staples.

### Cyperaceae

#### *Cyperus gracilis* R. Br.

*Previous knowledge:* Popularized by Lester McCoy about 1925 in Honolulu as a groundcover in shaded sites (Degener & Greenwell 1947). Hawaiian Archipelago distribution at least Kauai, Oahu, and Maui. Native to Australia and New Caledonia (Wagner *et al.* 1990: 1396).

*Significance:* **New island record** for Molokai in the Ka Pua Lei Ranch area near Kamalo in 1992 (*Hughes 13*, US). This naturalized species is common in lawns, along roadsides, and in disturbed areas on the E end of Molokai. Identification confirmed by W.L. Wagner and M. Strong.

***Cyperus haspan* L.**

*Previous knowledge:* First collected on Kauai in 1957 (*Stone 1665*, BISH). Hawaiian Archipelago distribution Kauai, Maui, and Hawaii. Native to subtropical and tropical regions worldwide (Wagner *et al.* 1990: 1398).

*Significance:* **New island record** for Molokai on the Wailau Trail in 1992 (*Hughes 15*, BISH). This naturalized species is occasional in very wet forest areas on eastern Molokai to at least 800 m elevation, and common in Pelekunu valley along the main stream to at least 300 m elevation. There appears to be some confusion with regard to the specific epithet. Wagner *et al.* (1990: 1398) stated that Linnaeus misread the vernacular name “halpan” as “haspan,” and that the correct epithet should be “halpan” as published in *The Manual of the flowering plants of Hawai‘i*. However, M. Strong, a sedge specialist at the Smithsonian Institution, identified the 1992 collection as *haspan*, the name published by Linnaeus. Identification confirmed by W.L. Wagner & M. Strong.

***Cyperus rotundus* L.**

*Previous knowledge:* First observed about 1850 (Hillebrand 1888). Hawaiian Archipelago distribution Kure Atoll, Midway Atoll, Niihau, Kauai, Oahu, Lanai, Maui, and Hawaii. A cosmopolitan weed worldwide (Wagner *et al.* 1990: 1399).

*Significance:* **New island record** for Molokai near Kaunakakai town in 1992 (*Hughes 14*, US). This naturalized species is common in lawns and disturbed lowland sites. Identification confirmed by W.L. Wagner and M. Strong.

***Gahnia beecheyi* H. Mann**

*Previous knowledge:* Occurring in open sites or on ridges in mesic forest and occasionally wet forest, 300–1370 m, on Kauai, Oahu, Lanai, Maui, and Hawaii (Wagner *et al.* 1990: 1409).

*Significance:* This Hawaiian endemic was recently collected on Molokai on the eastern side of Honolilililo, 1100 m, in Kamakou Preserve in 1992 (*Hughes 94*, US), and was previously collected by Degener on Molokai (Robynn Shannon, pers. comm., US). A second population was found near Pelekunu rim off of transect 5 established in 1980 by the USFWS forest bird survey. Identification confirmed by W.L. Wagner and M. Strong.

***Mariscus meyenianus* (Kunth) Nees**

*Previous knowledge:* First collected on Kauai in 1922 (*Skottsberg 1006*, BISH). Hawaiian Archipelago distribution Kauai and Oahu. Native to the Neotropics from the West Indies, Brazil and adjacent Uruguay, Paraguay, and northern Argentina (Wagner *et al.* 1990: 1421).

*Significance:* **New island record** for Molokai at the Waikolu Lookout picnic area, 960 m, in 1992 (*Hughes 338*, US). It is sparingly naturalized along the Molokai forest road in wet montane forest. Identification confirmed by W.L. Wagner and M. Strong.

**Euphorbiaceae*****Chamaesyce prostrata* (Aiton) Small**

*Previous knowledge:* First collected on Oahu in 1909 (*Forbes 1023.O*, BISH). Hawaiian Archipelago distribution Midway Atoll, Kauai, Oahu, Lanai, Maui, Kahoolawe, and Hawaii; perhaps more widespread. Native from southern United States to South

America, the West Indies, and the Paleotropics (Wagner *et al.* 1990: 613).

*Significance:* **New island record** for Molokai in Kalamaula Game Management Area, 30 m, in 1992 (*Hughes 8*, US). This naturalized species is common in mixed Kiawe/Haole koa lowland shrubland, *Cenchrus ciliaris* lowland grassland, and other dry, disturbed sites. Identification confirmed by W.L. Wagner.

### Fabaceae

#### *Acacia mearnsii* De Wild.

*Previous knowledge:* Collected in 1928 (*Munro 313*, BISH). Hawaiian Archipelago distribution Kauai, Oahu, Lanai, Maui, and Hawaii. Native to New South Wales and Tasmania, Australia (Wagner *et al.* 1990:642).

*Significance:* **New island record** for Molokai (*Hughes 51*, US). Distributed at least from Kakalahale to Onini, below 850 m, rapidly spreading, forming monotypic stands, and displacing native species. Identification by W.L. Wagner.

#### *Aeschynomene paniculata* Willd. ex Vog.

*Previous knowledge:* Unknown in Hawaiian Archipelago. Native distribution the Neotropics.

*Significance:* **New state record.** Collected on Molokai on Kakalahale ridge, 680 m, in 1990 (*Hughes s.n.*, BISH). This species is sparingly naturalized in secondary lowland forest dominated by *Grevillea robusta* A. Cunn. ex R. Br. and *Melinis minutiflora* P. Beauv.

#### *Chamaecrista nictitans* (L.) Moench var. *glabrata* (Vogel) H. Irwin & Barneby

*Previous knowledge:* In cultivation prior to 1871 (Hillebrand 1888). First naturalized collection in 1895 (*Heller 1969*, BISH). Hawaiian Archipelago distribution all the main islands except Molokai. Native to the Neotropics and now widely naturalized (Wagner *et al.* 1990: 656).

*Significance:* **New island record** for Molokai in Kalamaula Game Management Area, 125 m, in 1990 (*Hughes s.n.*, BISH). This naturalized species is common and widespread in all lowland areas. Identification confirmed by D.R. Herbst.

#### *Crotalaria incana* L.

*Previous knowledge:* First collected on Oahu in 1895 (*Heller 1966*, BISH). Hawaiian Archipelago distribution Midway Atoll and all the main islands except Molokai. Widespread in the tropics and subtropics (Wagner *et al.* 1990: 660).

*Significance:* **New island record** for Molokai in Kalamaula Game Management Area, 125 m, in 1990 (*Hughes s.n.*, BISH). This naturalized species is common in lowland areas and is fire adapted. Identification confirmed by D.R. Herbst.

#### *Desmodium tortuosum* (Sw.) DC

*Previous knowledge:* First collected on Maui in 1913 (*Collector unknown s.n.*, BISH). Hawaiian Archipelago distribution Kauai, Oahu, Maui, Kahoolawe, and Hawaii. Native to tropical and subtropical America; now widely naturalized in the Paleotropics (Wagner *et al.* 1990: 669).

*Significance:* **New island record** for Molokai in the area of Makolelau, 700 m, in 1992 (*Hughes s.n.*, BISH, *Hughes 28*, US). This species is sparingly naturalized and was

collected on a dirt road in mixed native shrub/Haole koa lowland shrubland. Identification by W.L. Wagner.

***Glycine wightii*** (Wight & Arnott) Verdc.

*Previous knowledge:* First collected on Hawaii in 1975 (*Herbst & Ishikawa 5515*, BISH). Hawaiian Archipelago distribution at least Oahu, Maui, Kahoolawe, and Hawaii. Native to Central and South America and the West Indies, now widely naturalized. Cultivated as a fodder plant (Wagner *et al.* 1990).

*Significance:* **New island record** for Molokai in Kalamaula Game Management Area in 1990 (*Hughes s.n.*, BISH). For a relatively new introduction, this plant has come to dominate large sections of secondary lowland habitat in western and central Molokai including Moomomi, Hoolehua, and Kaunakakai. This vine can produce a very large amount of seed, and forms a blanketlike layer on top of other vegetation that smothers and displaces other species. It has been observed climbing on top of 15 m-high kiawe trees along the Molokai forest road. Identification confirmed by D.R. Herbst.

***Indigofera suffruticosa*** Mill.

*Previous knowledge:* Introduced from Java in 1836 for cultivation (Hillebrand 1888). First recorded by Nelson in 1779 (St. John 1978). Hawaiian Archipelago distribution probably on all the main islands but not documented from Molokai. Pantropical, but presumably of Neotropical origin, formerly used for indigo production (Wagner *et al.* 1990: 676).

*Significance:* **New island record** for Molokai in Kalamaula Game Management Area, 125 m, in 1990 (*Hughes s.n.*, BISH). This naturalized species is common throughout all lowland areas on Molokai. Identification confirmed by D.R. Herbst.

***Prosopis pallida*** (Humb. & Bonpl. ex Willd.) Kunth

*Previous knowledge:* A single seed from the Royal Gardens in Paris was grown on the Catholic Mission grounds on Fort Street, Honolulu, by Father Bachelot in 1828. All trees of this species in Hawaii derived from this source. Hawaiian Archipelago distribution Midway Atoll and all the main islands, but not documented from Niihau or Molokai. Native to Peru, Colombia, and Ecuador (Wagner *et al.* 1990: 693).

*Significance:* **New island record** for Molokai. Collected in Kaunakakai in 1990 (*Hughes s.n.*, BISH). kiawe dominates the dry, lowland and coastal areas of Molokai. Identification confirmed by D.R. Herbst.

**Geraniaceae**

***Erodium*** sp.

*Previous knowledge:* Unknown to Hawaiian Archipelago. Unknown native origin.

*Significance:* **New state record.** First collected on Molokai in Kalamaula Game Management Area, 200 m, in 1992 (*Hughes 40*, BISH). D.R. Herbst (pers. comm.) states that it somewhat resembles *E. moschatum* L'Hér. of New Zealand. Sparingly naturalized in mixed Kiawe/Haole koa lowland shrubland and *Cenchrus ciliaris* L. lowland grassland.

**Melastomataceae*****Pterolepis glomerata*** (Rottb.) Miq.

*Previous knowledge:* First collected on Oahu in 1949 (*Greenwell s.n.*, BISH). Hawaiian Archipelago distribution Kauai, Oahu, and Hawaii. Native to tropical regions of eastern South America from Santa Catarina, Brazil, N to the Lesser Antilles (Wagner *et al.* 1990: 913).

*Significance:* **New island record** for Molokai on the Wailau Trail, 800 m, in 1992 (*Hughes 18*, US). Apparently only sparingly naturalized in wet mesic forest in disturbed areas. Identification by W.L. Wagner.

**Meliaceae*****Melia azedarach*** L.

*Previous knowledge:* Widely cultivated in Hawaii prior to 1871 (Hillebrand 1888). Hawaiian Archipelago distribution documented from all of the main islands except Molokai and Kahoolawe. Native to southwestern Asia (Wagner *et al.* 1990: 918).

*Significance:* **New island record** for Molokai in Kalamaula Game Management Area, 350 m, in 1992 (*Hughes 43*, BISH). Naturalized in lowland gulches and disturbed areas. This species is known to contain toxins and is of current interest for medicinal properties (J. Edmonds, pers comm., Oxford Forestry Institute). Identification confirmed by D.R. Herbst.

**Moraceae*****Ficus microcarpa*** L. f.

*Previous knowledge:* Cultivated at least since the early 1900s, but it could not have become naturalized prior to 1938 when its pollinating wasp was introduced. Hawaiian Archipelago distribution Oahu, Maui, and Hawaii, but probably on all of the main islands. Native from Sri Lanka to India, southern China, Ryukyu Islands, Australia, and New Caledonia (Wagner *et al.* 1990:926).

*Significance:* **New island record** for Molokai in Kalamaula Game Management Area, 310 m, in 1992 (*Hughes 62*, BISH). Naturalized in gulches in disturbed lowland areas of Molokai. Identification confirmed by W.L. Wagner.

**Passifloraceae*****Passiflora edulis*** Sims

*Previous knowledge:* Introduced prior to 1871, by which time it had already become naturalized on E Maui (Hillebrand 1888). Hawaiian Archipelago distribution Kauai, Oahu, Lanai, Maui, and Hawaii. Native to Brazil, widely cultivated for the succulent aril, which is used to make passion fruit juice (Wagner *et al.* 1990: 1010).

*Significance:* **New island record** for Molokai. It was observed growing around houses on at least the eastern end of the island. It also is naturalized at least from Upper Kalamaula to Puu Kauwa plantation areas in 1992 (*Hughes 107*, BISH).

**Poaceae*****Andropogon virginicus* L.**

*Previous knowledge:* First collected in 1924 (*Lee 65*, BISH). Hawaiian Archipelago distribution Oahu and Hawaii. Native to eastern North America, now extending into Central America (Wagner *et al.* 1990: 1497).

*Significance:* **New island record** for Molokai. It was collected on the Molokai Forest Rd near upper reservoir in 1991 (*Hughes s.n.*, BISH). This invasive grass, carried long distances by the strong trade winds, quickly colonizes disturbed mesic shrubland and dominates many disturbed areas from Kalae to Kamalo, from 600–1000 m on the southern aspect of eastern Molokai. First collected on Maui in 1980 (*Higashino 9360*, BISH) on USFWS transect 3 at 1100 m elevation. It seems sparingly naturalized in dieback forest on windward E Maui. However, at least on W Maui in 1993, it was observed to be dominating disturbed areas of lowland mesic shrubland in Kapunakea Preserve.

***Axonopus fissifolius* (Raddi) Kuhl.**

*Previous knowledge:* First collected in 1913 (*McClellan s.n.*, BISH). Hawaiian Archipelago distribution Kauai, Oahu, Lanai, Maui, and Hawaii. Native to subtropical North America and the Neotropics where it is used as a pasture grass (Wagner *et al.* 1990: 1502).

*Significance:* **New island record** for Molokai in the vicinity of Puu Kolekole in 1992 (*Hughes 374*, US). This popular lawn grass is naturalized in upper elevations from 800–1100 m at least along roads, trails, and forest plantations in Molokai Forest from the upper reservoirs, along the forest road, Puu Kauwa, Kahanui, Waikolu lookout, Puu Kaulahuki, Kupaia, Upper Kawela, and Puu Kolekole areas.

***Chloris gayana* Kunth**

*Previous knowledge:* First collected on Lanai in 1913 (*Forbes 181.L.*, BISH). Hawaiian Archipelago distribution Niihau, Oahu, Lanai, Maui, and Hawaii. Native to Africa, and naturalized throughout the Neotropics (Wagner *et al.* 1990:1515).

*Significance:* **New island record** for Molokai on Kapaakea ridge in 1992 (*Hughes 367*, US). This species is naturalized at least in the mixed Kiawe/Haole koa lowland shrublands and *Cenchrus ciliaris* lowland grasslands from Kalamaula Game Management Area to Kaunakakai gulch from 50–400 m.

***Dichanthium annulatum* (Forssk.) Stapf**

*Previous knowledge:* First collected on Oahu in 1940 (*Hosaka 2525*, BISH). Hawaiian Archipelago distribution Oahu. Native from northern Africa through the Middle East to India and Indonesia (Wagner *et al.* 1990: 1528).

*Significance:* **New island record** for Molokai. Collected in Hoolehua in 1992 (*Hughes 317*, US). This species is apparently sparingly naturalized along roadsides.

***Eragrostis amabilis* (L.) Wight & Arnott [syn. *E. tenella* (L.) P. Beauv. ex Roem. & Schult.]**

*Previous knowledge:* First collected on Oahu in 1895 (*Heller 1962*, BISH). Hawaiian Archipelago distribution Midway Atoll, Niihau, Oahu, Maui, Kahoolawe, and Hawaii.



Native to the Paleotropics, now widely distributed throughout the tropics (Wagner *et al.* 1990: 1545). Nomenclature and identification from Dr. Paul Peterson.

*Significance:* First collected on Molokai above the cliffs W of Moomomi (Hughes 457, US). This species is sparingly naturalized in disturbed lowland observed to at least 150 m elevation.

***Pennisetum clandestinum*** Chiov.

*Previous knowledge:* First collected on Hawaii in 1938 (Hosaka 2181, BISH). Hawaiian Archipelago distribution Oahu, Lanai, Maui, and Hawaii. Native to tropical Africa, now widely cultivated and naturalized (Wagner *et al.* 1990: 1579).

*Significance:* **New island record** for Molokai in 1992 (Hughes 335, US). This species is the most common grass used for fodder and has naturalized island-wide to 1100 m elevation. This grass species out-competes many native species for space and light. In natural areas it is established at least in upper Kalamaula, Waikolu lookout Puu Kaulahuki plantation area, Kamoku flats, Makakupaia, and Makolelau areas.

**Rosaceae**

***Rubus argutus*** Link

*Previous knowledge:* First collected in 1904 on Hawaii by O. Kuntze (Degener, 1938). Hawaiian Archipelago distribution Kauai, Oahu, Maui, and Hawaii. Native to central and eastern United States (Wagner *et al.* 1990: 1107).

*Significance:* **New island record** for Molokai in 1992 (Hanalilolilo, 1120 m, Hughes 9, BISH). This species is naturalized sporadically in wet forest on Molokai from 700–1120 m from Hanalilolilo to eastern Kawela. It is recognized as a serious threat to native vegetation because it forms dense thickets and spreads rapidly, apparently by birds.

**Solanaceae**

***Brugmansia candida*** Pers.

*Previous knowledge:* Probably first brought to Hawaii from Rio de Janeiro on the frigate *Blonde* in 1825 (Degener 1932). Hawaiian Archipelago distribution Kauai, Oahu, Maui, and Hawaii. Native to Peru and widely cultivated as an ornamental (Wagner *et al.* 1990: 1253).

*Significance:* **New island record** for Molokai in Pelekunu Valley in Pilipililau stream in 1992 (Hughes 6, US). This species is naturalizing from a historic homesite down the stream bed. It apparently likes very wet conditions.

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### New Hawaiian Plant Records. III

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#### Asteraceae

*Bidens campylotheca* Schultz-Bip. subsp. *pentamera* (Sherff) Ganders & Nagata.

MAUI: A population of about 20 plants of *Bidens campylotheca* subsp. *pentamera* was found in Papalaua Gulch on West Maui at an elevation of about 885 m. This represents a range extension of the taxon to West Maui. It was previously known only from East Maui [Ganders, F.R. & K.M. Nagata, 1990, p. 273. In: Wagner, W.L. *et al.*, *Manual of the flowering plants of Hawai'i*. Univ. Hawaii Press & Bishop Museum Press, Honolulu]. The new West Maui population is in mesic forest, whereas the East Maui populations are in wet forests.

*Material examined.* 13 Mar 1988, det. F. R. Ganders, 28 Dec 1990, *J. Lau 3210* (BISH).

#### Rhamnaceae

*Colubrina oppositifolia* Brogn. ex H. Mann.

MAUI: *Colubrina oppositifolia* was recently found on West Maui in the land section of Honokowai at 500 m. Only a single tree has been located (P. Bily, pers. comm., 1995). This find represents the first record of a naturally-occurring plant of *C. oppositifolia* on the island of Maui. The species was previously recorded only from the islands of Oahu and Hawaii (Wagner *et al.* 1990, *loc. cit.*, p.1094).

*Material examined.* 1 Dec 1992, det. J. Lau, 12 Jan 1995, *P. Bily & T. Cashman s.n.* (BISH).

### New Hawaiian Plant Records. IV

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New records of naturalized plant species and the spread of several established alien species have been documented in 2 prior publications (Nagata 1987, 1988). Similar information on several additional species are here presented. These records are updates to Wagner *et al.* (1990).

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**Annonaceae*****Artabotrys hexapetalus* (L. f.) Bhandari**

HAWAII: The ylang-ylang, a woody liana, has been long cultivated in Hawaii for its fragrant flowers. In January 1988 a naturalized population was discovered on Oahu along Waikane Stream in disturbed forest, *Nagata 3787*, 18 Jan 1988 (BISH, HLA). Later that year, a large population was found on Hawaii in Waimanu Valley approximately 1 mile from shore in a kukui forest, *Nagata 3891*, 24 Sep 1988 (BISH). No evidence of habitation was observed on either site and the occurrence of this species in such remote areas is somewhat enigmatic.

**Asteraceae*****Crassocephalum crepidioides* (Benth.) S. Moore**

LANAI: Naturalized in the Palawai Basin, Lanai, *Nagata 4011*, 8 Sep 1989 (BISH). **New island record.**

***Erigeron bellioides* DC**

OAHU: This diminutive species was first collected on Oahu in 1984 in Honolulu and in Kaneohe (*Nagata 1987*). By 1988 it had spread to Laie, Oahu, *Nagata 3941*, 27 Dec 1988 (BISH, HLA) and Makawao, Maui, *Wagner, Imada & Takeuchi 5797*, 3 Mar 1988 (BISH). The following year it was collected at Honolulu International Airport. *Hoe, s.n.*, 1 Dec 1989 (BISH). In 1992 it was discovered as a weed in the landscaping at Hilton Hawaiian Village, *Nagata 4245*, 25 Apr 1992 (BISH). In 1993 it was found at Barbers Point Naval Air Station, Ewa, *Nagata 4261*, 5 Feb 1993 (BISH). *Erigeron bellioides* is a very low-growing species with minute achenes. Wind does not appear to be a long-distance dispersal mechanism, yet it has spread far and wide in a relatively short time. It is possible that it is spread through the movement of soil or as a hitchhiker on footwear or on the feet of birds.

***Kalimeris indica* (L.) Schultz-Bip.**

KAUAI: Roadside near Limahuli Gardens, Kauai, escape from cultivation (W.L. Wagner, pers. comm., 1995), *Wagner, Mill, B. & C. Petersen & Flynn 5162*, 21 Dec 1983 (BISH). Naturalized in lawn and secondary road near Haena, Kauai, *Nagata 3914*, 28 May 1988 (HLA). **New island record.**

**Basellaceae*****Anredera cordifolia* (Ten.) Steenis**

LANAI: At edge of pineapple fields northwest of Lanai City, Lanai, *Nagata 3502*, 3 Jun 1986 (HLA). **New island record.**

***Basella alba* L.**

OAHU: Although several colonies have been documented along the roadways in Waimanalo, Oahu, these have been considered as escapes from cultivation (Wagner *et al.* 1990: 381). In 1988 a population was discovered in the hills above Pupukea far removed from human habitation, *Nagata 3948*, 27 Dec 1988 (BISH, HLA). It appears that the

Malabar spinach is slowly becoming naturalized at least on Oahu.

#### **Melastomataceae**

##### ***Oxyspora paniculata* (D. Don) DC**

OAHU: This species is known to be naturalized in the wet forest behind Honolulu. Until recently it was confined to the western portion and the W rim of Manoa Valley from Tantalus to Konahuanui. Small populations now occur on Waahila Ridge, the E rim of the valley, *Nagata 2490*, 6 Jul 1982 (HLA). It is probably just a matter of time before it spreads into the wet forests throughout the southern Koolau Range.

#### **Moraceae**

##### ***Ficus rubiginosa* Desf.**

OAHU: The pollinator wasps for 4 species of *Ficus* (*F. macrophylla* Desf., *F. carica* L., *F. rubiginosa*, *F. microcarpa* L. f.) have been introduced into Hawaii. Until now only *F. microcarpa* was definitely known to be naturalized. In 1988 a naturalized colony of *F. rubiginosa* was documented from a limestone ridge in the hills above Punamano, Koolauloa District, Oahu, *Nagata 3946*, 27 Dec 1988 (BISH, HLA). Included in this colony were several saplings and seedlings, confirming reproduction by seed of a second species of *Ficus* in Hawaii.

#### **Rosaceae**

##### ***Rosa laevigata* Michx.**

LANAI: In Hawaii, the Cherokee rose is known to occur on 3 islands. On Hawaii island, cultivated plants were known to occur in residential areas in Hawaii Volcanoes National Park as early as 1943, *Fagerlund & Mitchell 284*, 27 Jan 1943 (BISH). More recently, it has been collected along the roadside in Kokee State Park on Kauai, *Lorence 5255*, 21 May 1987 (BISH). These plants were considered remnants of an early planting and not naturalized. The earliest collection was made in 1938 on Lanai near the summit cabin at Lanaihale, doubtless from cultivated plants, *St. John & Hosaka 18854*, 15 Apr 1938 (BISH). This species is now locally common on Lanaihale especially on the west end at about 2800 ft elevation, *Nagata 2630*, 20 Mar 1983 (BISH, HLA). The spread of this species in the summit area of Lanai should be closely monitored.

##### ***Rubus niveus* Thunb.**

HAWAII: This species has been previously reported from the Kula area on Maui and at Volcano Transfer Station on the E side of Hawaii island (Wagner *et al.* 1990: 1110). It now occurs in the mesic open scrub at 4800 ft (1463 m) in N Kona on the W side of Hawaii, *Nagata 4233*, 25 Jan 1992 (BISH, HLA, US). As its seeds are bird dispersed, this species probably occurs in other mesic mid-elevation sites as well.

#### **Rubiaceae**

##### ***Pentas lanceolata* (Forssk.) K. Schum.**

HAWAII: A common garden plant, this species is naturalized along the Hwy between Laupahoehoe and Hilo, Hawaii Island, *Nagata 2650*, 2651, 2 Apr 1983 (HLA). Lavender

and white flowered forms occur in this population.

#### Scrophulariaceae

##### *Veronica serpyllifolia* L.

LANAI: Naturalized at Lanaihale at 3000 ft (914 m) elevation, Lanai, *Nagata* 2658, 20 Mar 1983 (HLA). **New island record.**

#### Solanaceae

##### *Physalis ixocarpa* Brot. ex Hornem.

MOLOKAI: Known from a single shrub in the arid scrubland in W Molokai, *Nagata* 2547, 11 Sep 1982 (K). This is something of an anomaly since this solitary individual was far from the nearest cultivated area. **New state record.**

#### Verbenaceae

##### *Citharexylum caudatum* L.

OAHU: This species is well-documented from the forests behind Honolulu especially in the Manoa-Pauoa Flats area (Wagner *et al.* 1990: 1317), but it has also been recorded from central Oahu. In 1966 it was documented as naturalized behind Schofield on the Wahiawa end of the Schofield-Waikane Trail at 1200 ft (365 m) elevation, *Nagata* 46, 5 Mar 1966 (HLA). Ten years later it was collected along the Poamoho Ridge Trail at 1800–2500 ft (548–762 m) elevation, *Little* 31191, 10 Sep 1976 (BISH). The seeds of *C. caudatum* are easily dispersed by birds and it is likely that the distributional range of this species is far wider than once believed.

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## Contributions to the Flora of Hawai'i. IV. New Records and Name Changes

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Publication of the *Manual of the flowering plants of Hawai'i* (Wagner *et al.* 1990) has provided a modern accurate account of the angiosperms occurring indigenously and naturalized after introduction by humans directly or indirectly. Collecting efforts after the cut-off date for the *Manual* project (September 1987) have resulted in a substantial number of new distributional records and detection of additional naturalized species. Also,

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recent publications have resulted in new classifications or nomenclatural changes for species that occur in the Hawaiian Islands. This paper, alphabetically treating the flowering plant families, provides records for naturalized species documented for the first time in the Hawaiian Islands, new range extensions for naturalized and a few native species within the archipelago, and briefly outlines name changes in the literature affecting species in the Hawaiian flora. These records and changes can be considered a supplement to the *Manual* (Wagner *et al.* 1990). In reporting additions to the flora we give diagnostic characters so that this paper can be used in conjunction with the *Manual* for identifications. We use the same definition for "naturalized" as used in the *Manual* (Wagner *et al.* 1990: 1645). We report 32 new island records for naturalized species and 5 for endemic species. We also call attention to 15 newly naturalized species in the Hawaiian Islands. We discuss 15 species for which the correct name has changed, and 2 species that were misidentified in the *Manual* (*Lepidium africanum* and *Mucuna sloanei*) are discussed. All identifications have been made by the authors except for those made by specialists listed in the acknowledgments.

### **Acanthaceae**

#### ***Blechnum pyramidatum* (Lam.) Urban**

A.C. Smith (1991: 121–22) indicated that the correct name for the species of Acanthaceae treated by Wagner *et al.* (1990) as *Blechnum brownei* Juss. is *B. pyramidatum*. We also report here a **new island record** for Hawaii.

*Material examined.* Hawaii: South Hilo District, Onomea, margin of the Hawaii Tropical Botanical Garden, 10 Jan 1990, *Matayoshi s. n.* (BISH).

### **Amaranthaceae**

#### ***Alternanthera brasiliana* (L.) Kuntze**

The following collection represents a **new naturalized record** of *Alternanthera brasiliana* on Oahu. Wagner *et al.* (1990: 183) list this species as also naturalized on Molokai.

*Material examined.* Oahu: [Waianae Mountains] Pohakea Trail, 27 May 1982, *E. Funk 406* (BISH).

#### ***Amaranthus viridis* L.**

The following collection represents a **new naturalized record** of *Amaranthus viridis* on Midway Atoll. The species also occurs on Kure Atoll, Kaula, Kauai, Oahu, Lanai, Maui, Kahoolawe, and Hawaii (Wagner *et al.* 1990: 189); and recently reported from Molokai (Hughes, this volume) and Niihau (St. John 1990: 85).

*Material examined.* Midway Atoll: Sand Island, Jul 1988, *Herbst & Takeuchi 9074, 9080* (BISH).

#### ***Blutaplaron vermiculare* (L.) Mears**

The following collection represents a **new state record** to the naturalized flora of the Hawaiian Islands. *Blutaplaron* can be characterized by its opposite linear to oblanceolate fleshy leaves, the hermaphroditic flowers in elongate, cylindrical, axillary spikes 1–2.8 cm long, perianth segments 5, free to the base, in 2 series, the outer 3 flat and broad, and the inner 2 sharply curved and tending to enclose a stamen, staminal filaments distinct

nearly to the base, anthers 5, unilocular at anthesis with 1 line of dehiscence, stigma 2-lobed, lobes filiform (Eliasson 1988, Mears 1982). *Blutaplaron vermiculare* is distinguished from the other 3 species of the genus by its prostrate habit, spikes greater than 5 mm in diameter, leaves greater than 1 cm long, pedicels not inflated, and perianth segments with inconspicuous nerves (Mears 1982).

*Material examined.* Oahu: Kahuku Pacific Sea Farms property, growing at end of old runway in area where wastewater is left to pond, prostrate herb forming small mounds, growing among *Sesuvium portulacastrum* on coralline substrate, 4 Jul 1991, *Char s.n.* (BISH).

#### *Gomphrena celosioides* Mart.

The following collection represents a **new island record** from the island of Kauai. *Gomphrena celosioides* was previously known in the Hawaiian Islands only from Oahu.

*Material examined.* Kauai: Koloa District, Poipu, junction of Hoona Road and Lawai Road, ca. 20 ft, 3 Dec 1986, *Flynn 1977* (BISH, PTBG).

### Apiaceae

#### *Spermolepis hawaiiensis* Wolff

The Lanai collections listed below represent island records inadvertently omitted by Constance & Affolter (1990: 212). The Molokai record shows that the species is still extant on that island.

*Material examined.* Lanai: Lanai District, Paomai, 18 Apr 1919, *Munro 310* (BISH), 18 Apr 1919, *Munro 340* (BISH); Kahinahina, 1200 ft, 11 Jun 1927, *Munro 46* (BISH); Naha Trail, Kapoho Gulch, extensive colony scattered on rock outcropping on a very steep slope, 750 ft, 21 Feb 1989, *Hobdy et al. 3017* (BISH). Molokai: Molokai District, W of Kamalo Canyon, fairly common in poor soil in ohia-pukiawe grassland, growing vigorously in patches in disturbed soil, plants robust and scented, 30 Mar 1989, *Hobdy et al. 3035* (BISH).

### Aquifoliaceae

#### *Ilex aquifolium* L.

The following collection represents a **new island record** for *Ilex aquifolium*. It also is naturalized on the island of Hawaii.

*Material examined.* Maui: Makawao District, Olinda Prison Camp, growing wild, 8000 ft, 2 Jan 1961, *Tanabe 37* (BISH).

### Asteraceae

#### *Artemisia vulgaris* L.

The following collection represents a **new island record** for *Artemisia vulgaris*. It also is naturalized on Kauai, Oahu, and Hawaii.

*Material examined.* Maui: East Maui, Makawao District, Makawao Town, an uncommon weed in gardens and along roadsides, 18 Jun 1986, *Hobdy 2567* (BISH).

#### *Centaurea cyanus* L.

The following collection represents a **new naturalized record** for *Centaurea cyanus*, bachelor's-buttons or cornflower, in the Hawaiian Islands.

*Material examined.* Lanai: Lanai District, a roadside weed on the outskirts of town, plants to 80 cm tall, 7 Jul 1986, *Hobdy 2576* (BISH, US).

*Conyza canadensis* L. var. *pusilla* (Nutt.) Cronq.

The following collection represents the first naturalized record for this species from Midway Atoll. This variety also occurs all of the main islands except Kahoolawe.

*Material examined.* Midway Atoll: Sand Island, Jul 1988, *Herbst & Takeuchi 9072* (BISH).

*Eclipta prostrata* (L.) L. [syn. *Eclipta alba* (L.) Hassk.]

As pointed out by A. C. Smith (1991: 274) 3 names compete for the correct epithet of this species if the types of both *Verbesina prostrata* L., Sp. Pl. 902. 1753 (TYPE: Herb. Plukenet (BM, lectotype, designated by Grierson, Fl. Ceylon 1: 212. 1980) and *Verbesina alba* L., Sp. Pl. 902. 1753 (TYPE: Herb Hort. Cliff. (BM, lectotype designated by Grierson, Fl. Ceylon 1: 212. 1980) are considered to represent the same species. The 3 epithets are: *Eclipta prostrata* (L.) L., Mant. Pl. Alt. 286. 1771; *E. alba* (L.) Hassk., Pl. Jav. Rar. 528. 1848; and *Eclipta erecta* L., Mant. Pl. Alt. 286. 1771, nom. superfl. *Eclipta alba* has long been used because it was believed that the first time that the 2 taxa were united was by Hasskarl in the above cited 1848 reference; however, Roxburgh (Fl. Ind. ed. 2. 3: 438. 1932) appears to be the first to have united the 2 taxa under the name *E. prostrata*, which is therefore to be used if the 2 are united in the genus *Eclipta* (ICBN 1994 Art. 11.5).

*Lactuca serriola* L.

The following collection represents a **new island record** of *Lactuca serriola* from Kauai. The species also occurs on Oahu, Lanai, Maui, and Hawaii.

*Material examined.* Kauai: Waimea District: Hanapepe Valley, roadside at low elevation, 18 May 1991, *Sugawa s. n.* (BISH 2 sheets).

*Parthenium hysterophorus* L.

The following collection represents a **new island record** of *Parthenium hysterophorus* from Oahu. The species also occurs on Kauai, Molokai, Maui, and Hawaii.

*Material examined.* Oahu: collected along Diamond Head Road at the turn-off into the crater, 17 Jul 1990, *E. Funk s. n.* (BISH).

*Pluchea carolinensis* (Jacq.) G. Don

Khan & Jarvis (1989) have shown that the name *Pluchea symphytifolia* resulted from an erroneous interpretation of the original material apparently associated with the name *Conyza symphytifolia* Mill. The typification by Gillis (1977) of this name was incorrect. Accordingly, his combination cannot apply to the species formerly and correctly known as *Pluchea carolinensis*. When following the typification by Khan and Jarvis, *Conyza symphytifolia* falls into the synonymy of *Neurolaena lobata* (L.) Cassini.

*Soliva sessilis* Ruiz & Pav.

The following represents a **new state record** (and only collection) of *Soliva sessilis*. This species appears to be at least locally naturalized in Hawaii Volcanoes National Park. This species, native to South America, is distinguished by: prostrate clumped habit, pinnate leaves, leaflets palmate, heads disciform, sessile in basal and cauline leaf axils, phyllaries 5–12 in 1–2 series, 2–3 mm long, receptacle naked, pistillate florets 10–12 without a corolla, staminate florets 4–6 with green translucent corollas 2–3 mm long.

*Material examined.* Hawaii: Kau District, Hawaii Volcanoes National Park, Kipukapuauulu,



4000 ft, tiny herb growing in ash soil on disturbed site adjacent to road and parking area, 24 Apr 1985, *Cuddihy & Tunison 1891* (BISH, US).

### Brassicaceae

*Brassica rapa* L. [syn. *Brassica campestris* L.]

The correct name for the species treated as *Brassica campestris* in Wagner *et al.* (1990: 400) is *B. rapa* (Rollins 1993: 226; Al-Shehbaz, pers. comm.). The following collection represents a **new island record** of this species from Maui. It was previously known from Pearl and Hermes Atoll, Kauai, Oahu, Molokai, Lanai, and Hawaii.

*Material examined.* Maui: Makawao District, East Maui, Haliimaile Rd., 305 m, growing along the roadside as a weed, 13 Apr 1991, *Hobdy 3289* (BISH).

*Capsella bursa-pastoris* (L.) Medik. [syn. *Capsella rubella* Ruet.]

Recent specialists in the Brassicaceae (Rollins 1993: 245, Al-Shehbaz pers. comm.) no longer recognize the minor variations discussed in Wagner *et al.* (1990: 402) separating *Capsella rubella* as a distinct species from *C. bursa-pastoris*. Rollins (1993) summarizes the situation.

*Lepidium africanum* (N.L. Burm.) DC

This species was first reported from the Hawaiian Islands as *Lepidium hyssopifolium* Desv. by Rollins (1986) and incorrectly followed as such in the *Manual* (Wagner *et al.* 1990: 407). *Lepidium hyssopifolium* is an Australian endemic (South Australia, New South Wales, southwestern Victoria, and Tasmania) according to Hewson (1982). The problem in identification of the Hawaiian material stems from the previous confusion of these 2 species in Australia. We provide below a description of *L. africanum* that replaces the partly erroneous one in Wagner *et al.* (1990: 407).

Annual or perennial herbs; stems erect, usually 3–7 dm tall, branched in the upper half, the branches usually ascending, glabrous. Leaves variable; basal leaves usually oblanceolate, toothed, sometimes pinnately lobed, 2–8 cm long; cauline leaves usually linear-lanceolate 1–4 cm long, toothed to entire, usually sparsely ciliate. Flowers in elongate racemes, usually 10–18 cm long; sepals 0.7–0.8 mm long, caducous; petals thread-like, shorter than sepals; stamens usually 2. Silicles ovate to obovate, 2–3 mm long, 1.5–2 mm wide, notch shallow, the margins scarcely exceeding the short style; pedicel ± flattened, adaxial side sparsely puberulent, ± curved. Seeds ca. 1.5 mm long. Native to Africa, naturalized in Australia and the Hawaiian Islands; in Hawaii naturalized in dry, disturbed sites, 820–2150 m, from scattered locations in Hamakua and North Kona Districts, Hawaii.

*Material examined.* Hawaii: Hamakua District: Mauna Kea, Ahumoa, abandoned radio facility, 7040 ft, 21 May 1975, *Herbst & Spence 5321* (BISH); Mauna Kea, Halepohaku, by old facilities, 27 May 1985, *Char & Stemmermann 85.019* (BISH); Mauna Kea, Puu Laau Road, in open mamane-naio forest, 2012 m, 19 Aug 1987, *Engilis 34* (BISH). North Kona District, Hualalai, Puu Waawaa, open rangeland with native canopy relicts, SE corner of 1986 burn, common among closely cropped grass or in patches on bare a'a, 2700 ft, May 1989, *Takeuchi 5790* (BISH).

*Lobularia maritima* (L.) Desv.

The following collection represents a **new naturalized record** from Oahu. The

species also is naturalized on Kure and Midway Atolls and on Maui.

*Material examined.* Oahu: Kahuku Golf Course/cemetery, annual herb . . . of waste areas, fields, and pastures, 18 Feb 1975, K. Ziegelbauer 20 (BISH).

### **Rorippa**

Specialists in the Brassicaceae no longer recognize the segregate genus *Nasturtium* R. Br. (Rollins 1993: 736; Al-Shehbaz, pers. comm.). The following are the correct names for the 2 species naturalized in the Hawaiian Islands.

***Rorippa microphylla*** (Boenn. ex Reichb.) Hylander ex Löve & Löve [syn. *Nasturtium microphyllum* Boenn. ex Reichb.]

***Rorippa sarmentosa*** (G. Forster ex DC) J. F. Macbr. [syn. *Nasturtium sarmentosum* (G. Forster ex DC) Schinz & Guillaumin]

### **Clusiaceae**

#### ***Hypericum mutilum*** L. subsp. ***mutilum***

In a recent publication on *Hypericum*, Robson (1990: 116–19) has indicated that the Hawaiian populations of *Hypericum mutilum* (Wagner *et al.* 1990: 544) are subsp. *mutilum*.

### **Costaceae**

#### ***Costus speciosus*** (J. König) Sm.

The following collection represents a **new island record** from Kauai. *Costus speciosus* previously was known to be naturalized only on Lanai.

*Material examined.* Kauai: Hanalei District, abundantly naturalized in *Syzygium cumini* forest, along Kuhio Hwy. near Limahuli Stream, 15 ft, 28 May 1988, K. Nagata 3849 (BISH).

### **Cyperaceae**

#### ***Cyperus compressus*** L.

The following collection of *Cyperus compressus* represents a **new naturalized record** from Maui. It also occurs on the island of Hawaii.

*Material examined.* Maui: Hana District, Kalahu Point, National Tropical Botanical Garden, Kahanu Garden, ca. 0–50 ft, disturbed area between *Pandanus* forest and lawn area around Piilani Heiau, common, 15 Oct 1987, Flynn & Tully 2446 (BISH, PTBG).

#### ***Cyperus phleoides*** (Nees ex Kunth) Hillebr. var. ***phleoides***

The following collection represents a **new island record** for this endemic Hawaiian sedge. It previously was known from all of the main islands except Kahoolawe and Hawaii.

*Material examined.* Kahoolawe: Makawa District, Ale ale stacks, near Puu Koa, mixed native coastal shrubland with *Portulaca molokiniensis* . . . 10–90 m, 50+ plants on stack, 18 Mar 1992, Wood *et al.* 1726 (BISH, PTBG).

#### ***Rhynchospora caduca*** Elliott

The following collection represents a **new island record** from Kauai. *Rhynchospora caduca* was previously known from Maui and Hawaii. Based on the recent introduction

of this species to the archipelago, it appears to be spreading rapidly.

*Material examined.* Kauai: Hanalei District, large bog mauka of Kilauea town, 450 ft, 10 Apr 1988, *Hume & Levine 332* (BISH, PTBG).

### Fabaceae

#### *Acacia aneura* F. Muell. ex Benth.

The following collection is a **new naturalized record** of *Acacia aneura*, known as mulga in Australia, in the Hawaiian Islands. It is known in cultivation from Oahu, Molokai, Lanai, and Kahoolawe. It has been cultivated in the archipelago since 1931 and was introduced from Australia by C.S. Judd for forestry plantings (from *Judd s. n.*, BISH). It is easily recognized by its narrow, dull phyllodes 0.9–8 (12) mm wide with inconspicuous veins, flat winged pods, and flowers in slender dense bright yellow spikes 1–3 cm long.

*Material examined.* Lanai: Lanai District, W of Lanai City and N of Kaumalapau, Kiei Gulch, lowland dry flat grassland, with *Leucaena*, *Sida*, *Casuarina*, and *Panicum*, 320 m, abundant and starting to naturalize, 14 May 1990, *Wood et al. 336* (BISH, PTBG).

#### *Adenanthera pavonina* L.

The following collection represents a **new naturalized record** of *Adenanthera pavonina* being in the Hawaiian Islands. This species, known locally as false wiliwili, is most easily distinguished by its bipinnately compound leaves, racemes of mixed white and yellow flowers, spirally twisted pods after dehiscence, and 9–10 mm long red lenticular seeds.

*Material examined.* Kauai: Koloa District, near Hwy 50 just E of the halfway bridge, along turnoff into cane field, ca. 100 m, apparently planted, now regenerating and becoming naturalized locally, 30 Nov 1989, *Lorence 6413* (BISH, PTBG).

#### *Canavalia sericea* A. Gray

The following collection represents a **new island record** of this species on Kauai. It also is naturalized on Oahu and Maui.

*Material examined.* Kauai: Kawaihau District, Aliomanu, a vine at back of beach creeping across sand, ca. 5 ft . . . locally common with *Scaevola*, 3 Jan 1990, *Flynn & Schaeffer 3727* (BISH).

#### *Crotalaria verrucosa* L.

*Crotalaria verrucosa*, quickly distinguished from other species of *Crotalaria* in the Hawaiian Islands by its blue corolla, was inadvertently omitted by Windler & Skinner (1990) in their treatment of the genus for the *Manual*. Additional characters that distinguish this species include its striate, 4-angled stem, and the simple, lanceolate, ovate, rhomboid or elliptic leaves. This species is currently known to be naturalized at least on Oahu (D.R. Herbst, field observ., 1995). The Fosberg collection cited below is the earliest record indicating that the species was naturalized in the Hawaiian Islands. Several of these specimens were identified by R. Barneby.

*Material examined.* Oahu: West slope of Ulupau Head along abandoned road in thick *Leucaena* scrub, fairly common, 10 Dec 1978, *Fosberg & Evans 58853* (BISH); 31 May 1926, *A.F. Judd 53* (BISH); University of Hawaii, semi-moist ground, 4 Mar 1931, *Inafuku, s.n.* (BISH); Molokai: Mapulehu, H.S.P.A. introduction, 21 May 1944, *A.J. Mangelsdorf, s.n.* (BISH).

*Desmanthus pernambucanus* (L.) Thellung

In a recent monograph of *Desmanthus* (Luckow 1993), species of the *D. virgatus* complex were reinterpreted. The result is that the species naturalized on many Pacific islands, including the Hawaiian Islands, is now referred to *D. pernambucanus*.

*Desmodium heterophyllum* (Willd.) DC

The following collections represent records of a species previously not recorded as naturalized in the Hawaiian Islands. *Desmodium heterophyllum* can be distinguished from other species of *Desmodium* naturalized in the archipelago by its usually broadly elliptic leaflets, the terminal one (0.3–)1–2.5 cm long, (0.3–)0.8–1.4(–2) cm wide, stems with spreading hairs up to 2 mm long, the pedicels or peduncle 10–30 mm long, and the articles ultimately dehiscent along the lower suture.

*Material examined.* Maui: abundant along road shoulder from Kaupakulua to Keanae, 20 Aug 1987, *Hobdy 2918* (BISH); Honopu, along Lupi Road in Koolau Forest Reserve, common in ditch access road, 2 Sep 1987, *Hobdy 2920* (BISH). Molokai: Plant Materials Center, grass and legume groundcover trail, initial testing field 8A, row 2, plot 15 HA-4732, sprigs collected at Palau Airport, 440 ft, 11 Jul 1990, *Evans M-84* (BISH).

*Medicago minima* (L.) Bartal.

The following collection represents a **new island record** for Kauai. *Medicago minima* was previously recorded from Lanai, Maui, and Hawaii.

*Material examined.* Kauai: Lihue District, Niumalu flat, Nawiliwili Bay along small boat harbor, 5 ft, 3 Apr 1987, *Flynn & Lorence 2142* (BISH, PTBG).

*Medicago sativa* L.

The following collection represents a **new island record** from Maui for *Medicago sativa*. This species was previously known to be naturalized on Midway Atoll, Oahu, Lanai, and Hawaii.

*Material examined.* Maui: East Maui, Baldwin area near Halliimaile Rd. junction, a weed on road shoulder, 17 Jun 1991, *Hobdy et al. 3381* (BISH).

*Melilotus alba* Medik.

The following collection represents a **new island record** for Maui. *Melilotus alba* was previously known to be naturalized on Midway Atoll and Hawaii.

*Material examined.* East Maui: along Kulu Highway, an uncommon roadside weed, 5 Jun 1987, *Hobdy 2830* (BISH).

*Mucuna sloanei* Fawcett & Rendle [syn. *M. urens* sensu auct. non (L.) Medik.]

Geesink *et al.* (1990: 689) misidentified the Hawaiian populations of *Mucuna urens*. These plants actually represent populations of the South American and Pacific basin species, *Mucuna sloanei* (Wilmot-Dear 1990: 25–29). Thus this species is indigenous in the Hawaiian Islands rather than naturalized as treated by Geesink *et al.* (1990). Wilmot-Dear recognized 2 varieties of *M. sloanei*, both occurring in the Hawaiian Islands. The indigenous *M. sloanei* var. *sloanei* is known from Kauai, Oahu, West and East Maui, and Hawaii, while the newly described and rare *M. sloanei* var. *perericea* Wilmot-Dear presently appears to be endemic to East Maui, from Makawao to Wailua Iki. The 2 vari-

eties can be distinguished by the amount of tomentum on their leaves and calyx. *Mucuna sloanei* var. *sloanei* has sparse to abundant fairly short, adpressed, fine silvery hairs covering the underside of the leaf and the calyx; the surface is usually visible through the hairs. *Mucuna sloanei* var. *persericea* has the underside of the leaf and calyx covered with a thick covering of rather coarse, long, yellowish white hairs that completely cover and hide the surface. In addition to the specimens cited by Wilmot-Dear the following collection of *M. sloanei* var. *persericea* should be noted.

*Material examined.* Maui: East Maui, Koolau Forest Reserve near Honopou Stream, makai of Ulalena, 1800 ft, open west-facing slope, 21 Feb 1986, *Hobdy 2571* (BISH).

***Mucuna gigantea* (Willd.) DC. subsp. *gigantea***

Wilmot-Dear (1990: 5) placed the Hawaiian populations of *Mucuna gigantea* in the Asian and Pacific subsp. *gigantea*.

***Senna septemtrionalis* (Vogel) H. Irwin & Barneby**

The following collections represent a **new island record** of *Senna septemtrionalis* on Hawaii. This species was previously recorded as naturalized on Kauai, Oahu, Molokai, and Maui.

*Material examined.* Hawaii: Hualalai, Olma [Ooma ?] Tract, Kaloka Mauka, 855 m, Ohia-fern forest, 17 Aug 1987, *Engilis 20* (BISH); Puuwaawaa, cattle paddock at 2700 ft, near SE corner of 1986 burn, common rangeland weed, May 1989, *Takeuchi 5784* (BISH).

**Gentianaceae**

***Centaurium sebaeoides* (Griseb.) Druce**

*Centaurium sebaeoides* was previously known only from coastal sites on Kauai, Oahu, Molokai, and West Maui. The following collection represents a **new island record** for this relatively uncommon species on Lanai.

*Material examined.* Lanai: Maunalei Canyon, 228 m, growing on rocky ledges in a gully on the west side of the canyon, 11 May 1991, *Hobdy 3292* (BISH).

**Juncaceae**

***Juncus bufonis* L.**

The following collection is a **new island record** of *Juncus bufonis* on Oahu. This species was previously recorded as naturalized on Kauai, Molokai, Maui, and Hawaii.

*Material examined.* Oahu: Waianae Mountains, Mt Kaala, occasional in parking lot at the Kaala Bog, 22 Mar 1988, *K. Nagata 3435* (BISH).

**Lamiaceae**

***Hyptis capitata* Jacq.**

The following collection represents a **new state record** of *Hyptis capitata*. It is at least locally naturalized in Waikane Valley. Because it has become so common elsewhere in the Pacific basin, it is expected to spread in the Hawaiian Islands. It can be easily distinguished from the other species naturalized in the Hawaiian Islands (Wagner *et al.* 1990: 801–02) by its globose, densely-flowered inflorescences.

*Material examined.* Oahu: Koolau Mountains, Waikane Valley, Koolaupoko, 85 ft, 16 Jan 1988, *K. Nagata 3788* (BISH).

***Hyptis suaveolens* (L.) Poit.**

The following collection represents a **new island record** for *Hyptis suaveolens* from Oahu. This species has been previously recorded as naturalized on Hawaii.

*Material examined.* Oahu: Lowland dryland grassland and forest W of Makakilo town below paved road leading toward Camp Timberline access road, occasional, 22 Oct 1990, *Imada et al.*, s.n. (BISH).

**Lauraceae*****Cinnamomum burmanni* (Nees) Blume**

The following collections represent a **new naturalized record** of *Cinnamomun burmanni* on Maui. Previously, it was known to be naturalized on Oahu.

*Material examined.* Maui: East Maui, Hwy 360 between Paia and Hana, near mile 28, in stream bottom with *Hedychium*, 7 Mar 1988, *Flynn et al.* 2717 (BISH, PTBG).

**Menispermaceae*****Cocculus orbiculatus* (L.) DC [syn. *Cocculus trilobus* (Thunb.) DC]**

In the *Manual* we followed L.L. Forman in his treatment of the genus *Cocculus* (Wagner *et al.* 1990: 921). Forman has recently published his treatment for *Flora Malesiana* (1986). In that work he used the older name *C. orbiculatus* for the species and placed *C. trilobus* in synonymy (Forman 1986: 231).

**Moraceae*****Fatoua villosa* (Thunb.) Nakai**

This is a **new state record** for *Fatoua villosa*. This Old World species is at least locally naturalized in the vicinity of Foster Botanic Garden and Lyon Arboretum. It can be distinguished from other Moraceae in the Hawaiian Islands by its diminutive herbaceous habit and the fruit an achene. Other characters that will differentiate this monoecious species from herbaceous members of the closely related Urticaceae include non-stinging hairs, the densely flowered cymose inflorescence, staminate flowers 4-merous, pistillate flowers 6-merous, and pendulous ovules.

*Material examined.* Oahu: Foster Botanic Garden. A weed growing in pots, in a slat house, 16 May 1986, *Lau 2403* (BISH); Lyon Arboretum, weed in holding area outside greenhouse, hairs not stinging, 29 Oct 1986, *K. Nagata 3566* (BISH).

**Onagraceae*****Epilobium billardierianum* Ser. subsp. *cinereum* (A. Rich.) Raven & Engelhorn**

*Epilobium billardierianum* was listed as "apparently very recently" naturalized on Kauai by Wagner *et al.* (1990: 995). The following collections document its occurrence on Kauai since at least 1986.

*Material examined.* Kauai: Waimea District: Kokee State Park, Puuokila lookout, mat forming herb along path, 18 Aug 1986, *Flynn 1865* (BISH, PTBG), 16 Sep 1987, *Lorence et al.* 5555 (BISH, PTBG).

***Oenothera laciniata* Hill**

The following collection represents a **new island record** for *Oenothera laciniata* from Kure Atoll. It was previously known to be naturalized on Midway Atoll, Maui, and

Hawaii.

*Material examined.* Kure Atoll: 8 May 1986, *Saito s. n.* (BISH).

### Piperaceae

#### *Peperomia obovatilimba* C. DC

The following collection represents a range extension of *Peperomia obovatilimba*, previously considered by Wagner *et al.* (1990: 1034) endemic to East Maui and the Kohala Mountains, Hawaii.

*Material examined.* West Maui: Koolau Forest Reserve, 730 m, ridge E of Halehaku Gulch, 12 May 1986, *Hobdy 2648* (BISH).

### Polemoniaceae

#### *Collomia linearis* Nutt.

The following collection represents a **new state record** for *Collomia linearis*. It appears to be locally naturalized in Haleakala National Park. It can be distinguished from *Gilia capitata* Sims, the only other species of Polemoniaceae naturalized in the Hawaiian Islands, by its simple toothed basal leaves, linear entire cauline leaves, white or pink corolla 8–15 mm long, and calyx with pleated to expanded sinuses, these not rupturing in maturity.

*Material examined.* Maui: Haleakala, in a rocky stream bed, 8200 ft, 18 Aug 1987, *Medeiros & Jessel s. n.* (BISH).

### Pontederiaceae

#### *Monochoria vaginalis* (N. L. Burm.) K. Presl

The following collection represents a **new island record** for Hawaii. *Monochoria vaginalis* was previously known to be naturalized on Kauai and Oahu.

*Material examined.* Hawaii: Waipo Valley, 19 Jul 1987, *Stemmermann & Luce 7174* (BISH).

### Poaceae

#### *Brachiaria plantaginea* (Link) Hitchc.

*Brachiaria plantaginea* apparently was originally introduced by the Hawaii Agricultural Experimental Station as part of their screening for grasses for pasture improvement in the Hawaiian Islands. It appears to have been naturalized on Oahu and Molokai for at least the past 15 years. It was inadvertently omitted by O'Connor (1990) in his treatment of the family in the *Manual*. This species, which is native to Mexico, and Central and South America, can be distinguished from other species of *Brachiaria* in the Hawaiian Islands as follows: coarse glabrous or sometimes pilose annuals to 60(–100) cm tall, spikelets 4–5 mm long, the first glume scarious, clasping, 1.5–2 mm long, second glume and sterile lemma similar, equal with slender prominent raised nerves and often with short ladderlike undulating raised veinlets between the nerves, the fertile lemma 3 mm long.

*Material examined.* Oahu: Waialua, Poamoho, Hawaiian Agricultural Experiment Station farm, planted in grass garden, 17 Oct 1940, *Hosaka 2551* (BISH), 23 Jun 1967, *Shinbara 0-81* (BISH); Honolulu, Hawaii Agricultural Experiment Station, Pensacola Station, near garage, 16 Oct 1941, *Hosaka 2609* (BISH); road leading to Barbers Point Beach Park, 24 Nov 1979, *Higashino et al. 8199*

(BISH). Molokai: Palaau District, along eastern edge of Waiahawahewa Gulch, 350 ft, 8 Mar 1976, *Herbst & Spence 5711* (BISH).

***Eustachys petraea*** (Sw.) Desv.

*Eustachys petraea* was reported by O'Connor (1990: 1513) as *Chloris petraea* Sw., an adventive species on Midway Atoll and French Frigate Shoals. It is included in this report because we wish call attention to the naturalized status of this species. Further, we point out that the commonly accepted placement for this species is in *Eustachys* (e.g., Clayton & Renvoize 1986: 237). *Eustachys* is characterized by an obtuse to bilobed, distinctly awned upper glume, and nearly awnless dark brown lemma, while in *Chloris* the upper glume is acute to bidenticulate, awnless or rarely with a very short awn, and the lemma is nearly always long-awned and pallid.

***Hyparrhenia hirta*** (L.) Stapf

O'Connor (1990: 1554) treated *Hyparrhenia hirta* as adventive on Molokai and Lanai. The following records establish this species as a naturalized element of the flora at least on Molokai and Lanai.

*Material examined.* Molokai: Mauna Loa, 26 Apr 1962, *Uehara 7* (BISH); road to Waikehaha, 16 May 1962, *Uehara 3* (BISH). Lanai: southern beginning of Munro Trail, common, locally along road, 24 Aug 1963, *Degener & Degener 31106* (BISH); along upper Kaumalapua Hwy, near Lanai City, 1185 ft, clumpy grass in large field of *Psidium* trees, 18 Oct 1973, *Spence 309* (BISH); Puu Manu, Land of Kaohai, 1500 ft, dominant on arid slopes below Puu Manu, 8 Nov 1987, *K. Nagata 3715* (BISH); Puu Manu, 2000 ft, common, 8 Nov 1987, *K. Nagata 3717* (BISH).

***Pennisetum clandestinum*** Chiov.

The following collection represents a **new naturalized record** of this species on Kauai. It also occurs on Oahu, Lanai, Maui, and Hawaii.

*Material examined.* Kauai: [Kokee State Park], Camp 10 Road, garden at Plews' residence, 23 Oct 1986, *Plews s. n.* (BISH); Waimea Canyon State Park, Puu Lua, Lua Reservoir, . . . around spillway on SW side of reservoir, ca. 3270 ft, 27 Jan 1988, *Flynn et al. 2712* (BISH, PTBG).

***Polypogon interruptus*** Kunth

The following collection represents a **new naturalized record** from Kure Atoll. It also is known from Midway Atoll, Kauai, Oahu, Maui, and Hawaii.

*Material examined.* Kure Atoll: near tennis court, 8 May 1986, *Saito s. n.* (BISH).

***Sporobolus pyramidatus*** (Lam.) Hitchc.

This species was recorded as adventive by O'Connor (1990: 1596), and was noted in coastal areas on Kure Atoll, French Frigate Shoals, and Oahu. As the label information cited below makes quite clear, this species is fairly widely naturalized in the archipelago. This species, which is native to North to South America, can be distinguished from the other species of *Sporobolus* in the Hawaiian Islands by the glumes, at least the second one, about as long as the spikelet, spikelets 1.5–2 mm long, the mature inflorescence is an open pyramidal panicle, the branches viscid and usually bare of spikelets on the lower 1/4–1/2, the lowest branches verticillate and spreading.

*Material examined.* Kure Atoll: Green Island, abundant along runway, also some near LORAN buildings, 4 Jan 1979, *Herbst 6271* (BISH). Laysan: SE border of guano hardpan in soil pockets, 22 Jun 1990, *McDermond & Niethammer s. n.* (BISH). French Frigate Shoals: Tern Island, very com-



mon grass, especially along SE half of the runway's border, 6ft, 11 Sep 1978, *Herbst 6232* (BISH). Oahu: Honolulu, Pensacola St., 25 Feb 1936, *Whitney 4040* (BISH); University of Hawaii campus, Manoa, lawn, edge of University Ave., 300 ft, 12 Apr 1956, *Stone 1243* (BISH), weed at construction site, 4 Jan 1969, *Herbst 1367* (BISH); Kahakaaulana Island, Keehi Lagoon, 30 Apr 1978, *Herbst & Walker 6086* (BISH); "Burm Island," Keehi Lagoon, 30 Apr 1978, *Herbst & Walker 6073* (BISH); "Coconut Island," Keehi Lagoon, 29 Jul 1978, *Herbst 6159* (BISH).

### Portulacaceae

*Talinum fruticosum* (L.) Juss. [syn. *Talinum triangulare* (Jacq.) Willd.]

This species was treated by Wagner *et al.* (1990: 1076) as *Talinum triangulare*. The synonymy of this species is detailed in Howard (1988: 206), which is followed here. The following collection represents a **new island record** from Oahu.

*Material examined.* Oahu: Honolulu, Makiki District Park, . . . growing as a weed which has recently escaped from an adjacent yard where the species is being cultivated, 9 Dec 1985, *Lau 1717* (BISH).

### Potamogetonaceae

*Potamogeton pectinatus* L.

The following collection represents a **new island record** for *Potamogeton pectinatus* from Hawaii. It has been previously recorded from Niihau and Kauai.

*Material examined.* Hawaii: Hilo District, Hilo, Wailoa estuary, submerged aquatic, 25 Jul 1987, *Stemmermann & Luce 7179* (BISH).

### Rubiaceae

*Coprosma ternata* W. Oliver

*Coprosma ternata* was previously known as an eastern Molokai endemic (Wagner *et al.* 1990: 1130). We report here a collection extending the range to include West Maui.

*Material examined.* Maui: West Maui, border of Lahaina and Wailuku Dists., Hanaula, rim of Ukumehame, N-facing aspect, *Metrosideros-Dicranopteris* montane wet forest, with *Platanthera*, *Myrsine*, *Vaccinium*, *Cibotium*, *Smilax*, *Touchardia*, *Boehmeria*, *Hedyotis*, *Wikstroemia*, *Dodonaea*, *Melicope*, *Pleomele*, *Dubautia*, *Cyrtandra*, *Scaevola*, *Styphelia*, *Bidens*, *Labordia*, *Sadleria*, *Rubus*, 3 m tree, 25 Aug 1991, *Wood & Perlman 1173* (BISH, PTBG).

*Galium divaricatum* Pourr. ex Lam.

The following collection represents a **new naturalized record** of *Galium divaricatum* on the island of Hawaii. It previously was recorded from the island of Maui.

*Material examined.* Hawaii: Hamakua District, Pohakuloa Training Area, along Saddle Road, between the 30 and 45 mile markers, within ca. 60 ft of road, 13 Dec 1990, *E. Funk PTA24* (BISH).

*Paederia foetida* L. [syn. *Paederia scandens* (Lour.) Merr.]

When we wrote the treatment of *Paederia* for the *Manual* (Wagner *et al.* 1990: 1160) we adopted the name *P. scandens* following numerous other floristic treatments in the Pacific, Malesian, and Asian regions. At the time we could not find a discussion of the reasons for the change, but because the switch from *P. foetida* to *P. scandens* appeared to be nearly universal we also made the switch. A recent detailed monograph treated both names as applying to the same species (Puff 1991: 210), thus the correct name for this species goes back to that used before the *Manual* (i.e., *P. foetida*).

**Solanaceae*****Nicotiana glauca*** Grah.

The following collection represents a **new island record** for *Nicotiana glauca*. It previously was recorded from the islands of Oahu, Lanai, Maui, and Kahoolawe.

*Material examined.* Hawaii: North Kona District, Mamalahoa Hwy near mile [marker] 28, 6 Aug 1987, *Flynn & Lorence 2280* (BISH, PTBG).

***Physalis lanceifolia*** Nees

The following collection represents a **new naturalized record** for the Hawaiian Islands. *Physalis lanceifolia* can be distinguished from the 2 other naturalized species of this genus in the Hawaiian Islands by its sparse pubescence of erect or spreading simple non-glandular hairs, corolla yellow with a darker yellow inconspicuous center, leaves narrowly elliptic, pedicels 20–30 mm long, and seeds 1.5–2 mm long.

*Material examined.* Maui: East Maui, Kokomo, 1400 ft, pasture weed, 17 Nov 1985, *Hobdy 2458* (BISH).

**Urticaceae*****Pilea microphylla*** (L.) Liebm.

The following collection represents a **new island record** for *Pilea microphylla*. It previously was recorded from the islands of Kauai, Oahu, Maui, and Hawaii.

*Material examined.* Midway Atoll: Sand Island, 6 Jul 1988, *Herbst & Takeuchi 9069* (BISH).

**Verbenaceae*****Clerodendrum chinense*** (Osb.) Mabb. [syn. *Clerodendrum philippinum* Schauer; *C. fragrans* Willd.]

Mabberley (1989: 131, 707) indicated that the correct name for the plant treated by Wagner *et al.* (1990: 1319) as *Clerodendrum philippinum* is *C. chinense*.

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**Notes on Two *Rhizoecus* Species New to the Hawaiian Islands,  
With a Revised Key to Hawaiian Hypogaecic Mealybugs  
(Homoptera: Pseudococcidae: Rhizoecinae)**

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In an earlier paper (Beardsley 1966) I treated 3 species of hypogaecic mealybugs (Rhizoecinae) known to be present in the Hawaiian Islands. Since then, 1 of these, *Rhizoecus advenus* Beardsley, was shown to be a junior synonym of a widespread south Asian and Pacific species, *R. amorphophalli* Betrem (Hambleton 1979), and 2 additional species, *R. caladii* Green (Beardsley 1982) and *R. saintpauliae* Williams (Beardsley 1992), have been reported established. I report here 2 additional immigrant *Rhizoecus* species that appear to be established, and offer a revised key to the hypogaecic mealybugs of Hawaii.

***Rhizoecus cacticans*** (Hambleton)

*Rhipsiella cacticans* Hambleton, 1946: 64. Type locality: Ecuador.

*Rhizoecus cacticans*: Ferris, 1953: 342.

This is a widespread species found throughout tropical America, north to Florida and California. It occurs also in Australia, Canary Islands, and under glass in Europe (Ben-Dov 1994). The Hawaiian record is based on 9 specimens on 3 slides labeled: OAHU, Mililani, 31.I.1994, ex strawberry roots (W. Kobayashi 94-054). Specimens in the collection of Hawaii State Department of Agriculture, Honolulu (HDOA), and in the author's collection (JWB).

***Rhizoecus hibisci*** Kawai & Takagi

*Rhizoecus hibisci* Kawai & Takagi, 1971: 181. Type locality: Japan

In addition to the type locality, this species has been reported from Puerto Rico (Williams & Granara de Willink 1992). I have seen specimens from the following Hawaiian collections: OAHU, Manoa Valley, 27.I.1992, on roots of Bermuda grass in lawn (S. Hino); OAHU, Waimanalo, 30.III.1993, ex Tifdwarf roots, Kaneohe Coop. Ext., 93-158; CALIFORNIA, in quarantine from Hilo, Hawaii, 26.V.1993, on roots of kentia palm; same data except on roots of Phoenix palm; and on roots of *Raphis* palm. Specimens in collections of HDOA; California Department of Food and Agriculture, Sacramento; and in JWB.

**Key to Hypogaecic Mealybugs of the Hawaiian Islands (Adult females)**

1. Anal lobes protuberant, strongly sclerotized, each bearing large sclerotized spine at apex; pair of smaller spines dorsally at apex of abdomen between anal lobes; pair of similar spines on dorsum of head ..... *Geococcus coffeae* Green  
— Anal lobes not noticeably protuberant or sclerotized; without such large sclerotized spines..... 2

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- 2. Multilocular disc pores absent; with 1 circulus and tritubular ducts; antenna 6-segmented..... 3
- Multilocular disc pores present; with 0–2 circuli and bitubular or tritubular ducts; antenna 5 or 6-segmented ..... 4
- 3. Size relatively small (1.0–1.5 mm long); anal ring less than 50µ wide; 3rd segment of antenna distinctly less than 2 X as long as 4th.....
- ..... *Rhizoecus hawaiiensis* (Hambleton)
- Size larger (1.8–2.5 mm long); anal ring more than 50µ wide; 3rd antennal segment about 2 X as long as 4th..... *Rhizoecus cacticans* (Hambleton)
- 4. With bitubular ducts; antenna 5-segmented; multilocular disc pores present on dorsum and venter ..... 5
- With tritubular ducts; antenna 6-segmented; multilocular disc pores confined to venter ..... 6
- 5. With 2 well-developed circuli; multilocular disc pores more numerous, 30–60 on dorsum of thorax ..... *Rhizoecus saintpauliae* Williams
- With 1 circulus or none; multilocular disc pores less numerous, 8–20 on dorsum of thorax ..... *Rhizoecus hibisci* Kawai & Takagi
- 6. Multilocular disc pores confined to posterior abdominal segments; dorsal tritubular ducts numerous, around 40 or more total; circulus present.....
- ..... *Rhizoecus amorphophalli* Betrem
- Multilocular disc pores present on anterior abdominal segments and thorax; dorsal tritubular ducts less numerous, around 15–20 total; circulus absent.....
- ..... *Rhizoecus caladii* Green

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## Notes on Flightless Hawaiian Dolichopodidae (Diptera)

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Flightless species of insect groups that are normally fully winged are characteristically found in remote areas and relatively high elevations. In the flightless dolichopodids known from Hawaii (currently all placed in the genus *Campsicnemus*), reduction of the wings to thin straplike structures has severely limited their mobility and restricted their habitat to soil, leaf litter, and low-growing vegetation at sites all normally over 1500 m in elevation. The increase of non-indigenous species, especially ungulates and predaceous arthropods, into native forests in Hawaii, has apparently led to the decline and possible extinction of some populations of these flightless flies. Continued surveys and monitoring of known populations of these flightless flies is highly desired in order to assess and document the potential impact of non-indigenous species on native populations of these flies.

### *Campsicnemus bryophila* (Adachi)

### New island record

This flightless species, previously known only from the island of Molokai has been found recently in a single population on Oahu, where it occurs in leaf litter in association with another species of flightless dolichopodid (undescribed), which will be described elsewhere. These 2 species are the first flightless dolichopodids to be found on Oahu since 1900 when R.C.L. Perkins collected the type series (and only known specimens) of *Emperoptera mirabilis* (Grimshaw 1902). Predaceous ants were thought to be the reason for the possible extinction of the populations of *E. mirabilis* (Zimmerman 1948), and ants presumably also potentially threaten the survival of this vulnerable Oahu population of *Campsicnemus bryophila*.

*Material examined:* Oahu: 4M, 2F, Mt Kaala, 4000 ft [1219 m], w. slope, *Broussasia* leaf litter, 19.i.1993, S.L. Montgomery (BPBM).

### *Campsicnemus hawaiiensis* Hardy & Delfinado

The original series of specimens of this flightless species were reared in the laboratory from soil samples collected in February of 1972 and 1973. The samples derived primarily from adjacent kipuka, Kipuka "9" and "14" (19 specimens) in the Saddle Road area of the island of Hawaii at an elevation of 5100 ft [1554 m] (Hardy & Delfinado 1974). I visited Kipuka "9" on 4 occasions in 1993 and 1994 but was not able to find additional specimens in any of my collecting attempts. A combination of visual observations, pan trapping, and rearing from collections of soil samples from numerous areas in Kipuka "9" proved fruitless.

Significant pig damage in the kipuka was noticed on the last 2 collecting trips. The presence of these rooting ungulates in the kipuka would have a deleterious effect on the fragile population of this flightless species of fly, which normally is restricted to soil and leaf litter habits within the kipuka.

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## Status of *Rhynchopalpus brunellus* in the Hawaiian Islands, With Comments on the Systematics of the Nolinae (Lepidoptera: Noctuidae)

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### *Rhynchopalpus brunellus* Hampson (1893) Resurrected combination, new island record

During a Bishop Museum field trip on 30 September 1989, the species referred to in Hawaiian literature as *Selca brunella* (Hampson 1893) was found at Schofield-Waikane Trail on Schofield Military Reservation, Oahu, at ultraviolet lights at both 370 m and 440 m elevation.

The species was introduced from Kuala Lumpur, Malaysia, and Singapore, for the control of *Melastoma candidum* (previously known as *M. malabathricum*; Almeida in Wagner *et al.* 1990: 910). It was released at Panaewa Forest, Hawaii, in 1965 (*Proc. Hawaii. Entomol. Soc.* 19: 202, 205) and Huleia, Kauai, in 1966 (*Proc. Hawaii. Entomol. Soc.* 19: 376, 378), and is considered to be well established on those islands (*Proc. Hawaii. Entomol. Soc.* 20: 27, 522). This species is considered successful in providing partial control of *Melastoma* (Clausen 1978: 398–99, Julien 1987: 53, Funasaki *et al.* 1988: 147).

Considerable variation among Hawaiian specimens in both size and wing maculation prompted us to verify the identification by comparison of male genitalia against the male syntype from Sri Lanka in The Natural History Museum, London (BMNH arctiid slide 450). The wings and male genitalia are illustrated in Figs. 1 and 2.

The species was described and illustrated as *Rhynchopalpus brunellus* by Hampson (1893: 89, pl. 158, fig. 31), but its taxonomic placement has been problematic. In Hawaiian literature it has been included in Arctiidae or Nolidae. It is currently placed in the subfamily Nolinae of the Noctuidae (Poole 1989). Poole (1989: 693) transferred *brunellus* to *Nola* Leach, but the male genitalia are atypical of this genus. This problem prompted a search for a better generic placement for *brunellus*, via an extensive program of dissection throughout the Nolinae, including the type specimens of type species of genera held at the BMNH and University Museum, Oxford (UMO). The results of these studies will be reported in detail elsewhere. The Nolinae are in great need of a comprehensive revision; we hope these notes will help fill the gap until such a revision can be undertaken.

### Notes on the Generic Classification of Nolinae

In his catalog of the Noctuidae, Poole (1989) retained the accepted synonymy (e.g., in Hampson 1900: 31, 46) for *Nola* and transferred all species under the generic concept of "Roeselia" (*Roeselia* Hübner is an isogenotypic synonym of *Nola*) to *Meganola* except

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those that were themselves type species of genera that had been placed as synonyms with *Roeselia*. These he treated as distinct, usually monobasic, genera. The majority of Nolinae were placed by Poole into 2 large genera: *Nola* Leach and *Meganola* Dyar. These can be diagnosed most reliably on characters of the male abdomen (Franclemont 1960: 53): *Nola* species have divided valvae, the uncus reduced or absent, and the eighth abdominal segment modified with apodemelike structures (see Holloway 1979: fig. 89.4). *Meganola* species have entire valvae, the uncus strong, and the eighth abdominal segment weakly modified if at all. A feature of *Meganola*, absent from *Nola*, is a pair of setose lobes associated with the anal tube (see Holloway 1979: fig. 94.1). Under these characters, *brunellus* should be placed in *Meganola*. However, genitalic and other characters show that the species and generic synonyms grouped under each of these genera in Poole are not monophyletic.

Generic synonyms attributed to *Nola* by Poole that are correctly placed, the type species having the apomorphic features mentioned above, or sharing the same type species, are: *Lira* Billberg, *Chlamifera* Hübner, *Roeselia* Hübner, *Celama* Walker, *Aradrapha* Walker, *Lebena* Walker, *Minnagara* Walker, *Argyrophytes* Grote, and *Epizeuctis* Meyrick. Five **new synonyms** of *Nola* have been located: *Pisara* Walker, *Necla* Walker, *Automala* Walker, *Neonola* Hampson, and *Idiocyttara* Turner.

Of the other synonyms of *Nola* listed by Poole, several names representing taxa lacking *Nola* features were described earlier than *Meganola* and should therefore be regarded as **revived genera**. The oldest is *Manoba* Walker (1863: 62), type species *implens* Walker. The holotype (UMO) is a female lacking head and abdomen (illustrated by Hampson 1900: pl. 19, fig. 22). A male and female collected by J.D.H. in the Gunung Mulu National Park, Sarawak, in 1978 have been matched with the type and dissected (BMNH noctuid slides 14460, 14568). *Rhynchopalpus* Hampson, **revived genus**, is allied to *Meganola* and *Manoba*. Holloway (1976: 1–2, fig. 727) referred to the type species, *argentalis* Moore, and described the closely related species *harthani* Holloway, which must therefore be transferred to *Rhynchopalpus* as a **new combination**. *Rhynchopalpus* (1893) is an older name than *Meganola* (1898) and resembles the type species of that genus more closely in facies than does *Manoba*. It may therefore have to take precedence over *Meganola* and is, of course, the genus of original description for *brunellus*. Thus *brunellus*, with “*Meganola*” features of male genitalia (valvae undivided), the derived state of the signa (strongly invaginated to form a ridge-, thorn- or bladelike process within the bursa; usually 2, sometimes reduced to 1), triline hindwing venation, and no larval modifications (see below), belongs to the suite of genera paraphyletic in relation to *Nola* that includes *Manoba*, *Rhynchopalpus*, and *Meganola*. The ultimate placement for *brunellus* must await revision of the subfamily, but we feel the most conservative alternative is to associate *brunellus* with its original genus, *Rhynchopalpus*.

A feature of potential relevance to the higher classification of the group is the tendency in some taxa for the larva to stack its old head capsules in a hornlike structure attached to the thoracic hairs. This feature is usually accompanied by the presence of mats of flocculent white fluff among the verrucae. McFarland (1980) reviewed instances of head capsule stacking by Nolinae in conjunction with a detailed description of the feature in the Australian noline *Uraba lugens* Walker (also illustrated by Campbell 1963: pl. 10, fig. 9; Scott & Scott 1988: 111; Common 1990: fig. 54.8). The head capsule stack is usually found subsequently attached to the outside of the cocoon. Rearing of *brunellus* in



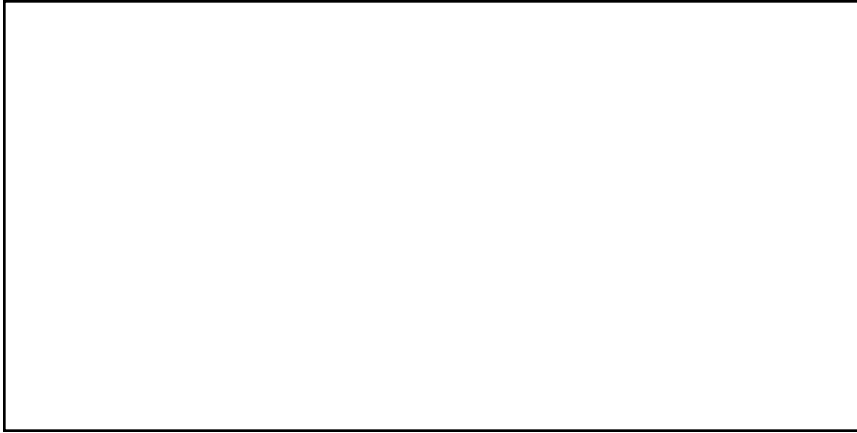


Fig. 1. *Rhynchopalpus brunellus*, wing pattern, Hawaii I (Bishop Museum).

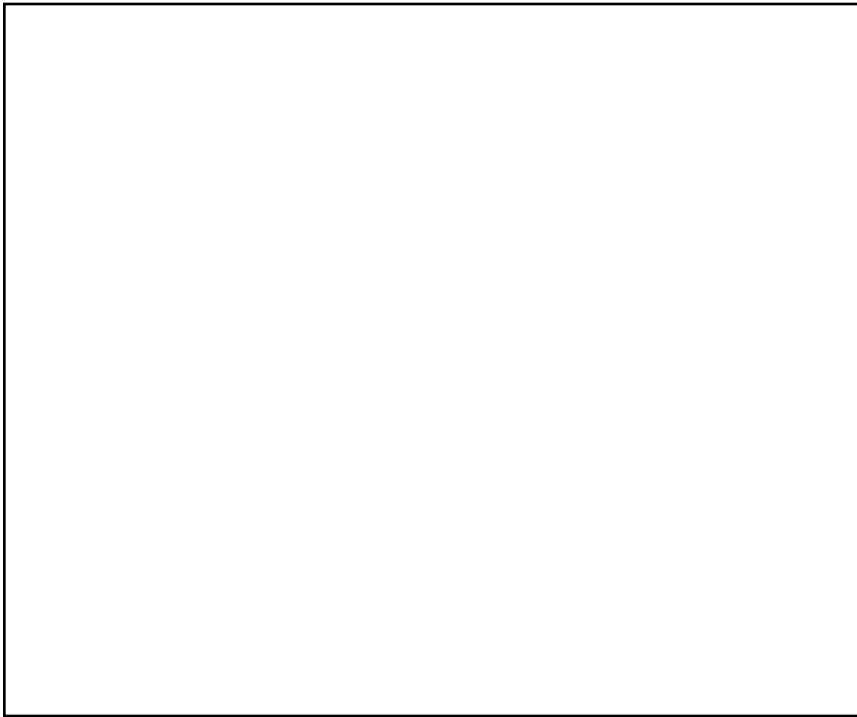


Fig. 2. *Rhynchopalpus brunellus*, male genitalia, Oahu (Bishop Museum). Line is 0.5 mm.

Hawaii has revealed that the larvae lack flocculent downy hairs and do not stack head capsules. Almost all taxa in which head capsule stacking has been recorded have the pleis-iomorphic, quadrifine hindwing venation. The trifine exception is the eastern Palaearctic *Evonima mandschuriana* (Oberthür).

#### Acknowledgments

Early drafts of this note were reviewed by I. Kitching and R.W. Poole. The Hawaii Department of Agriculture provided live specimens of *brunellus* and D. Preston cared for them. M. Filbert prepared the genitalic illustration.

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## Range Extensions of *Hylaeus* (Hymenoptera: Colletidae) on Kauai

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On 2 February 1994, 3 species of *Hylaeus* (Colletidae), were collected from the Polihale/Barking Sands area of west Kauai. Observations on their natural history at this location are reported. The 2 species of native Hawaiian *Hylaeus* were collected while they visited the flowers of the native plant *Sida cordifolia* (Malvaceae). While only 1 specimen of each was collected, other individuals of *Hylaeus* were present at the site of the collection. Bees of this genus were most active around *S. cordifolia*, which was the most abundant flower at that time. These 2 bees were identified by one of us (HVD). The non-native species was identified by R. Snelling of the Los Angeles County Museum. Voucher specimens of all 3 species to be deposited in Bishop Museum at the study's end.

### *Hylaeus (Nesoprosopis) anthracina* (Perkins) **New island record**

Previously reported from Hawaiian islands to the east (Perkins 1913, Nishida 1992). Also recollected recently on coastal Oahu where it was reported by Perkins (1913). Members of this genus appear to be abundant at one coastal location where one of us (DH) is currently studying its ecology with native coastal plants. *Hylaeus anthracina* is listed as extremely rare by the U.S. Fish and Wildlife Service (1994).

### *Hylaeus (Nesoprosopis) hostilis* (Perkins)

Endemic to Kauai (Perkins 1913, Nishida 1992) from elevations of 3000–4000 ft. Finding this and other species at sea level may be noteworthy especially in light of invasive arthropod assemblages at lower elevations (Howarth 1985).

### *Hylaeus (Gnathoprosopis) albonitens* (Cockerell) **New state record**

This is an introduced species native to northern and northeastern Australia (Houston 1981). Numerous individuals of this species, along with honey bees (*Apis mellifera* L.) were observed visiting the flowers of beach heliotrope (*Tournefortia argentea* L. f.), a species of plant indigenous throughout much of the Pacific, but introduced to Hawaii.

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### ***Platynota stultana*, the Omnivorous Leaf-Roller, Established in the Hawaiian Islands (Lepidoptera: Tortricidae)**

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*Platynota stultana* (Walsingham) became established on the island of Oahu in the mid 1980s and was widespread by 1989. Although specimens have existed in several collections, this is the first published report of the occurrence of the species in the Hawaiian Islands. The species is apparently native to semiarid northwestern mainland Mexico and the adjacent southwestern United States (not including California), but it has become widespread in California over the last 90 years (Powell 1983). It also occurs in Florida (Kimball 1965: 267) and is a greenhouse pest throughout the continental United States (Atkins *et al.* 1957). It has a broad range of recorded hosts, including over 25 plant families (Atkins *et al.* 1957, Powell 1983).

The species is easily distinguished from all other Hawaiian tortricids by the chestnut-brown forewing color and long, snoutlike labial palpi (Fig. 1). There are, however, simi-

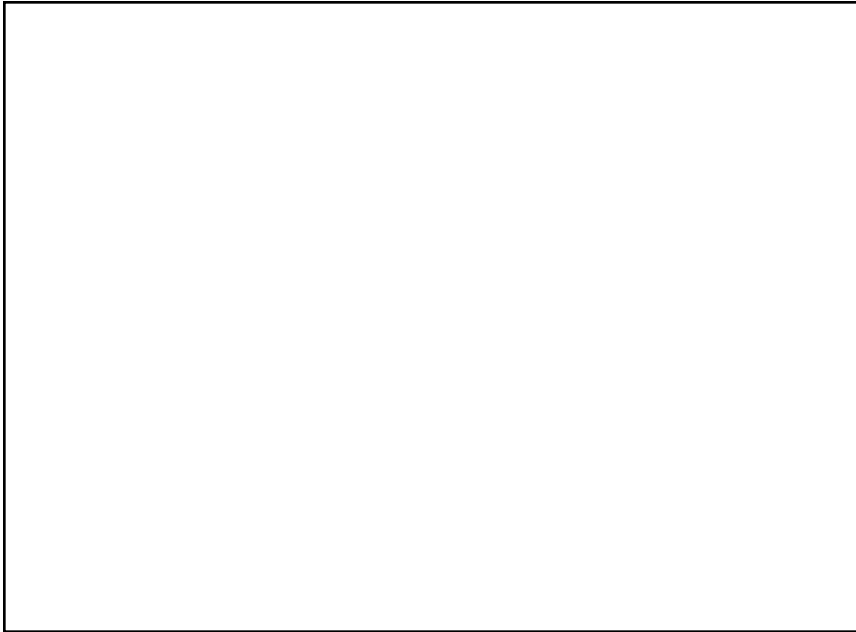


Fig. 1. *Platynota stultana* (Walsingham). Male, wingspan 14 mm. Specimen from Los Angeles, California, in Los Angeles County Museum of Natural History.

lar species of *Platynota* in the Americas that could be introduced to Hawaii in the future. Therefore, we illustrate the male and female genitalia of *P. stultana* (Figs. 2–3). We have confirmed our identification by dissection of a male from Schofield-Waikane Trail (USNM

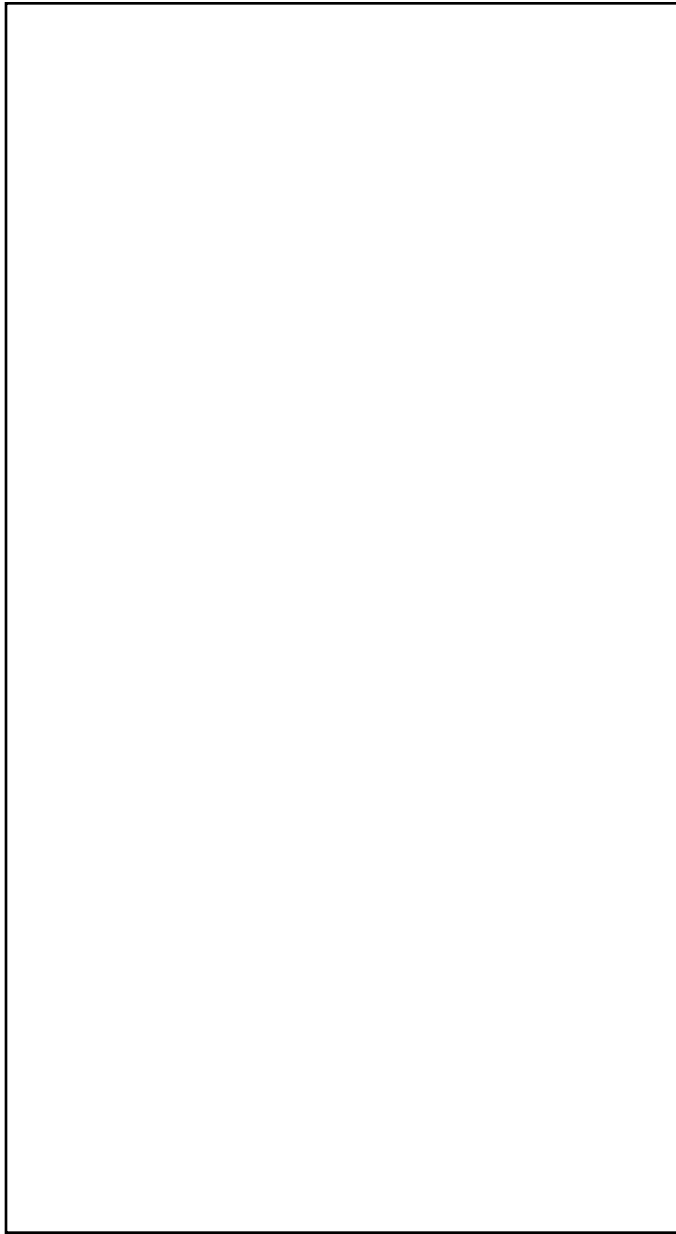


Fig. 2. *Platynota stultana* (Walsingham). Female genitalia. Composite drawing from USNM slides 26929 and 26933, both from Mexico. Line is 0.5 mm.

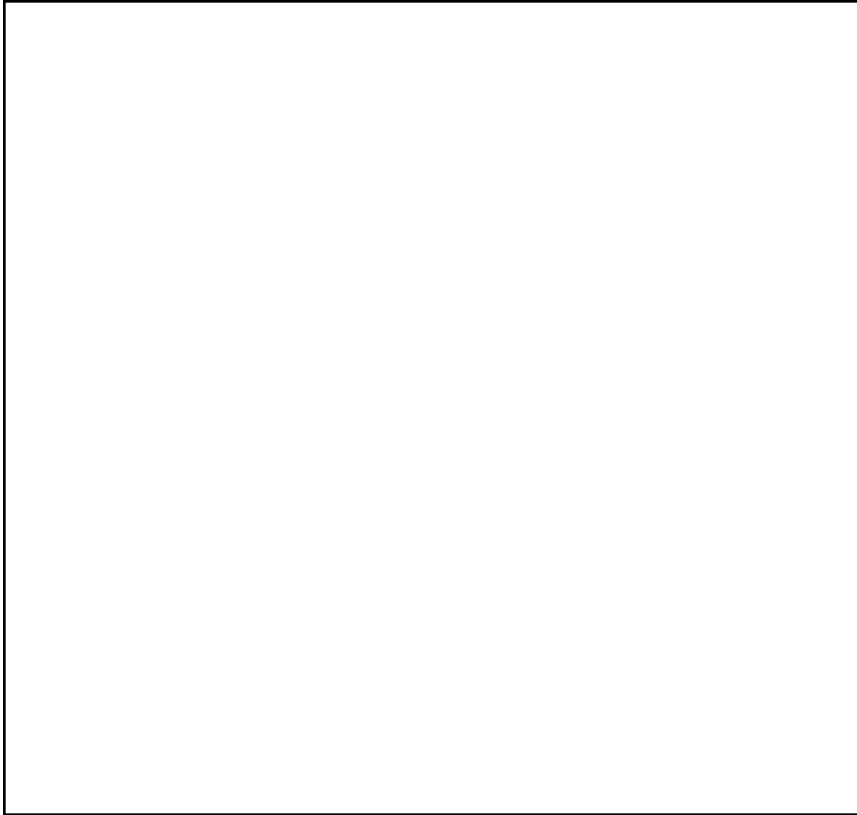


Fig. 3. *Platynota stultana* (Walsingham). Male genitalia. Specimen from Oahu, USNM slide 15994. Line is 0.5 mm. The cornuti are lost from the aedeagus in mating and are missing in the specimen drawn; cornuti that might be expected are shown in outline.

slide 15994). Atkins *et al.* (1957) and Mackay (1962: 85) provided descriptions and figures of the life stages.

Specimens in the collections of the Hawaiian Department of Agriculture (HDOA) and Bishop Museum (BPBM) suggest that *Platynota stultana* is widespread in lowland areas of the island of Oahu. It has been recorded from Honolulu (downtown [HDOA], Kalihi [BPBM], and Saint Louis Heights [HDOA]), Pearl City (HDOA), Waimanalo (HDOA), and Schofield Military Reservation (BPBM, USNM). The highest record is from near the base of Schofield-Waikane Trail at 370 m. We have not seen any specimens from other Hawaiian islands.

The earliest record is 1 specimen reared from fiddlewood (*Citharexylum spinosum* L.) in Honolulu "22-X-1985" (R. Heu, HDOA). It was not collected by Klaus Sattler in his extensive Microlepidoptera sampling in the Hawaiian Islands in 1973, 1976, and 1982 (K. Sattler, pers. comm., 1990).

Adults have been collected in April and September. Reared specimens are dated

throughout the year, but it is not clear if the dates represent collection of larvae or emergence of adults. Specimens in HDOA have been reared from *Leucaena lanceolata* S. Watson, carnation (*Dianthus caryophyllus* L.), amaranth (*Amaranthus* sp.), rose (*Rosa* sp.), and fiddlewood.

We thank B. Kumashiro (HDOA) and G. Staples (BPBM) for providing foodplant information. M. Filbert prepared the drawings and D. Preston prepared the photograph. This note is a by-product of the Hawaiian Terrestrial Invertebrate Survey pilot project funded by the John D. and Catherine T. MacArthur Foundation.

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### ***Usingeriessa onyxalis* (Dyar) (Lepidoptera: Crambidae: Nymphulinae), a Moth With Presumably Aquatic Larvae, Newly Recorded From Hawaii, With a Synopsis of Hawaiian Nymphulinae**

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The Nymphulinae, a subfamily of crambid moths, mostly with aquatic larvae, are widespread in tropical and temperate countries (Klima 1937, Lange 1956a). They are not native in Pacific Islands between Samoa in the west and Cocos in the east ("*Aulacodes*" *eupselias* Meyrick, described from the Marquesas, is actually a spilomeline pyraustine [Munroe 1991]). However, 2 non-indigenous species have been recorded from Hawaii. These are *Paraponyx fluctuosalis* (Zeller), a pantropical species associated with the culture of rice and other aquatic plants, first recorded by Butler (1879), but possibly introduced much earlier; and *Synclita oblitalis* (Walker), an eastern North American species that feeds on various aquatic plants, but especially *Lemna*, collected by D.T. Fullaway in 1942 and recorded by Williams (1944). *Synclita oblitalis* was perhaps introduced with aquarium stock. Both species are figured and described by Zimmerman (1958).

The purpose of this paper is to record and characterize a third nymphuline, *Usingeriessa onyxalis* (Hampson 1897: 149). Its type locality is Teapa, Tabasco, Mexico and it was originally described in *Cataclysta* Hübner. It has as a junior synonym *U. cancellalis* (Dyar 1917: 77) (type locality USA: Texas: Devil's River), originally described in *Elophila* Hübner. The species is native to southern Texas, Mexico, and Central America.

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The moth of *U. onyxalis* (Fig. 1) is dark in color and superficially somewhat resembles that of *Synclita oblitalis*, but is distinguished easily by features of structure and color pattern (Table 1). *Parapoynx fluctuosalis*, is pale buff in color, with dark bands parallel to the termen, and is therefore unlikely to be confused with *U. onyxalis* or *S. oblitalis*.

The early stages of *U. onyxalis* are unknown, but the species belongs to the tribe Argyractini, in which the known larvae have segmental clusters of usually unbranched, hemolymph-filled gills. In proposing this tribe, Lange (1956a) hypothesized that the larvae all feed on algae and live under webs on rocks in rapidly flowing or other highly oxygenated waters, as is true of the *Petrophila* [= *Parargyractis*] species known to him (Lange 1956b). However, subsequent work has shown that larvae of *Eoparargyractis plevie* (Dyar) feed on leaves of submerged rosette plants in lakes (Fiance & Moeller 1977), that those of *Eoparargyractis floralis* Lange and *Neargyractis slossonalis* (Dyar) live among and feed on submerged roots of a wide variety of plants in both flowing and standing water (Habeck 1988), and that larvae of "*Argyractis*" *subornata* Hampson and "*Argyractis*" *drumalis* (Dyar) feed on lateral roots of waterhyacinth and waterlettuce respectively (Forno 1983, Dray *et al.* 1989, Habeck & Solis 1994). The life history of *Usingeriessa onyxalis* is therefore conjectural, though the early stages are almost certainly aquatic.

*Usingeriessa onyxalis* was first taken on Kauai in 1975, and has been collected there several times since. It has been found on Oahu in 1978 and subsequently. The detailed records are as follows (all specimens in Bishop Museum):

The species was no doubt introduced from the American mainland with aquatic plants, but until more is known of its biology we cannot profitably speculate on the detailed method of introduction.

*Material examined.* KAUAI: Mahanaloa, 600m, 3 Sept. 1975 [no collector recorded], 1M; Kipu, 1 July, 2, 14 Dec. 1983, 9 Jan. 1984, J.C.E. Riotte, 4F; Lawai Valley, ca. 20 m, Pacific Tropical Botanic Garden, 7–9 Sept. 1988, S.E. Miller, 1M, 2F. OAHU: Waianae Mts, Waianae Kai Valley, 300 m, in tunnel entrance, 18 March 1978 [no collector recorded], 1 M; Honolulu, 7 Nov. 1978, F.G. Howarth, 1 F; Halawa Valley, 220m, 10 Sept. 1983, light, F.G. Howarth 1F; Halawa Valley, ca. 210 m, 30 Sept. 1992, mercury vapor light, S.E. Miller & D. Preston, 1F.

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**Table 1. Comparison of selected characters of *Usingeriessa onyxalis* (Hampson) and *Synclita oblitalis* (Walker)**

Character	<i>U. onyxalis</i>	<i>S. oblitalis</i>
Labial palpus third segment:	long, acuminate, extending high over frons	short, peglike, extending only midway up frons
Forewing termen:	straight	convex
Forewing apex:	sharp	rounded
Sharply defined triangular fuscous subapical patch on costa:	present	absent
Hind wing M2 and M3:	fused	separate
Hind wing termen with row of distinct black spots separated by shining metallic areas:	yes	no
Uncus:	triangular	fingerlike
Costa of valve:	concave before apex	convex before apex
Apical area of valve:	a few long recurved setae present	specialized setae absent

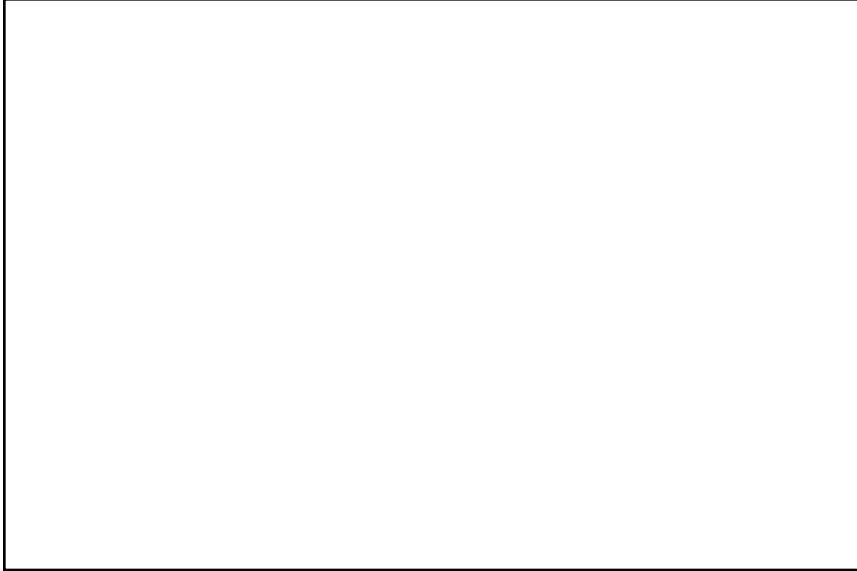


Fig. 1. *Usingeriessa onyxalis* (Hampson), female. Hawaiian Islands: Kauai: Kipu, 9 January 1984, J.C.E. Riotte (BPBM). Photograph by David Preston.

## New Heteroptera and Odonata (Insecta) Records and Range Extensions in the Hawaiian Islands

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The following represent new state or island records for Heteroptera and Odonata species in the state of Hawaii. Voucher specimens of all species treated are in the Bishop Museum unless otherwise noted.

### Heteroptera: Miridae

#### *Coridromius variegatus* (Montrouzier)

#### New state record

On French Frigate Shoals, this species was extremely abundant on flowering *Chenopodium oahuense*.

*Material examined.* HAWAII: Along Saddle Road, 15 mi SE Waimea, 1675 m, 27 January 1992 (D.A. Polhemus & D.J. Preston), on *Chenopodium oahuense*. MOLOKAI: Waikolu Stream below Molokai water tunnel intake, 200 m, 21 February 1992 (Polhemus), in malaise trap set over stream. OAHU: Barber's Point, 5 ft (1.5 m), 2 November 1992 (W.D. Perreira)(W.D. Perreira Collection). FRENCH FRIGATE SHOALS: Tern Island, 28 March to 1 April 1994, ex. *Chenopodium oahuense* (A. Asquith) (U.S. Fish & Wildlife Service Collection).

**Heteroptera: Notonectidae*****Notonecta indica* Linnaeus****New state record**

This species was first noted in student collections from Oahu, and has now expanded its distribution to other high islands. It is an adaptable predator that appears to particularly favor artificial ponds and reservoirs throughout a wide range of elevations.

*Material examined.* HAWAII: Pond along Upper Hamakua Ditch, nr head of Waipio Valley, approx. 5 mi N Waimea, 3900 ft, 25 January 1992 (Polhemus & Preston). Pond and stock trough nr milepost 50 on Hwy 19, E of Waimea, August 1991 (E. Larsen); Lily pond and stock trough 0.6 mi E milepost 50 on Hwy 19, E Waimea, August 1991 (Larsen). MAUI: Stock trough in ranchland below Haleakala Natl. Park at milepost 9 on Hwy 378, August 1991 (Larsen); Stock trough in ranchland below Haleakala Natl. Park at milepost 4 on Hwy 378, August 1991 (Larsen); Stock trough at Sakugawa Ranch, along Hwy 37, 0.6 mi E jct with Hwy 377, August 1991 (Larsen); Stock trough at Dr. Sun Yat Sen Memorial Park, 2.4 mi E milepost 16 on Hwy 378, August 1991 (Larsen). OAHU: Pools on summit of Mt Kaala, Waianae Mountains, 20 February 1992 (Polhemus & Preston); Stock trough approx. 0.25 mi beyond end of Umena Street at James Campbell Estate, Makakilo, 8 August 1991 (Larsen).

***Anisops batillifrons* Lundblad****New state record**

This is a widespread species in the Eastern Hemisphere. The present record is based on a single specimen taken in a stock pond at Sakugawa Ranch, on upland east Maui. This specimen was partially macerated for molecular analysis before it was realized that it was different from the sympatric series of *Buenoa pallipes* (F.) with which it had been captured. As a result only the head capsule, subsequently coated and photographed using a scanning electron microscope, remains as a voucher.

*Material examined.* MAUI: Stock trough at Sakugawa Ranch, along Hwy 37, 0.6 mi E jct with Hwy 377, August 1991 (Larsen).

**Odonata: Coenagrionidae*****Megalagrion nesiotes* (Perkins)****Notable rediscovery**

This species had not been recorded for over 70 years, and was in fact presumed extinct by the U. S. Fish and Wildlife Service. The population at East Wailua Iki appears to be stable, and occurs upslope of the Hana Road in an area dominated by disturbed wet forest vegetation. This indicates that additional colonies of this species may be scattered throughout the intermediate elevations of windward Maui, but have escaped detection due to the difficult topography, and the tendency of adults to fly low amid tangled undergrowth, in areas not typically searched for damselflies.

*Material examined.* MAUI: 1M, 1F, East Wailuaiki Stream at Hana Hwy (Hwy 360), 1.2 mi NW Puaakaa State Wayside Park nr milepost 21, 10 July 1993, (J.J. Daigle) (J.J. Daigle Collection); 5M, 2F, same as above but 20 July 1994 (Polhemus).

**Odonata: Libellulidae*****Crocothemis servilia* Drury****New state record**

First observed in early 1994 in the Salt Lake and Waimanalo areas, this Asian species is easily recognized by the bright scarlet coloration of the males. It breeds in lowland standing water habitats.

*Material examined.* OAHU: 1M, lower Waianu Str., Waiahole Valley, 100 ft, 27 December 1994, flying near taro fields, R. Englund (BPBM).

## Karsch's 1880 Paper on Hawaiian Spiders: Ignored or Overlooked?

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In 1878, H. Lucas published the first record of a Hawaiian spider based upon an introduction identified as "*Pholcus bobonicus* Vinson" [= *Artema atlanta* Walckenaer]. Two years later, Karsch (1880) described the first native Hawaiian spiders based upon a collection made by Herrn Dr. O. Finsch on the "Sandwichinseln."

Karsch's 1880 paper seemed to have been mostly ignored (Simon 1900, 1904) or overlooked (Suman 1964). Suman (1970: 773, 827) acknowledged Karsch's *Diaea kanakana* but erroneously commented "Simon referred to some of the Hawaiian species described by Karsch . . ." In truth, Simon (1900: 444) only referred to 1 Karsch record, *Scytodes marmorata* Koch, and (1897: 56) included *Pedinopistha* Karsch as a probable synonym of *Pandercetes* Koch, a heteropodid. Perhaps Karsch's paper was overlooked because Roewer (1942–1954) listed most of the species from Australia, "Olinda" or "Polynesien", and Bonnet (1955–1959) used "Polynésie."

All specimens were deposited in the Museum für Naturkunde der Humboldt Universität zu Berlin (ZMB) and were presumed lost during bombings in World War II. In response to my inquiries, Dr. M. Moritz wrote that the Karsch Collection had been located. With the opening of the borders between East and West Berlin it was possible to visit the collection. The catalog numbers given in this paper are those of ZMB.

An updated account is herein presented for the species recorded and described by Karsch. The specimens were collected almost entirely on the island of Maui, mostly at Olinda (Ranch); 2 each from "Waichu" (probably a misspelling for Waiehu, located near Olinda), Haleakala, and Grove Ranch (location unknown); 1 specimen each from Honolulu, Oahu, and Kauai.

The 18 species listed by Karsch are annotated below in the order in which he presented them.

### New Records Listed by Karsch

*Sarotes venatorius* (Linnaeus) [= *Heteropoda venatorius* (Linnaeus)].

1M, 1F from "Waichu." Not in collection, presumably lost.

*Misumena albiceris* Koch.

1 immature F from "Waichu," #3306. Misidentification, known only from Australia.

*Argiope aemula* (Walckenaer) [= *A. trifasciata* (Forsskål)].

1M, 1 immature F from "Haleakala" #3312; 1M, 1F, 1 immature F from Olinda, #3312a; 6F, 1 immature from Grove Ranch, #3312b; 1F from Kauai, no number.

*Epeira (Cyclosa) strangulata* Koch [= *Cyclosa turbinata* (Walckenaer)].

16 females and immatures from Olinda, #3313. Also, 1 unidentified female theridiid unlike any other I have seen from the islands.

*Theridium tepidariorum* Koch [= *Achaearanea tepidariorum* (Koch)].

Numerous specimens from Olinda, #3314.

*Theridium coeliferum* Koch [= *Steatoda grossa* (Koch)].

An immature from Olinda, #3314.

*Scytodes marmorata* Koch [= *S. longipes* Lucas].

1F from "Waichu," #3315.

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*Lycosa (Arctosa) vulpecula* Koch.

1M from Honolulu, #3323. Species transferred to *Avicosa* by Roewer (1954: 236). Misidentification, known only from Australia.

#### New Taxa Described by Karsch

##### *Pedinopistha* Karsch

*Pedinopistha* Karsch, 1880: 79–80. Type species: *P. petulcum* Karsch, by original designation.

*Pterelas* Simon, 1899: 417 (Preoccupied).

*Proernus* Simon, 1900: 497 (new name for *Pterelas*). Type species: *Pterelas schauinslandi* (Simon) by monotypy. **New synonymy.**

*Pedinopistha* Karsch (1880: 79) was described as a “novum genus Philodromidarum, inter genera *Opitis* [= *Philodromus*] et *Pandercetes* Koch . . .” (a heteropodid). Simon (1897: 56) questionably and erroneously treated it as a junior synonym of *Pandercetes* Koch, 1875, probably based upon Karsch’s comments. The type species, based upon a 9 mm-long immature female, is undoubtedly a philodromid and not a heteropodid. Furthermore, it is synonymous with *Proernus* Simon, 1900. No other philodromid of that size is known to occur on Maui. *Proernus*, as currently understood (Suman 1970), consists of 5 species endemic to the Hawaiian islands. As noted below, 1 of these (*Proernus velox* Simon) is synonymous with *Pedinopistha finschi* Karsch. The other species remain valid, but should be reassigned to *Pedinopistha*. They are: *Pedinopistha aculeatus* (Simon), **new combination**, *P. longulus* (Simon), **new combination**, *P. schauinslandi* (Simon), **new combination**, and *P. stigmaticus* (Simon), **new combination**. Because members of this genus are incorrectly cataloged by Roewer (1954: 723) and Bonnet (1958: 3443) as Eusparassidae and Sparassidae, respectively, they were not listed by Moritz & Fischer (1984) in the type catalog of the Philodromidae at the Zoologisches Museum, Berlin.

##### *Pedinopistha petulca* Karsch, **nomen dubium**

*Pedinopistha petulcum* Karsch, 1880: 79–80.

*Pedinopistha petulca*: Bonnet, 1958: 3443.

*Pandercetes petulcum*: Roewer, 1954: 723.

Immature female, # 3307. No locality given but undoubtedly from the same area as other new species in the collection (Olinda). The type appears synonymous with *Proernus aculeatus* Simon, also known from Maui, but because this identification is based upon an immature female, I prefer to consider this species a *nomen dubium*. Because this taxon is the type species for *Pedinopistha*, it would be beneficial for future researchers to examine and rear *P. aculeatus*-like immatures (from Olinda) to confirm or refute the suspected synonymy.

##### *Pedinopistha finschi* Karsch

*Pedinopistha finschii* Karsch, 1880: 80.

*Pedinopistha finschi*: Bonnet, 1958: 3443.

*Proernus velox* Simon, 1900: 499; Roewer, 1954: 803; Bonnet, 1958: 3775; Suman, 1970: 861–63, figs. 137–41. **New synonymy**

*Pandercetes finschi*: Roewer, 1954: 722.

The male holotype (# 3308) and immature male (# 3309) from Olinda key out (Suman 1970: 852–53) easily to *P. velox* and fit Suman's description.

***Misumenops kanakanus* (Karsch)**

*Diaea kanakana* Karsch, 1880: 80–81; Roewer, 1954: 870; Bonnet, 1956: 1414; Suman, 1970: 773; Moritz & Fischer, 1984: 94.

*Diaea vitellina* Simon, 1900: 497; Roewer, 1954: 872; Bonnet, 1956: 1418. **New synonymy.**

*Misumenops kanakanus*: Suman, 1970: 773, 791, 827.

*Misumenops vitellinus*: Suman, 1970: 836–39, figs. 92–96.

Karsch's holotype, a dried female (# 3310) from Haleakala was not available to Suman at the time of his 1970 study, but he suggested that the descriptions of the 2 species agreed. The distinctive epigynum of *kanakanus* corresponds with Suman's illustration of *vitellinus* (Suman 1970; figs. 95–96).

***Tetragnatha olindana* Karsch**

*Tetragnatha olindana* Karsch, 1880: 81; Roewer, 1942: 987; Bonnet, 1959: 4349; Moritz & Fischer, 1986; Gillespie, 1992: 2.

Female holotype (# 3311) from Olinda. Reported as a distinct (web-building) species near *Tetragnatha hawaiiensis* Simon by R.G. Gillespie, *in litt.* New collections of *T. olindana* were recorded from East Maui (Gillespie 1992) but no discussions on relationships were included.

The remaining spiders described by Karsch are all Lycosidae and appear (with 1 exception) to belong to *Lycosa*. The latter appear very similar and may represent only 1 or 2 species. I prefer for the moment to leave them as valid taxa. A taxonomic revision of the Hawaiian species of *Lycosa* is needed in order to correctly place Karsch's taxa. Very likely the male identified by Karsch as *Lycosa vulpecula* Koch is synonymous with one of these species. Karsch (1880) presented a key only to his new species of *Lycosa* and omitted *Lycosa vulpecula* Koch. Also *L. virgata* (only male known) is included in a couplet describing the "vulva". This section seemed useless to me since the epigyna of all appeared nearly identical.

Roewer (1954) placed most of the following species in various lycosid genera without explanation. I have followed Karsch's usage of *Lycosa*.

***Lycosa (Arctosa) versicula* Karsch, nomen dubium**

*Lycosa (Arctosa) versicula* Karsch, 1880: 81–82.

*Arctosa versicula*: Bonnet, 1954: 662.

*Trochosomma versicula*: Roewer, 1954: 304.

Penultimate F holotype (# 3316) from Olinda, apparently *Lycosella*.

***Lycosa calvata* Karsch, nomen dubium**

*Lycosa calvata* Karsch, 1880: 82; Bonnet, 1957: 2637.

*Trochosa calvata*: Roewer, 1954: 301.

2F from Olinda, not in collection, probably lost.

***Lycosa virgata*** Karsch

*Lycosa virgata* Karsch, 1880: 82; Bonnet, 1957: 2669.

*Trochosa virgata*: Roewer, 1954: 301.

Male holotype (# 3318) and 1 immature F from Olinda.

***Lycosa caduca*** Karsch

*Lycosa caduca* Karsch, 1880: 82–83; Bonnet, 1957: 2636.

*Trochosa caduca*: Roewer, 1954: 301.

1F holotype (# 3319) from Olinda.

***Lycosa aliusmodi*** Karsch

*Lycosa aliusmodi* Karsch, 1880: 83; Bonnet, 1957: 2633.

*Arcosa aliusmodi*: Roewer, 1954: 230.

3F syntypes (# 3320) from Olinda.

***Lycosa bruta*** Karsch

*Lycosa bruta* Karsch, 1880: 83; Bonnet, 1957: 2636.

*Trochosa bruta*: Roewer, 1954: 301.

2M, 2F, 1 immature M, syntypes (# 3321) from Olinda.

***Lycosa bruta filicum*** Karsch

*Lycosa bruta filicum* Karsch, 1880: 83.

*Trochosa bruta filicum*: Roewer, 1954: 301.

2F syntypes, # 3322. This variety was overlooked by Bonnet (1957).

**Acknowledgment**

Special thanks are extended to M. Moritz (ZMB) for courtesies and assistance during the trying times shortly after the unification of Germany.

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### Invalid and Unavailable Names in *Eupetinus* (Coleoptera: Nitidulidae)

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David Sharp with, in part, Hugh Scott [1908, IV. Coleoptera (various). *Fauna Hawaiiensis* **3**(5): 461–74] proposed and applied the same varietal name, *dimidiatus*, to various species of *Eupetinus* in the same publication. Applications of this name in 10 species are deemed unavailable to zoological nomenclature. The 1 application that was found to be available, *Eupetinus impressus dimidiatus* Sharp, is herein synonymized with the nominate subspecies.

Sharp explained (p. 461): “A curious variation occurs in several species, inasmuch as the black colour of the elytra and abdomen may be concentrated chiefly on the anterior parts, leaving the hinder portion of the two parts more or less clear yellow. In this variation the elytra are quite black in front and yellow behind; we have subsequently spoken of this form as var. *dimidiatus* (Pl. 14, fig. 20).”

Sharp clearly made *Eupetinus impressus dimidiatus* available. Under *E. impressus* (Sharp) Sharp wrote (p. 464): “Var. *dimidiatus*, var. nov. A series of about 20 specimens have the basal portion of the elytra dark—nearly or quite black—and the apical portion pale testaceous, the line of division between the two colours being not straight but irregular (Pl. 14, fig. 20). One specimen of this colour variety from Waianae is so aberrant that it may prove to be another species.” “The species varies so much in colour that it is not possible to treat this variety as a species; especially as a similar variation occurs in several of the other species, though in some cases not in so striking a manner.”

It is probable that Sharp had wished to anchor the varietal epithet to only 1 of the species. Anyway, the “var. nov.” assignment was applied only to *E. impressus*, which is also the species figured on Pl. 14, fig. 20. The varietal name is hereby synonymized.



*Eupetinus impressus* (Sharp, 1878)

*Brachypeplus impressus* Sharp, 1878, *Trans. Entomol. Soc. Lond.* 1878:135.

*Eupetinus impressus*: Sharp, 1908, *Fauna Hawaiiensis* 3(5):463.

*Eupetinus impressus dimidiatus* Sharp, 1908, l.c. 464. **New synonymy.**

*Remarks.* This varietal name was attached to a color morph of the nominate subspecies, and not to a discrete population, so it cannot stand to represent a geographical subspecies.

Sharp's and Scott's applications of "*dimidiatus*" to 10 other species of *Eupetinus* are interpreted here as descriptive, and have no nomenclatural standing in our opinion. They are listed below in order of appearance by species number. Each case is followed by the author's initials in brackets, if included in the original text: DS = David Sharp; HS = Hugh Scott.

- (1) *Eupetinus insignis*, sp. nov. (p. 461–62). "The . . . colour . . . which forms the var. *dimidiatus* of allied species, is here very marked." [HS]
- (2) *Eupetinus obscurus*, sp. nov. (p. 462). "Two male specimens show an approach to the *dimidiatus* form . . ." [HS]
- (3) *Eupetinus derasus*, sp. nov. (p. 462). "The color of the elytra is that of the *dimidiatus* form. We have only one specimen." The species is based on a unique specimen, so it could not also be a variety at the same time.
- (4) *Eupetinus subaper*, sp. nov. (p. 463). "In both sexes the specimens in colour vary considerably from light to darker, and some are of the var. *dimidiatus* form." [HS]
- (5) *Eupetinus impressus* (Sharp). [DS] See above.
- (11) *Eupetinus curtus* (Sharp) (p. 466–67). "Var. *dimidiatus*. In the Maui specimens this colour variety, described under *E. impressus*, is present in a strongly marked form in both sexes." [HS]
- (13) *Eupetinus sculptus* var. *parcus*, var. nov. (p. 468). "One specimen from Olaa and one from Kona are of the *dimidiatus* form." [DS]
- (15) *Eupetinus omalioides* (Sharp) (p. 469). "A few males approach the condition of the var. *dimidiatus* of allied species . . ."
- (18) *Eupetinus aper* (Sharp) (p. 470–71). "In a few specimens . . . thereby approaching the condition found in several closely-allied species . . . and most marked in the var. *dimidiatus* of *E. inaequalis*." Sharp synonymized *Brachypeplus inaequalis* with *B. impressus*, while placing the latter in *Eupetinus* (p. 463). [HS]
- (21) *Eupetinus dubius*, sp. nov. (p. 472). "Var. *dimidiatus*; this form present in both sexes." *E. dubius* var.? (p. 472). "A single male of the *dimidiatus* form from Oahu . . ." [HS]
- (24) *Eupetinus laevigatus*, sp. nov. (p. 473). "The var. *dimidiatus* is present." [HS]

## Some Oribatid Mites (Acari: Acariformes) From Mt. Kaala, Oahu

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Mt Kaala (21°31' N, 158°0' W) on Oahu, is the highest point in the island (1225 m). Located on the Waianae Range, it is one of Hawaii's Natural Area Reserves. Rainfall in the area averages 150–225 cm annually, with only 5.0–7.5 cm falling in the driest month and 20–30 cm falling in a wetter winter month (DOFAW 1990). The summit plateau was formed by dense a'ā lava flows, remnant from the original volcano that created the Waianae Mountains. The flat-topped summit is dominated by ohia (*Metrosideros polymorpha*) (Myrtaceae), its slopes predominantly covered by mixture of Ohia/Uluhe (*Dicranopteris linearis*) forest; ridge tops predominantly ohia that grades into koa (*Acacia koa*)/Ohia forest. At 600 m, non-native vegetation such as Christmas berry (*Schinus terebinthifolius*) and molasses grass (*Melinis minutiflora*) occupy drier slopes.

The only previous records of oribatid mites from Mt. Kaala are that of *Oribotritia hawaiiensis* Jacot 1934, which consisted of 5 adults, collected by R.C.L. Perkins in April, 1892 (BBM18P) (Jacot 1934) and that of *Phthiracarus dasyopus* (Dugès, 1834) (= *Hoplodermia dasyopus* Dugès) (Pearce 1910, Nishida 1994). Data on the latter species did not include date and name of collector, but it would be a reasonable presumption that this was also collected by Perkins.

On 10 October 1989, a sample of sphagnum-like moss with some soil attached to the root system was taken at the summit (1225 m). At ca. 500 m, *Casuarina* litter on disturbed habitat along the road was sampled. Fog and heavy rain at the summit characterized the area at the time of sampling whereas at 500 m, the rain had stopped leaving only moistened soil and litter. Each sample was approximately 2 hands full.

Oribatid mites were extracted using Tullgren-Berlese funnels. Mesostigmata (8–12% of total mite individuals) and Prostigmata (5–7%) were either mounted on slides or kept in the acari alcohol collection at the J. Linsley Gressitt Center for Research in Entomology, Bishop Museum for future studies. Sincere thanks to Mr. David G. Smith, Department of Land and Natural Resources, Division of Forestry and Wildlife, for his kind assistance in the field.

### Results and Discussion

The dominance of oribatid mites in *Sphagnum* moss and in soil and litter on Mt. Kaala, Hawaiian Islands, supports previous findings on the predominance of oribatids in said habitats (Norton 1990). From *Sphagnum* moss, 1078 oribatid specimens (81% of total mites) were collected whereas from *Casuarina* litter, 990 individuals (88%) were recovered. The oribatids recovered represent 14 superfamilies, 17 families, 19 genera, and 29 species. Six families, 10 genera, and 15 species are new records for the Hawaiian islands. A possible new genus near *Dometorina* (Scheloribatidae) was among the interesting oribatid taxa recovered (Table 1).

No oribatid mites were common to both samples. However, notable differences in composition of taxa were observed, for example, members of the family Phthiracaridae, a family in the Macrophylina group (Oribatei "Inferiores"), comprised 56% of the oribatid

Table 1. Oribatid taxa on Mt. Kaala, Oahu Island, Hawaiian Islands.

Taxon	1225 m elev. <i>Sphagnum</i> moss	500 m elev. <i>Casuarina</i> litter
ARCHEONOTHROIDEA		
Ctenacaridae *		
<i>Ctenacarus araneolus</i> (Grandjean, 1932)*		x
PHTHIRACAROIDEA		
Phthiracaridae		
<i>Atropacarus cf. striculus</i> (Koch, 1835)*	x	
<i>Phthiracarus</i> sp.	x	
EUPHTHIRACAROIDEA		
Oribotritiidae		
<i>Oribotritia cf. hawaiiensis</i> Jacot	x	
Euphthiracaridae		
<i>Microtritia cf. minima</i> (Berlese, 1904)	x	
NANHERMANNIOIDEA		
Nanhermanniidae*		
<i>Nanhermannia</i> sp.*	x	
HERMANNIELLOIDEA		
Hermanniellidae*		
<i>Hermanniella</i> sp.*	x	
DAMAEOIDEA		
Damaeidae*		
<i>Damaeus</i> sp.*	x	
CEPHEOIDEA		
Cepheidae		
<i>Cepheus</i> sp.	x	
MICROZETOIDEA		
Microzetidae		
<i>Berlesezetes cf. auxiliaris</i> Grandjean, 1936*		x
CARABODOIDEA		
Otocephidae		
<i>Dolicheremaeus</i> sp.		x
OPPIOIDEA		
Oppliidae		
<i>Microppia minus</i> (Paoli, 1908)*		x
Three undetermined species		x
Suctobelbidae*		
<i>Suctobelba</i> sp.*		x
ORIPODOIDEA		
Scheloribatidae		
<i>Scheloribates</i> nr. <i>indicus</i> Jacot, 1934		x
<i>Scheloribates</i> nr. <i>muiri</i> Jacot, 1934		x
<i>Scheloribates</i> n. sp.*	x	
<i>Scheloribates (Protoscheloribates)</i> sp.		x
<i>Scheloribates</i> (s.s.) nr. <i>oahuensis</i> Jacot, 1934		x
new genus near <i>Dometorina</i> *	x	
Haplozetidae		
<i>Xylobates cf. capucinus</i> (Berlese, 1908)*	x	
<i>Rostrozetes</i> sp.*		x
CERATOZETOIDEA		
Ceratozetidae		
<i>Fuscozetes</i> sp.*	x	
ACHIPTERIOIDEA		
Achipteriidae*		
<i>Achipteria</i> sp.*	x	
GALUMNOIDEA		
Galumnidae		
<i>Galumna fordii</i> Jacot, 1934.		x
<i>Galumna hawaiiensis</i> Jacot, 1934		x
<i>Galumna</i> sp.	x	

\* New state record

summit sample but was absent from the *Casuarina* sample. On the other hand, *Ctenacarus araneolus* (Grandjean 1932), a species belonging to the ancestral group Palaesomata and whose distribution is confined to the Neotropical and Holarctic regions (Marshall *et al.* 1987) was reported from *Casuarina* litter. Not finding a single taxon common to both samples could be attributed to the habitat type, food source and abiotic factors such as moisture and temperature. The oribatids found at the summit were most likely associated with *Sphagnum* moss, whereas species on soil and litter probably derived their food from the habitat either as saprophages or mycophages. Comprehensive samplings of different habitats are needed to ascertain natural patterns of oribatid distribution in Mt. Kaala and other areas of the Hawaiian Islands. It is noteworthy that it took approximately 100 years after Perkins' original collections before another oribatid mite or any mite was collected from Mt. Kaala.

The incredible diversity of oribatids from a single locality and from two meager samples suggests the numerical and environmental importance of this group in the soil ecosystem that might be exploited in future reserve or park management and conservation programs as ecological indicators of soil biotopes and as indicators of effects of human and animal activities on terrestrial ecosystems.

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### New Records of Copepods (Copepoda) from Oahu, Hawaii

NEAL L. EVENHUIS and DAVID J. PRESTON (Department of Natural Sciences, Bishop Museum, P.O. Box 19000A, Honolulu, Hawaii 96817, USA)

Results of a terrestrial invertebrate survey pilot project along the Schofield-Waikane Trail on Oahu in 1989 resulted in the discovery of copepods collected in elevated cup traps in ohia and koa trees along the trail. Two of the 3 species, identified by J. Reid of the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (NHNM), are new records to the fauna of copepods in Hawaii. Vouchers of all 3 species are in the Bishop Museum (BPBM).

***Bryocyclops anninae*** (Menzel, 1926)

Previously reported as collected in Hawaii from a *Pandanus* leaf axil, "the Pali", Oahu (Yeatman 1984); also known from Java and Vanuatu.

*Material examined.* OAHU: Schofield-Waikane Trail, 2–5.x.1989, 1900 ft [580 m], leaf-litter filled cup traps on *Acacia koa* and *Metrosideros* sp. (D.J. Preston) (BPBM).

***Epactophanes richardi*** Mrazek, 1893**New state record**

This species has a cosmopolitan distribution. However, this is the first record from the Hawaiian Islands.

*Material examined.* OAHU: Schofield-Waikane Trail, 2–5.x.1989, 1900 ft [580 m], leaf-litter filled cup traps on *Acacia koa* and *Metrosideros* sp. (D.J. Preston) (BPBM).

***Phyllognathopus viguieri*** (Maupas, 1892)**New state record**

This species has a cosmopolitan distribution. However, this is the first record of it from the Hawaiian Islands.

*Material examined.* OAHU: Schofield-Waikane Trail, 2–5.x.1989, 1900 ft [580 m], leaf-litter filled cup traps on *Acacia koa* and *Metrosideros* sp. (D.J. Preston) (BPBM).

**Reference**

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## **New Hawaiian Records for *Stephanoscyphus simplex* Kirkpatrick (Cnidaria: Scyphozoa)**

B.L. BURCH and T.A. BURCH (Research Associates, Department of Natural Sciences, Bishop Museum, P.O. Box 19000A, Honolulu, Hawaii 96817, USA)

New records for the Hawaiian Islands are reported for *Stephanoscyphus simplex* Kirkpatrick, 1890, a sessile scyphozoan (polyp) stages of a scyphistoma medusa taken by trawl by the NOAA National Marine Fisheries Service research vessel *Townsend Cromwell* off the island of Maui and by the Burch 32-foot steel-hulled trawler *Janthina VII* from sediments 82 to 160 meters deep off Oahu.

*Material examined.* Cat. No. D1035, Acc. No. 1995.007, 1 specimen, BURCH-81005, 01/10/81, Mamala Bay, Oahu [021°16.4'N, 157°51.6'W], sand, Halimeda [82 m]; Cat. No. D1036, Acc. No. 1995.007, 72 specimens, BURCH-81090, 12/19/81, Mamala Bay, Oahu [021°16.1'N, 157°52.1'W], sand [293 m]; Cat. No. D1037, Acc. No. 1995.007, 2 specimens, BURCH-82004, 01/10/82, Mamala Bay, Oahu [021°16.6'N, 158°01.2'W], sand [183 m]; Cat. No. D1038, Acc. No. 1995.007, 2 specimens, BURCH-83008, 02/05/83, Mamala Bay, Oahu [021°16.4'N, 158°01.0'W], sand [256 m]; Cat. No. D1039, Acc. No. 1981.136, 2 specimens, TC-40-91, 92, 11/25/68, Kahului, Maui [021°03.5'N, 156°29.0'W], sand, mud [274 m] (all in BPBM).

## Revised Checklist of Extant Shallow-Water Stony Coral Species from Hawaii (Cnidaria: Anthozoa: Scleractinia)

J.E. MARAGOS<sup>1</sup> (Program on Environment, East-West Center, Honolulu, Hawaii 96822, USA)

The list below includes updates since the last revision for Hawaii corals (Maragos 1977). New records from Hawaii since 1977 are marked with an "a" and all reported for the first time here unless otherwise indicated. Revisions based on resurrection of old species descriptions or changes in taxonomic assignments are marked with a "b", with the older names cited in Maragos (1977) in brackets. Species probably endemic to Hawaii and nearby islands (Johnston, Line, Phoenix) are marked with a "c".

### Acroporidae

- a *Acropora cytherea* (Dana, 1846) [cited in Grigg *et al.*, 1981]
- a *Acropora humilis* (Dana, 1846) [= *M. verrucosa* in Maragos, 1977]  
*Acropora paniculata* Verrill, 1902
- a *Acropora valida* (Dana, 1846) [cited in Grigg *et al.*, 1981]
- b,c *Montipora capitata* (Dana, 1846) [= *M. verrucosa* in Maragos, 1977]
- c *Montipora dilatata* Studer, 1901
- c *Montipora flabellata* Studer, 1901
- c *Montipora patula* Verrill, 1864
- b,c *Montipora studeri* Vaughan, 1907 [= *M. verrucosa* in Maragos, 1977]
- a *Montipora tuberculosa* (Lamarck, 1816)  
*Montipora verrilli* Vaughan, 1907

### Agariciidae

- a *Gardineroseris planulata* (Dana, 1846)  
*Leptoseris hawaiiensis* Vaughan, 1907  
*Leptoseris incrustans* (Quelch, 1886)
- a *Leptoseris mycetoseroides* Wells, 1954  
*Leptoseris papyracea* (Dana, 1846)  
*Leptoseris scabra* Vaughan, 1907
- c *Leptoseris tubulifera* Vaughan, 1907
- c *Pavona duerdeni* Vaughan, 1907  
*Pavona varians* Verrill, 1864
- b *Pavona maldivensis* (Gardiner, 1905) [= *Pavona (Pseudocolumnastraea) pollicata* Wells, 1954]

### Balanophyllidae

- Balanophyllia* sp. cf. *affinis* (Semper, 1872)
- Balanophyllia hawaiiensis* Vaughan, 1907

### Dendrophyllidae

- Tubastraea coccinea* Lesson, 1831

### Faviidae

- Cyphastrea ocellina* (Dana, 1846)
- Leptastrea bottae* (Milne-Edwards & Haime, 1850)
- Leptastrea purpurea* Dana, 1846

### Fungiidae

- b *Cycloseris tenuis* (Dana, 1846) [= *Cycloseris hexagonalis* in Maragos, 1977]  
*Cycloseris vaughani* (Boschma, 1923)
- b *Diaseris distorta* (Michelin, 1843) [= *Cycloseris fragilis* in Maragos, 1977]  
*Fungia (Pleuractis) scutaria* Lamarck, 1801

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**Pocilloporidae**

*Pocillopora damicornis* (Linnaeus, 1758)  
*Pocillopora eydouxi* Milne-Edwards & Haime, 1860

- c *Pocillopora ligulata* Dana, 1846  
*Pocillopora meandrina* Dana, 1846  
c *Pocillopora molokensis* Vaughan, 1907

**Poritidae**

- c *Porites brighami* Vaughan, 190  
c *Porites compressa* Dana, 1848  
c *Porites duerdeni* Vaughan, 1907  
c *Porites evermanni* Vaughan, 1907  
*Porites lichen* Dana, 1846  
b *Porites lobata* Dana, 1846  
c *Porites pukoensis* Vaughan, 1907  
b *Porites* (*Synaraea*) *rus* (Forskål, 1775) [= *P. (S.) convexa* Verrill, 1864, & *P.(S.) hawaiiensis* Vaughan, 1907]

**Rhizangiidae**

- a *Culicia* sp. cf. *tenella* Dana, 1846 [cited in Fitzhardinge, 1993]

**Siderastreidae**

- b *Coscinaraea wellsi* Veron & Pichon, 1979 [= *Coscinaraea ostreaeformis* in Maragos, 1977]  
a *Psammocora explanulata* Van der Horst, 1921  
*Psammocora nierstraszi* Van der Horst, 1922  
*Psammocora stellata* Verrill, 1864  
*Psammocora verrilli* Vaughan, 1907

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## First Record of the Blue Crab (*Callinectes sapidus*) in Hawaii (Decapoda: Brachyura)

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The blue crab, *Callinectes sapidus* Rathbun, has been collected for the first time in Kaneohe Bay, Oahu, Hawaii. The native range of the species is along the eastern seaboard of the New World from Nova Scotia to Argentina, including Bermuda and the Antilles (Williams, 1984). Six specimens (all female) have been collected since 1985 near the Heeia State Park and the Kaneohe Marine Corps base (see Material Examined below).

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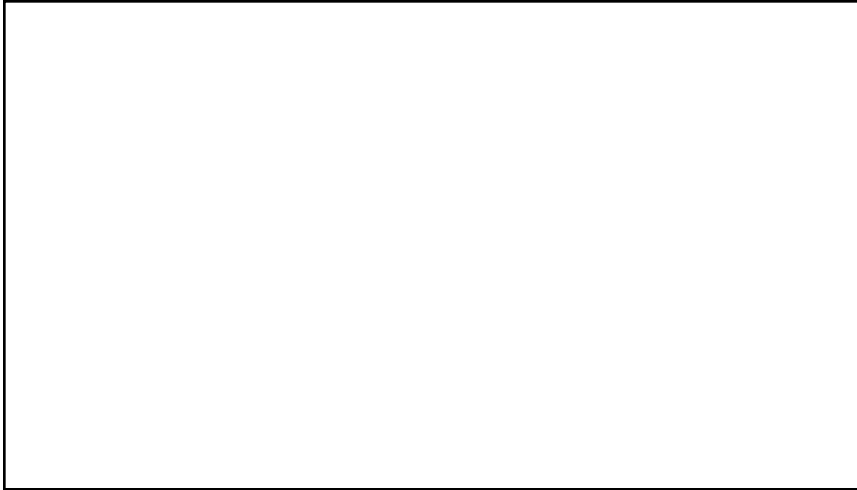


Fig. 1. *Callinectes sapidus* (BPBM S11231), Kaneohe Bay, Oahu, Hawaii.

The general shape of the lateral spines and the broadly triangular short frontal spines suggest that the specimen examined (or its introduced stock) originated from the North American part of its range (A. B. Williams, pers. comm.)

Specimens of *C. sapidus* have been commonly imported into Hawaii since October 1967 as a food product, with the majority originating from Louisiana. Wholesalers claim that individuals do not reproduce in Hawaii. However, they admit that not all specimens imported have been females.

It is not known whether *C. sapidus* is reproducing in Kaneohe Bay. The temperature of Kaneohe Bay ranges from 20.0–29.0 °C with a mean of 24.9 °C; the warmest months being June through September (U.S. Department of Commerce 1970). Within its natural range, larvae of this species can neither hatch nor molt much below 20 °C; females in the northerly part of its natural range spawn only during the warm months (Norse 1977). It would therefore be very possible for *C. sapidus* to reproduce in Kaneohe Bay.

Stephenson (1976) reported a *Callinectes* sp. from Pearl Harbor, Oahu, Hawaii, which was collected by Paul Bartsch in September 1920 [USNM Cat. No. 76617 (part)]. This juvenile male resembled *C. sapidus* but with some differences in proportions. Since the abdomen and pleopods were missing it was impossible to assign it to a recognized species. Stephenson noted that the specimen might be an accidental introduction. Interestingly, Edmondson (1954) did not note this record or make any mention of *C. sapidus*.

*Callinectes sapidus* was reported from Europe as early as the 1900s (first found in France; later, in the Netherlands and Denmark). The species is also reported from Egypt and the eastern Mediterranean (Williams 1984). In 1989, *C. sapidus* was collected in the Sea of Galilee [= Lake Tiberias] (Snovsky & Galil 1990). Specimens were first collected from Japan in 1975 at Hamana Lake in central Japan (Sakai 1976). Ariyama (1985) reported the species from Osaka Bay. A second record from Lake Hamana was in 1991 (Hasegawa 1992), and specimens have been collected from Sagami Bay (Muraoka & Taguchi 1992).

The primary means of accidental introduction into non-native areas suggested by the



various authors appears to be in ballast water or on ships' bottoms. Sakai (1976) suggested that the crab might have been taken by submarine from the east coast of the U.S. to central Japan, an opinion suggested to him by naval engineers. Snovsky & Galil (1990) assumed that the introduction into Lake Tiberias occurred when juvenile mugilid fish were transported from the Mediterranean to stock the lake. In the case of the Kaneohe Bay specimens, it is assumed that the individuals were released after having been purchased at a fish market, since all the specimens collected have been about the same size, without eggs, and from the same locality. Some well meaning citizens may have suspected that they might be able to establish their own fishery similar to that of the mangrove crab (*Scylla serrata*) which was introduced into Oahu waters from Samoa beginning in 1926 and is now among the more frequently collected species in certain embayments of the island of Hawaii (Eldredge 1994).

*Material examined.* Female, carapace length 59.7 mm; width at base of lateral spines 110 mm (BPBM S11231), August 15, 1992, from fish trap near Kaneohe Marine Corps base, Kaneohe Bay, Oahu, Hawaii (Fig. 1) [a second specimen was retained at Hawaii's Division of Aquatic Resources].

### Acknowledgements

Thanks are extended to Lester Zuckerman who collected the specimens and recognized that they were unusual and passed them to Joann Kushima of the Hawaii's Division of Aquatic Resources who brought them to my attention. Thanks are also extended to Austin Williams of the National Marine Fisheries Service, Systematic Laboratory, Smithsonian Institution for verifying the my identification of the specimen and to Ruth Gibbons for preparing the photograph; Domingo Carvalho of Hawaii's Division of Plant Quarantine provided background information on the import of blue crabs to Hawaii.

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### ***Corbicula fluminea* Müller (Mollusca: Bivalvia) Established on Oahu**

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On 7 September 1992, in Kamooalu Stream adjacent to Kaneki Street, Kaneohe, Oahu, Hawaii, a live juvenile *Corbicula fluminea* Müller, 1774 [BPBM Acc. No. 1995.007; Cat. No. BPBM 250462] was collected and photographed. It was first reported from Hawaii being sold as food in an open market at Kailua, Oahu on 8 August 1977 (B.L. Burch, 1978, *The Nautilus* 92(1): 54–55). This is the first record of this species now being established in streams on the windward side of Oahu.

### **New Records of Deep-Water Bivalves from the Hawaiian Islands (Mollusca: Bivalvia)**

B.L. BURCH and T.A. BURCH (Research Associates, Department of Natural Sciences, Bishop Museum, P.O. Box 19000A, Honolulu, Hawaii 96817, USA)

#### ***Alectryonella plicatula* (Gmelin, 1791)**

This is a **new state record** of the tropical southwest Pacific oyster found growing on a stem of black coral (*Antipathes* sp.) by the NOAA National Marine Fisheries Service research vessel *Townsend Cromwell*.

*Material examined.* Cat. No. BPBM 250463, 1 live specimen, TC-090-10-204, 06/12/90, South Molokai [021°03.0'N, 157°02.0'W] [79 m].

#### ***Neopycnodonte cochlear* (Poli, 1795)**

Twenty-five live specimens of this tropical Pacific oyster, which is a **new state record**, were found growing on black coral (*Antipathes* sp.) by the NOAA National Marine Fisheries Service Research Vessel *Townsend Cromwell* off Molokai in 79 meters [Acc. No. 1991.018] (only the valves attached to the coral were retained.) In addition, the *Townsend Cromwell* trawled 354 dead juvenile valves from 9 stations off Kahului, Maui [Acc. No. 1991.136, Cat. No. BPBM 250464].

*Material examined.* Cat. No. BPBM 250469, 1 valve, TC-033-09, 10/30/67, Hawaii [020°58.8'N, 156°48.2'W] [229-234 m]; Cat. No. BPBM 250470, 139 valves, TC-033-18, 11/01/67, Hawaii [021°03.7'N, 156°43.7'W] [245 m]; Cat. No. BPBM 250471, 8 valves, TC-033-37, 11/09/67, Hawaii [020°42.8'N, 156°42.1'W] [260-292 m]; Cat. No. BPBM 250472, 122 valves, TC-033-50, 11/13/67, Hawaii [021°00.4'N, 156°45.4'W] [210-241 m]; Cat. No. BPBM 250473, 5 valves, TC-033-

54, 11/14/67, Hawaii [020°57.3'N, 156°47.6'W] [214 m]; Cat. No. BPBM 250474, 36 valves, TC-033-55, 11/14/67, Hawaii [020°57.1'N, 156°47.1'W] [205-214 m]; Cat. No. BPBM 250475, 4 valves, TC-035-02, Hawaii [020°58'N, 156°46'W] [110 Fms]; Cat. No. BPBM 250476, 3 valves, TC-035-04, 03/28/68, Hawaii [020°59'N, 156°45'W] [110 Fms]; Cat. No. 250477, 10 valves, TC-036-19, 05/03/68, Hawaii [021°42.0'N, 158°05.0'W] [60 Fms]; Cat. No. BPBM 250464, 25 valves, TC-90-10-204, 12/06/90, South Molokai [021°03.0'N, 157°01.0'W] [43 Fms].

***Verticordia aequicostata*** Howard, 1950

This is a **new state record** and is a range extension from the Pacific Coast of the Americas and the Galapagos Islands. Two intact and 13 valves of this deep-water septibranch (Bivalvia) were dredged by the Burch 32-foot salmon trawler, *Janthina VII*.

*Material examined.* Cat. No. BPBM 250465, 2 intact and 13 valves, BURCH-82064, 10/02/82, Mamala Bay, Oahu, [021°16.4'N, 157°52.4'W] [277m].

***Verticordia deshayesiana*** (Fischer, 1862)

This is a **new state record** and is a range extension from the Atlantic and from Japan. This deep-water septibranch (Bivalvia) was dredged by the Burch 32-foot *Janthina VII*.

*Material examined.* Cat. No. BPBM 250467, 1 valve, BURCH-80093, 11/15/80, Mamala Bay, Oahu [021°16.9'N, 157°55.5'W] [199 m]; Cat. No. BPBM 250466, 9 valves, BURCH-82004, 01/10/82, Mamala Bay, Oahu [021°16.6'N, 158°01.2'W] [183 m].

## Recent Observations of Endangered Hawaiian Monk Seals (*Monachus schauinslandi*) on the Main Hawaiian Islands

DANIEL G. ZEVIN (Hawaii Heritage Program, The Nature Conservancy of Hawaii, 1116 Smith Street, Suite 201, Honolulu, Hawaii 96817, USA)

Virtually all occurrences of the Hawaiian Monk Seal on land are from the Northwestern Hawaiian Islands. Sightings on the main islands (Kauai, Oahu, Molokai, Lanai, Kahoolawe, Maui, Hawaii) are relatively rare, and most of these are from Kauai (Tomich 1986).

In recent years, a surplus of adult male seals at 2 main breeding sites has led to many instances of "mobbing," where groups of males attack and injure (sometimes fatally) adult females and immature seals of both sexes. To mitigate the effects of mobbing, the Marine Mammal Research Program of the National Marine Fisheries Service removed the surplus adult males at one of the breeding sites in 1994. The males were tagged for individual identification and released around the main Hawaiian Islands. Biologists from around the state are cooperating to monitor these animals to determine their movements and, in particular, to determine if they return to the Northwestern Hawaiian Islands. In addition, 5 males were fitted with satellite transmitters, which send signals to satellites passing overhead and thereby allow additional tracking of these males.

To date, dozens of sightings of these males have been documented, and satellite observations provide approximately 50 additional locations where animals have hauled out onto the beaches of the main Hawaiian Islands. These sightings have occurred from South Point on Hawaii Island to Kilauea Point on Kauai. Importantly, most of the males appear to be staying in the area where they were released. However, the success of this

relocation effort will be determined during the next reproductive season, which begins in March. If these males do not return to the Northwestern Hawaiian Islands at that time, then they will probably live out their lives as residents of the main Hawaiian Islands.

More details concerning these and other sightings are available via the Hawaii Natural Heritage Program's Natural Diversity Database, or from the National Marine Fisheries Service.

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### New Hawaiian Records of Sessile Foraminifera

B.L. BURCH and T.A. BURCH (Research Associates, Department of Natural Sciences, Bishop Museum, P.O. Box 19000-A, Honolulu, Hawaii 96817, USA)

New records are reported for sessile Foraminifera taken from sediment samples in the Hawaiian Archipelago by dredge or Peterson Grab from the NOAA National Marine Fisheries Service research vessel *Townsend Cromwell* from the island of Hawaii to Pearl and Hermes Reef, from dredge samples in the southern Hawaiian Islands from the Burch 32-foot steel salmon trawler, *Janthina VII*, or by scuba diving. *Miniacina miniacea* (Pallas, 1766) was the only species recorded throughout the Hawaiian Archipelago. Other species are newly reported from Oahu. These were *Discanomalina semipunctata* (Bailey, 1851) from 329 m off Waianae; *Ammolagena clavata* Jones & Parker, 1860, from 466 m off Kaneohe; *Sagenina divaricans* Cushman, 1910 and *Sagenina frondescens* (Brady, 1879) from 91 to 120 m off Oahu; and *Halyphysema tumanowiczii* Bowerbank, 1862. Newly reported form variations of *Biarritzina proteiformis* (Göes, 1882) and *Carpenteria monticularis* Carter, 1877 were found in range extensions from Oahu to Kahului, Maui in depths of 91 to 296 m.

#### *Ammolagena clavata* Jones & Parker, 1860

*Material examined.* BURCH-80064, 09/08/80, Kaneohe, Oahu [021°31.4'N, 157°45.9'W], mud [329 m], Acc. No. 1995.007, Cat. No. A293, 25 specimens.

#### *Biarritzina proteiformis* (Göes, 1882)

*Material examined.* BURCH-79030, 05/05/79, Mamala Bay, Oahu [021°16.9'N, 157°53.9'W], sand [119 m], Acc. No. 1995.007, Cat. No. A299, 8 specimens; BURCH-80068, 09/09/80, Mokapu Pt, Oahu [021°29.9'N, 157°41.8'W], sand, co-algae [= coralline algae] [110 m], Acc. No. 1995.007, Cat. No. A308, 63 specimens; BURCH-86011, 07/22/86, Haleiwa, Oahu [021°36.8'N, 158°11.6'W], sand, gravel [128 m], Acc. No. 1995.007, Cat. No. A315, 150 specimens.

#### *Calcituba polymorpha* von Roboz, 1884

*Material examined.* BURCH-86009, 07/01/86, Haleiwa, Oahu [021°36.8'N, 158°11.6'W], sand, coral [112 m], Acc. No. 1995.007, Cat. No. A295, 1 specimen.

***Carpenteria monticularis* Carter, 1877**

*Material examined.* TC-40-91, 11/25/68, Kahului, Maui [021°03.5'N, 156°29.0'W], sand, mud [274 m], Acc. No. 1981.136, Cat. No. A319, 14 specimens; TC-40-92, 11/25/68, Kahului, Maui [021°03.5'N, 156°29.1'W], sand, mud [296 m], Acc. No. 1981.136, Cat. No. A320, 20 specimens; BURCH-79030, 05/05/79, Mamala Bay, Oahu [021°16.9'N, 157°53.9'W], sand [119 m], Acc. No. 1995.007, Cat. No. A300, 11 specimens; BURCH-79081, 04/15/79, Waianae [021°27.3'N, 158°13.8'W], sand [91 m], Acc. No. 1995.007, Cat. No. A304, 10 specimens; BURCH-80068, 09/09/80, Mokapu Pt, Oahu [021°29.9'N, 157°41.8'W], sand, co-algae [110 m], Acc. No. 1995.007, Cat. No. A310, 120 specimens; BURCH-86011, 07/22/86, Haleiwa, Oahu [021°36.8'N, 158°11.6'W], sand, gravel [128 m], Acc. No. 1995.007, Cat. No. A316, 28 specimens.

***Discanomalina semipunctata* (Bailey, 1851)**

*Material examined.* BURCH-83048, 09/17/83, Waianae, Oahu [021°24.8'N, 158°13.6'W], sand [466 m], Acc. No. 1995.007, Cat. No. A296, 8 specimens.

***Halyphysema tumanowiczii* Bowerbank, 1862**

*Material examined.* BURCH-79078, 12/09/79, Kailua Bay, Oahu [021°25.8'N, 157°43.3'W], coral, *Chondrocidaris* [15 m], Acc. No. 1993.345, Cat. No. A288, 3 specimens.

***Miniacina miniacea* (Pallas, 1766)**

*Material examined.* BURCH-75005, 09/03/75, Mahukona, Hawaii [020°11.0'N, 155°54.8'W], sand, coral [59 m], Acc. No. 1995.007, Cat. No. A294, 5 specimens; BURCH-75015, 09/05/75, Puuhonau Pt, Hawaii [019°25.1'N, 155°55.3'W], sand, pinnae [102 m], Acc. No. 1995.007, Cat. No. A297, 24 specimens; BURCH-79030, 05/05/79, Mamala Bay, Oahu [021°16.9'N, 157°53.9'W], sand [119 m], Acc. No. 1995.007, Cat. No. A295, 44 specimens; BURCH-79081, 04/15/79, Waianae, Oahu [021°27.3'N, 158°13.8'W], sand [91 m], Acc. No. 1995.007, Cat. No. A303, 53 specimens; BURCH-80068, 09/09/80, Mokapu Pt, Oahu [021°29.9'N, 157°41.8'W], sand, co-algae [110 m], Acc. No. 1995.007, Cat. No. A307, 30 specimens; BURCH-86011, 07/22/86, Haleiwa, Oahu [021°36.8'N, 158°11.6'W], sand, gravel [128 m], Acc. No. 1995.007, Cat. No. A314, 151 specimens; TC-8104-066, 08/07/81, Pearl and Hermes Reef [027°46.2'N, 175°47.5'W], sand [73 m], Acc. No. 1991.136, Cat. No. A266, 1 specimen.

***Sagenina divaricans* Cushman, 1910**

*Material examined.* BURCH-79030, 05/05/79, Mamala Bay, Oahu [021°16.9'N, 157°53.9'W], sand [119 m], Acc. No. 1995.007, Cat. No. A302, 2 specimens; BURCH-79081, 04/15/79, Waianae, Oahu [021°27.3'N, 158°13.8'W], sand [91 m], Acc. No. 1995.007, Cat. No. A305, 65 specimens; BURCH-86011, 07/22/86, Haleiwa, Oahu [021°36.8'N, 158°11.6'W], sand, gravel [128 m], Acc. No. 1995.007, Cat. No. A317, 11 specimens.

***Sagenina frondescens* (Brady, 1879)**

*Material examined.* BURCH-79030, 05/05/79, Mamala Bay, Oahu [021°16.9'N, 157°53.9'W], sand [119 m], Acc. No. 1995.007, Cat. No. A301, 2 specimens; BURCH-79081, 04/15/79, Waianae, Oahu [021°27.3'N, 158°13.8'W], sand [91 m], Acc. No. 1995.007, Cat. No. A306, 11 specimens; BURCH-80068, 09/09/80, Mokapu Pt, Oahu [021°29.9'N, 157°41.8'W], sand, co-algae [110 m], Acc. No. 1995.007, Cat. No. A309, 16 specimens; BURCH-86011, 07/22/86, Haleiwa, Oahu [021°36.8'N, 158°11.6'W], sand, gravel [128 m], Acc. No. 1995.007, Cat. No. A318, 68 specimens.

### Contributions to the Hawaii Biological Survey (1992–1994)

The following represent the reports and publications of the staff and affiliates of the Hawaii Biological Survey, including those documents that were coauthored with non-Hawaii Biological Survey staff.

#### 1992

- 1992-001 Cowie, R.H. 1992. Identification and analysis of land snail shells recovered from sink hole deposits in the West Beach area of Oahu, Hawaiian Islands. *Bishop Museum Report to Paul H. Rosenthal, Ph.D., Inc.* 10 p.
- 1992-002 Mehrhoff, L.A. 1992. Draft recovery plan for the Hawaiian gardenia (*Gardenia brighamii*). *U.S. Fish and Wildlife Service*.
- 1992-003 Nishida, G.M. 1992. Biological information on rare plants, animals and natural communities of the Humuula Saddle proposed line area. *Bishop Museum Report to HECO/HELCO*.
- 1992-004 Polhemus, D. 1992. A preliminary survey of the aquatic insect fauna of Waikolu Stream, Molokai, Hawaii. *Bishop Museum Report to Hawaii DLNR*.
- 1992-005 Swift, S.F. 1992. Acarine (mite) communities associated with 'Ohi'a, *Metrosideros polymorpha*, at Hono O Na Pali and Kuia Natural Area Reserves on Kaua'i Island. *Bishop Museum Report to the State of Hawaii Natural Area Reserves System Commission*.
- 1992-006 Herbst, D.R. 1992. Endangered and threatened wildlife and plants; determination of endangered status for *Wilksia hobdyi* (dwarf iliau), a Hawaiian plant. *Federal Register* 57(120): 27859–27863.
- 1992-007 Herbst, D.R. 1992. Endangered and threatened wildlife and plants; determination of endangered status for *Marsilea villosa* (TihiTihi). *Federal Register* 57(120): 27863–27867.
- 1992-008 Herbst, D.R. *et al.* 1992. Endangered and threatened wildlife and plants; determination of endangered status for 16 plants on the island of Molokai, HI. *Federal Register* 57(196): 46325–46340.
- 1992-009 Herbst, D.R. & Wagner, W.L. 1992. Alien plants on the Northwestern Hawaiian Islands, p. 189–224. *In: Alien plant invasions in native ecosystems of Hawaii: management and research*. University of Hawaii, Honolulu.
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- 1992-014 Howarth, F.G. & Mull, W.P. 1992. *Hawaiian insects and their kin*. University of Hawaii Press, Honolulu. 160 p.
- 1992-015 Howarth, F.G. & Polhemus, D. 1992. A review of the Hawaiian stream insect fauna, p. 40–50. *In: New directions in research, management and conservation of Hawaiian freshwater stream ecosystems. Proceedings of the 1990 Symposium on Freshwater Stream Biology and Fisheries Management*. Hawaii DLNR, Honolulu.
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- O Lapa Lava Tube at Ahihi Kinau Natural Area Reserve, Island of Maui. *Bishop Museum Report to the Natural Area Reserves System Commission, DLNR*.
- 1992-017 Chan, J., Howarth, F.G. & Stone, F.D. 1992. Reconnaissance survey of cave resources within the Manuka Natural Area Reserve, S. Kona, Island of Hawaii. *Bishop Museum Report to the Natural Area Reserve System Commission, DLNR*.
- 1992-018 Nishida, G.M. 1992. Preliminary report on rare natural resources in the Keamuku-Keahole and Keahole-Kailua proposed 138KV transmission line corridor. *Bishop Museum Report to CH2M HILL*.
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- 1993-007 Cowie, R.H. & Nishida, G.M. 1993. Malacological inventory survey in the Multi-Purpose Range Complex study area of the Pohakuloa Training Area, Island of Hawaii. *Bishop Museum Report to The Nature Conservancy of Hawaii*. 56 p.
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## List of New Taxonomic Changes Published in this Volume

### Lepidoptera: Noctuidae

- Automala* Walker, **new synonym** of *Nola* Leach  
*Idiocyttara* Turner, **new synonym** of *Nola* Leach  
*Manoba* Walker, **revived genus**  
*Necla* Walker, **new synonym** of *Nola* Leach  
*Neonola* Hampson, **new synonym** of *Nola* Leach  
*Pisara* Walker, **new synonym** of *Nola* Leach  
*Rhynchopalpus* Hampson, **revived genus**  
*Rhynchopalpus brunellus* Hampson, **resurrected combination**  
*Rhynchopalpus harthani* Holloway, **new combination**

### Coleoptera: Nitidulidae

- Eupetinus impressus dimidiatus* Sharp, **new synonym** of *Eupetinus impressus* Sharp

### Araneae: Philodromidae

- Pedinopistha aculeatus* (Simon), **new combination**  
*Pedinopistha longulus* (Simon), **new combination**  
*Pedinopistha schauinslandi* (Simon), **new combination**  
*Pedinopistha stigmaticus* (Simon), **new combination**  
*Proernus* Simon, **new synonym** of *Pedinopistha* Karsch  
*Proernus velox* Simon, **new synonym** of *Pedinopistha finschi* Karsch

### Araneae: Thomisidae

- Diaea vitellina* Simon, **new synonym** of *Misumenops kanakanus* (Karsch)