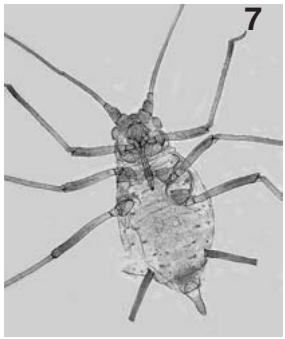

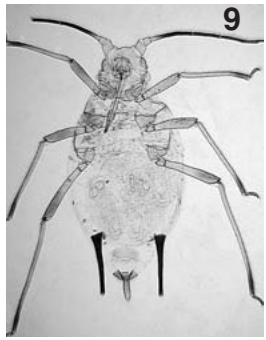

Figure 7. *Sitobion phyllanthi* (Takahashi), apterous adult. **Figure 8.** *Toxoptera odinae* (van der Goot), fourth instar nymph. **Figure 9.** *Aphis coreopsidis* (Thomas), apterous adult.

Acknowledgements

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

Literature Cited

Beardsley, **J**.**W**. 1979. The current status of the names of Hawaiian aphids. *Proceedings of the Hawaiian Entomological Society* **13**: 45–50.

Blackman, **R**.**L**. **& Eastop**, **V**.**F**. 1984. *Aphids on the world's crops: an identification and information guide*. Wiley & Sons, New York.

———. **& Eastop**, **V**.**F**. 1994. *Aphids on the world's trees: an identification and information guide*. CABI, Wallingford, UK.

Halbert, **S**.**E**., **Remaudiere**, **G**. **& Webb**, **S**. 2000. Newly established and rarely collected aphids in Florida and the southeastern United States. *Florida Entomologist* **83**: 79–91.

Kumashiro, **B**.,**Heu**, **R**., **Nishida**, **G**.**M**. **& Beardsley**, **J**.**W**. 2001. New state records of immigrant insects in the Hawaiian Islands for the year 1999. *Proceedings of the Hawaiian Entomological Society* **35**: 170–184.

Nishida, **G**.**M**., editor. 2002. Hawaiian arthropod checklist. Fourth edition. *Bishop Museum Technical Report* 22, iv + 313 p.

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

ALISTAIR S. RAMSDALE[2] & G. ALLAN SAMUELSON (Hawaii Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, Hawai'i, 96817-2704, USA)

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

1. Contribution No. 2006-023 to the Hawaii Biological Survey.
2. Present address: Montana Entomological Collection, Montana State University, P.O. Box 173020, Bozeman, Montana 59717-3020, USA.

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

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

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

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

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

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

ADEPHAGA

Dytiscidae

Rhantus pseudopacificus Balke **New island record**

Status: native (Balke 1993).

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

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

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

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

Carabidae

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

Status: adventive (Zimmerman 1972).

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

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

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

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

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

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

POLYPHAGA

Scarabaeidae

Adoretus sinicus Burmeister **New island record**

Status: adventive (Nishida 2002).

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

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

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

Status: adventive (Nishida 2002).

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

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

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

Status: adventive (Nishida 2002).

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

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

Dermestidae

Dermestes frischii Kugelann **New island record**

Status: adventive (Nishida 2002).

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

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

Phalacridae

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

Status: adventive.

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

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

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

Coccinellidae

Cryptolaemus montrouzieri Mulsant **New island record**

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

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

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

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

Tenebrionidae

Gonocephalum adpressiforme Kazab **New island record**

Status: adventive (Nishida 2002).

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

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

Chrysomelidae

Systena blanda Melsheimer **New island record**

Status: adventive (Samuelson 1988).

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

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

Curculionidae

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

Status: adventive (Zimmerman 1957).

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

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

Acknowledgments

We thank the following individuals: David Preston for getting us involved in this project, Steve Montgomery and Ken Wood for making the beetles they collected on Lehua available for our study and for choosing to deposit them at the Bishop Museum, Maya Le Grande for the informative presentation on the Lehua, Georgy Lyubarsky for consultation on the state of phalacrid taxonomy, and Neal Evenhuis and Dan Polhemus for reviewing the manuscript.

Literature Cited

Balke, **M**. 1993. Taxonomische Revision der pazifischen, australischen und indonesichen Arten der Gattung *Rhantus* Dejean, 1833 (Coleoptera: Dytiscidae). *Koleopterologische Rundshau* **63**: 39–84.

Cartwright, **O.L. & Gordon**, **R.D**. 1971. Coleoptera: Scarabaeidae. *Insects of Micronesia* **17**: 253–296

Casey, **T.L**. 1916. Some random studies among the Clavicornia. *Memoirs on the Coleoptera* **7**: 35–283.

Caum, **E.L**. 1936. Notes on the flora and fauna of Lehua and Kaula Islands. *Bernice P. Bishop Museum Occasional Papers* **11**(21): 3–17.

Champion, **G.C**. 1924. Some Indian Coleoptera (15). *Entomologist's Monthly Magazine* **60**: 236–247.

Fullaway, **D.T. & Krauss**, **N.L. H**. 1945. *Common Insects of Hawaii.* Tongg Publishing Company, Honolulu. 228 p.

Funasaki, **G.Y**., **Lai**, **P**., **Nakahara**, **L.M**., **Beardsley**, **J.W. & Ota**, **A.K**. 1988. A review of biological control introductions in Hawaii: 1890–1985. *Proceedings of the Hawaiian Entomological Society* **28**: 105–160.

Hinton, **H.E**. 1945. *A monograph of the beetles associated with stored products*. Volume 1. British Museum of Natural History, London. viii + 443 p.

Illingworth, **J.F**. 1927. A report on the insects and other animal organisms collected in the pineapple growing section at Mauna Loa, Molokai, June 1926. *Proceedings of the Hawaiian Entomological Society* **6**: 390–397.

Lea, **A. M**. 1932. The Phalacridae (Coleoptera) of Australia and New Guinea. *Records of the South Australian Museum* **4**: 433–481.

Lyubarsky, **G.Y**. 1994. New and little-known Phalacridae (Coleoptera) from the Oriental Region. *Russian Entomological Journal* **3**: 49–59.

Moore, **B.P**., **Weir**, **T.A. & Pyke**, **J.E**. 1987. Carabidae. *Zoological Catalog of Australia* **4**: 23–322.

Nishida, **G.M**. 2002. Hawaiian terrestrial arthropod checklist. Fourth edition. *Bishop Museum Technical Report* **22**, iv + 313 p.

Palmer, **H.S**. 1936. Geology of Lehua and Kaula Islands. *Bernice P. Bishop Museum Occasional Papers* **12**(13): 3–63.

Samuelson, **G.A**. 1988. [Notes and exhibitions]: *Systena blanda* Melsheimer. *Proceedings of the Hawaiian Entomological Society* **28**: 3–4.

———. 2003. Review of *Rhyncogonus* of the Hawaiian Islands (Coleoptera: Curculionidae). *Bishop Museum Bulletin in Entomology* **11**, viii + 107 p.

———. **Liebherr**, **J.K. & Will**, **K.W**. 1997. *Gnathaphanus picipes,* an established adventive in Hawai'i (Coleoptera: Carabidae). *Bishop Museum Occasional Papers* **49**: 22–23.

Stebnicka, **Z.T**. 2001. Aphodiinae (Insecta: Coleoptera: Scarabaeidae). *Fauna of New Zealand* **42**: 1–64.

Steiner, **W.E**. 1984. A review of the biology of phalacrid beetles, p. 424–445. *In*: Wheeler, Q. & Blackwell, M. (eds.). *Fungus-insect relationships*. Columbia University Press, New York. xiv + 514 p.

Vogt, **H**. 1967. Familie: Phalacridae, p. 158–166. *In:* H. Freude, K.W. Harde, & G.A. Lohse (eds.), *Die Käfer Mitteuropas*. Band 7. Clavicornia. Goecke & Evers, Krefeld, Germany. 310 p.

Wagner, **W.L**., **Herbst**, **D.R. & Sohmer**, **S.H**. 1990. Manual of the flowering plants of Hawai'i. Volume 2. *Bishop Museum Special Publication* **83**: 989–1854.

Wood, **K. R**., **VanderWerf**, **E. A**., **Swenson**, **C**., **LeGrande**, **M**., **Eijzenga**, **H. & Walker**, **R.L**. 2004. Biological inventory and assessment of Lehua Islet, Kaua'i County, Hawai'i. Final report prepared for the U.S. Fish and Wildlife Service, Pacific Islands Office, Honolulu.

Zimmerman, **E.C**. 1957. The Portulaca leafmining weevil, *Hypurus betrandi,* in Hawaii (Coleoptera: Curculionidae: Ceutorhynchinae). *Annals of the Entomological Society of America* **50**: 221–222.

———. 1972. On some foreign Carabidae established in Hawaii (Coleoptera). *Proceedings of the Hawaiian Entomological Society* **21**: 291–294.

Zimmerman, **J.R. & Smith**, **R.L**. 1975. The genus *Rhantus* (Coleoptera: Dytiscidae) in North America. Part I. General account of the species. *Transactions of the American Entomological Society* **101**: 33–123.

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

G. Allan Samuelson & Alistair S. Ramsdale[2] (Hawaii Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, Hawai'i 96817-2704, USA; email: alsam@bishopmuseum.org)

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

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

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

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

Passandra elongatula Grouvelle **New state record**

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

1. Contribution No. 2006-024 to the Hawaii Biological Survey.
2. Present address: Montana Entomological Collection, Montana State University, P.O. Box 173020, Bozeman, Montana 59717-3020, USA.