# Recent Introductions for Biological Control in Hawaii—IX

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## INTRODUCTION

This paper includes a list of new introductions and additional releases of beneficial organisms for biological control in Hawaii made since the last published listing (Davis and Krauss, 1963) and gives a few notes on the status of organisms recently introduced for the control of snail, weed, and insect pests.

## SNAIL PEST CONTROL

**Lymnaea ollula** Gould (liverfluke snail).

*Sepedon macropus* Walker, the introduced aquatic predator of the liverfluke snail, *L. ollula* (Gould) continued to be active at most release points, especially at Waiahole, Oahu, where it was first recovered in 1959. No significant developments occurred with regard to this control program and *S. macropus* remains the only introduced liverfluke snail predator to become successfully established in Hawaii.

**Achatina fulica** Bowdich (giant African snail).

African snail populations continued to decline in former areas of abundance, particularly in the Tantalus Drive area of Oahu. The beginning of this decline, first noted three years ago, coincides with the tremendous increase in *Gonaxis quadrilateralis* (Preston) populations in this and other areas. However, a new infestation was found at Hakalau, Hawaii, and infestations were found at Kalaupapa and Mauna Loa, Molokai for the first time, with an unconfirmed report from Lanai.

Worthy of note is active predation of *Achatina* by the flatworm, *Geoplana septemlineata* Hyman reported by Mead (1963). *Geoplana* also attacks *Gonaxis* and *Euglandina* according to Mead. However, since *Euglandina* is almost ubiquitous and many of the *Gonaxis* release points appear to be out of *Geoplana* range, the flatworm does not appear to be important in suppressing *Gonaxis* populations.

There were two recoveries of the introduced carabid, *Tefflus zanzibaricus alluaudi* Sternberg, near Kaneohe, Oahu during 1963, both by University students.

## WEED PEST CONTROL

Significant developments in the biological control of weeds were as follows:

**Lantana camara** var. **aculeata** (L.) Moldenke (lantana).

*Octotoma scabripennis* Guerin. This Mexican leaf-mining chrysomelid was recovered for the first time at White Sands Beach, Kona, Hawaii on July 13, 1963. The initial release of this leaf miner was made in Hookena in 1954, followed by releases on Magoon, McCandless and Honomalino Ranches in August 1955. Several months after its release, *Octotoma* disappeared from all release points and was not seen again until the recent discovery at White Sands, some 18 miles or so from the nearest release point. Since the White Sands discovery, it has also been found at Kahauloa, Kona which has an annual rainfall of 50 inches so it appears that this leaf-mining chrysomelid is well adapted to both wet and dry habitats.

*Uroplata girardi* Pic. This Brazilian leaf-mining hispid continued to spread slowly from the release point at Lawai Valley, Kauai and there is no question about its firm establishment.

**Tribulus terrestris** L.; **T. cistoides** L. (puncture vine).

*Microlarinus lypriformis* (Wollaston), the puncture vine stem weevil was recovered for the first time on September 24, 1963 from exotic and indigenous species of puncture vine at Kekaha, Kauai. The native species, *T. cistoides*, was heavily infested and sustained considerable mortality. *M. lypriformis* was collected by the junior author in California and initially released at Kekaha, Kauai on July 8, 1963.

*M. lareynii* Duval. The puncture vine seed weevil continued to spread at Mana, Kauai, and is attacking the seeds of both *Tribulus* species. The biological control of *T. terrestris* and *T. cistoides* is most promising.

**Elephantopus mollis** HBK.

*Tetraeuaresta obscuriventris* (Loew). Population explosions of this introduced seed-feeding tephritid, introduced from Fiji in December 1961, were observed at Lawai, Omao, and Kalaheo, Kauai in January and February. The impact of these high populations on *Elephantopus* density should be evident within two or three years.

**Rubus lucidus** Rydberg (blackberry).

*Bembecia marginata* (Harris). This root and crown boring aegerid was liberated at Olinda, Maui in August, following releases at Kokee, Kauai, in September for the control of blackberry.

*Schreckensteinia festaliella* Hübner. This leaf skeletonizing heliodinid was released at Olinda, Maui on October 30, followed by releases at Kokee, Kauai in November and December.

This marks the first release of *Bembecia* and *Schreckensteinia* for the control of blackberry in Hawaii.

## INSECT PEST CONTROL

**Nezara viridula** var. **smaragdula** (Fabricius) (southern green stink bug).

The southern green stink bug, first recorded on Oahu in October 15, 1961, began to build up in large numbers on wild weed hosts such as *Chenopodium alba* L. (lambs quarters), *Amaranthus spinosus* L. (amaranth), *Asystasia coro-*

*mandeliana* Nees (asystasia) and *Malva parviflora* L. (cheeseweed) in Waianae, and in the Ewa District, Oahu, during the first four months of 1963. This was followed by reports of damage to vandas, epidendrons, and watercress. In April and May, Haden mangoes were severely attacked, as many as 10 bugs being observed on a single fruit. Parasites which were introduced for the biological control of *Nezara* include the egg parasites *Telenomus basalis* Wollaston, *Ooencyrtus submetallicus* (Howard), *Ooencyrtus trinidadensis* Crawford, *Xenoencyrtus niger* Riek, *Telenomus* sp. and the tachinids, *Trichopoda pennipes* var. *pilipes* Fabr. and *T. pennipes* (Fabricius) [PROCEEDINGS 18(2):247–248]. Of these only *T. basalis* and *T. pennipes* var. *pilipes* are established.

*Telenomus basalis.* This egg parasite was recovered from many localities on Oahu and is undoubtedly the most effective parasite of *Nezara.* The first recovery on the island of Hawaii was made in Hilo in November 1963, followed by recoveries in Kailua and Honomalino, Kona in December 1963.

*Trichopoda pennipes* var. *pilipes.* This tachinid is well established on Oahu, Kona and Hilo, Hawaii, and on Kauai. It is well adapted to our climatic conditions and is attracted to the flowers of golden rod, *Solidago altissima* L. in great numbers.

*Trichopoda pennipes* was collected by the junior author in Florida in August–November 1963 and released for the first time at Ewa, Oahu in November 1963. It has not been recovered to date.

**Sphenophorus venatus vestitus** Chittenden (hunting billbug).

*Patasson calendrae* (Gahan). This egg parasite was introduced by the Entomology Department, Hawaii Sugar Planters' Association Experiment Station for the control of the hunting billbug. Releases were made in several localities on Oahu.

## MISCELLANEOUS

**Bubulcus ibis** L.

The cattle egret, which was introduced for control of hornflies and other live stock pests, continued to increase in numbers. The presence of a cattle egret rookery in a mangrove thicket in the West Loch of Pearl Harbor, Oahu was confirmed on February 20. The rookery contained at least 60 nests with an average of two fledglings in downy stages per nest. The population in the Ewa District of Oahu was estimated at 500 birds by the end of the year. *B. ibis* was introduced in 1959 and released on Oahu, Kauai, Maui and Hawaii. However, they have not been sighted on the neighbor islands for several years.

## ACKNOWLEDGMENTS

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Table 1. New Introductions and Additional Releases for Biological Control in Hawaii
1963
(All introductions by Hawaii Department of Agriculture unless otherwise indicated)

| Pest Needing Control | Organism Introduced | Source | Collector | Date Released (1963) | Number ** | Release Point ** |
|---|---|---|---|---|---|---|
| 1. Weed Pests | | | | | | |
| *Lantana camara* var. *aculeata* (L.) Moldenke (Lantana) | **Aerenicopsis championi* Bates (Coleoptera: Cerambycidae) | Veracruz, Mexico | N.L.H. Krauss | Apr. 30 | 18 | Hookena, Kona, Hawaii |
| | **Plagiohammus spinipennis* Thomson (Coleoptera: Cerambycidae) | Jalapa area, Veracruz, Mexico | N.L.H. Krauss | Mar. 5<br>Apr. 30 | 16<br>39 | Kahauloa, Kona, Hawaii<br>McCandless Ranch, Kona, Hawaii. |
| | **Teleonemia vanduzeei* Drake | Gainesville, Florida | N.L.H. Krauss | Sept. 10<br>Sept. 13<br>Oct. 18 | 200<br>575<br>500 | White Sands, Kona, Hawaii<br>Keokea, Maui<br>Kukulono Park, Kauai |
| *Rubus lucidus* Rydberg (Blackberry) | *Bembecia marginata* (Harris) (Lepidoptera: Aegeriidae) | Stayton, Oregon | N.L.H. Krauss | Aug. 26<br>Sept. 4 | 13<br>23 | Olinda, Maui<br>Kokee, Kauai |
| | *Schreckensteinia festaliella* Hübner | Santa Barbara, Calif. | N.L.H. Krauss | Oct. 30<br>Nov. 5 | 45<br>73 | Olinda, Maui<br>Kokee, Kauai |
| *Tribulus terrestris* L. (Puncture Vine) | **Microlarinus lareynii* Duval (Coleoptera: Curculionidae) | Tucson, Arizona | N.L.H. Krauss | July 25 | 150 | Kihei, Maui |
| | *Microlarinus lypriformis* (Wollaston) | Moreno, near Riverside, California<br>Tucson, Arizona | N.L.H. Krauss | July 8 | 460 | Kekaha, Kauai |
| 2. Insect Pests | | | | | | |
| *Chrysomphalus ficus* Ashmead (Florida Red Scale) | *Aphytis holoxanthus* DeBach (Hymenoptera: Aphelinidae) | Rehovot, Israel | D.J. Nadel | Mar. 8 | 50 | Makiki Nursery, Honolulu, Oahu |

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| INSECT PESTS (continued) | | | | | | |
| Noctuidae (Army-worms and Cutworms) | *Eucelatoria armigera* (Coquillett) (Diptera: Tachinidae) | New Britain, New Guinea | Gordon Dun | Mar. 29 | 10 | Ewa, Oahu |
| *Ithome concolorella* (Chambers) (Kiawe Flower Moth) | **Orius tristicolor* (White) (Hemiptera: Anthocoridae) | Arizona localities | N.L.H. Krauss | July 30 | 100 | Hanapepe, Kauai |
| *Sphenophorus venatus vestita* (Chittenden) (Hunting Billbug) | ****Patasson calendrae* (Gahan) (Hymenoptera: Mymaridae) | Missouri | F.A. Bianchi | Aug. | 50 | Kunia, Oahu |
| *Nezara viridula* var. *smaragdula* (Fabr.) (Southern Green Stink Bug) | *Trichopoda pennipes* (Fabr.) complex. Florida strain (Diptera: Tachinidae) | Florida (Gainesville, Clearwater, etc.) | N.L.H. Krauss | Nov. 19 | 38 | Ewa, Oahu |
| *Siphona irritans* L. (Hornfly) | *Ateuchus lecontei* Harold (Coleoptera: Scarabaeidae) | Gainesville, Florida | N.L.H. Krauss | Sept. 4 | 95 | Ewa, Oahu |
| | *Canthon pilularis* (L.) (Coleoptera: Scarabaeidae) | Gainesville, Florida | N.L.H. Krauss | Sept. 4<br>Sept. 19 | 2<br>25 | Ewa, Oahu<br>Kailua, Oahu |
| | *Onthophagus oklahomensis* Brown (Coleoptera: Scarabaeidae) | Gainesville, Florida | N.L.H. Krauss | Sept. 4 | 3 | Ewa, Oahu |

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| INSECT PESTS (continued) | | | | | | |
| | *Onthophagus tuberculifrons* Harold (Coleoptera: Scarabaeidae) | Gainesville, Florida | N.L.H. Krauss | Sept. 4<br>Sept. 19 | 3<br>15 | Ewa, Oahu<br>Kailua, Oahu |
| | *Onthophagus* sp. (Coleoptera: Scarabaeidae) | Gainesville, Florida | N.L.H. Krauss | Sept. 19 | 12 | Kailua, Oahu |
| | *Hister abbreviatus* Fabr. (Coleoptera: Histeridae) | Gainesville, Florida | N.L.H. Krauss | Sept. 19 | 35 | Kailua, Oahu |
| | **Hister coenosus* (Erichson) (Coleoptera: Histeridae) | Gainesville, Florida | N.L.H. Krauss | Sept. 19 | 35 | Kailua, Oahu |
| Aphids | **Hippodamia convergens* Guerin (Coleoptera: Coccinellidae) | Ukiah, California | N.L.H. Krauss | July 10 | 75 | Makiki, Oahu |
| | **Coccinella californica* (Coleoptera: Coccinellidae) | Ukiah, California | N.L.H. Krauss | July 10 | 310 | Makiki, Oahu |
| *Saccaricoccus sacchari* (Cockerell) (Pink sugarcane mealybug) | ****Hyperaspis trilineata* Mulsant (Coleoptera: Coccinellidae) | Barbados, West Indies | Leon W. Coles | Feb. 18<br>Feb. 26 | 200 eggs<br>200 eggs | Waipahu, Oahu<br>Waialua, Oahu |

* Previously introduced
** Applies to initial release on each island only
*** Introduced by H.S.P.A. Experiment Station.

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