Recent Introductions for Biological Control in Hawaii – XI

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INTRODUCTION

This paper includes a list of new introductions and additional releases of beneficial organisms for biological control in Hawaii (Table 1) made since the last published listing (Davis & Krauss, 1965) and gives a few notes on the status of organisms recently introduced for the control of snail, weed and insect pests.

SNAIL PEST CONTROL

Achatina fulica Bowdich (giant African snail)

Replacement populations for *A. fulica* continued to wane in many former areas of abundance on Oahu; also, a reduction of snail numbers was observed for the first time on the road banks and in haole koa (*Leucaena glauca*) thickets on Makiki Round Top Drive, Honolulu, in late 1964 and during the rainy months of November and December, 1965. For many years, this region has supported extremely high giant African snail populations and Mead (1961) states that "the infestation on Round Top near Honolulu is clearly among the most dense on record."

On the Neighbor Islands, a stubborn incipient infestation continues to exist near Kahaluu, Kailua-Kona but prospects for eradication appear promising. Eradication has been successful at Keaukaha, Hawaii and Mana, Kauai and excellent progress has been made at Hakalau, Hawaii and at Poipu, Kauai by the Entomology staff of the State Department of Agriculture.

Populations of the predaceous snail, *Euglandina rosea* (Ferussac), are low on Oahu, but are steadily increasing at Hana, Maui and on Hawaii. They have spread from Hilo, Hawaii to Mountain View and approximately 6 miles up the Kulani Road. The principal host snail is *Bradybaena similaris* (Ferussac), followed by occasional slugs and other snails.

The introduced carnivorous snail, *Gonaxis quadrilateralis* (Preston), continued to exert strong pressure on snail populations in the Makiki Round Top area by its voracious feeding on *Achatina* eggs and juveniles.

WEED PEST CONTROL

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

Significant developments in the biological control of lantana occurred on Hawaii where the destructive stem and root boring cerambycid, *Plagio-*

Table 1. New introductions and additional releases for biological control in Hawaii 1965

(All introductions by Entomology Branch, Hawaii Department of Agriculture)

Pest Needing Control	Organism Introduced	Source	Collector	Date Rel'd (1965) **	Number **	Release Point **
1. WEED PESTS						
Hypericum perforatum L. (Klamath weed)	*Zeuxidiplosis giardi* (Kieffer) (Diptera: Cecidomyiidae)	Nelson, New Zealand	B.B. Given, DSIR	Feb. 5	3 infested plants	Mt. Hualalai, Hawaii
	Chrysolina quadrigemina (Suffrian) (Coleoptera: Chrysomelidae)	Albany, California	Robert B. Hawkes, USDA	June 8	3,000	Mt. Hualalai, Hawaii
Lantana camera aculeata (L.) Moldenke	**Octotoma scabripennis* Guerin (Coleoptera: Chrysomelidae)	Cuernavaca, Morelos, Mexico	N.L.H. Krauss	Jul. 26 Jul. 30	24 26	Below Kokee area, Kauai Tantalus, Oahu
	**Aerenicopsis championi* Bates (Coleoptera: Cerambycidae)	Mocambo, Vera Cruz, Mexico	N.L.H. Krauss	June	36	Greenwell Ranch, Kona Hawaii
	**Plagiohammus spinipennis* Thomson (Coleoptera: Cerambycidae)	Jalapa area, Vera Cruz, Mexico	N.L.H. Krauss	April	110	Kahua Ranch, Kohala, Hawaii
	**Blepharomastix acutangulalis* (Snellen) (Lepidoptera: Pyralidae)	Mocambo, Vera Cruz, Mexico	N.L.H. Krauss	Sept. 13 Sept. 22 Oct.	75 60 150	Nuuanu, Oahu Ulupalakua, Maui Puna, Hawaii
Melastoma malabathricum L. (Indian rhododendron)	*Selca brunella* Hampson (Lepidoptera: Arctiidae)	Kuala Lumpur and Singapore, Malaysia	N.L.H. Krauss	July	409	Panaewa Forest, Hawaii
	Bocchoris adipalis Zeller (Lepidoptera: Pyraustidae)	Kuala Lumpur and Singapore, Malaysia	N.L.H. Krauss	Dec. 17	16	Waiakea, Hilo, Hawaii
2. INSECT PESTS						
Musca domestica L. (House fly)	*Spalangia cameroni* Perkins (Trinidad strain) (Hymenoptera: Pteromalidae)	Riverside, California	E.F. Legner, University of California	Feb. 19 Aug. 30 Sept. 21 Dec. 22	2,000 250 700 1,000	Ewa, Oahu Waiakea uka, Hawaii Kihei, Maui Lanai City, Lanai

— Continued —

Table 1 (Cont.). New introductions and additional releases for biological control in Hawaii 1965

(All introductions by Entomology Branch, Hawaii Department of Agriculture)

Pest Needing Control	Organism Introduced	Source	Collector	Date Rel'd (1965) **	Number **	Release Point **
2. INSPECT PESTS (Continued)						
Musca domestica L. (House fly)	*Spalangia cameroni* Perkins (Jamaica strain)	Riverside, California	E.F. Legner	Feb. 2 Sept. 29	1,000 800	Ewa, Oahu Waimea, Hawaii
	Spalangia endius Walker	Riverside, California	E.F. Legner	Mar. 5 Sept. 21 Sept. 29 Dec. 22	500 1,500 750 800	Ewa, Oahu Kihei Maui Waimea, Hawaii Lanai City, Lanai
	**Muscidifurax raptor* Girault & Sanders (Hymenoptera: Pteromalidae)	Riverside, California	E.F. Legner	Mar. 5 Aug. 30 Sept. 21	1,000 250 1,400	Ewa, Oahu Waiakea uka, Hawaii Kihei, Maui
Aphis nerii Boyer de Fonscolombe (Oleander aphid)	**Aphidius* (=*Lysiphlebus*) *testaceipes* (Cresson) (Hymenoptera: Braconidae)	Cuernavaca, Morelos Mexico	N.L.H. Krauss	Mar. 25	115	Makiki, Honolulu, Oahu
Gynaikothrips ficorum Marchal (Cuban-laurel thrips or Banyan thrips)	Lacewing-fly (Chrysopidae)	Cuernavaca, Morelos, Mexico	N.L.H. Krauss	May 31	6	Makiki, Honolulu, Oahu
	Macrotrachelia thripiformis Champion (Hemiptera: Anthocoridae)	Cuernavaca, Morelos, Mexico	N.L.H. Krauss	Jul. 9	45	Aliamanu, Oahu
Ithome concolorella (Chambers) (Kiawe flower moth)	*Bracon* n. sp. (Hymenoptera: Braconidae)	San Antonio, Texas	N.L.H. Krauss	Aug. 25	65	Koko Head, Oahu
	Agathis n. sp. (Hymenoptera: Braconidae)	San Antonio, Texas	N.L.H. Krauss	Aug. 25	150	Koko Head, Oahu
Xylosandrus compactus (Eichhoff) (Black coffee twig borer)	*Ecphylus* sp. (Braconidae)	Barra de Navidad, Jalisco, Mexico	N.L.H. Krauss	Nov. 1	26	Ewa Beach, Oahu

*Previously introduced **Applies to initial release on each island only

hammus spinipennis Thomson, caused considerable damage on several acres of lantana at Kukui Paddock, Kau. This stemmed from the transfer of 51 *P. spinipennis* larvae to lantana stumps in 1960 and liberation of 53 sexually mature adults in 1961. In August, 1965, 18 field adults were captured at night at this locality by Dr. Ken Harley, Australian Entomologist, constituting the first recovery of adult *Plagiohammus* in the field.

To augment the work of *Plagiohammus*, the first release on Hawaii of the larval leaf mining and adult leaf feeding hispid, *Uroplata girardi* Pic, was made on October 22, 1965 at Kukui Paddock and by December, the first field generation emerged. Between October and December, a total of 1,500 *Uroplata* adults were released in this locality.

The Mexican blotch leaf mining lantana chrysomelid, *Octotoma scabripennis* Guerin, continued to spread in Kona, Hawaii and by the middle of the year, attained high population levels at the McCandless Ranch in Hookena, Kona. In some situations, 100% of the leaves were attacked, and serious foliar damage resulted.

On Kauai, the Brazilian hispid, *U. girardi* Pic, spread extensively over an estimated area of 6,500 acres in Lawai Valley in June, 1965. Earlier that year, it was recovered on Tantalus, Oahu for the first time and since has become widely distributed on Tantalus and Round Top Drives.

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

The present status of the biological control of puncture vine by *Microlarinus lypriformis* (Wollaston) and *M. lareynii* Duval on infested islands is as follows:

	Partial	Substantial (As of 1965)	Complete
Kauai* (1962)			×
Oahu (1964)		×	
Maui (1964)	×		
Molokai	×		

*First released

Although *M. lypriformis* was barely established on *T. cistoides* on Molokai during the latter part of 1965, it was never released here, thus it is speculated that it either flew inter-island or immigrated via aircraft or surface vessel.

In addition to the 3 weed hosts listed in Proc. Haw. Ent. Soc., Vol. XIX (1) p. 89, adult feeding damage to stems and leaves was noted also on *Portulaca oleracae* (purslane) and *Verbesina encelioides* (golden crown beard).

Rubus lucidus Rydberg **and other species** (blackberry)

Extensive foliar damage to wild blackberry at Kokee, Kauai was caused by the introduced heliodinid, *Schreckensteinia festaliella* Hübner, during June and July, 1965 and later that year. It was first liberated at Kokee on October 30, 1963 and is expected to be an important biological control agent of blackberry on Maui and Kauai.

Aptoforma sp., a tortricid from Jalapa, Mexico, was recovered and is established at Olinda, Maui and Kokee, Kauai.

Hypericum perforatum (Klamath weed)

On July 6, 1964, Klamath weed was discovered on Mt. Hualalai, Hawaii at 7,100 ft. Surveys indicated that approximately 2,000 acres were infested and that eradication by chemicals would not be feasible economically.

Through the cooperation of Dr. Bruce B. Given, Leader, Biological Control Section, Department of Scientific and Industrial Research, New Zealand, 2 shipments of the Klamath weed gall midge, *Zeuxidiplosis giardi* (Kieffer) were recieved in February, 1965 and were liberated near Poikahi, Mt. Hualalai. This midge has been recoverd, and its establishment is very promising.

A shipment of 3,000 Klamath weed beetles, *Chrysolina quadrigemina* (Suffrian) from California followed, sent through the cooperation of USDA Entomologist Robert Hawkes, Biological Control of Weeds Investigations, Albany, California. The beetles were released on June 8, 1964 and progeny have not been observed.

Melastoma malabathricum L. (Indian rhododendron)

This noxious plant and the related *M. decemfidum* Roxb. infest approximately 8,000 acres on Kauai and 30,500 acres on Hawaii. In April, 1958, *Bocchoris fatualis* (Lederer) was released on Kauai and Hawaii for control of this pest, and although established on Kauai, it is not sufficiently abundant to effect control.

An arctiid moth, *Selca brunella* Hampson, introduced from Kuala Lumpur and Singapore, Malaysia in 1964 and liberated in the Panaewa Forest in July, 1965, was recovered in August, 1965 and has spread considerably since. The caterpillars feed avidly in the flower buds, bore into terminal stems and cause foliar damage.

Another melastoma insect, *Bocchoris adipalis* Zeller, from Kuala Lumpur and Singapore, Malaysia, 1964, was released at Panaewa Forest Reserve in December, 1965. The caterpillars are leaf rollers. No recoveries have been made to date.

INSECT PEST CONTROL

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

Populations of the southern green stink bug were generally below economic levels throughout the state, but there were limited increases in some districts on Oahu, especially in Waianae between January and May, on Maui in May, and on Hawaii, Kohala (June) and Kau (August). The latter two and Puna Districts were among the last to be invaded.

For the second consecutive year, the mango crop in Honolulu was relatively free from stink bug injury but an increase in macadamia nut damage

was reported by University of Hawaii entomologists. On Maui, passion fruit flower buds in a commercial orchard were heavily damaged and in Waiohinu, Hawaii, heavy infestations in wild Christmas berry, *Schinus terebinthifolius* Raddi, spread into a commercial tomato crop causing economic losses.

The introduced stink bug parasites *Asolcus* (=*Telenomus*) *basalis* (Wollaston) (Australia), an egg parasite, and *Trichopoda pennipes* var. *pilipes* Fabricius (West Indies), an adult parasite, were ubiquitous throughout the state and helped to suppress stink bug populations considerably in many localities.

Gynaikothrips ficorum (Marchal) (Cuban-laurel thrips)

The incidence of Cuban-laurel thrips infestation per banyan tree on Oahu and Kauai was reduced to an extremely low level during 1965. However, populations were high on Maui and Hawaii.

Although the introduced anthocorid, *Montandoniola moraguesi* (Puton), was never released on Maui, Hawaii and Molokai, it was reported and confirmed on these islands in May and November, 1965.

Continuous observations at Lanikai, Oahu during 1965 substantiated by workers in other parts of Honolulu, indicate that the predaceous anthocorid is an important bio-control agent in suppressing Cuban-laurel thrips populations. Local predators found in infested banyan leaves were *Orius persequens* (White, *Pronotellus* (=*Buchananiella*) *sodalis* (White), *Chrysopa lanata* Banks and *Physopleurella mundula* (White).

Aphis nerii Boyer de Fonscolombe (Aphid or plant louse)

This immigrant aphid was found for the first time ex *Nerium oleander* L. (oleander) at Barber's Point, Oahu on February 3, 1965.

Parasitism by the previously established braconid *Aphidius* (=*Lysiphlebus*) *testaceipes* (Cresson) was close to 100% and the aphid is extremely rare.

Musca domestica (Linnaeus) (house fly)

The introduction, breeding and propagation of house fly parasites from the Department of Biological Control, University of California, Riverside has been very successful and the following strains were liberated here: *Muscidifurax raptor* Girault & Sanders, *Spalangia endius* Walker, *S. cameroni* Perkins (Trinidad strain), and *S. cameroni* Perkins (Jamaica strain). Of these, *S. endius* was recovered at Ewa, Oahu on April 28, 1965.

Xylosandrus compactus (Eichhoff) (black coffee twig borer)

Additional hosts of the black coffee twig borer, *X. compactus*, have been recorded bringing the total up to 20. Three parasites, *Chaetospila frater* (Girault), *Dendrosoter enervatus* Marsh and *Ecphylus* sp., were liberated but not recovered to date.

Beneficial livestock insects

The horn fly (*Haematobia irritans* (L.)) predators *Pachylister caffer* Erichson and *Hister nomas* Erichson (Histeridae) were collected for the first time on February 12, 1965 on Parker Ranch, Hawaii.

MISCELLANEOUS

Bubulcus ibis L.

During 1965, there was considerable shifting of cattle egret populations to other localities on Oahu, and there were unconfirmed reports of sightings on Kauai and Maui. As a result, it was difficut to count the population. It is estimated, however, that their numbers now exceed 1,000.

The cattle egret was introduced in 1959, for horn fly and other cattle pest control and limited observations on Kauai and Oahu indicate that the introduction was fully warranted.

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