

Recent Introductions for Biological Control in Hawaii—V

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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, 1959). The list is presented in table form and is preceded by a few notes on the status of organisms recently introduced for the control of snail, weed, and insect pests.

Snail Pest Control

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

Sepedon macropus Walker: The presence of the liverfluke, *Fasciola gigantica* Cobbold, in Hawaii dates back to 1892 and, according to Alicata (1946), fascioliasis is one of the most important parasitic diseases of cattle in the Hawaiian Islands. The principal intermediate host, *L. ollula*, has been present for many years and is probably of Asiatic origin. The snail, *Pseudosuccinea columella* (Say), has been recorded as a host under laboratory conditions (Alicata, 1953).

Earlier attempts were made to control the intermediate host by introducing natural enemies such as the fireflies, *Luciola cruciata* Motschulsky, *L. lateralis* Motschulsky, *Proturis hebes* Porter, and *Colophotia praeusta* Escholtz, but although these were distributed widely, they apparently failed to become established.

In October of 1958, through the cooperation of Dr. Clifford Berg, Cornell University, Ithaca, New York, a shipment of marsh flies, *Sepedon macropus* Walker was obtained for trial on the liverfluke snail. Dr. Berg's *S. macropus* culture originated from material collected in Nicaragua. The larvae fed avidly on *Lymnaea* and *Physa* snail egg masses in the insectary, and killed and devoured the contents of snails of all ages.

Insectary propagation of *S. macropus* was very successful, and thousands of flies were released on the major islands of the Hawaiian Group. Eight months after the first release on Oahu, adult marsh flies were recovered and the species was found well established in a *Colocasia esculenta* (Linnaeus) (taro) habitat at Waiahole. It was also recovered on the Island of Kauai. This has been the first successful breakthrough in the attempt to establish fresh-water predators of the liverfluke snail in Hawaii.

TABLE I.

NEW INTRODUCTIONS AND ADDITIONAL RELEASES FOR BIOLOGICAL CONTROL IN HAWAII

| Pest Needing Control | Organism Introduced | Source | Collector | Date Rel'd. (1958) | No. | ***Release Point |
|--|--|----------------------------|------------------------|--------------------|----------------|--|
| I SNAIL PESTS <i>Achatina fulica</i> Bowdich (giant African snail) | * <i>Damaster blaptoides blaptoides</i> Kollar | Fukuoka, Japan | Professor K. Yasumatsu | 8 May | 102 | Makiki Round Top Road, Oahu |
| | | | | 8 May | 50 | Haiku, Maui |
| | * <i>Tefflus carinatus</i> Klug | Kenya, Africa | D. J. McCrae | 9 July | 13 | Michelmore's, Hauula, Oahu |
| | * <i>Tefflus zanzibaricus alluaudi</i> Sternberg | Kenya, Africa | D. J. McCrae | 9 July | 7 | Michelmore's, Hauula, Oahu |
| <i>Lymnaea ollula</i> Gould (liverfluke snail) | <i>Dictya abnormis</i> Steyskal | Ithaca, New York | Dr. C. Berg | 30 June | 35 | Kionaole Road, Oahu |
| II WEED PESTS <i>Lantana camara</i> L. var. <i>aculeata</i> (L.) Moldenke | * <i>Aerenicopsis championi</i> Bates | Mocambo, Vera Cruz, Mexico | N.L.H. Krauss | 6 May | 12 | Molokai Ranch, Molokai |
| | | | | 11 May | 64 | S. Greenwell Ranch, South Kona, Hawaii |
| | | | | 15 May | 32 | Near Pali Golf Course, Oahu |
| | * <i>Octotoma scabripennis</i> Guerin | Cuernavaca, Mexico | N.L.H. Krauss | 29 June | 135 | Kaakepa, Puna, Hawaii |
| | | | 25 June | 68 | Tantalus, Oahu | |
| <i>Pluchea odorata</i> (L.) Cass. (sour bush) | * <i>Acinia fucata</i> Fabricius | Guatemala City, Guatemala | N.L.H. Krauss | 6 Oct. | 30 | Waiau, Oahu |
| | <i>Trichotaphe</i> sp. (Clemens) | Mexico | N.L.H. Krauss | 20 Jun '57 | 50 | Papakolea, Oahu |
| III INSECT PESTS <i>Spodoptera mauritia acronyctooides</i> (Guenee) | * <i>Apanteles ruficrus</i> Haliday | Manila, Philippine Islands | S. Capco | 15 Aug. | 35 | Mundy's, Kailua, Oahu |
| | <i>Maruca testulalis</i> (Geyer) | Tabogo Island, Panama | N.L.H. Krauss | 18 Nov. | 100 | Kaneohe, Oahu |

*Previously introduced.

***Applies to initial releases only.

B. *Achatina fulica* Bowdich (Giant African snail).

Gonaxis kibweziensis (Smith) and *G. quadrilateralis* (Preston): These East African carnivorous snails were frequently found in the egg clutches of the African snail, *A. fulica*, and it was suspected that in addition to devouring the emerging infants, they were also preying upon the eggs. This was subsequently confirmed by microscopic examination in which both species were observed rasping the shells and devouring the embryonic snails. *G. kibweziensis* was found well established in four of twelve release points while *G. quadrilateralis* was recovered in eight of seventeen release points.

Euglandina rosea (Ferrusac): Although well established and widely distributed since its introduction in 1955, subnormal rainfall and a possible population shift to higher areas during 1959 may be factors responsible for the scarcity of *Euglandina* in areas of former abundance.

Weed Pest Control

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

The control of this range pest seems a step closer as a result of incessant attack by introduced enemies. Foremost among these is the noctuid moth, *Hypena jussalis* Walker, which got underway during the latter part of 1958 (Davis, 1959). This species remained abundant during the early months of 1959, and by April and May many square miles of lantana at Ulupalakua, Maui were completely defoliated. Next in order of importance was the pyralid, *Syngamia haemorrhoidalis* Guenée. Field observations at a number of locations in the state suggested that activity by this defoliator often preceded that of *Hypena*. Populations of both species appeared to level off during the summer months. During this period the lantana tingid, *Teleonomus scrupulosa* Stål, became increasingly active, and up to 100% defoliation resulted in many localities between sea level and 2,000 feet elevation. Overlapping of activity occurred not only with the aforementioned insects but also with the leaf-mining tineid moth, *Cremastobombycia lantanella* Busck, the noctuid moth, *Catabena esula* Druce, and the garden looper, *Plusia chalcites* (Esper).

B. *Melastoma malabathricum* Linnaeus

The recovery and establishment of *Bocchoris fatualis* Munro at Knudsen Gap, Kauai, was reported by Resident Entomologist Stephen Au in April, 1959. This pyralid moth was introduced from Paete, Laguna Province, Philippine Islands in 1957. The caterpillars feed on the foliage.

C. *Opuntia megacantha* Salm-Dyck

Lagocheirus funestus Thomson, a cerambycid borer introduced from Australia in 1951, was increasingly active and is extending its range. It was observed in September along the Kohala Road, Hawaii, approximately two miles from the junction of the Kohala and Kawaihae Roads.

Insect Pest Control

A. *Peregrinus maidis* (Ashmead) (corn leafhopper).

The mirid bug, *Cyrtorhinus lividipennis* Reuter, which feeds on the eggs of the corn leafhopper, was introduced into Hawaii from Guam in 1939, 1951 and 1952. It was particularly active on Oahu during 1959, and was recovered for the first time at Kapoho, Island of Hawaii, in February, 1959.

B. *Siphona irritans* L. (horn fly).

The scarabaeid dung beetle, *Onthophagus catta* (Fabricius) (determined by Dr. O. L. Cartwright), was recovered for the first time at Wahiawa, Oahu by E. J. Ford Jr. It has since appeared in light traps operated by HSPA entomologists at Waipio, and Ewa, Oahu. *O. catta* was collected in Southern Rhodesia and Kenya, Africa by N. L. H. Krauss, and was liberated on Oahu in 1957.

Miscellaneous

One hundred five cattle egrets, *Bubulcus ibis* (Linnaeus), and 21 barn owls, *Tyto alba* (Scopoli), were liberated for horn fly and rodent control during 1959. The cattle egrets were released on Oahu, Kauai, Molokai, Maui, and Hawaii, while the barn owls were released on Hawaii, Oahu, and Kauai.

The propagation and testing of all organisms considered for liberation were conducted by Mr. Q. C. Chock, State Entomologist, assisted by C. J. Davis, Assistant State Entomologist, and by Miss Mabel Chong, Insectary Supervisor. The assistance of collaborators in making insect shipments, and determinations by the Insect Identification and Parasite Introduction Section, U. S. Department of Agriculture, is gratefully acknowledged.

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