Recent Introductions for Biological Control XVIII

C. J. DAVIS
STATE DEPARTMENT OF AGRICULTURE
HONOLULU, HAWAII

For many years the Entomology Branch of the Hawaii Department of Agriculture has maintained a continuous program of beneficial introductions. This paper includes a list of new introductions and additional releases for biological control in Hawaii (Table 1) made since the last listing (Davis, 1971) and gives a few notes on the status of pests and their purposely introduced enemies.

SNAIL PEST CONTROL

Achatina fulica Bowdich (giant African snail)

Efforts to eradicate the giant African snail, *A. fulica* Bowdich, at Kona, Hawaii and at Poipu and Wahiawa, Kauai continued. Two aerial drops with metaldehyde bait were made during rainy periods and although considerable kill was observed, small numbers of the giant African snail persist in rocky terrain and aestivate during long periods of dry weather.

Galba (=Lymnaea) **viridis** (Quoy and Gaimard) (liver fluke snail)

Over 200 species of snail eating flies have been studied by Berg, et al. (1971) and of eight introduced species two are established in Hawaii, namely, *Sepedon macropus* Walker and *S. sauteri* Hendel.

Additional introductions such as *S. plumbella* Wiedemann, *S.* new sp. and *S. senex* Wiedmann have not been recovered to date.

For the islands of Hawaii, Maui and Oahu, slaughterhouse records indicate a downward trend in the percentage of infested livers between 1966 and 1972 and this strongly suggests that the established sciomyzids, *S. macropus* and *S. sauteri* may be exerting considerable pressure on liver fluke snails. The incidence of fluke infestation on the island of Kauai remains high however and there is a need to consider other sciomyzids that may be better adapted to Kauai eco-systems.

WEED PEST CONTROL

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

The destructive stem boring cerambycid, *Plagiohammus spinipennis* Thomson is well established in Hilo, Hawaii where the annual rainfall amounts to 135 plus inches and the elevation is 15 meters. Under these conditions, the bark of the trunk is generally more succulent and apparently more attractive for beetle oviposition than the smaller woody

TABLE 1. *New Introductions and Additional Releases for Biological Control in Hawaii,* 1972.
(Unless otherwise indicated, all introductions by Entomology Branch, Hawaii Department of Agriculture)

Pest Needing Control	*Organism Introduced*	*No.*	*Source*	*Collector*	*Date Rel'd*	*Release Point*
Insect Pests						
Pineus pini Koch (Eurasian pine aphid)	*Leucopis nigraluna* McAlpine (Diptera: Chamaemyiidae)	501	Rawalpindi, Pakistan	Dr. M.A. Ghani	March 16 to Sept.	Waikii, Hawaii
Plutella xylostella (L.) (diamondback cabbage moth)	*Apanteles plutellae* Kurdj. (Hymenoptera: Braconidae)	13	Taipei, Taiwan	Dr. C. Tao	Apr. 28	Kula, Maui Palolo, Oahu

trunks of drier regions. This is borne out at the original release points in the Districts of Kona and Ka'u, Hawaii. At Kona, *P. spinipennis* moved naturally from 274 meters to 914 meters elevation between 1961 and 1970. Efforts to establish *P. spinipennis* at Ulupalakua, Maui are underway and although no emergence holes have been observed to date, larval activity is encouraging.

The Peruvian lantana tingid, *Leptobyrsa decora* Drake, is established at Ulupalakua, Maui where all stages were noted. Unlike *Teleonemia scrupulosa* Stål, *L. decora* favors the ventral side of lantana foliage for brood tending and feeding. This tingid is also established near Puukapele, Kokee, Kauai where all stages were observed in December, 1972. It was released in this locality May, 1970.

Clidemia hirta (L.) (Koster's curse)

This noxious forest pest was discovered in the Puna Forest Reserve, Hawaii 8 May 1972 by Stephen Montgomery, and was recently reported on Molokai by Mr. Lorin Gill of the Sierra Club. Mr. Gill also reported its spread to the Waianae Mountain Range between Kolekole and Puu Kanehoa.

A pyrallid moth, *Blepharomastix ebulealis* (Guenee), was introduced from Puerto Rico and Trinidad, West Indies in 1969 for control of this weed pest. Although successfully propagated and liberated by the thousands on Oahu and Hawaii, there have been no recoveries up to the present time. *B. ebulealis* also feeds on *Melastoma malabathricum* (Indian rhododendron) and *Tibouchina semidecandra* (princess flower), two other noxious weed pests on Hawaii, so that the chances of its recovery and establishment may be greater on Hawaii.

INSECT PEST CONTROL

Aspidiotus destructor Signoret (coconut scale)

Thus far, the coconut scale, *A. destructor,* has not spread to the neighbor islands, largely due to effective plant quarantine measures. In the meantime, two species of coccinellids introduced from Guam, *Pseudoscymnus anomolus* Chapin (February, 1971) and *Chilocorus nigritus* (F.) (August, 1971) were recovered for the first time. *P. anomolus* was recovered on coconut fronds at Hawaii Kai, Oahu, September, 1972 while *C. nigritus* was found feeding on the scale, *Asterolecanium bambusae* (Boisduval), infesting bamboo plants on the University of Hawaii campus, June, 1972 by Dick Tsuda, University of Hawaii graduate student.

Ceroplastes cirripediformis Comstock (barnacle scale)

The barnacle scale, *C. cirripediformis* was, until 1972, a serious pest of passion fruit vines, particularly at Kahului, Maui where much vine killing was observed (Davis and Chong, 1968). Field material collected during this period was negative for parasitism.

In July, 1967, an encyrtid, *Coccidoxenus mexicanus* (Girault) was received from Trinidad, West Indies through the cooperation of Dr. Fred D. Bennett and liberated in untreated areas of the orchard. Established scale parasites on Oahu were also liberated. By October, 1971, 90 percent of the barnacle scales in this planting were parasitized, primarily by *C. mexicanus*. Throughout 1972 only light to negligible scale populations occurred and there was no longer a need for pesticide applications. Yield loss during 1971 due to the barnacle scale amounted to approximately $110,000.

Pineus pini Koch (Eurasian pine aphid)

The Eurasian pine aphid, *P. pini* is an important newly established pest of conifers locally and occurs in Japan, New Zealand and Australia as well as some European countries. It does not occur in continental United States. It was discovered at Waikii, Hawaii in April 1970 and statewide surveys disclosed that it was present on Oahu (Kailua, July, 1970) and on Maui in July, 1971. At present, the infestations are found primarily on bonsai (dwarf) conifers in residential plantings, namely, Japanese black pine, *Pinus thunbergii* and Japanese red pine, *P. densiflora* and on cluster pine, *P. pinaster*, in private forest plantings.

A dipterous predator, *Leucopis nigraluna* McAlpine, was introduced from Pakistan in March 1972 through the cooperation of Dr. M.A. Ghani, Commonwealth Institute of Biological Control and a total of 501 *Leucopis* was released. No recoveries have been made up to the present time.

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