

BIOLOGICAL CONTROL INVESTIGATIONS ON SOME HAWAIIAN WEEDS

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Brief notes are given on insects attacking several shrubs and trees which are pests in extensive areas of Hawaii, especially on grazing land. The observations were made during the past several years while I was working on various biological control projects.

Identifications of the insects were made by specialists of the Entomology Research Division, U.S. Department of Agriculture and the Commonwealth Institute of Entomology, London. The eriophyid mites were named by H. H. Keifer, California Department of Agriculture. Rearing and feeding tests on economic plants of several selected species of insects and the release of approved species in Hawaii was carried on by Q. C. Chock, C. J. Davis, H. Nakao, Mabel Chong and other members of the staff of the Entomology Branch, Hawaii Department of Agriculture.

OPIUMA (*Pithecellobium dulce* [Roxb.]) Benth., Leguminosae

A tropical American tree now found in various south Asian countries and elsewhere, became established in Hawaii about 1870 and since has become a pest. About 1,750 acres of land are infested. The following insects were noted on this plant:

THYSANOPTERA

Phlaeothripidae

Liothrips sp. Cuernavaca, Mor., Mexico, Apr.

HEMIPTERA, HETEROPTERA

Anthocoridae

Macrotrachelis sp. ? Cali, Colombia, Nov.

Miridae

Ceratocapsus sp. ? Cali, Colombia, Nov.

Lygus sp ? Cali, Colombia, Nov.

Rhinacola forticornis Reuter. Cali, Colombia, Nov.

Taeda sp. Cali, Colombia, Nov.

Pentatomidae

Podisus acutissimus Stål ? Coral Gables, Florida, Sept.

Podisus (Tylospilus) sp. Cali, Colombia, Nov.

HEMIPTERA, HOMOPTERA

Aleyrodidae

Tetraleurodes sp. near *acaciae* (Quaintance). Cuernavaca, Mor., Mexico, July, on leaves.

Cicadellidae

Coelidia sp. Acapulco, Gro., Mexico, Aug.

Empoasca sp. Acapulco, Gro., Mexico, Aug.

Oncometopia sp. near *alpha* Fowler. Acapulco, Gro., Mexico, Aug.

Zygina sp. Acapulco and Chilpancingo, Gro., Mexico, Aug., on leaves.

Coccoidea

Coccus elongatus (Signoret). Cuernavaca and Chilpancingo, Mexico, Aug., Sept., on leaves and branches.

Ferrisia virgata (Cockerell). Coyuca de Benitez, Gro., Mexico, Aug. Calcutta, India, Nov., on leaves.

Pseudischnaspis bowreyi (Cockerell). Chilpancingo, Gro., Mexico, Aug., on leaves.

Membracidae

Aconophora sp. Cali, Colombia, Nov.

Micrutalis sp. Colombia, Nov., on branches.

Platycentrus obtusicornis Stål. Cuernavaca, Mor., Mexico, July, on stem.

Umbonia crassicornis (Amyot & Serville). Cali, Colombia, Nov., on branches.

Vanduzea segmentata Fowler. Colombia, Nov., on branches.

Psyllidae

Psylla minuticornis Crawford. Cuernavaca, Mor., Mexico, March and Aug., on leaves.

Psylla sp. Cali, Colombia, Nov., on leaves.

Tropiduchidae

Sp. of genus near *Neurotmeta*. Acapulco, Gro., Mexico.

LEPIDOPTERA

Arctiidae

Arachnis sp. Cuernavaca, Mor., Mexico, July, hairy gray larva feeding on leaves.

Geometriidae

Macaria sp. Cuernavaca, Mor., Mexico, Aug., larva feeding on leaves.

Semiothisa khasiana Moore. Saigon, Vietnam, Nov., larva feeding on leaves.

Semiothisa sp. ? *myandaria* Walker. Kuala Lumpur, Malaya, Sept., larva feeding on leaves.

Glyphiterygidae

Imma sp. Manila, Philippines, Oct., Larva feeding on leaves.

Gracilariidae

Acrocerochops sp. Coyuca de Benitez, Gro., Mexico, Aug., small red larvae forming blotch mines in leaves. The eulophid parasite

Cirrospilus sp. was reared also from the mines.

Lycaenidae

Species? Havana, Cuba, Dec., larvae feeding on flowers. Adults of *Leptotes cassius theonus* (Lucas) were resting on the flowers.

Notodontidae

Hemiceras sp. Chilpancingo, Gro., Mexico, Aug., larva feeding on leaves.

Phalaenidae

Sp. of *Catocalinae*. Acapulco, Gro., Mexico, Aug., feeding on leaves.

Riodinidae

Lymnas acroleuca Fldr. Chilpancingo, Gro., Mexico, Aug., larva feeding on leaves. Acapulco, Mexico, Aug., adult on leaves.

Tortricidae

"*Tortrix*" sp. Cali, Colombia, Nov., caterpillars webbing leaves.

Unidentified: Blastobasidae (Havana, Cuba), Gelechiidae (Havana, Cuba), Hesperiiidae (Acapulco, Gro., Mexico), Limacadiidae (Cuernavaca, Mor., Mexico), Lyonetiidae (Acapulco, Coyuca de Benitez, Gro., Mexico), Noctuidae (Acapulco, Gro., Mexico), Psychidae (Kingston, Jamaica; Guerrero, Mexico).

COLEOPTERA

Chrysomelidae

Near *Cyrcylus vittatus* Jacoby. Chilpancingo, Gro., Mexico, Aug., on leaves.

Nodonota curtula Jacoby. Chilpancingo, Gro., Mexico, Aug., feeding on leaves.

Curculionidae

Pandelitus nodifer Champion. Coral Gables, Florida, Sept., adults feeding on leaves. (New to the United States.)

Meloidae

Species? Puerto Marques, Gro., Mexico, Aug., adults feeding on leaves.

SOUR BUSH (*Pluchea odorata* (L.) Cass., Compositae)

This tropical American shrub was first found in Hawaii about 1930. The abundant light seeds have enabled it to infest over 50,000 acres of grazing and wasteland. Two species of insects were introduced into Hawaii to help control this plant: the gelechiid leaf-folding moth *Trichotaphe aenigmatica* Clarke from Veracruz, Mexico in May-August 1955, and the tephritid flower-infesting fly, *Acinia picturata* (Snow), from Guatemala in September-November 1959. Though well established, these insects have done little to control sour bush. The following insects were collected on this plant:

ACARINA

Eriophyiidae

Aceria pluchaeae (Cook). Veracruz, Mexico, May. Coral Cables, Fla., Sept., in small galls on leaves.

ORTHOPTERA

Acrididae

- Machaerocera mexicana* Saussure. Nogales, Ver., Mexico, June. Hummingbird Highway, near Roaring Creek, British Honduras, July, feeding on leaves.
- Osmilia flavolineata* (De Geer), Belize, Br. Honduras, Sept., feeding on leaves.
- Schistocerca vaga* (Scudder). Veracruz, Mexico, June, feeding on leaves.
- Schistocerca* sp., probably *vitticeps* (Walker). Belize, Br. Honduras, Sept., feeding on leaves.

HEMIPTERA, HETEROPTERA

Coreidae

- Catorhintha selector* Stål. Veracruz, Mexico, May, June, on leaves.

Lygaeidae

- Nysius raphanus* Howard. Boca del Rio, Ver., Mexico, May, on leaves.
- Nysius tenellus* Barber. Boca del Rio, Mexico, May, on leaves.
- Nysius* sp. Cuernavaca, Mexico, March, on leaves.
- Ortholomus jamaicensis* (Dallas). Rancho Creek, Br. Honduras, July, on leaves.

Pentatomidae

- Platycarenum humilis* (H.-S.). Veracruz, Mexico, May, on stems.

HEMIPTERA, HOMOPTERA

Aphididae

- Aphis gossypii* Glover. Boca del Rio, Ver., Mexico, May, on leaves and flower-buds.
- Macrosiphum* sp. Boca del Rio, Ver., Mexico, May on leaves.

Cicadellidae

- Agallia lingula* Van Duzee. Veracruz, Mexico, June, on leaves.
- Agrosoma* sp. San Miguel, Cozumel I., Mexico, July.
- Cyrtodisca major* Signoret. Cuernavaca, Mexico, July, on branch.
- Graphocephala propior* (Fowler). Nogales, Ver., Mexico, Dec., on leaves.
- Graphocephala* or closely related genus. Rancho Creek, Br. Honduras, July on leaves.
- Gyponana* sp. Veracruz, Mexico, June, Sept. Roaring Creek, Br. Honduras, July, on leaves and branches.
- Sp. of genus near *Keonolla*. Near Roaring Creek, Br. Honduras, July, on leaves.
- Oncometopia* sp. Veracruz, Mexico, May. San Miguel, Cozumel I., Mexico, July. Tuxtla Gutierrez, Chiapas, Mexico, Aug.
- Scaphytopius nitridus* De Long. Nogales, Ver., Mexico, Dec., on leaves.
- Sibovia occatoria* (Say). Tuxtla Gutierrez, Chiapas, Mexico, Aug.
- Tettigella sexlineata* (Fowler). Nogales, Ver., Mexico, Dec. Near

Roaring Creek, Br. Honduras, July, on leaves.

Tettigella urbana (Stål). Near Roaring Creek, Br. Honduras, July, on leaves.

Cicadidae

Pacarina puella Davis? Veracruz, Mexico, May, on stem.

Cixiidae

Bothriocera signoreti Stål. Cuernavaca, Mexico, July, on leaves.

Bothriocera tinealis Burmeister. Veracruz, Mexico, May, on leaf.

Haplaxius serratus Caldwell. Veracruz, Mexico, May, on leaves.

Oecleus sp. Veracruz, Mexico, May, June, on leaves.

Oliarus sp. Veracruz, Mexico, June, on leaves.

Coccoidea

Ceroplastes sp. Veracruz, Mexico, May, on stem.

Eriococcus sp., close to *toumeyi* (Cockerell). Veracruz, Mexico, Nov., on leaves and twigs.

Eriococcus sp., close to *dubius* Cockerell. Veracruz, Mexico, May, on stems.

Phenacoccus gossypii Townsend & Cockerell. Veracruz, Mexico, May, June, on leaves and stems.

Dictopharidae

Nersia sp. Tuxtla Gutierrez, Chiapas, Mexico, Aug.

Flatidae

Cyarda sp. Havana, Cuba, Nov., on branches.

Sp. of *Cyarda* or related genus. Veracruz, Mexico, May, on leaf.

Ormenis sp. near *dolobrata* Fowler. Veracruz, Mexico, June, on stems.

Fulgoroidea

Cyrpoptus sp. Veracruz, Mexico, Nov., on branch.

Issidae

Colpoptera sp. Veracruz, Mexico, May, on leaves.

Thionia sp. Tuxtla Gutierrez, Chiapas, Mexico, Aug.

Membracidae

Aconophora pallescens Stål ? Near Roaring Creek, Br. Honduras, July, on branch.

Enchenopa binotata Say. Veracruz, Mexico, June. Nogales, Ver., Mexico, June, Dec., on leaves and stems.

LEPIDOPTERA

Arctiidae

Halsidota sp. Veracruz, Mexico, Nov., larva feeding on leaves.

Thalesa parva Rothschild. Veracruz, Mexico, June, larva feeding on leaves.

Gelechiidae

Trichotaphe aenigmatica Clarke. Several lots of this species were sent to Honolulu from Veracruz, Mexico in May-August 1955. The

first releases were made in 1957 and the moth is now well established. The braconid parasites *Apanteles* sp. and *Phanerotoma* sp. and the eulophid *Horsmenus* were reared from *Trichotaphe* material. The eulophid is a secondary parasite.

Noctuidae (=Phalaenidae)

Sp. of Acontiinae. Near Roaring Creek, Br. Honduras, July, white caterpillar boring in branch tip.

Eublemma minima (Guenée). San Vicente, P. R., Cuba, Nov., larvae boring in stem tips.

Species? Belize, Br. Honduras, July. Veracruz, Mexico, July, larvae feeding on leaves.

Riodinidae

Lephelisca sp. Veracruz, Mexico, Sept., larva feeding on leaf.

Xylorictidae

Dolidiria arcanella Busck. Veracruz, Mexico, Dec., small greenish caterpillar feeding on upper surface of leaf under web.

COLEOPTERA

Chrysomelidae

Omophoita aequinoctialis (L.) Veracruz, Mexico, April, adults feeding on leaves.

Systema sp. Nogales, Ver., Mexico, May, on leaves.

Curculionidae

Anthonomus sp. Veracruz, Mexico, June, on stem tips.

Baridinae, Centrinini, genus? Veracruz, Mexico, June, on stem tip.

Baris aerea (Boheman). Veracruz, Mexico, May. Near Roaring Creek, Br. Honduras. Adults boring in branch and stem tips.

Epicaerus near *nebulosus* Boheman. Veracruz, Mexico, July, feeding on leaves.

Lixus sp. Veracruz, Mexico, Dec., larvae boring in live branches.

Veracruz, May, June, July, Dec.; Cuernavaca, Mexico, June,

July, Aug.; Tuxtla Gutierrez, Mexico, Aug.; Belize, Br. Hond.,

July, Sept.; Near Roaring Creek, Br. Hond., July; El Cayo, Br.

Honduras, Sept.; Tegucigalpa, Honduras, Nov.; adults on plants.

DIPTERA

Tephritidae

Acinia picturata (Snow) Several lots of this insect were sent to Honolulu from Guatemala City, Guatemala and San Salvador, El Salvador in September-November 1959. The first release was made in October 1959 and the fly quickly became established and is very common now. I have seen it on *Pluchea odorata* at Veracruz, Mexico; San Vicente, P. R., Cuba; and Nassau, Bahamas.

GUAVA (*Psidium guajava* L., Myrtaceae)

The guava is a small tropical American tree introduced into Hawaii

early in the 19th century. It has spread widely over the islands and was estimated in 1962 by the Weed Branch, State Department of Agriculture, to be established on 768,000 acres, of which 39,000 acres were heavily infested. It is a serious problem on some ranches but the fruits are extensively used in the production of jellies and juice. No attempt has been made at biological control of the plant but a number of insects have been noted associated with it in various countries.

THYSANOPTERA

Phlaeothripidae

Liothrips sp., *similis* Bagnall, or species near this. Cartago, Costa Rica, Oct., Nov., on leaves.

HEMIPTERA, HETEROPTERA

Coreidae

Leptoglossus cinctus (H.-S.). Zamorano, Honduras, Sept., feeding on fruit.

Leptoglossus stigmosa (Herbst). Zamorano, Honduras, Sept., feeding on fruit.

HEMIPTERA, HOMOPTERA

Aleyrodidae

Aleurodicus sp. near *coccoloba* Quaintance and Brues. Orosi, Costa Rica, Oct., on leaves.

Aleurothrixus floccosus (Maskell). Rio de Janeiro and Belem, Brazil, July, on leaves.

Coccoidea

Ceroplastes floridensis Comstock. Orosi, Costa Rica, Nov., on leaves.

Pseudococcus nipae (Maskell). Boquete, Panama, Oct., on leaves.

Pseudococcus sp. probably undescribed. Cordoba, Ver., Mexico, June, on leaves.

Flatidae

Ormensis sp. Veracruz, Ver., Mexico, July, on branch.

Psyllidae

Ceropsylla sp. Ribeirão Pires, S.P., Brazil, April, on leaves.

Kuwayama sp. Santos, S.P., Brazil, Oct., on leaves.

LEPIDOPTERA

Olethreutidae

Platypeplus aprobola (Meyrick). Tautira, Tahiti, Jan., larvae webbing leaves. This species also was found webbing leaves of mango and Java plum (*Syzygium cumini*) on Tahiti and Huahine Islands in the Society group.

Strepsicrates holotephras (Meyrick). Kuala Lumpur, Malaya, Aug. Shui-li, Taiwan, May. Fare, Huahine, Society Is., Feb.

Tautira, Tahiti, Jan. Larvae webbing leaves in all cases.
Strepsicrates sp. near *rhothia* (Meyrick). Bandung, Java, Indonesia,
 Aug., larvae webbing leaves.

DOWNY ROSE MYRTLE

(*Rhodomyrtus tomentosa* [Ait.] Hassk., Myrtaceae)

This plant is native to southeast Asia and was introduced into Hawaii about 1920. It is established on Kauai and Hawaii and infests over 8,000 acres. The following insects were collected on this plant:

HEMIPTERA, HOMOPTERA

Aphididae

Trichosiphum sp. Sha Tin, New Territories, Hong Kong, April, on twigs.

Cicadellidae

Hishimonus disciguttus (Walker). Hong Kong I., April-May.

Platymetopiini, species? Hong Kong I., April.

Stragania sp. Hong Kong I., April.

Cicadidae

Mogannia sp. perhaps *mandarina* Distant. Hong Kong I., May, on branches.

Coccoidea

Probably *Ceroplastes ceriferus* Anderson. Hong Kong I., April, on leaves.

Ceroplastes floridensis Cosmtock. Hong Kong I., April and Nov., on leaves.

Probably *Ceroplastes rubens* Maskell. Hong Kong I., April, on leaf.

Coccus mangiferae (Green). Hong Kong I., April, on leaf.

Phenacaspis sp. near *dendrobii* Kuwana. Hong Kong I., May, on leaves.

Phenacaspis sp., close to *litsea* Green. Sha Tin, New Terrs., Hong Kong, May, on leaves.

Pseudococcus sp., close to *citriculus* Green. Hong Kong I., April, on leaves and branches.

Fulgoroidea

Betacixius obliquus Mats. Hong Kong I., April, on leaf.

Seliza tigmaria (Walker). Hong Kong I., May, on branch.

Machaerotidae

Machaerota sp. Hong Kong I., April, on leaf.

Membracidae

Gargara rubrogranulata Bierman. Singapore, Malaysia, Nov.

LEPIDOPTERA

Lasiocampidae

Trabala vishnou Lef. Hong Kong I., Aug., larvae feeding on leaves.
 The adults bear urticating hairs.

Lymantriidae

Euproctis bipunctipex Hampson. Hong Kong I., May, larvae feeding on leaves. The adults have urticating hairs.

Olethreutidae

Olethreutes albitibiana (Snell.) Peak Area, Hong Kong I., July, larvae webbing leaves. The parasites *Goniozus* sp. (Bethylidae) and *Campoplex* sp. (*Ichneumonidae*) were reared from webbed leaves.

Noctuidae (=Phalaenidae)

Eutelia sp. Singapore, Malaysia, Nov., larvae feeding on leaves.

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