FOREST ENTOMOLOGY IN HAWAII

An annotated check-list of the insect faunas of the various components of the Hawaiian forests

By

OTTO H. SWEZEY

CONSULTING ENTOMOLOGIST, EXPERIMENT STATION
OF THE HAWAIIAN SUGAR PLANTERS' ASSOCIATION and
HONORARY CONSULTANT, BERNICE P. BISHOP MUSEUM

(*Edited by* R. H. VAN ZWALUWENBURG)

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EDITOR'S NOTES

The need of a comprehensive, authentic publication on the insects associated with the native Hawaiian flora has long been apparent. Many publications exist which deal with the insects of cultivated plants, but since early in the present century, when the field work was concluded in preparation for the "FAUNA HAWAIIENSIS," most of the local entomologists have given little attention to the insect fauna of the native plants, and particularly of the native forest. Dr. Swezey, fortunately, made this his lifelong study, and his detailed notes, accumulated over a period of more than 40 years, cover the subject thoroughly. Had he not begun this project soon after his arrival here, the results could not have been so comprehensive as they are, for during the past half-century changes have occurred in the forests which profoundly affected many of the native insects. His colleagues and other members of the Hawaiian Entomological Society long urged on Dr. Swezey the importance of putting this wealth of information on record, and he did so during his last years of residence in Hawaii. As a permanent reference work this publication will be invaluable to entomologists and to all interested in the unique fauna and flora of these islands, particularly since it is the result of many years of research by a highly qualified worker.

In Dr. Swezey's text each insect is cited with the name of its describer, followed, in parentheses, by a date and a page number, which refer to a publication appearing in the list of "References" which begins on page 231. For example, **"Nesotocus kauaiensis** Perkins (1900: 151)" means that the original description of that insect appears on page 151 of a paper by Perkins published in 1900, which is to be found in the chronological listing of papers under that author's name.

An asterisk (*) before a name indicates that the insect is specifically attached to the hostplant; insects without asterisk have one or more alternative plants on which they feed.

The localities given do not necessarily include all the islands from which a particular species of insect is known. They indicate the islands on which the insect has been recorded from the hostplant under consideration.

An attempt has been made to give the currently accepted botanical name in brackets, following the name used by Dr. Swezey. Mr. E. H. Bryan, Jr., of the Bernice P. Bishop Museum has kindly checked all the plant names, and compiled the index. Dr. J. L. Gressitt helped greatly in the proof reading.

R. H. Van Zwaluwenburg

FOREWORD

In the usual works on forest entomology the main purpose is to treat of the insects which are significantly injurious to the forest trees, and to advance methods of control or means of lessening the damage done. Here in Hawaii, the endemic insect life in the natural, undisturbed forest, in the main, is not detrimental to the welfare of the trees. Although there are a great many species of insects attacking some kinds of trees in one way or another, yet a natural balance is maintained so that there is seldom any devastating effect. A few excessive infestations have come under our observation, and will be treated of in their proper place.

The main purpose of this paper is to record the results of study of the insect faunas of the different kinds of trees in Hawaiian forests, which the writer has pursued as opportunities have presented themselves during the past five decades. Soon after coming to Hawaii in 1904 to participate in the work of the Entomology Department of the Experiment Station of the Hawaiian Sugar Planters' Association, the writer became interested in the endemic insect fauna, as well as in the study of sugar cane pests, which are chiefly of foreign origin, as are the majority of pests of other crops in Hawaii.

Several factors led to this interest in the endemic insect fauna, one being the association in the work of the Experiment Station, with Dr. R. C. L. Perkins, who had made earlier the extensive insect collections in the Hawaiian forests on which the comprehensive volumes of the "FAUNA HAWAIIENSIS" are based. Then too, the writer had begun faunistic studies on leafhoppers (Delphacidae) in Ohio before coming to Hawaii. As most of the entomological work at the Experiment Station, at that time, was concerned with the sugar cane leafhopper (*Perkinsiella saccharicida* Kirkaldy), a pest which had been introduced accidentally from Australia and was ravaging Hawaiian cane fields, it was but natural to take an interest in related leafhoppers in the forests. Many species of leafhoppers were found in addition to those already known, and it was found that each species was attached to a particular kind of tree or plant.

From leafhoppers interest spread to other kinds of insects and their relations to the various kinds of trees, and as time went on much data accumulated concerning the habits and host relationships of the forest insects. From time to time there have been published in the annual "PROCEEDINGS" of the Hawaiian Entomological Society many notes and short papers recording much of the information already obtained. It is my present purpose to bring together this information in the form of faunistic studies of the various Hawaiian forest

trees, listing, with appropriate notes, the insects attached to, or otherwise associated with, each kind of tree. The trees will be treated by genus because in many cases it is impossible to separate with certainty the species of a genus. The insects themselves do not usually distinguish between the species of a genus, but are likely to feed on any species of the genus to which they are attached. There are rare instances, however, where different species of an insect genus each feeds on a different species of a certain genus of trees. These instances will be called to attention in due course.

In the main, the observations reported are the writer's, but in some cases observations are recorded of other entomologists who also have been interested in studies of the Hawaiian insects. Use is made especially of any hostplant records found in the "FAUNA HAWAIIENSIS." Unfortunately, however, much of the information that Dr. Perkins acquired as to hostplant records is not included in the "FAUNA." Some additional records have been taken from "INSECTS OF HAWAII," by E. C. Zimmerman, five volumes of which were published by the University of Hawaii Press in 1948.

A considerable part of the writer's forest insect collections is still unworked, as is also the case with some collections by other entomologists. If all of this material were completely identified, numerous additions could probably be made to the present lists.

O. H. Swezey

October, 1952.

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ACACIA KOA GRAY

Family: Leguminosae.

Hawaiian name: koa.

This list of koa insects includes some which may have been collected from related species of *Acacia,* or from varieties of *koa,* for some of the earlier records made no distinction between true *Acacia koa,* and related members of what may be called the "koa complex." There are probably more endemic insect species attached to this koa complex than to any other generic group of trees in the Hawaiian Islands. Besides those species definitely attached to koa, there are many others, endemic and otherwise, which are associated with it in one way or another. The particular relationship of each species to the hostplant is discussed, and the relationships of the other associated insects set forth, both with respect to the host tree and to each other.

LEPIDOPTERA

Family Geometridae

* **Scotorythra caryopis** Meyrick (1899: 173) - - - - - - - - Oahu
* **Scotorythra isospora** Meyrick (1899; 175) - - - - - - - - - Kauai
* **Scotorythra corticea** (Butler) (1881: 319) - - - - - - - - - Maui
* **Scotorythra aruraea** Meyrick (1899: 176) - - - - - - - - Hawaii

The green caterpillars of these moths are "loopers," feeding on the new foliage, each species restricted to the island indicated. They are never numerous enough to cause significant injury. At Kumuweia, Kauai, in 1932, 75 per cent of the caterpillars of *S. isospora* were parasitized by *Hyposoter exiguae* (Viereck) (1912: 638), a parasite introduced from California. On Mt. Tantalus, Oahu, a single *Apanteles marginiventris* (Cresson) (1865: 57) was once reared from a caterpillar of *S. caryopis;* this *Apanteles* is a parasite of armyworms, and was introduced from Texas.

Scotorythra rara (Butler) (1879: 273) - - - - - - - - All the islands
Scotorythra paludicola (Butler) (1879: 272) Fig. 1 - Kauai; Maui; Hawaii
Scotorythra idolias Meyrick (1899: 178) - - - - - - - - - Hawaii

The caterpillars of these three moths feed to some extent on koa foliage, and on other trees as well.

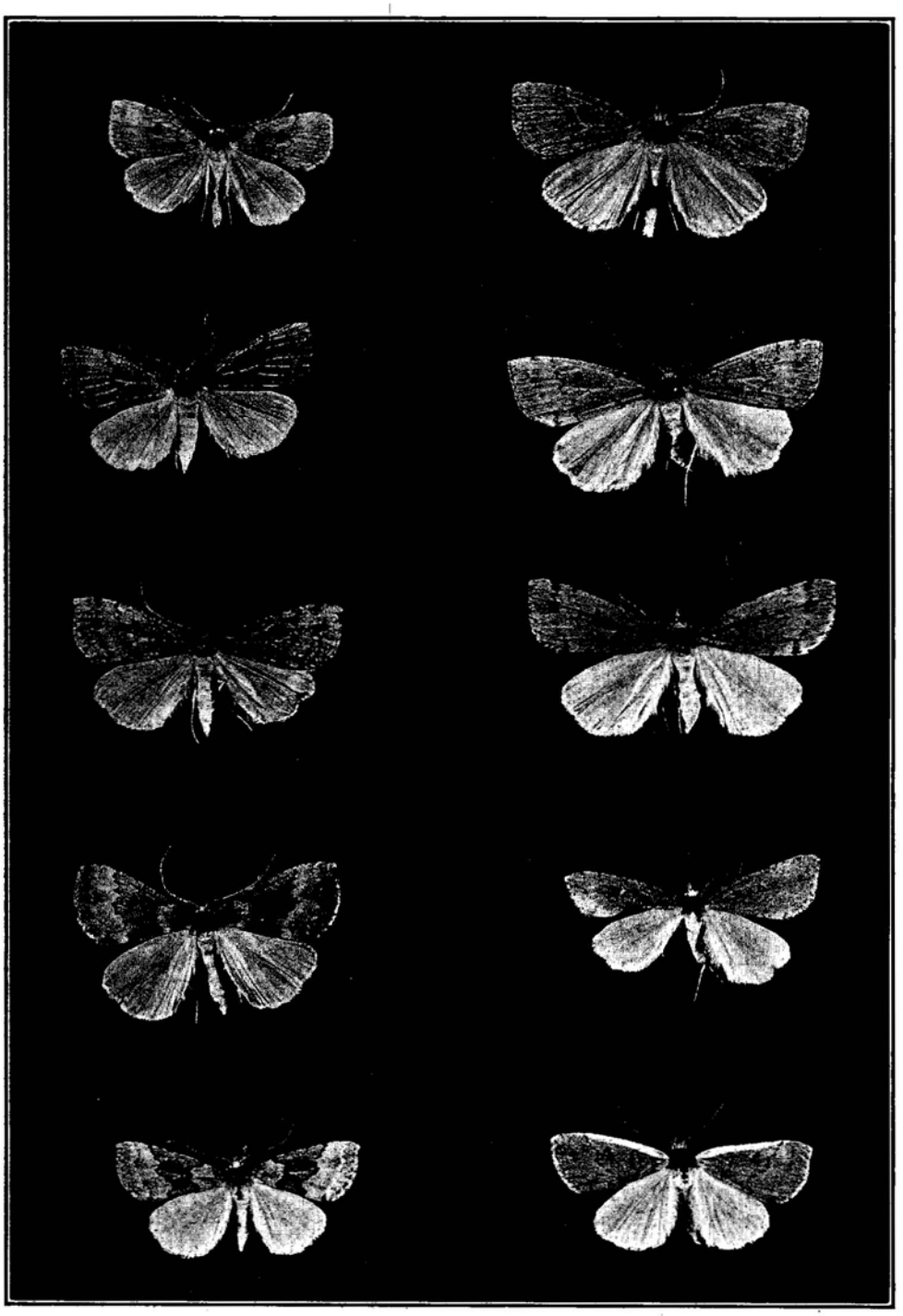

FIGURE 1. **Scotorythra paludicola,** showing variations in wing pattern, a feature which is prevalent in some of the Hawaiian moths.

In 1926 a considerable area of the koa forest along the Kula pipe line trail, east of Olinda, Maui, was defoliated by caterpillars of *S. paludicola,* with the result that the branches of many trees died back for from one to three feet. Many entire branches died, and some of the older trees succumbed, but their death may have been due partially to other causes, for the whole forest in that region was on the decline.

About 30 years earlier Dr. Perkins witnessed in the Olinda region a similar occurrence, involving caterpillars of the same species (*paludicola*). He also once observed a serious denudation of koa trees on Hawaii by caterpillars of *S. idolias*; he records that native birds in thousands were attracted by the abundance of caterpillars. No doubt birds were at times an important factor in preventing more of these epidemics of caterpillars.

Scotorythra metacrossa Meyrick (1904 : 352)

Dr. Perkins once found the caterpillars of this species participating, with *S. rara,* in the defoliation of koa trees on Mt. Tantalus, Oahu. It is not known if *metacrossa* feeds on other trees also.

In a letter of February 15, 1926, Dr. Perkins says: "In the early days of my collecting, I saw the koa trees stripped almost every year in one locality or another. In 1892 the trees of the wet belt in Kona—presumably by *idolias,* but I did not breed any; in 1893 I was not in any koa district, but in 1894 and 1895 the Haleakala forest of koa, 4,000-5,000 ft. was stripped for miles by *paludicola*; and in the latter year also all the dry koa forest near Kilauea (as also again in some later years) by *idolias,* though there may have been some *paludicola* also. In 1895 or 1896 all the koas at 3,500 feet were again stripped in Kona. In 1900 the koa trees on Tantalus were many of them quite stripped, but more than one species of caterpillar was present, *metacrossa* being certainly the smaller and probably *rara* the larger species. I do not remember to have seen any total stripping of trees after 1900, but then I had not much opportunity later . . . When the mynah birds reached the height of their abundance in the forests I believe the defoliation by these caterpillars really became much less frequent . . ."

At the time of the 1926 outbreak in the Olinda area, the following predators and parasites were found preying on the caterpillars of *paludicola* and *corticea:*

Oechalia pacifica (Stål) (1859 : 221). A predaceous bug (fig. 32), quite common; its egg clusters of from 6 to 10 eggs each, were found on the koa phyllodes.

Enicospilus mauicola Ashmead (1901 : 347). A native ophionid wasp parasite whose cocoons were formed where caterpillars had spun up to pupate under trash on the ground, the parasite larvae having issued from the caterpillars before the latter pupated.

Hyposoter exiguae (Viereck) (1912 : 638). An introduced ichneumonid whose larva issues from the immature caterpillar and spins its banded cocoon nearby on a leaf or phyllode.

Chaetogaedia monticola (Bigot) (1888: 91).

Achaetoneura archippivora (Williston) (1889: 1923).

Two immigrant tachinid flies which parasitize the caterpillars.

Family Xylorictidae

Thyrocopa indecora (Butler) (1881: 397)

This moth was described from Haleakala, Maui, and there are no other records of its distribution. Its brownish caterpillars feed in rotten bark of koa and no doubt other trees.

Thyrocopa argentea (Butler) (1881: 399)

Described from Oahu and also recorded from Hawaii. The moths have been reared from bark of dead koa on Mt. Tantalus, Oahu, and Kilauea, Hawaii.

Family Tortricidae

Argyroploce illepida (Butler) (1882: 42) Fig. 2

This is a reddish moth, generally distributed in the Hawaiian Islands, whose caterpillars feed on the seeds in koa pods. Often a high percentage of seeds is destroyed so that it is sometimes difficult to obtain seeds for planting in reforestation projects. Counts of koa pods in various localities showed percentages of seed destruction as follows:

Kilauea, Hawaii	87 per cent	Mt. Olympus, Oahu	15-67 per cent
Nauhi gulch, Hawaii	61 " "	Paumalu, Oahu	99 " "
Poamoho, Oahu	60 " "	Aiea, Oahu	14 " "
Sugar Loaf, Oahu	25 " "	Waipio ridge, Oahu	15 " "
Halawa, Oahu	23.5 " "	Mt. Tantalus, Oahu	13;15;10;14.5 " "

Aside from koa, the caterpillars feed commonly on the seeds of *Acacia confusa* Merrill, *Acacia farnesiana* (Linnaeus) Willdenow and *Sapindus oahuensis* Hillebrand, and occasionally on those of *Cassia glauca* Lamarck, *Dodonaea viscosa* Linnaeus, macadamia nut, lima bean, *Mezoneurum kauaiense* (Mann) Hillebrand, and in the pulp of mango and litchi fruits.

Parasites which have been reared from caterpillars of *Argyroploce illepida* are: *Pristomerus hawaiiensis* Perkins (1910-H: 680), *Sierola cryptophlebiae* Fullaway (1920: 119) and *Sierola koa* Fullaway (1920: 88).

* **Adenoneura rufipennis** (Butler) (1881: 395) Fig. 2

This is a smaller reddish species occurring on Kauai and Oahu, whose caterpillars feed in koa pods and flower heads, but not nearly so abundantly as the preceding species does.

* **Adenoneura conspicua** (Walsingham) (1907: 684)

This moth is known on Oahu and Maui. It has been reared from caterpillars feeding in and beneath the bark of recently felled koa trees, and similarly under the bark of stumps.

* **Enarmonia walsinghami** (Butler) (1882: 43) Fig. 2

This moth occurs on Kauai, Oahu, Maui and Hawaii. The caterpillars live in dead twigs of koa and also bore into tips of living twigs. They have been found most abundantly in the enlarged phyllodes and twigs which have been infected and malformed by the rust, *Uromyces koae* Arthur. Sometimes such malformed twigs grow into branches of an inch or more in diameter, within which the caterpillars of this moth are found in the bark or in the living wood. *Pristomerus hawaiiensis* Perkins (1910-H: 680) is a parasite of the caterpillar.

Amorbia emigratella Busck (1909: 201)

A yellowish brown immigrant moth whose green caterpillars feed on the foliage to a slight extent, webbing together the leaves or phyllodes.

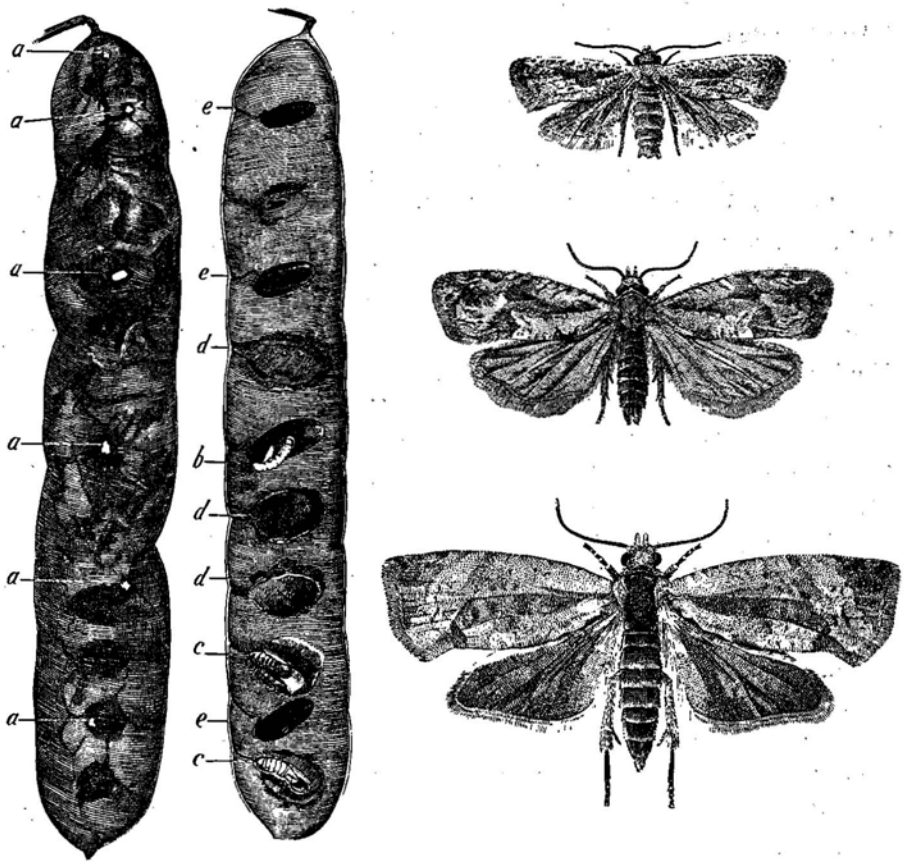

FIGURE 2. Koa seed moths. Above, **Adenoneura rufipennis;** middle, **Enarmonia walsinghami;** below, **Argyroploce illepida.** At left, pods in which the seeds have been eaten by moth larvae: **a,** exit holes where larvae have issued or entered; **b,** larva eating seed; **c,** pupa *in situ;* **d,** frass, where a larva has eaten a seed; **e,** uninjured seed.

Archips postvittanus (Walker) (1863 : 297)

Another immigrant moth whose green caterpillars sometimes feed similarly to *Amorbia emigratella* on koa. The caterpillars of these two moths can be told apart by the presence in *Amorbia* of a black line on the lateral margin of the prothorax, which is lacking in *Archips*.

Family Hyponomeutidae

* **Aphthonetus kauaiensis** Walsingham (1907 : 518)

This tiny moth has been reared from the phyllodes of koa. The larvae feed at the tips of new phyllodes where they are folded by webbing to produce a hiding place for the larvae, which occur singly. The moth was described from Kauai, with no record of its habits. The rearing records are from koa on Oahu and Maui.

* **Aphthonetus bitincta** Walsingham (1907 : 521)

Closely related to the preceding species, but a little larger. It was described from Haleakala, Maui, and has been collected on Mt. Kaala and elsewhere on Oahu. The moth has been reared from koa bark.

Hyposmocoma alliterata Walsingham (1907 : 600)

The larvae of this small moth live in cases and feed on lichens on koa bark, as well as on other trees such as kukui, algaroba, *Sophora* and the *Ceara* rubber tree. The cases are flat and broadly oval with an extending flange made of tiny bits of lichen, bark and debris fastened together. The moth is known from the Kohala Mountains and Kilauea, Hawaii, from Nahiku, Maui and from various regions on Oahu.

Hyposmocoma empedota Meyrick (1915 : 341)

This moth is closely related to the preceding and has similar habits. Its larval case, however, lacks the wide flange. It is known only from Oahu.

Hyposmocoma lupella candidella Walsingham (1907 : 564)

The larva of this moth lives in a brown case, in or under dead koa bark. It is known on all the main islands except Oahu.

Hyposmocoma jugifera Meyrick (1928 : 102)

This species was reared from a dead branch of koa on Mt. Tantalus and at Niu, Oahu.

Hyposmocoma chilonella Walsingham (1907 : 637)

Widely distributed in the Hawaiian Islands with four varieties. The caterpillars are elongate, whitish and feed in dead wood of koa and of several other trees. The moths have been reared from dead koa on Oahu and Maui.

Hyperdasysella cryptogamiella (Walsingham) (1907 : 642)

The caterpillars of this moth are similar to those of *Hyposmocoma chilonella*, and feed in dead wood of koa and other trees. Moths have been

reared from koa wood on Hawaii and from other trees on Oahu and Hawaii.

Hyperdasysella semiusta (Walsingham) (1907: 640)

Described from the Kauai mountains; it was reared from caterpillars in rotten koa wood in Haleauau Valley, Waianae Mountains, Oahu, in 1935.

Family Lyonetiidae

Opogona omoscopa (Meyrick) (1892: 567)

This is an immigrant from New Zealand, widely distributed in the Hawaiian Islands. The caterpillars are scavengers, feeding in many kinds of decaying vegetation; they have been found abundantly in rotten koa wood on Maui.

Family Lycaenidae

*** Lycaena blackburni** (Tuely) (1878: 9)

This is a small butterfly with wings dull bluish above, and green beneath. The short, plump larva feeds on the blossoms and new foliage of koa, which is its main foodplant. It has also been reared from *Pipturus, Perrottetia* and *Dodonaea,* as well as from *Pithecellobium dulce* (Roxburgh) Bentham. The butterfly is on all the main islands of the Hawaiian group.

COLEOPTERA

Family Carabidae

Several species of these predaceous beetles have been found associated with koa trees.

Anchonymus agonoides Sharp (1902: 199)

Found by Perkins inhabiting cavities in the trunk or branches of koa on Haleakala, Maui.

Barypristus incendiarius (Blackburn) (1879: 105)

Under bark of koa trees, ovipositing in chinks in the bark (Perkins).

Baryneus sharpi (Blackburn) (1878: 122)

Beneath bark of koa (Perkins), Haleakala, Maui.

Mecyclothorax robustus Sharp (1903: 255)

Thriscothorax ducalis Sharp (1903: 266)

Thriscothorax robustus (Blackburn) (1881: 228)

These three species were found under the bark of a rotten koa tree on the Kula pipe line trail, Maui, March 21, 1930 (Swezey).

Mecyclothorax konanus Sharp (1903: 248)

Thriscothorax gracilis Sharp (1903: 258)

These two species were found abundantly in rotten koa logs, Nauhi gulch, 5,250 ft., Hawaii, October, 1931 (Swezey and Williams, 1932: 183).

Metrothorax haleakalae Sharp (1903: 271)

Collected from koa Waikamoi, Maui, January 14, 1926 (Swezey).

Metrothorax oahuensis Blackburn (1878: 123)

Collected from rotten koa log, Haleauau Valley, Oahu, March 10, 1940 (Swezey).

Family Cerambycidae

Several species of these beetles, belonging to two endemic genera (*Plagithmysus* and *Neoclytarlus*) are attached to koa. Each species is confined to a single island. The larvae of all of them feed in and beneath the bark, and in the outer wood of dead or dying branches, or in injured, sickly or fallen trees. They pupate within cells excavated in the outer wood. The species by island are as follows:

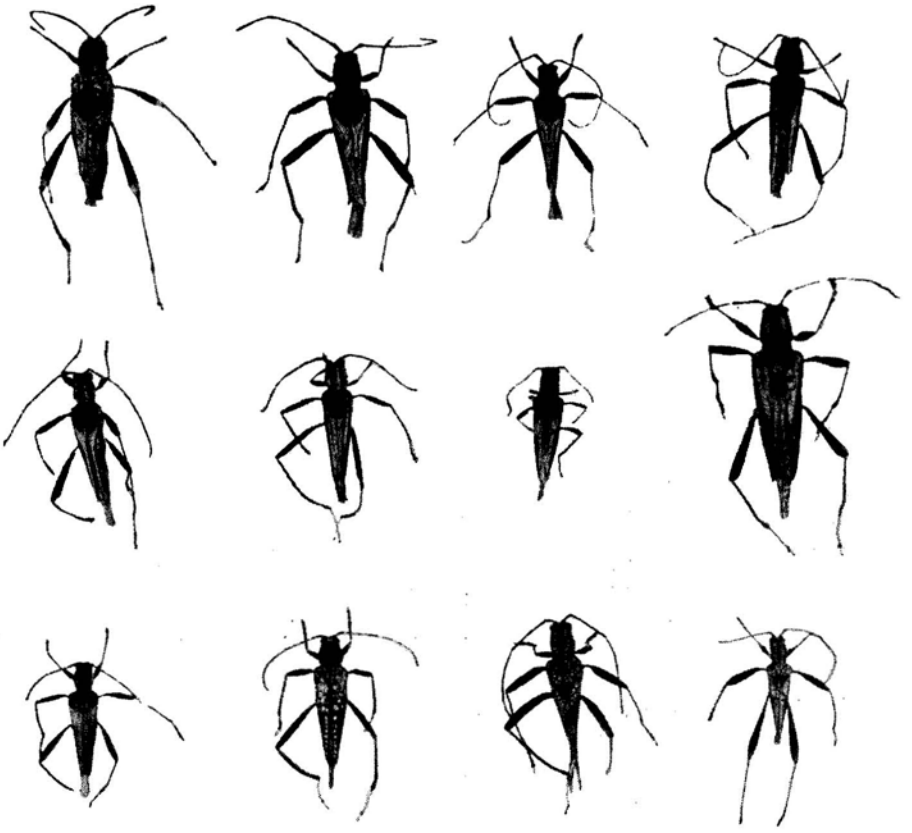

FIGURE 3. Species of **Plagithmysus.** Top row (left to right): **pulverulentus,** ex *Acacia koa;* **darwinianus,** ex *Sophora;* **varians,** ex koa; **platydesmae,** ex *Platydesma.* Middle row: **lamarckianus,** ex *Pipturus;* **bishopi,** ex *Pelea;* **funebris,** ex *Sophora;* **bilineatus,** ex *Metrosideros.* Bottom row: **giffardi,** ex *Smilax;* **vitticollis,** ex *Perrottetia;* **munroi,** ex *Sideroxylon;* **solitarius,** ex *Metrosideros* and *Syzygium.*

* **Plagithmysus pulverulentus** (Motschulsky) (1845:85) Fig. 3 - - Oahu
* **Plagithmysus cristatus** (Sharp) (1878:207) Fig. 25 - - - - Oahu
* **Plagithmysus arachnipes** Sharp (1896:274) - - - - - - - - Kauai
* **Plagithmysus aequalis** Sharp (1896:273) - - - - - - - - - Kauai
* **Plagithmysus finschi** (Harold) (1880:166) - - - - - - - - - Maui
* **Plagithmysus varians** Sharp (1896:245) Fig. 3 - - - - - - Hawaii
* **Neoclytarlus fragilis** (Sharp) (1881:534) - - - - - - - - - Oahu
* **Neoclytarlus immundus** (Sharp) (1910:646) - - - - - - - - Oahu
* **Neoclytarlus obscurus** (Sharp) (1900:100) - - - - - - - - Kauai
* **Neoclytarlus longipes** (Sharp) (1900:103) - - - - - - - - Kauai
* **Neoclytarlus annectens** (Sharp) (1900:104) - - - - - - - - Kauai
* **Neoclytarlus pennatus** (Sharp) (1881:532) Fig. 25 - - - - - - Maui
* **Neoclytarlus laticollis** (Sharp) (1900:101) - - - - - - - - - Maui
* **Neoclytarlus modestus** (Sharp) (1879:104) - - - - - - - - - Maui
* **Neoclytarlus debilis** (Sharp) (1900:99) - - - - - - - - - Hawaii
* **Neoclytarlus claviger** (Sharp) (1900:101) - - - - - - - - Hawaii
* **Neoclytarlus nodifer** (Sharp) (1900:102) - - - - - - - - Hawaii

Parasites of the cerambycid larvae are *Ischiogonus palliatus* (Cameron) (1881:560) and *Ischiogonus pallidiceps* Perkins (1910-H:684). There may be several parasite larvae per host larva. They feed externally, and when full grown produce a mass of white cocoons *in situ*. *Eupelmus leptophyas* Perkins (1910-H:642) was once reared from a larva of *Plagithmysus varians* at Kilauea, Hawaii.

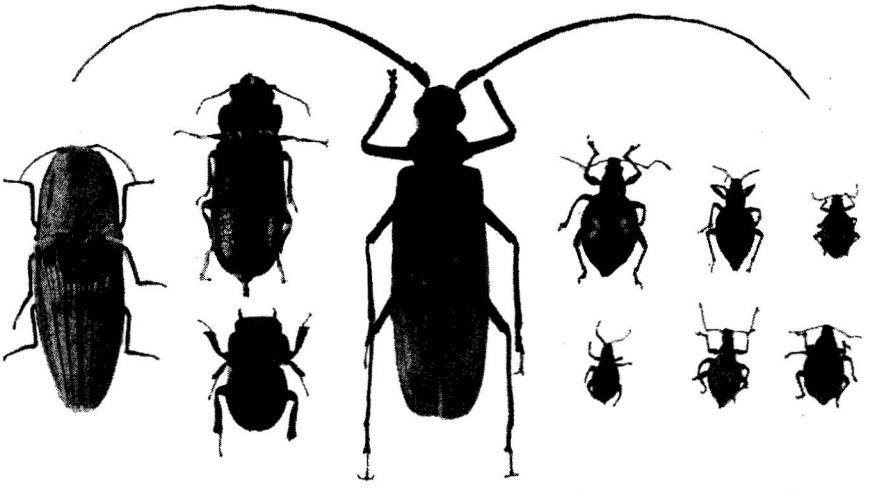

FIGURE 4. In middle: **Megopis (Aegosoma) reflexa.** At left (left to right): **Chalcolepidius erythroloma, Parandra puncticeps** (upper), **Apterocyclus honoluluensis** (lower). At right (left to right): upper row, **Rhyncogonus blackburni, R. koebelei, R. extraneus;** lower row, **R. saltus, R. vittatus, R. alternans.**

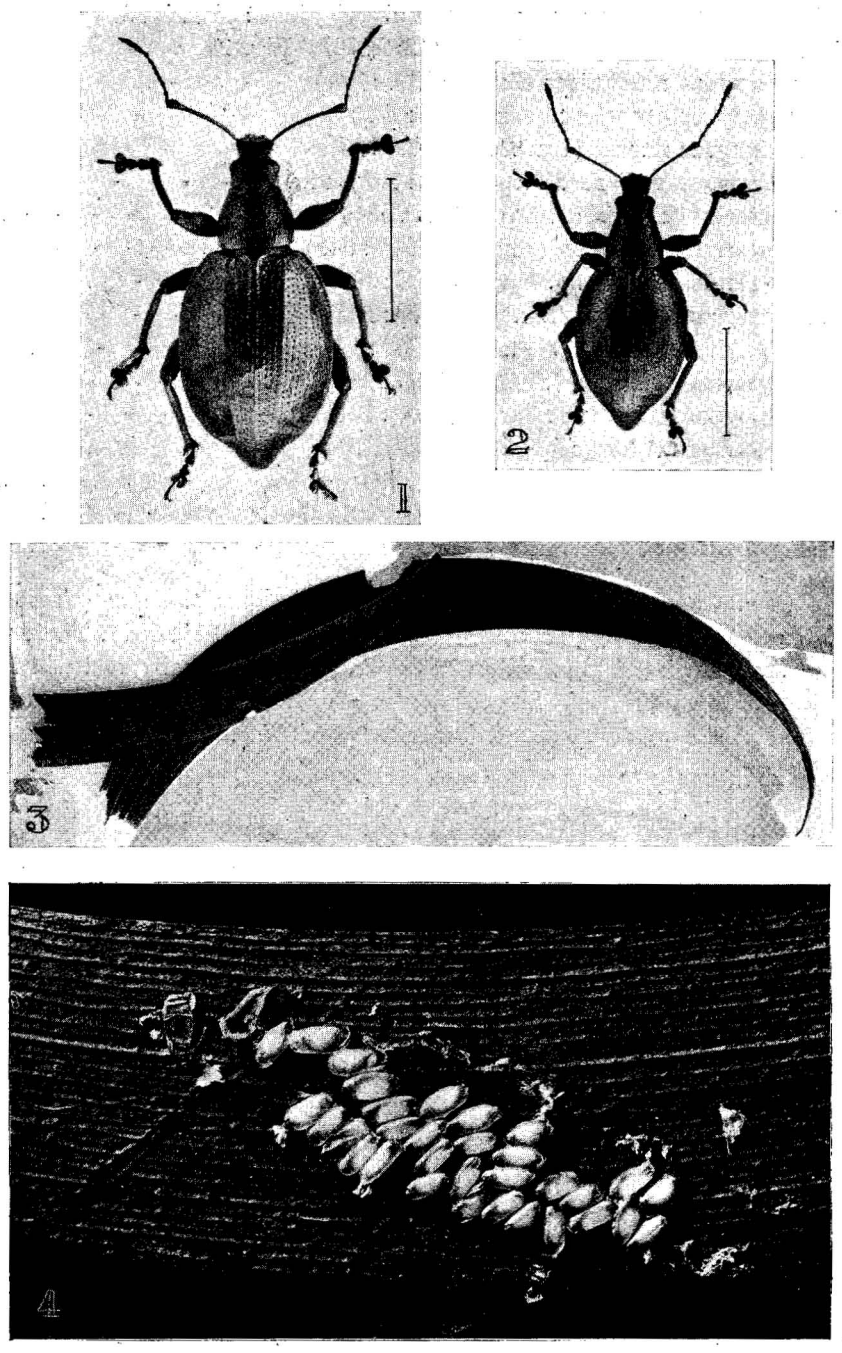

FIGURE 5. **Rhyncogonus blackburni.** 1, adult female; 2, adult male; 3, koa phyllode enclosing egg cluster; 4, cluster of eggs exposed.

An adult wasp of *Odynerus instabilis* Perkins (1899: 48) issued from a nest in an exit hole of a cerambycid beetle in a dead koa stump on the Kula pipe line trail, Maui, February 27, 1935 (Swezey).

Parandra puncticeps Sharp (1878: 202) Fig. 4

Megopis (Aegosoma) reflexa (Karsch) (1881: 7) Fig. 4

These two large beetles of non-endemic genera occur on all the main islands of the Hawaiian group. Their grubs bore in dead, standing trees; sometimes they are found in living trees, but more often in fallen trees and rotting logs. Besides koa they feed in other native trees such as *Straussia, Myrsine, Myoporum, Pipturus, Metrosideros, Elaeocarpus* and *Pelea.* On Maui sugar cane stools were once found infested with *Megopis reflexa* grubs in a field recent'y cleared of forest. Similarly, in the Olaa district of Hawaii when coffee was grown there, the large grubs of this beetle injured many coffee trees by boring into them below the soil surface.

The eggs of *Parandra puncticeps* were once found in the hard wood of a dead koa tree at Halemanu, Kauai. The tree was still standing but the bark of the lower part of the trunk had loosened so that the female beetles were able to get beneath the bark to oviposit. Each white cylindrical egg (3 mm. long by 1 mm. wide) is placed in a separate excavation, the strong ovipositor being adapted for penetrating the solid wood.

Ceresium unicolor (Fabricius) (1787: 147)

This immigrant species is occasionally reared from dead koa branches.

Family Curculionidae

Rhyncogonus blackburni Sharp (Blackburn and Sharp, 1885: 177) Fig. 5

This large black weevil occurs on Mt. Tantalus and its vicinity on Oahu. The adult beetles feed on the foliage, but are so rare that no injury from them is ever noticed. The eggs are laid in clusters between two phyllodes which are glued together (Fig. 5). The footless larvae, or grubs, live in the ground, feeding on roots, or on decaying vegetable matter. The adults may be found occasionally on other trees than koa. *Eupelmus rhyncogoni* Perkins (1910-H: 635) (fig. 6) is a parasite of the eggs.

Rhyncogonus vittatus Perkins (1900: 129) Fig. 4

This species is rare on Kauai, the only island on which it is known to occur. A few were collected from koa on one occasion in the Koloa mountains; nothing further is known of its habits.

Pantomorus godmani (Crotch) (1867: 389)

This is an immigrant weevil from America, which has become widely distributed and is injurious to many kinds of cultivated plants. The beetles feed on the foliage of numerous native trees including koa. The eggs are often found in clusters in old koa pods which have been infested by *Argyroploce*

illepida. The white, footless grubs are found in the ground and are often quite abundant in sugar cane fields; the adults sometimes damage young cane leaves by their feeding.

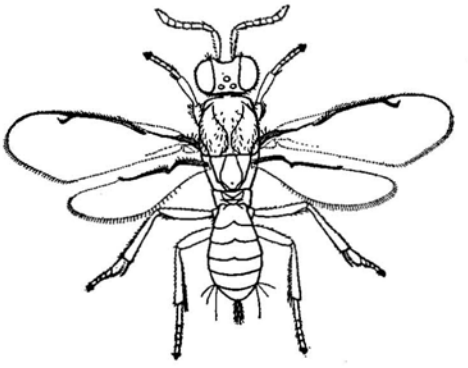

FIGURE 6. **Eupelmus rhyncogoni.**

Dryophthorus gravidus Sharp (1878: 22) - Oahu; Molokai; Maui; Hawaii
Dryophthorus modestus Sharp (1878: 23) - - - Oahu; Maui; Hawaii
Dryophthorus squalidus Sharp (1878: 22) - - - - - - All the islands
Dryophthorus crassus Sharp (1878: 22) - - - - - - - - Oahu; Maui
Dryophthorus pusillus Sharp (1878: 24) - - - - - - - Oahu; Hawaii
Dryophthorus insignis Sharp (1878: 24) - - - - - - - All the islands
Dryophthorus declivis Sharp (1878: 23) - Oahu; Molokai; Maui; Hawaii
Dryophthorus distinguendus Perkins (1900: 140) - - - All the islands
Anotheorus montanus Blackburn (1877: 5) - - - - - - - - - Oahu
Anotheorus ignavus Blackburn (1881: 201) - - - - - - - - - Maui
Oodemas corticis Perkins (1900: 168) - Molokai; Lanai; Maui; Hawaii
Oodemas purpurascens Perkins (1900: 166) - - - - - - - - - Kauai
Oodemas grande Perkins (1900: 167) - - - - - - - - - - - Kauai
Oodemas montanum Perkins (1900: 160) - - - - - - - - - Kauai
Oodemas longirostre Perkins (1900: 155) - - - - - - - - - Kauai

The footless larvae of the eight species of *Dryophthorus* listed above feed in dead wood and rotten logs, and are restricted to the islands noted. They are not attached to koa however, for they also are found in dead wood and in logs of other trees. The *Anotheorus* and *Oodemas* feed in and beneath bark of dead koa and other trees on their particular islands.

Family Anobiidae

Holcobius major Sharp (1881: 521) - - - - - - - - - - - - Maui
Holcobius granulatus Sharp (1881: 520) - - - - - - - Maui; Hawaii
* **Holcobius glabricollis** Sharp (1881: 520) - - - - - - - Oahu; Maui

Dryophthorus squalidus Sharp (1878: 22) - - - - - - All the islands

The grubs of these species are hairy and have thoracic legs. They feed in the wood of dead branches; *H. major* and *granulatus* have been recorded from other trees as well as koa, but *glabricollis* from that tree only, and sometimes very abundantly in dead koa on Sugar Loaf hill back of Honolulu.

Xyletobius marmoratus Sharp (1881 : 517) - Maui; Molokai; Lanai; Oahu

Blackburn collected this species from dead branches of koa on Haleakala, Maui. Probably other species of *Xyletobius* also feed on koa.

Mirosternus spp.

Seventy species of this genus are recorded in the "FAUNA HAWAIIENSIS," but without host records. In the "INTRODUCTION" (p. cxxix) Dr. Perkins writes: "They breed in dead wood, and when the bark is stripped from dead Koa trees, one sometimes finds the remains of thousands of examples beneath this. They chiefly affect the same trees as the species of *Xyletobius,* and in fact are generally taken in company with these . . ."

Family Nitidulidae

Orthostolus guttatus (Sharp) (1881 : 513)

Blackburn collected this beetle in exuding sap of koa on Oahu. It is commonly found under dead bark of koa and other trees on Oahu, Maui and Hawaii. Dr. Perkins states in the "INTRODUCTION" to the "FAUNA HAWAIIENSIS" that several species are attached to koa, but he does not list them.

Family Alleculidae

Pseudocistela kauaiensis (Perkins) (1900 : 248)

This species was abundant in all stages in a rotten koa stump at Kokee, Kauai, June 24, 1932.

Pseudocistela subaenescens (Perkins) (1900 : 249)

A few adults were swept from koa foliage at Halemanu, Kauai, June 22, 1932.

Family Aglycyderidae

* **Proterhinus dubiosus** Perkins (1900 : 187) - - - - - - - - - Kauai
* **Proterhinus oscillans** Sharp (1878 : 18) - - - - - - Oahu; Hawaii
* **Proterhinus vicinus** Perkins (1900 : 212) - - - - - - - - - Oahu
* **Proterhinus laticollis** Blackburn (Blackburn and Sharp, 1885 : 170) Oahu
* **Proterhinus validus** Sharp (1881 : 531) - - - - - - - - - - Maui

These are small beetles with footless larvae which feed in dead koa twigs. Some are restricted to a single island.

Family Ciidae

Cis tabidus Sharp (1879: 93)

Adults of this species have been collected in and beneath rotten bark of koa trees in Manoa Valley, on Mt. Tantalus and at Wailupe and Haleauau, Oahu; at Kokee, Kauai; and at Olinda, Maui. They are believed to feed on microscopic fungi growing in the decaying bark. They occur in a number of other trees besides koa. The following species have been collected from koa:

Cis signatus Sharp (1879: 92) - - - - - - - - - - - - Kokee, Kauai
Cis setarius Sharp (Blackburn and Sharp, 1885: 162) - - Kokee, Kauai
Cis cognatissimus Perkins (1900: 256) - Kauai; Waianae Mountains, Oahu
Cis bicolor Sharp (1879: 93) - - - - - - - Waianae Mountains, Oahu
Cis bimaculatus Sharp (Blackburn and Sharp, 1885: 161) - Olinda, Maui
Cis calidus Sharp (Blackburn and Sharp, 1885: 164) - Waipio ridge, Oahu
Cis roridus Sharp (Blackburn and Sharp, 1885: 165) Pacific Heights, Oahu
Cis insularis Sharp (Blackburn and Sharp, 1885: 164)
- - - - - Haleauau Valley, Oahu
Cis pacificus Sharp (1879: 91)
(ex bracket fungus) - - - Haleauau Valley and Mt. Tantalus, Oahu

Family Scolytidae

Hypothenemus ruficeps Perkins (1900: 181) - - - - - - - - - - Maui
Hypothenemus insularis Perkins (1900: 181) - - - - - - - - - Oahu
Xyleborus pseudoangustatus Schedl (1940: 28) - Oahu; Maui; Hawaii
Xyleborus testaceus (Walker) (1859: 260) - - - - - - - - - - Maui
Xyleborus frigidus Blackburn (Blackburn and Sharp, 1885: 193) - Maui

The above species of *Xyleborus* (ambrosia beetles) have been recorded from koa on the islands indicated. They are not attached to koa but affect other trees as well. The adult females usually attack trees in a particular stage of decay or disease; they bore through the bark into the sap wood and oviposit in the channels so made. The larvae feed on special kinds of fungi growing in the channels. The larvae of *Hypothenemus* feed in and beneath decaying bark.

Family Platypodidae

Platypus (Crossotarsus) externedentatus Fairmaire (1850: 57)

This species attacks koa and other trees much as the species of *Xyleborus* listed above do.

Family Eucnemidae

Dromaeolus pachyderes Sharp (Sharp and Scott, 1908: 398) - - Oahu
Dromaeolus sputator Sharp (Sharp and Scott, 1908: 395) - - - Hawaii

On p. cxxxi of the "INTRODUCTION" to the "FAUNA HAWAIIENSIS" Dr. Perkins states that *Acacia koa* is a favorite tree with the genus *Dromaeolus,* and that a number of species are attached to it. However, the two species named above are the only ones specifically recorded from koa. I found one adult and two larvae of *D. pachydcres* in a rotten koa log in Haleauau Valley, Oahu, on July 4, 1938, and elytra of *D. perkinsi* Sharp (Sharp and Scott, 1908: 386), and of another species, possibly *D. obtusus* (Blackburn) (Blackburn and Sharp, 1885: 152), under bark at Keanakolu, Hawaii, October 4, 1931.

Family Elateridae

Eopenthes konae Blackburn (Blackburn and Sharp, 1885: 154)

Elytra of this beetle were found under koa bark at Keanakolu, Hawaii, October 4, 1931. The larvae of Elateridae are often found in rotten koa logs, and are probably predaceous on other insects.

Eopenthes basalis Sharp (Blackburn and Sharp, 1885: 153)

I reared this beetle from a larva found in a rotten koa trunk, Mt. Tantalus, Oahu, February 12, 1922.

Eopenthes mauiensis Sharp (Sharp and Scott, 1908: 376)

Larvae and a pupa of this species were found in a dead koa stump on the Kula pipe line trail, Maui, February 27, 1935; a single adult emerged (Swezey).

Family Monotomidae

Hesperobaenus capito (Fairmaire) (1850: 54)

This small beetle is occasionally found under dead koa bark.

Family Cucujidae

Parandrita aenea (Sharp) (Blackburn and Sharp, 1885: 143)

Occasionally found under dead bark or beaten from dead koa twigs.

Family Mycetophagidae

Litargus vestitus Sharp (1879: 88)

Sometimes found in old bark or beaten from dead koa twigs.

Family Chrysomelidae

Diachus auratus (Fabricius) (1801: 57)

This small leaf beetle is often collected from koa foliage.

HETEROPTERA

Family Scutelleridae

* **Coleotichus blackburniae** White (1881 : 52)

This large green insect is the most conspicuous of the native bugs, and is widely distributed on all the islands. It occurs sometimes in large colonies, sucking the sap from tender foliage and green pods. It may be said to be attached to koa, but has often been found breeding on *Dodonaea*. The eggs are golden green, nearly globular, about 1.5 mm. in diameter and smooth; they are laid in a compact cluster of about 20 on the surface of leaf, phyllode or pod. The young nymphs feed gregariously.

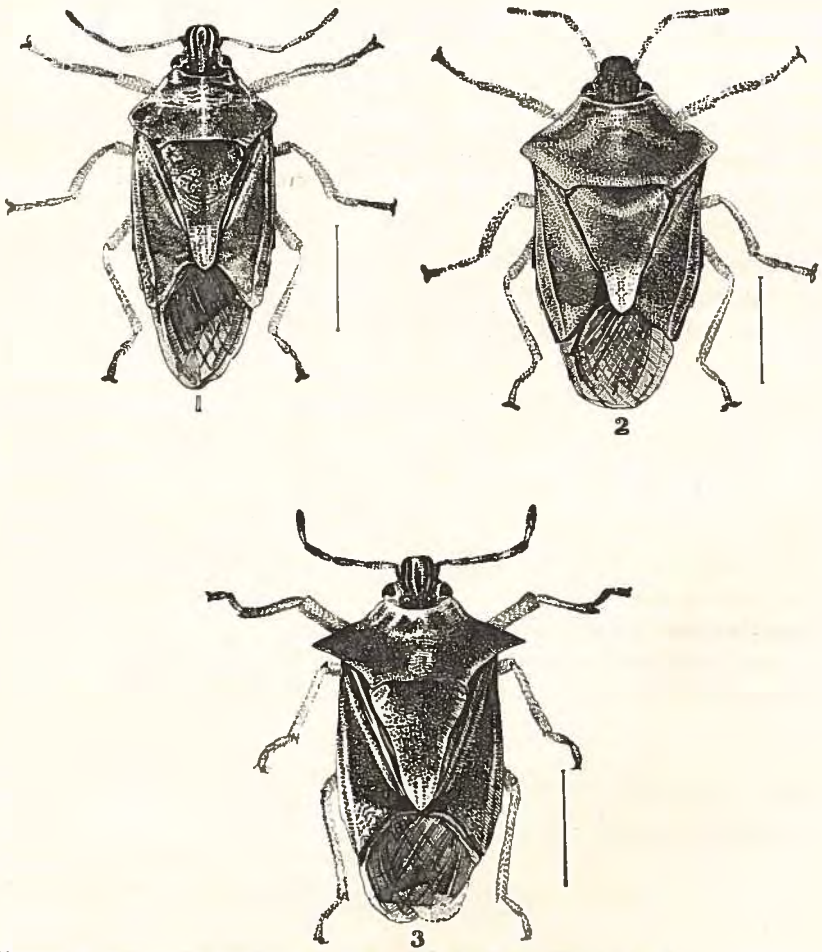

FIGURE 7. Species of **Oechalia. 1, O. grisea; 2. O. pacifica; 3, O. kaonohi.** Predaceous bugs occurring on many trees.

Family Pentatomidae

Oechalia pacifica (Stål) (1859: 221) Fig. 7

This predaceous bug was quite common on koa in the forest along the Kula pipe line trail, Maui, February 27, 1926, preying on caterpillars of the moth *Scotorythra paludicola* (Butler) (1879: 272) which were defoliating the trees over an extensive area. The eggs were found in clusters of from 6 to 10 each on the phyllodes. This bug is not attached to koa, for it occurs on various other trees in the forests of all the islands except Hawaii.

About a dozen other species of *Oechalia* with predaceous habits are known in the Hawaiian Islands, but are not attached to any particular tree.

Family Nabidae

The following species of predaceous bugs have been collected from koa at various times and places, probably attracted there by the presence of leafhoppers, caterpillars and other insects on which they prey:

Nabis tarai (Kirkaldy) (1902: 154) - - - - - - - - - All the islands

This species is most frequently found on *Styphelia tameiameiae.*

Nabis blackburni White (1878: 373) - - - - - - - - All the islands
Nabis lusciosus White (1877: 112) - - - - - - - - - - - - - Oahu
Nabis kerasphoros (Kirkaldy) (1907: 248) - - - - - - - - - - Oahu
Nabis rubritinctus Blackburn (1889: 351) - - - - - - - - - - Maui
Nabis silvestris (Kirkaldy) (1908: 194) - - - - - - - - - - Kauai

Family Lygaeidae

Nysius communis Usinger (1942: 110)
Nysius blackburni White (1881: 53)
Nysius coenosulus Stål (1859: 243)
Nysius nigriscutellatus Usinger (1942: 102)

These bugs have been taken occasionally on koa, but their occurrence there is probably accidental, for they are more numerous on other plants.

Family Miridae

Psallus sharpianus Kirkaldy (1902: 131)

This small red bug was collected from koa foliage at Kokee, Kauai, in 1932, and on Mt. Tantalus, Oahu in March, 1935. It also occurs on *Euphorbia.*

Undetermined sp.

One specimen of a black species swept from koa foliage, Haleauau Valley, Oahu, July 4, 1938.

HOMOPTERA

Family Delphacidae

* **Nesosydne koae** Kirkaldy (1907: 161) - - - - Kauai; Oahu; Hawaii
* **Nesosydne koae-phyllodii** Muir (1916: 186) - - - - - - - - Kauai
* **Nesosydne rubescens** (Kirkaldy) (1907: 161)
- - - - Kauai; Oahu; Maui; Hawaii
* **Nesosydne rubescens pele** (Kirkaldy) (1910: 585) - - Oahu; Hawaii
* **Nesosydne pseudorubescens** Muir (1916: 186) - - - - Maui; Hawaii

These five leafhoppers occur on *A. koa* on their respective islands. *N. koae* feeds on new leaves and the others on the phyllodes. In July, 1934 I reared six specimens of the dryinid, *Pseudogonatopus perkinsi* (Ashmead) (1901: 293) from nymphs of *N. koae* on koa in the Kipuka Puaulu at Kilauea, Hawaii. From cocoons of the same dryinid eight specimens of a hyperparasite, *Hypergonatopus brunneipes* Timberlake (1922: 159), were reared.

Family Flatidae

Siphanta acuta (Walker) (1851: 448)

This green immigrant homopteron is commonly called the "torpedo bug." It feeds on the tender shoots and foliage of many forest plants, including koa. The eggs are laid in a compact circular mass on the leaf surface and are parasitized by the purposely introduced scelionid wasp, *Aphanomerus pusillus* Perkins (1905: 203).

Family Cixiidae

* **Oliarus acaciae** Kirkaldy (1909: 78)

The adults were collected by sweeping koa foliage on both mountain ranges of Oahu. The nymphs were found at the base of a bunch grass, *Eragrostis.*

* **Oliarus koae** Giffard (1925: 130)

This close relative of *Oliarus acaciae* was taken on koa at Halemanu, Kauai, in 1921.

Family Cicadellidae

Nesophrosyne pluvialis Kirkaldy (1910: 568)

This leafhopper, from Olaa, Hawaii, has been taken on koa as well as on a few other trees.

Family Coccidae

Pseudococcus swezeyi Ehrhorn (1916: 237)

This mealybug was described from specimens found between folded leaves of koa on Mt. Tantalus, Oahu. It has also been found in a koa pod, on *Dianella odorata* at Kokee, Kauai, and on ilima (*Sida*) in Waikapu gulch, Maui.

THYSANOPTERA

Several species of thrips have been collected on koa, but none is considered to be attached to it specifically. They have various feeding habits and are of no importance in connection with koa.

Taeniothrips frici (Uzel) (1895: 126)

This species occurs on Maui and Hawaii, and is a flower feeder.

Taeniothrips hawaiiensis (Morgan) (1913: 3)

Widely distributed in the Hawaiian Islands; it is a flower feeder with a wide range of hostplants besides koa.

Thrips tabaci Lindeman (1888: 15)

Widely distributed in Hawaii, it occurs on a great many kinds of plants including fruits, vegetable crops, weeds and woody plants. It is sometimes very injurious. *T. tabaci* feeds on flowers and foliage, but is only incidental on koa.

Thrips (Isoneurothrips) carteri (Moulton) (1937: 411)

A rare species known only on Oahu and Hawaii. On Oahu it was taken in a wind-trap in a pineapple field; on Hawaii it was associated with the rust fungus, *Uromyces koae* Arthur, on new twigs and foliage of koa at Kilauea.

Thrips (Isoneurothrips) williamsi (Moulton) (1928: 115)

This species occurs on Kauai, Oahu and Hawaii. It is a flower feeder on koa and several other forest trees.

Phlaeothrips mauiensis Moulton (1928: 130)

A species which is known from Oahu, Maui and Hawaii; under dead bark of koa and a few other forest trees.

Macrophthalmothrips hawaiiensis Moulton (1928: 122)

Under dead bark of koa and several other forest trees, on Kauai, Oahu, Maui and Hawaii.

Hoplothrips flavitibia Moulton (1928: 117)

Occurs on Oahu, Maui and Hawaii under dead bark and in insect burrows in koa and several other kinds of forest trees.

Hoplothrips mauiensis Moulton (1928: 119)

Occurs under dead koa bark on Oahu and Maui.

Karnyothrips flavipes (Jones) (1912: 18)

A predaceous species collected on Oahu and Hawaii from koa and a number of other trees.

Haplothrips davisi Bianchi (1946: 503)

Collected on leaves and dead branches of koa and several other trees on the Mauna Loa truck trail, 6,500 feet elevation, on Hawaii.

CORRODENTIA

A few species of "bark lice" have been collected on koa bark and foliage;

no doubt more would be added to the list if more attention were given to collecting these interesting insects.

Ectopsocus fullawayi Enderlein (1913 : 356)

Recorded from Oahu on koa and other plants.

Psocus distinguendus Perkins (1899 : 80)

Collected from koa and a few other trees on Molokai, Lanai, Maui and Hawaii.

Psocus oahuensis Perkins (1899 : 81)

On koa and a few other trees in the Waianae Mountains, Oahu.

ISOPTERA

Neotermes connexus Snyder (1922 : 9)

This large termite is found in the forests on all the Hawaiian Islands at elevations between 500 and 6,500 feet. The termite feeds in logs, stumps or dead wood of almost every kind of tree; koa seems especially subject to attack. In some cases it is found feeding in living portions of trees, but it is usually apparent that the attack began in dead wood. Sometimes when koa trees are dying because of the upsetting of natural forest conditions, and unhealthy trees are found to contain termites, the dying condition of the trees has been attributed to these insects. However, it is more than likely that the termites began their infestation in branches already dead or partially so. Observations have shown that healthy koa trees growing under normal forest conditions are not infested with termites. The logical conclusion is that termites are not primarily harmful to the trees; rather, in the economy of nature they help to convert dead wood into material suitable for plant food.

ZORAPTERA

Zorotypus swezeyi Caudell (1922 : 133)

This rare insect was first discovered in rotten logs in the Kokee region of Kauai in 1921. It was collected in rotten koa logs in Haleauau Valley in the Waianae Mountains and on Waipio ridge, Oahu, in 1927. The logs were well rotted and moist, and the delicate white insects were found in the loose material. Their feeding habits were not determined, but they are probably predaceous on smaller insects, or feed on fungi in the wood.

ACACIA KOAIA HILLEBRAND

Family: Leguminosae.

Hawaiian names: koaia; koa oha.

This *Acacia* is but little known, and where it was known previously is now apparently extinct. The only area where *A. koaia* is now growing has

been established as a sanctuary for the preservation of the species, by the Board of Agriculture and Forestry. The sanctuary is located on a cattle ranch at Kawaihae-Uka on the island of Hawaii, a few miles towards Kohala along the road leading from Kamuela.

In 1952 Clifton J. Davis made a study of the insect fauna of koaia trees in this area, and found that the insects are, for the most part, the same as occur on the related *Acacia koa.*

LEPIDOPTERA

Family Pyraustidae

Orthomecyna sp.

Swept from koaia foliage.

Family Tortricidae

Argyroploce illepida (Butler) (1882:42) Fig. 2

The larvae are abundant in green pods, feeding on the seeds, hardly any of which escape injury. Two parasites have been reared: *Pristomerus hawaiiensis* Perkins (1910-H:680), and an unidentified species of *Eupelmus.*

Enarmonia walsinghami (Butler) (1882:43) Fig. 2

Reared from a dead twig.

Amorbia emigratella Busck (1909:201)

The caterpillars feed on the new foliage.

Family Lyonetiidae

Decadarchis minuscula (Walsingham) (1907:716)

A few moths were reared from dead twigs.

COLEOPTERA

Family Cerambycidae

Neoclytarlus nodifer (Sharp) (1900:102)

This beetle was reared abundantly from dead twigs. It was much more numerous on koaia than it ever was on *Acacia koa.*

Plagithmysus sp.

A small, undescribed species quite unlike any of those beetles recorded from koa. Only a few were reared from dead twigs.

Plagithmysus sp.

In a large dead branch were found borings by a species larger than the preceding one, but no specimens were reared or collected.

Family Bostrichidae

Sinoxylon conigerum Gerstaecker (1855:268)

Xylopsocus castanoptera (Fairmaire) (1850:50)

These two beetles were reared from dead branches.

Family Curculionidae

Pantomorus godmani (Crotch) (1867 : 389)

This immigrant feeds commonly on the foliage; its egg clusters are found on the phyllodes.

Family Anthribidae

Araecerus vieillardi (Montrouzier) (1860 : 873)

Reared from dead twigs.

Family Coccinellidae

Cryptolaemus montrouzieri Mulsant (1853 : 268)

This ladybeetle was collected from foliage; it is predaceous on mealybugs.

Family Tenebrionidae

Epitragus diremptus Karsch (1881 : 6)

Collected by beating; it is usually found on the ground, in, or beneath, trash.

HETEROPTERA

Family Scutelleridae

Coleotichus blackburniae White (1881 : 52)

A few of this large green bug were feeding on pods and foliage.

Family Lygaeidae

Nysius nigriscutellatus Usinger (1942 : 102)

Common on foliage.

Family Miridae

Koanoa sp.

Common on foliage.

HOMOPTERA

Family Flatidae

Siphanta acuta (Walker) (1851 : 448)

This Australian immigrant feeds on the foliage.

Family Delphacidae

Nesosydne rubescens (Kirkaldy) (1907 : 161)

This leafhopper was common on the foliage.

Family Coccidae

Icerya purchasi Maskell (1878 : 221)

Pseudococcus citri (Risso) (1813 : 59)

A few of both species were found by Mr. Davis among the pods of koaia.

CORRODENTIA

Caecilius analis Banks (1931 : 437)
Psocus distinguendus Perkins (1899 : 80)
Psocus konae Perkins (1899 : 79)

These psocids were collected by Mr. Davis from twigs and branches.

ALEURITES MOLUCCANA (LINNAEUS) WILLDENOW

Family: Euphorbiaceae.

Hawaiian name: kukui.

The kukui, or candlenut tree, is common on all the islands from low elevations up to 2,000 feet, in gulches and on the slopes of mountain ridges. It is believed to have been brought to Hawaii by the early Polynesian immigrants from the southeast Pacific. Only one native species of insect is attached to it, though a few endemic species have been collected on it.

COLEOPTERA

Family Anobiidae

* **Xyletobius aleuritis** Perkins (1910 : 595)

This is one of the larger species of the genus. It was named by Dr. Perkins from specimens found in dead kukui wood in the Waianae Mountains of Oahu. I once obtained a few beetles from a standing, dead kukui trunk in Makaleha Valley, Waianae Mountains, which was honeycombed with tunnellings. At another time I collected an adult and larvae from a dead spot in a kukui tree at Ukumehame Valley in West Maui. I have also collected this species from beneath bark of *Pipturus* in the Waianaes.

Family Aglycyderidae

Proterhinus robustus Blackburn (Blackburn and Sharp, 1885 : 171) - Oahu
Proterhinus deceptor Perkins (1900 : 245) - - - - - - - - - - Oahu
Proterhinus innotabilis Perkins (1900 : 242) - - - - - - - - - Lanai
Proterhinus vestitus Sharp (1878 : 16) - - - - - - - - - - - Oahu

These species have been collected from dead twigs and branches of kukui; all occur on other trees also.

Family Curculionidae

Oxydema fusiforme Wollaston (1873 : 632)
Dryophthorus squalidus Sharp (1878 : 22)
Dryophthorus distinguendus Perkins (1900 : 140)
Dryophthorus insignis Sharp (1878 : 24)

These weevils have been collected from dead kukui wood. They occur on all the islands and on many kinds of trees.

LEPIDOPTERA

Family Hyponomeutidae

Hyposmocoma trimaculata Walsingham (1907: 598)

This little moth was reared from case-bearing larvae which were numerous feeding on lichens on the bark of kukui trees in the Waianae Mountains, Oahu. A parasite, *Lepideupelmus setiger* (Perkins) (1910-H: 634) was also reared from this material.

DERMAPTERA

Family Labiidae

Labia dubronyi Hebard (1922: 318)

This earwig is found under bark of kukui and other trees in the mountain forests.

HOMOPTERA

Family Coccidae

Chrysomphalus ficus Ashmead (1880: 267)
Phenacaspis sandwicensis (Fullaway) (1932: 103)
Morganella longispina (Morgan) (1889: 352)

These scale insects have been found on leaves of kukui and other trees; *Phenacaspis sandwicensis* is the most common.

THYSANOPTERA

Taeniothrips hawaiiensis (Morgan) (1913: 3)

A flower-feeding thrips which occurs on kukui and is numerous on other trees and plants, mostly in the lowlands.

Hoplothrips flavitibia Moulton (1928: 117)

Under bark of kukui and other trees.

Dichaetothrips setidens (Moulton) (1928: 129)

The largest thrips in Hawaii; under bark and in dead wood of kukui and a few other plants.

ALPHITONIA EXCELSA REISSEK

(now called **Alphitonia ponderosa** Hillebrand)

Family: Rhamnaceae.

Hawaiian name: kauwila or kauila.

This large tree is not much attacked by insects. Practically all recorded from it occur also on other trees, and perhaps none can be said to be attached to it.

COLEOPTERA

Family Carabidae

Specimens of an undetermined carabid were collected under dead bark at Halemanu, Kauai.

Family Cerambycidae

Neoclytarlus longipes (Sharp) (1900: 103)

This was reared abundantly from larvae in dead twigs and branches at Halemanu, Kauai. It has been considered to be attached to *Acacia koa* on Kauai. There is a possibility that the present determination is in error, and that these specimens from *Alphitonia* are an undescribed species.

Family Curculionidae

Oodemas comitans Perkins (1935: 82)

Oodemas leiothorax Perkins (1900: 164)

These two weevils were found in dead twigs at Halemanu, Kauai.

Family Anobiidae

Holcobius frater Perkins (1910: 585)

Collected from dead twigs at Halemanu, Kauai.

Mirosternus testaceus Perkins (1910: 617)

The larvae and pupae were in a kauwila log at Nualolo, Kauai; two adults were reared.

LEPIDOPTERA

Family Hydriomenidae

Eucymatoge monticolans (Butler) (1881: 320)

This highly variable moth was reared from larvae on kauwila foliage at Kumuweia, Kauai. It also occurs on several other native trees and shrubs.

Family Carposinidae

Heterocrossa sp.

An undetermined species of this genus was reared from kauwila seeds at Halemanu, Kauai.

Family Hyponomeutidae

Semnoprepia sp.

A moth was reared from a caterpillar in dead kauwila wood at Kumuweia, Kauai, but was not in good enough condition for specific determination.

HETEROPTERA

Family Miridae

Orthotylus iolani Kirkaldy (1902: 133)

Psallus sharpianus Kirkaldy (1902: 131)

These plant bugs are sometimes common on foliage of *Alphitonia. Psallus sharpianus* was taken at Halemanu, Kauai, the other species at Halemanu and at Kumuweia, Kauai.

HOMOPTERA

Family Delphacidae

Nesothoë dodonaeae (Muir) (1916: 176)
Nesothoë hula Kirkaldy (1908: 204)

These leafhoppers were collected on kauwila at Halemanu, Kauai; they occur mainly on other trees.

ALYXIA OLIVAEFORMIS GAUDICHAUD

Family: Apocynaceae.

Hawaiian name: maile.

The maile is a climbing vine occurring in the forests on all the islands.

COLEOPTERA

Family Aglycyderidae

* **Proterhinus alyxiae** Perkins (1900: 244) - - - - - - - - Molokai
* **Proterhinus angustiformis** Perkins (1900: 197) - - - Kokee, Kauai
* **Proterhinus subdeceptor** Perkins (1910: 664)
- - - - Haelaau ridge, Maui; both mountain ranges, Oahu
* **Proterhinus calliphyas** Perkins (1900: 224) - - - - Haleakala, Maui
Proterhinus sp. near **laticollis** Blackburn (Blackburn and Sharp, 1885: 170)
- - - - Haleauau Valley, Oahu
Proterhinus eulepis Perkins (1900: 188) - - - - - - - Kokee, Kauai

The larvae of these beetles feed in dead stems of *Alyxia; P. eulepis* has other hostplants besides maile.

Family Curculionidae

Orothreptes callithrix Perkins (1900: 147)

Collected from maile vines at Olinda, Maui.

Acalles sp.

Swept from dead twigs of *Alyxia* at Kainalu, Molokai.

Family Anobiidae

Xyletobius sp.

Beaten from dead stems of *Alyxia,* Olinda, Maui.

Family Ciidae

Cis nesiotes Perkins (1900: 256) - - - - - - - - - - Olinda, Maui
Cis signatus Sharp (1879: 92) - - - - - - - - - - Haleauau, Oahu
These fungus-feeding beetles were beaten from dead stems of *Alyxia.*

Family Carabidae

Mecyclothorax ovipennis Sharp (1902: 250)
This predaceous beetle was beaten from maile vines at Olinda, Maui.

HETEROPTERA

Family Lygaeidae

* **Oceanides bimaculatus** Usinger (1942: 37)
Collected from *Alyxia* on Haelāau ridge, Maui, on only one occasion, and never from any other plant.
Glyptonysius hylaeus (Kirkaldy) (1910: 539)
Recorded in "INSECTS OF HAWAII" (vol. 3: 73) from both *Alyxia* and *Dubautia,* Waimea Mountains, Kauai.

Family Nabidae

Nabis silvestris (Kirkaldy) (1908: 194)
A predaceous bug on *Alyxia, Acacia koa* and *Cibotium* in the Waimea Mountains, Kauai.

Family Miridae

Orthotylus kassandra (Kirkaldy) (1902: 135)
On *Alyxia* and many other trees; it occurs on all the islands.

HOMOPTERA

Family Cicadellidae

* **Nesophrosyne signatula** Osborn (1935: 48)
Collected from *Alyxia* on Mt. Kaala, Oahu.

Family Coccidae

Pinnaspis uniloba (Kuwana) (1909: 156)
This scale insect has been found infesting *Alyxia* on Oahu.

DIPTERA

Family Agromyzidae

An agromyzid leafminer was found in *Alyxia* leaves in Haleauau Valley, Oahu, but was not reared.

ANTIDESMA PLATYPHYLLUM MANN

Family: Euphorbiaceae.

Hawaiian name: hame or haa.

This tree occurs on all the islands, particularly in dry forests.

COLEOPTERA

Family Aglycyderidae

Proterhinus dubiosus Perkins (1900: 187)
Proterhinus difficilis Perkins (1900: 188)

These beetles were taken on *Antidesma* at Kokee, Kauai, but are not attached to this plant.

Family Anobiidae

Xyletobius ashmeadi Perkins (1910: 598)
Mirosternus sp.

Both these beetles were collected from *Antidesma* in Haleauau Valley, Oahu, but probably neither is attached to it.

Family Dermestidae

Labrocerus affinis Sharp (1908: 410)

A scavenger, collected from *Antidesma* in Haleauau Valley, Oahu.

Family Alleculidae

Pseudocistela subaenescens (Perkins) (1900: 249)

Collected from *Antidesma,* in Haleauau Valley, Oahu, but probably not attached to it.

LEPIDOPTERA

Family Geometridae

Scotorythra syngonopa Meyrick (1899: 172)

This moth was reared from a caterpillar on *Antidesma* at Kainalu, Molokai. It has also been reared from *Santalum* and *Maba.*

HETEROPTERA

Family Anthocoridae

Lasiochilus denigratus (White) (1879: 146)

A predaceous bug which has been collected from *Antidesma.*

HOMOPTERA

Family Delphacidae

* **Nesothoë pluvialis** Kirkaldy (1908: 204) - - - - - - Halemanu, Kauai
* **Nesothoë antidesmae** (Muir) (1917: 300) - - - - - - Haleauau, Oahu
* **Nesothoë haa** (Muir) (1921: 509) - - - - - - - - - - Olaa, Hawaii

* **Nesothoë dryope** (Kirkaldy) (1910: 597)
- - - - Kauai; Mt. Tantalus, Oahu; Olaa, Hawaii

Nesothoë fletus Kirkaldy (1908: 204) - - - - - - - - Kauai; Lanai

All but *N. fletus,* which occurs also on *Myrsine,* are attached to *Antidesma. Pseudogonatopus perkinsi* (Ashmead) (1901: 293) is a parasite of *N. antidesmae,* and probably of the other species also.

Family Cicadellidae

* **Nesophrosyne (Nesoreias) eburneola** Osborn (1935: 54)

Collected from *Antidesma* at Glenwood, Olaa and Kau, Hawaii.

Nesophrosyne sp.

Collected from *Antidesma* at Kainalu, Molokai.

Family Coccidae

Ceroplastes rubens Maskell (1892: 214)

This scale insect occurs on *Antidesma* and on many other forest plants.

ARGYROXIPHIUM SANDWICENSE DE CANDOLLE

(See **Wilkesia,** pp. 226, 227, for additional species now considered to be **Argyroxiphium**)

Family: Compositae.

Hawaiian name: ahinahina.

The silversword is not a forest plant. Its chief habitat at present is on the slopes of cinder cones in Haleakala crater on Maui, but formerly it also occurred at high elevations on the slopes of Mauna Kea, Mauna Loa and Hualalai, Hawaii. A small, prostrate form has been found on the summits of Mt. Eeke and Puu Kukui, on West Maui. A few insects are attached to silversword.

LEPIDOPTERA

Family Phycitidae

* **Rhynchephestia rhabdotis** Hampson (1930: 52) Fig. 8

Larvae of this moth feed in the flower heads, destroying the seeds. When blossoms are not present the caterpillars feed at the base of the leaves. This insect is known only from the crater of Haleakala, Maui.

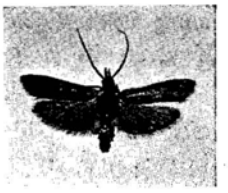

FIGURE 8. **Rhynchephestia rhabdotis.**

Family Phalaenidae

Euxoa epicremna (Meyrick) (1899: 149)

Phalaenid caterpillars were found hidden beneath silversword plants; as there was no other vegetation nearby it is likely that they had fed on the silversword, the lower leaves of which rested in a mass on the ground. Moths of this species were collected from the surface of water in a tank at the Haleakala summit rest house, and it is possible that the caterpillars found hiding beneath the silversword plants were of *E. epicremna.*

COLEOPTERA

Family Cerambycidae

* **Aeschrithmysus terryi** Perkins (1929: 261)

Adults and larvae of this beetle were found in stems of blossoming silversword in Haleakala crater, Maui; nothing more is known concerning it, but it appears to be attached to this plant.

HETEROPTERA

Family Lygaeidae

Nysius terrestris Usinger (1942: 95)
Nysius communis Usinger (1942: 110)

These bugs have been recorded on silversword, but are not attached to it, for they occur on numerous other plants.

HOMOPTERA

Family Delphacidae

* **Nesosydne argyroxiphii** Kirkaldy (1908: 203) - Haleakala, Crater, Maui
* **Nesosydne eeke** (Muir) (1919: 92)
- - - - Puu Kukui and Mt. Eeke, West Maui
* **Nesosydne ahinahina** (Muir) (1919: 98) - - - - Mt. Eeke, West Maui

These leafhoppers, each in its restricted locality, occur on *Argyroxiphium.*

DIPTERA

Family Tephritidae

* **Tephritis cratericola** Grimshaw (1901: 46)

This small fly breeds abundantly in the flower heads of silversword in the Haleakala crater. Its maggots feed on the seeds, usually destroying most of those in a blossom head.

Family Anthomyiidae

Hylemya cilicrura (Rondani) (1866: 165)

A dying plant which had not yet flowered, was found to have thousands

of fly maggots feeding in the decaying stem and leaf bases. The adults reared from this material proved to be *H. cilicrura.*

ARGYROXIPHIUM VIRESCENS HILLEBRAND

Family: Compositae.

Common name: greensword.

This rare plant is known in only two localities: a small gulch near Puu Nianiau, Haleakala, Maui, and the Koolau gap of Haleakala's windward slope.

COLEOPTERA

Family Aglycyderidae

* **Proterhinus fuscicolor** Perkins (1920: 353)

This beetle was found abundantly among the dead leaves at the base of the stalk, in Nianiau gulch, Maui.

HOMOPTERA

Family Delphacidae

* **Nesosydne bridwelli** (Muir) (1919: 90)

Collected from greensword in Nianiau gulch. (See Swezey, 1928: 184.)

MISCELLANEOUS

The following incidental captures were made on greensword in Nianiau gulch, June 15, 1927 (Swezey):

Oodemas mauiense Blackburn (1878: 75)
2 **Lathridius nodifer** Westwood (1839: 155)
2 **Nesosteles** sp.
4 **Nysius communis** Usinger (1942: 110)
Nysius terrestris Usinger (1942: 95)
Ithamar hawaiiensis Kirkaldy (1902: 120)

ASPIDIUM

See **Ferns (Filices),** p. 85

ASPLENIUM

See **Ferns (Filices),** p. 85

ASTELIA VERATROIDES GAUDICHAUD

Family: Liliaceae.

Hawaiian name: painiu.

A plant with very long leaves, growing on tree trunks or on the ground on all the islands from 2,000 to 6,000 feet elevation. A number of insects are attached to it, and even more are associated with it in one way or another. Some of the printed records are from *Astelia menziesiana* Smith, commonly considered a variety of *veratroides*.

LEPIDOPTERA

Family Pyraustidae

* **Omiodes scotaea** (Hampson) (1912: 442) - Both mountain ranges, Oahu

* **Omiodes hemiombra** (Hampson) (1912: 442)
- - - - Nauhi gulch and Kilauea, Hawaii

* **Omiodes iridias** Meyrick (1899: 203) - - - - - - - Kilauea, Hawaii

The caterpillars of these three species feed on *Astelia* leaves.

Family Tortricidae

* **Panaphelix asteliana** Swezey (1932: 202) Fig. 9

The caterpillars of this moth were found feeding on *Astelia* foliage on Mt. Kaala, Oahu.

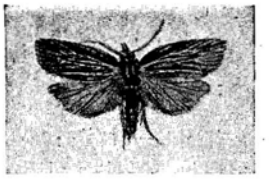

FIGURE 9. **Panaphelix asteliana.**

COLEOPTERA

Family Curculionidae

* **Heteramphus wollastoni** Sharp (Blackburn and Sharp, 1885: 188)
- - - - Palolo and Mt. Olympus, Oahu

* **Heteramphus foveatus** Sharp (Blackburn and Sharp, 1885: 188)
- - - - Palolo and Mt. Olympus, Oahu

* **Heteramphus cylindricus** Sharp (Blackburn and Sharp, 1885: 188)
- - - - Mt. Kaala, Kahana and Mt. Olympus, Oahu

The larvae of these weevils are to be found at the base of the leaves, and boring in the stems of *Astelia*.

Family Aglycyderidae

* **Proterhinus asteliae** Perkins (1920: 351) - - - - - Mt. Kaala, Oahu
The larvae are leafminers at the base of the leaves of *Astelia.*

Family Carabidae

Atelothrus fractistriatus Perkins (1917: 247) - - - Mt. Olympus, Oahu
Metromenus mutabilis (Blackburn) (1877: 148)
- - - - Palolo and Mt. Olympus, Oahu
Metromenus caliginosus (Blackburn) (1877: 148)
- - - - Palikea and Mt. Kaala, Oahu

These predaceous beetles are commonly found at the base of *Astelia* leaves.

HETEROPTERA

Family Lygaeidae

* **Neseis (Trachynysius) whitei brachypterus** Usinger (1942: 56)
This bug seems to be attached to *Astelia.* It was collected from this plant on only one occasion, at Nauhi gulch, Hawaii.

HOMOPTERA

Family Delphacidae

* **Nesosydne asteliae** Muir (1917: 307) - - - - - - - Mt. Kaala, Oahu
* **Nesosydne nesopele** (Muir) (1921: 511) - - - - - Haleakala, Maui
* **Nesosydne painiu** (Muir) (1919: 102) - South ridge of Iao Valley, Maui
These leafhoppers are definitely attached to this hostplant.

Family Cixiidae

Oliarus opuna Kirkaldy (1902: 122)
Collected from *Astelia* at Kilauea, Hawaii.

Family Coccidae

Pseudococcus montanus Ehrhorn (1916: 242) - - Palolo Valley, Oahu
Pseudococcus pseudonipae (Cockerell) (1897: 302) - - Kilauea, Hawaii
Although these mealybugs have been found on *Astelia,* they cannot be said to be attached to it.

DERMAPTERA

Family Labiidae

Labia dubronyi Hebard (1922: 318)
This predaceous earwig is often found hunting its prey in the axils of the leaves.

* **Nesosydne painiu** (Muir) (1919: 102) - South ridge of Iao Valley, Maui

ODONATA

Family Coenagriidae

Megalagrion amaurodytum amaurodytum (Perkins) (1899: 66)

\- - - - - 2,000 ft., Molokai

Megalagrion amaurodytum waianaeanum (Perkins) (1899: 67)

\- - - - - Waianae Mts., Oahu

Megalagrion koelense (Blackburn) (1884: 417)

\- - - - - Maui; Oahu; Lanai; Hawaii

The nymphs of these damselflies live in the moist habitat provided at the base of *Astelia* leaves.

THYSANOPTERA

Taeniothrips hawaiiensis (Morgan) (1913: 3)

This flower-infesting thrips is generally distributed in the Hawaiian Islands and has been recorded from a wide variety of plants, including *Astelia menziesiana.*

Thrips (Isoneurothrips) antennatus (Moulton) (1928: 112)

Sometimes found in abundance in the blossoms of several forest plants, including *Astelia menziesiana.*

BIDENS (CAMPYLOTHECA) spp.

Family: Compositae.

Hawaiian name: kokolau.

The genus *Bidens* in Hawaii comprised a dozen species, as treated by Hillebrand in his "FLORA OF THE HAWAIIAN ISLANDS", under the name *Campylotheca;* since then more have been described. They are shrubs for the most part, with yellow, composite flower heads. Most of the earlier records are without specific plant identification. Probably most of the insects listed here are indiscriminate as to the species of *Bidens* they attack; a few may be attached to the plants of this genus.

LEPIDOPTERA

Family Phycitidae

* **Homoeosoma bidensana** Swezey (1933: 299)

The larvae of this moth live in the stems of *Bidens cosmoides* Sherff in the Kokee region of Kauai. The infested stems become swollen and gall-like; pupation takes place within this swelling.

including *Astelia menziesiana*

Family Pyraustidae

* **Phlyctaenia campylotheca** Swezey (1946: 625)

This is a leafroller occurring on *Bidens* on Oahu and Kauai; it probably attacks more than one species.

COLEOPTERA

Family Curculionidae

* **Rhyncogonus saltus** Perkins (1924: 379) Fig. 4

This beetle confined to Kolekole Pass and Hapapa in the Waianae Mountains of Oahu, feeds heavily on the leaves of *Bidens waianensis* Sherff. The eggs are laid between two overlapping leaves; the larvae feed on roots in the ground.

Oodemas comitans Perkins (1935: 82)

Common in dead stems of *Bidens cosmoides* at Kumuweia, Kauai.

Family Aglycyderidae

* **Proterhinus miricornis** Perkins (1927: 487)

Collected in considerable numbers in dead stems of *Bidens cosmoides* in the Kokee region on Kauai.

Proterhinus sp. near **leiorhynchus** Perkins (1900: 200)

Collected from *Bidens* sp. on Puu Kalena, Oahu.

HETEROPTERA

Family Lygaeidae

Nysius communis Usinger (1942: 110)
Nysius mixtus Usinger (1942: 110)
Nysius fucatus Usinger (1942: 90)

These bugs were collected from *Bidens* sp. on Milolii ridge, Kauai. They occur on other plants also.

Family Nabidae

Nabis blackburni White (1878: 373)

This predaceous bug was collected on *Bidens* sp., and occurs on other plants as well.

Family Miridae

Koanoa hawaiiensis Kirkaldy (1902: 136)

This small black species was taken on *Bidens cosmoides*; it occurs on other plants also.

HOMOPTERA

Family Delphacidae

* **Aloha campylothecae** Muir (1916: 183) - - - - - - - - - Oahu
* **Nesothoë seminigrofrons** (Muir) (1922: 94) - - - - - - - - Kauai
* **Nesosydne campylothecae** (Muir) (1922: 97) - - - - - - - - Kauai
* **Nesosydne kokolau** (Muir) (1919: 95) - - - - - - - - - - Maui
Nesosydne mauiensis (Muir) (1919: 99) - - - - - - - - - - Maui
Aloha swezeyi Muir (1916: 180) - - - - - - Kauai; Oahu; Hawaii

The first four named above are attached to *Bidens*; the other two are found on other plants also.

Family Cicadellidae

* **Nesophrosyne halemanu** Kirkaldy (1910: 559)

This leafhopper has been found commonly on *Bidens cosmoides* at Kumuweia and Nualolo, Kauai.

DIPTERA

Family Tephritidae

* **Tephritis crassipes** (Thomson) (1868: 583)

The larvae of this species, found on Oahu, feed in flower heads of various species of *Bidens,* especially the weed, *B. pilosa,* destroying the seeds. *Bracon terryi* (Bridwell) (1919: 169) is parasitic on this fly, and *Eurytoma* sp. is a hyperparasite.

* **Phaeogramma vittipennis** Grimshaw (1901: 48)

This species was reared from a maggot boring in a stem of *Bidens* sp. in Iao Valley, Maui. What may have been the same fly was found as issued puparia in stems of *Bidens cosmoides* at Kokee, Kauai.

Undetermined sp.

An unidentified tephritid, possibly a new species, was reared from heads of *Bidens cosmoides* at Kokee.

BOBEA ELATIOR GAUDICHAUD

BOBEA MANNII HILLEBRAND

Family: Rubiaceae.

Hawaiian names: ahakea and (B. mannii) akupa.

Few insects are primarily attached to *Bobea,* but many which occur on other plants have been taken on it. In the following list the records from Oahu and Hawaii are from *Bobea elatior,* those from Kauai, from *B. mannii.*

LEPIDOPTERA

Family Sphingidae

Hawaiina wilsoni (Rothschild) (1894: 83) Fig. 10

Bobea is one of the hostplants of this endemic hawk moth on Hawaii.

Family Carposinidae

Heterocrossa sp.

Reared from terminal buds of *B. mannii,* at Kumuweia, Kauai.

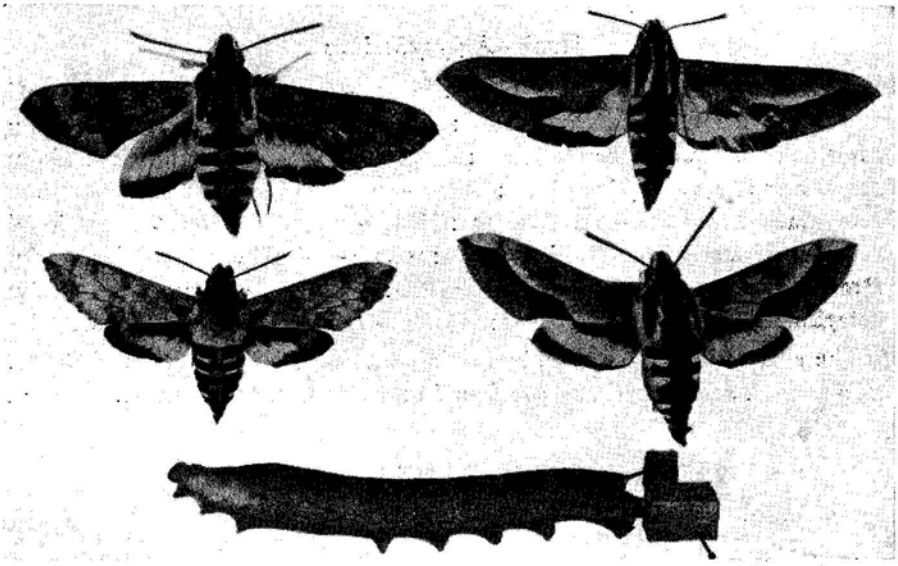

FIGURE 10. Species of **Hawaiina,** Hawaiian hawk moths. Upper row (left to right): **wilsoni; calida hawaiensis.** Middle row: **perkinsi, calida.** Bottom row: larva of *Hawaiina* sp.

COLEOPTERA

Family Cerambycidae

* **Callithmysus microgaster** (Sharp) (1879: 103)

This Oahu species was reared in numbers from dying *Bobea* trees in the Waikane Valley and at Pupukea. The larvae feed in the bark and cambium layer, and pupate in burrows in the wood.

* **Plagithmysus vitticollis longulus** Sharp (1896: 240)
- - - - - Puna and Kilauea, Hawaii

* **Plagithmysus permundus** Sharp (1900: 105) - - - - - - - - - Kauai

Family Anobiidae

Xyletobius sp.

Adults were obtained from dead twigs by beating at Kumuweia, Kauai.

Family Scolytidae

Xyleborus testaceus (Walker) (1859:260) - - - - - - Waikane, Oahu
Xyleborus confusus Eichhoff (1867:401) - - - - - - Waimano, Oahu
Xyleborus truncatus Sharp (Blackburn and Sharp, 1885:192)
- - - - - Waikane, Oahu

These three bark beetles were reared from *Bobea*; they occur on other trees also.

Family Aglycyderidae

Proterhinus eugonias Perkins (1900:186) - - - - - - Kokee, Kauai
Proterhinus blackburni Sharp (1876:17) - - - - - - - Kauai; Oahu
Proterhinus obscurus Sharp (1878:18) - - - - - Mt. Tantalus, Oahu
Proterhinus adelus Perkins (1900:202) - - - - - - - Poamoho, Oahu
Proterhinus deceptor Perkins (1900:245) - - - - - Iao Valley, Maui
Proterhinus excrucians Perkins (1910:662) - - Many localities, Oahu
* **Proterhinus squamicollis** Perkins (1900:201) - Koolau range, Oahu
Proterhinus vestitus Sharp (1878:16) - - - - - - - - Manoa, Oahu

These have all been collected by beating dead twigs and branches of *Bobea*. Except for *P. squamicollis*, all are found on several other trees also.

HETEROPTERA

Family Miridae

Orthotylus sp.

An undetermined species taken on *Bobea* at Nualolo, Kauai.

HOMOPTERA

Family Delphacidae

* **Nesothoë bobeae** Kirkaldy (1908:204) - - - - Mt. Tantalus, Oahu

Family Cicadellidae

* **Nesophrosyne bobeae** Kirkaldy (1910:564)

Common on *Bobea* in several localities of the Koolau range, Oahu, including Mt. Tantalus.

* **Nesophrosyne** spp.

Two or three undetermined species were collected abundantly on *Bobea* at several places in the Kokee region, Kauai.

BOEHMERIA GRANDIS (HOOKER AND ARNOTT) HELLER
(formerly called **Boehmeria stipularis** Weddell)

Family: Urticaceae.

This is a shrub with only three insect species attached to it.

LEPIDOPTERA

Family Nymphalidae

Vanessa tameamea Eschscholtz (1821 : 207) Figs. 26-28

The caterpillars of the Kamehameha butterfly occasionally feed on *Boehmeria,* but their favorite hostplant is *Pipturus,* a related tree.

Family Lyonetiidae

* **Bedellia boehmeriella** Swezey (1912 : 185)

A minute species which mines leaves of *Boehmeria*; it has been noted at Palolo, Kahana and Mt. Kaala, all on Oahu.

HETEROPTERA

Family Lygaeidae

* **Neseis (Trachynysius) oahuensis** Usinger (1942 : 57)

Collected on *Boehmeria* on the Manoa-Palolo ridge, on Mt. Olympus, at Waiahole and in Makaleha Valley, Oahu.

HOMOPTERA

Family Delphacidae

* **Nesosydne boehmeriae** (Muir) (1921 : 514)

A leafhopper attached to *Boehmeria,* Makaleha, Oahu.

Nesosydne sharpi Muir (1916 : 195)

This species, from Mt. Olympus and Punaluu, Oahu, occurs on many plants, among them sometimes *Boehmeria.*

Family Coccidae

Pseudococcus citri (Risso) (1831 : 59)

Boehmeria is one of the many hostplants of this mealybug.

HYMENOPTERA

Family Prosopididae

Nesoprosopis anomala Perkins (1899 : 112)

This bee frequently nests in burrows in dead *Boehmeria* twigs.

BROUSSAISIA ARGUTA GAUDICHAUD

Family: Saxifragaceae.

Hawaiian names: puahanui; kanawau.

A large shrub or small tree with a numerous insect fauna.

COLEOPTERA

Family Aglycyderidae

* **Proterhinus abnormis** Perkins (1920: 352) Fig. 11
- - - - - Mt. Kaala and Puu Kalena, Oahu

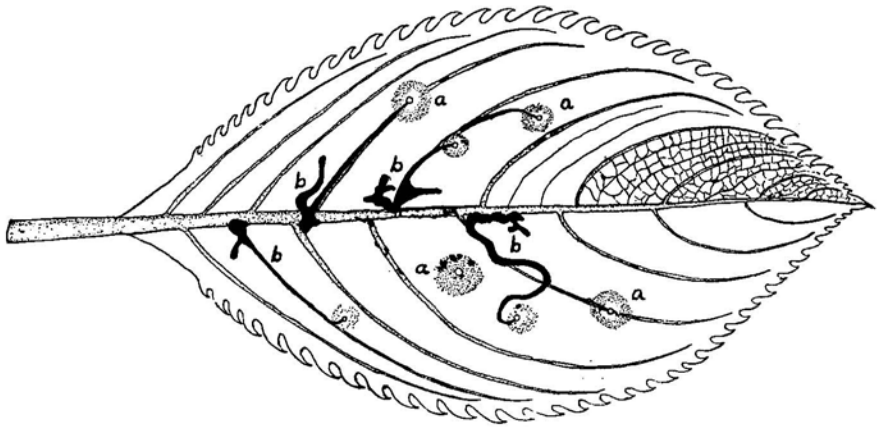

FIGURE 11. *Broussaisia* leaf with mines of **Proterhinus abnormis.**

* **Proterhinus phyllobius** Perkins (1920: 352)
- - - - - Numerous places in the Koolau range, Oahu

These two species are leafminers.

* **Proterhinus swezeyi** Perkins (1920: 347) Fig. 12
- - - - - Both mountain ranges, Oahu

* **Proterhinus cristatus** Perkins (1931: 510) - - - - - Mt. Kaala, Oahu

* **Proterhinus deinops** Perkins (1900: 201)
- - - - - Mt. Kaala and Haleauau Valley, Oahu

* **Proterhinus kahanae** Perkins (1931: 509) - Summit trail, Kahana, Oahu

All of these species are attached to *Broussaisia* on Oahu. The specimen from which *P. swezeyi* was described was from a *Pritchardia* palm on the Olympus-Konahuanui trail. This individual must have been a straggler, for afterwards it was collected abundantly in many localities from *Broussaisia,* and never again from *Pritchardia.* The adult beetles are found in the pith of dead terminal twigs. The larvae have been found in living *Broussaisia* twigs,

and that may well be its usual habitat. A few other species which are occasionally taken on *Broussaisia* are also found on other plants.

Family Curculionidae

* **Oodemas aenescens kahanae** Perkins (1935:75) - - - Kahana, Oahu
Oodemas robustum Blackburn (1878:75) - - - - - Waianae Mts., Oahu
Oodemas angustum Blackburn (1878:75) - - - - - Waianae Mts., Oahu
Oodemas aenescens Boheman (1859:138) - - Many localities on Oahu

The last three species are found in several plants as well as *Broussaisia*. *Oodemas* larvae live in dead twigs, especially in those having a high proportion of pith.

* **Rhyncogonus koebelei** Perkins (1900:126) Fig. 4

This beetle was found along the Palolo-Olympus trail, Oahu, feeding on

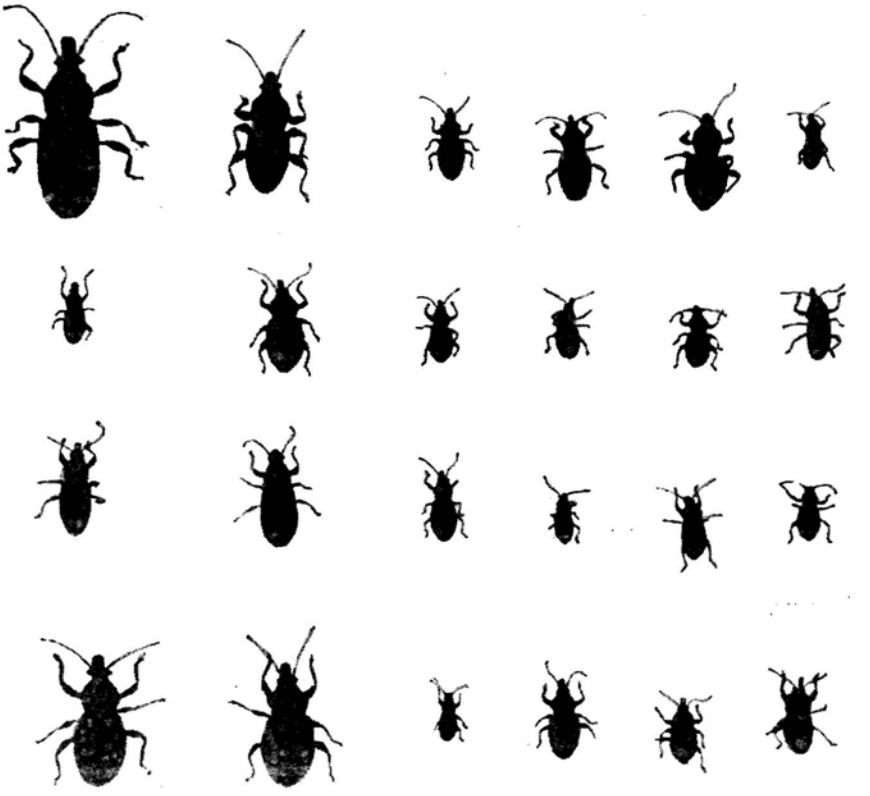

FIGURE 12. Species of **Proterhinus,** a Hawaiian genus of nearly 150 species. These few species illustrate the range in size from **maurus,** at the left end of the top row, to **angustiformis,** third from the left in the bottom row. Two of the most attractive species are **swezeyi** and **gigas,** at the left end of the bottom row. All are slightly larger than natural size.

Broussaisia leaves at the ends of the growing stems. The larvae feed on roots in the ground.

Family Alleculidae

Pseudocistela subaenescens Perkins (1900: 249)

Waianae Mts., Oahu. Taken on *Broussaisia,* but found on other plants as well.

Family Cerambycidae

Nesithmysus bridwelli Perkins (1920: 343) Fig. 25

One specimen of this beetle was collected on *Broussaisia* on Mt. Kaala, Oahu; it must have been a straggler, for *Pelea* is its usual hostplant.

Callithmysus sp.

There is a doubtful record of this insect on *Broussaisia* from Mt. Kaala, Oahu.

LEPIDOPTERA

Family Carposinidae

Heterocrossa crinifera Walsingham (1907: 657)

The adult has been reared abundantly from fruit clusters of *Broussaisia* from Mt. Kaala. It is also reared in numbers from *Kadua* fruits.

HETEROPTERA

Family Lygaeidae

Oceanides nimbatus (Kirkaldy) (1910: 543)

This bug has been collected at many localities on Oahu, on *Broussaisia* and many other plants.

Family Miridae

Orthotylus kekele Kirkaldy (1902: 134)

This species has been recorded from Kauai on *Broussaisia* and also on *Pipturus.*

HOMOPTERA

Family Delphacidae

Nesosydne montis-tantalus Muir (1916: 195)

On *Broussaisia* and *Lobelia hypoleuca* Hillebrand, Mt. Tantalus and Kaumuohona, Oahu.

Family Cixiidae

Oliarus kaonohi Kirkaldy (1909: 77)

Occurs widely on Oahu, sometimes on *Broussaisia* but usually on ferns.

The adult has been reared abundantly from fruit clusters of *Broussaisia*

Family Cicadellidae

Nesophrosyne pluvialis Kirkaldy (1910: 568) - - - - Olaa, Hawaii
Nesophrosyne cuprescens Osborn (1935: 26)
- - - - Palolo and Mt. Olympus, Oahu

These treehoppers have been collected on *Broussaisia,* but occur on other trees as well.

* **Nesophrosyne** sp.

This insect, a new and undescribed species, was abundant on *Broussaisia* and apparently restricted to that hostplant, in the Kohala Mountains, at Nauhi gulch, at Kilauea and at Napau, all on Hawaii.

ISOPTERA

Neotermes connexus Snyder (1922: 9)

This termite has been recorded from *Broussaisia,* as well as from many other trees.

THYSANOPTERA

Thrips (Isoneurothrips) antennatus (Moulton) (1928: 112)
- - - - Oahu; Molokai; Maui; Hawaii
Thrips (Isoneurothrips) fullawayi (Moulton) (1928: 112) - Kauai; Oahu

The above-named species occur in the blossoms of many plants, including *Broussaisia.*

* **Conocephalothrips tricolor** Bianchi (1946: 500)

Found on leaves of *Broussaisia* on Mt. Kaala, Oahu. Later F. A. Bianchi found this species abundant in litter on Mt. Kaala.

BYRONIA SANDWICENSIS
See **Ilex anomala,** p. 109

CAMPYLOTHECA
See **Bidens,** p. 34

CANTHIUM
See **Plectronia,** p. 171

CAREX
See **Sedges,** p. 193

CEODES
See **Pisonia,** p. 167

CHAETOCHLOA
See **Grasses,** p. 98

CHARPENTIERA OBOVATA GAUDICHAUD
CHARPENTIERA OVATA GAUDICHAUD

Family: Amaranthaceae.

Hawaiian name: papala.

There are two species of this small tree. Although it is not always certain from which species an insect should be recorded, in most cases it is probably *obovata.*

LEPIDOPTERA

Family Hyponomeutidae

* **Mapsidius auspicata** Walsingham (1907 : 650)

- Mohihi, Kauai; Kilauea, Hawaii; Mt. Tantalus and Haleauau, Oahu

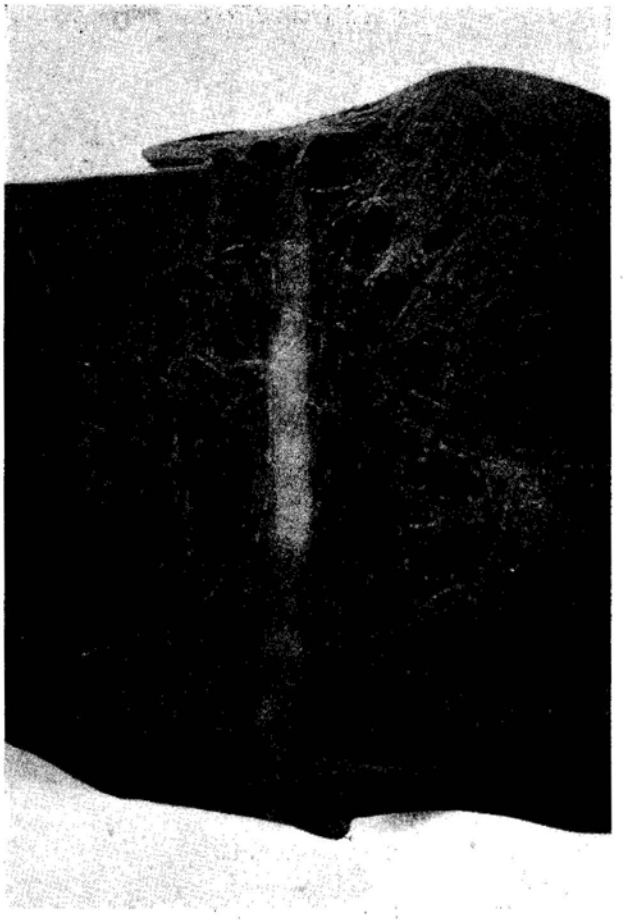

FIGURE 13. Cocoon of **Mapsidius quadridentata** on under surface of leaf of *Charpentiera ovata.*

* **Mapsidius quadridentata** (Walsingham) (1907:651) Fig. 13
- - - - Iao Valley, Maui

* **Mapsidius iridescens** Walsingham (1907:651) - - Kumuweia, Kauai

* **Mapsidius charpentierii** Swezey (1932:201) Fig. 14
- - - - Haleauau and Mohiakea, Oahu

The caterpillars of these moths feed within webs on the new apical foliage; later, when the leaves have fully expanded they are sometimes very ragged from the work of these larvae. The white, densely spun cocoons are made on the leaves.

FIGURE 14. **Mapsidius charpentierii.**

COLEOPTERA

Family Cerambycidae

* **Neoclytarlus immundus** (Sharp) (1910:646)

This beetle was reared from *Charpentiera* at Kona, Hawaii.

Family Aglycyderidae

Proterhinus vestitus Sharp (1878:16)

This beetle has been collected on Oahu from *Charpentiera* and several other Hawaiian forest trees.

HOMOPTERA

Family Delphacidae

* **Nesosydne oahuensis** Muir (1916:188)
- - - - Mt. Kaala and Mt. Tantalus, Oahu

This species is attached to *Charpentiera.*

Nesosydne cyrtandricola Muir (1918:407) - Olaa and Glenwood, Hawaii

Nesosydne umbratica Kirkaldy (1910:585) - - - Oahu; Maui; Hawaii

Nesosydne blackburni Muir (1916:169) - - - - South Kona, Hawaii

These three leafhoppers were taken on *Charpentiera* and occur on other plants also.

Family Coccidae

Pseudococcus straussiae Ehrhorn (1916:237)

This mealybug has been recorded from *Charpentiera,* but its preferred host-plant is *Straussia.*

DERMAPTERA

Labia dubronyi Hebard (1922: 318)

This earwig has been collected from rotten trunks of *Charpentiera* and other trees.

DIPTERA

Family Tachinidae

Achaetoneura archippivora (Williston) (1889: 1923)

Reared from *Mapsidius iridescens* Walsingham, on *Charpentiera* foliage at Kumuweia, Kauai.

Family Tipulidae

Limonia (Libnotes) perkinsi (Grimshaw) (1901: 6)

This cranefly was reared from an old rotted *Charpentiera* trunk on Oahu.

CHEIRODENDRON PLATYPHYLLUM (HOOKER AND ARNOTT) SEEMANN

CHEIRODENDRON GAUDICHAUDII (DE CANDOLLE) SEEMANN

Family: Araliaceae.

Hawaiian names: lapalapa; olapa.

Only a few insects are known to be attached to the species of *Cheirodendron.*

COLEOPTERA

Family Curculionidae

* **Nesotocus kauaiensis** Perkins (1900: 151) - - - - - - - - - Kauai
* **Nesotocus giffardi** Perkins (1910: 654) Fig. 15 - - - - - - - - Oahu
* **Nesotocus newelli** Perkins (1900: 151) - - - - - - - - - - Maui
* **Nesotocus munroi** Perkins (1900: 150) - - - - - - - - - Hawaii

These large weevils with long proboscis and long legs are striking insects when seen on the bark of their host trees. The four species are similar, but differ slightly on their respective islands. The plump, legless larvae feed in decaying bark of dying or fallen trees, and are sometimes very numerous. When they have completed their growth they bore into the wood to form cells for pupation, as shown in Fig. 15. Standing dead trees are sometimes found stripped of bark, and showing hundreds of exit holes from which the adults have emerged (Fig. 16). My first observations on their habits were made on a fallen *Cheirodendron gaudichaudii* tree at a landslide on the mountain trail beyond Pauoa Flats, Oahu. Numerous larvae were feeding in the

bark. On a later visit to this tree, pupae were found in cells in the wood, and from them adults were reared.

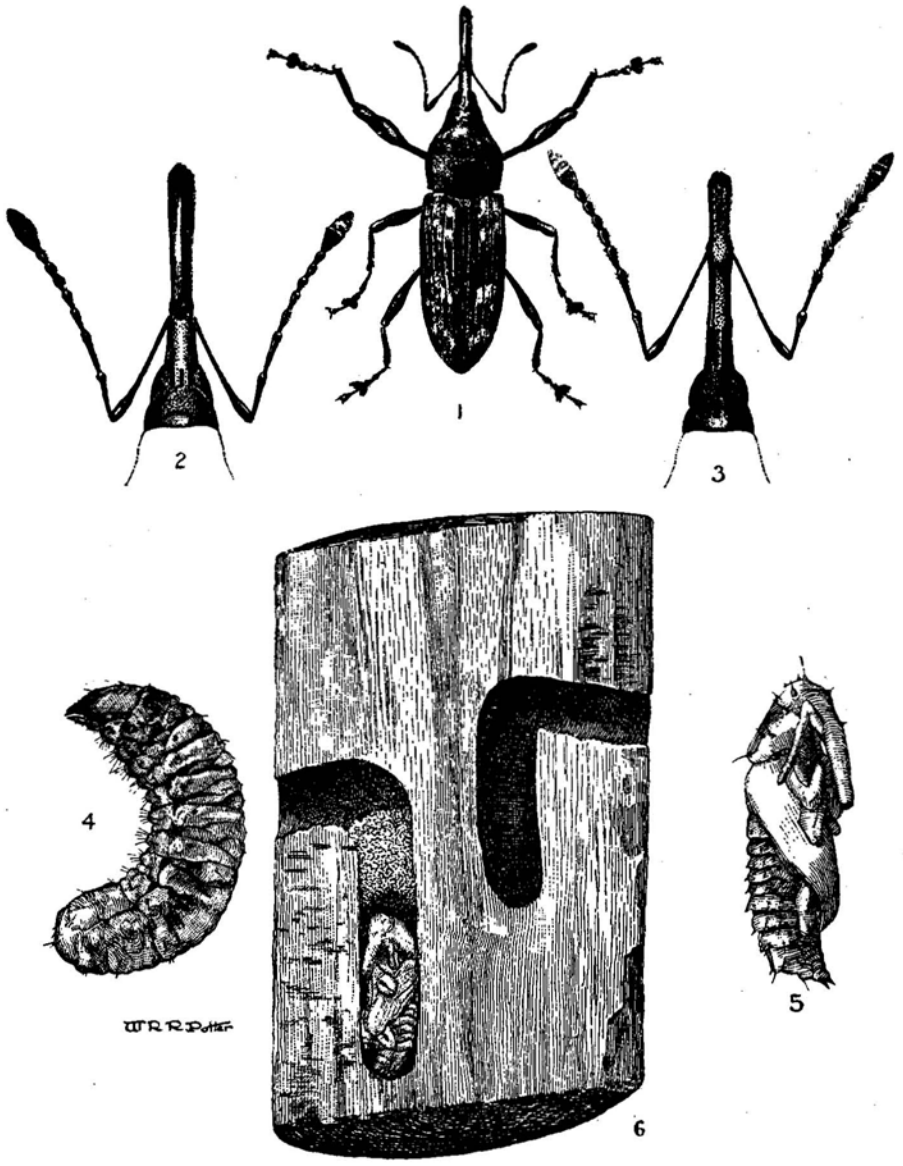

FIGURE 15. **Nesotocus giffardi, 1,** adult; **2,** head and antennae of female; **3,** head and antennae of male; **4,** larva; **5,** pupa; **6,** section of *Cheirodendron* branch showing pupal cells and pupa *in situ.* (From Bridwell, 1920.)

In another instance, a dying tree from which the adult weevils were issuing in numbers, was seen along the upper Hamakua ditch trail in the Kohala Mountains, Hawaii. The beetles could be collected from the bark if one were quick enough to capture them before they took flight.

FIGURE 16. Section of *Cheirodendron* tree showing exit holes of **Nesotocus giffardi.**

Dryophthorus crassus Sharp (1878: 23)
Dryophthorus modestus Sharp (1878: 23)
Dryophthorus insignis Sharp (1878: 24)

These species have been collected from dead stems of *Cheirodendron* on Oahu; they occur also on other trees.

Oodemas borrei Blackburn (?) (1878: 75)

Family Anobiidae

Xyletobius proteus Perkins (?) (1910: 590)
Xyletobius lineatus Sharp (?) (Blackburn and Sharp, 1885: 159)

Both these were collected from twigs along the Kula pipe line, Maui.

Family Aglycyderidae

Proterhinus gigas Perkins (1900: 185) Fig. 12

This species was collected by Dr. Perkins under *Cheirodendron* bark in the Kauai mountains.

Proterhinus epichrysus Perkins (1900: 218)

In dead twigs, along the Kula pipe line, Maui.

Family Scolytidae

* **Xyleborus kauaiensis** Perkins (1900: 174)

This ambrosia beetle is apparently attached to *Cheirodendron,* for it has not been recorded on any other tree. Although described from Kauai, it has been collected at Kilauea and in the Kohala Mountains of Hawaii, and at Olinda, Maui. The adult females bore through the bark to oviposit in the wood; there the larvae feed on fungi or on the ooze from fermentation.

LEPIDOPTERA

Family Tortricidae

* **Spheterista pleonectes** (Walsingham) (1907: 705) - - - - Hawaii
* **Spheterista asaphopis** Meyrick (1928: 96) - - - - - - - - - Oahu
* **Spheterista castaneana** (Walsingham) (1907: 705) - - - - - Kauai

The green larvae of these moths feed between webbed leaves of *Cheirodendron,* and appear to be attached to this tree. The species are variable, and the three could be considered a single species. Caterpillars (perhaps one of the above-named species) were found on *Cheirodendron* on Maui, but none was reared. Instead, these parasites emerged: *Horogenes blackburni* (Cameron) (1886: 192) and *Pristomerus hawaiiensis* Perkins (1910-H: 680).

Family Hyponomeutidae

* **Euperissus ferrugineus** (Swezey) (1915: 94)

This moth was reared from elongate, whitish larvae boring in dead twigs and branches of *Cheirodendron* on Mt. Kaala, Oahu.

HETEROPTERA

Family Miridae

Nesiomiris hawaiiensis Kirkaldy (1902: 145)

An elongate, dark green plant bug with long antennae, which occurs on the foliage of *Cheirodendron* and other related trees on Hawaii, Maui and Kauai.

Koanoa hawaiiensis Kirkaldy (1902: 136)

A small black bug collected on *Cheirodendron* and other trees, at Nauhi gulch, Hawaii.

HOMOPTERA

Family Delphacidae

Aloha swezeyi Muir (1916: 180)

Recorded by Giffard from *Cheirodendron gaudichaudii* at Puuwaawaa, Hawaii. It also occurs on several other plants.

CORRODENTIA

Kilauella psylloides (Perkins) (1899: 85)

Collected at Nauhi gulch, Hawaii.

CHENOPODIUM OAHUENSE (MEYEN) AELLEN

Family: Chenopodiaceae.

Hawaiian name: aweoweo.

A shrub which is found abundantly in the region about Pohakuloa, at the western base of Mauna Kea, Hawaii, and occasionally on the Waianae Mountains, Oahu.

LEPIDOPTERA

Family Phalaenidae

Agrotis coniotis Hampson (1903: 426)

* **Feltia lookii** Swezey (1947: 103)

These moths were reared from *Chenopodium* leaves at Pohakuloa, Hawaii. The tachinid parasites, *Achaetoneura archippivora* (Williston) (1889: 1923) and *Chaetogaedia monticola* (Bigot) (1888: 90) were reared from *coniotis* larvae and pupae respectively.

Family Hyponomeutidae

* **Mapsidius chenopodii** Swezey (1947: 101)

Caterpillars of this species were abundant on *Chenopodium* foliage at Pohakuloa.

COLEOPTERA

Family Cerambycidae

* **Neoclytarlus chenopodii** Perkins (1938: 59)

This beetle was reared abundantly from *Chenopodium* in a dying condition at Palikea in the Waianae Mountains, Oahu. Its abundance was indicated by 130 exit-holes in a 2-foot piece of stem. Parasites reared were *Ischiogonus palliatus* (Cameron) (1881: 560) and *Rhaconotus vagrans* (Bridwell) (1920: 390).

* **Neoclytarlus lookii** Swezey (1947: 101)

A species closely related to *N. chenopodii,* and like it, very abundant, was found breeding in *Chenopodium* stems at Pohakuloa, Hawaii. These parasites were reared from it: *Eupelmus leptophyas* Perkins (1910-H: 642), *Eupelmus* sp., *Sierola* sp. and *Scleroderma* sp.

HETEROPTERA

Family Lygaeidae

Nysius nigriscutellatus Usinger (1942: 403)

Exceedingly abundant on *Chenopodium* at Pohakuloa, Hawaii. It occurs on many other plants.

HOMOPTERA

Family Delphacidae

* **Nesosydne chenopodii** Zimmerman (1952: 433)

Reared from *Chenopodium oahuense* at Pohakuloa, Hawaii.

CIBOTIUM CHAMISSOI KAULFUSS

CIBOTIUM MENZIESII HOOKER

Family: Dicksoniaceae.

Hawaiian name: hapu.

In the records of insects from tree ferns, it has not always been certain which species of *Cibotium* was involved; it is probable that the insects listed below attack either kind indiscriminately.

COLEOPTERA

Family Curculionidae

All of the following weevils live in dry, dead stems of fern fronds.

* **Heteramphus filicum** Perkins (1900: 152)

In the past this species was only occasionally collected on Mt. Tantalus, Oahu. It is probably now extinct.

Oxydema longulum (Boheman) (1859: 149)

This insect occurs in dead stems of several plants, including tree fern, on Oahu, Maui and Hawaii.

* **Stenotrupis prolixum** (Sharp) (1878: 25)

A species definitely attached to tree ferns, and common on all the islands.

* **Dryophthorus pusillus** Sharp (1878: 24)

The smallest species of the genus. It is attached to tree fern and is found on Oahu and Hawaii.

Oodemas aenescens kahanae Perkins (1935: 75)

This variety was abundant at Kahana and Puu Kaaumakua, Oahu.

* **Oodemas purpureum** Zimmerman (1939: 329)

Collected on Puu Kaaumakua, Oahu.

* **Oodemas swezeyi** Perkins (1935: 84)

Collected from *C. chamissoi* in the Alakai swamp, Kauai; the only record.

Family Aglycyderidae

* **Proterhinus longulus** Sharp (1879: 97) - - - - - - - - - - Oahu
* **Proterhinus ferrugineus** Perkins (1900: 241) - - - - - - - Hawaii
* **Proterhinus epitretus** Perkins (1900: 229) - - - - - - - - - Lanai
* **Proterhinus sharpi** Perkins (1900: 213) - - - - - - - - - - Maui
* **Proterhinus setulosus** Perkins (1900: 192) - - - - - - - - - Kauai
* **Proterhinus blackburni hystrix** Sharp (1881: 527) - - - - - Maui

These species live in the dry, dead frond stems of *Cibotium,* each on its respective island.

Family Carabidae

Many species of adult carabid beetles can be found hiding, or in search of prey, in split or broken dead frond stems of *Cibotium.* Their larvae presumably live in, or under, trash on the ground. The following have been found as adults in broken fronds, and additional species may be expected in such habitat:

Colpocaccus hawaiiensis Sharp (1903: 214) - - - - - Kilauea, Hawaii
Colpocaccus tantalus Blackburn (1877: 147) - - Haleauau Valley, Oahu
Derobroscus micans Sharp (1903: 197) - Puu Kalena, Waianae Mts., Oahu
Derobroscus politus Sharp (1903: 198) - - - - Puu Kaaumakua, Oahu
Mysticomenus tibialis Sharp (1903: 212) - - - - - Puu Kalena, Oahu
Atelothrus erro (Blackburn) (1877: 121) - - - - - Waikamoi, Maui
Atelothrus fractistriatus Perkins (1917: 247) - - - Waipio ridge, Oahu
Mesothriscus near **vagans** Sharp (1903: 222) - - - - Waikamoi, Maui
Metromenus mutabilis (Blackburn) (1877: 148)
- - - - Marsh trail and Puu Kaaumakua, Oahu

* **Proterhinus sharpi** Perkins (1900: 213)

Metromenus caliginosus (Blackburn) (1877 : 148)
- - - - - Mt. Kaala and Puu Kalena, Oahu
Metromenus epicurus (Blackburn) (1877 : 145) - - - Marsh trail, Oahu
Metromenus perpolitus Sharp (1903 : 241) - - - - - Marsh trail, Oahu
Mecyclothorax ovipennis Sharp (1903 : 250) - - - Kula pipe line, Maui
Mecyclothorax konanus Sharp (1903 : 248) - - - Nauhi gulch, Hawaii
Thriscothorax modestus Sharp (1903 : 259) - - - Kula pipe line, Maui
Thriscothorax subconstrictus Sharp (1903 : 259) - Kula pipe line, Maui
Thriscothorax variipes Sharp (1903 : 265) - - - Nauhi gulch, Hawaii
Thriscothorax near **bembidioides** (Blackburn) (1879 : 107)
- - - - - Nauhi gulch, Hawaii
Metrothorax deverilli (Blackburn) (1879 : 107) - - Nauhi gulch, Hawaii
Metrothorax perkinsianus Sharp (1903 : 270) - - - - - - Olinda, Maui

Family Nitidulidae

Nesapterus monticola (Sharp) (1878 : 130)

This beetle, and probably some other unidentified species, have been found in dead frond stems on Oahu, along the Marsh trail and on Mt. Kaala.

LEPIDOPTERA

Family Hyponomeutidae

* **Hyposmocoma filicivora** Meyrick (1935 : 108)

This little moth was reared from flat larval cases in dead frond stems of *Cibotium chamissoi* from Konohuanui, Oahu.

HOMOPTERA

Family Delphacidae

Nesorestias filicicola Kirkaldy (?) (1908 : 205)

This rare species occurs on other ferns, and although recorded from *Cibotium,* there is some question as to its identity.

Family Cicadellidae

* **Balclutha kilaueae** (Kirkaldy) (1910 : 575)

Collected from *C. chamissoi* at Kilauea, Hawaii. Described as "bright yellow," but its natural color is green.

Nesophrosyne sp. near **marginalis** Osborn (1935 : 51)

This insect was collected commonly at Kilauea, Hawaii in 1934 on *C. chamissoi.* It so closely resembles *N. marginalis,* and is so variable, that it might be considered to be that species, which also was collected on *Cibotium* at Kilauea.

Family Cixiidae

* **Oliarus kaonohi** Kirkaldy (1909:77) - - Both mountain ranges, Oahu
* **Oliarus haleakalae** Kirkaldy (1909:78) - - - - - - Haleakala, Maui
* **Oliarus halehaku** Giffard (1925:94) - - - - - - - - Nahiku, Maui
* **Oliarus filicicola** Kirkaldy (1909:77) - Kohala Mts., and Kilauea, Hawaii

The nymphs of these four species have been found in dead frond stems of tree ferns under conditions so moist as to approach decay. They may have been feeding on fermenting plant juices, or on fungi present under such conditions. The nymphs produce fluffy, white, waxy fibers which surround them where they feed; sometimes they have been found with rotting tree fern trunks on the ground.

CLADIUM

See **Sedges**, p. 193

CLAOXYLON SANDWICENSE MUELLER OF ARGAU

Family: Euphorbiaceae.

Hawaiian name: pooloa.

A small tree or shrub found on most of the islands, but usually not common. Only a few insects have been collected from *Claoxylon*. None is attached to this plant, and probably most of the records are only incidental.

COLEOPTERA

Family Dermestidae

Argocerus similaris Sharp (1908:411)

Collected from *Claoxylon* at Nualolo, Kauai.

Family Anthribidae

Araecerus fasciculatus (Degeer) (1775:276)

On *Claoxylon* at Nualolo, Kauai.

HETEROPTERA

Family Lygaeidae

Neseis (Trachnysius) saundersianus (Kirkaldy) (1902:163)

Recorded from *Claoxylon,* without locality. The species occurs on Oahu, Molokai, Lanai, Maui and Hawaii.

Family Miridae

Sulamita opuna Kirkaldy (1902:131) - - - - - - Mt. Kaala, Oahu
Sulamita lunalilo Kirkaldy (1902:130) - - - - - - Nualolo, Kauai
Sarona sp. - - - - - - - - - - - - - - - - Nualolo, Kauai

These bugs occur in *Claoxylon* as well as on other trees. The two last-named species were common at Nualolo. The *Sarona* is an undescribed species.

mon. Only a few insects have been collected from *Claoxylon*. None is attached

HOMOPTERA

Family Cicadellidae

Nesophrosyne sp.

A few specimens were taken from *Claoxylon* at Nualolo, Kauai.

CLERMONTIA

See **Lobelioideae, p. 114**

COCOS NUCIFERA LINNAEUS

Family: Palmae.

Hawaiian name: niu.

The coconut is not a forest tree. It grows naturally near the sea, but has been extensively planted at considerable distances from the shore. It is one of the plants thought to have been brought to Hawaii by the early Polynesian immigrants. Therefore any insects occurring on coconut also could be expected to be immigrants, and with one possible exception this is true.

LEPIDOPTERA

Family Pyraustidae

* **Omiodes blackburni** (Butler) (1887: 48) Fig. 22

The coconut leafroller was described from a single specimen collected in 1877 by the Rev. Thomas Blackburn. It was next mentioned in literature in 1888, when two specimens, also collected by Blackburn, were recorded. Neither of these records had any information as to dates or localities of capture. In Hillebrand's "FLORA OF THE HAWAIIAN ISLANDS," published in 1888, it is stated that the Hawaiian Islands form the northern boundary of the coconut tree's range in the Pacific, and that the tree was thriving in vigorous groves at Lahaina, Maui and on southern Hawaii. Then Dr. Hillebrand remarks: "For a number of years, however, its leaves have been subject to the attacks of a moth which deposits its eggs in the fold of the leaf-segments. Before the caterpillars have entered the pupa state the young leaves are literally reduced to shreds which gives to the trees a sad appearance and creates in the occasional visitor the impression that they live under unsuitable climatic conditions." This reference is certainly to *Omiodes blackburni,* which has been a coconut pest here ever since. It would seem that it may have been a recent immigrant at the time it was first noticed in Hillebrand's "FLORA." There is no record of specimens having been preserved at the time of Hillebrand's observations, which were considerably earlier than Blackburn's first capture of this moth. The Rev. Thomas Blackburn lived in the

Islands from 1876 to 1882; Dr. Hillebrand left Honolulu in 1871 to return to Germany after twenty years' residence on Oahu. Evidence contrary to the belief that *O. blackburni* is an immigrant insect here consists principally of the fact that the species is known only in the Hawaiian Islands, even though a great deal of information is available concerning the insects associated with the coconut tree throughout its range in the Pacific basin.

The first collections of *O. blackburni* specimens of any consequence were made by R. C. L. Perkins while collecting material for the "FAUNA HAWAIIENSIS"; the section on Macrolepidoptera was published in the "FAUNA" in 1899. Perkins collected the moth at Olaa, Hawaii; Lahaina, Maui; Honolulu, Oahu; Lanai; and on Kauai at Makaweli and in the Waimea Mountains. He remarked that it was a coconut pest, and also attacked banana. I also have reared it from banana, particularly from native bananas in Iao Valley, Maui, in 1908, as well as from that plant at Nahiku, Maui; from Kohala and on windward Hawaii, from Kukuihaele to Hilo. The fact that it attacks banana suggests that this was its original hostplant, and that it had already shifted to coconut by the time it was first observed by Dr. Hillebrand. It is likewise significant that five other closely related species of *Omiodes* also feed on native banana, but not on any other plant. A corresponding situation exists with respect to five species of grass-feeding *Omiodes,* one of which has become a pest of sugar cane.

There remains to be considered another possibility as to the original hostplant of *O. blackburni.* There are many species of endemic palms in Hawaii belonging to the genus *Pritchardia.* Whenever any of these are planted in the lowlands they are readily attacked there by *O. blackburni,* which suggests that *Pritchardia* may have been its original hostplant. In trying to solve this problem I have never succeeded in rearing any *blackburni* moths from caterpillars found on *Pritchardia* trees growing in their natural habitat. Several times I have found caterpillars on *Pritchardia* leaves in the forest, but they were different from larvae of *blackburni.* In most cases I failed to rear them, but in one instance moths were reared which were distinctly different from the coconut leafroller.

From all these considerations it seems sufficiently evident that *O. blackburni* is an endemic species, whatever its original hostplant. For at least 50 years after Hillebrand's time, *blackburni* was very destructive to coconut palms. Then from time to time parasites were introduced or arrived unassisted, so that in more recent years there has been less evidence of injury by *blackburni* caterpillars, and in some regions the trees are in nearly perfect leaf. A list of the parasites attacking *Omiodes blackburni* follows:

Trichogramma minutum Riley (1871:157) - - - - - - - - - - Egg-parasite
Bracon omiodivorum (Terry) (1907:37) - - - - - - - Parasite on caterpillar
Zaleptopygus flavo-orbitalis (Cameron) (1907:589) - - - Parasite on caterpillar
Achaetoneura archippivora (Williston) (1889; 1923) - - - - - Larval parasite

Horogenes blackburni (Cameron) (1886:241) - - - - - - - - Larval parasite
Echthromorpha fuscator (Fabricius) (1793:163) - - - - - - - Parasite of pupa
Coccygomimus punicipes (Cresson) (1873:398) - - - - - - - Parasite of pupa
Brachymeria obscurata (Smith) (1874:399) - - - - - - - - Parasite of pupa

Family Lyonetiidae

Erechthias flavistriata (Walsingham) (1907:716)

This moth was reared from a caterpillar in the husk of an old dried coconut on the ground, in Manoa Valley, Honolulu.

Family Coleophoridae

Agonoxena argaula Meyrick (1921:472)

This small moth was first seen here on coconut leaves in the Kahala section of Honolulu in June, 1948. It was soon found to be widely spread in the city and within two years had spread to the windward coast of Oahu. It is an immigrant from Samoa or Fiji, where it feeds on coconut and some native forest palms. Parasites were known to occur, and one was promptly introduced from Samoa, which has become established here and has spread as widely as its host. It is *Brachymeria agonoxenae* Fullaway (1950:63) which oviposits and develops in the pupa of its host, within a white cocoon on the surface of a coconut leaflet. The slender *Agonoxena* caterpillar feeds beneath a slight web on the underside of the leaflet; it eats the lower epidermis and green parenchyma, leaving the upper epidermis as a narrow, dry, dead patch. As the larva grows it moves about, producing several of these dead spots in the course of its life, so that there may be hundreds of narrow dead areas on each leaf of badly infested trees. In appearance these spots differ distinctly from the work of the coconut leafroller, so the presence of either *Agonoxema* or *O. blackburni* can be distinguished readily.

COLEOPTERA

Family Curculionidae

Rhabdoscelus obscurus (Boisduval) (1835:448)

This is the sugar cane weevil borer which occurs throughout Oceania, Australia and Papua. Occasionally it is found boring in the basal portion of the leaf petiole of coconut. It has been known in the Hawaiian Islands for nearly a century, and was probably introduced with sugar cane from Tahiti in 1854. It is not particularly injurious to coconut palms.

* **Diocalandra taitensis** (Guerin) (1844:171)

The Tahitian coconut weevil is an immigrant first found in the Islands at Honaunau, Kona, Hawaii, in 1919. The beetles are found in the cut ends of the petioles of young trees. The larvae feed in the leaf petioles whether attached to the tree or cut off; their presence is indicated by a conspicuous gummy exudation from small holes near the petiole margins, near the base.

Later in 1919, the weevil was found in coconut trees at Kailua, Kawaihae and Honuapu, Hawaii, and in 1921 at Punaluu, Hawaii, beneath the bracts at the base of the coconuts, their larvae feeding on the husk of the nuts. This indicates the probability that this insect was introduced in coconuts brought to Hawaii from the south Pacific. In 1922 the insect was found at Lahaina, Maui. The first record on Oahu was from Kuliouou in 1922. In 1923 it was reported from Kinau Street, Honolulu, in 1930 from Judd Street, and shortly afterward was found to be widespread throughout the city. It does no appreciable damage either to the trees or to the nuts, but it is possible that some small nuts drop from the tree as a result of its attack.

HOMOPTERA

Family Coccidae

All the coccids associated with the coconut palm are immigrants to Hawaii.

Pseudococcus palmarum (Ehrhorn) (1916: 245)

This mealybug, although described from Hawaii, is believed to be an immigrant. It occurs on several other palms besides coconut. It is not especially injurious except to very young trees, on which it sometimes occurs in masses in the crown. On older trees, small infestations occur on leaflets webbed together by the coconut leafroller, or where leaflets remain in close contact. *Anagyrus nigricornis* Timberlake (1919: 197) is a parasite, and larvae of the drosophilid fly, *Gitona perspicax* (Knab) (1914: 166), are predators on this mealybug.

Chrysomphalus ficus Ashmead (1880: 267)

This scale is usually more or less conspicuous on coconut leaves, but it is not particularly injurious.

Pinnaspis buxi (Bouché) (1851: 111)

This insect has produced some destructive infestations on coconut palms, notably at Hilo, Hawaii, and in Hanalei Valley, Kauai. A small ladybird beetle, *Telsimia nitida* Chapin (1926: 131) was introduced from Guam in 1936, and soon became established here. It increased sufficiently to reduce the outbreaks, and the palms recovered.

The following coccids have been recorded by Zimmerman ("INSECTS OF HAWAII," vol. 5, 1948) as attacking coconut in addition to other hostplants, but they are not serious pests, or occur only rarely:

Pinnaspis strachani (Cooley) (1899: 54)
Coccus acutissimus (Green) (1896: 10)
Coccus elongatus (Signoret) (1873: 404)
Eucalymnatus tessellatus (Signoret) (1873: 401)
Aonidiella inornata McKenzie (1938: 10)
Ischnaspis longirostris (Signoret) (1882: xxxv)
Diaspis boisduvalii Signoret (1869: 432)
Lepidosaphes beckii (Newman) (1869: 217)
Phenacaspis sandwicensis (Fullaway) (1932: 103)

DIPTERA

Family Otitidae

* **Scholastes bimaculatus** Hendel (1914: 252)

This fly, an immigrant, was first observed in Honolulu in 1904. It came from the south Pacific, being known in Samoa and Fiji. The larvae live in decaying, fallen nuts, feeding on the rancid meat of opened nuts, especially of those cut for drinking. The young maggots are whitish, but later become bluish when full-fed. At Niu beach in 1943, a large watersoaked coconut was found to have hundreds of maggots feeding in the soaked (but not decaying) husk; from this one nut 1,380 adult flies issued.

COPROSMA spp.

Family: Rubiaceae.

Hawaiian name: pilo.

There are about a dozen species of *Coprosma* in the Hawaiian Islands, but most of the insect records from these trees are not specific as to hostplant.

LEPIDOPTERA

Family Sphingidae

Hawaiina calida (Butler) (1881: 317) Fig. 10

This hawkmoth was reared from *Coprosma* at Kawela, Molokai; its larvae occur on various other trees also.

Family Hyponomeutidae

* **Euperissus coprosmae** (Swezey) (1920: 382)

The caterpillars of this moth are slender and whitish. At Malamalama, Oahu, they were found rather commonly boring in living wood of *Coprosma longifolia* Gray.

Euperissus sp.

Undetermined larvae of this genus were found in rotten *Coprosma* wood at Olinda, Maui.

Hyposmocoma chilonella Walsingham (1907: 637)

This moth was reared at Kainalu, Molokai, from an elongate white caterpillar boring in dead wood of *Coprosma foliosa* Gray. It occurs in other dead trees also.

Family Gelechiidae

Aristotelia sp.

An undetermined leafminer was found on *Coprosma* at Kainalu, Molokai.

This hawkmoth was reared from *Coprosma* at Kawela, Molokai; its lar-

COLEOPTERA

Family Cerambycidae

Parandra puncticeps Sharp (1878: 202) Fig. 4

A larva, probably of this species, was found in rotten *Coprosma* wood at Olinda, Maui; it occurs under similar conditions in many other trees.

Family Carabidae

Thriscothorax subconstrictus Sharp (1903: 259)

Thriscothorax unctus (Blackburn) (1881: 227)

Both these predaceous beetles were found in rotten wood at Olinda, Maui.

Family Curculionidae

Dryophthorus declivis Sharp (1878: 23)

Dryophthorus modestus Sharp (1878: 23)

Dryophthorus insignis Sharp (1878: 24)

Oodemas sp.

These four weevils were found at Kainalu, Molokai, in dead wood of *C. foliosa.*

Oodemas angustum Blackburn (1878: 75)

Collected from dead *Coprosma* stem on Mt. Kaala, Oahu.

Family Anobiidae

Xyletobius proteus Perkins (1910: 590)

An adult beetle was collected from dead *Coprosma* wood at Kamiloloa, Molokai.

Family Aglycyderidae

* **Proterhinus coprosmicola** Perkins (1928: 195)
- - - - Pacific Heights, Honolulu, Oahu

* **Proterhinus podagricus coprosmae** Perkins (1928: 194)
- - - - Mt. Kaala, Oahu

* **Proterhinus kamptarthrus** Perkins (1900: 199)
- - - - Haleauau and Mt. Kaala, Oahu

Proterhinus vicinus Perkins (1900: 212) - - - Kukuiala Valley, Oahu

Proterhinus adelus Perkins (1900: 202) - - - Moanalua Valley, Oahu

Proterhinus angustiformis Perkins (1900: 197) Fig. 12 - - Kokee, Kauai

Proterhinus convexiusculus Perkins (1900: 232) - Kamiloloa, Molokai

Proterhinus vulcanus Perkins (1900: 236) - - - Nauhi gulch, Hawaii

These beetles were beaten from dead twigs of *Coprosma* (*P. angustiformis* from *Coprosma waimeae* Wawra). The species listed without an asterisk occur on other trees also.

Family Ciidae

Cis porcatus Sharp (1879: 92) - - - - - - - - Nauhi gulch, Hawaii
Cis cognatissimus Perkins (1900: 256) - - - - - Nauhi gulch, Hawaii
Cis sp. - Kainalu, Molokai

These tiny beetles are in rotten wood and in, or under, dead bark.

HETEROPTERA

Family Pentatomidae

Oechalia patruelis (Stål) (1859: 220) - - - - - - - - - - - - Oahu
Oechalia bryani Usinger (1941: 81) - - - - - - Nauhi gulch, Hawaii

These predaceous bugs sometimes occur on *Coprosma*. The eggs of *patruelis* were found on the leaves.

Family Lygaeidae

Oceanides fosbergi Usinger (1942: 31) - - - - - - - - - - - Lanai
Oceanides nimbatus (Kirkaldy) (1910: 543) - - - - - - - - - - Oahu
Neseis (Trachynysius) fasciatus fasciatus Usinger (1942: 80)
- - - - - Kilauea, Hawaii
Neseis (Trachynysius) fasciatus hyalinus Usinger (1942: 81)
- - - - - North Kona, Hawaii
Neseis (Trachynysius) fulgidus Usinger (1942: 59) - - Punaluu, Oahu
Neseis (Trachynysius) mauiensis mauiensis (Blackburn) (1888: 345)
- - - - - Haleakala, Maui
Neseis (Trachynysius) saundersianus (Kirkaldy) (1902: 163) All the islands
Nysius communis Usinger (1942: 110) - - - - - - - - All the islands
Nysius delectus White (1878: 367) - - - - - - - - - All the islands
Sephora criniger (White) (1881: 57) - - - - Molokai; Lanai; Maui
Pachybrachius nigriceps (Dallas) (1852: 577) - - - - All the islands

These plant bugs have been collected on *Coprosma* and many other plants, in many localities.

Family Nabidae

Nabis koelensis Blackburn (1888: 352) - - - - Koele, Lanai; Molokai
Nabis rubritinctus Blackburn (1888: 351) - - - - - - - - - - Maui

Both these predaceous bugs were collected on *Coprosma*.

Family Anthocoridae

Lasiochilus denigratus (White) (1879: 146) - - - - - All the islands

A predaceous species sometimes found on *Coprosma*.

Family Miridae

Hyalopeplus pellucidus (Stål) (1859: 255) - - - - - All the islands
Orthotylus azalais Kirkaldy (1902: 136) - - - - - Makaweli, Kauai

Orthotylus perkinsi Kirkaldy (1902: 133) - - - Nauhi gulch, Hawaii
These plant bugs occur on several trees, including *Coprosma.*

HOMOPTERA

Family Delphacidae

* **Nesosydne wailupensis** (Muir) (1916: 181) - - - - Wailupe, Oahu
* **Nesosydne coprosmicola** (Muir) (1919: 103)
- - - - Kau, Kilauea and Olaa, Hawaii
* **Nesosydne pilo** (Muir) (1922: 99) - - - - - - - - Haleakala, Maui
Taken on *Coprosma ernodeoides.*
* **Nesosydne neowailupensis** (Muir) (1916: 191) - - - Wailupe, Oahu
* **Nesosydne monticola** Kirkaldy (1910: 591) - - - - Haleakala, Maui
Collected on *Coprosma montana* Hillebrand.
All the *Nesosydne* listed here are attached to *Coprosma.*

Family Cicadellidae

* **Nesophrosyne angulifera** Osborn (1935: 22) - Molokai; Olinda, Maui
* **Nesophrosyne haleakala** Kirkaldy (1910: 567) - - - Haleakala, Maui
* **Nesophrosyne cinerea** Osborn (1935: 35) - - - - - - - Olinda, Maui
* **Nesophrosyne obliqua** (Osborn) (1935: 23) - - - - - Lanai; Maui
Nesophrosyne pluvialis Kirkaldy (1910: 568) - - - - - Olaa, Hawaii
Nesophrosyne myrsines Kirkaldy (1910: 568) - - - - Kilauea, Hawaii
There are undetermined species of *Nesophrosyne* in addition to those listed, which occur on *Coprosma.* Species without asterisk are found on other plants as well.

Family Cercopidae

Philaenus spumarius (Linnaeus) (1758: 437)
This immigrant spittle insect has been found on *Coprosma ernodeoides* Gray and *C. rhynchocarpa* Gray in the Hawaii National Park, Hawaii, as well as on a large number of other plants.

ISOPTERA

Neotermes connexus Snyder (1922: 9)
This forest termite occurs in dead *Coprosma* wood, as well as in that of almost every other forest tree.

THYSANOPTERA

Hoplothrips coprosmae Moulton (1936: 186)
Taken at Nauhi gulch, Hawaii; it occurs also on *Dodonaea.*
Karnyothrips flavipes (Jones) (1912: 18)
A predaceous thrips found on *Coprosma* and many other trees on the island of Hawaii.

HYMENOPTERA

Family Encyrtidae

Hypergonatopus vulcanus Timberlake (1922: 152)

This tiny wasp was reared from *Pseudogonatopus perkinsi* (Ashmead) (1901: 293), which, in turn, was parasitic on nymphs of the leafhopper *Nesosydne coprosmicola* (Muir) on *C. ernodeoides,* near Kilauea, Hawaii.

CRYPTOCARYA MANNII HILLEBRAND

Family: Lauraceae.

Hawaiian name: holio.

This is a rare tree found in the Kokee region of Kauai. A variety, *oahuensis* (Degener) Fosberg, occurs at Hapapa in the Waianae Mountains on Oahu.

COLEOPTERA

Family Cerambycidae

* **Plagithmysus polystictus** Perkins (1933: 266)

The only known specimen, a male, was collected from the trunk of *Cryptocarya* at Kumuweia, Kauai.

Family Aglycyderidae

Proterhinus eugonias Perkins (1900: 186)

Proterhinus dubiosus Perkins (1900: 187)

The capture of these beetles on *Cryptocarya* was probably accidental; they occur more commonly on other trees.

HOMOPTERA

Family Psyllidae

* **Trioza uniqua** (Caldwell) (1940: 392)

This species occurs on the leaves without forming galls. It was collected at Kumuweia, and along the Kokee-Kalalau trail, Kauai.

* **Paurotriozana adaptata** Caldwell (1940: 396)

This species was taken only once; it was reared from a gall on the lower surface of a leaf of the variety *oahuensis,* near Kolekole Pass in the Waianae Mountains, Oahu.

MISCELLANEOUS

The incidental captures on *Cryptocarya* at Kumuweia, Kauai, which follow, have no importance or special relation to the tree:

Nesophryne sp.
Orthotylus sp.
Metromenus sp. ?
Pseudocistela kauaiensis (Perkins). (1900: 248)
Cis porcatus Sharp (1879: 93)
Orcus chalybeus (Boisduval) (1835: 595)
Dromaeolus piger Sharp (1908: 396)
Oceanides planicollis Usinger (1942: 28)

CYANEA

See **Lobelioideae**, p. 118

CYATHODES

See **Styphelia**, p. 211

CYNODON

See **Grasses**, p. 98

CYPERUS

See **Sedges**, p. 193

CYRTANDRA spp.

Family Gesneriaceae.

There are numerous species and varieties of these moderate-sized shrubs in the wet forests of Hawaii.

LEPIDOPTERA

Family Pyraustidae

* **Phlyctaenia iocrossa** Meyrick (1899: 212) Fig. 29

The caterpillars of this moth feed between webbed leaves. I have reared moths on Oahu from *Cyrtandra kalihii* Wawra and *C. paludosa* Gaudichaud. On Maui I reared it on *C. cordifolia* Gaudichaud, and at Halemanu, Kauai, on *Cyrtandra* sp.

Family Carposinidae

* **Heterocrossa viridis** Walsingham (1907: 656)

Reared from a larva in the stem of *Cyrtandra cordifolia* at Waialae Iki, Oahu.

HOMOPTERA

Family Delphacidae

Numerous delphacid leafhoppers have been recorded from one or another species of *Cyrtandra* by Giffard (1917: 346; 1922: 117) and Zimmerman (1948, vol. 4):

Nesothoë giffardi (Kirkaldy) (1908: 203)
Very abundant on undersides of leaves of *C. grandiflora* Gaudichaud and *C. garnotiana* Gaudichaud, in the Koolau Mountains, Oahu.

Nesothoë elaeocarpi (Kirkaldy) (1908: 203)
On *Cyrtandra paludosa,* Mt. Tantalus, Oahu.

* **Nesosydne gouldiae** Kirkaldy (1910: 586)
On *Cyrtandra grandiflora,* Mt. Tantalus, Oahu.

Nesosydne giffardi Muir (1916: 194)
On *C. grandiflora,* Mt. Tantalus, Oahu.

* **Nesosydne cyrtandrae** Muir (1916: 189)
On *Cyrtandra,* Nahiku, Maui.

Nesosydne timberlakei Muir (1917: 304)
On *C. garnotiana,* Waiahole, Oahu.

* **Nesosydne cyrtandricola** Muir (1918: 407)
On *Cyrtandra* sp., Glenwood, Hawaii.

* **Nesosydne longipes** (Muir) (1919: 93)
On *C. mauiensis* Rock, Olinda, Maui.

* **Nesosydne sulcata** (Muir) (1921: 516)
On *Cyrtandra,* Keanae, Maui.

Nesosydne umbricata Kirkaldy (1910: 585)
On *Cyrtandra* sp., Kilauea, Hawaii.

* **Nesosydne acuta** (Muir) (1919: 96)
On *C. mauiensis,* Iao Valley, Maui.

* **Nesosydne kuschei** (Muir) (1922: 96)
On *Cyrtandra* sp., Kokee and Waialae Falls, Kauai.

Family Cicadellidae

Nesophrosyne pipturi Kirkaldy (1910: 560) - - - - - - - - - Lanai

Nesophrosyne pluvialis Kirkaldy (1910: 568)
- - - - Mt. Kaala, Oahu; Olaa, Glenwood and Kilauea, Hawaii

* **Nesophrosyne gouldiae** Kirkaldy (1910: 560)
- - - - Palolo and Mt. Tantalus, Oahu

The third one of the above species was named *gouldiae* because the tree on which it was first observed was thought to be a species of *Gouldia.* Later the host tree was correctly identified as *Cyrtandra cordifolia.*

DIPTERA

Family Tipulidae

* **Limonia (Dicranomyia) foliocuniculator** (Swezey) (1915: 28) Fig. 17
The larvae of this cranefly mine the leaves of *Cyrtandra paludosa,* and are

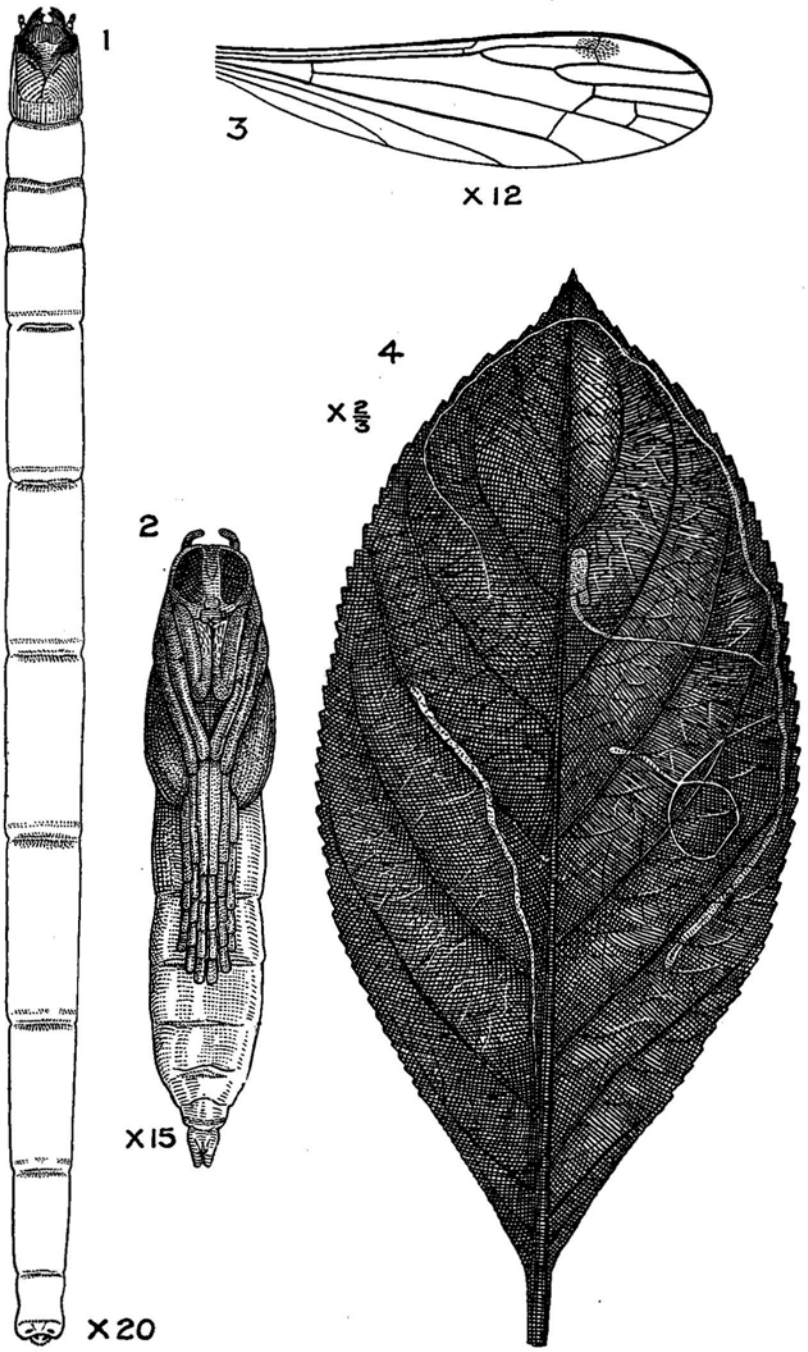

FIGURE 17. **Limonia foliocuniculator,** 1, larva; 2, pupa; 3, wing of adult; 4, *Cyrtandra* leaf showing mines of larvae.

often abundant on Oahu. The larvae are long and slender, and the pupae are formed within the mines, an unusual habit for insects of this group. The species has been found on *Cyrtandra* on Kauai; other species are mined to some extent.

DESCHAMPSIA

See **Grasses**, p. 98

DIANELLA ODORATA BLUME [SANDWICENSIS HOOKER AND ARNOTT]

Family: Liliaceae.

Hawaiian name: uki.

A low, lily-like plant growing in clumps in the ground or on logs.

LEPIDOPTERA

Family Pyraustidae

* **Omiodes monogramma** Meyrick (1899: 205)

A reddish colored moth whose caterpillars are leafrollers on *Dianella* leaves. It occurs on all the islands.

Family Lyonetiidae

* **Bedellia,** new species

An undescribed moth, reared from mines in *Dianella* leaves at Kokee, Kauai.

HOMOPTERA

Family Coccidae

Pseudococcus swezeyi Ehrhorn (1916: 237)

This mealybug was described from Mt. Tantalus, Oahu, where it was found between the phyllodes of *Acacia koa.* It has been reported from *Dianella* at Kokee, Kauai, and from a few other plants.

DICRANOPTERIS

See **Ferns (Filices)**, p. 85

DIGITARIA

See **Grasses**, p. 98

DIOSPYROS

See **Maba**, p. 122

DIPLAZIUM

See **Ferns (Filices)**, p. 85

DODONAEA VISCOSA JACQUIN AND VARIETIES

Family: Sapindaceae.

Hawaiian name: aalii.

These are shrubs and small trees, common on all the islands, mainly in dry localities.

LEPIDOPTERA

Family Lycaenidae

Lycaena blackburni (Tuely) (1878: 9)

This butterfly has been reared from *Dodonaea* at Kilauea, Hawaii. Its chief hostplant is *Acacia koa,* but it occasionally occurs on a few other trees also.

Family Geometridae

* **Scotorythra trapezias** Meyrick (1899: 177)

This is a very variable species. Its green looping caterpillars feed on *Dodonaea* foliage. It is widely distributed, occurring at Kokee and Lihue, Kauai; Wailupe, Manoa, Mt. Olympus, Kahauiki Valley and Mt. Kaala, Oahu; Makolelau, Molokai; Iao Valley, Maui; and Kilauea, Hawaii. *Hyposoter exiguae* (Viereck) (1913: 638) is a parasite of the larva.

* **Scotorythra paratactis** Meyrick (1904: 353)

This species seems to be confined to Oahu, where it was reared from *Dodonaea* in the valleys of Manoa, Kahauiki and Kawaihapai.

Family Tortricidae

Argyroploce illepida (Butler) (1882: 42) Fig. 2

The larvae of this moth feed mostly in the seeds of *Acacia koa* and other legumes, but have been reared from *Dodonaea* seeds on Oahu and at Kilauea, Hawaii.

Archips postvittanus (Walker) (1863: 297)

The caterpillars of this immigrant moth have been reared on leaves of *Dodonaea* at Kilauea, Hawaii. The species occurs on all the islands, and on numerous other hostplants.

Amorbia emigratella Busck (1909: 201)

The caterpillars of this immigrant moth have occurred commonly on *Dodonaea* foliage at Hawaii National Park, Kilauea, Hawaii. The species also occurs on many other plants, and is generally distributed. Its eggs are often highly parasitized by *Trichogramma minutum* Riley (1871: 157) The wasp *Bracon omiodivorum* (Terry) (1907: 37) parasitizes the caterpillars, several of the parasite larvae feeding externally on a single paralyzed caterpillar.

COLEOPTERA

Family Cerambycidae

* **Neoclytarlus dodonaeae** Swezey (1946 : 621)

This small cerambycid has been reared from *Dodonaea* trees in a small area in the Hawaii National Park, along the Mauna Loa truck trail, at from 4,500 to 6,400 ft. elevation.

Family Curculionidae

Pantomorus godmani (Crotch) (1867 : 389)

This widely distributed immigrant weevil feeds on the leaves of *Dodonaea* and many other plants.

HETEROPTERA

Family Scutelleridae

Coleotichus blackburniae White (1881 : 52)

This large beautifully colored bug commonly occurs on *Dodonaea* in the Kilauea region on Hawaii, but is even more abundant on koa.

Family Pentatomidae

Oechalia virgula Van Duzee (1936 : 220)

This predaceous bug has been collected from *Dodonaea* at Kilauea, Hawaii. It occurs also on *Acacia koa* and *Myoporum.*

Family Lygaeidae

Oceanides montivagus (Kirkaldy) (1910 : 544) - - - - Haelaau, Maui
Nysius coenosulus Stål (1859 : 243) - - - - - - - - - All the islands
Neseis (Trachynysius) nitidus impressicollis Usinger (1942 : 60)
- - - - Kokee, Kauai

These plant bugs occur mainly on other plants, but have been collected occasionally on *Dodonaea.*

Family Miridae

Hyalopeplus pellucidus (Stål) (1859 : 255)

This capsid bug is often found in small numbers on *Dodonaea.*

HOMOPTERA

Family Flatidae

Siphanta acuta (Walker) (1851 : 448)

This so-called torpedo-bug feeds on *Dodonaea* as well as on many other plants. It is an immigrant from Australia.

Family Delphacidae

* **Nesothoë dodonaeae** (Muir) (1916: 176) - Waimea Mountains, Kauai
* **Nesothoë munroi** (Muir) (1917: 303) - - - Lanai; Kilauea, Hawaii
These leafhoppers feed on *Dodonaea.*

Family Cicadellidae

* **Nesophrosyne nuenue** Kirkaldy (1910: 572) - - Lanai; Kilauea, Hawaii
* **Nesophrosyne maritima** Kirkaldy (1910: 500)
- - - Nualolo, Milolii, Kauai; Waianae coast and Koko Crater, Oahu
These cicadellids feed on *Dodonaea.*

Family Coccidae

Pseudococcus adonidum (Linnaeus) (1758: 455)
This cosmopolitan mealybug has been found infesting *Dodonaea* at Kilauea, Hawaii; it has numerous other hostplants. *Anagyrus nigricornis* Timberlake (1919: 197) is a parasite, and *Cryptolaemus montrouzieri* Mulsant (1853: 268) and the purposely introduced lacewing, *Sympherobius barberi* (Banks) (1903: 241) are predators on this coccid.

THYSANOPTERA

Hoplothrips coprosmae Moulton (1936: 186)
This species, described from *Coprosma,* was found on *Dodonaea* at Nauhi gulch, Hawaii.

Dracaena aurea H. Mann

Family: Liliaceae.

Hawaiian name: halapepe.

Very few insects are attached to this tree, nor have many been found associated with it.

LEPIDOPTERA

Family Tortricidae

Amorbia emigratella Busck (1909: 201)
Caterpillars of this immigrant moth have been found feeding on flower shoots of *Dracaena* in the Waianae Mountains, Oahu.

COLEOPTERA

Family Nitidulidae

Gonioryctus kauaiensis Sharp (1908: 440)
This large black beetle was found commonly in terminal buds at Halemanu, Puu Ka Pele and Kumuweia, Kauai.

Cillaeopeplus sp. probably **infimus** (Sharp) (1878: 135)
Collected from *D. aurea* at Paumalu, Oahu.

Family Monotomidae

Hesperobaenus capito (Fairmaire) (1850: 54)
Collected under bark of *D. aurea* at Paumalu, Oahu.

Family Ciidae

* **Cis dracaenae** Perkins (1931: 514)
Collected from *Dracaena aurea* bark at the Nuuanu Pali, Oahu. This species is not known on any other tree.

Family Curculionidae

* **Dryophthorus homoeorhynchus** Perkins (1900: 142)
This weevil apparently is attached to *Dracaena,* for it occurs commonly in dead stems of that plant in many localities, and has not been taken on any other tree. It was described from Kaholuamanu, Kauai, without mention of hostplant. It was later recorded from Kokee, Kauai; Paumalu and Pupukea, Oahu; Puu Kolekole, Molokai; and Iao Valley, Maui.

Family Aglycyderidae

Proterhinus vestitus Sharp (1878: 16)
This beetle has been collected from bark of *Dracaena,* as well as from other trees.

Family Scolytidae

* **Xyleborus nuuanus** Schedl (1941: 114)
This ambrosia beetle was described from *Dracaena* in Nuuanu Valley, Oahu, and has never been found on any other tree.
Xyleborus confusus Eichhoff (1867: 401) - - - - - - Paumalu, Oahu
Xyleborus testaceus (Walker) (1859: 260) - - - Nuuanu Valley, Oahu
Both these beetles occur on many other plants in addition to *Dracaena.*

HOMOPTERA

Family Coccidae

* **Pseudococcus floriger** Ferris (1948: 212)
This mealybug was numerous at the base of *Dracaena* leaves at Kanaio, Maui. It has not been found on any other plant.

DERMAPTERA

Chelisoches morio (Fabricius) (1775: 270)
This large black earwig is commonly found in the axils of the leaves, where it is in search of its prey.

DIPTERA
Family Syrphidae

Volucella dracaena Curran (1947: 2)

This immigrant fly was described from specimens taken on *Dracaena* flowers in Honolulu. The plant was a cultivated species, not *aurea*.

DRYOPTERIS
See **Ferns (Filices)**, p. 85

DRYPETES
See **Neowawraea**, p. 141

DUBAUTIA PLANTAGINEA GAUDICHAUD

DUBAUTIA LAXA HOOKER AND ARNOTT

Family: Compositae.

Hawaiian name: naenae.

These shrubs are well supplied with insects, and most of the records given here are from the species *plantaginea* and *laxa*, as defined in Hillebrand's "FLORA OF THE HAWAIIAN ISLANDS." However, if more recent revisions of the genus *Dubautia* are followed, the identity of the plants becomes uncertain. The question, however, is not of great importance, for most of the insects are not particular as to which species of *Dubautia* they attack.

LEPIDOPTERA
Family Geometridae

Scotorythra sp.

A *Scotorythra* caterpillar was collected from *Dubautia* at Palikea, Oahu. However, instead of an adult moth being reared from it, it yielded the parasite *Hyposoter exiguae* (Viereck) (1912: 638).

Family Pyraustidae

* **Phlyctaenia ommatias** Meyrick (1899: 415) Fig. 29

The caterpillars of this moth feed between webbed leaves of terminal foliage of both *D. plantaginea* and *laxa*. It occurs in the Alakai swamp on Kauai and has been reared from several localities on Oahu: Mt. Tantalus, Mt. Olympus, Pacific Heights ridge, Kaumuohona and Mt. Konahuanui. *Casinaria infesta* (Cresson) (1872: 172) is a parasite of the caterpillars.

Family Gracilariidae

* **Parectopa naenaeiella** Swezey (1940: 462)

This leafminer has been reared from leaves of *D. laxa* at several localities on Oahu: Mt. Kaala, Mt. Konahuanui, Mt. Olympus, Kahana, Hauula, Ka-

huku, Pupukea and Kawailoa. The larva issues from its mine to form a white, flat cocoon on the leaf.

* **Parectopa dubautiella** (Swezey) (1913: 278)

This species mines the leaves of *D. plantaginea* and has been reared from numerous localities on Oahu: Mt. Olympus, Pacific Heights ridge, Pauoa Flats, Hillebrand's Glen, Nuuanu Valley, Moanalua and Kahuku. The larva makes its cocoon inside the mine.

The following hymenopterous parasites have been reared from the larvae of *P. naenaeiella* and probably attack the other species of *Parectopa* also: *Euderus metallicus* (Ashmead) (1901: 327), *Pnigalio externa* (Timberlake) (1927: 522), *Eucremnus* sp. (?), and *Sierola planiceps* Fullaway (1920: 146).

* **Parectopa dubauticola** Swezey (1940: 463)

This species was reared from mines in what was probably *D. plantaginea* on the ridge above Haelaau, Maui.

* **Parectopa nigrelloides** Swezey (1946: 628)

This was reared from a mine in a leaf of an unidentified *Dubautia* in the Alakai swamp, Kauai.

COLEOPTERA

Family Elateridae

Eopenthes unicolor Sharp (1908: 337)

This beetle was collected from both *Dubautia* and *Metrosideros* at the same locality in the Alakai swamp, Kauai.

Family Aglycyderidae

Proterhinus deceptor Perkins (1900: 245) - - - Puu Kolekole, Molokai
Proterhinus excrucians Perkins (1910: 662) - - - Mt. Olympus, Oahu

These beetles were collected from *Dubautia* at the localities named; they occur on many other trees also.

Family Scolytidae

Xyleborus hawaiiensis Perkins (1900: 175)

Taken on *Dubautia laxa* on Mt. Olympus, Oahu.

HETEROPTERA

Family Lygaeidae

* **Glyptonysius hylaeus** (Kirkaldy) (1910: 539)

This bug has been recorded from *Dubautia* at Kumuweia, Kauai, and from no other plant.

Oceanides montivagus (Kirkaldy) (1910: 544)
- - - - Kainalu, Kawela and Puu Kolekole, Molokai

Nysius blackburni White (1881: 53) - - - - - - - - Kilauea, Hawaii
Nysius delectulus Perkins (1912: 736) - - - - - - - Kilauea, Hawaii
Nysius coenosulus Stål (1859: 243) - - - - - - - - All the islands
Nysius communis Usinger (1942: 110) - - - - - - - All the islands
Nysius delectus White (1878: 367) - - - All the islands except Kauai
Nysius lichenicola Kirkaldy (1910: 540) - - - - - - Kilauea, Hawaii
Nysius mixtus Usinger (1942: 110) - - - Kalalau trail, Kokee, Kauai
Nysius nemorivagus White (1881: 54) - - - - - - - - All the islands
Nysius nigriscutellatus Usinger (1942: 102) - - - - - - All the islands
Nysius terrestris Usinger (1942: 95) - - - - - - - All the islands

All of these bugs have been collected from *Dubautia* in the localities named. They occur on other plants as well, some of them on many different hostplant species.

HOMOPTERA

Family Delphacidae

* **Aloha dubautiae** (Kirkaldy) (1910: 583)

This leafhopper occurs on both species of *Dubautia* on Mt. Tantalus and Mt. Olympus, Oahu. Some years ago observations were made on Tantalus at several successive intervals to learn if the various life history stages were seasonal. Each time, all stages of the insect were present, indicating that breeding was continuous throughout the year. The eggs of this species are parasitized by *Polynema ciliata* Perkins (1910-H: 666).

* **Aloha flavocollaris** Muir (1916: 181)

This species occurs on both common species of *Dubautia* on Mt. Kaala, Oahu.

* **Nesosydne dubautiae** (Muir) (1921: 510)

This species occurs on *D. plantaginea* in Iao Valley, Maui.

* **Nesosydne naenae** (Muir) (1922: 98)

Collected from *Dubautia* sp. in the Alakai swamp, Kauai.

Family Coccidae

* **Pseudococcus nudus** Ferris (1948: 235)

This endemic mealybug was collected on *Dubautia* on Mt. Haleakala, Maui, and has not been found on any other plant.

NEUROPTERA

Family Hemerobiidae

* **Pseudopsectra cookeorum** Zimmerman (1946: 659)

A pair of this remarkable insect was beaten from *Dubautia* growing on the steep slope just inside the crater rim below the summit of Haleakala, Maui, at about 9,700 feet elevation.

at several successive intervals to learn if the various life history stages were

THYSANOPTERA

Thrips (Isoneurothrips) dubautiae (Moulton) (1928: 113)

This thrips was named from *Dubautia* on which it was collected on Mt. Tantalus, Oahu, but it is not confined to this plant.

DIPTERA

Family Tephritidae

* **Tephritis dubautiae** Bryan (1920: 477)

The maggots of this fly feed on the developing seeds in flower heads of *Dubautia*. It was reared from material from Mt. Lanihuli, Rooke Valley, Kaumuahona and Mt. Kaala, Oahu.

* **Tephritis swezeyi** Bryan (1920: 477)

The larvae of this species live in the terminal buds of the leafy stems of *Dubautia*. It has been reared from the following localities on Oahu: Palolo Valley, Mt. Olympus, Pacific Heights ridge, Kaumuahona and Palikea.

Family Heleidae

Dasyhelea hawaiiensis Macfie (1934: 133)

The larvae of this midge have been found breeding in moist situations in the leaf axils of *Dubautia laxa pseudoplantaginea* Skottsberg on Mt. Olympus, Oahu.

DUBAUTIA, SPECIES[1]

Family Compositae.

What seems to be an undescribed species of *Dubautia* grows as a woody vine in a considerable mass on the sloping bank of a small tributary of Kokee stream, at Kumuweia, Kauai. So far as I know, no one has ever found it in bloom. I once found a dried portion of inflorescence which indicated that it might be a *Dubautia*, and some of the insects found on it tend to confirm the belief that the plant belongs in that genus. Because this plant is unique, I have listed the insects collected from it separately from the other *Dubautia* insects.

LEPIDOPTERA

Family Gracilariidae

Parectopa sp.

A lepidopterous leafminer was present in some of the leaves. A single poor specimen of the moth was obtained, which was sufficient to show its

[1] This is presumably *Dubautia latifolia* (Gray) Keck, for a plant, identified as this species by Dr. Harold St. John (his herbarium number 24,891) was collected by him, December 26, 1952, on Nualolo trail, about 1 mile away from the site of the plant I found at Kumuweia. The plant found by Dr. St. John was in full, though old, fruit. To quote his letter: "It was a true and long vine, climbing 40 feet over trees. This is in Hillebrand's FLORA as *Raillardia latifolia*. Later it was reclassified as *Dubautia latifolia* (Gray) Keck and when in 1950 [PACIFIC SCIENCE, 4:342] I revised the two genera, I came to the same conclusion, that only the genus *Dubautia* could be maintained. . . ."

close relationship to other *Parectopa* leafminers in *Dubautia.* A parasite, which appears to be an undetermined eulophid, was reared from one mine.

COLEOPTERA

Family Aglycyderidae

Proterhinus eulepis Perkins (1900: 188)
Proterhinus basalis Sharp (1879: 98)
Proterhinus angustiformis Perkins (1900: 197) Fig. 12
Proterhinus nigricans Sharp (1879: 95)
Proterhinus neglectus Perkins (1900: 189)

Family Anobiidae

Xyletobius nuptus kauaiensis Perkins (1910: 592)

Family Ciidae

Cis insularis Sharp (Blackburn and Sharp, 1885: 164)
Cis evanescens Sharp (1879: 95)
Apterocis impunctatus Perkins (1900: 168)

All of the small beetles were obtained by beating among a mass of dead stems.

HOMOPTERA

Family Delphacidae

Leialoha oceanides (Kirkaldy) (1910: 580)

A single specimen, probably a straggler, was taken on this *Dubautia;* its usual hostplant is *Osmanthus.*

Family Cixiidae

Oliarus nubigenus Kirkaldy (1909: 78)

Two adults; incidental captures.

Family Flatidae

Siphanta acuta (Walker) (1851: 448)

An Australian immigrant occurring on many plants.

DIPTERA

Family Tephritidae

Tephritis swezeyi Bryan (1920: 477)

The maggots were found feeding in several of the terminal buds, in the same way they feed on the Oahu species of *Dubautia.* None was reared; instead, several individuals of a parasite, *Euderus metallicus* (Ashmead) (1901: 327) were bred out.

stems

ELAEOCARPUS BIFIDUS HOOKER

Family: Tiliaceae.

Hawaiian name: kalia.

Only one species of this large genus occurs in Hawaii.

LEPIDOPTERA

Family Carposinidae

* **Heterocrossa divaricata** Walsingham (1907: 665)

The larvae of this moth are often quite common in *Elaeocarpus* seeds, on which they feed, on Mt. Tantalus and Waialae Iki, Oahu. The moth has also been reared from larvae in *Syzygium sandwicensis* (Gray) Neidenzu [formerly *Eugenia*].

Family Hyponomeutidae

Hyperdasysella unicolor (Walsingham) (1907: 642)

This moth has been reared from dead *Elaeocarpus* wood at Kahauiki, Oahu, and Puu Ka Pele, Kauai. It has been reared from other trees also.

COLEOPTERA

Family Aglycyderidae

Proterhinus obscurus Sharp (1878: 18) - - - - - Mt. Tantalus, Oahu

* **Proterhinus obscurus elaeocarpi** Perkins (1910: 663)

- - - - Mt. Tantalus, Kaumuahona, Haleauau and Kukuiala, Oahu

Proterhinus eugonias Perkins (1900: 186) - - - - - - Kokee, Kauai

These beetles were all collected from *Elaeocarpus* bark; the variety of *obscurus* appears to be attached to this tree.

Family Cerambycidae

Plagithmysus solitarius Sharp (1896: 241) Fig. 3

This beetle has been reared from *Elaeocarpus* on Mt. Tantalus and in Haleauau Valley, Oahu. It has been reared also from *Metrosideros* and *Syzygium*.

Plagithmysus sp.

Larvae and evidence of their work in *Elaeocarpus* were found at Kumuweia, Kauai, but no beetles were reared.

Family Curculionidae

Chaenosternum konanum Blackburn (Blackburn and Sharp, 1885: 182)

"Collected from dead branches of *Elaeocarpus* tree" (Giffard) on Mt. Tantalus, Oahu.

Family Scolytidae

Xyleborus truncatus Sharp (Blackburn and Sharp, 1885: 192)
- - - - - Haleauau Valley, Oahu

Xyleborus testaceus (Walker) (1859: 260) - - - - - Mt. Kaala, Oahu

Crossotarsus externedentatus Fairmaire (1850: 31) - - Waimalu, Oahu

These shot-hole borers have been collected from *Elaeocarpus,* and occur on many other kinds of trees as well.

Family Ciidae

Cis tabidus Sharp (1879: 93)

Under *Elaeocarpus* bark, Kukuiala Valley, Oahu.

Family Eucnemidae

Dromaeolus spp.

Two species were found under bark at Kumuweia, Kauai. One is a large black beetle, the other a smaller, narrow, rufous insect.

Family Colydiidae

Antilissus aper Sharp (1879: 86)

Derolathrus atomus Sharp (1908: 331)

These very small beetles were collected under bark at Kokee, Kauai.

Family Anobiidae

Xyletobius nuptus kauaiensis Perkins (1910: 592)

Beaten from dead twigs at Kumuweia, Kauai.

HETEROPTERA

Family Lygaeidae

* **Oceanides delicatus** Usinger (1942: 25)

This bug apparently is attached to *Elaeocarpus,* having been collected from it in several localities on Oahu: Mt. Tantalus, Pukuloa Valley and Haleauau Valley, and from no other plant.

Oceanides oribasus (Kirkaldy) (1910: 544)

Taken on *Elaeocarpus* in Haleauau Valley and the Waialua mountains, Oahu. It also occurs on *Straussia.*

Family Miridae

Pseudoclerada morai Kirkaldy (1902: 141)

Collected from *Elaeocarpus* in Haleauau Valley, Oahu; on other trees also.

Undetermined sp.

Collected in considerable numbers from *Elaeocarpus* at Kumuweia, Kauai.

HOMOPTERA

Family Delphacidae

* **Nesothoë elaeocarpi** (Kirkaldy) (1908: 203)
- - - - Mt. Tantalus and Kamokuiki, Oahu

Nesothoë hula Kirkaldy (1908: 204) - - - - - - - - Nualolo, Kauai

Leialoha suttoniae Muir (1922: 92) - - - - - - - - Kumuweia, Kauai

These leafhoppers were collected from *Elaeocarpus* in the localities given.

Family Cicadellidae

* **Nesophryne kaiamamao** (Kirkaldy) (1902: 115)

This bulky treehopper has been taken on *Elaeocarpus* several times on Kauai, both as adults and nymphs, and appears to be attached to this tree. It was collected at Puu Ka Pele, Kumuweia, Kalalau trail from Kokee, and in the Alakai swamp.

Nesophrosyne sp.

Collected from *Elaeocarpus* at Kumuweia, Kauai.

Family Coccidae

Eucalymnatus tessellatus (Signoret) (1873: 401)

Collected on *Elaeocarpus* leaves at Puu Ka Pele, Kauai.

Ceroplastes rubens Maskell (1892: 214)

On *Elaeocarpus,* Mt. Tantalus, Oahu.

HYMENOPTERA

Family Crabronidae

Nesocrabro stygius (Kirby) (1880: 188) - - - - - - Kahuku, Oahu

Oreocrabro abnormis (Blackburn and Cameron) (1885: 168)
- - - - Mt. Olympus, Oahu

Nests of these wasps stored with Diptera have been found in rotten wood of *Elaeocarpus* logs. After rotting, the wood becomes very soft, and if dry (not rain soaked), is in suitable condition for these wasps to burrow into for nesting. Several kinds of *Odynerus* wasps and *Nesoprosopis* bees similarly take advantage of such conditions to make their nests.

ELAPHOGLOSSUM

See **Ferns (Filices),** p. 85

ERAGROSTIS

See **Grasses,** p. 98

ERYTHRINA MONOSPERMA GAUDICHAUD

[now called **Erythrina sandwicensis** Degener]

Family: Leguminosae.

Hawaiian name: wiliwili.

Only a few insects have been collected from this dry-land, deciduous tree.

LEPIDOPTERA

Family Pyraustidae

* **Omiodes monogona** Meyrick (1888: 216)

Caterpillars of this moth feed on the leaves, usually on those webbed together. The species is restricted to Oahu with records from Kamokunui Valley, Kealia, Niu and Palmer's crater. Sometimes as many as 50 per cent of the caterpillars are parasitized by *Zaleptopygus flavo-orbitalis* (Cameron) (1907: 589) and *Casinaria infesta* (Cresson) (1872: 172).

Terastia meticulosalis Guénée (1854: 212)

This moth was reared from *Erythrina* seeds in Makaleha Valley, Waianae Mountains, Oahu.

Family Phycitidae

Myelois ceratoniae Zeller (1839: 176)

This species was reared from *Erythrina* seeds on the Ewa coral plain, Oahu.

COLEOPTERA

Family Cerambycidae

Lagocheirus obsoletus Thomson (1860: 10) - - - Ewa coral plain, Oahu

Coptops aedificator (Fabricius) (1792: 275)

- - - - Makua and Ewa coral plain, Oahu

Both these species were reared from dead *Erythrina* branches.

Prosoplus bankii (Fabricius) (1775: 176)

"Reared from *Erythrina* pods" (Bryan) at Koko Head, Oahu.

Family Bruchidae

Bruchus pruininus Horn (1873: 327)

"Reared from seeds" (Fullaway), Waianae Mountains, Oahu.

HETEROPTERA

Family Lygaeidae

Nysius coenosulus Stål (1859: 243)

Usinger includes *Erythrina* in a long list of hostplants of this bug, but cites no locality.

Orthotylus iolani Kirkaldy (1902: 133)

This little green bug occurred very abundantly on *Erythrina* leaves at Kealia, Oahu.

HOMOPTERA

Family Coccidae

Ferrisiana virgata (Cockerell) (1893: 178)

This mealybug has been found on *Erythrina* leaves on the Ewa coral plain, Oahu. It was preyed upon by the ladybird beetles *Azya luteipes* Mulsant (1850: 928) and *Cryptolaemus montrouzieri* Mulsant (1853: 268)

Phenacoccus gossypii Townsend and Cockerell (1898: 170)

This species has been reported to infest *Erythrina* in Honolulu; the host-plant was probably an introduced species, not the native *monosperma.*

EUGENIA MALACCENSIS

See **Jambosa**, p. 111

EUGENIA SANDWICENSIS

See **Syzygium**, p. 213

EUPHORBIA spp.

Family: Euphorbiaceae.

Hawaiian names: koko or akoko.

There are several species of *Euphorbia* in the Hawaiian forests; most of them are shrubs.

LEPIDOPTERA

Family Phycitidae

* **Genophantis iodora** Meyrick (1888: 246)

The caterpillars feed between webbed leaves of *Euphorbia clusiaefolia* Hooker and Arnott and *E. celastroides* Boissier. The species occurs on Kauai, Oahu, Molokai and Hawaii.

* **Genophantis leahi** Swezey (1910: 103)

The larvae feed on webbed leaves of *Euphorbia cordata* Meyen, and on the lowland weeds, *E. hirta* Linnaeus and *E. bifida* Hooker and Arnott [now called *Euphorbia hypericifolia* Linnaeus]. Known on Oahu, Molokai, Maui and Hawaii.

COLEOPTERA

Family Cerambycidae

* **Neoclytarlus euphorbiae** Bridwell (1920: 323) Fig. 25

This endemic beetle was described from a large series of specimens reared from broken or dying stems of *Euphorbia multiformis* Hooker and Arnott growing among algaroba (*Prosopis*) trees on the Ewa coral plain, Oahu. Also feeding on the same plants were the immigrant cerambycid beetles *Lagocheirus obsoletus* Thomson (1860: 10), *Ceresium unicolor* (Fabricius) (1787:147), *Prosoplus bankii* (Fabricius) (1775: 176) and *Sybra alternans* (Wiedemann) (1823: 111). Reared from larvae of *Neoclytarlus euphorbiae* were *Rhaconotus vagrans* (Bridwell) (1920: 390) and *Scleroderma immigrans* Bridwell (1918: 484).

Family Aglycyderidae

Larvae of the following species feed in dead twigs of *Euphorbia,* on their respective islands:

* **Proterhinus euphorbiae** Perkins (1920: 349)
- - - - Mt. Kaala, Mt. Lanihuli and Kukuiala, Oahu

* **Proterhinus impressiscutis** Perkins (1920: 350) - - - Mt. Kaala, Oahu

* **Proterhinus impressiscutis nudior** Perkins (1928: 196)
- - - - Kuliouou, Kahauiki and Hauula, Oahu

* **Proterhinus euops** Perkins (1920: 348) - - - - - Mt. Kaala, Oahu

* **Proterhinus bridwelli** Perkins (1920: 350) - - - - Iao Valley, Maui
This species is on *Euphorbia hookeri integrifolia* Hillebrand.

* **Proterhinus bryani** Perkins (1926: 64) - - - - - - - - - - Nihoa

* **Proterhinus abundans** Perkins (1926: 65) - - - - - - - - - Nihoa

* **Proterhinus obscurus chryseis** Perkins (1910: 663) - - - Kaumuahona, Kuliouou, Mt. Tantalus, Kahana, Kahauiki and Mt. Kaala, Oahu
This species is found on *Euphorbia clusiaefolia* Hooker and Arnott.

Proterhinus ruficornis Perkins (1900: 200) - - - - - Kahana, Oahu

* **Proterhinus tantali** Perkins (1935: 87) - - - - - Mt. Tantalus, Oahu

Family Curculionidae

Oodemas breviscapum Perkins (1926: 58)

Oodemas erro Perkins (1926: 59)

These two species are found on the island of Nihoa, on *Euphorbia* as well as on bunch grass.

Family Anobiidae

* **Xyletobius euphorbiae** Perkins (1910: 602)

The larvae of this beetle were found in dead wood on Mauna Loa, Hawaii.

Family Scolytidae

* **Hypothenemus mauiensis** Schedl (1941 : 110)
In *Euphorbia hookeri integrifolia* Hillebrand in Iao Valley, Maui.

Hypothenemus insularis Perkins (1900 : 181)
Reared from dead branches of *Euphorbia* at Puuwaawaa, Hawaii.

Family Ciidae

* **Cis vagans** Perkins (1926 : 66)
This small beetle is known only from Nihoa.

HETEROPTERA

Family Coreidae

* **Ithamar annectans** Van Duzee (1936 : 222)
Attached to *Euphorbia* on Oahu and Maui.

Ithamar hawaiiensis Kirkaldy (1902 : 170)
This insect has been collected on *Euphorbia* on Oahu, Molokai, Lanai, Maui and Hawaii. It occurs on numerous plants.

Family Lygaeidae

* **Oceanides membranaceus** Usinger (1942 : 34)
Apparently this bug is attached to *Euphorbia,* for it has been collected from that plant only. It is widely distributed on Oahu where it has been taken in several localities on both mountain ranges.

* **Oceanides planicollis** Usinger (1942 : 28)
Collected from *Euphorbia* at Halemanu, Kauai.

Oceanides parvulus Usinger (1942 : 30)
This species has been collected in several localities on both mountain ranges of Oahu, on *Euphorbia* and on *Straussia.*

Family Miridae

Psallus sharpianus Kirkaldy (1902 : 131)
This occurs chiefly on *Acacia koa,* but has been collected on *Euphorbia.* It is known from Kauai, Oahu, Maui and Hawaii.

Psallus sharpianus luteus Zimmerman (1948, vol. 3 : 187)
This variety has the same distribution and hostplants as the typical form.

HOMOPTERA

Family Delphacidae

* **Dictyophorodelphax mirabilis** Swezey (1907 : 105) Fig. 18
This was the first species to be discovered of this remarkable genus with the greatly prolonged head. It was first found on *Euphorbia clusiaefolia* Hooker

and Arnott on Mt. Kaumuahona, Oahu; later it was found on *Euphorbia hillebrandi* Leveille on Mt. Kaala, Oahu.

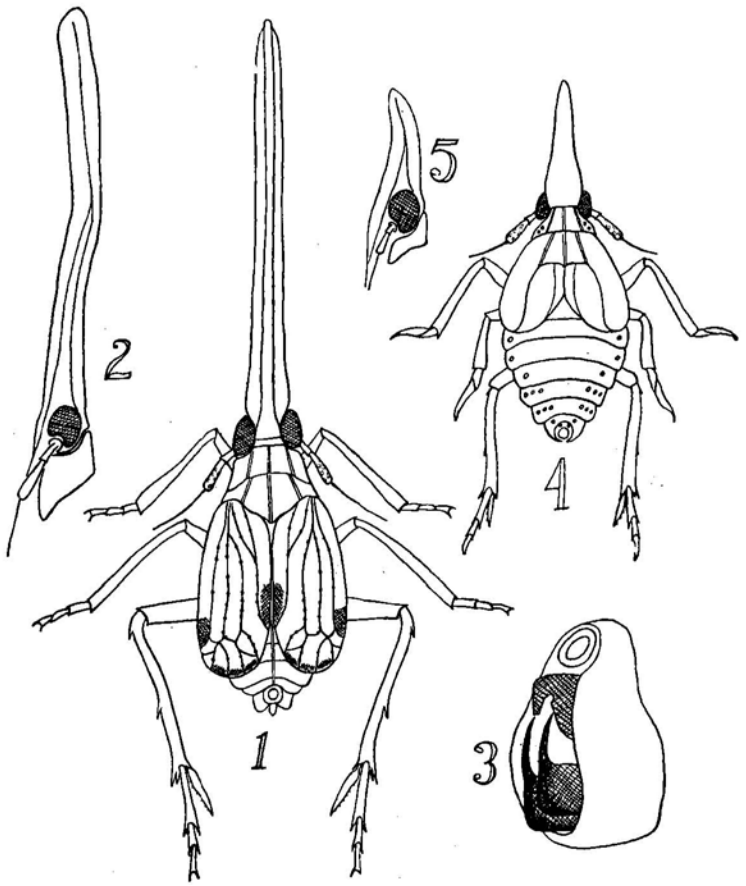

FIGURE 18. **Dictyophorodelphax mirabilis. 1,** adult; **2,** side view of head of adult; **3,** male genitalia; **4,** nymph; **5,** side view of head of nymph.

* **Dictyophorodelphax swezeyi** Bridwell (1918: 386)
On *Euphorbia celastroides* Boissier at Wailupe and Niu, Oahu.

* **Dictyophorodelphax praedicta** Bridwell (1919: 72)
On *Euphorbia hookeri integrifolia* Hillebrand, in Iao Valley, Maui.

* **Dictyophorodelphax usingeri** Swezey (1937: 431)
On *Euphorbia* sp., at an elevation of 2,000 to 3,000 feet on Lanai.

* **Aloha kirkaldyi** Muir (1916: 180)
On *Euphorbia hillebrandi* Leveille and other species at various localities on Oahu: Punaluu, Waiahole, Mt. Kaala, Kanehoa, Palikea and Kalihi.

* Dictyop. sp. from Kauai · Beardsley

Nesothoë gulicki (Muir) (1916: 177)

This leafhopper has been collected on *Euphorbia* on Oahu and Hawaii, but occurs also on some other plants.

Family Cicadellidae

* **Kirkaldiella euphorbiae** Osborn (1935: 14)

On *Euphorbia* sp., at Moomomi, Molokai.

* **Kirkaldiella ewana** Osborn (1935: 15)

On *Euphorbia multiformis* Hooker and Arnott, Ewa coral plain, Oahu.

FERNS

See also **Sadleria**, p. 183

Class: Filices.

Ferns are a large component of the Hawaiian forests. Including the tree ferns, the insect fauna of which is treated separately (p. 51), there are about 130 species. Immediately below are listed the insect records from the many other ferns; in some cases the identity of the fern was not known, and some records are based on sweeping of mixed fern growths. However, in the case of insects especially attached to ferns, the name of the plant is recorded. No insects have yet been recorded from the great majority of the fern species; further study would doubtless add to the list of insect species attached to, or associated with, ferns.

LEPIDOPTERA

Family Phalaenidae

* **Eriopygodes euclidias** (Meyrick) (1899: 140)

This is a variable species whose caterpillars feed on ferns generally, in the forests on all the islands. As a result of recent studies this species is now considered to be in reality several species.

Family Geometridae

Scotorythra rara (Butler) (1879: 273)

The caterpillars of this moth are loopers which feed on many kinds of forest trees throughout the islands; they sometimes feed on ferns.

Family Hyponomeutidae

* **Batrachedra sophroniella** Walsingham (1907: 511)

The larvae of this small moth feed, protected by a web, on the sporangia of *Aspidium cyatheoides* [=*Dryopteris cyatheoides* (Kaulfuss) Kuntze]. They also feed on the under surface of the fronds, and are often abundant; the cocoon is made alongside a midrib. The species has been reared on Oahu

from Palolo, Pauoa, Halawa, Waiawa, Kahauiki and Mt. Tantalus, from Keanae, Maui, and from Waimea, Hawaii.

* **Batrachedra lomentella** Walsingham (1907 : 511)

This moth has been reared from an unidentified fern in Hakalau Valley, Hawaii, and in Palolo Valley, Oahu.

* **Batrachedra bedelliella** Walsingham (1907 : 509)

This moth was reared from larvae feeding on sporangia of *Asplenium nidus* Linnaeus in Palolo Valley, Oahu, and in Hakalau Valley, Hawaii.

* **Batrachedra syrraphella** Walsingham (1907 : 509)

The larvae of this moth feed on the sporangia of *Dryopteris parasitica* (Linnaeus) Kuntze [now called *D. dentata* (Forskal) Christensen] in Palolo Valley and at Waianae, Oahu, and probably occur in other localities as well.

* **Batrachedra** sp.

An unidentified species of *Batrachedra* was reared from *Asplenium arnottii* [=*Diplazium arnottii* Brackenridge] in Haleauau Valley, and from *Asplenium caudatum* Forster on Mt. Kaala, Oahu. A parasite, an undetermined species of *Sierola,* was reared from this material.

* **Batrachedra** sp.

Fronds of *Pteris irregularis* Kaulfuss on Mt. Tantalus, Oahu, were found heavily mined by small larvae which were certainly *Batrachedra;* none was reared.

Batrachedra spp.

There are, in addition to the above, four species of *Batrachedra* of unknown habit, listed in the "FAUNA HAWAIIENSIS". It is probable that they eventually will be found attached to some of the ferns.

* **Euhyposmocoma ekaha** (Swezey) (1910 : 105) Fig. 19

The larvae of this moth feed singly on the underside of fronds of *Asplenium nidus* Linnaeus. They eat the parenchyma, leaving the upper epidermis in dead patches. While feeding, the larvae are protected by a covering of silk and frass, making a sort of covered way connected with a burrow in the midrib, where the larvae stay when not feeding. This moth occurs wherever this fern is found in the mountain valleys of Oahu. A parasite of *E. ekaha* is *Ephialtes hawaiiensis* (Cameron) (1886 : 239).

* **Euhyposmocoma trivitella** Swezey (1912 : 278)

The larvae of this species are miners in the simple, sterile fronds of *Elaphoglossum reticulatum* (Kaulfuss) Gaudichaud and *E. gorgoneum* (Kaulfuss) Brackenridge. They have been found only on the east side of the Kauai mountains, behind Lihue and along the summit camp trail.

* **Undetermined** sp.

A leafminer, probably a hyponomeutid, occurs in fronds of *Polypodium spectrum* Kaulfuss on Oahu. It has been found on Tantalus and in Palolo Valley and in the mountains above Punaluu. The peculiar larva differs from

the usual leafminer, and is larger than the *Batrachedra* larva. Several attempts to rear this species have failed, so the adult moth is unknown.

Hyposmocoma spp.

Several kinds of larval cases of this genus have been found on various kinds of ferns, but have not been reared. It is not known if any significant relationship with the ferns exists.

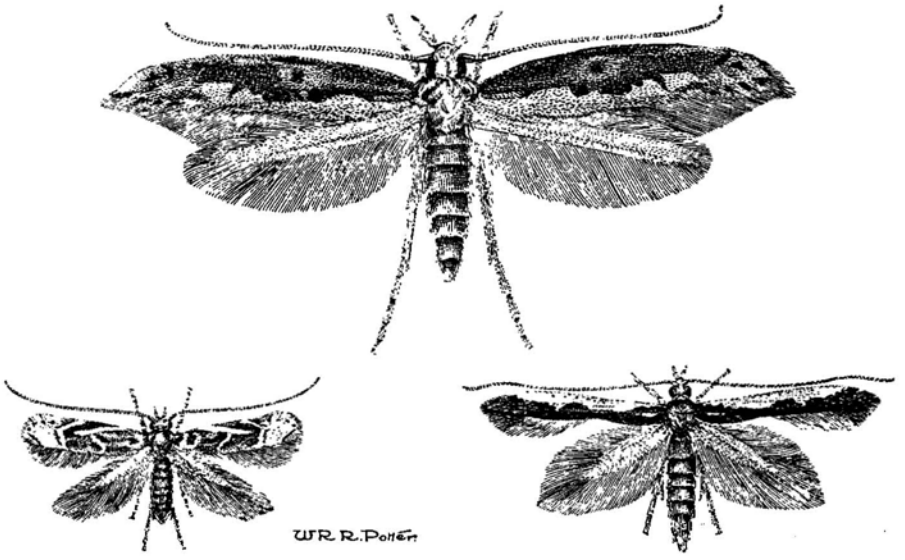

FIGURE 19. Upper figure, **Euhyposmocoma ekaha.** Lower figures, **Parectopa hauicola** (left) and **P. mabaella** (right).

COLEOPTERA

Family Curculionidae

* **Heteramphus swezeyi** Perkins (1916: 250)

The larvae of this weevil mine in sterile fronds of *Elaphoglossum gorgoneum* (Kaulfuss) Brackenridge, *E. reticulatum* (Kaulfuss) Gaudichaud, *E. micradenium* (Fee) Moore and *E. squamosum* [=*E. hirtum* (Swartz) Christensen] on Oahu. The species has been found on the ridges or valleys at Waialae Nui, Palolo, Mt. Olympus, Mt. Tantalus, Punaluu and Kawailoa. It is heavily parasitized by *Euderus metallicus* (Ashmead) (1901: 327), *Sierola* sp., and *Eupelmella subaptera* (Ashmead) (1901: 315).

* **Oodemas brunneum** Perkins (1900: 159)

This weevil was found in dead frond stems of *Pteris* sp., on Molokai.

Syagrius fulvitarsis Pascoe (1875: 57)

The Australian fern weevil seriously infests *Asplenium nidus* Linnaeus ferns in Nuuanu Valley, Oahu. Its favorite hostplant, however, is the *Sadleria* fern; this beetle occurs on Oahu, Maui and Hawaii.

Family Anobiidae

Larvae of anobiid beetles were found in *Asplenium horridum* Kaulfuss stems in Haleauau Valley, Oahu, but were not reared.

Family Aglycyderidae

* **Proterhinus pteridis** Perkins (1900: 235)

This bettle was found in leaf stalks of *Pteria* sp. on Molokai.

Proterhinus longulus Sharp (1879: 97)

In stems of *Phegopteris polycarpa* Hooker and Arnott on Puu Kalena, Oahu, but more commonly in dead frond stems of *Cibotium*.

* **Proterhinus denudatus** Perkins (1900: 203)

In stems of *Gleichenia linearis* [now called *Dicranopteris linearis* (Burmann) Underwood] on both mountain ranges of Oahu (Perkins). I have swept it from *Gleichenia* in Kamokunui Valley, Oahu.

* **Proterhinus sharpi** Perkins (1900: 213)

Collected from an unidentified fern on Haleakala, Maui.

HETEROPTERA

Family Lygaeidae

Nysius blackburni White (1881: 53) - - - - - - - - Maui; Hawaii
Nysius rubescens White (1881: 55) - - - - - - - - - - - - Hawaii
Sephora criniger (White) (1881: 57) - - - - Lanai; Molokai; Maui

These bugs have been recorded on ferns, which are not their chief hostplant.

Family Reduviidae

Empicoris rubromaculatus (Blackburn) (1889: 349) - - All the islands

This predaceous bug occurs on ferns.

Family Nabidae

Nabis blackburni White (1878: 373) - - - - - - - - All the islands
Nabis lusciosus White (1877: 112) - - - - - - - - - - - - - Oahu

Both these predaceous bugs have been found on ferns.

HOMOPTERA

Family Delphacidae

* **Nesorestias filicicola** Kirkaldy (1908: 205)

Collected from *Elaphoglossum gorgoneum* (Kaulfuss) Brackenridge and *Cibotium* on Tantalus, Oahu.

* **Nesorestias nimbata** (Kirkaldy) (1910: 582)

Collected from *Phegopteris* sp. on Kaumuahona, Waiawa, Waiahole and Punaluu ridges, Oahu.

* **Nothorestias swezeyi** Muir (1922 : 87)

On *Aspidium* sp. in Makaha Valley, and on unidentified ferns at Kawaihapai and Kamokunui Valley, Oahu.

* **Nothorestias badia** Muir (1917 : 304)

On an unidentified fern at Kuliouou, Oahu.

* **Nesosydne nephrolepidis** Kirkaldy (1908 : 203)

Collected from *Nephrolepis exaltata* (Linnaeus) Schutt on Tantalus, Oahu; it also is known from Maui and Hawaii.

Family Cixiidae

Oliarus immaculatus Giffard (1925 : 96)

On unidentified ferns at Kokee and in the mountains back of Lihue, Kauai.

Oliarus koele Giffard (1925 : 93)

Collected from unidentified ferns on Lanai.

Iolania koolauensis Giffard (1925 : 154) - - - - - - - Waiahole, Oahu
Iolania lanaiensis Giffard (1925 : 155) - - - - - - - - - - - - Lanai
Iolania mauiensis Giffard (1925 : 155) - - - - - - - Wailuaiki, Maui
Iolania oahuensis Giffard (1925 : 154) - - - - - - - - Palolo, Oahu
Iolania perkinsi Kirkaldy (1902 : 119) - - - - - - - Kilauea, Hawaii

The above-named leafhoppers have been collected from miscellaneous unidentified ferns; perhaps they can be said to be attached to them.

Family Cicadellidae

* **Nesophryne kaiamamao** (Kirkaldy) (1902 : 115)

This large species has been recorded from *Microlepia strigosa* Presl at Kalihiwai, Kauai. According to Zimmerman (1948, vol. 4 : 35) both *Nesophryne filicicola* Kirkaldy and *N. microlepiae* Kirkaldy are synonyms of this species.

* **Nesophrosyne** sp.

Common on *Aspidium* and *Gleichenia* [*Dicranopteris*] at Kainalu, Molokai.

Family Aphididae

* **Idiopterus nephrolepidis** Davis (1909 : 199)

Recorded from *Elaphoglossum reticulatum* (Kaulfuss) Gaudichaud and *Polypodium lineare* Thunberg on Mt. Tantalus, Oahu; from unidentified ferns in Kamokuiki Valley, Oahu and Kilauea, Hawaii. According to Zimmerman (1948, vol. 5 : 123) *Asplenium kaulfussii* Schlechtendahl is also a hostplant of this aphid.

Family Coccidae

Ceroplastes rubens Maskell (1892 : 214)

The wax scale has been found on *Elaphoglossum reticulatum* (Kaulfuss) Gaudichaud and other ferns, as well as on many other forest plants.

ORTHOPTERA

Family Gryllidae

* **Paratrigonidium filicum** Perkins (1899: 17)

* **Paratrigonidium viridescens** Perkins (1899: 18)

These small crickets frequent soft ferns on the ground and on tree trunks in the Olaa forest, Hawaii (Perkins).

Paratrigonidium pacificum Scudder (1868: 139)

This cricket was abundant on ferns at Kainalu, Molokai.

ODONATA

Megalagrion oahuense (Blackburn) (1884: 415)

The extraordinary habits of the nymphs of this damselfly were disclosed by the studies of Dr. F. X. Williams, who found them in debris of rotten fern fronds, etc., on moist ground beneath a heavy growth of *Gleichenia* [*Dicranopteris*] on the east side of Manoa Valley, Oahu. The adult damselflies commonly hover about the locality.

DIPTERA

Family Agromyzidae

* **Undetermined** sp.

An unidentified agromyzid fly was reared from mines in fronds of *Marattia douglasii* (Presl) Baker in the forest near Mt. Olympus, Oahu.

FREYCINETIA ARNOTTI GAUDICHAUD

[now **F. arborea** Gaudichaud]

Family: Pandanaceae.

Hawaiian name: ieie.

The ieie vine has a small number of insects which actually feed on its stems or leaves, and a larger number which simply take advantage of the leaf axils as hiding places, or to prey on other insects found there. A sufficient amount of rain water is usually present in the leaf axils to furnish a permanently wet habitat.

LEPIDOPTERA

Family Xyloryctidae

* **Catamempsis decipiens** Walsingham (1907: 491)

The caterpillars of this moth feed gregariously at the base of the leaves in the crown of the plant. This, together with the wet condition usually pre-

vailing, produces a filthy environment attractive to nitidulid beetles, the species of which have not been determined. The moth caterpillars do not destroy the terminal bud, but do check normal growth. The moth occurs on Oahu, Molokai and Hawaii.

Family Diplosaridae

* **Euperissus cristatus** Butler (1881 : 402)

The elongate whitish caterpillars of this moth feed in the pith of dead *Freycinetia* stems. The species occurs on Oahu, Molokai and Hawaii.

HOMOPTERA

Family Delphacidae

* **Nesodryas freycinetiae** Kirkaldy (1908 : 203)

This long-winged, pale green leafhopper has been collected only a few times from *Freycinetia* leaves on Pacific Heights ridge and Mt. Tantalus, Oahu.

* **Nesosydne halia** Kirkaldy (1908 : 202)

This short-winged leafhopper is rare; it has been collected on Mt. Tantalus, Mt. Olympus and at Punaluu, Oahu.

* **Nesosydne anceps** Muir (1916 : 187)

Collected from *Freycinetia* at Glenwood, Hawaii.

HETEROPTERA

Family Lygaeidae

Several species of lygaeid bugs are found in the axils at the base of *Freycinetia* leaves; most, if not all, of them are probably attached to the ieie plant.

* **Neseis (Physonysius) molokaiensis** Usinger (1942 : 50)

Collected only on *Freycinetia* on the Mapulehu-Punaula ridge, Molokai.

Neseis (Trachynysius) saundersianus (Kirkaldy) (1902 : 163)

On all the islands, and on many different plants, including *Freycinetia.*

Nesoclimacias contracta contracta (Blackburn) (1888 : 347)

Collected on Mt. Konahuanui, Oahu, at leaf bases of *Freycinetia* and in decaying vegetation.

Nesoclimacias contracta picea Kirkaldy (1908 : 188)

Collected from ground litter and on *Freycinetia* in the Koolau Mountains, Oahu.

Nesocryptias villosa (White) (1878 : 371)

Collected from ground litter in damp places, under *Freycinetia* and other plants, on Kauai and Oahu.

Clerada apicicornis Signoret (1863: J-28)

An immigrant predaceous bug which occurs in many different situations on Kauai, Oahu and Hawaii. It has been collected in leaf axils of ieie.

Family Nabidae

* **Nabis procellaris** (Kirkaldy) (1908: 193)
* **Nabis silvicola** (Kirkaldy) (1908: 192)

These endemic bugs are predaceous; they have been taken on *Freycinetia* on Molokai.

Family Miridae

Sulamita lunalilo Kirkaldy (1902: 130) - - - - - - - - Kona, Hawaii
Pseudoclerada morai Kirkaldy (1902: 141) - - - - - - - - Molokai
* **Koanoa williamsi** Usinger (1937: 437) - - - - Mt. Lanihuli, Oahu

The three bugs have been collected from leaf bases of *Freycinetia* on their respective islands.

ORTHOPTERA

Family Gryllidae

* **Paratrigonidium freycinetiae** Perkins (1899: 16) - - - - Olaa, Hawaii
* **Paratrigonidium saltator** Perkins (1899: 16) - - - - - - - - Oahu

These small endemic crickets, according to Dr. Perkins' observations "live only at the bases of the leaves of *Freycinetia.*"

* **Leptogryllus nigrolineatus** Perkins (1899: 28) - Oahu; Maui; Hawaii
* **Leptogryllus similis** Perkins (1899: 28) - - - - - - - - - Hawaii
* **Leptogryllus fusconotatus** Perkins (1899: 29) - - - - - - - - Oahu

Dr. Perkins says of these three wingless crickets: "Their favorite hiding place is at the base of the leaves of *Freycinetia.*"

DERMAPTERA

Euborellia annulipes (Lucas) (1847: lxxxiv)
Chelisoches morio (Fabricius) (1775: 270)

These two earwigs occur on all the islands. They are commonly found in search of prey at the bases of *Freycinetia* leaves, but also occur in numerous other situations.

ODONATA

Family Coenagriidae

* **Megalagrion amaurodytum waianaeanum** (Perkins) (1899: 67)
* **Megalagrion koelense** (Blackburn) (1884: 417)

The naiads of these two damselflies live in the axils of *Freycinetia* leaves, where water and trash collect, and feed upon the insects and other animals which also frequent such places.

ISOPTERA

Neotermes connexus Snyder (1922 : 9)

This forest tree termite occurs on all of the islands, in many kinds of trees, feeding on dead branches and trunks. It has been found feeding in dead *Freycinetia* stems.

COLEOPTERA

Family Carabidae

Metromenus palmae (Blackburn) (1887 : 147)

This beetle is commonly found on Mt. Olympus, in axils of *Freycinetia* leaves where it searches for its prey.

Family Nitidulidae

Nesopetinus discedens (Sharp) (1878 : 133)
Eupetinus omalioides (Sharp) (1878 : 136)

These scavenger beetles are commonly found among debris at the leaf bases of *Freycinetia* on Mt. Olympus, Oahu. Other nitidulid species also probably have the same habitat.

GERANIUM ARBOREUM GRAY

GERANIUM TRIDENS HILLEBRAND

[**G. cuneatum** var. **tridens** (Hillebrand) Fosberg]

Family: Geraniaceae.

Hawaiian name: hinahina.

There are several shrubby native species of *Geranium*. The insect records in the literature are from *arboreum* and *tridens* (the latter erroneously given as *trifida*).

COLEOPTERA

Family Cerambycidae

* **Neoclytarlus geranii** Perkins (1935 : 417)

The larvae of this beetle were found feeding in dead stems of *Geranium tridens* in a small gulch near Puu Nianiau, at an elevation of about 6,000 feet on the windward slope of Mt. Haleakala, Maui.

HETEROPTERA

Family Lygaeidae

Nysius coenosulus Stål (1859 : 243)
Nysius lichenicola Kirkaldy (1910 : 540)
Nysius terrestris Usinger (1942 : 95)

These bugs were collected from *Geranium* on Haleakala, Maui. They occur on many other plants also, and are widely spread.

HOMOPTERA

Family Delphacidae

* **Nesosydne geranii** (Muir) (1921 : 515)

This leafhopper was collected from *Geranium arboreum* at 6,000 feet on Haleakala, Maui.

GLEICHENIA

See **Ferns (Filices)**, p. 85

GOULDIA spp.

Family: Rubiaceae.

Hawaiian name: manono.

There are several species and many varieties of *Gouldia.* Some of the insect records are from the species *coriacea* (Hooker and Arnott) Hillebrand, *elongata* Heller, and *terminalis* (Hooker and Arnott) Hillebrand, but according to the latest revision of the genus, there can be no certainty as to which species or varieties these records apply. Much depends upon the locality where the observations were made.

LEPIDOPTERA

Family Sphingidae

Hawaiina calida (Butler) (1881 : 317) Fig. 10

A sphingid egg was found on a *Gouldia* leaf in the upper part of Kaluanui Valley, Oahu; it hatched, but the larva died. The species was probably *calida,* the caterpillars of which have been found on several kinds of Hawaiian trees.

Family Geometridae

Scotorythra sp.

Two caterpillars were found on *Gouldia* in Haleauau Valley in the Waianae Mountains, Oahu, but they failed to mature. It is probable that they were the species *rara,* which has been found on many kinds of trees.

Family Gelechiidae

* **Aristotelia elegantior** Walsingham (1907 : 481)

This moth was reared from *Gouldia* fruits from Pauoa Flats, Oahu, and Kipuka Puaulu, Hawaii. Larvae from the latter locality were parasitized by *Eupelmus peles* Perkins (1910-H : 644) and *Atrometus* sp.

* **Aristotelia homoxyla** Meyrick (1928: 101)

This species was reared from stem galls on *Gouldia* from Mt. Olympus, Kaumuohona and Pauoa Flats, Oahu. From *Gouldia* stem galls found in Lulumahu Valley, Oahu, one moth issued and four individuals of the parasite, *Sierola tantalea* Fullaway (1920: 90)

* **Aristotelia xylospila** Meyrick (1928: 100) Fig. 20

This moth was reared from stem galls on *Gouldia* from Mt. Kaala, Oahu.

FIGURE 20. Twigs of *Gouldia* showing stem galls of **Aristotelia xylospila.**

* **Aristotelia multiformis** Meyrick (1928: 101)

This species is a leafminer in *Gouldia,* and has been reared from material from Mt. Olympus, Mt. Tantalus, Mt. Konahuanui, Palolo Valley, Pauoa Flats and Punaluu Valley, all on Oahu.

* **Aristotelia notata** Walsingham (1907: 480)

There is some doubt as to the identity of this record. Leaf mines were found in *Gouldia* at Waikolu, Kainalu and Kawela, Molokai, but no adults were reared. However, *notata* was described from the mountains of Molokai, so it is probable that these miners were of that species.

* **Aristotelia lanaiensis** Walsingham (1907 : 481)

This moth was reared from *Gouldia* fruits in the Hawaii National Park, Kilauea, Hawaii.

Family Carposinidae

* **Heterocrossa solutella** Walsingham (1907 : 672)

Reared from fruits of *Gouldia* from Palolo and Mt. Olympus, Oahu, and from Kilauea, Hawaii. These parasites were also reared from the material: *Pristomerus hawaiiensis* Perkins (1910-H : 680), *Eupelmus peles* Perkins (1910-H : 644), and *Sierola* sp.

COLEOPTERA

Family Carabidae

Derobroscus politus Sharp (1903 : 198)

A single specimen was collected from *Gouldia* on the Koolau crest above Kahana Valley, Oahu.

Family Ciidae

Cis signatus Sharp (1897 : 92)

This beetle was collected under *Gouldia* bark at Pupukea, Oahu.

Family Curculionidae

Oodemas aenescens Boheman (1859 : 138) - - - Mt. Olympus, Oahu
Oodemas aenescens kahanae Perkins (1935 : 75) - - - Kahana, Oahu
Oodemas angustum Blackburn (1878 : 75) - - - Haleauau Valley, Oahu
Oodemas sp. - - - - - - - - - - - - - - - - - Kainalu, Molokai

These weevils were all collected in dead *Gouldia* twigs.

Family Aglycyderidae

Proterhinus excrucians Perkins (1910 : 662) - - - Mt. Olympus, Oahu
Proterhinus adelus Perkins (1900 : 202)
- - - - Kaumuahona, Kaluanui Valley, Waipio ridge, Oahu
Proterhinus blackburni Sharp (1878 : 17) - - - Kukuiala Valley, Oahu
Proterhinus echidna Perkins (1910 : 658) - Mountains near Honolulu, Oahu
Proterhinus vestitus Sharp (1878 : 16) - - - - Haleauau Valley, Oahu
Proterhinus obscurus perobscurus Perkins (1910 : 663) - Pupukea, Oahu
Proterhinus platygonioides Perkins (1910 : 661) - - - Hauula, Oahu
Proterhinus ruficornis Perkins (1900 : 200) - - - Pauoa Flats, Oahu
Proterhinus vicinus Perkins (1900 : 212) - Kukuiala and Haleauau, Oahu
* **Proterhinus basalis** Sharp (1879 : 98) - - - - - - - - Kokee, Kauai
Proterhinus maculifer Perkins (1900 : 198) - - - - - Kokee, Kauai
Proterhinus laticornis Perkins (1900 : 196) - - - - - Kokee, Kauai
Proterhinus angustiformis Perkins variety (1900 : 197) Fig. 12
- - - - - - - Kokee, Kauai

* **Proterhinus perkinsi** Zimmerman (1940: 483) - Haleauau Valley, Oahu
Proterhinus sp. - - - - - - - - - - - - - - - - Kainalu, Molokai

All of the above have been collected from *Gouldia* by beating dead twigs; most of them occur on other trees as well. As yet, *P. perkinsi* has been collected only from *Gouldia.*

Family Anobiidae

Mirosternus sp.

This beetle was collected from dead *Gouldia* twigs in Haleauau Valley, Oahu.

HETEROPTERA

Family Lygaeidae

Oceanides nimbatus (Kirkaldy) (1910: 543)

Collected from *Gouldia* on Mt. Kaala, Pauoa Flats and Punaluu, Oahu. It is more common on trees other than *Gouldia.*

Sephora criniger (White) (1881: 57)

Pachybrachius nigriceps (Dallas) (1852: 577)

These two bugs have been reported from *Gouldia,* without locality records.

Family Miridae

* **Engytatus confusus** (Perkins) (1912: 729)

"Oahu, common in all stages on *Gouldia* in the mountains" (Perkins).

Orthotylus azalais Kirkaldy (1902: 136)

Collected on Kauai at Makaweli, 2,000 feet, and in the Waimea Mountains, 3,000 feet elevation. This bug has been recorded from *Gouldia* and *Coprosma.*

HOMOPTERA

Family Delphacidae

Nesosydne ipomoeicola Kirkaldy (1907: 120)

This leafhopper has been collected from *Gouldia* in South Kona, Hawaii, and on Mt. Kaala, Pauoa Flats and Punaluu, Oahu. It occurs also on numerous other plants.

Nesosydne sp.

An undetermined species of *Nesosydne* was taken on *Gouldia* at Waikolu, Molokai.

Family Cicadellidae

Nesophrosyne koleae (Kirkaldy) (1910: 562) - Haleauau Valley, Oahu
Nesophrosyne sp. - - - - - Haleauau Valley and Mt. Kaala, Oahu
Nesophrosyne sp. - - - - - - - - - - - - - - Kulani, Hawaii
Nesophrosyne sp. - - - - - - - - - - - - - - Kumuweia, Kauai

Collected on Kauai at Makaweli, 2,000 feet, and in the Waimea Mountains

Nesophrosyne sp. - - - - - - - - - - - - - - - Kainalu, Molokai

Several undetermined *Nesophrosyne* have been collected from *Gouldia* in the localities recorded.

Family Coccidae

Ceroplastes rubens Maskell (1892:214) - - - Kaluanui Valley, Oahu

Pseudococcus straussiae Ehrhorn (1916:237) - - Kaumuahona, Oahu

These coccids were collected on *Gouldia,* but occur mainly on other plants.

ISOPTERA

Neotermes connexus Snyder (1922:9)

This termite was found in dead *Gouldia* at Kainalu, Molokai.

GRASSES

See also **Isachne distichophylla** Munro, p. 110

Family: Graminaceae. [Gramineae]

There are many species of grasses found in the Hawaiian forests, in open places, on rocky ridges or in forest shade. Associated with these grasses are numerous insects.

LEPIDOPTERA

Family Phalaenidae

Cirphis unipuncta (Haworth) (1809:4)

The common armyworm feeds on grasses in general, including sugar cane; it occurs on all the islands.

* **Cirphis amblycasis** (Meyrick) (1899:141)

This native species is not common, but has been found on grass. It has occurred occasionally on sugar cane at Hamakua and Olaa, Hawaii.

Cirphis pyrrhias (Meyrick) (1899:141)

The caterpillars of this species feed mostly on sedges, but have been found on bunchgrass.

* **Agrotis crinigera** (Butler) (1881:321)

The larvae of this moth are general feeders on grassy areas at high elevations.

Feltia dislocata (Walker) (1856:112)

This insect has the same habits as the preceding species, but is not confined to grasses.

Laphygma exempta (Walker) (1856:355)

This is an immigrant species which feeds on grasses, including sugar cane, at lower elevations.

* **Acrapex exanimis** (Meyrick) (1899 : 153)

The caterpillar is a stem borer in *Panicum torridum* Gaudichaud at Koko Head, Oahu (Swezey, 1928: 179-182). Its work has been found on *Panicum kaalense* Hitchcock in Haleauau Valley, in the Waianae Mountains of Oahu, and adult moths have been taken at Kunia, an adjoining region.

Family Plusiidae

* **Hypenodes altivolans** (Butler) (1880 : 9)

This moth has been bred from *Paspalum conjugatum* Bergius and other grasses, Mt. Tantalus, Oahu.

* **Nesamiptis plagiota** Meyrick (1899 : 156)

Reared from grasses, Iao Valley, Maui.

* **Nesamiptis obsoleta** (Butler) (1887 : 47)

Reared from *Paspalum conjugatum,* Mt. Tantalus, Oahu; it feeds on other grasses also.

Plusia chalcites (Esper) (1786 : 447)

Panicum torridum was found eaten by this caterpillar at Koko Head, Oahu. The eggs and cocoons of the moth have been found on the same grass.

Family Pyraustidae

* **Omiodes accepta** (Butler) (1887 : 49)

Reared from *Paspalum conjugatum* and *Oplismenus compositus* (Linnaeus) Beauvois on Mt. Tantalus, Oahu. It attacks other grasses also, and is the well known leafroller of sugar cane.

* **Omiodes giffardi** Swezey (1921 : 469)

The larvae are leafrollers on *Isachne distichophylla* Munro at Kilauea, Hawaii.

* **Omiodes localis** (Butler) (1879 : 271)

Reared from a leafroller on *Panicum pruriens* [=*Digitaria pruriens* (Trinius) Buse] in Makiki Valley, Oahu. It occurs also on *Oplismenus* and other grasses, and has been found occasionally on sugar cane.

* **Omiodes demaratalis** (Walker) (1859 : 1009)

Reared from *Panicum torridum* at Koko Head, Oahu. It occurs also on *Panicum pruriens, Paspalum conjugatum* and other grasses.

* **Omiodes continuatalis** (Wallengren) (1860 : 175)

Reared from *Heteropogon contortus* (Linnaeus) Beauvois on Diamond Head and Punchbowl crater, Honolulu, Oahu.

Family Tortricidae

* **Bactra** sp.

This is an unnamed species, the larvae of which bore the stems of *Isachne distichophylla* Munro at Kilauea, Hawaii, where the "dead hearts"

caused by its work are common. It has been confused with *Bactra straminea* (Butler) (1881 : 393), a larger species which bores the stems of the large sedge, *Cladium angustifolium* (Gaudichaud) Bentham and Hooker in the same region. The larvae of the two species are noticeably different.

Family Cosmopterygidae

Pyroderces rileyi (Walsingham) (1882 : 198)

The pink caterpillars of this immigrant moth were very abundant in "dead hearts" of *Panicum torridum* stems bored by *Acrapex exanimis* at Koko Head, Oahu. Adult moths were reared.

* **Batrachedra microstigma** Walsingham (1907 : 510)

This tiny moth was reared from larvae in flower heads of *Eragrostis* at Kolekole Pass, Oahu, and from a larva boring in an *Eragrostis* stem on nearby Mt. Kaala. Larvae were common boring in stems of the same grass on Puu Kalena, Oahu, which may have been this species, but no adults were reared.

Family Lyonetiidae

* **Bedellia oplismeniella** Swezey (1912 : 184)

This is a common leafminer in *Oplismenus compositus* on Tantalus, Oahu and has also been reared from leaves of *Panicum torridum* at Koko Head. Material from the latter locality was parasitized by *Euderus metallicus* (Ashmead) (1901 : 327).

HOMOPTERA

Family Delphacidae

* **Kelisia eragrosticola** Muir (1919 : 85)

This leafhopper was collected from *Eragrostis variabilis* (Gaudichaud) Stendel in Iao Valley, Maui.

* **Kelisia swezeyi** Kirkaldy (1910 : 578)

Collected from *Eragrostis variabilis* in Nuuanu Valley, Palehua, Puu Kaua and Kolekole Pass, Oahu, and in Olokele canyon, Kauai.

* **Kelisia emoloa** Muir (1917 : 311)

This species was collected from *Eragrostis variabilis* in Niu Valley, Kuliouou, Palolo Valley, Kaneohe hills and the Waianae Mountains, Oahu.

* **Kelisia sporobolicola** Kirkaldy (1910 : 578)

This species occurs on the beach grass, *Sporobolus virginicus* (Linnaeus) Kunth wherever this grass is found on Kauai, Oahu, Maui and Hawaii. Its eggs are parasitized by *Anagrus frequens* Perkins (1905 : 198) and preyed upon by the bug *Cyrtorhinus mundulus* (Breddin) (1896 : 106), introduced from Fiji and Australia to prey upon sugar cane leafhopper eggs.

* **Kelisia sporobolicola immaculata** Muir (1921 : 509)

Collected on *Deschampsia australis* Nees at Kilauea, Hawaii.

Material from the latter locality was parasitized by *Euderus metallicus* (Ash-

Perkinsiella saccharicida Kirkaldy (1903: 179)

This is the immigrant sugar cane leafhopper, which feeds on several kinds of grass.

Peregrinus maidis (Ashmead) (1890: 323)

The corn leafhopper also feeds on some of the wild grasses.

Family Cicadellidae

* **Nesolina lineata** Osborn (1935: 60)

Collected from *Eragrostis variabilis* at Diamond Head, Oahu, and at Kilauea, Hawaii.

* **Balclutha timberlakei** (Osborn) (1935: 59)

Collected on *Eragrostis variabilis* in Niu Valley, Kuliouou, Palolo Valley, Waimanalo, Kaneohe, Nuuanu Pali, Puu Kaua and Puu Hapapa, Oahu, and in Iao Valley, Maui.

* **Balclutha volcanicola** (Kirkaldy) (1910: 574)

On *Eragrostis variabilis* at Kilauea, Hawaii.

* **Balclutha hospes** (Kirkaldy) (1910: 574)

On all of the islands; on *Cynodon dactylon* (Linnaeus) Persoon and *Panicum barbinode* [now called *Panicum purpurascens* Raddi].

Stragania robusta (Uhler) (1877: 467)

An immigrant species, on *Cynodon dactylon* in Honolulu and at Kawela Bay, Oahu.

Deltocephalus hospes Kirkaldy (1904: 177)

An immigrant species which occurs commonly on *Cynodon dactylon* on Kauai, Oahu, Molokai and Hawaii.

Draeculacephala minerva Ball (1927: 36)

On *Cynodon dactylon* and other grasses including rice and sugar cane, and sedges. An immigrant species, generally distributed on Oahu.

Family Cercopidae

Philaenus spumarius (Linnaeus) (1758: 437)

This immigrant spittle-bug has been found at Kilauea, Hawaii, on a long list of hostplants, including *Cynodon dactylon* and *Panicum purpurascens* Raddi.

Family Aphididae

Aphis maidis Fitch (1856: 318)

The corn aphis has been found on many kinds of grasses.

Rhopalosiphum prunifoliae (Fitch) (1854: 826)

This aphid was found on *Cynodon dactylon* at Kilauea, Hawaii.

An immigrant species which occurs commonly on *Cynodon dactylon* on

Family Coccidae

* **Antonina graminis** (Maskell) (1897 : 244)

This scale insect occurs on *Cynodon dactylon* and many other lowland grasses. It clusters at the base of the stems, and among the roots.

* **Odonaspis ruthae** Kotinsky (1915 : 102)

This scale is found on *Cynodon* and on *Eragrostis.*

* **Trionymus insularis** Ehrhorn (1916 : 236)

This grass mealybug is widely distributed. It occurs on *Cynodon dactylon* and *Chaetochloa verticillata* [now called *Setaria verticillata* (Linnaeus) Beauvois] on the Oahu lowlands, on *Panicum torridum* at Koko Head, *Eragrostis variabilis* and *Paspalum conjugatum* on ridges, and on *Deschampsia australis* at 6,000 feet on Mauna Loa, Hawaii. The ladybird beetles, *Scymnus debilis* LeConte and *Scymnus ocellatus* Sharp commonly feed on *T. insularis,* as do also the larvae of *Gitona perspicax* (Knab) (1914 : 166). Parasites of *T. insularis* are *Anagyrus nigricornis* Timberlake (1919 : 197), *Anagyrus swezeyi* Timberlake (1919 : 199) and *Xanthoencyrtus apterus* Timberlake (1919 : 201).

Pseudococcus brevipes (Cockerell) (1893 : 267)

The pineapple mealybug infests numerous kinds of plants, some grasses among them.

HETEROPTERA

A considerable number of bugs are associated with grasses in one way or another, mostly in the lowlands. Most of them are immigrants; a few are native and are attached to grasses.

Family Cydnidae

Geotomus pygmaeus (Dallas) (1851 : 120)

This black bug is common in litter and under low plants; it has been found feeding at the roots of *Paspalum fimbriatum* Humboldt, Bonpland and Kunth in Honolulu.

Family Nabidae

Nabis blackburni White (1878 : 373)

This predaceous bug has been found on *Deschampsia australis* Nees, and on many other plants.

Family Lygaeidae

Nysius lichenicola Kirkaldy (1910 : 540)

Eragrostis is the preferred host of this bug which occurs on many other plants also.

* **Nysius longicollis** Blackburn (1888 : 344)

This species occurs on *Eragrostis* and is widely distributed: Nualolo and Halemanu, Kauai; Koko Head and Mt. Tantalus, Oahu; Puunene and Olo-

walu, Maui; and on Hawaii at Puako, along the upper Hamakua ditch trail, the Kohala Mountains, and Humuula.

Nysius nigriscutellatus Usinger (1942: 102)

A widely distributed species found on many plants; it has been taken on *Eragrostis*.

Nysius coenosulus Stål (1859: 243)

This is another widely distributed species found on many plants; among them is *Eragrostis leptophylla* Hitchcock.

Geocoris pallens Stål (1874: 236)

Geocoris puncticeps (Say) (1832: 19)

These two rather recent immigrant bugs occur on *Cynodon dactylon* and other lowland grasses.

* **Nesomartis psammophila** Kirkaldy (1907: 245)

Reclada moesta (White) (1878: 370)

Both of these bugs are associated with grasses, with *Eragrostis* the preferred host, but they occur on other plants also. *Nesomartis psammophila* is an endemic species, the other, an immigrant.

* **Pseudocymus giffardi** Van Duzee (1936: 224)

Collected from *Eragrostis* at Nuuanu Pali and on Mt. Lanihuli, Oahu. The species is not known from any other plant.

Nesocymus calvus (White) (1881: 56)

This insect feeds chiefly on sedge on Oahu, but has been recorded from *Eragrostis*.

Pachybrachius vincta (Say) (1832: 16)

A widely distributed immigrant in the Islands; it has been recorded on *Cynodon dactylon*, as well as on other plants.

Family Nabidae

Nabis capsiformis Germar (1837: 132)

Widely distributed in the Hawaiian Islands, this predaceous species is found on *Cynodon dactylon* and other grasses, as well as on many other plants. Its eggs are parasitized by *Polynema reduvioli* Perkins (1905: 196).

Nabis blackburni White (1878: 373)

A widely distributed predaceous species on many plants. It has been recorded from *Deschampsia australis* at Kilauea, Hawaii, as well as from other grasses.

Family Miridae

* **Halticus chrysolepis** Kirkaldy (1904: 179)

Common on *Cynodon dactylon* in Honolulu, and on *Digitaria henryi* Rendle and other grasses. It has been found on sedges also.

Pachybrachius vincta (Say) (1832: 16)

* **Oronomiris hawaiiensis** Kirkaldy (1902: 144)

This species occurs on most of the islands on *Chloris paraguayensis* Steudel, *Echinochloa colonum* (Linnaeus) Link, *Cynodon dactylon, Sporobolus virginicus* and some of the native grasses.

Leucopoecila albofasciata Reuter (1907: 26)

An immigrant species found on *Cynodon dactylon* and on many garden plants on Oahu.

ORTHOPTERA

Family Acrididae

Oxya chinensis (Thunberg) (1815: 253)

This is an immigrant from China which arrived on Oahu before 1892, later spreading to Kauai, Maui and Hawaii. It feeds on many grasses, and was sometimes destructive to young sugar cane before the introduction in 1930-1931 of an egg parasite from Malaya: *Scelio pembertoni* Timberlake (Proc. Haw. Ent. Soc., 8: 155, 1932).

Family Tettigoniidae

Conocephalus saltator (Saussure) (1859: 208)

An immigrant from tropical America arriving before 1895; it is now widely spread in the Islands. It is a grass feeder, and at one time damaged rice by feeding on the immature grains in the "milk" stage; it also feeds on the blossoms of *Canna, Ipomoea* and other plants. *C. saltator* is predaceous to some extent on aphids, mealybugs, sugar cane leafhoppers, etc. Its eggs are placed in clusters beneath leafsheaths of plants like *Canna,* sugar cane and (once) *Panicum torridum. Centrodora xiphidii* (Perkins) (1906: 264) is a parasite of the eggs.

THYSANOPTERA

Many species of thrips, probably all immigrants, have been collected on various grasses, mainly in the lowlands.

* **Plesiothrips panicus** (Moulton) (1929: 61)

On sugar cane and many other grasses; occurs on Kauai, Oahu and Molokai.

* **Anaphothrips obscurus** (Muller) (1776: 96)

Recorded from sugar cane and sudan grass in Honolulu, Oahu.

* **Anaphothrips swezeyi** Moulton (1928: 107)

On many grasses including sugar cane, Kauai, Oahu and Hawaii.

* **Limothrips cerealium** (Haliday) (1836: 445)

The corn thrips, found on various grasses.

An immigrant from tropical America arriving before 1895; it is now widely

* **Bregmatothrips venustus** Hood (1912: 67)

On *Cynodon* and *Echinochloa crus-galli* (Linnaeus) Beauvisage.

Haplothrips gowdeyi (Franklin) (1908: 724)

On *Eragrostis variabilis, E. cilianensis* (Allioni) Link and many other plants.

* **Chirothrips fulvus** Moulton (1936: 182)

On *Paspalum orbiculare* Forster and *P. dilatatum* Poiret.

Chirothrips mexicanus Crawford (1909: 114)

On *Eragrostis* and many other grasses.

* **Chirothrips spiniceps** Hood (1915: 12)

On corn, sugar cane and several other immigrant grasses.

* **Aptinothrips rufa** (Gmelin) (1788: 2224)

On *Holcus lanatus* Linnaeus at Kilauea, Hawaii.

Thrips tabaci Lindeman (1888: 15)

Collected from *Cenchrus, Digitaria* and other grasses, as well as from some non-grasses.

Karnyothrips meleleuca (Bagnall) (1911: 61)

This thrips is predaceous on red spiders; it has been collected on Job's tears, sugar cane, *Digitaria sanguinalis* (Linnaeus) Scopoli, *Tricholaena repens* (Willdenow) Hitchcock, and many other plants.

* **Thrips saccharoni** Moulton (1928: 111)

On sugar cane and *Panicum purpurascens.*

* **Frankliniella williamsi** Hood (1915: 19)

On corn, sorghum and *Panicum purpurascens.*

HYMENOPTERA

Family Eurytomidae

* **Harmolita swezeyi** Phillips and Poos (1922: 350)

The larva of this wasp feeds in the stems of *Cynodon dactylon.* Although it was described from Honolulu, it probably is an immigrant; it occurs on Kauai, Oahu and Hawaii. An undetermined, wingless eupelmid was reared from *H. swezeyi* at Kaimuki, Oahu.

HEDYOTIS

See **Kadua,** p. 112

HETEROPOGON

See **Grasses,** p. 98

HIBISCUS ARNOTTIANUS GRAY
HIBISCUS TILIACEUS LINNAEUS

Family: Malvaceae.

Hawaiian names: hauhele; hau.

LEPIDOPTERA

Family Plusiidae

* **Cosmophila sabulifera** (Guénée) (1852 : 404)

This green looper caterpillar feeds on the leaves of both species of *Hibiscus,* and also sometimes on the cultivated varieties. It is known from all the islands.

Family Pyraustidae

* **Phlyctaenia chytropa** Meyrick (1899 : 210)

The green caterpillars of this moth feed between webbed leaves of *H. arnottianus* on Mt. Tantalus, Oahu. The species has been collected in the Waianae Mountains of Oahu, and also on Kauai, where the caterpillars undoubtedly feed on native *Hibiscus.*

Family Tortricidae

* **Crocidosema marcidella** (Walsingham) (1907 : 678)

The larvae of this moth feed on the seeds of *H. arnottianus* on Mt. Tantalus, Oahu. It has also been collected in the Waianae Mountains, where it feeds in the seed capsules of native *Hibiscus.*

Family Gracilariidae

* **Parectopa hibiscella** (Swezey) (1913 : 279)

This is a leafminer of *H. arnottianus* on Mt. Tantalus and of cultivated *Hibiscus* hybrids in the lowlands. It is usually scarce, but in March, 1950, a severe infestation occurred on a hybrid *Hibiscus* hedge on the grounds of the plant quarantine station in Honolulu. In June, 1950, a light infestation of this species was observed on roadside *Hibiscus* at Niu, Oahu. The larvae leave the mines when through feeding and spin their oval, white cocoons on the leaf surface. The following immigrant insects, which parasitize other leafminers also, have been reared from *P. hibiscella:*

Euderus metallicus (Ashmead) (1901 : 327)
Sympiesis vagans (Timberlake) (1926 : 37)
Pnigalio externa (Timberlake) (1927 : 522)
Achrysocharis fullawayi (Crawford) (1913 : 348)

The most common of the above parasites is *Sympiesis vagans;* its egg is placed on the nearly full-grown host larva. Upon hatching the parasite feeds externally and pupates *in situ,* issuing when mature, through a small, round hole in the mine.

* **Parectopa hauicola** (Swezey) (1910: 106) Fig. 19

This species is a leafminer in *H. tiliaceus,* or hau. It occurs on Kauai, Oahu and Hawaii, practically wherever the hau tree is found. Often very scarce, this moth at other times may be very abundant; sometimes as many as 60 mines can be found in a large leaf. Even so, the plant does not seem to be severely injured, for it is constantly producing new foliage. The larva issues from the mine to form its oval, white cocoon, usually on the upper leaf surface. In cases where mines are numerous, most of the larvae are parasitized when small, and only about one-third of them attain full growth. The following parasites of *P. hauicola* are listed in the order of their abundance in records of rearings from material collected at frequent intervals throughout the greater part of the year:

Euderus metallicus (Ashmead) (1901: 327)
Pnigalio externa (Timberlake) (1927: 522)
Closterocerus sp., probably **utahensis** Crawford (Proc. U.S. Nat. Mus., 43: 175, 1912)
Apanteles bedelliae Viereck (1911: 174) (Issues from the cocoon)
Sympiesis vagans (Timberlake) (1926: 37)
Eulophid ?
Eupelmid ?
Undet. parasite which feeds externally on the pupa.

Parectopa hibiscella and *P. hauicola* are attached to their respective host-plants. I have never found either on any other host.

COLEOPTERA

Family Aglycyderidae

Proterhinus vestitus Sharp (1878: 16)
Proterhinus pachycnemis Perkins (1900: 121)
Proterhinus myrsineoides Perkins (1910: 659)

All of these beetles have been collected on native *Hibiscus* in several localities on Oahu, but occur more commonly on other trees.

Family Cerambycidae

Gelonaetha hirta (Fairmaire) (1850: 60)
Oopsis nutator (Fabricius) (1787: 142)
Sybra alternans (Wiedemann) (1823: 111)
Prosoplus bankii (Fabricius) (1775: 176)

Of these four immigrant longhorn beetles, the first three have been reared from hau (*Hibiscus tiliaceus*), the last, from cultivated *Hibiscus.*

HOMOPTERA

Family Aleyrodidae

* **Pealius hibisci** (Kotinsky) (1907: 96)

This aleyrodid is sometimes very abundant on native hau (*H. tiliaceus*)

and the cultivated varieties of *Hibiscus;* it occurs less commonly on *H. arnottianus.* The following parasites have been reared from it:

Prospaltella transvena Timberlake (1926: 312)
Eretmocerus corni Haldeman (1850: 110)
Encarsia pergandiella Howard (1907: 78). (*Encarsia versicolor* Girault is a synonym).

Family Aphididae

Aphis gossypii Glover (1877: 36)

This aphid commonly infests buds and new leaves of cultivated *Hibiscus* hybrids, and to a less degree, *Hibiscus tiliaceus.* It is preyed upon by the ladybird beetles, *Coelophora inaequalis* (Fabricius) (1775: 80), *Scymnodes lividigaster* (Mulsant) (1853: 286) and *Olla v-nigrum* (Mulsant) (1866: 64)

Myzus circumflexus (Buckton) (1876: 130)

This aphid has been recorded from cultivated *Hibiscus.*

Toxoptera aurantii (Boyer de Folscolombe) (1841: 178)

This species has been recorded on *Hibiscus arnottianus* and *H. rosasinensis* Linnaeus.

Family Coccidae

* **Clavicoccus tribulus** Ferris (1948: 174)

This coccid is known from a single small collection, from "native *Hibiscus,*" Kaluanui stream, Oahu, May 14, 1946 (F. A. Bianchi).

Pseudococcus adonidum (Linnaeus) (1758: 455)
Pseudococcus vastator (Maskell) (1895: 65)
Ferrisiana virgata (Cockerell) (1893: 178)
Asterolecanium pustulans (Cockerell) (1892: 143)
Saissetia nigra (Nietner) (1861: 9)
Pulvinaria mammeae Maskell (1895: 59)
Duplaspidiotus claviger (Cockerell) (1901: 226)
* **Duplaspidiotus tesseratus** (de Charmoy) (1899: 23)
Pinnaspis buxi (Bouché) (1851: 111)
Pinnaspis strachani (Cooley) (1899: 54)
Howardia biclavis (Comstock) (1883: 98)

All of the immigrant coccids listed above have been recorded from cultivated varieties of *Hibiscus. Pseudococcus vastator* and *Pinnaspis buxi* have been collected also from *H. arnottianus. Pinnaspis strachani,* the *Hibiscus* snow scale, is often very destructive to hedges of that plant.

Holcus

See Grasses, p. 98

* **Clavicoccus tribulus** Ferris (1948: 174)

ILEX ANOMALA (HOOKER AND ARNOTT) HELLER

Family: Aquifoliaceae.

Hawaiian name: kaawau.

Synonym: Byronia sandwicensis Endlicher.

For most of the earlier insect records of this tree, the name *Byronia sandwicensis* has been used, following Hillebrand's "FLORA OF THE HAWAIIAN ISLANDS"; *Ilex anomala* is the name more recently used. This tree is usually quite free from insect attack, and almost all the insects taken on it are merely casual, or such as occur on other trees also. The majority are immigrant species.

LEPIDOPTERA

Family Hydriomenidae

Eucymatoge sp.

Caterpillars found feeding on terminal foliage of *Ilex* on Mt. Kaala, Oahu, failed to mature, but appeared to be like others known to be of the genus *Eucymatoge*.

COLEOPTERA

Family Anobiidae

Xyletobius timberlakei Perkins (1921 : 505)

This beetle was collected from *Ilex* at Kealakekua, Kona, Hawaii. It is more common on *Straussia*.

Family Scolytidae

* **Xyleborus tantalus** Schedl (1941 : 114)

This ambrosia beetle has been collected from *Ilex* on Mt. Tantalus, Oahu, and in South Kona, Hawaii. It is only doubtfully attached to this tree, but as yet has not been recorded from any other plant.

Xyleborus testaceus (Walker) (1859 : 260)

Xyleborus pseudoangustatus Schedl (1941 : 123)

These beetles were collected from *Ilex* at Haelaau, Maui; they occur on other trees also.

Miscellaneous

Thoracophorus sp.

Antilissus aper Sharp (1879 : 86)

Ptiliodes pulchellus Scott (Sharp and Scott, 1908 : 537)

Dryophthorus distinguendus Perkins (1900 : 140)

Dryophthorus declivis Sharp (1878 : 23)

Dryophthorus modestus Sharp (1878 : 23)

Dryophthorus oahuensis Perkins (1900 : 143)

Dryophthorus insignis Sharp (1878 : 24)

All of the miscellaneous beetles listed above were collected from rotten trunks and stumps of *Ilex* on Kahauiki ridge, Oahu. They are commonly found in dead trees.

HOMOPTERA

Family Cercopidae

Philaenus spumarius (Linnaeus) (1758: 437)

This spittle-insect is an immigrant recently established in the Kilauea region on Hawaii. *Ilex anomala* is one of a long list of foodplants on which its nymphs have been found.

Family Aphididae

Toxoptera aurantii (Boyer de Fonscolombe) (1841: 178)

This aphid has been recorded from *Ilex* as well as from a number of other forest trees in Hawaii.

HETEROPTERA

Family Lygaeidae

Nesocryptias villosa (White) (1878: 37)

Geocoris puncticeps (Say) (1832: 19)

Both these bugs have been collected on *Ilex*, but their occurrence there was probably incidental.

Family Miridae

Nesiomiris hawaiiensis Kirkaldy (1902: 145)

This elongate green bug has been recorded from *Byronia*, but its specific identity is not clear. It is possible that the *Nesiomiris* on that host tree consist of different species on the different islands. The bugs occur on other trees also.

ISOPTERA

Neotermes connexus Snyder (1922: 9)

This termite occurs in dead wood of *Ilex* and other forest trees.

ISACHNE DISTICHOPHYLLA MUNRO

See also **Grasses**, p. 98

Family: Graminaceae. [Gramineae]

Hawaiian name: ohe.

This native grass is common in the Kilauea region of Hawaii, especially near Kilauea Iki.

LEPIDOPTERA

Family Pyraustidae

* **Omiodes giffardi** Swezey (1921 : 469)

The leafroller caterpillar of this moth was reared from *Isachne* at Kilauea, Hawaii.

Family Tortricidae

Bactra straminea (Butler) (1881 : 393), or a new species

On one occasion *Isachne* grass in the vicinity of Kilauea Iki, had many "dead hearts" caused by the caterpillars of a moth boring in the stems. Most of the bored stems had no insect within, but a few contained caterpillars. These differed from larvae of *straminea,* which bore in the stems of *Cladium,* a sedge. A moth which issued from *Isachne* also was different, and was like moths collected earlier in a light trap in the Hawaii National Park which had been determined as *straminea,* a variable species. However, it is possible that the moth from *Isachne* is a new species distinct from *straminea,* because not only do the larvae and adults differ in appearance, and the adults in size (the moth from *Isachne* is smaller than *straminea*), but the host-plants are different, one a grass, the other a sedge.

JAMBOSA MALACCENSIS (LINNAEUS) DE CANDOLLE

Family: Myrtaceae.

Hawaiian name: ohia ai.

This tree was brought here by the Hawaiians in their early migrations, and has spread into the lower valleys, where it is often found in dense stands along streams. No insect is definitely attached to it, and only a few are even associated with it. Apparently no insects were introduced with the tree when it was brought from the south Pacific islands. Some of the earlier insect records are under the botanical name *Eugenia,* which is the one used for this tree by Dr. Hillebrand.

COLEOPTERA

Family Curculionidae

Acalles eugeniae Perkins (1916 : 249)

This weevil was so named because the first specimens were reared from a dead branch of the tree then known as *Eugenia,* from Manoa Valley, Oahu. Later it was reared from dead wood of other trees in Palolo Valley and on Mt. Tantalus, Oahu.

Family Scolytidae

Xyleborus confusus Eichhoff (1867: 407) - - - - - - - Hauula, Oahu
Xyleborus testaceus (Walker) (1859: 260) - - - - Manoa Valley, Oahu
Crossotarsus externedentatus Fairmaire (1850: 51) - - - - - - - Oahu

These scolytids all occur in many kinds of trees.

DIPTERA

Family Tephritidae

Ceratitis capitata (Wiedemann) (1824: 55)
Dacus dorsalis Hendel (1912: 18)

Both these notorious fruit flies have been reared from *Jambosa* fruits.

JOINVILLEA ADSCENDENS GAUDICHAUD

[now called **Joinvillea gaudichaudiana** Brongniart and Grisebach]

Family: Flagellariaceae.

Hawaiian name: ohe.

Only one species of insect has been reared from this rare, bamboo-like plant.

LEPIDOPTERA

Family Pyraustidae

* **Omiodes asaphombra** Meyrick (1899: 202)

The caterpillars of this moth infest the inflorescence and upper parts of the plant, webbing the leaves together. Plants so infested have been found in Manoa, Pacific Heights, Waiahole and Kahana, Oahu; Kainalu, Molokai; and in the Alakai swamp and at Hanamaulu, Kauai. The parasite *Casinaria infesta* (Cresson) (1872: 172) has been reared from the caterpillar.

KADUA spp.

[now placed in genus **Hedyotis**]

Family: Rubiaceae.

There are more than a dozen species of *Kadua* in Hawaii. They are mostly erect shrubs, but some are straggly vines. Specific host records are mainly confined to a few species.

LEPIDOPTERA

Family Sphingidae

Hawaiina perkinsi (Swezey) (1920: 379) Fig. 10

This moth was reared from a green caterpillar on *Kadua* on Malamalama

ridge, and Waialae Iki Valley, Oahu. The parasite, *Trichogramma semifumatum* Perkins (1910-H: 659) has been reared from the egg.

Family Carposinidae

* **Heterocrossa crinifera** Walsingham (1907: 657)

This moth was reared from fruit capsules of *Kadua* on Mt. Tantalus, Oahu.

Family Gelechiidae

* **Aristotelia compsodelta** Meyrick (1928: 99)

Reared from *Kadua* fruit capsules on Mt. Tantalus, Oahu. The parasites *Pristomerus hawaiiensis* Perkins (1910-H: 680) and *Pnigalio externa* (Timberlake) (1927: 522) were reared from its caterpillars.

* **Aristotelia thurifica** Meyrick (1928: 102)

This is a leafminer the adult of which was reared from *Kadua acuminata* Chamisso and Schlechtendahl [now placed in the genus *Hedyotis*] from Mt. Tantalus, Mt. Olympus and Palolo Valley, Oahu. The parasite, *Euderus metallicus* (Ashmead) (1901: 327) was reared from the larva.

Family Gracilariidae

Parectopa naenaeiella Swezey (1940: 462)

This leafminer was once reared from *Kadua* at Kumuweia, Kauai, but *Dubautia* is its true hostplant.

Family Lycaenidae

Lycaena blackburni (Tuely) (1878: 9)

This butterfly was once reared from a caterpillar on *Kadua* on the Manoa cliff trail, Mt. Tantalus, Oahu, but it is most common on *Acacia koa.*

COLEOPTERA

Family Aglycyderidae

Proterhinus adelus Perkins (1900: 202)

This beetle has been recorded from *Kadua,* but occurs principally on other plants.

HOMOPTERA

Family Delphacidae

Nesosydne lobeliae Muir (1916: 212)

This leafhopper has been recorded on *Kadua* on Mt. Olympus, Oahu, but *Lobelia* is its preferred hostplant.

Family Cicadellidae

* **Nesophrosyne albicosta** Osborn (1935: 19)

This treehopper was collected on Manoa cliff trail, Mt. Tantalus, Oahu, on *Kadua acuminata,* which apparently is its true hostplant.

ISOPTERA

Neotermes connexus Snyder (1922: 9)

This forest termite has been recorded from *Kadua* at Waipa ridge, Kauai.

LOBELIOIDEAE

(Tribe of the family **Campanulaceae**)

Hawaiian names: oha wai; haha or oha.

There are numerous plant species in this tribe in the Hawaiian Islands, most of them shrubs or small trees. The insects recorded from these plants pertain, for the most part, to the genera *Clermontia, Cyanea, Lobelia* and *Rollandia,* and in the pages to follow, the records are grouped separately by plant genus. However, a few insects are from hostplants unidentified as to genus, and these records are given immediately below.

COLEOPTERA

Family Nitidulidae

Orthostolus robustus Sharp (1878: 134)

This and several undetermined species of nitidulid beetles have been collected from various lobelioid species. These insects are often numerous in flowers, fruits and in decaying bark.

HETEROPTERA

Family Miridae

Several undetermined species of plant bugs belonging to this family have been collected from lobelioids.

HOMOPTERA

Family Cicadellidae

Nesophrosyne spp.

Several species of treehoppers, as yet unidentified, have been taken on lobelioid plants.

CLERMONTIA spp.

Family: Campanulaceae.

Although most of the insect records for this plant have been given only as *Clermontia,* it is probable that in each case the species was *macrocarpa*

Gaudichaud or *kakeana* Walpers, two names applied to the same common plant. Unless another species is given, the hostplant is this species.

COLEOPTERA

Family Carabidae

Numerous undetermined carabid beetles have been collected on Mt. Tantalus, Oahu, from hollow dead *Clermontia* stems, where they were either hiding or in search of prey.

Family Elateridae

* **Anchastus swezeyi** Van Zwaluwenburg (1931 : 489)

The larvae of this native species were numerous in dead *Clermontia macrocarpa* stems at Nahiku, Maui.

Undetermined sp.

Elaterid larvae were found in rotten stems at Kainalu, Molokai, but were not reared.

Family Monotomidae

Hesperobaenus capito (Fairmaire) (1850 : 54)

Collected from dead *Clermontia* stems in Palolo Valley, Oahu.

Family Anthribidae

* **Araecerus varians** Jordan (1946 : 520)

Collected from *Clermontia* in South Kona, Hawaii.

Family Nitidulidae

Orthostolus prosternalis Sharp (1908 : 454)

Collected from *C. arborescens* (Mann) Hillebrand on the Kula pipe line trail, Maui.

Family Curculionidae

Oodemas aenescens Boheman (1859 : 138) - - - - - Mt. Olympus, Oahu
Oodemas corticis Perkins (1900 : 168) - Kainalu, Molokai ; Olinda, Maui
Dryophthorus crassus Sharp (1878 : 23)
Dryophthorus squalidus Sharp (1878 : 22) - - - - - - Kainalu, Molokai
Dryophthorus gravidus Sharp (1878 : 22)
- - - - - Puu Kalena, Oahu ; Kainalu, Molokai
Dryophthorus insignis Sharp (1878 : 24)

These weevils have been collected from dead *Clermontia* stems in the localities listed ; *Oodemas corticis* was in a decayed stem of *C. grandiflora* Gaudichaud.

Family Aglycyderidae

Proterhinus vestitus Sharp (1878 : 16) - - - - - - - Mt. Tantalus, Oahu

* **Proterhinus deceptor clermontiae** Perkins (1928: 198) - - Pauoa, Oahu
From dead stems, the latter insect on *C. grandiflora.*

Family Scolytidae

Ericryphalus sylvicolus (Perkins) (1900: 181)
This beetle was abundant in dead *Clermontia* stems in Manoa Valley, Oahu.

Family Anobiidae

Xyletobius timberlakei Perkins (1921: 505)
Collected from dead twigs of *Clermontia coerulea* Hillebrand at Kealakekua, Hawaii.

LEPIDOPTERA

Family Xylorictidae

Thyrocopa sp.
This moth was reared from larvae in dead stems of *C. kakeana,* on Mt. Tantalus, Oahu. A parasite, *Agathis hawaiicola* (Ashmead) (1901: 361), has been reared from this species.

Family Carposinidae

* **Heterocrossa olivaceonitens** Walsingham (1907: 655)
This moth was reared from fruit and flower buds of *C. kakeana* on Mt. Tantalus, Oahu, and from fruit of *C. arborescens* at Haelaau, Maui.
Heterocrossa gemmata Walsingham (1907: 660)
Reared from *Clermontia* fruit, Palolo, Oahu.
Heterocrossa sp., near **bicincta** Walsingham (1907: 661)
Reared from leafmines in *C. kakeana* and *C. arborescens* at Haelaau, Maui.
Heterocrossa sp.
Reared from fruits of *C. grandiflora* at Kainalu, Molokai. *Pristomerus hawaiiensis* Perkins (1910-H: 680) is a parasite of this species.

Family Hyponomeutidae

Neelysia sp.
Reared from a larva in dead stem of *Clermontia kakeana,* Mt. Tantalus, Oahu.
Hyperdasysella cryptogamiella (Walsingham) (1907: 642)
Reared from a larva in dead stem of *C. kakeana,* Mt. Tantalus, Oahu.

Family Lyonetiidae

Opogona aurisquamosa (Butler) (1881: 403)
Reared from larvae in dead *Clermontia* stems, Haelaau, Maui.
Opogona omoscopa (Meyrick) (1892: 567)
Reared from larvae in rotten wood of *C. grandiflora,* Kainalu, Molokai.

Family Gracilariidae

Philodoria sp. ?

Reared from leafmines in *C. grandiflora* at Kainalu, Molokai. Bred from it was the parasite, *Euderus metallicus* (Ashmead) (1901 : 327).

HOMOPTERA

Family Delphacidae

Nesosydne umbratica Kirkaldy (1910 : 585)

Collected on *C. parviflora* Gaudichaud at Kainalu, Molokai, and at Kilauea, Hawaii ; on *C. coerulea* at Kona, Hawaii.

Nesosydne pseudorubescens Muir (1916 : 186)

Collected on *C. parviflora* at Olaa, 29 miles, Hawaii.

Nesosydne sp.

On *C. grandiflora* at Kainalu, Molokai.

Nesothoë perkinsi Kirkaldy (1908 : 204)

On *C. kakeana* at Malamalama, Oahu.

Family Cicadellidae

Nesophryne sp.

This large cicadellid was found commonly on *C. kakeana* at Malamalama, Oahu.

Family Coccidae

Saissetia hemisphaerica (Targioni-Tozzetti) (1867 : 26)

On *Clermontia parviflora,* Olaa, 29 miles, Hawaii.

Saissetia sp.

On leaves of *Clermontia grandiflora,* Kainalu, Molokai.

DIPTERA

Family Agromyzidae

Undetermined sp.

The larvae were found mining leaves of *Clermontia persicifolia* Gaudichaud in Palolo Valley, Oahu. No adults were reared.

Undetermined sp.

The larvae were in leafmines on *Clermontia arborescens* along the Kula pipe line trail, Maui, but none was reared to maturity.

ORTHOPTERA

Family Gryllidae

Prognathogryllus alatus Brunner (1895 : 986)

Prognathogryllus oahuensis Perkins (1899 : 25)

These elongate native crickets are often found hiding in dead hollow *Clermontia* stems.

ISOPTERA

Neotermes connexus Snyder (1922 : 9)

This termite has been found in stems of dead *Clermontia* at Kainalu, Molokai.

THYSANOPTERA

Heliothrips haemorrhoidalis (Bouché) (1833 : 206)

This thrips has been recorded on *Clermontia parviflora.*

CYANEA spp.

Family: Campanulaceae.

COLEOPTERA

Family Anthribidae

* **Araecerus varians** Jordan (1946 : 520)

Collected from fruits of *Cyanea leptostegia* Gray at Kumuweia, Kauai.

Family Aglycyderidae

Proterhinus vestitus Sharp (1878 : 16)

Adults and larvae were found on Mt. Olympus, Oahu, under bark, the pupae in pith of *Cyanea angustifolia* (Chamisso) Hillebrand.

LEPIDOPTERA

Family Carposinidae

* **Heterocrossa** sp.

Reared from larvae in stem of *Cyanea* on Niu ridge, Oahu.

HOMOPTERA

Family Delphacidae

Nesosydne waikamoiensis (Muir) (1919 : 97)

Collected from *Cyanea aculeatiflora* Rock in Waikamoi Valley, Maui, and from *Cyanea* sp., on Haleakala, Maui. This species occurs on *Pipturus* also.

Nesosydne umbratica Kirkaldy (1910 : 585)

Collected from *Cyanea hamatiflora* Rock in Waikamoi Valley, Maui.

* **Nesosydne aku** (Muir) (1921 : 513)

On *Cyanea tritomantha* Gray at Olaa, 29 miles, Hawaii.

* **Nesosydne timberlakei** Muir (1917 : 304)

Collected from *Cyanea truncata* Rock and *Cyrtandra garnotiana* at Waiahole, Oahu.

LOBELIA spp.

Family: Campanulaceae.

There are several species of shrubs belonging to this genus, but few of the records cite hostplant species.

COLEOPTERA

Family Staphylinidae

Philonthus discoideus (Gravenhorst) (1802: 19)

This predaceous beetle has been found in rotten *Lobelia* bark at Kaluanui, Oahu.

Family Nitidulidae

Orthostolus robustus Sharp (1878: 134)

Abundant in rotting *Lobelia* bark on Mt. Olympus, Oahu.

Family Curculionidae

Dryophthorus gravidus Sharp (1878: 22)

Found in hollow dead stems of *Lobelia yuccoides* Hillebrand at Kumuweia, Kauai.

Oodemas comitans Perkins (1935: 82)

Oodemas leiothorax Perkins (1900: 164)

These two beetles were also taken in hollow dead stems of *L. yuccoides* at Kumuweia, Kauai.

Family Aglycyderidae

Proterhinus gigas Perkins (1900: 185) Fig. 12

Proterhinus eulepis Perkins (1900: 188)

Both these species were abundant in hollow dead stems of *L. yuccoides* at Kumuweia, Kauai. They occur on other plants also.

LEPIDOPTERA

Family Hyponomeutidae

Hyposmocoma chilonella triocellata Walsingham (1907: 637)

This moth was reared from a larva in a hollow dead stem of *Lobelia yuccoides* at Kumuweia, Kauai.

HOMOPTERA

Family Delphacidae

* **Nesosydne lobeliae** Muir (1916: 212)

This leafhopper was collected from *Lobelia hypoleuca* Hillebrand and from *Lobelia* sp., at Palikea, Oahu.

* **Nesosydne montis-tantalus** Muir (1916: 195)

This species was collected from *L. hypoleuca* on Mt. Tantalus, Oahu.

* **Nesosydne olympica** (Muir) (1921 : 520)

Collected from *L. gaudichaudii* A. de Candolle on Waipio ridge, Oahu, and from *Lobelia* sp. along the Castle trail and Mt. Olympus, Oahu.

* **Aloha** sp.

An undetermined species was collected from *Lobelia gloria-montis* Rock on Mt. Kukui, Maui.

Family Cicadellidae

Nesophrosyne sp.

An undetermined species from *L. gloria-montis* on Mt. Kukui, Maui.

DIPTERA

Family Drosophilidae

Drosophila sp.

An undetermined species was reared from larvae in rotting bark of *Lobelia* sp. in Kaluanui Valley, Oahu.

Family Agromyzidae

Undetermined sp.

Mines of one or more species of agromyzid flies have been found in *Lobelia* leaves at Kahana, Kaluanui and Waipio ridge, Oahu, and on Mt. Kukui, Maui. On Puu Kukui an undetermined figitid wasp was obtained which was probably parasitic on the agromyzid maggots.

Family Psychodidae

Psychoda sp.

Undetermined psychodids were reared from rotten *Lobelia* bark at Kahana and Kaluanui, Oahu.

DERMAPTERA

Labia dubronyi Hebard (1922 : 318)

Adults of this predaceous species were found in rotten stems of *Lobelia* at Kaluanui, Oahu.

ROLLANDIA spp.

Family: Campanulaceae.

LEPIDOPTERA

Family Carposinidae

* **Heterocrossa gemmata** Walsingham (1907 : 660)

This moth was reared from larvae in fruits and flowers of *Rollandia,* on Mt. Tantalus, Oahu.

Maui, Mt. Puu Kukui an undetermined figitid wasp was obtained which was

Heterocrossa crinifera Walsingham (1907: 657)

Reared from larvae in leafmines in *Rollandia humboldtiana* Gaudichaud. (I believe this record is based on an error in determination. O.H.S.)

HOMOPTERA

Family Delphacidae

* **Nesosydne wailupensis** (Muir) (1916: 181)

Nesosydne giffardi Muir (1916: 194)

Both these leafhoppers were collected from *Rollandia crispa* Gaudichaud, the first in Wailupe Valley, the other on Mt. Tantalus, both on Oahu. *N. giffardi* also occurs on *Cyrtandra.*

LYSIMACHIA spp.

Family: Primulaceae.

Hawaiian name: puahekili.

The few species of *Lysimachia* are low shrubs, restricted as to locality, and usually rare.

LEPIDOPTERA

Family Tortricidae

* **Tortrix lysimachiana** Swezey (1946: 626)

Reared from a larva on leaves of *Lysimachia rotundifolia* Hillebrand on Puu Hapapa, Waianae Mountains, Oahu.

* **Eulia lysimachiae** Swezey (1933: 302)

Reared from a larva on leaves of *L. hillebrandi venosa* Hillebrand (*glutinea* Rock) on the trail to the Kalalau Lookout from Kokee, Kauai.

Family Gracilariidae

* **Philodoria lysimachiella** Swezey (1928: 188)

Reared from leafmines in *L. rotundifolia* on Puu Hapapa, Oahu.

* **Philodoria molokaiensis** Swezey (1928: 188)

Reared from leafmines in *L. hillebrandi* Hooker var., in the mountains above Kawela, Molokai.

* **Philodoria** sp.

A leafmine was found on *Lysimachia* on the Kalalau Lookout trail, Kokee, Kauai. Adults were not reared, but would probably have been another species of *Philodoria.*

COLEOPTERA

Family Curculionidae

Oodemas comitans Perkins (1935: 82)

In dead stem of *Lysimachia,* Kalalau trail, Kokee, Kauai.

* **Eulia lysimachiae** Swezey (1933: 302)

Family Aglycyderidae

Proterhinus eugonias Perkins (1900: 185)
Proterhinus basalis Sharp (1879: 98)
Proterhinus angustiformis Perkins (1900: 197) Fig. 12

These species were all collected from dead *Lysimachia* twigs on the Kalalau trail, Kauai. They also occur on other trees in the same region.

HETEROPTERA

Family Nabidae

Nabis blackburni (White) (1878: 373)

This predaceous bug was found on *Lysimachia* on the Kalalau trail, Kokee, Kauai.

Family Miridae

Engytatus confusus (Perkins) (1912: 729)

What appeared to be this species was abundant on *Lysimachia* on the Kalalau trail, Kokee, Kauai.

HOMOPTERA

Family Delphacidae

* **Leialoha** sp.

An undescribed species of this genus was abundant on *Lysimachia* on the Kalalau trail, Kokee, Kauai.

MABA SANDWICENSIS A. DE CANDOLLE

[now a subspecies of **Diospyros ferrea** (Willdenow) Bakhuizen]

MABA HILLEBRANDII SEEMANN

[now placed in **Diospyros**]

Family: Ebenaceae.

Hawaiian name: lama.

There are few records of insects associated with *Maba;* only four are believed to be attached to the genus. The name *Diospyros ferrea* has been used in recent years for *Maba sandwicensis.*

LEPIDOPTERA

Family Plusiidae

Hypocala andremona (Cramer) (1782: 132)

Reared from *Maba* leaves at Pupukea, Niu and Waialae Iki Valley, Oahu. On one occasion this moth was abundant on a *Sapota* tree in Honolulu. The moth is an immigrant from America.

* **Hypocala velans** (Walker) (1857 : 1177)

Reared from *Maba* at Niu and Wahiawa, Oahu. This species was considered a native race of *H. andremona* by Meyrick in "FAUNA HAWAIIENSIS" (1899 : 159), but I have found caterpillars of two kinds on the same *Maba* tree, and reared both these moths from them. The pupae have distinctive characters, and the moths of each are constant in color differences of wing pattern. Hence, it is definite that the two are different species.

Family Geometridae

Scotorythra syngonopa Meyrick (1899 : 172)

This moth was reared from a caterpillar on *Maba* foliage in Makua Valley, Oahu. It has also been found on sandalwood trees.

Family Gracilariidae

* **Parectopa mabaella** (Swezey) (1910 : 89) Fig. 19

This small species is a leafminer, especially in new growth. It is recorded from Mt. Tantalus, Makua Valley, Wahiawa and Niu ridge, Oahu.

COLEOPTERA

Family Elateridae

Chalcolepidius erythroloma Candèze (1857 : 282)

The large predaceous larva of this immigrant from South America was found in a rotten *Maba* log on Niu ridge, Oahu. It was probably feeding on the forest termite *Neotermes connexus* Snyder which was also present in the log.

Family Cerambycidae

Neoclytarlus filipes (Sharp) (Blackburn and Sharp, 1885 : 196)

This beetle was found abundant in a dead *Maba* tree at Puuwaawaa, Hawaii. It is more commonly found in *Sophora.*

* **Plagithmysus davisi** Swezey (1946 : 621)

This fine beetle was found abundant in dead *Diospyros ferrea* (*M. sandwicensis*) at Puuwaawaa, Hawaii. It has not been found on any other tree.

Family Aglycyderidae

Proterhinus pachycnemis Perkins (1900 : 211)

Proterhinus obscurus elaeocarpi Perkins (1910 : 663)

These two bark beetles were collected from *Maba* in Makaleha Valley, Oahu. It occurs in many other trees.

HETEROPTERA

Family Reduviidae

Empicoris rubromaculatus (Blackburn) (1889 : 349)

This predaceous bug has been recorded from *Maba sandwicensis,* as well as from several other trees.

HOMOPTERA

Family Delphacidae

Nesothoë maculata (Muir) (1916: 177)

This leafhopper was collected abundantly from *Maba* in the Kahuku district of Hawaii. It occurs also on other trees.

Family Cicadellidae

* **Nesophrosyne mabae** Osborn (1935: 49)

Collected from *Maba sandwicensis* along the South Kona road, Hawaii, and at Kahuku, Kau, Hawaii.

Family Coccidae

Aspidiotus hederae (Vallot) (1829: 30)

Fiorinia fioriniae (Targioni-Tozzetti) (1867: 14)

Both these scales have been recorded on *Diospyros ferrea* (*M. sandwicensis*) at Puuwaawaa, Hawaii. They occur more commonly on other plants.

THYSANOPTERA

Haplothrips (Hindsiana) williamsi Moulton (1934: 502)

Collected under dead *Diospyros* bark on Mt. Hualalai, Hawaii. It occurs similarly on some other trees.

DIPTERA

Family Tephritidae

Dacus dorsalis Hendel (1912: 18)

Reared from fruits of *Diospyros ferrea* at Puuwaawaa, Hawaii.

MARATTIA

See **Ferns (Filices)**, p. 85

METROSIDEROS COLLINA POLYMORPHA (GAUDICHAUD) ROCK

Family: Myrtaceae.

Hawaiian name: ohia lehua.

This, with its many varieties, is the most prevalent tree in the Hawaiian forests. A few other species exist here but are relatively few in numbers. The records given in these pages apply chiefly to the subspecies *polymorpha.* However, it is reasonable to suppose that the insects listed here would be found on all the species and their varieties if sufficient attention were given to their study. For present purposes the name *Metrosideros* is used for the generic complex as a whole. Although not so many insects are known on *Metrosideros* as on *Acacia koa,* the list for ohia lehua is a fairly long one.

similarly on some other trees.

COLEOPTERA

Family Cerambycidae

Several species of these tree borers have been reared from *Metrosideros,* each on a particular island. They customarily attack dying, dead or fallen trees, the larvae feeding beneath the bark in the outer wood, eventually going deeper into the wood to pupate.

* **Plagithmysus bilineatus** Sharp (1896: 243) Fig. 3

This large species is fairly abundant in the National Park on Hawaii, where it has been suspected of partial responsibility for the death of *Metrosideros* trees in the dry "Chain-of-Craters" region, where soil conditions (lava) are unfavorable for the trees. In 1934 I found the beetles were greatly attracted to the felled trees on land being cleared for garden purposes in the wet forest about two miles to the windward of the Volcano house; the larvae also were found under the bark of *Metrosideros* stumps. The beetle grubs are parasitized by *Doryctes palliatus* (Cameron) (1881: 560), an external parasite. As many as 14 *Doryctes* cocoons have been found within a single beetle burrow, all parasite larvae having fed on one beetle larva.

Upon inspection in 1917 of dead and dying *Metrosideros* trees in the upper forest above Niulii Plantation, Kohala, Hawaii, the wood was found to have numerous exit holes made by beetles. An adult *P. bilineatus* was captured, indicating that it was the species responsible for the holes. Several species of wasps, *Odynerus vulcanus* Blackburn (Blackburn and Cameron, 1885: 152), *O. eutretus* Perkins (1902: 138) and *O. dromedarius* Blackburn (Blackburn and Cameron, 1885: 151) were using these holes to store caterpillars, the food for their young. A native bee, *Nesoprosopis pubescens* Perkins (1899: 107), was utilizing the holes for nesting. The Hawaiian guide remarked: "Bad bee, make hole in tree." He informed me that cattle from the ranch just above had formerly roamed the forest at will before the present wire fence had been erected. This explained the dying and receding of the forest, a large area of which had succumbed because of the depredations of cattle. It is common knowledge in Hawaii that the native forests cannot survive encroachment by cattle, which destroy the undergrowth.

* **Plagithmysus pulvillatus** (Karsch) (1881: 9) - - - - - - - - Maui

* **Plagithmysus aestivus** Sharp (1896: 272) - - - - - - - - Molokai

Both these species were collected on *Metrosideros* by Perkins.

* **Plagithmysus concolor** Sharp (1896: 241) - - - - Halemanu, Kauai

Reared from *Metrosideros* by Swezey.

* **Plagithmysus lanaiensis** Sharp (1896: 244) - - - - - - - - - Lanai

This species somewhat resembles *P. bilineatus.* Because *Metrosideros* was the predominant tree in the locality where he captured this beetle, Dr. Perkins inferred that it was probably attached to it.

* **Plagithmysus solitarius** Sharp (1896: 241) Fig. 3 - - - - - - - Oahu

This species was reared from *Metrosideros* in the Waianae Mountains and on Mt. Tantalus, both on Oahu. It has also been reared from *Syzygium sandwicensis,* a related tree.

* **Plagithmysus monroi** Sharp (1900: 112) - - - - - - - - - - Kauai

Adults of this species were collected from *Metrosideros* at several places in Kokee, Kauai. It was not determined that they had bred in this tree, but it was inferred that they had.

Megopis (Aegosoma) reflexa (Karsch) (1881: 7) Fig. 4 - All the islands

The large larvae of this beetle are sometimes found in *Metrosideros* as well as in several other trees. Larvae are sometimes found in live trees.

Neoclytarlus abnormis (Sharp) (1900: 102) - - - - - - Olaa, Hawaii

Recorded in the "FAUNA HAWAIIENSIS" as probably attached to *Metrosideros* or *Straussia.*

* **Paraclytarlus timberlakei** Perkins (1927: 480)

Described from a single specimen collected on *Metrosideros* by Timberlake, on Mt. Olympus, Oahu.

Ceresium unicolor (Fabricius) (1787: 147)

This immigrant beetle has been reared now and then from dead *Metrosideros* branches.

Family Elateridae

Eopenthes unicolor Sharp (1908: 377)

These blue beetles were collected abundantly on *Metrosideros* flowers in the Alakai swamp, Kauai, in 1921.

Family Aglycyderidae

* **Proterhinus blackburni bisignatus** Perkins (1900: 246)

This variety occurs in the layers of old *Metrosideros* bark; it has been taken on Mt. Tantalus and on Mt. Kaala, Oahu.

Proterhinus excrucians Perkins (1910: 662)

This beetle has been beaten from dead twigs in several localities on Oahu. It also occurs on other trees.

Proterhinus echidna Perkins (1910: 658)

A single specimen of this species was taken on *Metrosideros* on Mt. Tantalus, Oahu.

Proterhinus deceptor Perkins (1900: 245)

Proterhinus innotabilis Perkins (1900: 242)

Both these species have been collected from *Metrosideros* on Lanai.

Proterhinus deceptor major Perkins (1900: 246)

Beaten from dead *Metrosideros* branches at Nauhi gulch, Hawaii.

Proterhinus sp.

An undetermined species was collected from *Metrosideros,* near Kaunakakai, Molokai, at 2,400 feet elevation.

Proterhinus sp.

An unidentified *Proterhinus* was collected from dead twigs of *Metrosideros* on the Kula pipe line trail, at Olinda, Maui.

All of the above-named insects, with the exception of *P. blackburni* variety *bisignatus,* occur on other trees besides *Metrosideros.*

Family Carabidae

Colpodiscus lucipetens (Blackburn) (1879: 105)

These predaceous beetles are commonly found on *Metrosideros* flowers at Kilauea, Hawaii.

HETEROPTERA

Family Pentatomidae

Oechalia sinuata Usinger (1942: 217) - - - - - - - Mt. Kaala, Oahu
Oechalia pacifica (Stål) (1859: 221) Fig. 7 - - - - - - - Olinda, Maui
Oechalia bryani Usinger (1941: 81) - - - - - - - Nauhi gulch, Hawaii

These bugs were collected from *Metrosideros* where they preyed on other insects.

Family Lygaeidae

Oceanides montivagus (Kirkaldy) (1910: 544) - - - - - Oahu; Molokai
Oceanides pteridicola (White) (1881: 55) - - - - - - - Maui; Hawaii
Oceanides vulcan (White) (1881: 56) - - - - - - - - - - - - Hawaii
Nysius communis Usinger (1942: 110) - - - - - - - - All the islands
Nysius delectus White (1878: 367) - - - - All the islands except Kauai
Nysius coenosulus Stål (1859: 243) - - - - - - - - - All the islands

These bugs are leaf feeders which have been taken, perhaps only incidentally, on *Metrosideros;* they occur on other plants also. At times *N. communis* has been found in enormous numbers on *Metrosideros* foliage on the crest of the Waianae Mountains, Oahu. Because only adults were present it was thought they had bred on weeds in the lowlands and migrated to the higher elevations, as some ladybird beetles do.

Metrarga obscura Blackburn (1888: 347)

This bug has been collected on *Metrosideros* at Kilauea, Hawaii.

Family Reduviidae

Empicoris rubromaculatus (Blackburn) (1889: 349)

This delicate long-legged predaceous bug has been collected frequently from *Metrosideros,* as well as from other trees in the forest. It occurs on all the islands.

Family Nabidae

Nabis subrufus White (1877:112) - - - - - - - - - - - - - Oahu
Nabis blackburni White (1878:373) - - - - - - - - - All the islands
Nabis kerasphoros (Kirkaldy) (1907:248) - - - - - - - - - - Oahu
Nabis koelensis Blackburn (?) (1888:352) - - - - - - Lanai; Molokai
Nabis lusciosus White (1877:112) - - - - - - - - - - - - - Oahu
Nabis nubigenus (Kirkaldy) (1908:191) - - - - Molokai; Lanai; Maui
Nabis oscillans Blackburn (1888:352) - - - - - - - - - - Hawaii
Nabis pele (Kirkaldy) (1909:67) - - - - - - - - - - - - - Hawaii

These predaceous bugs are often taken on *Metrosideros* as well as on other trees. *N. subrufus* is most frequently taken on ohia lehua.

Family Miridae

Sarona adonias Kirkaldy (1902:142) - - Molokai; Lanai; Maui; Hawaii
Koanoa hawaiiensis Kirkaldy (1902:136) - - - - - - - All the islands
Hyalopeplus pellucidus (Stål) (1859:255) - - - - - - - All the islands

These plant bugs have been collected on *Metrosideros* as well as on other trees.

HOMOPTERA

Family Delphacidae

* **Leialoha lehuae** (Kirkaldy) (1910:581) - - - - - - - Oahu; Lanai
* **Leialoha oahuensis** (Muir) (1916:173) - - - - - - - Oahu; Lanai
* **Leialoha hawaiiensis** (Muir) (1916:173) - - - - - - - - - Hawaii
* **Leialoha mauiensis** (Muir) (1919:87) - - - - - - - - - - Maui
* **Leialoha lanaiensis** (Muir) (1917:299) - - - - - - - - - - Lanai
* **Leialoha kauaiensis** (Muir) (1916:173) - - - - - - - - - - Kauai
* **Leialoha naniicola** (Kirkaldy) (1910:580) - - - - - - - - - Oahu
* **Leialoha ohiae** (Kirkaldy) (1910:581) - Kauai; Oahu; Maui; Hawaii
Nesothoë gulicki (Muir) (1916:177) - - - Oahu; Lanai (?); Hawaii
Nesothoë perkinsi Kirkaldy (1908:204) - - - - - - - - - - Oahu

All of the above-named leafhoppers are attached to *Metrosideros,* with the exception of the two species of *Nesothoë,* which occur also on some other trees.

Family Cicadellidae

* **Nesophrosyne cuprescens** Osborn (1935:26) - - - - - Palolo, Oahu
* **Nesophrosyne notatula** Osborn (1935:47) - - - - - Mt. Kaala, Oahu
* **Nesophrosyne sinuata** Osborn (1935:34) - - - - - - - Olaa, Hawaii
* **Nesophrosyne silvicola** Kirkaldy (1910:570) - - - - - Kilauea, Hawaii

These four leafhoppers were collected from *Metrosideros,* and are believed to be attached to that tree.

Family Cixiidae

* **Oliarus pele** Kirkaldy (1909: 79)

Reared from a damp rotten *Metrosideros* log on the Kula pipe line trail, Maui. Adults occur on ferns and moss.

* **Oliarus kahavalu** Kirkaldy (1909: 77)

On *Metrosideros* at Kamiloloa, Molokai.

* **Oliarus kanakanus** Kirkaldy (1902: 121)

On *Metrosideros* in Nauhi gulch, Hawaii.

Oliarus filicicola Kirkaldy (1909: 77)

This species occurs mainly on ferns, but was collected from *Metrosideros* on the upper Hamakua ditch trail, Kohala Mountains, Hawaii.

Family Cercopidae

Philaenus spumarius (Linnaeus) (1758: 437)

Metrosideros is included in a list of 61 plants from which this recent immigrant froghopper has been collected at Kilauea, Hawaii.

Family Flatidae

Siphanta acuta (Walker) (1851: 448)

This immigrant torpedo bug is commonly found on *Metrosideros,* as well as on many other forest plants. Formerly it was a pest of coffee and citrus, but it is now well controlled by the egg parasite, *Aphanomerus pusillus* Perkins (1905: 203), introduced from Australia in 1904.

Family Psyllidae

Galls of jumping plant lice are conspicuous on *Metrosideros* leaves on all the islands. These galls are of various forms, usually appearing as circular swellings, bulging more on the under than the upper side of the leaf, and varying in the degree of prominence according to the insect species or the variety of *Metrosideros.* Sometimes the galls are conical. A single psyllid nymph occupies the hollow of the gall, sucking the sap from the swollen tissues until it has completed its transformation. Finally the gall dries and splits radially permitting the adult to emerge. In some galls a circular cap dries and opens for the issuance of the psyllid; it is not known if this is a specific peculiarity of the insect, or if it depends on the variety of tree.

As many as 68 galls have been found on a single leaf, completely occupying its surface. Because the galls are formed in growing tissue, they often produce malformations which interfere with normal functioning of the leaf, and cause stunted growth. Although they are detrimental to the tree's well being, and unsightly, psyllid infestations apparently never cause the death of *Metrosideros.*

* **Trioza iolani** Kirkaldy (1902: 114) - - - - - - Kauai; Oahu; Maui

* **Trioza ohiacola** Crawford (1918: 442) Fig. 21 - - - - Oahu; Hawaii

FIGURE 21. **Trioza** (psyllid) galls on leaves of *Metrosideros.*

* **Trioza lehua** Crawford (1925:29) - - - - - - - - - - - Kauai
* **Trioza kauaiensis** Crawford (1925:29) - - - - - - - - - - Kauai
* **Trioza molokaiensis** Crawford (1927:423) - - - - - - - - Molokai
* **Trioza lanaiensis** Crawford (1918:443) - - - - - - - - - - Lanai
* **Trioza pullata** Crawford (1918:444) - - - - - - - - - - - Lanai
* **Trioza hawaiiensis** Crawford (1918:444) - - - - - - - - - Hawaii

All these species of *Trioza* except *pullata,* have been recorded definitely from *Metrosideros;* it is inferred that *pullata* also is attached to it. In one instance *T. ohiacola* was reared from galls on stems and buds, as well as on leaves of variety *glaberrima* (Leveille) Rock on Tantalus, Oahu. Parasites (undetermined eulophids) were reared from this same material. Other parasites have been reared from psyllid galls on ohia lehua on Hawaii, at Kilauea and in the Kohala Mountains. In the latter region adult psyllids on *Metrosideros* were seen being eaten by larvae of a lacewing fly, *Anomalochrysa frater* Perkins (1899:52).

The species of *Kuwayama* listed below occur on *Metrosideros* leaves but do not produce galls. They are smaller insects than *Trioza,* and less common.
* **Kuwayama gracilis** Crawford (1918:447) - - - Oahu; Molokai; Maui
* **Kuwayama minuta** Crawford (1918:447) - - - - - - - - - Hawaii
* **Kuwayama nigricapita** Crawford (1918:446) - Molokai; Lanai; Hawaii

FIGURE 21. **Trioza** (psyllid) galls on leaves of *Metrosideros.*

Family Coccidae

Pseudococcus adonidum (Linnaeus) (1758: 455)

Colonies of this mealybug have been found on *Metrosideros* in old, unoccupied psyllid galls, or among leaves webbed together by caterpillars or spiders. *Anagyrus nigricornis* Timberlake (1919: 197) is a parasite of this species.

Coccus elongatus (Signoret) (?) (1873: 404)
Icerya purchasi Maskell (1878: 221)
Ceroplastes rubens Maskell (1892: 214)
Pulvinaria psidii Maskell (1892: 223)
Eucalymnatus tessellatus (Signoret) (1873: 401)
Saissetia nigra (Nietner) (1861: 9)
Hemiberlesia rapax (Comstock) (1881: 307)
Hemiberlesia lataniae (Signoret) (1869: 124)

Sometimes these immigrant scale insects are found on leaves or twigs of *Metrosideros,* but never in important numbers. Several parasites are associated with some or all of the species listed above: *Microterys flavus* (Howard) (1881: 367), *Microterys kotinskyi* (Fullaway) (1913: 26), *Encyrtus infelix* (Embleton) (1902: 223), *Encyrtus barbatus* Timberlake (1919: 209), *Tomocera californica* Howard (1881: 368), *Scutellista cyanea* Motschulsky (1859: 172), *Coccophagus hawaiiensis* Timberlake (1926: 315) and *Aneristus ceroplastae* Howard (1895: 351).

LEPIDOPTERA

Family Geometridae

The caterpillars of this family are "measuring worms" or "loopers," feeding on foliage. Not enough is known of the habits of most of them to say definitely that they are attached to *Metrosideros,* but a few species of *Scotorythra* have been reared from it.

Scotorythra rara (Butler) (1879: 273)

This is a common species on all the islands, and has been reared from several kinds of trees including *Metrosideros.*

Scotorythra pachyspila Meyrick (1899: 185)

Reared from *Metrosideros* in the Kohala Mountains, Hawaii, in 1917.

*** Scotorythra hyparcha** Meyrick (1899: 189)

This is the largest species of *Scotorythra* occurring on the island of Hawaii. Although they were not reared, the largest caterpillars of this genus which I have seen were on *Metrosideros,* and it is assumed that they were *hyparcha.* At Nauhi gulch, Hawaii, in 1931, pupae from which adult *S. hyparcha* later issued, were found in cells in rotten logs near *Metrosideros* trees. From one

such cell was reared a parasite, *Enicospilus tyrannus* Perkins (1910-H: 678), a species which leaves its host before the caterpillar pupates.

Scotorythra euryphaea Meyrick (1899: 188)

This is another large species, about the size of *hyparcha;* it is abundant on Kauai, where its caterpillars supposedly feed on ohia lehua foliage.

Family Hydriomenidae

Eucymatoge monticolans (Butler) (1881: 320)

The green slender loopers of this species have been reared from *Metrosideros* at Kilauea, Hawaii, but occur more commonly on foliage of *Styphelia.*

Family Tortricidae

* **Eccoptocera foetorivorans** (Butler) (1881: 394)

The larvae of this moth are attached to *Metrosideros* on all the islands, feeding on webbed-up leaves.

Family Carposinidae

* **Heterocrossa** sp.

Larvae of one or more species of this genus feed in the terminal buds of ohia lehua. Elsewhere I have recorded *H. distincta* Walsingham, from *Metrosideros,* but am now of the opinion that the record was erroneous.

Family Gracilariidae

* **Philodoria splendida** Walsingham (1907: 719)

The larvae of this moth are leafminers in *Metrosideros* on Kauai and Oahu.

* **Philodoria basalis** Walsingham (1907: 720)

Another leafminer in ohia lehua, on Maui and Hawaii.

Family Hyponomeutidae

Semnoprepia sp. (?)

Caterpillars believed to be of this genus were found feeding in bark of living *Metrosideros* trees in Makua Valley, Oahu, but failed to mature.

ZORAPTERA

Zorotypus swezeyi Caudell (1922: 133)

This rare insect was found in a rotten lehua stump on the summit camp trail, Kauai, on February 13, 1927 by Dr. F. X. Williams.

HYMENOPTERA

Family Braconidae

Doryctes palliatus (Cameron) (1881: 560)

Doryctes pallidiceps (Perkins) (1910-H: 684)

Both these parasites were reared from *Plagithmysus solitarius* Sharp (1896: 241) in *Metrosideros* on Mt. Tantalus, Oahu.

MEZONEURUM KAUAIENSE (MANN) HILLEBRAND

Family: Leguminosae.

Hawaiian names: kea; kalamona; uhiuhi.

This is a rare tree, and very few insects have been collected from it.

COLEOPTERA

Family Cerambycidae

* **Neoclytarlus mezoneuri** Swezey (1946: 623)

Ceresium unicolor (Fabricius) (1787: 147)

These beetles were reared from larvae in dead *Mezoneurum* branches on the slope of Mt. Hualalai, Hawaii.

LEPIDOPTERA

Family Tortricidae

Argyroploce illepida (Butler) (1882: 42)

This moth was reared from seed pods of *Mezoneurum* near the highway on the northwest slope of Mt. Hualalai, Hawaii.

THYSANOPTERA

Karnyothrips flavipes (Jones) (1912: 18)

Collected from dead branches of *Mezoneurum,* east of Puuwaawaa ranch road, Hawaii.

MUSA spp.

Family: Musaceae.

Hawaiian name: maia.

A number of species or varieties of wild bananas grow in inaccessible gulches and valleys in the mountains, and are supposed to have gone wild from plantings made long ago by the early Hawaiians. Only a small insect fauna has developed on wild bananas.

LEPIDOPTERA

Family Pyraustidae

A number of closely related species of pyraustid moths are associated with, or attached to wild bananas, and never migrate from their forest habitat in the mountains to cultivated bananas in the lowlands. These species, though very similar in wing pattern, have caterpillars with markings which are distinc-

tive for each of the recognized species. In some cases caterpillars have been found on banana leaves which differ from those of known species, but because they have not been reared, none has so far been named.

Omiodes blackburni (Butler) (1887 : 48) Fig. 22

This is the notorious coconut leafroller, which occurs on all islands. It is not one of the group attached to bananas, although the adult is very similar to them in wing pattern. The caterpillars, so destructive to coconut foliage in the lowlands, seldom attack banana leaves of cultivated varieties outdoors, although they eat them readily under laboratory conditions. All the other *Omiodes* listed here are strictly banana insects. Collecting in the mountain forests of late years, I have seldom found the ragged feeding on wild banana leaves which formerly was so prevalent and indicated the presence of *Omiodes*. This appears to be due to the work of immigrant parasites such as *Zaleptopygus flavo-orbitalis* (Cameron) (1907 : 589) and *Casinaria infesta* (Cresson) (1872 : 172), both of which I have reared from *Omiodes* caterpillars, and which first appeared in the lowland areas in 1910 and 1921, respectively. At first these parasites attacked *Hymenia recurvalis* (Fabricius), the amaranth webworm, then gradually spread to the native pyraustid caterpillars in the mountain forests, with the result that many species of native moths are now so scarce as to be almost extinct.

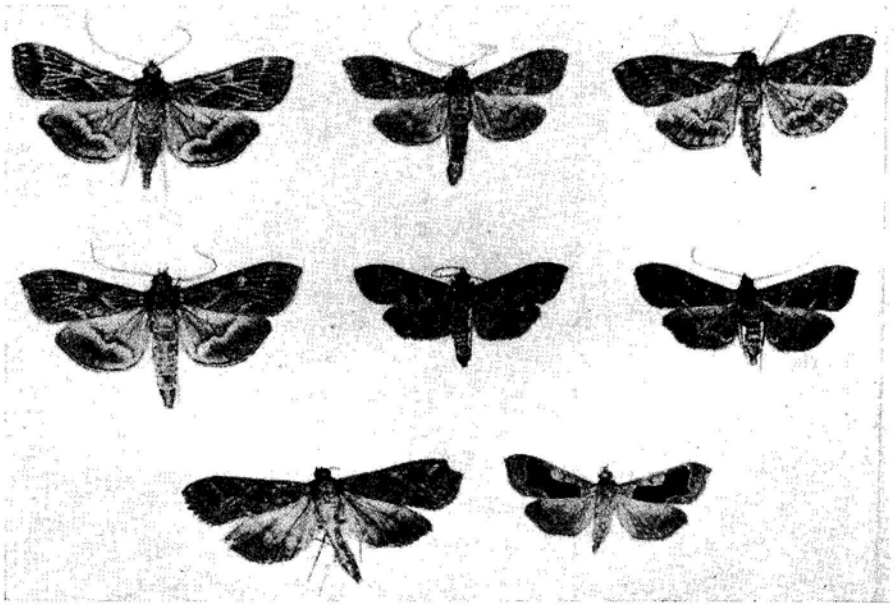

FIGURE 22. Banana moths; species of **Omiodes.** Top row (left to right) : **blackburni,** female; **meyricki,** male; **meyricki,** female. Middle row: **blackburni,** male; **musicola; maia.** Bottom row : **fullawayi; euryprora.**

* **Omiodes meyricki** Swezey (1907 : 24) Fig. 22

This was the first of the strictly banana species to be discovered. It has been reared from wild bananas in many places on windward Hawaii. It is difficult to distinguish accurately its moths from those of *O. blackburni,* but its caterpillars can be recognized at once by markings on the head and the thoracic segments. Furthermore, *meyricki* larvae have never been found on any but banana leaves. They feed along the midrib and sometimes along the margins where they roll the edge of the leaf to make a hiding place, or for pupation.

* **Omiodes musicola** Swezey (1909 : 40) Fig. 22

This species, first reared from wild bananas in Iao Valley, Maui, also is found on Molokai.

* **Omiodes maia** Swezey (1909 : 74) Fig. 22

The larvae of this species occur on wild bananas in many of the valleys on Oahu, in both mountain ranges. The moths have also been reared from wild banana back of Lihue, Kauai, on the eastern base of Mt. Waialeale.

* **Omiodes euryprora** Meyrick (1899 : 202) Fig. 22

Mountain View, Hawaii, is the only locality from which this moth is known ; adults were reared from caterpillars on wild banana.

* **Omiodes fullawayi** Swezey (1913 : 272) Fig. 22

Reared from wild banana in Kona, Hawaii, and collected at light at Kilauea, Hawaii.

COLEOPTERA

Family Curculionidae

* **Polytus mellerborgi** (Boheman) (1838 : 976)

The larvae of this beetle feed in the base or corm of old banana plants, especially after the trunk has been cut down. It occurs on Oahu and Maui, in both wild and cultivated bananas.

* **Stenommatus musae** Marshall (1920 : 277)

The larvae of this tiny weevil have been found in old banana stumps in Kaimuki and Manoa, Oahu. It is not known how widespread it is on Oahu, for little attention has been given it. It is an immigrant species recorded from Java.

MYOPORUM SANDWICENSE (A. DE CANDOLLE) GRAY

Family: Myoporaceae.

Hawaiian names: naeo; naio.

There is only one species of this genus in Hawaiian forests. It is usually a large tree, but at such places along the sea shore as Barber's Point and

Kaena Point, Oahu, it sometimes occurs as a shrub. A number of insects have been collected from it, but not many are attached to it.

LEPIDOPTERA

Family Geometridae

Scotorythra sp.

Caterpillars were found under bark of a dead branch, apparently preparing to pupate, and on the leaves in Kipuka Ki, Hawaii. No adults were reared.

Family Gracilariidae

Parectopa sp. (?)

Leafminers were abundant in *Myoporum* leaves at Pohakuloa and Kipuka Puaulu, Hawaii, but none were reared.

COLEOPTERA

Family Cerambycidae

* **Plagithmysus perkinsi** Sharp (1896: 244)

This fine longicorn is attached to *Myoporum*. It has been reared from injured or dying trees at Kipuka Puaulu and Puu Oo trail, Kilauea, and Nauhi gulch, all on the island of Hawaii.

Family Aglycyderidae

Proterhinus similis Blackburn (Blackburn and Sharp, 1885: 170)
- - - - Kipuka Puaulu, Hawaii

Proterhinus deceptor Perkins (1900: 245) - - - - - - - Kokee, Kauai

Proterhinus sp. - - - - - - - - - - - - - - Nauhi gulch, Hawaii

These species have all been collected from dead *Myoporum* twigs; they occur on other trees also.

Family Ciidae

Cis nesiotes Perkins (1900: 256)

Collected from bark and dead twigs at Kipuka Puaulu, Hawaii.

Family Anobiidae

Xyletobius sp.

An undetermined species was collected from dead naeo twigs at Kipuka Puaulu, Hawaii.

HOMOPTERA

Family Delphacidae

* **Aloha myoporicola** Kirkaldy (1910: 581)

This leafhopper is attached to *Myoporum* and probably can be found wherever this tree occurs. I have collected it at Kumuweia, Kauai; Barber's

Point and Kolekole Pass, Oahu; Kawela, Molokai; and Kipuka Ki and Kipuka Puaulu, Kilauea, Hawaii.

Family Cixiidae

* **Oliarus myoporicola** Giffard (1925: 74)
Collected abundantly on *Myoporum* at Barber's Point, Oahu.

Family Cicadellidae

* **Nesophrosyne giffardi interrupta** Osborn (1935: 32)
On *Myoporum* at Kona, Hawaii.

Nesophrosyne (Nesoreias) eburneola Osborn (1935: 54)
Collected from *Myoporum* at Barber's Point, Oahu; it occurs on several other plants on the island of Hawaii.

Family Coccidae

Pseudococcus adonidum (Linnaeus) (1758: 455)
This mealybug has been recorded from *Myoporum*.

HETEROPTERA

Family Pentatomidae

Oechalia virgula Van Duzee (1936: 220)
A predaceous bug collected from *Myoporum* on Hawaii.

Family Lygaeidae

* **Oceanides myopori** Usinger (1942: 26) - - - - - Kumuweia, Kauai
* **Oceanides nubicola** (Kirkaldy) (1910: 542) - - - Humuula, Hawaii
Nysius coenosulus Stål (1859: 243) - - - - - - - - - - Widespread
Nesocryptias villosa (White) (1878: 371)
The last-named species occurs on Oahu in ground litter under *Myoporum*.

Family Miridae

Orthotylus sp., perhaps **iolani** Kirkaldy (1902: 133)
Specimens of this genus were collected from *Myoporum* at KipukaPuaulu, Hawaii, but have been mislaid and are not available for identification.

ISOPTERA

Kalotermes immigrans Snyder (1922: 2)
This termite, which occurs on all of the principal islands, has been recorded in dead *Myoporum*.

THYSANOPTERA

Thrips (Isoneurothrips) williamsi (Moulton) (1928: 115)
On young leaves of *Myoporum* on Mt. Hualalai, Hawaii.

* **Oceanides nubicola** (Kirkaldy) (1910: 542) - - - Humuula, Hawaii

Thrips (Isoneurothrips) carteri (Moulton) (1937 : 411)

In tunnels of a leafminer in *Myoporum,* Mauna Kea, 4,000 feet, Hawaii.

Karnyothrips doliicornis Bianchi (1946 : 510)

In dead *Myoporum* wood, Keauhou ranch, Kilauea, Hawaii.

Karnyothrips flavipes (Jones) (1912 : 18)

Widespread, occurring in the flowers of many different kinds of plants.

Haplothrips (Hindsiana) sakimurai Moulton (1937 : 412)

In dead twigs of *Myoporum* and other plants; Mauna Loa truck trail, Hawaii National Park, Hawaii.

MYRSINE spp. (SUTTONIA)

Family: Myrsinaceae.

Hawaiian name: kolea.

There are several species of this genus in Hawaii, but most of the published records refer only to genus, either *Myrsine* sp. or *Suttonia* sp. The latter name was used for a time by local botanists for these trees, but later use of *Myrsine* was resumed. Some specific records exist for *M. sandwicensis* A. de Candolle and *lessertiana* A. de Candolle which are probably the commonest species; no doubt the majority of the insects occur on both these trees.

LEPIDOPTERA

Family Tortricidae

* **Eulia dermatopa** Meyrick (1928 : 96)
- - - - Mt. Olympus and Mt. Tantalus, Oahu

* **Eulia notocosma** Meyrick (1928 : 97) - - - - - Mt. Olympus, Oahu

* **Eulia pycnomias** Meyrick (1928 : 97) - - - - - - - - Wailupe, Oahu

* **Eulia chlorippa** Meyrick (1928 : 98) - - - - - Mt. Olympus, Oahu

These four species were reared from caterpillars on *M. lessertiana* on Oahu. One specimen of *E. notocosma* has been reared from *Astelia veratroides* Gaudichaud. Another specimen, apparently *E. dermatopa,* was reared from *Suttonia* on Kauai; because it comes from an island where *dermatopa* has not been known, it may prove to be a new species. More reared specimens are needed.

Tortricid caterpillars were once found on *Myrsine* leaves at Olinda, Maui, but were not reared or identified.

Family Carposinidae

* **Heterocrossa nigronotata** Walsingham (1907 : 656)

The caterpillar feeds in *Myrsine* fruits, and is parasitized by *Pristomerus hawaiiensis* Perkins (1910-H : 680) and *Euderus metallicus* (Ashmead) (1901 : 327).

Family Gracilariidae

* **Philodoria auromagnifica** Walsingham (1907 : 718)

* **Philodoria succedanea** Walsingham (1907 : 717)

Larvae of these moths are leafminers in *Myrsine;* both species occur on Oahu and Hawaii. Mines were found in *Myrsine* leaves at Kokee, Kauai, and at Haelaau, Maui, but no moths were reared.

COLEOPTERA

Family Aglycyderidae

* **Proterhinus myrsineus** Perkins (1910 : 659) - - - - - - - - - Oahu
* **Proterhinus myrsineoides** Perkins (1910 : 659) - - - - - - - - Oahu
* **Proterhinus maurus** Perkins (1910 : 658) Fig. 12 - - - - - - - Oahu
Proterhinus angustiformis Perkins (1925 : 492) Fig. 12 - - - - - Kauai
Proterhinus dubiosus Perkins (1900 : 187) - - - - - - - - - - Kauai
Proterhinus excrucians Perkins (1910 : 662) - - - - - - - - - Oahu
Proterhinus platygonioides Perkins (1910 : 661) - - - - - - - - Oahu
Proterhinus squamicollis Perkins (1900 : 201) - - - - - - - - Oahu

These bark beetles have been collected from *Myrsine* on the islands named; they are usually found in dead twigs. The first three species are attached to *Myrsine,* but the rest occur on other trees also.

Family Anobiidae

* **Holcobius hawaiiensis** Perkins (1910 : 583)

This large beetle lives in dead branches and trunks of *Myrsine* on Hawaii. Its abundance in the Kilauea region is indicated by my finding a dead *Myrsine* tree from which a portion of the trunk, 9½ inches long, and 4½ inches in diameter (Fig. 32), yielded 35 beetles in various stages of growth. On that basis, the population of the entire trunk would have been about 700 beetles.

HOMOPTERA

Family Delphacidae

* **Leialoha suttoniae** Muir (1922 : 92)

This leafhopper is attached to *Myrsine sandwicensis* in the Kokee region of Kauai.

Nesothoë fletus Kirkaldy (1908 : 204) - - - - - - - - - Lanai ; Maui
Nesothoë dodonaeae (Muir) (1916 : 176) - - - - - - - - - - Kauai
Nesothoë hula Kirkaldy (1908 : 204) - - - - - - - - - - - Kauai
Nesothoë perkinsi Kirkaldy - - - - - - - - - - - - - - - Oahu

These species have been collected from *Myrsine,* but occur on other trees also.

This large beetle lives in dead branches and trunks of *Myrsine* on Hawaii

Family Flatidae

Siphanta acuta (Walker) (1851 : 448)

The torpedo bug occurs on many kinds of plants, including *Myrsine;* it is on all the islands.

Family Cicadellidae

Nesophrosyne myrsines Kirkaldy (1910 : 568) - - - - - - - - Hawaii
*** Nesophrosyne nimbicola** Kirkaldy (1910 : 565) - - - - - - - Lanai
*** Nesophrosyne ulaula** Kirkaldy (1910 : 563) - - - Oahu ; Maui ; Hawaii
Nesophrosyne (Nesoreias) koleae (Kirkaldy) (1910 : 562) - - - Oahu

These species have all been collected on *Myrsine. N. myrsines* and *koleae* have been collected from other trees as well.

Family Aphididae

Toxoptera aurantii (Boyer de Fonscolombe) (1841 : 178)

This aphid occurs on many different plants in the islands, including *Myrsine.*

Family Coccidae

*** Pseudococcus mendiculus** Ferris (1948 : 223)

This mealybug has been collected only from *Myrsine;* it was found at Kanaio, Maui.

Pseudococcus straussiae Ehrhorn (1916 : 237, 239)

This mealybug has been collected on Oahu and Molokai from *Myrsine,* but its chief hostplant is *Straussia.*

Ceroplastes rubens Maskell (1892 : 214)

This soft scale occurs on all the islands and has been collected from *Myrsine,* as well as from numerous other trees and shrubs.

HETEROPTERA

Family Lygaeidae

Oceanides incognitus Usinger (1942 : 35)

Collected from *Myrsine* and *Pteralyxia* in Haleauau Valley, Oahu.

Neseis (Trachynysius) fasciatus fasciatus Usinger (1942 : 80) - Hawaii
Nysius coenosulus Stål (1859 : 243) - - - - - - - - - All the islands
Nysius delectus White (1878 : 367) - - - - - - - - - All the islands

These three insects have been collected from *Myrsine,* but occur on many other trees also.

Family Nabidae

Nabis blackburni White (1878 : 373)

A predaceous bug found on all the islands on many plants, including *Myrsine.*

ISOPTERA

Neotermes connexus Snyder (1922: 9)

This termite is found in dead *Myrsine* wood, as well as in many other kinds of dead trees.

THYSANOPTERA

Dermothrips hawaiiensis Bagnall (1910: 678) - - On most of the islands
Hoplothrips flavitibia Moulton (1928: 117) - - - On most of the islands
Hoplothrips swezeyi Moulton (1928: 120) - - - - - - - Olinda, Maui
Haplothrips (Haplothrips) rosai Bianchi (1946: 506) - - - - Hawaii
Haplothrips (Hindsiana) williamsi Moulton (1934: 502) - - - Hawaii

These are black species, usually found under bark or in dead wood. They have been collected on *Myrsine* and occur on many other trees as well.

NEOWAWRAEA PHYLLANTHOIDES ROCK

(now called **Drypetes phyllanthoides** [Rock] Sherff)

Family: Euphorbiaceae.

Hawaiian name: mehamehame.

A rare tree in the Waianae Mountains of Oahu, now almost extinct. The partial remains of a living tree in Makua Valley shows it to have been a very large one. The insects associated with *Neowawraea* are usually found in dead wood.

COLEOPTERA

Family Anobiidae

* **Holcobius pikoensis** Perkins (1935: 85)

Reared from wood of a dead *Neowawraea* tree on the Piko trail in Makua Valley, Oahu. This is the only time this beetle was ever collected.

Xyletobius lineatus Sharp (Blackburn and Sharp, 1885: 159)

Mirosternus sp.

Both these species were reared from the same Makua Valley material in which *H. pikoensis* was found. Parasites reared from one or the other of these beetles were two species of *Scleroderma,* one pale, the other dark-winged.

Family Ciidae

Cis porcatus Sharp (1879: 92)

Collected from dead *Neowawraea* wood on the Piko trail in Makua Valley.

LEPIDOPTERA

Family Hyponomeutidae

Hyperdasysella sp. (?)

Pupae from which adults had issued were found in dead wood where caterpillars had been feeding, at the site on the Piko trail mentioned above.

ISOPTERA

Neotermes connexus Snyder (1922: 9)

This forest termite was found feeding in a *Neowawraea* log in Kamokuiki Valley in the Waianae Mountains, Oahu.

NEPHROLEPIS

See **Ferns (Filices)**, p. 85

NERAUDIA MELASTOMAEFOLIA GAUDICHAUD

Family: Urticaceae.

Hawaiian names: oloa; maoloa.

This is a rare shrub in the mountain forest; very few insects have been recorded from it.

LEPIDOPTERA

Family Nymphalidae

Vanessa tameamea Eschscholtz (1821: 207) Figs. 26-28

Caterpillars of the Kamehameha butterfly have been found feeding on this bush, but *Pipturus,* another urticaceous genus, is its favorite foodplant.

Family Gracilariidae

*** Parectopa neraudicola** (Swezey) (1920: 385)

This moth was reared from leafmines in *Neraudia* at Punaluu and Waiahole, Oahu. It has also been reared from *Pipturus* at Pahoa, Oahu, and Panaewa, Kona, Hawaii.

HOMOPTERA

Family Delphacidae

Nesosydne pipturi Kirkaldy (1908: 202)

This leafhopper was collected from *Neraudia* on Puu Hapapa, Waianae Mountains, Oahu. Its chief hostplant is *Pipturus.*

NOTHOCESTRUM spp.

Family: Solanaceae.

Hawaiian name: aiea.

Four species of this genus occur in Hawaiian forests, but none is common. Few insects are associated with *Nothocestrum.*

LEPIDOPTERA

Family Tineidae

* **Acrolepia nothocestri** Busck (1914 : 106)

This moth was reared from a leafmine in *Nothocestrum* on Mt. Olympus, Oahu.

* **Acrolepia aiea** Swezey (1933 : 303)

This species was reared from leafmines in *Nothocestrum* at Kumuweia, Kokee, Kauai.

HOMOPTERA

Family Psyllidae

Psyllid nymphs are recorded in my field notebook, on *Nothocestrum* leaves at Kumuweia, Kauai. Apparently none were collected, for they are not mentioned in Caldwell's paper (1940) on the psyllids I collected in the Kokee region.

OLEA

See **Osmanthus**

OPLISMENUS

See **Grasses**, p. 98

OSMANTHUS (OLEA) SANDWICENSIS (GRAY) KNOBLAUCH

Family: Oleaceae.

Hawaiian names: pua, ulupua.

The only species of this genus occuring in Hawaii is common to all the islands, but is rather infrequent. Hillebrand used the name *Olea,* but more recently *Osmanthus* has been used. Only a few insects are attached to this plant, but several have been collected from it.

LEPIDOPTERA

Family Carposinidae

* **Heterocrossa graminicolor** Walsingham (1907 : 654)

This moth has been reared from *Osmanthus* fruits at Wailupe and Waialae Nui, Oahu, and at Kilauea, Hawaii.

COLEOPTERA

Family Aglycyderidae

Proterhinus eugonias Perkins (1900 : 186) - - - - - - Kokee, Kauai

Proterhinus pusillus Sharp (1879:97) - - - - - Halona Valley, Oahu

These beetles have been collected from *Osmanthus,* but are found more commonly on dead twigs of other trees.

Family Anobiidae

An undetermined anobiid beetle was found in dead *Osmanthus* twigs, at Kilauea, Hawaii.

Family Scolytidae

Hypothenemus insularis Perkins (1900:181)

This bark beetle was reared from fruit stems of *Osmanthus* in Keekee gulch in the Waianae Mountains of Oahu. It occurs in the bark of many other plants.

HOMOPTERA

Family Delphacidae

Nesothoë terryi Kirkaldy (1908:204)
- - - - Waialua, Keekee gulch, Waialae Nui, Oahu

* **Nesothoë semialba** (Muir) (1922:95)
- - - - Alakai Swamp and Kalalau trail, Kauai

* **Nesothoë piilani** Kirkaldy (1908:204)
- - - - Alakai Swamp, Kauai; Kaiholena, Lanai

Nesothoë maculata (Muir) (1916:177) - - - - - - Kaiholena, Lanai

Nesothoë hula Kirkaldy (1908:204) - - - Kalalau trail, Kokee, Kauai

Nesothoë gulicki (Muir) (1916:177) - - - - - - Waiamau, Hawaii

Leialoha oceanides (Kirkaldy) (1910:580)
- - - - Alakai Swamp, and Kalalau trail, Kauai

All of these leafhoppers have been collected on *Osmanthus;* the last four occur on other trees also.

Family Cicadellidae

Nesophrosyne spp.

Undetermined species have been collected from *Osmanthus* at Kokee, Kauai; Keekee gulch and Halona Valley, Oahu; and Kilauea, Hawaii. Some appeared to be attached to *Osmanthus,* others did not.

Family Flatidae

Siphanta acuta (Walker) (1851:448)

Collected from *Osmanthus* at Kokee, Kauai; on many other plants also.

HETEROPTERA

Family Lygaeidae

Neseis (Trachynysius) nitidus impressicollis Usinger (1942:60)

Nysius nigriscutellatus Usinger (1942: 102)

These bugs have been collected at Kokee, Kauai, on *Osmanthus* and many other plants.

OSTEOMELES ANTHYLLIDIFOLIA LINDLEY

Family: Rosaceae.

Hawaiian name: uulei.

This plant occurs in dry regions as a shrub or sometimes a small tree. Few insects are associated with it.

LEPIDOPTERA

Family Plusiidae

* **Cosmophila vulpicolor** Meyrick (1928: 94)

This moth was reared from caterpillars on *Osteomeles* foliage at Woodlawn and Niu Valley, Oahu. A caterpillar was found on this plant on Molokai, and another in the Kau desert near Naalehu, Hawaii; neither was reared. Larvae of this species are very different from those of other *Cosmophila* in Hawaii.

Family Hydriomenidae

Eucymatoge sp.

Green looping caterpillars, probably of this genus, were collected on *Osteomeles* at Kilauea, Hawaii, but failed to mature.

Family Tortricidae

* **Epagoge osteomelesana** Swezey (1946: 626)

A moth of this species was reared from a caterpillar on *Osteomeles* foliage at Woodlawn, Manoa Valley, Oahu.

COLEOPTERA

Family Scolytidae

Stephanoderes maculicollis (Sharp) (1879: 101)

Collected from dead stems of *Osteomeles* at Woodlawn, Manoa Valley, Oahu.

Family Cerambycidae

Plagithmysus davisi Swezey (1946: 621)

Reared from dead *Osteomeles* at Puuwaawaa, Hawaii.

Green looping caterpillars, probably of this genus, were collected on

HOMOPTERA

Family Flatidae

Siphanta acuta (Walker) (1851 : 448)
Collected from *Osteomeles* at Kilauea, Hawaii.

Family Aphididae

Tuberolachnus salignus (Gmelin) (1790 : 2209)
This immigrant aphid was found feeding on the bark of *Osteomeles* twigs at Kilauea, Hawaii.

THYSANOPTERA

* **Diceratothrips brevicornis** Bagnall (1910 : 697)
This thrips was found under bark of *Osteomeles* in Manoa Valley, Oahu. It has not been recorded from any other plant.

PANDANUS ODORATISSIMUS LINNAEUS

Family: Pandanaceae.

Hawaiian names: hala; lauhala (for the leaf).

This native "screw pine" occurs at lower elevations in the drier regions, rather than in the denser forests. Only a few insect species are attached to it.

LEPIDOPTERA

Family Cosmopterygidae

* **Trissodoris quadrifasciata** (Walsingham) (1907 : 516)
The slender larva of this moth is a leafminer in dead *Pandanus* leaves. When full grown it cuts oval pieces from both upper and lower epidermis, and fastens them together to form a pupal case, which is usually drawn into the space where the insect has been feeding. An undetermined *Eupelmus* has been reared from larval cases collected at Waiahole and in Manoa Valley, Oahu.

* **Pyroderces incertulella** (Walker) (1864 :658)
Larvae of this moth were found in great numbers feeding on the male inflorescence of *Pandanus* at Waiahole, Oahu, and in Honolulu; from one inflorescence 266 adult moths were reared. In the absence of flowers, the caterpillars feed on dead leaves.

Family Lyonetiidae

* **Ereunetis penicillata** Swezey (1909 : 13)
The only rearing record for this moth is from dead *Pandanus* leaves at Kilauea, Kauai.

Decadarchis minuscula (Walsingham) (1897 : 155)

This moth was reared from dead leaves of *Pandanus,* but is found similarly on many other plants.

Family Hyponomeutidae

* **Hyposmocoma oxypetra** Meyrick (1935 : 65)

This moth was reared from larval cases on dead *Pandanus* leaves at Kilauea, Kauai. There are no other records for the species.

Family Tineidae

Choropleca terpsichorella (Busck) (1910 : 134)

Reared from dead leaves of *Pandanus* in Honolulu, Oahu. It occurs similarly on other plants.

COLEOPTERA

Family Carabidae

Plochionus timidus Haldeman (1843 : 298)

Adults and larvae of this predaceous immigrant beetle were found on *Pandanus* at Paia, Maui.

Family Curculionidae

Oxydema fusiforme Wollaston (1873 : 632)

Oxydema longulum (Boheman) (1859 : 149)

These weevils were both collected from *Pandanus* in upper Manoa Valley, Oahu.

Family Corylophidae

Corylophodes rotundus (Sharp) (Blackburn and Sharp, 1885 : 127)

Collected from *Pandanus* in upper Manoa Valley, Oahu.

DIPTERA

Family Culicidae

Aedes albopictus (Skuse) (1894 : 20)

Family Tipulidae

Limonia (Libnotes) perkinsi (Grimshaw) (1901 : 6)

Family Asteiidae

Stenomicra orientalis Malloch (1927 : 25)

Larvae of these three Diptera have been found in the moisture accumulated in the axils of *Pandanus* leaves; they occur in similar situations on other plants.

HOMOPTERA

Family Coccidae

* **Pseudococcus giffardi** (Ehrhorn) (1916: 243)

This mealybug often occurs in Honolulu in masses at the base of *Pandanus* leaves. It is preyed upon by the ladybird beetle, *Cryptolaemus montrouzieri* Mulsant (1853: 268), and by the larvae of the drosophilid, *Gitona perspicax* (Knab) (1914: 166).

Chrysomphalus ficus Ashmead (1880:267) - - - - - - - - - Oahu

Chrysomphalus propsimus Banks (1906: 230) - - - - - - - - Oahu

Pinnaspis buxi (Bouché) (1851: 111) - - - - - - - - Pukoo, Molokai

This last-named scale is parasitized by *Aspidiotiphagus citrinus* (Craw) (1891: 4), and *Aphytis proclia* (Walker) (1839: 9), (a synonym of which is *Aphytis diaspidis* Howard); the scale is preyed upon by the ladybird, *Telsimia nitida* Chapin (1926: 131).

Ischnaspis longirostris (Signoret) (1882: xxxv) - - - Oahu; Molokai

All of the scales named above have been found on *Pandanus* and are sometimes injurious; they have many other hostplants.

ISOPTERA

Neotermes connexus Snyder (1922: 9)

Pandanus is one of many hosts of this forest termite.

THYSANOPTERA

* **Docidothrips trespinus** (Moulton) (1934: 500)

This thrips is common in the male flowers of *Pandanus* at Hauula, Oahu; it is also present on Kauai and Hawaii. Although it occurs on a few other plants, *Pandanus* is considered its true host.

Taeniothrips hawaiiensis (Morgan) (1913: 3)

This species feeds on flowers.

Plesiothrips panicus (Moulton) (1929: 61)

This thrips has been found on male flowers of *Pandanus* on Kauai, Oahu and Molokai. It occurs also on many grasses.

Phlaeothrips claratibia Moulton (1937: 414)

Collected from *Pandanus* leaves at Kipapa, Oahu; this thrips occurs also on pineapple and *Pritchardia*.

PANICUM

See **Grasses**, p. 98

PASPALUM

See **Grasses**, p. 98

PELEA spp.

Family: Rutaceae.

Hawaiian name: alani.

There are numerous species of *Pelea* in the Hawaiian forests, many of them restricted to a single island. Many of the insects listed are found on only one island; the majority are strictly attached to this plant.

LEPIDOPTERA

Family Hyponomeutidae

* **Prays fulvocanellus** Walsingham (1907: 652)

The larvae of this moth, which occurs on all the islands, feed in the buds and seeds of *Pelea* without regard to species.

Family Opostegidae

The genus *Opostega* has five species known to be leafminers in *Pelea;* each has a distinctive mine (shown in Fig. 23). The adult moths are very small and are seldom seen or reared.

* **Opostega maculata** Walsingham (1907: 711) Fig. 23-B

This moth was described from Molokai. I have reared it from leaves of *Pelea oblongifolia* Gray on Oahu, and have found its characteristic mines in leaves of *P. rotundifolia* Gray and on several undetermined species of *Pelea* in numerous localities in the Koolau range, Oahu.

* **Opostega callosa** Swezey (1921: 532) Fig. 23-A

This species was reared from the circular callus-like mine in leaves of *Pelea rotundifolia* on Oahu. Its mines have been found in *P. lydgatei* Hillebrand and in several undetermined species of *Pelea;* they have been seen in many localities of the Koolau range on Oahu.

* **Opostega serpentina** Swezey (1921: 533) Fig. 23-C

This moth has been reared from serpentine mines in leaves of *Pelea elliptica* (Gray) Hillebrand from Mt. Olympus, Oahu. The mines have also been found in *P. clusiaefolia* Gray and other species of *Pelea* in several places in the Koolau range, Oahu, and in leaves of *P. sapotaefolia* Mann [now considered a variety of *P. clusiaefolia*] on Kauai.

* **Opostega filiforma** Swezey (1921: 534) Fig. 23-D

An individual of this species was collected on Mt. Kaala, Oahu, on *Pelea sapotaefolia,* the leaves of which had numerous mines of the type shown in Fig. 23-D. No other type of mine was present, so it seems reasonable to believe the moth was from that mine. The mines were found abundantly in leaves of *Pelea elliptica* on Mt. Konahuanui and on other ridges near Honolulu. In its later stages the larva enters the cambium layer of the petiole.

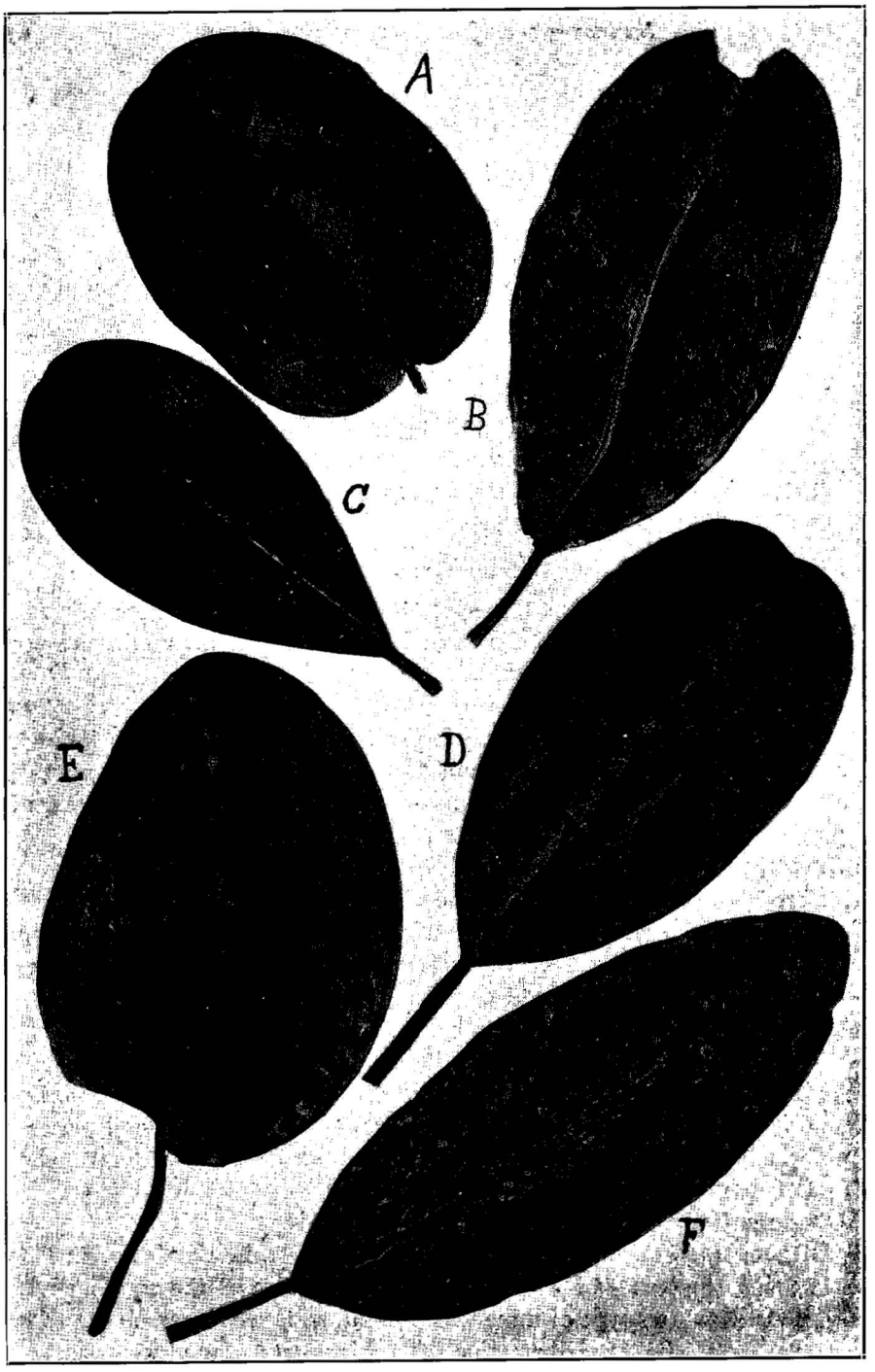

FIGURE 23. Leaves of *Pelea* spp., with mines of **Opostega** spp. **A, callosa; B, maculata; C, serpentina; D, filiformis; E, peleana; F,** undetermined species.

* **Opostega peleana** Swezey (1921 : 534) Fig. 23-E

This moth was reared from a mine such as shown in Fig. 23-E, in *Pelea sandwicensis* (Gaudichaud) Gray, Mt. Olympus, Oahu. Its mines have been found in leaves of *P. rotundifolia* and in undetermined species of *Pelea* on several of the ridges of the Koolau range, Oahu, as well as on Kauai.

* **Opostega dives** Walsingham (1907 : 711)

This beautiful moth was described from specimens caught at Halemanu, Kauai. It has never been reared, but it is believed to form mines of a type found in leaves of *Pelea anisata* Mann (the mokehana), *P. kauaiensis* Mann and *P. gayana* Rock at Kaholuamano, Kauai. Dr. Perkins collected the only two specimens known; one was running over a *Pelea* leaf, and the other ovipositing there. Undetermined chalcidoid parasites have been reared from *Opostega* mines.

Family Xylorictidae

* **Thyrocopa peleana** Swezey (1932 : 200) Fig. 24

The white moths of this species were reared from caterpillars in burrows of the longicorn beetle, *Nesithmysus bridwelli* Perkins (1920: 343), in *Pelea* trees on Waipio ridge, Oahu. The larvae feed in decaying wood and on bark around the entrance to the burrows, spinning a sheet-like web to cover the feeding area.

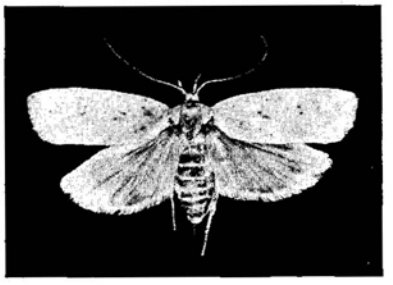

FIGURE 24. **Thyrocopa peleana.**

COLEOPTERA

Family Cerambycidae

Four species of *Plagithmysus* are attached to *Pelea*. The larvae feed in and under the bark of injured or dying trees, and pupate in the wood. Each species is restricted to a single island.

* **Plagithmysus diana** Sharp (1900: 107) - - - - - - - - - - Kauai

* **Plagithmysus collaris** Sharp (1900: 107) - - - Mt. Haleakala, Maui

* **Plagithmysus bishopi** Sharp (1896: 242) Fig. 3 - - Kilauea, Hawaii

This last species was reared from *Pelea cinerea* (Gray) Hillebrand and *P. zahlbruckneri* Rock, as well as from *Zanthoxylum dipetalum geminicarpum* Rock, a related tree.

* **Plagithmysus vicinus** Sharp (1896: 243) - - - - - Mauna Loa, Hawaii

Four species of *Nesithmysus* are attached to *Pelea,* their larvae in living trees, in and under the bark, and in the wood:

* **Nesithmysus bridwelli** Perkins (1920: 343) Fig. 25

This beetle was reared from *Pelea sandwicensis* and *P. clusiaefolia,* on Mt. Kaala, at Kahana summit and Waipio ridge, Oahu.

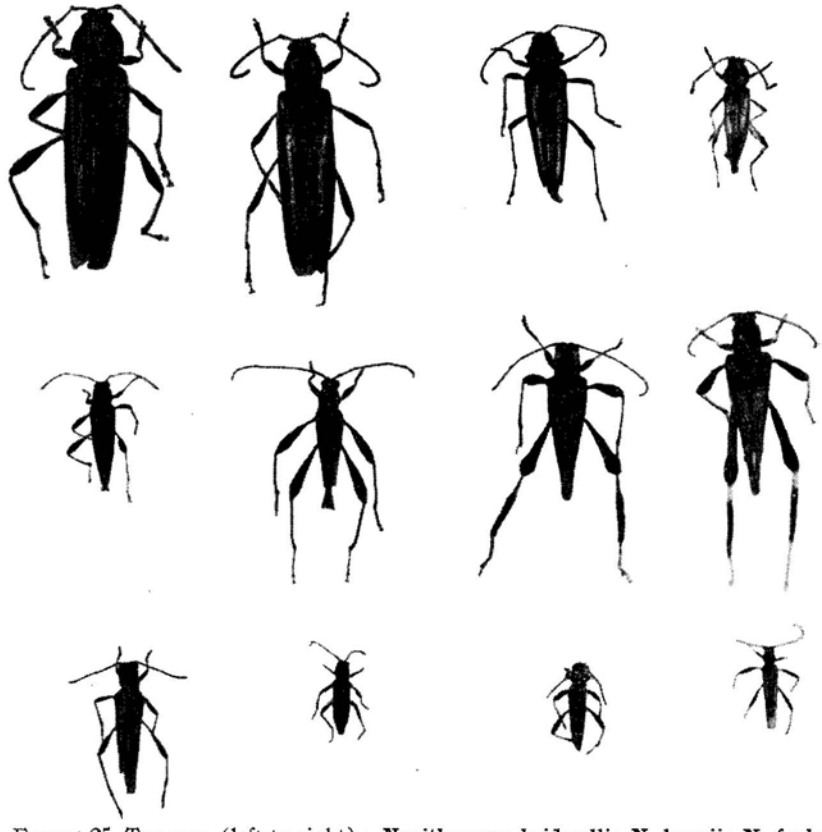

FIGURE 25. Top row (left to right): **Nesithmysus bridwelli; N. haasii; N. forbesii; N. swezeyi.** Middle row: **Paraclytarlus podagricus; Plagithmysus cristatus; Callithmysus hirtipes; Callithmysus koebelei.** Bottom row: **Neoclytarlus pennatus; N. euphorbiae; N. indecens; N. smilacis.**

* **Nesithmysus haasii** Perkins (1921: 504)

Reared from *Pelea* sp. from Kahana summit, Oahu.

* **Nesithmysus forbesii** Perkins (1921: 503)

Reared from *Pelea,* Kula pipe line trail, Olinda, Maui.

* **Nesithmysus swezeyi** Perkins (1927: 485)

Reared from *Pelea* sp., Kula pipe line trail, Olinda, Maui.

Family Aglycyderidae

The following bark beetles were collected from *Pelea* sp.; their larvae inhabit the dead twigs.

Proterhinus archaeus Perkins (1900: 209)

Although collected from *Pelea* sp., it is chiefly found under *Straussia* bark, in both mountain ranges, Oahu.

Proterhinus pusillus Sharp (1879: 97)

On *Pelea* sp., Mt. Tantalus and Manoa, Oahu, but usually on other trees.

* **Proterhinus pusillus subpusillus** Perkins (1910: 665)

This variety is attached to *Pelea,* and is widely distributed on Oahu.

* **Proterhinus squamicollis moestus** Perkins (1928: 197)

Collected on *Pelea,* Lanipo, Oahu.

Proterhinus obscuricolor Perkins (1900: 202)

On *Pelea* sp., Woodlawn trail, Oahu, but really attached to *Straussia.*

Proterhinus myrsineus Perkins (1910: 659)

On *Pelea* sp., Haleauau Valley, Waianae Mountains, Oahu; attached to *Myrsine* (*Suttonia*).

* **Proterhinus epimelas** Perkins (1900: 226)

On *Pelea* sp., Olinda, Maui

HOMOPTERA

Family Cicadellidae

* **Nesophrosyne peleae** Osborn (1935: 25)

This species has been collected from *Pelea,* to which it is probably attached, on Mt. Kaala and in Palolo Valley, Oahu, as well as at Kilauea, Hawaii.

Family Delphacidae

Nesothoë hula Kirkaldy (1908: 204)

This leafhopper was collected from *Pelea* in the Kauai mountains; it occurs also on several other kinds of trees.

Family Psyllidae

* **Hevaheva perkinsi** Kirkaldy (1902: 113) - - - Kauai; Oahu; Hawaii
* **Hevaheva silvestris** Kirkaldy (1908: 206) - Kauai; Mt. Tantalus, Oahu
* **Hevaheva minuta** Crawford (1925: 28) - - - - - - - Nualolo, Kauai
* **Hevaheva hyalina** Crawford (1918: 451) - - - - Glenwood, Hawaii
* **Hevaheva monticola** Kirkaldy (1908: 205) - - Haleauau Valley, Oahu
* **Hevaheva swezeyi** Crawford (1928: 33) - - - - - - - Olinda, Maui
* **Hevaheva maculata** Caldwell (1940: 396) - - - - Kauaikinana, Kauai

These species of jumping plant lice are all attached to *Pelea,* some possibly to particular species, though in most cases the hostplant was not specifically determined. *Hevaheva perkinsi* has been recorded from *P. clusiaefolia, P. lyd-*

gatei and *P. wawreana* Rock; *H. silvestris* has been taken from *P. rotundifolia*. The nymphs of *H. perkinsi* live in galls on the leaves; those of *H. minuta* and *H. silvestris* are free-living on the foliage. The young of *minuta* have a pair of long, blue, caudal filaments; the nymphs of *swezeyi* adhere closely to the leaves, superficially resembling small Coccidae.

HETEROPTERA

Family Lygaeidae

Neseis (Trachynysius) mauiensis (Blackburn) (1888: 345)
- - - - Olinda and Waikamoi, Maui

Neseis (Icteronysius) ochriasis (Kirkaldy) (1902: 162)
- - - - Kilauea and Mt. Hualalai, Hawaii

Nysius coenosulus Stål (1859: 243) - - - - - - - - - All the islands

Nysius delectus White (1878: 367) - - - - All the islands except Kauai

All of these bugs have been collected from *Pelea*, but occur more commonly on other trees and plants.

Family Miridae

Sarona adonias Kirkaldy (1902: 142)

This bug has been collected from *Pelea* and *Metrosideros* on all the islands except Kauai.

PERROTTETIA SANDWICENSIS GRAY

Family: Celastraceae.

Hawaiian name: olomea.

There is but a single species of *Perrottetia* and few insects are attached to it.

LEPIDOPTERA

Family Lycaenidae

Lycaena blackburni (Tuely) (1878: 9)

This small butterfly was once reared from caterpillars on newly sprouted *Perrottetia* leaves on the Manoa cliff trail, Mt. Tantalus, Oahu. Its true host-plant is *Acacia koa*.

COLEOPTERA

Family Cerambycidae

Plagithmysus vitticollis Sharp (1896: 240) Fig. 3

This beetle was reared several times from *Perrottetia* in the Kilauea region of Hawaii, and from *Rubus hawaiiensis* Gray on the upper Hamakua ditch trail, Kohala Mountains, Hawaii.

Callithmysus microgaster hirtipes Sharp (1900: 113) Fig. 25

A beetle reared from a fallen *Perrottetia* tree on the Cooke trail, Nuuanu Valley, Oahu, was recorded as this variety. This was before I had seen typical *microgaster,* or had reared it from *Bobea,* its host tree. From more recent study of the specimen from *Perrottetia* it appears that it is the typical *microgaster,* not the variety. The variety *hirtipes* is based on the fact that the hairs of the hind tibiae are longer than those of typical microgaster; in the *Perrottetia* specimen they are no longer than in specimens from *Bobea.*

Family Curculionidae

Oodemas purpurascens Perkins (1900: 166) - - - - Kauaikoi, Kauai
Oodemas molokaiensis Perkins (1900: 158) - - - - Iao Valley, Maui

These weevils are found in dead wood of *Perrottetia* and other trees.

Family Aglycyderidae

Proterhinus basalis Sharp (1879: 98) - - - - - - - Kumuweia, Kauai
Proterhinus angustiformis Perkins (1900: 197) - - - Kumuweia, Kauai
Proterhinus excrucians Perkins (1910: 662) - - - - - Kaluanui, Oahu
Proterhinus blackburni Sharp (1878: 17) - Manoa arboretum trail, Oahu
Proterhinus platygonioides Perkins (1910: 661) - - - Mt. Kaala, Oahu
* **Proterhinus obscurus perobscurus** Perkins (1910: 663)
- - - - Mt. Tantalus, Oahu

These bark beetles have been collected from dead *Perrottetia* twigs; all occur on other trees except *P. obscurus perobscurus,* which is attached to olomea.

Family Scolytidae

Xyleborus truncatus Sharp (Blackburn and Sharp, 1885: 192)
- - - - Cooke trail, Nuuanu, Oahu
Xyleborus pseudoangustatus Schedl (1940: 28) - - - Kawailoa, Oahu

These ambrosia beetles have been recorded from *Perrottetia* but occur more commonly on other trees.

HOMOPTERA

Family Cicadellidae

* **Nesophrosyne monticola** (Kirkaldy (1910: 562)

Collected from *Perrottetia* on Kuliouou ridge, Oahu.

HETEROPTERA

Family Miridae

* **Orthotylus** sp.

What may be an undescribed species was abundant on *Perrottetia* at Kumuweia and Kauaikoi, Kauai.

ISOPTERA

Neotermes connexus Snyder (1922: 9)

Perrottetia is one of a long list of Hawaiian trees from which this termite has been recorded.

THYSANOPTERA

Macrophthalmothrips hawaiiensis Moulton (1928: 122)

Found under *Perrottetia* bark on Kauai, Oahu and Maui. It is found on other trees also.

Merothrips morgani Hood (1912: 132)

Collected on *Perrottetia* and several other forest trees in Hawaii National Park, Kilauea, Hawaii.

PHEGOPTERIS

See **Ferns (Filices)**, p. 85

PIPTURUS spp.

Family: Urticaceae.

Hawaiian name: mamake.

Hillebrand's "FLORA OF THE HAWAIIAN ISLANDS" lists a single variable species, *Pipturus albidus* (Hooker and Arnott) Gray, which is widely distributed on all the islands of this group. More recent studies have separated the genus into several species and varieties, but the insect records use only the name *albidus*. A large number of insects are associated with *Pipturus,* including many which are attached to it. In addition some incidental captures are recorded.

FIGURE 26. **Vanessa tameamea,** the Kamehameha butterfly.

LEPIDOPTERA

Family Nymphalidae

* **Vanessa tameamea** Eschscholtz (1821: 207) Figs. 26-28

This is the Kamehameha butterfly, the large spiny caterpillars of which (Fig. 27) feed on *Pipturus* leaves on all the islands. Occasionally the caterpillars are found on *Urera, Neraudia, Touchardia* and *Boehmeria,* all closely related to *Pipturus*. In their early stages the caterpillars hide under folded-over leaf margins. The large chrysalis (Fig. 28) is suspended from the underside

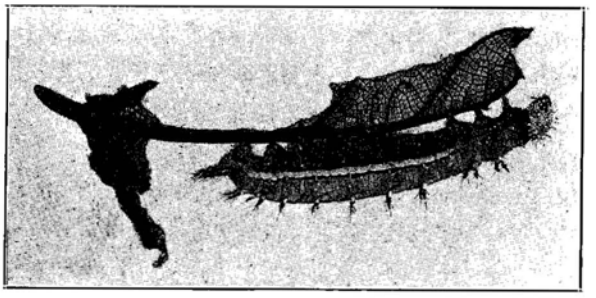

FIGURE 27. Caterpillar of Kamehameha butterfly.

of a leaf or other convenient object; it is often parasitized by *Echthromorpha fuscator* (Fabricius) (1793: 163). The eggs, which are laid singly on the leaves, are sometimes parasitized by *Trichogramma minutum* Riley (1871: 157).

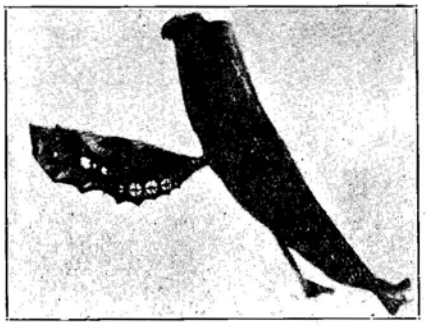

FIGURE 28. Pupa of Kamehameha butterfly.

Vanessa atalanta (Linnaeus) (1758: 478)

This immigrant butterfly occurs on the island of Hawaii, where it is widely distributed. Its larvae feed on *Pipturus* leaves, the eggs being deposited in clusters on the foliage. It differs in this respect from the Kamehameha butterfly, which lays its eggs singly. *V. atalanta* is not known from any island of the

group but Hawaii, except for a single, worn adult collected at Kokee, Kauai, on June 27, 1932 ("PROCEEDINGS" Haw. Ent. Soc., 8: 274, 1933).

Family Lycaenidae

Lycaena blackburni (Tuely) (1878: 9)

This butterfly was reared from caterpillars feeding on new *Pipturus* foliage; its favorite hostplant is *Acacia koa.*

Family Geometridae

Scotorythra rara (Butler) (1879: 273)

This moth has been reared from variegated looping caterpillars on *Pipturus,* Mt. Tantalus, Oahu. The larvae feed on many other trees also.

Family Hydriomenidae

Eucymatoge monticolans (Butler) (1881: 320)

Reared from green looping caterpillars on *Pipturus* foliage at Kamiloloa, Molokai. The species more frequently occurs on *Styphelia.*

Family Pyraustidae

* **Phlyctaenia stellata** (Butler) (1883: 179) Fig. 29

The caterpillars of this moth feed on webbed-together leaves of *Pipturus* on Mt. Tantalus, Oahu; Kilauea, Hawaii; Kumuweia, Kauai; and Kamiloloa, Molokai. The parasite, *Casinaria infesta* (Cresson) (1872:172), was reared

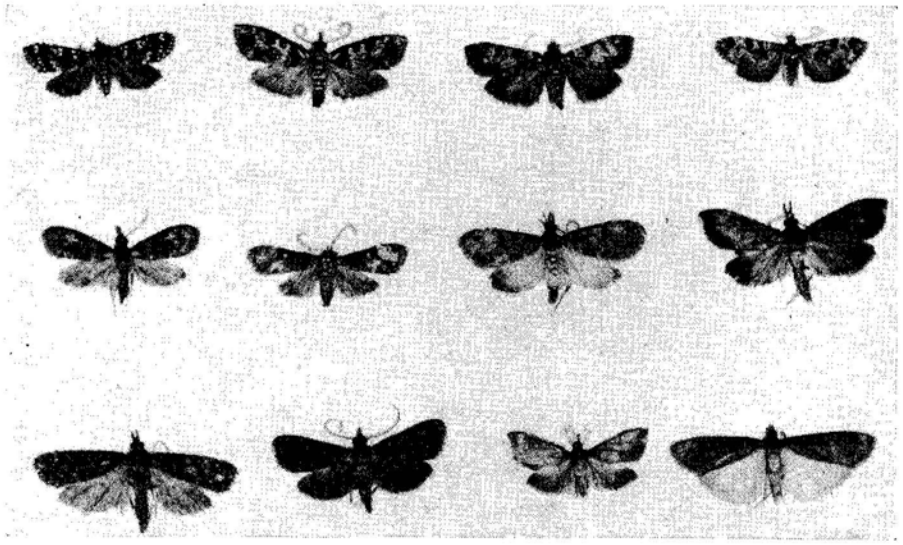

FIGURE 29. Species of **Phlyctaenia.** Top row (left to right): **synastra; chalcophanes; monticolans; nigrescens.** Middle row: **iocrossa; platyleuca; metasema; ommatias.** Bottom row: **stellata; ennychioides; despecta; pyranthes.**

from caterpillars on Mt. Tantalus; others from Kilauea, Hawaii were parasitized by *Zaleptopygus flavo-orbitalis* (Cameron) (1907: 589) and *Meteorus laphygmae* Viereck (1913: 560).

Family Tortricidae

* **Epagoge infaustana** Walsingham (1907: 709)

The caterpillars of this moth feed on the terminal foliage of *Pipturus,* and occur on all the islands, wherever that plant is found. *Horogenes blackburni* (Cameron) (1883: 192) was reared from caterpillars at Kumuweia, Kauai, and *Zaleptopygus flavo-orbitalis* (Cameron) (1907: 589) from a caterpillar at Kilauea, Hawaii.

Archips postvittanus (Walker) (1863: 297)

Amorbia emigratella Busck (1908: 201)

The green caterpillars of these immigrant moths have been found feeding on *Pipturus* foliage on Mt. Tantalus, Oahu.

Family Hyponomeutidae

Hyposmocoma chilonella Walsingham (1907: 637)

The elongate caterpillars of this moth bore in dead wood of *Pipturus* and other trees. On Mt. Tantalus, Oahu, the parasite *Scleroderma chilonellae* Bridwell (1919: 31) was reared from larvae in *Pipturus.*

Hyposmocoma chilonella triocellata Walsingham (1907: 637)

This moth was reared from dead *Pipturus* at Kamiloloa, Molokai; a larva from the same locality was parasitized by *Scleroderma* sp.

Hyposmocoma liturata Walsingham (1907: 622)

Reared from larval cases on bark of *Pipturus,* Kipuka Puaulu, Kilauea, Hawaii. The parasite *Gelis tenellus* (Say) (1836: 233) was reared from this species.

* **Aphthonetus praefracta** Meyrick (1935: 63)

This very small moth was reared from *Pipturus* bark at Kumuweia, Kauai.

Family Gracilariidae

* **Philodoria floscula** Walsingham (1907: 718) - Mountain View, Hawaii

* **Philodoria micropetala** Walsingham (1907: 719) - - Kumuweia, Kauai

* **Philodoria pipturiella** Swezey (1923: 294)
- - - - - Mt. Tantalus and other localities, Oahu

* **Philodoria costalis** Swezey (1934: 524) - Makaha ridge, 3,000 ft., Oahu

* **Philodoria pipturiana** Swezey (1923: 295)
- - - - - Upper Hamakua ditch trail, Hawaii

* **Philodoria pipturicola** Swezey (1915: 96)
- - - - - Waiahole, Punaluu, Oahu; Wailuku, Maui

These six species are all leafminers in *Pipturus.*

* **Parectopa neraudicola** (Swezey) (1920: 385)

This leafminer was reared from *Pipturus* at Olokele canyon, Kauai; Kamiloloa, Molokai; the Panaewa forest reserve south of Hilo, and Puna, Hawaii. Although this species was described from specimens bred from *Neraudia,* it later was found to prefer *Pipturus.*

Parasites bred from these seven leafminers are:

Euderus metallicus (Ashmead) (1910: 327) from *Philodoria pipturiella* and *Parectopa neraudicola*

Pnigalio externa (Timberlake) (1927: 522) from *Philodoria pipturicola* and *Parectopa neraudicola*

Achrysocharis fullawayi (Crawford) (1913: 348) from *Philodoria pipturiella* and *micropetala*

Family Lyonetiidae

Opogona aurisquamosa (Butler) (1881: 403)

Decadarchis minuscula Walsingham (1897: 155)

The larvae of these moths are general scavengers occurring in dead or dying branches, and under bark.

Family Xylorictidae

Thyrocopa abusa Walsingham (1907: 492)

The larvae of this moth can be found in recently dead *Pipturus* branches; they are general scavengers.

COLEOPTERA

Family Cerambycidae

* **Plagithmysus lamarckianus** Sharp (1900: 110) Fig. 3
- - Paauilo, upper Hamakua ditch trail, Kilauea, Hawaii

* **Plagithmysus simillimus** Perkins (1931: 415) - - - - Olinda, Maui

* **Plagithmysus molokaiensis** Perkins (1927: 475) - - Kamiloloa, Molokai

* **Plagithmysus kuhnsi** Perkins (1916: 248)
- - - - Mt. Tantalus, Haleauau Valley, Oahu

* **Plagithmysus sharpianus** Perkins (1927: 475) - - Kumuweia, Kauai

* **Callithmysus koebelei** Perkins (1908: 210) Fig. 25
- - - - Mt. Tantalus, Kaipapau Valley, Oahu

* **Paraclytarlus pipturicola** Perkins (1927: 481) - - - - Kailua, Maui

The larvae of these native beetles feed in trunks and branches of dead or dying *Pipturus,* each on a separate island. They were reared in the localities mentioned, but probably are more widely spread on their respective islands. The parasite *Doryctes palliatus* (Cameron) (1881: 560) has been reared from a few of the species, and is known to parasitize the larvae of many Hawaiian Cerambycidae. The parasite larvae feed externally on their host, often a dozen or more together, and their cocoons are usually formed in a mass.

Parandra puncticeps Sharp (1878: 202) Fig. 4

Larvae and pupae of this large beetle were found in the trunk of a dead *Pipturus* tree at Kumuweia, Kauai. They occur in several other trees as well.

Oopsis nutator (Fabricius) (1787: 142)

This immigrant species was once reared from dead *Pipturus* in Manoa Valley, Oahu. It breeds more commonly in hau (*Hibiscus tiliaceus* Linnaeus) and in breadfruit.

Ceresium unicolor (Fabricius) (1787: 147)

This immigrant usually breeds in wood of introduced lowland trees, but was reared once from dead *Pipturus* in the Panaewa forest near Hilo, Hawaii.

Family Aglycyderidae

* **Proterhinus pipturi** Perkins (1910: 665)

This beetle has been collected from *Pipturus* on Mt. Tantalus, and at Nuuanu, Kaluanui, Kahana and Haleauau, Oahu.

* **Proterhinus nigricans** Sharp (1879: 45)

This species occurs commonly on *Pipturus* at Nualolo and Kokee, Kauai, and sometimes is found on other trees too.

Proterhinus vestitus Sharp (1878: 16) - - - - - - - - - - - Oahu

Proterhinus blackburni Sharp (1878: 17) - - - - - On all the islands

Proterhinus eugonias Perkins (1900: 186) - - - - - - Kokee, Kauai

Proterhinus similis Blackburn (Blackburn and Sharp, 1885: 170)
- - - - Kilauea, Hawaii

Proterhinus deceptor Perkins (1900: 245) - - - - - - Kokee, Kauai

These seven species have all been collected from *Pipturus* in the localities listed. The two marked with an asterisk are attached to that tree; the others occur more commonly on other hostplants.

Family Curculionidae

* **Acalles pusillissimus** Perkins (1910: 653) - - - - Mt. Tantalus, Oahu

Oodemas brunneum Perkins (1900: 159) - - - - Kamiloloa, Molokai

Oodemas angustum Blackburn (1878: 75) - - - Haleauau Valley, Oahu

Oodemas halticoides Blackburn (1877: 5) - - - - Mt. Tantalus, Oahu

Dryophthorus squalidus Sharp (1878: 22) - All the islands except Kauai

Dryophthorus declivis Sharp (1878: 23) - - - - - Mt. Olympus, Oahu

* **Dryophthorus oahuensis** Perkins (1900: 143) - - Mt. Tantalus, Oahu

Dryophthorus gravidus Sharp (1878: 22) - - - - Mt. Tantalus, Oahu

Dryophthorus distinguendus Perkins (1900: 140) - - Mt. Tantalus, Oahu

Dryophthorus modestus Sharp (1878: 23) - - - - Mt. Tantalus, Oahu

Dryophthorus insignis Sharp (1878: 24) - - - - - Mt. Tantalus, Oahu

Dryophthorus insignoides Perkins (1900: 144) - - - Mt. Tantalus, Oahu

Dryophthorus crassus Sharp (1878: 23) - - - - - Mt. Tantalus, Oahu

The larvae of all these weevils have been found feeding in dead wood or under bark of *Pipturus* in the localities named. *Acalles pusillissimus* and *Dryophthorus oahuensis* are known only from *Pipturus;* the others feed in other trees as well.

Family Anthribidae

Araecerus varians Jordan (1946: 120)

Collected from *Pipturus* at Kumuweia, Kauai.

Family Chrysomelidae

Diachus auratus (Fabricius) (1801: 57)

Adults and larvae of this immigrant beetle were found feeding on *Pipturus* foliage at Kumuweia, Kauai. It attacks numerous other plants, and occurs on the other islands.

Family Anobiidae

Xyletobius walsinghamii Perkins (1910: 587)

Reared from larvae in trunk of dead *Pipturus,* Mt. Tantalus and Haleauau Valley, Oahu. This beetle has been reared from *Straussia* and *Perrottetia* also.

Xyletobius aleuritis Perkins (1935: 87)

This beetle was once found under dead *Pipturus* bark in Kamokunui Valley, Waianae Mountains, Oahu; otherwise it is known only from dead wood of *Aleurites.*

Xyletobius sp.

Reared from *Pipturus* in the forest above Paauilo, Hawaii. This insect resembles *X. walsinghamii,* but it is smaller and the pronotum is different.

Family Scolytidae

Poecilips persicae (Hopkins) (1915: 45) - - - - - Mt. Tantalus, Oahu
Xyleborus hawaiiensis Perkins (1900: 175) - Hauula and Makaleha, Oahu
Xyleborus testaceus (Walker) (1859: 260) - - Haleauau Valley, Oahu
Xyleborus confusus Eichhoff (1867: 401) - Mt. Tantalus and Manoa, Oahu
Xyleborus truncatus Sharp (Blackburn and Sharp, 1885: 192)
- - - - Kahana, Oahu; Nahiku, Maui; Kilauea, Hawaii
Xyleborus pseudoangustatus Schedl (1940: 28)
- - - - Manoa and Haleauau, Oahu
Ericryphalus sylvicolus (Perkins) (1900: 181) - Hauula and Manoa, Oahu

These seven scolytid beetles were taken from dead and dying *Pipturus* at the places named; they occur in other trees also.

Family Cucujidae

Cryptamorpha desjardinsi (Guerin) (1844: 196)

This small flat beetle was collected from *Pipturus* at Kumuweia, Kauai; it is very common under leaf sheaths of sugar cane.

Family Colydiidae

Neotrichus latiusculus Fairmaire (1881 : 255)

Several of these beetles were found under dead *Pipturus* bark in the Panaewa forest, south of Hilo, Hawaii.

Antilissus aper Sharp (1879 : 86)

Under dead bark of *Pipturus* on Mt. Tantalus, Oahu.

Family Ciidae

Cis tabidus Sharp (1879 : 93) - - Nuuanu, Haleauau, Kamokunui, Oahu
Cis evanescens Sharp (1879 : 95) - - - - Mt. Tantalus, Haleauau, Oahu
Apterocis ephistemoides (Sharp) (Blackburn and Sharp, 1885 : 165)
- - - - Nuuanu, Oahu ; Kamiloloa, Molokai

These small fungus-feeding beetles have been collected under bark and in dead stems of *Pipturus* in the localities given. They occur in similar situations on other trees also.

Family Nitidulidae

Eupetinus impressus (Sharp) (1878 : 135)

Common under rotten *Pipturus* bark on Mt. Tantalus, Oahu.

HOMOPTERA

Family Cercopidae

Philaenus spumarius (Linnaeus) (1758 : 437)

This immigrant, first found in 1944, appears to be confined to the region about the Hawaii National Park at Kilauea, Hawaii. It has a long list of hostplants, including *Pipturus*.

Family Delphacidae

* **Nesosydne pipturi** Kirkaldy (1908 : 202 - - - - - Throughout Oahu
* **Nesosydne mamake** (Muir) (1919 : 101) - - - - - Waikamoi, Maui
Nesosydne waikamoiensis (Muir) (1919 : 97) - - - - Waikamoi, Maui
Nesosydne ipomoeicola Kirkaldy (1907 : 120) - - - - - Kokee, Kauai
Nesosydne umbratica Kirkaldy (1910 : 585)
- - - - Widely distributed on Oahu, Maui and Hawaii

These leafhoppers are common on *Pipturus;* the first two are attached to it, but the others have additional hostplants. *Dorilas* (formerly *Pipunculus*) *swezeyi* (Perkins) (1905 : 155) is a parasite of *N. pipturi.*

Family Cicadellidae

* **Nesophrosyne pipturi** Kirkaldy (1910 : 560)
- - - - Mt. Tantalus, Oahu ; Molokai
* **Nesophrosyne ponapona** Kirkaldy (1910 : 561)
- - - - Widespread on Kauai, Oahu, Molokai and Hawaii

* **Nesophrosyne ehu** Kirkaldy (1910: 569) - - - - - - Nahiku, Maui

These leafhoppers are attached to *Pipturus* in their respective localities.

Family Coccidae

* **Nesococcus pipturi** Ehrhorn (1916: 238, 246)
- - - - Mt. Tantalus, Oahu; Molokai

Pseudococcus citri (Risso) (1813: 59) - - - - - - Mt. Tantalus, Oahu

Saissetia hemisphaerica (Targioni-Tozzetti) (1867: 26)
- - - - Mt. Tantalus, Oahu

These coccids are occasionally found on *Pipturus*.

HETEROPTERA

Family Lygaeidae

* **Neseis (Trachynysius) fulgidus** Usinger (1942: 59)
- - - - Punaluu and Haleauau, Oahu

* **Neseis (Trachynysius) hiloensis intermedius** Usinger (1942: 71)
- - - - Kohala Mt. and Kilauea, Hawaii

* **Neseis (Trachynysius) hiloensis interoculatus** Usinger (1942: 69)
- - - - Mapulehu ridge, Molokai

* **Neseis (Trachynysius) hiloensis jugatus** Usinger (1942: 68)
- - - - Mountains above Punaluu, Oahu

* **Neseis (Trachynysius) nitidus** (White) (1881: 53) - - - - - Maui

* **Neseis (Trachynysius) nitidus pipturi** Usinger (1942: 65)
- - - - Kohala Mts., Kona and Kilauea, Hawaii

* **Neseis (Trachynysius) nitidus comitans** (Perkins) (1912: 736)
- - - - Ookala and Hilo, Hawaii

* **Neseis (Trachynysius) nitidus contubernalis** Usinger (1942: 61)
- - - - Manoa Valley and Punaluu, Oahu

* **Neseis (Trachynysius) nitidus impressicollis** Usinger (1942: 60)
- - - - Kumuweia and Halemanu, Kauai

* **Neseis (Trachynysius) swezeyi** Usinger (1942: 73)
- - - - Mapulehu ridge, Molokai

All of these bugs are attached to *Pipturus* in their respective localities.

Metrarga nuda nuda White (1878: 371)

This bug occurs under dead bark of *Pipturus* on Oahu, Maui and Hawaii.

Nesocymus calvus (White) (1881: 56)

This insect has been collected on *Pipturus* at Kawela and Kamiloloa, Molokai, but sedges are its preferred hostplants.

Family Nabidae

Nabis lusciosus White (1877: 112)

* **Neseis (Trachynysius) hiloensis jugatus** Usinger (1942: 68)

Nabis truculentus (Kirkaldy) (1908: 191)

These predaceous bugs have been found on Mt. Tantalus, Oahu, on *Pipturus.*

Family Miridae

Pseudoclerada morai Kirkaldy (1902: 141)

Under dead bark of *Pipturus* and other trees. It was described from Molokai; records of its occurrence on Kauai, Oahu, Lanai, Maui and Hawaii are doubtful.

Orthotylus kanakanus Kirkaldy (1902: 134)
- - - - - Kauai; Oahu; Molokai; Lanai; Hawaii

Orthotylus iolani Kirkaldy (1902: 133) - - - - - - - Oahu; Hawaii

Orthotylus kassandra (Kirkaldy) (1902: 135) - - - - Kilauea, Hawaii

Orthotylus kekele Kirkaldy (1902: 134) - - - - - - - - - - Kauai

* **Orthotylus tantali** Perkins (1912: 730) - - - - - Mt. Tantalus, Oahu

These leaf bugs occur on *Pipturus;* the last species is attached to that tree, but the rest occur on other plants also.

Kamehameha lunalilo Kirkaldy (1902: 137)

Collected on *Pipturus* in the Waianae Mountains, Oahu; it occurs also on *Cyrtandra.*

Hyalopeplus pellucidus (Stål) (1859: 255)

An insect of wide distribution, found on many plants besides *Pipturus.*

DERMAPTERA

Labia dubronyi Hebard (1922: 318)

This earwig is found occasionally under dead *Pipturus* bark, where it is in search of prey.

ISOPTERA

Neotermes connexus Snyder (1922: 9)

Pipturus is another in the long list of trees in which this large forest termite feeds.

THYSANOPTERA

Thrips (Isoneurothrips) fullawayi (Moulton) (1928: 114)

This species occurs on the leaves of many plants, among them *Pipturus.*

Hoplothrips swezeyi Moulton (1928: 120)

This thrips was found in dead stems of *Pipturus* at Olinda, Maui. It has been recorded on other trees also.

Haplothrips davisi Bianchi (1946: 503)

This species was found on leaves and dead branches of *Pipturus* near the Thurston lava tube at Kilauea, Hawaii. It occurs on other trees also, on the same island.

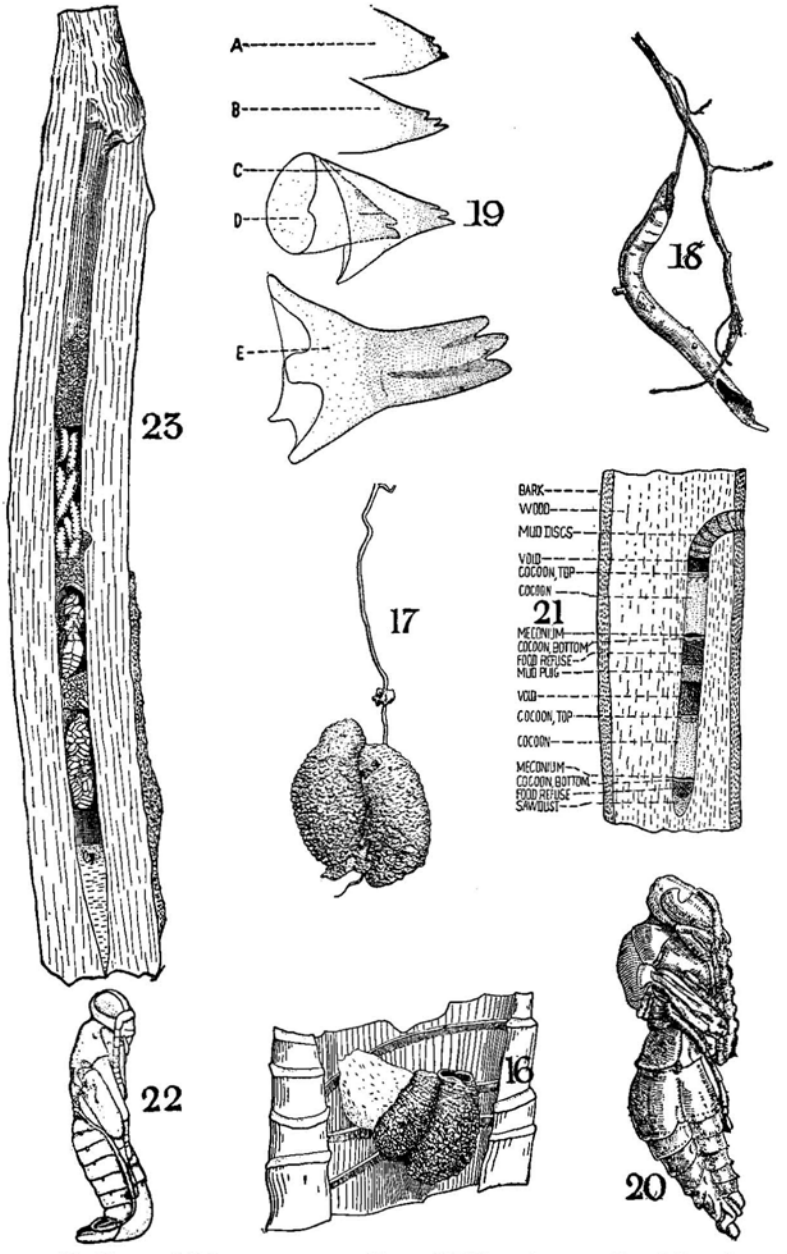

FIGURE 30. Nests of **Odynerus** wasps (From Williams). 16, cells of **O. oahuensis** in fragment of *Freycinetia;* 17, cells of **O. oahuensis;** 18, portion of dead hollowed rootlet occupied by nest of **O. pseudochromus;** 19, larval jaws of **O. pseudochromus;** 20, pupa of **O. pseudochromus;** 21, nest of **O. paludicola** in anobiid boring in dead koa; 22, pupa of eupelmid parasitic on larva of **O. paludicola;** 23, nest of **O. orbus** in beetle boring in *Myoporum* twig.

HYMENOPTERA

Family Prosopididae

Nesoprosopis unica Perkins (1899: 88)

Nesoprosopis anomala Perkins (1899: 122)

The nests of these small native bees have been found in hollow, dead *Pipturus* twigs on Mt. Tantalus, Oahu.

Family Eumenidae

Odynerus spp. Fig. 30

Nests of one or more undetermined species of this wasp were found in dead hollow twigs of *Pipturus* on Mt. Tantalus, Oahu. They had been stored with paralyzed caterpillars as food for the wasp larvae.

PISONIA UMBELLIFERA FORSTER

[now placed in the genus **Ceodes**]

Family: Nyctaginaceae.

Hawaiian name: papala kepau.

This is a tree with very soft wood. Although considerable numbers of insects have been collected from *Pisonia,* only three species are attached to it.

LEPIDOPTERA

Family Geometridae

Sisyrophyta gomphias Meyrick (1899: 169)

This moth was reared from a looping caterpillar on *Pisonia* on Mt. Tantalus, Oahu.

Scotorythra spp.

Two kinds of looping caterpillars, one black, the other green, were found on *Pisonia* in Keekee gulch in the Waianae Mountains, Oahu. No moths were reared, but the larvae probably represent two species of *Scotorythra.*

Family Gracilariidae

* **Parectopa** sp.

Leafmines were found on *Pisonia* in Kukuiala Valley, Waianae Mountains, Oahu. No moth was reared, but it probably would have been a *Parectopa,* attached to this plant. Instead of a moth, a parasite was reared from this material: *Euderus metallicus* (Ashmead) (1901: 327).

Family Hyponomeutidae

Diplosara lignivora (Butler) (1878: 273)

Larval cases of this moth were found under rotten bark of *Pisonia.*

COLEOPTERA

Family Carabidae

Metrothorax curtipes Sharp (1902: 273)

This beetle has been found in dead *Pisonia* trees at Kawela and Kamiloloa, Molokai.

Family Curculionidae

Orothreptes callithrix Perkins (1900: 147)

This weevil was collected from *Pisonia* in Halona Valley, Waianae Mountains, Oahu.

Dryophthorus squalidus Sharp (1878: 22)

This beetle was collected from dead *Pisonia* in Kamiloloa Valley, Molokai.

Family Aglycyderidae

Proterhinus vestitus Sharp (1878: 16)

Recorded from *Pisonia* without locality.

Family Scolytidae

Xyleborus confusus Eichhoff (1867: 401)

In *Pisonia* at Waiahole, Oahu.

Family Corylophidae

Sericoderus pubipennis Sharp (Blackburn and Sharp, 1885: 128)

Collected from *Pisonia* in Kamokuiki Valley, Waianae Mountains, Oahu.

HOMOPTERA

Family Psyllidae

* **Kuwayama minutura** (Caldwell) (1940: 391)

The nymphs of this psyllid were found in shallow pits on the underside of *Pisonia* leaves in Kukuiala Valley, along the Piko trail in Makua Valley, and in Haleauau Valley, all in the Waianae Mountains, Oahu.

* **Kuwayama pisonia** Caldwell (1940: 391)

The nymphs occur in large galls on the underside of *Pisonia* leaves, as many as five being found in a single gall. The only locality in which this psyllid has been found is in Halona Valley, Waianae Mountains, Oahu.

HETEROPTERA

Family Reduviidae

Empicoris rubromaculatus (Blackburn) (1889: 349)

This predaceous bug has been recorded on *Pisonia*.

Family Miridae

Sulamita opuna Kirkaldy (1902: 131)

This plant bug has been collected from *Pisonia* on Mt. Kaala, Oahu.

Orthotylus iolani Kirkaldy (1902: 133)

This green insect often occurs in great abundance on *Pisonia* leaves. It has been collected in several places in the Waianae Mountains of Oahu: Keekee gulch, and in Kukuiala, Kamokuiki, Halona and Haleauau valleys. It occurs on several other forest trees besides *Pisonia.*

HYMENOPTERA

Family Sphecidae

Trypoxylon bicolor Smith (1856: 377)

This wasp stores spiders in its nests, one of which was found in soft rotten wood of dead *Pisonia* on Mt. Tantalus, Oahu.

PITTOSPORUM spp.

Family: Pittosporaceae.

Hawaiian name: hoawa.

There are about a dozen species of this genus in Hawaii. Few insects are attached to them, and probably none specifically.

LEPIDOPTERA

Family Phalaenidae

Agrotis cinctipennis (Butler) (1881: 323)

A colony of young caterpillars of this moth was once found on a *Pittosporum* leaf at Malamalama, Oahu, and adults were reared. The species has other hostplants.

Family Hyponomeutidae

* **Hyposmocoma latiflua** Meyrick (1915: 344)

This species was reared from free (not case-bearing) larvae occurring in the heavy tomentum on the underside of leaves of *Pittosporum cauliflorum* Mann at Puu Kalena and Paumalu, Oahu.

* **Diplosara pittospori** (Swezey) (1920: 382)

This species has been collected only as larvae in dead wood of *Pittosporum* at Kuliouou Valley, Oahu; adults were reared.

Family Gracilariidae

* **Parectopa pittosporella** Swezey (1928: 189)

Reared from leafmines in Pittosporum on Mt. Kaala, Oahu.

HOMOPTERA

Family Cicadellidae

* **Nesophrosyne ignigena** Kirkaldy (1910: 570)

This treehopper was collected abundantly from *Pittosporum hosmeri longifolium* Rock in Kau, Hawaii.

Family Aphididae

Toxoptera aurantii (Boyer de Fonscolombe) (1841: 178)

This aphid has been recorded from *Pittosporum,* and occurs on many kinds of Hawaiian trees.

Family Coccidae

Ceroplastes rubens Maskell (1892: 214)

This wax scale was found on *Pittosporum* at Kaluanui, Oahu; it occurs on many hostplants. *Aneristus ceroplastae* Howard (1895: 351) is a parasite of this scale.

THYSANOPTERA

Merothrips morgani Hood (1912: 132) - - - - - - - Kilauea, Hawaii

Thrips (Isoneurothrips) australis Bagnall (1915: 592) - - - - - - Oahu

In *Pittosporum* flowers.

Phlaeothrips mauiensis Moulton (1928: 130)

Under *Pittosporum* bark at Olinda, Maui.

Karnyothrips melaleuca (Bagnall) (1911: 61)

This predaceous species has been collected on *Pittosporum.*

PLANCHONELLA

See **Sideroxylon,** p. 198

PLATYDESMA CAMPANULATA MANN

Family: Rutaceae.

Hawaiian name: pilo kea.

COLEOPTERA

Family Cerambycidae

* **Plagithmysus platydesmae** Perkins (1920: 345) Fig. 3

This beetle was reared from a living *Platydesma campanulata* in the forest near Glenwood, Hawaii. The small tree, or shrub, was heavily infested, and several beetles were reared. This is the only time this species has ever been found.

HOMOPTERA

Family Coccidae

Aspidiotus hederae (Vallot) (1829 : 30)

This scale has been recorded from *Platydesma;* it has a great many host-plants.

PLECTRONIA ODORATA (FORSTER) BENTHAM AND HOOKER

[now placed in the genus **Canthium**]

Family: Rubiaceae.

Hawaiian names: walahee; alahee.

This is a small tree occurring commonly in dry regions, and at not very high elevations. Only a few insects have been recorded from it.

LEPIDOPTERA

Family Geometridae

Scotorythra sp.

An undetermined species of *Scotorythra* was reared from *Plectronia* foliage at Wailupe, Oahu.

Family Orneodidae

* **Orneodes objurgatella** Walsingham (1907 : 477)

Larvae of this moth infest the fruits of *Plectronia* wherever that tree is found. Moths have been reared from the following localities: Palolo, Wailupe, Kealia and Keawaula, Oahu; Kaupo and Makena, Maui; Pahala, Kau, Hawaii. Parasites reared from *Orneodes* are *Euderus metallicus* (Ashmead) (1901 : 327) and *Eupelmus* near *aporostichus* Perkins (1910-H : 648).

Family Carposinidae

* **Heterocrossa** sp.

An undetermined species of *Heterocrossa* (probably new) has been reared from *Plectronia* fruits at Keawaula, Palolo and Wailupe, Oahu.

Family Phycitidae

Cryptoblabes aliena Swezey (1909 : 24)

The larvae of this scavenger moth were found among fruit clusters of *Plectronia* at Kealia, Oahu.

HOMOPTERA

Family Coccidae

Saissetia hemisphaerica (Targioni-Tozzetti) (1867 : 26)

This scale was present among clusters of fruit of *Plectronia* at Kealia, Oahu. It has many hostplants.

POLYPODIUM

See **Ferns (Filices)**, p. 85

PRITCHARDIA spp.

Family: Palmae.

Hawaiian names: loulou; loulu.

Many species of *Pritchardia* palms occur in the Hawaiian forests, usually a different one in each locality. Numerous insect species are attached to one or another of the species.

LEPIDOPTERA

Family Pyraustidae

* **Omiodes pritchardii** Swezey (1948: 260)

Reared from caterpillars on leaves of *Pritchardia beccariana* Rock in forest along the Kulani road, Hawaii.

Omiodes blackburni (Butler) (1887: 48) Fig. 22

The caterpillars of the coconut leafroller feed on leaves of *Pritchardia* planted in the lowlands.

* **Omiodes** sp.

Caterpillars were found feeding on leaves of a *Pritchardia* along the trail from Kokee to Kalalau, Kauai. No moths were reared, but would probably have proved to be distinct from other species of *Omiodes,* for the caterpillars were differently marked.

Family Hyponomeutidae

* **Hyposmocoma palmivora** Meyrick (1928: 104)

Reared from caterpillars feding in the heavy coating of tomentum on the underside of leaves of *Pritchardia eriophora* Beccari on Kumuweia ridge, Kauai. The caterpillars were not in cases as are many *Hyposmocoma* larvae.

* **Bubaloceras pritchardiae** Swezey (1933: 303)

Reared from caterpillars feeding between folds of *P. eriophora* leaves at Kumuweia, Kauai.

COLEOPTERA

Family Curculionidae

* **Pentarthrum pritchardiae** Perkins (1926: 57)

Collected from *Pritchardia remota* Beccari on Nihoa Island.

Rhabdoscelus obscurus (Boisduval) (1835: 448)

The sugar cane beetle borer was collected from *Pritchardia* in the upper part of Kaluanui Valley, Oahu. It commonly attacks *Pritchardia* palms in the lowlands, boring into trunks and petioles.

Family Aglycyderidae

Proterhinus obscurus Sharp (1878: 18)

Collected from *Pritchardia martii* (H. Wendland) O. Kuntze near Mt. Olympus, Oahu.

Proterhinus swezeyi Perkins (1920: 347)

This species was described from a single specimen collected on a leaf of *Pritchardia martii* near Mt. Olympus. Later it was found that this beetle is attached to *Broussaisia,* the larvae feeding in the terminal twigs.

Family Scolytidae

Coccotrypes pygmaeus Eichhoff (1879: 310)

Reared from seeds of *P. thurstoni* (F. Mueller and Drudz) O. Kuntze (a cultivated species from Fiji) on the University of Hawaii campus, Honolulu, Oahu.

Coccotrypes dactyliperda (Fabricius) (1801: 387)

Reared from seeds of *P. pacifica* (Seemann and Wendland) O. Kuntze (a cultivated species from Fiji) in Honolulu. Both of these scolytids breed in seeds of many kinds of introduced palms in Honolulu.

HOMOPTERA

Family Delphacidae

* **Nesosydne gigantea** (Muir) (1921: 517)

This leafhopper was described from material collected from *Pritchardia* in upper Kaluanui Valley, Oahu.

* **Nesodryas swezeyi** Zimmerman (1948, 4: 159)

This species was discovered on leaves of *P. beccariana* in the forest along the Kulani road, Hawaii.

Family Psyllidae

* **Megatrioza palmicola** Crawford (1918: 452)

This large psyllid has been found on *Pritchardia* leaves in many localities, and probably occurs on all species of these palms. *M. palmicola* has been collected at Glenwood, on the Kulani road and along the upper Hamakua ditch trail, Hawaii; in Kaluanui, Kahana and Waiahole valleys, near Mt. Olympus and on Wailupe ridge, Oahu; at Kumuweia and along the Kokee-Kalalau trail, Kauai.

Family Aphididae

Cerataphis lataniae (Boisduval) (1867: 355)

This peculiar aphid has been found on *Pritchardia* in Honolulu.

Family Coccidae

* **Platycoccus tylocephalus** Stickney (1934: 108)

On *Pritchardia* leaves along the Waikane-Schofield trail, Oahu.

* **Palmaricoccus pritchardiae** Stickney (1934: 67)

On fruits of *Pritchardia hardyi* Rock on Molokai, and on *P. rockiana* Beccari in upper Kaluanui Valley, Oahu.

Pseudococcus nipae (Maskell) (1892: 232)

This mealybug has been recorded from *Pritchardia* without locality. It formerly infested many plants severely until it was controlled by a parasite introduced from Mexico, *Pseudaphycus utilis* Timberlake (1923: 323).

Hemiberlesia lataniae (Signoret) (1869: 124)

This scale was found on *P. martii* near Mt. Olympus, Oahu.

HETEROPTERA

Family Lygaeidae

Reclada moesta White (1878: 370)

This bug has been recorded on *Pritchardia remota* from Nihoa Island; it occurs also on Kauai and Oahu.

Clerada apicicornis Signoret (1863: J-28)

Recorded on *Pritchardia* on Oahu; the insect occurs on Kauai and Hawaii also.

Both these bugs are probably predaceous in the debris about the base of the leaves.

THYSANOPTERA

Phlaeothrips claratibia Moulton (1937: 414)

This thrips has been recorded on *Pritchardia* leaves, without locality.

Pseudomorus brunoniana (Endlicher) Bureau

[also called **P. sandwicensis** Degener]

Family: Moraceae.

Hawaiian name: aiai.

This tree is so rare that very little insect collecting on it has been possible.

LEPIDOPTERA

Family Pyraustidae

* **Margaronia cyanomichla** Meyrick (1899: 201)

This moth was reared from caterpillars on the leaves of *Pseudomorus* in Haleauau and Kukuiala valleys in the Waianae Mountains, Oahu. The parasite, *Casinaria infesta* (Cresson) (1872: 172) has been reared from it. Caterpillars of this species, from which moths were reared, were found defoliating a mulberry tree at the Catholic boys' school in Hilo, Hawaii. Adult moths have been collected at Kokee, Kaholuamano and Olokele canyon, Kauai,

and in the mountains on Molokai, with no record of their foodplant. However, *Pseudomorus* probably were present in the areas, because, though far from common, the tree has a wide distribution.

PTERALYXIA MACROCARPA (HILLEBRAND) K. SCHUMACHER

Family: Apocynaceae.

Hawaiian name: kaulu.

A genus of rare trees from which only a few insects have been collected. The name *Vallesia* was used for the genus by early botanists.

COLEOPTERA

Family Curculionidae

* **Deinocossonus nesiotes** Perkins (1900: 148)

A rare species, once found very abundantly (larvae and beetles) in dead twigs of *Pteralyxia* in Haleauau Valley, Waianae Mountains, Oahu. It has also been collected on the same tree at Pupukea, Oahu.

Family Aglycyderidae

Proterhinus robustus Blackburn (Blackburn and Sharp, 1885: 171)

Under bark of *Pteralyxia,* Halona Valley, Oahu.

Proterhinus vestitus Sharp (1878: 16)

In *Pteralyxia* fruit, Haleauau Valley, Oahu.

Family Ciidae

Apterocis ephistemoides (Sharp) (Blackburn and Sharp, 1885: 165)

Collected in dead twigs, Pupukea, Oahu.

HETEROPTERA

Family Lygaeidae

Oceanides incognitus Usinger (1942: 35)

Found hiding in hollow *Pteralyxia* twig, Haleauau Valley, Oahu.

THYSANOPTERA

Dichaetothrips setidens (Moulton) (1928: 129)

Under bark of *Pteralyxia* in Halona Valley, Oahu.

HYMENOPTERA

Family Formicidae

Cardiocondylia wroughtonii hawaiiensis Forel (1899: 119)

A nest of this ant was found in a dead twig of *Pteralyxia* in Haleauau Valley, Oahu.

DIPTERA

Family Agromyzidae

Undetermined sp.

Leafmining dipterous larvae were found in *Pteralyxia* leaves in Haleauau Valley, Oahu; no adults were obtained.

PTERIS

See **Ferns (Filices)**, p. 85

PTEROTROPIA KAUAIENSIS (MANN) HILLEBRAND

(now called **Tetraplasandra,** see also p. 215)

Family: Araliaceae.

Hawaiian name: ohe ohe.

This is a large, rather uncommon tree occurring in the Kokee region of Kauai and on Oahu. Little collecting has been done on it.

LEPIDOPTERA

Family Tortricidae

* **Capua pterotropiana** Swezey (1933 : 301)

Reared from larvae in the terminal buds, Halemanu, Kauai.

* **Capua oheoheana** Swezey (1933 : 301)

Reared from larvae in dead twigs, Halemanu, Kauai.

COLEOPTERA

Family Anobiidae

Undetermined sp.

Specimens of a small undetermined species were reared from larvae and pupae in dead *Pterotropia* twigs at Halemanu, Kauai.

Family Curculionidae

Nesotocus giffardi Perkins (1910 : 654)

Collected from a fallen *Pterotropia* tree on the Pupukea trail, Oahu. It is more particularly attached to *Cheirodendron* of the same botanical family.

HOMOPTERA

Family Cicadellidae

* **Nesophrosyne** spp.

Two species, as yet undescribed, were collected abundantly on *Pterotropia* at Halemanu, Kauai.

HETEROPTERA

Family Lygaeidae

* **Oceanides rugosiceps** Usinger (1942: 37)

The only record of this species' capture is from a *Pterotropia* tree at Halemanu, Kauai.

* **Neseis (Trachynysius) alternatus** Usinger (1942: 76)

Collected from *Pterotropia* at Halemanu, Kauai, the only record of the species.

Family Miridae

Undetermined spp.

A large green mirid and a smaller species were collected on *Pterotropia* at Halemanu, Kauai.

HYMENOPTERA

Family Prosopididae

Nesoprosopis kauaiensis Perkins (1899: 90)

A nest of this bee was found in a burrow in a dead twig of *Pterotropia* at Halemanu, Kauai.

Family Bethylidae

Sierola sp.

Specimens were reared from tortricid larvae on *Pterotropia* at Halemanu, Kauai.

RAILLIARDIA spp.

Family: Compositae.

Hawaiian name: naenae.

LEPIDOPTERA

Family Hydriomenidae

Eucymatoge monticolans (Butler) (1881: 320)

Reared from caterpillars on *Railliardia* at Kilauea, Hawaii; this moth is more common on *Styphelia.*

Family Gracilariidae

Parectopa marginestrigata Walsingham (1907: 721)

This leafminer, commonly in *Sida,* was reared from *Railliardia* at Kamiloloa, Molokai.

COLEOPTERA

Family Cerambycidae

* **Aeschrithmysus swezeyi** Perkins (1929 : 262)

* **Neoclytarlus raillardiae** Perkins (1931 : 416)

Both these species were collected from *Railliardia ciliolata* de Candolle on the summit of Haleakala, Maui, the larvae boring in dead stems.

* **Neoclytarlus** sp.

What is probably an undescribed species of *Neoclytarlus* was reared recently from *Railliardia* on the Saddle Road, Hawaii, by C. J. Davis.

Borings, presumably by cerambycid larvae, were found in *Railliardia* at Nauhi, Hawaii, at 8,000 feet elevation, but no living material was obtained for determination.

HOMOPTERA

Family Delphacidae

* **Nesosydne naenae** (Muir) (1916 : 98)

This leafhopper was collected on *Railliardia* in the Alakai swamp, Kauai; it occurs also on *Dubautia*.

* **Nesosydne osborni** Muir (1916 : 192)

Collected from *Railliardia menziesii* Gray, Mt. Haleakala, Maui.

* **Nesosydne chambersi** Kirkaldy (1908 : 202)

On *R. ciliolata* at Kilauea and Nauhi gulch, Hawaii.

* **Nesosydne raillardiae** Kirkaldy (1908 : 203)

Collected from *R. ciliolata* and *R. scabra* de Candolle at Kilauea and Kau, Hawaii.

* **Nesosydne raillardiicola** (Muir) (1919 : 102)

On *Railliardia menziesii* and *R. platyphylla* Gray, Mt. Haleakala, Maui.

Family Cercopidae

Philaenus spumarius (Linnaeus) (1758 : 437)

This immigrant was collected from *Railliardia scabra* at Kilauea, Hawaii.

HETEROPTERA

Family Lygaeidae

Neseis (Icteronysius) ochriasis (Kirkaldy) (1902 : 162) - Kilauea, Hawaii

Nysius communis Usinger (1942 : 110) - Nauhi gulch and Kilauea, Hawaii

Nysius nemorivagus White (1881 : 54) - - - - - Nauhi gulch, Hawaii

Nysius blackburni White (1881 : 53) - - - - - - - Kilauea, Hawaii

These bugs, taken from *Railliardia*, occur on many other plants.

Family Nabidae

Nabis blackburni White (1878: 373)

This predaceous bug is recorded from *Railliardia,* without locality; it occurs on many trees.

Family Miridae

* **Engytatus hawaiiensis** (Kirkaldy) (1902: 138)

This plant bug was found on *R. menziesii* in the crater of Haleakala, Maui.

An undetermined black mirid occurred commonly on *Railliardia* at Kilauea, Hawaii.

THYSANOPTERA

Thrips (Isoneurothrips) sp.

An unidentified species was found on *Railliardia* leaves in Waikolu Valley, Molokai.

HYMENOPTERA

Family Scelionidae

Phanurus vulcanus (Perkins) (1910-H: 619)

This parasite was reared from *Nysius* eggs in flower heads of *Railliardia* at Kilauea, Hawaii.

DIPTERA

Family Tephritidae

Trypanea cratericola (Grimshaw) (1901): 46)

This fly was collected from *Railliardia* on Haleakala, Maui, and at Kilauea, Hawaii. The maggots feed in the seeds in flower heads of silversword, *Argyroxiphium sandwicense* de Candolle, in the Haleakala crater.

Tephritis sp.

Larvae of an undetermined species were found in *Railliardia* flower heads at Kilauea, Hawaii. A parasite, *Tetrastichus* sp., was reared from them, and its adults were collected from *Railliardia* blossom heads at Makaopuhi crater, Hawaii. Adults of *Eurytoma* sp. also were present, another parasite probably of the fly maggots.

RAUWOLFIA SANDWICENSIS A. DE CANDOLLE

[also spelled **Rauvolfia**]

Family: Apocynaceae.

Hawaiian name: hao.

This is a rare, small tree; there is but the one species of the genus in Hawaii.

LEPIDOPTERA

Family Pyraustidae

* **Margaronia exaula** (Meyrick) (1888: 213)

The caterpillars of this moth live on *Rauwolfia,* spinning up the leaves like leafrollers. They also have been reared on *Ochrosia,* a related plant. Adults have been reared from Wailupe Valley, Waimano ridge and Pupukea, Oahu. They have been collected, without foodplant record, at Kilauea, Naalehu, Kapapala and Pahala, Hawaii; Lahaina, Olinda and Kula, Maui; in the mountains of Molokai; and in Olokele canyon, Kauai. These records indicate the presence of *Rauwolfia* or of *Orchrosia sandwicensis* Gray in those regions.

REYNOLDSIA SANDWICENSIS GRAY

Family: Araliaceae.

Hawaiian names: ohe; ohe makai.

A rare tree, growing in dry regions at low elevations on all the islands.

LEPIDOPTERA

Family Tortricidae

* **Capua reynoldsiana** Swezey (1920: 384) Fig. 31

This small moth has been reared from *Reynoldsia* foliage in Niu and Wailupe valleys, and at Kunia, Oahu. Parasites reared from this species are:

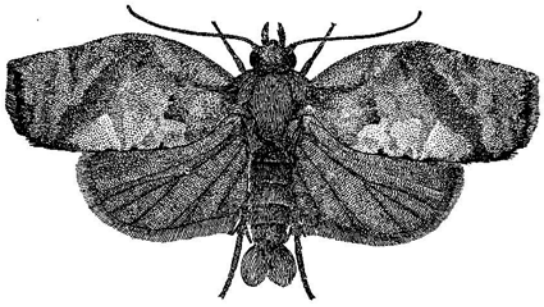

FIGURE 31. **Capua reynoldsiana.**

Zaleptopygus flavo-orbitalis (Cameron) (1907: 589), from the larvae, and *Echthromorpha fuscator* (Fabricius) (1793: 163) and *Brachymeria obscurata* (Walker) (1874: 399) from the pupae.

ROLLANDIA

See p. 120

Family Tortricidae

RUBUS HAWAIIENSIS GRAY

Family: Rosaceae.

Hawaiian name: akala.

This shrub and its varieties, often occur in thickets in the mountain forests at elevations of from 4,000 to 8,000 feet, on the eastern slope of Mauna Kea, above Nauhi, Hawaii. Few insects are attached to *Rubus,* but several have been reared from the pith within the stems. The numerous records from Olinda, Maui, are from along the Kula pipe line trail, east of Olinda.

COLEOPTERA

Family Cerambycidae

* **Plagithmysus vitticollis** Sharp (1896: 240) Fig. 3

Reared from *Rubus* at Kilauea and along the upper Hamakua ditch trail in the Kohala Mountains, Hawaii. Larvae were found in *Rubus* stems at Nauhi gulch, Hawaii, but were not reared.

* **Plagithmysus rubi** Perkins (1931: 415)

Reared from *Rubus* stems, Olinda, Maui.

Family Melasidae

Dromaeolus agriotoides Sharp (1908: 388)

Larvae in pith of dead stems of *Rubus,* Olinda, Maui.

Family Ciidae

Apterocis sp.

Larvae in pith of dead stems, Olinda, Maui.

Family Curculionidae

Rhyncogonus tuberculatus Perkins (1900: 129)

Adult weevils were collected on foliage of *Rubus* at Kokee, Kauai.

* **Oodemas rubicola** Perkins (1933: 267)

Common in dead stems at Nauhi gulch, Hawaii, 5,000 to 6,000 feet.

Oodemas sp.

The larvae in pith of dead stems, Olinda, Maui.

Family Aglycyderidae

Proterhinus epichrysus Perkins (1900: 218)

Both larvae and adults were in pith of dead stems, Olinda, Maui.

LEPIDOPTERA

Family Geometridae

Scotorythra rara (Butler) (1879: 273)

The caterpillars were common on *Rubus* foliage at Olinda, Maui. Some were parasitized by *Hyposoter exiguae* (Viereck) (1912: 638).

Family Pyraustidae

* **Phlyctaenia endopyra** Meyrick (1899 : 219)

Reared from caterpillars on *Rubus* foliage, Kawela, Molokai. Larvae were found on the leaves at Nauhi gulch and at the Kulani prison camp, on Hawaii, but were not reared.

Family Tortricidae

Archips postvittanus (Walker) (1863 : 297)

Reared from caterpillars on foliage, Nauhi, Hawaii.

Amorbia emigratella Busck (1909 : 201)

Caterpillars on foliage, Olinda, Maui.

Family Xylorictidae

Thyrocopa argentea (Butler) (1881 : 399)

Reared from dead *Rubus* stem at Olinda, Maui.

Family Hyponomeutidae

Hyposmocoma chilonella Walsingham (1907 : 637)

Reared from larvae in pith of dead stems, Olinda, Maui. These parasites were reared: *Pycnophion fuscipennis* Perkins (1910-H : 680) and *Ophelinus mauiensis* Ashmead (1901 : 329).

Hyposmocoma chilonella triocellata Walsingham (1907 : 637)

Reared from caterpillars in dead stems, Nauhi gulch, Hawaii.

* **Euperissus catapyrrha** Meyrick (1935 : 64)

Reared from a larva in dead *Rubus* stem, Olinda, Maui.

Family Lyonetiidae

Opogona omoscopa (Meyrick) (1893 : 567)

The larvae of this moth were numerous in dead stems, Olinda, Maui.

HOMOPTERA

Family Flatidae

Siphanta acuta (Walker) (1851 : 448)

The torpedo bug was abundant on *Rubus* at Olinda, Maui.

Family Coccidae

Saissetia oleae (Bernard) (1782 : 108).

On *Rubus* at Olinda, Maui.

HETEROPTERA

Family Lygaeidae

Neseis (Physonysius) ampliatus Usinger (1942 : 51)

On *Rubus,* on windward Haleakala, Maui, at from 2,000 to 2,500 feet elevation.

Hyposmocoma chilonella triocellata Walsingham (1907 : 637)

Neseis (Trachynysius) mauiensis (Blackburn) (1888: 345)
Neseis mauiensis pallidipennis Usinger (1942: 80)
These two bugs were on *Rubus* at Olinda, Maui.

THYSANOPTERA

Hoplothrips swezeyi Moulton (1928: 120)
On *Rubus,* Olinda, Maui.
Haplothrips (Hindsiana) williamsi Moulton (1934: 502)
Thrips (Isoneurothrips) sp.
The last two thrips were collected on Hualalai, Hawaii, *Thrips* sp. being in *Rubus* flowers.

HYMENOPTERA

Family Prosopididae

Nesoprosopis haleakalae Perkins (1899: 87)
This bee had made its nest in a dead, hollow *Rubus* stem, Olinda, Maui.

SADLERIA CYATHEOIDES KAULFUSS

See also **Ferns (Filices),** p. 85

Class: Filices.

Hawaiian name: amaumau.

HOMOPTERA

Family Delphacidae

* **Nesosydne amaumau** (Muir) (1921: 512)
Attached to *Sadleria* fern, Haleakala, Maui.
* **Nesosydne** sp.
An undescribed species of *Nesosydne,* closely related to *N. amaumau,* is attached to *Sadleria,* Kilauea, Hawaii.
Nesosydne ipomoeicola Kirkaldy (1907: 120)
This species occurs on all the islands on many kinds of plants, including *Sadleria.*

Family Cixiidae

Oliarus halehaku Giffard (1925: 94)
Adults of this species were collected at many localities in the rain forest on the windward side of Haleakala, Maui, on *Sadleria* and other plants. The nymphs are found in rotten stems of tree ferns.
Oliarus immaculatus Giffard (1925: 96)
The adults were common at Kawaikoi, Kauai; probably the nymphs also are associated with *Sadleria.*

Family Cicadellidae

Nesophrosyne myrsines Kirkaldy (1910: 568) - - - - Kilauea, Hawaii
Nesophrosyne obliqua Osborn (1935: 23) - - - - - - Lanai; Maui
These leafhoppers occur on *Sadleria* as well as on other plants.

HETEROPTERA

Family Lygaeidae

Oceanides montivagus (Kirkaldy) (1910: 544)
- - - - Oahu; Molokai; Lanai; Maui
Nysius coenosulus Stål (1859: 243) - - - - - - - - - All the islands
Nysius communis Usinger (1942: 110) - - - - - - - - All the islands
Sephora criniger (White) (1881: 57) - - - - - Molokai; Lanai; Maui
These bugs have been collected on *Sadleria* and also on other plants.

Family Miridae

Orthotylus kassandra (Kirkaldy) (1902: 135)
- - - - All the islands except Maui
This plant bug has been taken on *Sadleria* and on other trees and plants.

COLEOPTERA

Family Curculionidae

Syagrius fulvitarsis Pascoe (1875: 57)

The Australian fern weevil became established on Oahu before 1903, on Hawaii by 1908, and on Maui before 1929. It practically killed off the *Sadleria* ferns, as well as a species of *Asplenium,* on Mt. Tantalus, Oahu. It also attacks cultivated maidenhair and other ferns. A parasite, *Ischiogonus syagrii* Fullaway (1922: 201), was introduced from Australia in 1921, and soon became established; it has spread and to some extent has checked damage by the fern weevil.

Family Aglycyderidae

Proterhinus setulosus Perkins (1900: 192)

This beetle is common in dead frond stems of *Sadleria* at Kumuweia, Kauai, and in similar sites in *Cibotium.*

Proterhinus blackburni Sharp (1878: 17)

This species is found rarely in *Sadleria* frond stems at Kawaikoi, Kauai.

THYSANOPTERA

Karnyothrips doliicornis Bianchi (1946: 510)
Haplothrips rosai Bianchi (1946: 506)

These two thrips were collected from *Sadleria* and from several forest trees, on the island of Hawaii.

DIPTERA

Family Drosophilidae

* **Drosophila sadleria** Bryan (1938: 41)

This small fly has been reared from slender larvae which bore extensively in the parenchyma of the rachis of *Sadleria* fronds. Pupation takes place in the burrows. The frond stems of *Sadleria* in the Kilauea area are heavily infested, but the adult flies are seldom seen or reared.

SANTALUM spp.

Family: Santalaceae.

Hawaiian name: iliahi.

Only a few insects have been reared or collected from *Santalum;* the plant species is seldom given in the records.

LEPIDOPTERA

Family Geometridae

* **Scotorythra arboricolans** (Butler) (1883: 177)

The green caterpillars of this moth have been reared from foliage of *Santalum* at several localities on Oahu and Kauai, and at Kilauea, Hawaii.

* **Scotorythra syngonopa** Meyrick (1899: 172)

This moth has been reared on Oahu from *Santalum* and from *Maba.* The caterpillars of this and the preceding species are loopers.

Family Tortricidae

* **Capua santalata** Swezey (1913: 276)

The caterpillars of this small moth occur on webbed leaves of nearly all the species of *Santalum* on Oahu, practically everywhere the plant is found.

* **Capua trigonifer** Walsingham (1907: 704)

This species was reared from *Santalum* at Kilauea, Hawaii.

Archips postvittanus (Walker) (1863: 297)

This moth was reared from *Santalum* at Halemanu, Kauai; it occurs on many plants.

HOMOPTERA

Family Coccidae

* **Pseudococcus gallicola** Ehrhorn (1916: 241)

This mealybug lives in galls on the upper side of *Santalum* leaves. It is widely distributed on Oahu and Maui. It is parasitized by *Anagyrus nigricornis* Timberlake (1919: 197).

caterpillars of this and the preceding species are loopers.

* **Pseudococcus antricolens** Ferris (1948: 181)

This mealybug also inhabits galls on *Santalum* leaves. It was discovered on *S. freycinetianum* Gaudichaud on the Palolo-Waialae ridge, Oahu. The colony was heavily parasitized, probably by *Anagyrus nigricornis* Timberlake.

THYSANOPTERA

Merothrips morgani Hood (1912: 132)

This species was collected from *Santalum paniculatum* Hooker and Arnott and several other endemic trees at Kilauea, Hawaii, by beating from dead branches.

DIPTERA

Family Tephritidae

Ceratitis capitata (Wiedemann) (1824: 55)

The Mediterranean fruit fly was reared from fruit of *Santalum paniculatum* at Puuwaawaa, Hawaii.

SAPINDUS OAHUENSIS HILLEBRAND

Family: Sapindaceae.

Hawaiian names: aulu; kaulu; lonomea.

This is a medium-sized tree in the dry forests of Oahu and Kauai. Only a few insect species are attached to it, although a considerable number have been recorded from it, mostly as scavengers in dead bark and wood.

COLEOPTERA

Family Cerambycidae

* **Plagithmysus cuneatus** Sharp (1896: 241)

Reared from dead or dying branches at Palikea, in the Waianae Mountains, on Niu ridge and in Papaia Valley, Oahu.

* **Plagithmysus sapindi** Perkins (1933: 265)

Reared from branches on Niu ridge, Oahu.

* **Plagithmysus** sp.

Since this paper was prepared, E. J. Ford, Jr., of Honolulu, in January, 1954, reared a series of what is probably a new species of this genus, from dead branches of *S. oahuensis* from Halona Valley, Waianae Mountains, Oahu.

Cyllene crinicornis (Chevrolet) (1860: 460)

Reared from cut branches on the Kealia trail, Waianae Mountains, Oahu. It is more closely attached to kiawe trees (*Prosopis chilensis*).

Family Cucujidae

Laemophloeus minutus (Olivier) (1791 : 243)

Family Tenebrionidae

Gnathocerus maxillosus (Fabricius) (1801 : 155)

Family Cleridae

Tarsostenus univittatus (Rossi) (1792 : 44)

Family Mycetophagidae

Litargus balteatus LeConte (1856 : 14)

Family Lyctidae

Lyctus curtulus Casey (1891 : 15)
Lyctus brunneus (Stephens) (1839 : 117)

The six small beetles listed above, were all reared from dead wood of *Sapindus* at Kealia, Oahu.

Family Anthribidae

Araecerus fasciculatus (Degeer) (1775 : 276)

Reared from *Sapindus* seeds, Waianae Mountains, Oahu.

Family Scolytidae

Xyleborus lanaiensis Perkins (1900 : 176)

Collected from branches of *Sapindus* in Halona Valley, Oahu.

LEPIDOPTERA

Family Xylorictidae

* **Thyrocopa sapindiella** Swezey (1913 : 274)

Reared from caterpillars on *Sapindus* leaves on Niu ridge and Palikea, Oahu.

Family Lyonetiidae

Decadarchis minuscula (Walsingham) (1897 : 155)
Decadarchis simulans (Butler) (1882 : 43)

Both moths were reared from dead bark of *Sapindus* at Kealia, Oahu.

Family Tortricidae

Argyroploce illepida (Butler) (1882 : 42)

The koa seed-moth has been reared from *Sapindus* seeds at Niu, Oahu.

Family Cosmopterygidae

Pyroderces rileyi (Walsingham) (1882 : 198)

The cotton pink bollworm was reared from *Sapindus* fruits in the Waianae Mountains, Oahu.

LEPIDOPTERA

ORTHOPTERA

Family Tettigoniidae

Holochlora japonica Brunner (1878: 181)

The eggs of this insect were found inserted in *Sapindus* twigs in Waimalu Valley, Oahu.

HYMENOPTERA

Family Bethylidae

Scleroderma immigrans Bridwell (1918: 484)

This parasite probably was breeding on *Cyllene crinicornis,* for a large number of them issued from a block of *Sapindus* wood from which several *Cyllene* beetles had issued, and a cluster of *Scleroderma* coccons was found in a *Cyllene* burrow.

Family Ichneumonidae

Idecthis canescens (Gravenhorst) (1829: 555)

This parasite was reared from a *Decadarchis simulans* caterpillar in dead bark of *Sapindus* at Palikea, Oahu.

SAPINDUS SAPONARIA LINNAEUS

Family: Sapindaceae.

Hawaiian name: manele.

This large deciduous tree grows in thick stands in the dry forests at Puuwaawaa on the slopes of Mt. Hualalai, and in the Kipuka Puaulu and other kipukas on the slopes of Mauna Loa, near Kilauea, Hawaii. Even though this species is growing in the kipukas ("islands" of ancient forest which have escaped destruction from lava flows), the tree is considered to be the American species, *saponaria.* No native insects are attached to this tree and most of the few which occur on it are found on other trees as well.

COLEOPTERA

Family Cerambycidae

Plagithmysus darwinianus Sharp (1896: 271) Fig. 3

Adults of this beetle were once found numerous on a fallen trunk of *S. saponaria* in Kipuka Puaulu, Hawaii, but it is not certain that they were breeding in it. This insect is attached to *Sophora chrysophylla* (Salisbury) Seemann which occurs in the same region.

LEPIDOPTERA

Family Tortricidae

Argyroploce illepida (Butler) (1882: 42)

This koa seed-moth was reared from fruits of *S. saponaria* in the Kipuka Puaulu, Hawaii.

Family Geometridae

Scotorythra sp.

Evidence of feeding by caterpillars was observed on foliage of *S. saponaria* in Kipuka Puaulu, Hawaii, and caterpillars of an undetermined *Scotorythra* were found hiding under loose bark; however, adults were not reared.

THYSANOPTERA

Macrophthalmothrips hawaiiensis Moulton (1928: 211)

This large thrips was found under dead bark of *S. saponaria* in Kipuka Puaulu, Hawaii. The insect occurs on numerous other trees.

SCAEVOLA spp.

Family: Goodeniaceae.

Hawaiian name: naupaka.

Several species of *Scaevola* occur in the Hawaiian forests, mainly as shrubs or small trees. Most of the insect records are from *S. chamissoniana* Gaudichaud, as defined in Hillebrand's "FLORA OF THE HAWAIIAN ISLANDS," or *gaudichaudiana* Chamisso, following Skottsberg's revision of the genus in 1927; if no species is given, *chamissoniana* (*gaudichaudiana*) is intended.

LEPIDOPTERA

Family Sphingidae

Hawaiina calida (Butler) (1881: 317) Fig. 10

Caterpillars of this hawk moth were once found numerous on *S. gaudichaudiana* in upper Manoa Valley, Oahu, and moths were reared from them. This species has been reared more frequently from other trees.

Family Pyraustidae

* **Pyrausta constricta** (Butler) (1882: 40)

Caterpillars of this moth are found on *S. gaudichaudiana* just about everywhere the plant occurs. It has been reared from Mt. Tantalus, Mt. Kaumuahona, Mt. Konahuanui, Waialua and Haleauau Valley, Oahu, and from Waikolu, Molokai. At Kokee, Kauai, *Scaevola* leaves showed caterpillar damage by what was probably this species, which is known to occur there. There are records of *P. constricta* on *Scaevola mollis* Hooker and Arnott at Wahiawa, Oahu.

* **Pyrausta dryadopa** Meyrick (1899: 222)

Reared from *Scaevola glabra* [now *Camphusia glabra* (Hooker and Arnott) De Vriese] at Lanipo and Kaumuahona, Oahu.

COLEOPTERA

Family Aglycyderidae

*** Proterhinus basalis** Sharp (1879: 98) - - - - - - - - Kokee, Kauai
Proterhinus amaurodes Perkins (1900: 190) - - - - - - Kokee, Kauai
Proterhinus maculifer Perkins (1900: 198) - - - - - - - Kokee, Kauai
Proterhinus adelus chrysadelus (Perkins) (1910: 658)
- - - - - Kaumuahona, Oahu
Proterhinus deceptor Perkins (1900: 245) - - - - - - - Hauulu, Oahu
Proterhinus obscurus perobscurus Perkins (1910: 663) - Pupukea, Oahu

The first species is attached to *Scaevola;* the rest are probably accidental captures on that plant.

Family Curculionidae

Rhyncogonus blackburni Sharp (Blackburn and Sharp, 1885: 177)
Figs. 4 and 5 - - - - - - - - - - - - - - - - Mt. Tantalus, Oahu
Rhyncogonus koebelei Perkins (1900: 126) Fig. 4 - Mt. Tantalus, Oahu
Rhyncogonus tuberculatus Perkins (1900: 129) - - - - - Kokee, Kauai

The adults of these species feed on *Scaevola* leaves, as well as on foliage of other plants. The larvae are general feeders on roots in the ground.

Oodemas aenescens Boheman (1889: 138) - - - - - - - - - - Oahu
Oodemas laysanensis Fullaway (1914: 18) - - - - - - - Laysan Island

The larvae of these two weevils feed in dead stems of *Scaevola,* the first on *chamissoniana,* the other, on *frutescens* (Miller) Krause.

Family Cerambycidae

Sybra alternans (Wiedemann) (1823: 111)
In dead stem of *S. frutescens,* Kaupo, Oahu.

Family Ciidae

Cis porcatus Sharp (1879: 92)
Under dead bark of *Scaevola.*

Family Bostrichidae

Amphicerus cornutus (Pallas) (1772: 8)
Collected from *S. frutescens,* boring in the stem.

Family Elateridae

Eopenthes parvulus Sharp (Sharp and Scott, 1908: 381)
Eopenthes marginatus Sharp (Sharp and Scott, 1908: 381)

Only females of the first species, and only males of the second, have ever been found; the two are probably one species, with *parvulus* the valid name. Collected from *Scaevola* at Pupukea, Oahu.

HOMOPTERA

Family Delphacidae

* **Leialoha scaevolae** Muir (1922 : 93)

Collected from *Scaevola* at Kumuweia, Kauai.

Nesothoë elaeocarpi (Kirkaldy) (1908 : 103)

Collected, probably as an accidental visitor, on *S. mollis,* on Mt. Tantalus, Oahu.

Aloha ipomoeae Kirkaldy (1904 : 177)

Collected from *S. frutescens,* Kahului, Maui.

Family Cicadellidae

Nesophrosyne sp.

One or more undetermined species were collected from *Scaevola,* Palolo Valley and Mt. Olympus, Oahu, and Kokee, Kauai.

Stragania robusta (Uhler) (1877 : 467)

Collected from *S. frutescens* at Kawela Bay, Oahu; an immigrant from North America.

Family Aphididae

Toxoptera aurantii (Boyer de Fonscolombe) (1841 : 178)

Found on *Scaevola* in the mountains of Oahu; it occurs on many forest plants.

Family Coccidae

An undetermined scale was found killing *Scaevola* in upper Manoa Valley, Oahu.

Family Pentatomidae

Oechalia virescens Usinger (1941 : 77)

A predaceous bug, collected on *Scaevola* at Kokee, Kauai.

Family Lygaeidae

Oceanides fosbergi Usinger (1942 : 31) - - - - - - - - - - - Lanai
Nysius coenosulus Stål (1859 : 243) - - - - - - - - - - - - Oahu
Nysius communis Usinger (1942 : 110) - - - - - - - - - - - Oahu
Sephora criniger (White) (1881 : 57) - - - - - - - - - - - Lanai

These plant bugs have been collected on *Scaevola,* and occur on many different plants.

Family Nabidae

Nabis blackburni White (1878 : 373)

This predaceous species has been taken on *Scaevola* and on many other plants; it is widely distributed.

ORTHOPTERA

Family Acrididae

Atractomorpha ambigua Bolivar (1905 : 209)

This grasshopper has been found feeding on *Scaevola* on Oahu.

THYSANOPTERA

Taeniothrips hawaiiensis (Morgan) (1913 : 3)

A very common thrips, collected on *Scaevola frutescens* flowers as well as many other plants.

HYMENOPTERA

Family Apidae

Apis mellifera Linnaeus (1758 : 576)

The honey bee is commonly attracted to *Scaevola* flowers.

Family Prosopididae

Nesoprosopis spp.

Many species of these native bees are attracted to *Scaevola* blossoms.

Family Megachilidae

Megachile fullawayi Cockerell (1914 : 2)

This leafcutting bee was seen feeding on flowers of *S. frutescens* at Mokapu, Oahu.

Family Bethylidae

Scleroderma manoa Bridwell (1919 : 28)

This parasite was reared from a caterpillar (? *Diplosara* sp.) in dead *Scaevola* stems, Manoa cliffs trail, Mt. Tantalus, Oahu.

Family Eupelmidae

Anastatus koebelei Ashmead (1901 : 320)

A male of this parasite was reared from an egg of *Hawaiina calida* (Butler) on a *Scaevola* leaf in upper Manoa Valley, Oahu.

DIPTERA

Family Tephritidae

Ceratitis capitata (Wiedemann) (1824 : 55)

The Mediterranean fruit fly was reared from *Scaevola* fruits at the Manoa arboretum, Oahu.

Dacus dorsalis Hendel (1912 : 18)

The oriental fruit fly was reared from fruit of *S. frutescens* at Kawela Bay, Oahu. This is not a favorable host, however, for from many infested berries only one or two flies were reared.

Megachile fullawayi Cockerell (1914 : 2)

These fruit fly species infest many kinds of fruit, both of cultivated plants and forest trees.

SCIRPUS

See **Sedges.**

SEDGES

Family: Cyperaceae.

There are many sedges in the mountain forests of Hawaii, and several insects are attached to them.

LEPIDOPTERA

Family Pyraustidae

* **Omiodes antidoxa** Meyrick (1904: 358)

This moth was reared from caterpillars on *Rhynchospora thyrsoidea* Nees and Meyen [now called *R. scleroides* Hooker and Arnott] in Palolo Valley, Oahu, and on *Carex oahuensis* Meyer, [*Carex wahuensis* Meyer] at Kokee, Kauai.

* **Omiodes anastrepta** Meyrick (1899: 204)

Reared from *Carex oahuensis* at Kilauea, Hawaii.

* **Omiodes anastreptoidis** Swezey (1913: 272)

Reared from an unidentified sedge at Kilauea, and in the Kohala Mountains, Hawaii.

Family Tortricidae

* **Bactra straminea** (Butler) (1881: 393)

The larva bores in the stems of sedges. It is most common in *Cladium angustifolium* (Gaudichaud) Bentham and Hooker in the Kilauea region of Hawaii, and has been reared from the same sedge on Pacific Heights ridge, Oahu. *Horogenes chilonis* (Cushman) (1929: 244), an introduced parasite, was reared from *B. straminea* larvae at Kilauea, Hawaii.

* **Bactra truculenta** Meyrick (1909: 586)

This moth was introduced from the Philippines in 1925 because it breeds in nut grass, *Cyperus rotundus* Linnaeus, which was a bad weed in Hawaiian sugar cane fields. The caterpillar bores down the stem into the "nut." It became widely spread and abundant, conspicuously checking the nutgrass. But after a few years parasitism of its eggs by *Trichogramma minutum* Riley (1871: 157) became so heavy that the effectiveness of the moth on nutgrass was greatly reduced, and is now hardly perceptible.

Family Cosmopterygidae

* **Batrachedra foliocuniculator** Busck (1914: 106)

A leafminer in *Scirpus maritimus* Linnaeus, and also a borer in stems of *Cyperus laevigatus* Linnaeus, when these sedges occurred in the swamps of Kewalo and Kapiolani Park, Honolulu, before those areas were drained.

COLEOPTERA

Family Curculionidae

* **Athesapeuta cyperi** Marshall (1928: 266)

A small weevil introduced from the Philippines in 1925 at the same time as *Bactra truculenta.* Its larva bores down the stem into the "nut" of *Cyperus rotundus,* sometimes killing the plant. It has become well established, but is of little importance in checking nutgrass.

HOMOPTERA

Family Delphacidae

Kelisia sporobolicola immaculata Muir (1921: 509)

Collected from *Cladium angustifolium* on Napau trail, Kilauea, Hawaii. It occurs usually on the tree fern, *Cibotium chamissoi* Kaulfuss.

Draeculacephala minerva Ball (1927: 36)

This immigrant sharpshooter occurred on sedges in the swamps of Kewalo and Kapiolani Park, Honolulu, before these swamps were obliterated by municipal improvements. The eggs are laid in the leaves of *Scirpus maritimus,* and are parasitized by *Gonatocerus mexicanus* Perkins (1912: 21), *Oligosita caerulocephala* (Fullaway) (1914: 23), *Brachistella lutea* (Fullaway) (1914: 22) and *Ootetrastichus beatus* Perkins (1906: 263).

Family Aphididae

Aphis maidis Fitch (1856: 318)

This aphid was collected on *Scirpus maritimus* in Kewalo swamp, Honolulu. The parasite, *Aphelinus maidis* Timberlake (1924: 405), was reared from it.

* **Vesiculaphis caricis** (Fullaway) (1910: 32)

This species was found on *Carex* sp., in the mountains back of Honolulu.

Family Coccidae

Pseudococcus brevipes (Cockerell) (1893: 267)

The notorious pineapple mealybug was once found at the roots of a large unidentified sedge, about six miles from Hilo, Hawaii. It has a long list of hostplants.

occurs usually on the tree fern, *Cibotium chamissoi* Kaulfuss.

HETEROPTERA

Family Lygaeidae

* **Nesocymus calvus** (White) (1881 : 56)

Collected from the inflorescence of sedges in the mountains above Kahana, Oahu.

THYSANOPTERA

Haplothrips fusca Moulton (1928 : 124)

Zimmerman (1948, vol. 2 : 444) has recorded this thrips from *Cladium angustifolium.*

SIDA CORDIFOLIA LINNAEUS
(now called **Sida fallax** Walpers)

Family: Malvaceae.

Hawaiian name: ilima.

Although the records of insects associated with *Sida* are chiefly from *S. cordifolia,* a few refer to other species of these lowland shrubs.

LEPIDOPTERA

Family Phalaenidae

Heliothis armigera (Hübner) (1802-1808 : 370)

The caterpillars of the cotton bollworm, or corn earworm, feed on *Sida* buds and flowers, as well as on many other kinds of flowers. It is a bad pest of corn in the Hawaiian Islands.

Cosmophila noctivolans (Butler) (1880 : 8)

This is one of the very variable Hawaiian moths, and occurs on Kauai, Oahu and Maui. Its caterpillars feed on *Sida* foliage.

Laphygma exigua (Hübner) (1802-1808 : 362)

Caterpillars of this moth are sometimes found on *Sida* foliage.

* **Amyna natalis** (Walker) (1858 : 214)

The looping caterpillars of this recent immigrant feed exclusively on *Sida* foliage, and are widely distributed on Oahu, the only island on which the moth is known to occur. One of the parasites introduced from Texas to combat armyworms, *Meteorus laphygmae* Viereck (1913 : 560), has been reared from *A. natalis* larvae.

Family Geometridae

Anacamptodes fragilaria (Grossbeck) (1909 : 194)

Sida is one of the many plants on which the caterpillars of this recent immigrant feed. The moth now occurs on most of the main islands of the Hawaiian group.

Oahu; later it was reared from dead stems of the native cotton, *Gossypium tomentosum* Nuttall.

Family Pyraustidae

Phlyctaenia nigrescens (Butler) (1881 : 328) Fig. 29

The larvae of this moth feed on the foliage of *Sida* and *Abutilon*. It has been reared from *Sida* at Kaimuki, Oahu, and at Papaaloa and Kilauea, Hawaii.

Family Tortricidae

Crocidosema plebeiana Zeller (1847 : 721)

The larvae of this moth feed in the buds and fruits of *Sida* and *Abutilon*, as well as in fruits of *Sapindus*. It occurs on all the islands.

Family Gracilariidae

*** Parectopa marginestrigata** (Walsingham) (1907 : 721)

A leafminer in *Sida, Abutilon, Abortipetalum* and *Xanthium*, occurring on all the islands. It is parasitized by the following: *Sympiesis vagans* (Timberlake) (1926 : 37), *Pnigalio externa* (Timberlake) (1927 : 522), *Euderus metallicus* (Ashmead) (1901 : 327), *Achrysocharis fullawayi* (Crawford) (1913 : 348) and *Solenotus begini* (Crawford) (1912 : 184).

HOMOPTERA

Family Delphacidae

*** Nesothöe laka** Kirkaldy (1908 : 204)

Collected on *Sida* in Iao Valley, Maui.

Family Cicadellidae

*** Nesophrosyne perkinsi** (Kirkaldy) (1904 : 178)

On *Sida* on Oahu, Molokai, Lanai and Hawaii.

Family Aphididae

Aphis gossypii Glover (1877 : 36)

On *Sida cordifolia, S. rhombifolia* Linnaeus and numerous other plants. It is parasitized by *Lysiphlebus testaceipes* (Cresson) (1880 : 208), and preyed upon by the ladybird beetles, *Scymnus notescens* Blackburn (1889 : 197) and *Coelophora inaequalis* (Fabricius) (1775 : 80).

Family Coccidae

Pseudococcus brevipes (Cockerell) (1893 : 267)

Sida is included among the numerous hostplants of this mealybug.

HETEROPTERA

Family Coreidae

Liorhyssus hyalinus (Fabricius) (1794 : 168)

S. cordifolia is one of several hostplants of this bug, which occurs on all the islands. Adults are parasitized by the tachinid fly, *Paradionaea atra* (Town-

send) (1891 : 380), and the eggs by the scelionids *Microphanurus paractias* (Perkins) (1910-H : 619) and *M. rhopali* (Perkins) (1910-H : 618).

Ithamar hawaiiensis Kirkaldy (1902 : 170)

This bug occurs on *S. cordifolia* and several other plants; it is on all the islands.

Family Lygaeidae

Nysius nigriscutellatus Usinger (1942 : 102)

Nysius terrestris Usinger (1942 : 95)

These bugs occur on all the islands, and *Sida* is among their many host-plants.

Nesomartis psammophila Kirkaldy (1907 : 245)

This bug has been taken on *Sida,* but its preferred host is *Eragrostis* grass. It is on most of the islands.

Family Reduviidae

Zelus renardii Kolenati (1856 : 460)

This predaceous bug was found on *Sida,* where it was in search of prey.

Family Nabidae

Nabis capsiformis Germar (1837 : 132)

This is another predaceous bug which has been collected on *Sida.*

Family Miridae

* **Campylomma hawaiiensis** (Kirkaldy) (1902 : 140)

This bug, which is attached to *Sida,* occurs on the southeast and west coasts of Oahu. It is also known from Wake Island.

Hyalopeplus pellucidus (Stål) (1859 : 255)

Sida is among the many hostplants of this bug. The insect is common on all the islands.

Engytatus geniculatus Reuter (1876 : 83)

This immigrant bug, which is a pest on tomatoes and other garden crops, has been collected from *Sida* at Waianae, Oahu.

Family Anthocoridae

Orius persequens (White) (1877 : 111)

This small predaceous black bug has been collected from *Sida* on Oahu.

COLEOPTERA

Family Anobiidae

Xyletobius gossypii Ford (1954 : 312)

This anobiid beetle was first reared from dead stems of *Sida* at Kaimuki, Oahu; later it was reared from dead stems of the native cotton, *Gossypium tomentosum* Nuttall.

SIDEROXYLON SANDWICENSE (GRAY) BENTHAM AND HOOKER

(now placed in the genus **Planchonella**)

Family: Sapotaceae.

Hawaiian names: aulu; kaulu.

A tree of medium size, present on all the islands except Hawaii, and usually not numerous in the forests. A few insect species are attached to it, each on a particular island.

COLEOPTERA

Family Cerambycidae

* **Plagithmysus muiri** Perkins (1927: 476)

This beetle was reared abundantly from trunks of dying *Sideroxylon* in Haleauau and Mohikea valleys, in the Waianae Mountains, Oahu.

* **Plagithmysus munroi** Sharp (1900: 112) Fig. 3

Reared from *Sideroxylon* at Kumuweia, Kauai. It has also been collected from *Metrosideros* at several localities in the Kokee region of Kauai, but it is not known that it breeds in that tree. The record from *Sideroxylon* is the only instance in which a tree served as the actual hostplant for the larvae. *Doryctes palliatus* (Cameron) (1881: 560) is a parasite of this species.

Family Aglycyderidae

Proterhinus eugonias Perkins (1900: 186) - - - - - - - Kokee, Kauai
Proterhinus angustiformis Perkins (1900: 197) Fig. 12 - Nualolo, Kauai
Proterhinus gigas Perkins (1900: 185) Fig. 12 - - - Kumuweia, Kauai
Proterhinus myrsineus Perkins (1910: 659) - - Haleauau Valley, Oahu
Proterhinus pusillus subpusillus Perkins (1910: 665)
- - - - Haleauau Valley, Oahu

These species of *Proterhinus* have been collected from *Sideroxylon,* but occur on other trees also.

Family Curculionidae

Oodemas purpurascens Perkins (1900: 166)

Collected from *Sideroxylon* at Kumuweia, Kauai, but occurs more numerously on *Lobelia, Bidens* and *Wilkesia.* The larvae feed in the pith of dead *Wilkesia* stems.

Family Scolytidae

* **Xyleborus lanaiensis** Perkins (1900:176)

Reared chiefly from *Sideroxylon* on Lanai and in Haleauau Valley, Oahu. It was also reared from *Sapindus* on Oahu.

Crossotarsus externedentatus (Fairmaire) (1850: 51)

Reared from *Sideroxylon,* but occurs on many other trees.

Family Anobiidae

Xyletobius sp.
Collected from *Sideroxylon* at Kumuweia, Kauai.

Family Ciidae

Cis porcatus Sharp (1879: 92) - - - - - Kalalau trail, Kokee, Kauai
Cis evanescens Sharp (1879: 95) - - - - - - Haleauau Valley, Oahu
Apterocis impunctatus Perkins (1900: 268) - - - Haleauau Valley, Oahu
These small beetles were collected from rotten bark.

Family Dermestidae

Labrocerus affinis Sharp (1908: 410) - - - - - - - - Haleauau, Oahu
Labrocerus moerens Sharp (1908: 406) - - Kalalau trail, Kokee, Kauai
Collected under bark.

Family Colydiidae

Antilissus aper Sharp (1879: 87)
Collected under bark in Haleauau Valley, Oahu.

Family Alleculidae

Pseudocistela kauaiensis (Perkins) (1900: 248)
Collected from *Sideroxylon* foliage at Kokee, Kauai.

LEPIDOPTERA

Family Hydriomenidae

* **Eucymatoge orichloris** Meyrick (1899: 163)
Reared from a caterpillar on a *Sideroxylon* leaf at Puu Peahinaia, Oahu. It is the only foodplant record for this greenish moth.

Family Carposinidae

Heterocrossa olivaceonitens Walsingham (1907: 655)
Reared abundantly from *Sideroxylon* fruits in Makaleha Valley, Oahu, and at Nahiku, Maui. It was also reared from *Clermontia* buds on Kamuahona ridge, Oahu.

Family Hyponomeutidae

* **Aphthonetus sideroxyloni** Swezey (1932: 200)
Reared from larvae on leaves of *Sideroxylon* at Puu Peahinaia, Oahu.

HOMOPTERA

Family Psyllidae

* **Swezeyana elongagena** Caldwell (1940: 390)
Collected abundantly on *Sideroxylon* leaves, Haelaau, Maui. The nymphs do not form galls.

* **Swezeyana reticulata** Caldwell (1940: 390)
On *Sideroxylon* foliage, Kalalau trail, Kokee, Kauai.

Family Delphacidae

Nesothoë hula Kirkaldy (1908: 204)
Collected from *Sideroxylon* at Kokee and Nualolo, Kauai. It occurs also on some other trees of the region.

HETEROPTERA

Family Lygaeidae

Neseis (Trachynysius) hiloensis approximatus Usinger (1942: 70)
On *Sideroxylon* on Haelaau ridge, Maui; it also occurs on *Pipturus*.

Family Miridae

Koanoa hawaiiensis Kirkaldy (1902: 136)
Recorded from *Sideroxylon,* without locality. The bug occurs also on several other trees.

DERMAPTERA

Labia dubronyi Hebard (1922: 318)
A predaceous earwig, found under bark.

HYMENOPTERA

Family Eumenidae

Odynerus vittativentris Perkins (1899: 65)

Odynerus caenosus Perkins (1899: 35)
These wasps were reared from nests in vacated cerambycid burrows in *Sideroxylon* at Kumuweia, Kauai. The adults store caterpillars in the nests as food for their young. See Fig. 30 for typical *Odynerus* nests.

DIPTERA

Family Drosophilidae

* **Drosophila kauluai** Bryan (1934: 439)
Reared from fallen *Sideroxylon* fruits, Pacific Heights, Oahu.

Drosophila sp.
Reared from fallen fruits, Haleauau Valley, Oahu.

SMILAX MELASTOMIFOLIA SMITH

SMILAX SANDWICENSIS KUNTH

Family: Liliaceae.

Hawaiian names: ulihihi; uhi.

These species of *Smilax* vines are found here and there in Hawaiian forests, but usually are not common. In the insect records the species *sandwicensis* is most often mentioned, but it is by no means certain that this is the correct identification in all cases. It is probable the insects attack whichever species is present.

COLEOPTERA

Family Cerambycidae

* **Plagithmysus giffardi** Perkins (1907 : 96) Fig. 3

Reared from larvae in *Smilax* stems, along the "Sandalwood trail" at Kilauea crater, Hawaii. Beetles have also been collected from *Myrsine* trees in the Kilauea region, but it is not known if they breed in *Myrsine*.

* **Neoclytarlus indecens** (Perkins) (1920 : 346) Fig. 25

Reared from *Smilax* stems at Kahana, Waipio ridge and Mt. Kaala, Oahu. The eggs are laid at the nodes of living stems; thus the larvae begin life in living material which dies before they complete their growth. The parasites *Scleroderma polynesialis* Saunders (1881 : 116) and *Doryctes palliatus* (Cameron) (1881 : 560) were reared from *indecens* larvae on Mt. Kaala.

* **Neoclytarlus indecens kainaluensis** Perkins (1931 : 418)

Reared from *Smilax* stems at Kainalu, Molokai. Parasites reared from it were *Eupelmus* sp. and *Scleroderma* sp.

* **Neoclytarlus smilacis** Perkins (1927 : 484) Fig. 25

Reared from *Smilax* stems at Waikamoi, Maui; it was abundant in both living and dead stems. A parasite, *Eupelmus* sp., was reared from this insect.

Family Curculionidae

Oodemas obscurum Blackburn (1878 : 75) - - - - - - - Olinda, Maui
Oodemas halticoides Blackburn (1877 : 5) - - - - - - - Wailupe, Oahu
Oodemas angustum Blackburn (1878 : 75)
- - - - Puu Kaua, Waianae Mts., Oahu

These weevils were collected in dead *Smilax* stems in the localities named; they occur in stems of other plants also.

Oodemas sp. (probably **halticoides**)

All stages were found in *Smilax* stems in Waialae Nui Valley, Oahu. *Eupelmus* sp. was reared from a larva feeding externally on an *Oodemas* larva.

Family Anobiidae

Mirosternus sp.

This beetle was collected in dead *Smilax* stems at Waialae Nui and Haleauau Valley, Oahu.

Family Aglycyderidae

Proterhinus obscurus Sharp (1878: 18)

Collected from *Smilax* on Mt. Kaala, Oahu.

Proterhinus sp.

Collected from *Smilax* stems at Olinda, Maui.

Family Ciidae

Cis sp.

In dead stems of *Smilax,* Olinda, Maui.

Family Melasidae

Dromaeolus sp.

A larva was found in a dead *Smilax* stem at Waialae Nui, Oahu.

LEPIDOPTERA

Family Hyponomeutidae

Diplosara sp.

Larvae and empty pupal cases of *Diplosara* were found in dead *Smilax* stems in Waialae Nui Valley, Oahu. Adults of *Scleroderma chilonellae* Bridwell (1919: 31), found in dead stems on Wailupe ridge, Oahu, probably were parasitic on larval *Diplosara. S. chilonellae* was reared and described from a similar sort of host caterpillar, *Hyposmocoma chilonella* Walsingham (1907: 637).

Diplosara sp.

Larvae were found in *Smilax* stems at Olinda, Maui; no adults were reared.

* **Hyposmocoma insinuatrix** Meyrick (1928: 103) - - Kainalu, Molokai

* **Hyposmocoma caecinervis** Meyrick (1928: 103) - - - Mt. Kaala, Oahu

* **Hyposmocoma argomacha** Meyrick (1935: 67) - - - Kilauea, Hawaii

These *Hyposmocoma* were reared from larvae in dead *Smilax* stems in their respective localities.

HOMOPTERA

Family Delphacidae

* **Nesosydne ulehihi** (Muir) (1919: 104)

This leafhopper was collected from *Smilax* at Olaa, 23 miles, along the road to the volcano, Hawaii.

Family Coccidae

Coccus acutissimus (Green) (1896: 10)

A slender black scale collected on *Smilax* leaves on Mt. Kaala, Oahu. This

scale, which is an immigrant occurring on other plants, is found singly along the veins.

HYMENOPTERA

Family Prosopididae

Nesoprosopis facilis (Smith) (1879: 683)

A nest of this small native bee was found in a dead *Smilax* stem at Kainalu, Molokai. Entrance to the stem had been by way of an exit hole made by *Neoclytarlus indecens kainaluensis* Perkins (1931: 418)

SOPHORA CHRYSOPHYLLA (SALISBURY) SEEMANN

Family: Leguminosae.

Hawaiian name: mamani.

There is but one species of the genus in Hawaii. It occurs only on Kauai, Maui and Hawaii, at elevations of from 4,000 to 8,000 feet, sometimes forming groves above the main forests. The trees always support many kinds of insects, some of which are often exceedingly abundant.

COLEOPTERA

Family Cerambycidae

* **Plagithmysus blackburni** (Sharp) (Blackburn and Sharp, 1885: 195)

This species occurs on sick or dying trees at many localities on Hawaii: on Mauna Kea, at Nauhi 8,000 feet, Pohakuloa, Puuwaawaa, North Kona, and Kipuka Nene, in the Hawaii National Park.

* **Plagithmysus darwinianus** Sharp (1896: 271) Fig. 3

This species was collected at Huehue, Kona, Kau and Kilauea, Hawaii.

* **Plagithmysus funebris** Sharp (1896: 273) Fig. 3

This species occurs in the Olinda forest on Haleakala, Maui, and has been found on *Sophora* on the south slope of the same mountain.

* **Neoclytarlus filipes** (Sharp) (Blackburn and Sharp, 1885: 196)

Collected from *Sophora* at Pohakuloa, Puuwaawaa and Kipuka Nene, Hawaii.

* **Neoclytarlus mediocris** (Sharp) (1900: 99)

Reared from *Sophora* on Haleakala, Maui.

Family Curculionidae

Pantomorus godmani (Crotch) (1867: 389)

This immigant weevil was found feeding on *Sophora* foilage at Nualolo,

Kauai, and on the Parker Ranch, Hawaii. It feeds also on many other kinds of trees.

Family Aglycyderidae

Proterhinus similis Blackburn (Blackburn and Sharp, 1885 : 170)

This beetle was collected from dead twigs of *Sophora* in Kipuka Puaulu, Hawaii National Park, Kilauea, Hawaii, and from several other trees on Hawaii.

Family Anobiidae

Holcobius granulatus Sharp (1881 : 520)

Reared from dead *Sophora* stems, Kilauea, Hawaii. It has been reared from *Acacia koa* also.

Xyletobius sp.

Collected from dead stems, Nualolo, Kauai.

Family Chrysomelidae

Diachus auratus (Fabricius) (1801 : 57)

This small immigrant leaf beetle was found feeding on *Sophora* at Nualolo, Kauai.

LEPIDOPTERA

Family Geometridae

Scotorythra sp.

Green caterpillars of this genus were found on *Sophora* leaves in the Olinda forest, Maui ; no adults were reared.

Family Pyraustidae

* **Mecyna virescens** Butler (1881 : 329)

The caterpillars were found among webbed leaves of *Sophora* at Nualolo, Kauai, and at Olinda, Maui. The moth also occurs at Kilauea, Hawaii.

Family Xylorictidae

Thyrocopa indecora (Butler) (1881 : 387)

Reared from larvae in dead *Sophora* wood, Nauhi gulch, Hawaii.

Family Tortricidae

* **Adenoneura plicatum** Walsingham (1907 : 678)

\- - - - Haleakala, Maui ; Nauhi and Mauna Loa truck trail, Hawaii

* **Adenoneura latifemoris** Walsingham (1907 : 679)

\- - - - Hualalai, Hawaii ; Haleakala, Maui

* **Adenoneura montanum** Walsingham (1907 : 679)

\- - - - Kilauea and Kona, Hawaii

The larvae of these moths feed on the seeds in *Sophora* pods. The parasites *Pristomerus hawaiiensis* Perkins (1910-H : 680) and *Eupelmus pelodes* Per-

kins (1910-H: 649) were reared from larvae of *A. plicatum* on the Mauna Loa truck trail, Kilauea, Hawaii.

Amorbia emigratella Busck (1909: 201)

This immigrant moth was reared from larvae on *Sophora* leaves along the Kau road several miles west of the Volcano House, Hawaii.

Family Hyponomeutidae

Hyperdasysella cryptogamiella (Walsingham) (1907: 642)

Reared from larvae in dead *Sophora* wood in Kipuka Puaulu, Kilauea, Hawaii.

HYMENOPTERA

Family Apidae

Apis mellifera Linnaeus (1758: 576)

Family Prosopididae

Nesoprosopis difficilis Perkins (1899: 80)

These bees were common on *Sophora* flowers at Nauhi, Hawaii, 8,000 feet elevation.

HOMOPTERA

Family Flatidae

Siphanta acuta (Walker) (1851: 448)

The torpedo bug was found on *Sophora* along the Kau road, several miles west of Kilauea, Hawaii.

Family Coccidae

Icerya purchasi Maskell (1878: 221)

Found on *Sophora* at Hawaii National Park, Kilauea, Hawaii.

HETEROPTERA

Family Pentatomidae

Oechalia bryani Usinger (1941: 81)

This predaceous bug was collected from *Sophora* at Hookomo, Mauna Kea, Hawaii, at 8,500 feet elevation.

Family Coreidae

Ithamar hawaiiensis Kirkaldy (1902: 170)

This bug has been recorded from *Sophora,* one of many hostplants.

Family Lygaeidae

* **Neseis (Icteronysius) orchriasis orchriasis** (Kirkaldy) (1910: 541)

- - - - Hualalai and Kilauea, Hawaii

* **Neseis (Icteronysius) orchriasis baldwini** Usinger (1945 : 405)
- - - - Haleakala crater, Maui

* **Neseis (Icteronysius) orchriasis maculiceps** (Usinger) (1942 : 84)
- - - - Humuula, Hawaii

These three bugs seem to be attached to *Sophora.*

Nysius coenosulus Stål (1859 : 243) - - - - - - - - - - - Hawaii
Nysius communis Usinger (1942 : 110) - - - - - - - - - - Hawaii
Nysius lichenicola Kirkaldy (1910 : 540) - - - - - - - Nauhi, Hawaii
Nysius nemorivagus White (1881 : 54) - - - - - - - - Nauhi, Hawaii
Nysius terrestris Usinger (1942 : 95) - - - - - - - - - - - Hawaii
Nesomartis psammophila Kirkaldy (1907 : 245) - - - Humuula, Hawaii
Geocoris pallens Stål (?) (1874 : 236) - - - - - - - - - - Hawaii
Pachybrachius nigriceps (Dallas) (1852 : 577) - - - - - - - - Hawaii
Pachybrachius vincta (Say) (1832 : 16) - - - - - - - - - - Hawaii

These bugs have been collected from *Sophora* on Hawaii; they occur on many other plants also.

Family Nabidae

Nabis blackburni White (1878 : 373)

A predaceous bug, collected on *Sophora,* at Kona and Kilauea, Hawaii, and on many other plants.

* **Nabis kahavalu** (Kirkaldy) (1907 : 156)

A predaceous species, apparently attached to *Sophora.*

Family Miridae

Orthotylus iolani Kirkaldy (1902 : 133)

Collected abundantly from *Sophora,* Hawaii National Park, Kilauea, Hawaii; it occurs on numerous plants.

THYSANOPTERA

Thrips (Isoneurothrips) williamsi (Moulton) (1928 : 115)

On *Sophora* flowers, Kilauea, Hawaii.

Phlaeothrips mauiensis Moulton (1928 : 130)

On old branches, Kipuka Ki, Hawaii.

Macrophthalmothrips hawaiiensis Moulton (1928 : 122) - - - - Hawaii
Karnyothrips doliicornis Bianchi (1946 : 510) - - - Kipuka Ki, Hawaii
Haplothrips davisi Bianchi (1946 : 503)

On leaves and dead branches of *Sophora,* Mauna Loa truck trail, Hawaii, 6,500 feet elevation.

All of these thrips occur on other trees besides *Sophora.*

SPOROBOLUS

See **Grasses,** p. 98

STRAUSSIA spp.

Family: Rubiaceae.

Hawaiian name: kopiko.

Few specific plant names are available for the records which follow. Probably the insects have no particular preferences.

LEPIDOPTERA

Family Geometridae

Sisyrophyta gomphias Meyrick (1899: 169)

Reared from *Straussia,* Iao Valley, Maui.

Family Gelechiidae

* **Aristotelia gratula** Meyrick (1928: 101)

This is a leafminer, reared from *Straussia* on Mt. Olympus, Oahu.

* **Aristotelia straussiella** Swezey (1953: 23)

The larvae of this species also are leafminers. Adults were reared from *Straussia kaduana* (Chamisso and von Schlechtendahl) Gray and *Straussia mariniana* (Chamisso and von Schlechtendahl) Gray on Mt. Tantalus and Mt. Olympus, Oahu.

Family Sphingidae

Hawaiina perkinsi Swezey (1920: 379) Fig. 10

Reared from green caterpillars on *Straussia,* Mt. Tantalus, Niu and Haula, Oahu, and Kainalu, Molokai. This moth has also been reared from other host trees.

COLEOPTERA

Family Anobiidae

* **Xyletobius timberlakei** Perkins (1921: 505) Fig. 32

Reared from trunks of dead *Straussia,* Honokaa, Hawaii, and on the Marsh trail, Koolau Mountains, Oahu. From the latter locality 58 adult beetles issued from a 1-ft. long section of trunk.

Family Aglycyderidae

* **Proterhinus subangularis** Perkins (1910: 660)
- - - - All the islands except Kauai

* **Proterhinus angularis** Sharp (1881: 530) - - - - - - - - - Oahu

* **Proterhinus archaeus** Perkins (1900: 209) - - - - - - - - - Oahu

* **Proterhinus obscuricolor** Perkins (1900: 202) - - - - - - - - - Oahu

* **Proterhinus subplanatus** Perkins (1900: 205) - - - - - - - - - Oahu

* **Proterhinus anthracias** Perkins (1900: 185) - - - - - - - - - Kauai

* **Proterhinus maculifer** Perkins (1900: 198) - - - - - - - - - Kauai

* **Proterhinus amaurodes** Perkins (1900: 190) - - - - - - - - Kauai

The three species last-named were reared from *Straussia mariniana;* there are no specific rearing records for the rest. Some of these beetles are very abundant occasionally; 71 adults of *P. subplanatus,* for example, issued from a 1-ft.-long section of dead trunk. The other species are rare and are possibly more common on other trees. For the most part, the species listed are probably attached to *Straussia.*

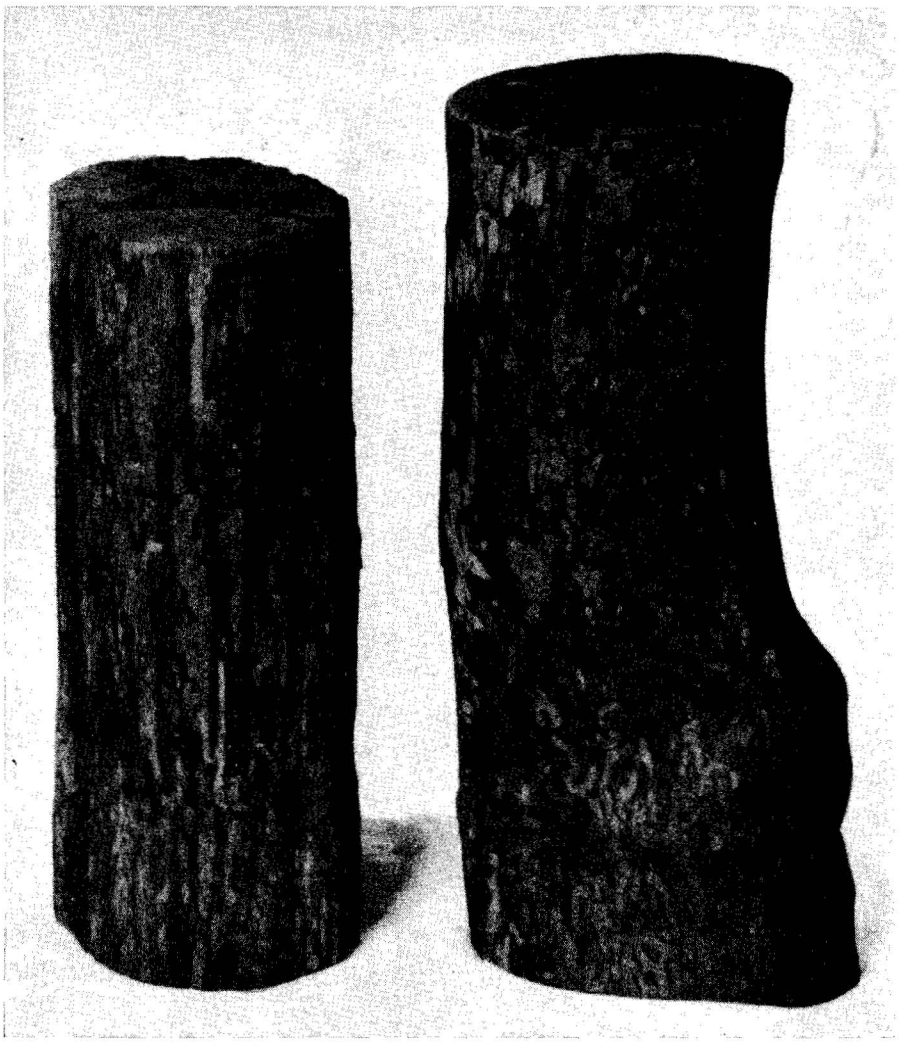

FIGURE 32. Left: section of dead *Suttonia* trunk with exit holes of **Holcobius hawaiiensis.** Right: section of dead *Straussia* trunk with exit holes of **Xyletobius timberlakei.**

HOMOPTERA

Family Delphacidae

Nesothoë eugeniae (Kirkaldy) (1908: 203)

Nesosydne pilo (Muir) (1922: 99)

Leialoha hawaiiensis (Muir) (1916: 173)

These leafhoppers have been recorded from *Straussia,* but probably occur on that plant accidentally.

Family Cicadellidae

Nesophrosyne (Nesoreias) eburneola Osborn (1935: 54)

Collected from *S. hillebrandii* Rock at Glenwood and Kona, Hawaii. This leafhopper also occurs on other trees.

* **Nesophrosyne (Nesoreias) oceanides** Kirkaldy (1910: 573)

Collected from *S. hawaiiensis* Gray in South Kona and Olaa, Hawaii, the only hostplant known.

Nesophrosyne silvicola Kirkaldy (1910: 570)

Collection from *S. hillebrandii* at Kilauea, Hawaii; on other trees also.

Family Aphididae

Toxoptera aurantii (Boyer de Fonscolombe) (1841: 178)

This aphid occurs on the tender growth of many plants; it has been found on *Straussia.*

Family Coccidae

* **Pseudococcus straussiae** Ehrhorn (1916: 237)

An uncommon species collected on *S. kaduana* and *S. hawaiiensis* in several localities on Oahu. It occurs chiefly on *Straussia* but has been found on a few other trees also.

Pseudococcus brevipes (Cockerell) (1893: 267)

Pseudococcus nipae (Maskell) (1892: 232)

These two mealybugs occur on numerous hostplants, including *Straussia,* throughout the islands.

Pulvinaria psidii Maskell (1892: 223)

Ceroplastes rubens Maskell (1892: 214)

On many hostplants, including *Straussia,* throughout the islands.

HETEROPTERA

Family Pentatomidae

Oechalia virescens Usinger (1941: 77)

This predaceous bug was found on *Straussia* at Kokee, Kauai.

Family Lygaeidae

Oceanides fosbergi Usinger (1942: 31)
On *Straussia* and other trees on Lanai.

Oceanides bryani Usinger (1942: 28)
On *S. hawaiiensis* at Humuula, Hawaii.

Oceanides oribasus (Kirkaldy) (1910: 544)
On *Straussia* in the mountains above Waialua, Oahu.

Oceanides parvulus Usinger (1942: 30)
On *S. kaduana* on the Manoa-Palolo ridge, Oahu.

Neseis (Trachynysius) fasciatus fasciatus Usinger (1942: 80)
On *Straussia* at Kilauea, Hawaii.

Neseis (Trachynysius) fasciatus fasciatus hyalinus Usinger (1942: 81)
Found in North Kona, Hawaii, on *Straussia.*

* **Neseis (Trachynysius) silvestris** (Kirkaldy) (1910: 541)
On *Straussia* in Haleauau Valley, Oahu, and on *S. kaduana,* Manoa-Palolo ridge, Oahu. As yet it has been collected only on these trees, and it is perhaps the only one of the lygaeid bugs attached to *Straussia;* the others have all been found on other host trees, as well as on *Straussia.*

Sephora criniger (White) (1881: 57)
On *Straussia* and other plants, including ferns. The species occurs on Molokai, Lanai and Maui.

Family Nabidae

Nabis lusciosus White (1877: 112)
On *Straussia* and other plants on Oahu; a predaceous bug.

Family Anthocoridae

Lilia dilecta White (1879: 147)
Predaceous, occurring under *Straussia* bark on Kauai and Maui.

Lasiochilus decolor (White) (1879: 147)
This also is a predaceous species; it was found on *Straussia* on Oahu.

Family Miridae

Engytatus confusus (Perkins) (1912: 729)
Collected on *Straussia* on Oahu; it occurs also on a few other trees.

Orthotylus kanakanus Kirkaldy (1902: 134)
On several of the islands on *Straussia* and other trees.

Orthotylus kassandra (Kirkaldy) (1902: 135)
This species occurs on most of the islands of the group, on *Straussia* and several other trees.

Hyalopeplus pellucidus (Stål) (1859: 255)
On all the islands and on many trees and plants, including *Straussia.*

On *Straussia* and other plants, including ferns. The species occurs on Molo-

ISOPTERA

Neotermes connexus Snyder (1922 : 9)

This forest termite, a dead-wood feeder, has been recorded from *Straussia* and numerous other trees, on all the islands from 500 to 6,000 feet elevation.

ZORAPTERA

Zorotypus swezeyi Caudell (1922 : 133)

This strange insect is very rare. It has been found in rotten logs of *Acacia koa* at Kokee, Kauai, and in both mountain ranges on Oahu. On Oahu it has been recorded from a rotten *Straussia* log.

STYPHELIA TAMEIAMEIAE (CHAMISSO) F. MUELLER

Family: Epacridaceae.

Hawaiian names: puakeawe or pukeawe; maieli.

This is a common shrub on all the islands. Most of the insect records have appeared under the generic name *Cyathodes,* the one used by Hillebrand. A few records use the more modern name *Styphelia.*

LEPIDOPTERA

Family Hydriomenidae

Eucymatoge monticolans (Butler) (1881 : 320)

The slender green caterpillars of this moth feed commonly on *Styphelia* foliage on all the islands. This species might be considered to be attached to this tree, but it has been reared from a few other hostplants also.

* **Eucymatoge stypheliae** Swezey (1948 : 259)

The only record of this species is from *Styphelia* at Kilauea, Hawaii.

Family Carposinidae

* **Heterocrossa gracillima** Walsingham (1907 : 672)

The larvae of this small white moth commonly feed in the fruits of *Styphelia,* on all the islands.

HOMOPTERA

Family Cercopidae

Philaenus spumarius (Linnaeus) (1758 : 437)

The spittle bug is a recent immigrant to the Kilauea region on Hawaii. *Styphelia* is but one of a long list of its hostplants in the Hawaii National Park area.

Family Delphacidae

* **Nesosydne cyathodis** Kirkaldy (1910: 589) - - - - - Kilauea, Hawaii
* **Nesosydne eeke** (Muir) (1919: 92) - - - - - - - - - Mt. Eeke, Maui
* **Nesosydne fullawayi** (Muir) (1916: 192) - - - - - Kamoku, Molokai
* **Nesosydne lanaiensis** (Muir) (1917: 309) - - - - - - - - - - Lanai
* **Nesosydne nigrinervis** (Muir) (1919: 92) - - - - - Haleakala, Maui

These small leafhoppers occur only on *Styphelia,* in the localities indicated.

Family Cicadellidae

* **Balclutha plutonis** (Kirkaldy) (1910: 574)

This small green leafhopper seems to be attached to *Styphelia.* It is widely distributed, for I have found it commonly at Halemanu, Kauai, Palikea, Oahu, Wailuku, Maui, and Kilauea, Hawaii.

Family Flatidae

Siphanta acuta (Walker) (1851: 448)

This immigrant torpedo bug occurs on *Styphelia* and many other plants throughout the islands. Its eggs are heavily parasitized by *Aphanomerus pusillus* Perkins (1905: 203), which was purposely introduced from Australia.

HETEROPTERA

Family Coreidae

Ithamar hawaiiensis Kirkaldy (1902: 170)

This bug has been collected on *Styphelia* as well as on other plants.

Family Lygaeidae

Oceanides sinuatus Usinger (1942: 36) - - - - - - - Puu Kaua, Oahu
* **Neseis (Leionysius) pallidus** Usinger (1942: 53) - - Haleakala, Maui
Nysius coenosulus Stål (1859: 243) - - - - - - - - - All the islands
Nysius communis Usinger (1942: 110) - - - - - - - - All the islands
Nysius lichenicola Kirkaldy (1910: 540)
- - - - - Haleakala, Maui; Kilauea, Hawaii
Nysius mixtus Usinger (1942: 110) - - - - - - - - - Kokee, Kauai
Nysius nigriscutellatus Usinger (1942: 102) - - - - - - All the islands
Nysius terrestris Usinger (1942: 95) - - - - - - - - - All the islands

Of these lygaeid bugs, *Neseis pallidus* is the only one which has never been collected on any plant other than *Styphelia.*

Family Nabidae

* **Nabis tarai** (Kirkaldy) (1902: 154)

A predaceous bug occurring on *Styphelia* on all the islands, and attached to that plant.

Nabis blackburni White (1878: 373)
Nabis capsiformis Germar (1837: 132)

These two predaceous bugs are on many other hostplants besides *Styphelia; blackburni* occurs on all the islands, *capsiformis,* at Kumuweia, Kauai.

Family Miridae

Hyalopeplus pellucidus (Stål) (1859: 255) - - - - Kumuweia, Kauai
Psallus sharpianus Kirkaldy (1902: 131) - - - - - - All the islands
Koanoa hawaiiensis Kirkaldy (1902: 136) - - - - - - All the islands

These plant bugs occur on other plants also.

THYSANOPTERA

Aeolothrips fasciatus (Linnaeus) (1758: 457)
Predaceous - - - - - - - - - - - - - - - - Haleakala, Maui
Heliothrips haemorrhoidalis (Bouché) (1833: 206)
On leaves - - - - - - - - - - - - - - - - - All the islands
Taeniothrips hawaiiensis (Morgan) (1913: 3)
On flowers - - - - - - - - - - - - - - - - - All the islands
Taeniothrips frici (Uzel) (1895: 126) On flowers - - - - Maui; Hawaii
Thrips (Isoneurothrips) sp. - - - - - - - - - - Hualalai, Hawaii
Chirothrips fulvus Moulton (1936: 182) - Mauna Loa truck trail, Hawaii

These thrips occur on numerous other plants in addition to *Styphelia.*

SUTTONIA

See **Myrsine,** p. 138

SYZYGIUM SANDWICENSIS (GRAY) NIEDENZU

Family: Myrtaceae.

Hawaiian name: ohia ha.

A widely distributed tree, formerly called *Eugenia,* but more recently placed in *Syzygium.* It somewhat resembles the more common ohia lehua (*Metrosideros*) but differs from it in both inflorescence and fruit.

COLEOPTERA

Family Cerambycidae

* **Plagithmysus concolor** Sharp (1896: 241)

This beetle has been observed ovipositing in *Syzygium,* and adults have been reared from that tree at Kokee and Kaholuamanu, Kauai. The adults have been collected from *Metrosideros* also.

See **Myrsine,** p. 138

* **Plagithmysus solitarius** Sharp (1896: 241) Fig. 3

Reared from *Syzygium* on Mt. Tantalus and at Nuuanu, Kawailoa and Pupukea, Oahu. It has been recorded from *Metrosideros* also.

Family Aglycyderidae

* **Proterhinus binotatus** Perkins (1900: 191)

Collected abundantly from dead twigs of *Syzygium* at Kokee, Kauai.

Proterhinus deceptor Perkins (1900: 245)

In dead *Syzygium* twigs, Mt. Olympus, Oahu; on several other trees also.

Proterhinus sp.

Collected from dead twigs, Kainalu, Molokai.

Proterhinus excrucians Perkins (1910: 662)

From dead twigs, Kukuiala Valley, Oahu. This beetle occurs also on many other trees.

Family Scolytidae

Xyleborus truncatus Sharp (Blackburn and Sharp, 1885: 192)

From galleries in *Syzygium* bark on Kawailoa ridge, Oahu; in several other Hawaiian forest trees also.

Family Ciidae

Cis porcatus Sharp (1879: 92)

Under bark at Kawailoa and in Kukuiala Valley, Oahu.

Cis sp.

In dead twigs, Kainalu, Molokai.

LEPIDOPTERA

Family Carposinidae

Heterocrossa sp.

Reared on Oahu from larvae in terminal buds of *Syzygium,* but more commonly in *Metrosideros* buds. Although recorded from this host as *H. distincta* Walsingham (1907: 666), it is now apparent that the identification was erroneous.

Heterocrossa divaricata Walsingham (1907: 665)

Reared abundantly from *Syzygium* fruits on Oahu. It has also been reared in considerable numbers from fruits of *Elaeocarpus.*

Family Tortricidae

Eccoptocera foetorivorans (Butler) (1881: 394)

Reared from caterpillars found between webbed leaves, Kukuiala Valley, Oahu. It occurs more commonly on *Metrosideros.*

Family Tineidae

HOMOPTERA

Family Delphacidae

* **Nesothoë eugeniae** (Kirkaldy) (1908: 203)

This leafhopper has been collected from *Syzygium at* Kawailoa, Mt. Tantalus and other places on Oahu.

Family Cicadellidae

Nesophrosyne (Nesoreias) koleae (Kirkaldy) (1910: 563)

This insect has been collected from *Syzygium* on Mt. Tantalus, Oahu, but occurs chiefly on *Myrsine* and *Straussia.*

Nesophrosyne spp.

Two undetermined species were collected abundantly on *Syzygium* at Kawaikoi, Kauai.

Family Aphididae

Toxoptera aurantii (Boyer de Fonscolombe) (1841: 178)

This aphid occurs on new shoots of *Syzygium.*

Family Coccidae

Ceroplastes rubens Maskell (1892: 214)

The wax scale has been recorded from *Syzygium,* without locality; it occurs on many plants.

TETRAPLASANDRA spp.

See also **Pterotropia,** p. 176

Family: Araliaceae.

Hawaiian name: ohe.

There are several species of *Tetraplasandra* in the Hawaiian forests. In these records no attention has been given to the species from which the insects were collected.

COLEOPTERA

Family Carabidae

Colpodiscus lucipetens (Blackburn) (1879: 105)

Adults were collected from cavities in a dead branch of *Tetraplasandra* at Kainalu, Molokai.

Family Curculionidae

Dryophthorus squalidus Sharp (1878: 22)

In rotten wood, Kainalu, Molokai.

Dryophthorus nesiotes Perkins (1900: 141)

In dead wood at Kokee, Kauai.

Nesotocus giffardi Perkins (1910: 654) Fig. 15

Reared from dead branches of *Tetraplasandra* from Kuliouou to Mt. Lanihuli, Oahu. This weevil is found in other Araliaceae.

* **Nesotocus** sp.

An undescribed species of *Nesotocus* was reared from larvae in pith of twigs at Kainalu, Molokai.

Family Aglycyderidae

* **Proterhinus gigas** Perkins (1900: 185) Fig. 12

Collected from *Tetraplasandra* at Kokee, Kauai, as well as from *Cheirodendron.*

Family Scolytidae

Xyleborus confusus Eichhoff (1867: 401)

Recorded from *Tetraplasandra* at Kuliouou, Oahu.

LEPIDOPTERA

Family Geometridae

Scotorythra sp.

Egg clusters of a *Scotorythra* were found under loose bark at Kainalu, Molokai, which were parasitized by *Trichogramma semifumatum* (Perkins) (1910-H: 659). No moths were reared.

Family Tortricidae

* **Spheterista tetraplasandra** (Swezey) (1920: 385)

Reared from caterpillars on *Tetraplasandra* leaves at Wailupe, Kaumuahona and Puu Kaua, Oahu.

Capua sp. (?)

Caterpillars thought to belong to this moth genus were found on *Tetraplasandra* at Milolii, Kauai; none was reared.

Family Hyponomeutidae

Diplosara lignivora (Butler) (1879: 273)

The larval cases were found in rotten wood at Kainalu, Molokai.

HOMOPTERA

Family Cicadellidae

* **Nesophrosyne** sp.

An undetermined species was abundant on a *Tetraplasandra* tree on the Alakai trail, Kauai.

Family Flatidae

Siphanta acuta (Walker) (1851 : 448)
On *Tetraplasandra* at Kainalu, Molokai.

Family Psyllidae

* **Crawforda triopsyllina** Caldwell (1940 : 397)
On leaves at Kainalu, Molokai; the nymphs resemble Coccidae.

Family Coccidae

Pseudococcus adonidum (Linnaeus) (1758 : 455)
This mealybug was found on *Tetraplasandra* at Kainalu, Molokai. It was preyed upon by *Cryptolaemus montrouzieri* Mulsant (1853 : 268).
Saissetia sp.
On leaves at Kainalu, Molokai; its parasite, *Tomocera californica* Howard (1881 : 252) also was present.

HETEROPTERA

Family Miridae

Pseudoclerada morai Kirkaldy (1902 : 141)
Under bark and in hollow stems; possibly predaceous.
Engytatus confusus (Perkins) (1912 : 729)
A few specimens of this bug were found on *Tetraplasandra* leaves on the Alakai trail, Kauai.
Nesiomiris hawaiiensis Kirkaldy (1902 : 145)
Numerous on *Tetraplasandra* leaves on the Alakai trail, Kauai, and at Kainalu, Molokai.

ISOPTERA

Neotermes connexus Snyder (1922 : 9)
In dead branches, Kainalu, Molokai.

The following insects were obtained in 1928 from a tree at Kokee, Kauai, which at the time was thought to be *Tetraplasandra,* but which instead may possibly have been a *Pterotropia.*

Tortricid moth, unidentified
Hyposmocoma spp., larval cases of 2 or 3 kinds
Diplosara lignivora (Butler) (1879 : 273)
Proterhinus gigas Perkins (1900 : 185)
Oodemas grande Perkins (1900 : 167)
Dryophthorus nesiotes Perkins (1900 : 141)
Parandra puncticeps Sharp (1878 : 202)
Xyleborus sp.
Coleoptera, 1 small black undet. sp.
Histeridae, 1 undet. sp.
Heteroptera, 3 undet. spp.

TOUCHARDIA LATIFOLIA GAUDICHAUD

Family: Urticaceae.

Hawaiian name: olona.

The olona is a large shrub found on all the islands, in deep, damp, mountain ravines; it is not common. Only a few insects are associated with it.

LEPIDOPTERA

Family Nymphalidae

Vanessa tameamea Eschscholtz (1821: 207) Figs. 26-28

Caterpillars of the Kamehameha butterfly have been found on leaves of *Touchardia* on Mt. Tantalus, Oahu. Its favorite foodplant is *Pipturus*.

Family Pyraustidae

* **Phlyctaenia platyleuca** Meyrick (1899: 214) Fig. 29

This moth has been reared from larvae on *Touchardia* leaves from Mt. Tantalus, and Manoa Valley, Oahu. A parasite, *Casinaria infesta* (Cresson) (1872: 172) has been reared from the caterpillars.

* **Phlyctaenia** sp.

Phlyctaenia moths, reared from *Touchardia* in Manoa Valley, Waikane and Puu Kalena, Oahu, and Iao Valley, Maui, were at first thought to be *P. chalcophanes* Meyrick (1899: 209), but are now believed to be a new, undescribed species.

Family Gracilariidae

* **Parectopa touchardiella** Swezey (1928: 189)

Reared from leafmines in *Touchardia,* Iao Valley, Maui.

HOMOPTERA

Family Delphacidae

Nesothoë giffardi (Kirkaldy) (1908: 203)

Collected from *Touchardia* on Mt. Tantalus, Oahu; the species occurs also on *Cyrtandra.*

Nesosydne umbricata Kirkaldy (1910: 585)

Collected from *Touchardia* at Glenwood, Hawaii; it occurs on several different trees. A synonym of this species is *N. blackburni* Muir.

Family Cicadellidae

* **Nesophrosyne touchardii** Osborn (1935: 18)

On *Touchardia* in Manoa Valley and at Waikane, Oahu.

* **Phlyctaenia** sp.

ORTHOPTERA

Family Gryllidae

Prognathogryllus oahuensis Perkins (1899: 25)

Hollow dead stems of *Touchardia* are favorite hiding places for this elongate cricket.

TRICHOLAENA

See **Grasses**, p. 98

URERA SANDVICENSIS WEDDELL

Family: Urticaceae.

Hawaiian name: opuhe.

There are two species and several varieties of *Urera;* most of the few insect records are for *U. sandvicensis.*

COLEOPTERA

Family Cerambycidae

* **Plagithmysus sulphurescens** Sharp (1896: 271)

Originally recorded from an unidentified tree, this beetle later was recorded from *Urera* at Kilauea, Hawaii.

Plagithmysus lamarckianus Sharp (1900: 110) Fig. 3

This beetle also was recorded from *Urera* at Kilauea, Hawaii, but it is more often associated with *Pipturus,* a related tree.

Family Aglycyderidae

Proterhinus obscurus Sharp (1878: 18)

Collected from *Urera* in Haleauau Valley, Oahu; on many other kinds of trees also.

LEPIDOPTERA

Family Pyraustidae

* **Phlyctaenia platyleuca** Meyrick (1899: 214) Fig. 29

Reared from caterpillars on *Urera* leaves on Mt. Kaala and in Kamokuiki Valley, Waianae Mountains, Oahu. Parasites reared from the larvae were *Casinaria infesta* (Cresson) (1872: 172) and *Sierola* sp.

Family Tortricidae

* **Epagoge urerana** Swezey (1915: 93)

Reared from caterpillars boring in living *Urera* twigs on Mt. Tantalus, Oahu.

Family Gracilariidae

* **Parectopa ureraella** (Swezey) (1915 : 94)

This is a leafminer occurring on Mt. Tantalus and in Kamokuiki Valley, Oahu. On Puu Kaua in the Waianae Mountains, Oahu, it was mining leaves of *Urera kaalae* Wawra. Parasites reared were *Sierola pulchra* Fullaway (1926 : 97) and *Euderus metallicus* (Ashmead) (1901 : 327).

* **Parectopa urerana** (Swezey) (1915 : 95)

A leafminer reared from *Urera* on Mt. Tantalus, Oahu, and Kilauea, Hawaii.

Family Nymphalidae

Vanessa tameamea Eschscholtz (1821 : 207) Figs. 26-28

The Kamehameha butterfly was reared from caterpillars on *Urera* leaves in Kipuka Puaulu, Kilauea, Hawaii, and Mt. Tantalus, Oahu. Its favorite hostplant is the related *Pipturus* tree. *Trichogramma minutum* Riley (1871 : 151) was reared from the eggs of this species found on *Urera* in Kamokunui Valley, Oahu.

HOMOPTERA

Family Delphacidae

Nesosydne umbratica Kirkaldy (1910 : 585)

This leafhopper has been collected abundantly from *Urera* at Olaa, 29 miles, Hawaii; it also occurs commonly on *Pipturus* and other plants.

Family Coccidae

Pseudococcus nipae (Maskell) (1892 : 232)

Pseudococcus pseudonipae (Cockerell) (1897 : 302)

These mealybugs, which occur on *Urera* and many other plants, have been considered as distinct species by local entomologists. *P. nipae* was all but eradicated by an introduced parasite, *Pseudaphycus utilis* Timberlake (1923 : 323) from Mexico, but this wasp does not attack *P. pseudonipae*. Ferris (1948 : 235) states that there are no morphological differences to separate the two mealybugs. Later ("Scale insects of North America," ser. V—The Pseudococcidae, Pt. I, 1950) Ferris made *P. nipae* the genotype of *Nipaecoccus*.

* **Phyllococcus oahuensis** (Ehrhorn) (1912 : 149)

This mealybug lives in erect galls on the leaves of *Urera,* and has been found on Mt. Tantalus, Oahu, and on the island of Lanai.

HETEROPTERA

Family Lygaeidae

Neseis (Trachynysius) nitidus White (1881 : 53) - - - Haleakala, Maui

Neseis (Trachynysius) saundersianus (Kirkaldy) (1902: 163)

- - - - Mapulehu, Molokai; Kipuka Puaulu, Hawaii

These bugs have been found on *Urera,* but occur more often on other trees.

Family Miridae

An undetermined species of plant bug was found abundant on *Urera* in Kipuka Puaulu, Kilauea, Hawaii.

THYSANOPTERA

Merothrips morgani Hood (1912: 132)

On branches of *Urera at* Kipuka Puaulu, Hawaii.

VACCINIUM PENDULIFLORUM GAUDICHAUD
VACCINIUM RETICULATUM SMITH

Family: Vaccinaceae.

Hawaiian name: ohelo.

The ohelo is a shrub or small tree. Most of the insect records for the genus refer to *V. penduliflorum* [now called *Vaccinium dentatum* Smith], or its varieties.

LEPIDOPTERA

Family Pyraustidae

* **Phlyctaenia pyranthes** Meyrick (1899: 220) Fig. 29

This reddish moth was reared from caterpillars on *Vaccinium* from many localities: Mt. Kaala and Mt. Olympus, Oahu; Kumuweia, Kauai; Waikolu, Molokai; Olinda, Maui; and Kilauea, Hawaii.

Family Pterophoridae

* **Platyptilia rhynchophora** Meyrick (1888: 239)

This plume moth was reared from caterpillars on *Vaccinium* leaves at Kilauea, Hawaii; Olinda, Maui; and Mt. Kaala, Oahu.

Family Carposinidae

* **Heterocrossa inscripta** Walsingham (1907: 669)

The larva of this moth lives in ohelo berries in the Kilauea region, Hawaii.

* **Heterocrossa atronotata** Walsingham (1907: 669)

The larvae occur in ohelo berries along the "Sandalwood trail," Kilauea, Hawaii, and the caterpillar has been reared on leaves, Mt. Kaala, Oahu. *Pristomerus hawaiiensis* Perkins (1910-H: 680) parasitizes the larvae.

Heterocrossa sp.

Larvae were found in terminal buds of ohelo at Nauhi gulch, Hawaii; they were not reared.

Heterocrossa sp.

Larvae were found feeding in berries at Nauhi gulch, Hawaii, but were not reared. The last two insects may be the same species, and possibly are *atronotata.*

Family Tortricidae

Archips postvittanus (Walker) (1863 : 297)

The caterpillars were found on *Vaccinium* leaves at Waikolu, Molokai.

Family Geometridae

Scotorythra rara (Butler) (1879 : 273)

These caterpillars occurred on leaves at Olinda, Maui. The species has many hostplants.

COLEOPTERA

Family Cerambycidae

* **Neoclytarlus atricolor** Perkins (1933 : 266)

Burrows of this beetle were common in *Vaccinium peleanum* Skottsberg at 8,500 feet elevation, Nauhi gulch, Hawaii. Two larvae were found, and one matured. The species was reared from the same hostplant at 6,700 feet elevation on the Mauna Loa truck trail, Hawaii.

Plagithmysus vitticollis Sharp (1896 : 240) Fig. 3

One adult was reared from *V. calycinum* Smith near an old vegetable garden, Kilauea, Hawaii, and another larva was found in the same plant at Byron's Ledge, Kilauea. In the Kohala Mountains of Hawaii this beetle has been reared from *Rubus hawaiiensis* Gray.

Family Curculionidae

Oodemas sp.

In dead stems at Olinda, Maui.

Family Aglycyderidae

Proterhinus sp.

In dead stems, Olinda, Maui.

Family Cucujidae

Brontolaemus elegans Sharp (Blackburn and Sharp, 1885 : 142)

Collected from dead twigs in Kahauiki Valley, Oahu.

Family Ciidae

Cis sp.

In dead stems, Olinda, Maui.

Family Anobiidae

Xyletobius sp.

In dead stems, Olinda, Maui.

HOMOPTERA

Family Cercopidae

Philaenus spumarius (Linnaeus) (1758: 437)
On *Vaccinium* in the National Park, Kilauea, Hawaii.

Family Cicadellidae

Nesophrosyne haleakala Kirkaldy (1910: 16)
Collected from *Vaccinium* or *Coprosma* (in a mixed growth), Haleakala, Maui, 8,500 feet elevation.

Family Aphididae

Amphorophora vaccinii Mason (1925: 67)
Mauna Loa truck trail, 6,500 feet, Hawaii National Park, Hawaii.
Toxoptera aurantii (Boyer de Fonscolombe) (1841: 178)
On *Vaccinium* leaves, Kilauea, Hawaii.
Myzus circumflexus (Buckton) (1876: 130)
In the Pepeekeo forest reserve, Hawaii.

HETEROPTERA

Family Lygaeidae

Nysius lichenicola Kirkaldy (1910: 540)
An occasional specimen of this bug was seen on *Vaccinium,* Haleakala, Maui.
Nysius rubescens White (1881: 55)
Pachybrachius vincta (Say) (1832: 16)
These two bugs have been collected on ohelo at Kilauea, Hawaii.

THYSANOPTERA

Thrips (Isoneurothrips) antennatus (Moulton) (1928: 112)
On ohelo leaves, Kilauea, Hawaii.
Haplothrips rosai Bianchi (1946: 506)
On leaves and dead branches, Kilauea, Hawaii.
Heliothrips haemorrhoidalis (Bouché) (1833: 206)
On leaves of *V. calycinum,* Waikolu Valley, Molokai, and Pepeekeo forest reserve, Hawaii.

DIPTERA

Family Tephritidae

Ceratitis capitata (Wiedemann) (1824: 55)
The Mediterranean fruit fly was reared from ohelo berries at Kilauea, Hawaii.

VALLESIA
See **Pteralyxia,** p. 175

On *W. phillyreaefolia* Gray at Kilauea, Hawaii, and many other plants.

Family Cicadellidae

* **Nesophrosyne oreadis** Kirkaldy (1910: 569)
On *Wikstroemia,* Kaumuahona and Mt. Konahuanui, Oahu.
These two bugs have been collected on ohelo at Kilauea, Hawaii.

WIKSTROEMIA OAHUENSIS (GRAY) ROCK

Family: Thymelaeaceae.

Hawaiian name: akia.

There are several species of *Wikstroemia* in Hawaii, but most of the insect records are from *W. oahuensis*. The plant is a shrub or small tree, well distributed in the islands, but never in great abundance. There is a poisonous principle in the bark which was made use of by the Hawaiians to stupefy fish, but it does not deter insects from feeding on various parts of the plants.

LEPIDOPTERA

Family Phalaenidae

* **Euxoa hephaestaea** (Meyrick) (1904 : 346)

Synonyms: *Euxoa diplosticta* Hampson; *E. wikstroemia* Swezey.

The caterpillars of this moth feed on foliage of *Wikstroemia,* remaining among the leaves throughout their entire larval life instead of descending to hide in the ground as many related moths do. I have reared this species from the Kalalau trail, Kokee, Kauai, Malamalama and Mt. Kaala, Oahu, and Waikolu, Molokai. Caterpillars were found, but not reared, in the following places: Alewa Heights and Waialae Nui, Oahu, and Kainalu, Molokai. Adult moths have been collected abundantly in the northwest part of the Koolau Mountains, Oahu, and at Kokee, Kauai. Sufficient material has been obtained to study the variation in wing color and pattern, and to establish the synonymy given above.

Agrotis cinctipennis (Butler) (1881 : 323)

Adults were reared from a colony of caterpillars found on a *Wikstroemia* leaf on Mt. Kaala, Oahu. This is a variable species, which is not confined to *Wikstroemia.*

Family Tortricidae

Amorbia emigratella Busck (1909 : 201)

Eggs of this moth were found on a leaf of *Wikstroemia* at Kainalu, Molokai; some were parasitized by *Trichogramma minutum* Riley (1871 : 157).

Archips postvittanus (Walker) (1863 : 297)

Caterpillars of this moth were found on *Wikstroemia* leaves at Kumuweia, Kauai, and at Waikolu and Kainalu, Molokai.

Family Hyponomeutidae

Hyposmocoma chilonella triocellata Walsingham (1907 : 637)

Hyposmocoma chilonella venosa Walsingham (1907 : 638)

These two varieties were reared from elongate, white larvae in dead wood at Kainalu, Molokai; they occur in wood of other trees also.

Neelysia palmifera Meyrick (1935 : 63)

Reared from dead stems of *Wikstroemia* at Pauoa Flats, Oahu. The moth has also been reared from dead branches of *Acacia koa* on Hawaii.

Diplosara lignivora (Butler) (1879 : 273)

The large brown larval cases of this moth were found under loose *Wikstroemia* bark at Pauoa Flats, Oahu.

Hyperdasyella unicolor (Walsingham) (1907 : 642)

Reared from dead wood at Pauoa Flats, Oahu.

Family Lyonetiidae

Opogona omoscopa (Meyrick) (1892 : 567)

Reared from old bark at Pauoa Flats, Oahu. The caterpillars are scavengers on dead or decaying vegetation.

COLEOPTERA

Family Aglycyderidae

* **Proterhinus dispar** Sharp (1881 : 528)

From *Wikstroemia* bark, Pauoa Flats, Pacific Heights, Malamalama, Mt. Lanihuli and Kahauiki, Oahu.

* **Proterhinus wikstroemiae** Perkins (1900 : 195)

Abundant in *Wikstroemia* bark at Kokee, Kauai.

* **Proterhinus persimilis** Perkins (1900 : 224)

On *Wikstroemia* in Iao Valley, Maui.

Proterhinus blackburni Sharp (1878 : 17)

On *Wikstroemia* bark at Pauoa Flats, Oahu; the insect occurs on many trees.

Family Curculionidae

Oodemas aenescens Boheman (1859 : 138)

In a dead *Wikstroemia* branch at Pauoa Flats, Oahu.

Family Cucujidae

Brontolaemus elegans Sharp (Blackburn and Sharp, 1885 : 142)

Collected from *Wikstroemia* bark, Kokee, Kauai.

HOMOPTERA

Family Cercopidae

Philaenus spumarius (Linnaeus) (1758 : 437)

On *W. phillyreaefolia* Gray at Kilauea, Hawaii, and many other plants.

Family Cicadellidae

* **Nesophrosyne oreadis** Kirkaldy (1910 : 569)

On *Wikstroemia,* Kaumuahona and Mt. Konahuanui, Oahu.

Nesophrosyne monticola Kirkaldy (1910: 562)
Recorded from *Wikstroemia* with some doubt. Mt. Kaala, Oahu.

Nesophrosyne sp.
An unidentified species was found on *Wikstroemia* at Kainalu, Molokai.

HETEROPTERA

Family Lygaeidae

* **Oceanides picturatus** Usinger (1942: 24)
- - - - Pauoa Flats, Kaumuahona, Oahu

* **Oceanides ventralis** Usinger (1942: 24) - - - - Kauaikinana, Kauai

Nysius terrestris Usinger (1942: 95) - - - - - - Pauoa Flats, Oahu

Glyptonysius hylaeus (Kirkaldy) (1910: 539) - - - - - Kokee, Kauai
These bugs were all collected from *Wikstroemia* in the localities named.

DERMAPTERA

Labia dubronyi Hebard (1922: 318)
Predaceous; under loose bark, Pauoa Flats, Oahu.

THYSANOPTERA

Taeniothrips hawaiiensis (Morgan) (1913: 3)
In the flowers of *Wikstroemia* and many other plants.

Thrips sp.
Under dead bark, Kainalu, Molokai.

DIPTERA

Family Tephritidae

Ceratitis capitata (Wiedemann) (1824: 55)
Reared from fruits of *W. phillyreaefolia* at Pahala, Hawaii.

WILKESIA GYMNOXIPHIUM GRAY

[the genus **Wilkesia** has been combined with **Argyroxiphium**]

Family: Compositae.

Hawaiian name: iliau.

This is a shrub of limited distribution on the dry outskirts of the Waimea plateau, Kauai. It grows for several years before the inflorescence appears above the apical mass of swordlike leaves; after blooming the plant dies.

LEPIDOPTERA

Family Phycitidae

* **Homoeosoma amphibola** Meyrick (1899: 197)

The larvae of this moth feed in the flower heads, but without injuring the seeds. They complete their growth by feeding on the pith of the stems and form their cocoons in the hollowed stems. Some larvae remain dormant within the cocoons before pupating, possibly to carry the species over until the next flowering season. The caterpillars are heavily parasitized by *Sierola* sp.

COLEOPTERA

Family Curculionidae

Oodemas sp.

Collected at Halemanu, Kauai, from dead stems.

Family Ciidae

Cis sp.

A black species, probably *porcatus* Sharp (1879: 92), was found in dead stems at Halemanu, Kauai.

WILKESIA GRAYANA HILLEBRAND

[now **Argyroxiphium grayanum** (Hillebrand) Degener]

Family: Compositae.

I have seen this rare shrub only on the summit of Puu Kukui, Maui.

LEPIDOPTERA

Family Gracilariidae

* **Philodoria wilkesiella** Swezey (1940: 464)

A leafminer, Puu Kukui, Maui.

Family Pyraustidae

Phlyctaenia sp. (?)

The larvae were in the tips of the twigs; no adults were reared.

HOMOPTERA

Family Delphacidae

* **Nesosydne** sp.

Family Psyllidae

An undetermined psyllid (?) occurs on this plant on Puu Kukui, Maui.

HETEROPTERA

Family Lygaeidae

Nysius sp.

COLEOPTERA

Family Carabidae

An undetermined carabid was found in a dead stem, Puu Kukui, Maui.

XYLOSMA HAWAIIENSE SEEMANN

Family: Flacourtiaceae.

Hawaiian name: maua.

LEPIDOPTERA

Family Tortricidae

* **Dipterina fulvosericea** Walsingham (1907 : 697)

This is one of the larger Hawaiian tortricids; its caterpillars feed on the leaves of *Xylosma,* to which it is attached. The moth occurs on Kauai, Oahu, Molokai and Lanai. I have reared it from Kokee, Kauai, and from various localities on Oahu.

Tortrix metallurgica Walsingham (1907 : 699)

This moth was once reared from *Xylosma* leaves on Mt. Tantalus, Oahu. It occurs on other trees also.

HOMOPTERA

Family Delphacidae

* **Nesothoë semialba** (Muir) (1922 : 95)

Both adults and nymphs were collected on *Xylosma* at Kawaikoi, Kauai. The species was described from a single specimen from *Osmanthus,* which was probably an accidental host. It is likely that *semialba* is attached to *Xylosma,* as evidenced by the presence of nymphs on that plant.

Family Psyllidae

* **Cerotrioza bivittata** Crawford (1918 : 454)

This rather rare species is attached to *Xylosma;* the nymphs feed on the leaves without forming galls. It has been collected on Oahu, Maui and Hawaii.

HETEROPTERA

Family Miridae

* **Orthotylus daphne** Kirkaldy (1902 : 135)

Recorded from *Xylosma* at Waianae, Oahu by Zimmerman (1948, vol. 3 : 210). I know of no other record for this bug, from any plant.

Orthotylus sp.

This was collected from *Xylosma* at Kumuweia, Kauai.

COLEOPTERA

Family Anobiidae

Xyletobius sp.

Collected from *Xylosma* at Kumuweia, Kauai.

THYSANOPTERA

Macrophthalmothrips hawaiiensis Moulton (1928: 122)

This thrips occurs on most of the islands. It has been collected on *Xylosma* as well as on numerous other trees.

ZANTHOXYLUM spp.

[formerly spelled **Xanthoxylum**; by some botanists placed in the genus **Fagara**]

Family: Rutaceae.

Hawaiian name: a'e, or hea'e.

COLEOPTERA

Family Cerambycidae

Plagithmysus bishopi Sharp (1896: 242) Fig. 3

Reared from *Z. dipetalum geminicarpum* Rock, in Kipuka Puaulu, Kilauea, Hawaii. However, *Pelea,* a related tree, is its chief hostplant.

Family Curculionidae

Oodemas aenescens kahanae Perkins (1935: 75)

Collected on *Zanthoxylum* at Kahana, Oahu.

Oodemas angustum Blackburn (1878: 75)

Collected from dead branches at Palikea, Oahu.

Family Aglycyderidae

* **Proterhinus xanthoxyli** Perkins (1931: 511)

Collected from dead branches at Puu Palikea and Haleauau Valley, Waianae Mountains, Oahu. A parasite, *Rhaconotus vagrans* (Bridwell) (1920: 390), was reared from the Palikea material.

Family Scolytidae

Hypothenemus insularis Perkins (1900: 181)

From dead branches, Palikea, Oahu.

Family Anobiidae

Xyletobius sykesii Perkins (1910: 607)
Collected from dead branches at Palikea, Oahu.

Family Ciidae

Apterocis impunctatus Perkins (1900: 268)

Cis porcatus Sharp (1879: 92)

Cis cognatissimus Perkins (1900: 256)
These three species were collected from dead branches of *Xanthoxylum* at Palikea, Oahu.

LEPIDOPTERA

Family Pyraustidae

Scoparia mesoleuca Meyrick (1899: 252)
Reared from dead branches, Palikea, Oahu.

HOMOPTERA

Family Psyllidae

* **Hevaheva aloha** Caldwell (1940: 394)
On *Zanthoxylum* leaves, Mohihi, Kauai.

HETEROPTERA

Family Miridae

Sulamita lunalilo Kirkaldy (1902: 130)

Sulamita opuna Kirkaldy (1902: 131)
These bugs were collected from *Zanthoxylum,* the latter species on Mt. Kaala, Oahu.

* **Hevaheva aloha** Caldwell (1940: 394)

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