

abdomen bitten off, they refused to release their grip on her feet. Others rushed to the rescue of their broken mates, and when about seven or more took a hand, they were barely able to hold their victim. They held by every possible appendage: antennae, legs, and even her vicious sting. After an hour it simply became a tug-of-war. More and more workers joined the attackers, but not a single soldier appeared. The newcomers seized the legs of their mates who were already attached. In this way, with lines two and three deep on every appendage they finally held their victim motionless, though it had taken them fully two hours. The losses in their own ranks, as far as I could see, had been eight killed and maimed. At this stage the soldiers appeared, when all danger was past, and began their job of cutting up the victim. The legs were first severed by cutting the soft connecting membranes next to the body, which was also finally cut into bits. When I had to leave at the end of the third hour of contest, the remains were not nearly cleared away.

From these observations it appears to me evident that the predominance of *Pheidole* in the tropical and subtropical countries lies in their dogged persistence. The little workers are absolutely fearless, attacking insects many times their size, even where they may be instantly crushed to death in powerful jaws. This and other observations show that their splendid team work is entirely due to instinct. I can see nothing suggestive of reasoning in any of their activities.

**A Report on Insects and Other Animal Organisms Collected
in the Pineapple Growing Section at Mauna Loa,
Molokai, June, 1926.**

BY J. F. ILLINGWORTH.

(Presented at the meeting of September 2, 1926.)

I here list 69 organisms with brief remarks as to what is known about the habits of each. Undoubtedly some of these creatures have no bearing upon the growing of pineapples. I would place in this class those that are checked with a star (*).

The field work for this report was of necessity very limited. Further collecting, especially at different seasons of the year, would undoubtedly greatly extend the list. At any rate, even with this small beginning, we see the abundance of potential pests that are already turning their attention to pineapples.

Class CRUSTACEA

Order ONISCOIDEA

Family Oniscidae

Porcellio lacvis Latr. (Sowbug or damp bug).

Family Armadillididae

Armadillo hawaiiensis Dana (*Spherillo*). (Pill bug.)

Both of these Isopods are abundant under paper in pineapple fields. I watched them feeding on the fertilizer at the base of the plant. Though they feed normally on plant refuse, the indications are that they feed upon living roots during long periods of drought.

Class ARACHNIDA

Order ACARINA (mites)

Family Tyroglyphidae

Tyroglyphus sp. Mites belonging to this genus are abundant in soil among roots of wilting pineapple plants.

Class INSECTA

Order COLLEMBOLA (Springtails)

Very minute insects, belonging to this order, are abundant in old, diseased fields. A tiny, white species, less than 1/25th of an inch in length, does considerable damage to the roots, feeding upon the tender tissues at the growing point.

Order ORTHOPTERA

Family Blattidae

Pycnoscelus surinamensis (Linn.) (Burrowing roach).

In soil about roots, under paper. This roach has a bad reputation as a feeder on roots.

Cutilia soror (Brunner). Another roach of similar habits.

Family Gryllidae

Grylloides sigillatus (Walker). These crickets are very abundant under paper.

Order DERMAPTERA (Earwigs)

Family Labiduridae

Labidura riparia (Pallas). Thought to be largely predaceous on other insects.

Order HEMIPTERA

Family Reduviidae

Zelus renardii Kol. These large, predaceous "assassin bugs" capture insects of various kinds, on which they feed.

Family Myodochidae

**Nysius delectus* White. In old fields, principally on purslane.

Family Cydnidae

Geotomus pygmaeus Dallas. (Det. by Bryan.)

Burrowing bugs, found in soil among diseased pineapple roots. Kirkaldy states that this species is distributed over the entire oriental region, being also recorded from Celebes and New Caledonia. A European species, found at the roots of grasses, is said to suck the sap from various plants.

Family Coccidae

Pseudococcus brevipes (Cockerell). (Pineapple mealy bug.) Fairly common on pineapple fruit.

Diaspis bromeliae (Kerner). (Pineapple scale.) Fairly abundant on plants and fruit.

Order COLEOPTERA (Beetles)

Family Histeridae

**Saprinus fimbriatus* Lec. Predaceous on dipterous larvae in manure,—evidently from droppings of work animals.

Family Elateridae

Monocrepidius exsul Sharp. The larval wireworms of these click beetles feed on pineapple roots.

Family Anthicidæ

**Anthicus floralis* Lec. On weeds in old fields.

Family Nitidulidæ

Carpophilus humeralis (Fab.) (Pineapple beetle.)

Carpophilus maculatus Murray.

Although these souring beetles have become major pests in most pineapple-growing sections of Hawaii, they are still rare on Molokai.

Family Cucujidae

Cryptamorpha desjardinsi (Guer.). Both the larvae and the adults of this predaceous beetle are destructive to maggots, caterpillars, etc., on pineapples.

Family Coccinellidae

**Diomus notescens* (Blackburn)

**Platyomus lividigaster* Mulsant

**Coclophora inaequalis* (Fabr.)

Predaceous beetles introduced by Koebele from Australia, to prey upon plant lice. They were collected on weeds in old fields.

Cryptolaemus montrouzieri Mulsant. This Australian lady-beetle, now widely distributed in Hawaii, feeds on mealy bugs of the genus *Pseudococcus*. It is a valuable enemy of the pineapple mealy bug.

Family Scarabaeidae

Adoretus sinicus Burmeister. (Rose beetle.) The larvae (white grubs) feed somewhat on pineapple roots.

Pleurophorus parvulus Chev. Both adults and larvae are closely associated in the soil with new pineapple plants. Possibly they are attracted by the ammonium sulphate fertilizer applied at the time of planting.

**Aphodius lividus* Olivier. These are typical manure feeders. They are rather abundant in new fields, breeding in the droppings of animals.

Family Tenebrionidae (Ground beetles)

Gonocephalum seriatum (Boisduval)*Alphitobius lateralis* (Boheman)*Blapstinus dilatatus* Lec.*Epitragus diremptus* Karsch

The above four species are very abundant in pineapple fields, especially under paper. Their larvae resemble wireworms. Although normally they feed on decomposing organic matter in the soil, I suspect that they may eat pineapple roots during periods of drought.

Order LEPIDOPTERA

Family Nymphalidae

**Anosia erippus* Cramer. (Milkweed or Monarch butterfly.)
In old fields.

Family Lycaenidae

**Lycaena boetica* (Linn.). In old fields on *Crotalaria*.

Family Tineidae

Ereunetis flavistriata Walsm. (Det. by Swezey.) (Bud moths.)

Batrachedra rileyi Walsingham. (Det. by Swezey.) (Bud moths.)

The moths of both of these species are very abundant in fruiting fields. The caterpillars of the second are pink in color and live largely in the eyes of the fruit, where they feed on the stamens and pistil. The caterpillars of the first are grayish in color and are frequently associated with mealy bugs at the base of the fruit. Both, occasionally, eat into the living tissue of the fruit and may cause the entrance of other organisms of decay.

Order DIPTERA

Family Psychodidae

**Psychoda alternata* Say (Det. by Bryan). Found breeding in drain from houses.

Family Scenopinidae

**Scenopinus fenestralis* (Linn.) (Det. by Bryan.) On window.

Family Syrphidae

**Eristalis punctulatus* Macq.

**Eristalis aeneus* (Scopoli)

Both of these breed in garbage, etc., about camp.
Allograpta obliqua (Say). A valuable predator on plant lice.

Family Tachinidae

Archytas cirphis Curran (MS). This valuable cut-worm parasite is abundant and thoroughly established.

Family Sarcophagidae

Sarcophaga haemorrhoidalis Fallen. Breeds in human excrement in fields.

Sarcophaga pallinervis Thomson. Breeds in cow dung.

Family Muscidae

Musca vicina Macq. (Housefly.)

Stomoxys calcitrans (Linn.) (Stable fly.)

Haematobia irritans (Linn.) (Horn fly.)

All of these flies are exceedingly abundant in the vicinity of quarters. They breed in the manure-laden soil under stable floors, in manure piles in gardens, and in garbage, etc.

Family Calliphoridae (Blow flies)

Chrysomya megacephala (Fabr.)

Chrysomya albiceps Wied.

Both of these flies have a bad reputation, blowing meat and even infesting living animals. They come from India.

Family Anthomyidae

Atherigona excisa Wied. Lives in decaying vegetable matter.

Limnophora arcuata Stein. Hovering fly with spotted abdomen.

Family Ortalidae

Euxesta annonae Fabr. Found breeding in pineapple plants and among the bracts on the under side of the Fruits.

Family Trypetidae

**Dacus cucurbitae* Coquillett. The melon fly, found breeding in cucurbitaceous plants near quarters.

Family Agromyzidae

Milichiella lacteipennis (Loew). Breeds in droppings of animals in fields.

Order HYMENOPTERA

Family Chalcididae

Chalcis obscurata Walker

A valuable parasitic wasp introduced by Koebele from Japan and China. It breeds principally upon leaf-rolling caterpillars of bananas, palms, etc.

Family Braconidae

Chelonus blackburni Cameron. Parasitic on caterpillars.

Family Ichneumonidae

Amblyteles koebelii (Swezey)

Echthromorpha fuscator (Fabr.)

Pimpla hawaiiensis Cameron

These are valuable parasites on caterpillars of various kinds; the first two are effective checks upon cutworms.

Family Figitidae

**Eucoila impatiens* (Say). An internal parasite on dipterous larvae, principally of Sarcophagid flies, about quarters.

Family Formicidae

Pheidole megacephala (Fabr.) (Pheidole ant.) This predaceous ant is exceedingly abundant, feeding upon the numerous organisms in the fields. It does some injury to the plants by attending mealy bugs.

Camponotus maculatus (Fabr.) (Large sugar ant.) A very few around the borders of fields and in new ground. These ants also attend mealy bugs.

Family Psammocharidae

Psammochares luctuosus (Cresson) (Det. by Williams).

Collect spiders, to store in their nests.

Family Vespidae

Polistes aurifer Sauss. An important natural enemy of the webbing caterpillars that occur on the fruit.

Family Eumenidae

Pachodynerus simplicicornis (Saussure).

Odynerus petrobis Perkins (Det. by Williams).

These species are constantly seen in the fields, searching for caterpillars about the fruits, to store in their nests.

Family Scoliidae

Scolia manilae Ashmead. This important parasitic check on *Adoretus* grubs is well established on Molokai.

Family Sphecidae

Sceliphron caementarium (Drury) (Mud wasp).

Notogonidea luzonensis Rohwer (Cricket wasp) (Det. by Williams).

This introduced wasp abundant in fields infested with crickets under paper.

Family Bethylidae

Epyris extraneus Bridwell (Det. by Williams). This wasp is parasitic on the larvae of our ground beetles (Tenebrionidae), so abundant under paper in pineapple fields. (See Proc. Hawaiian Ent. Soc. vol. 4, p. 55).

Family Xylocopidae

**Xylocopa varipuncta* Patton. (Carpenter bee.)

These large black bees bore into fence posts, etc., to build their nests. They are very partial to redwood timber.

Insects Attracted to Carrion in Southern California.

BY J. F. ILLINGWORTH

(Presented at the meeting of December 2, 1926.)

During my visit to Upland, California, in April and May, 1925, I found flies so remarkably abundant that I decided to make a study of them. Residents accounted for this scourge, particularly of the common housefly, as due to the heavy application of stable manure that was being spread on the surrounding orange groves. This fertilizer was brought in on trains from Los Angeles, where it had been collected fresh from the stables. Yet I was especially impressed with the variety and numbers of blowflies present, for there was little in evidence for them to breed upon.