Notes on Insect Pests in Samoa.

BY O. H. SWEZEY.

(Presented at the meeting of November 1, 1923.)

While in Samoa four weeks during September, 1923, every opportunity was taken to make observations on insect pests of economic importance there.

Apparently the most destructive pests are those of the coconut and banana, and they appear to be such as have comparatively recently arrived there from elsewhere, probably from other Islands of the South Pacific.

The worst pest on sugar cane is the borer, the same kind that we have in Hawaii. As cane is grown in Samoa only for thatching the native houses, the damage done by the borer is not taken so seriously as if it were a commercial crop.

Insects on Sugar Cane.

Perkinsiella vitiensis Kirk.

This leafhopper was usually to be found in patches of sugar cane, though not abundant enough to be injurious. In fact, the insects themselves were rather so scarce as to be difficult to find, but their presence was known by the discoloration of the midrib of the leaves where eggs had been deposited. Very few eggs were found anywhere, and I failed to find any that were parasitized. However, a few of the little round exit holes were found which indicate where the egg-parasite *Ootetrastichus* had issued. This was very likely the same species (*Ootetrastichus beatus* Perkins) that occurs in Fiji. The adult parasite oviposits in eggs of the leafhopper. In developing, the parasite larva consumes the leafhopper egg in which it has hatched, it then eats the other two to seven eggs of the same cluster of leafhopper eggs. Having obtained its growth the larva transforms to the pupa and adult in a small cavity in the leaf tissue, and gnaws the tiny round exit hole to make its escape when fully matured. This egg-parasite was introduced from Fiji to Hawaii in 1905 where it rendered valuable assistance in checking the cane leafhopper (*Perkinsiella saccharicida* Kirk.)

occurring there. A single specimen of the egg-parasite was collected in a cane patch on the island of Tau of the Manu'a group, which proves to be the Fijian species mentioned.

Rhabdocnemis obscura (Boisd.).

The cane borer was generally present and quite injurious. In some places worse than others, sometimes scarce and hard to find in cane patches. Often it was easier to find in coconut trees, where its larvae were in the bases of old leafstalks, usually the stubs where leaves had been cut off.

A colony of the New Guinea Tachinid fly parasitic on the larvae of this borer was sent to the Naval Station, Pago Pago, in 1918. I learned that the flies had been liberated in a cane patch at a Samoan village on Pago Pago harbor. As I was not able to find any of the parasites anywhere that I looked, it must have failed to become established. If it had succeeded in establishing, it could have spread quite generally by this time. Other colonies of this parasite have recently been sent in further attempts to establish it there.

Elytroteinus subtruncatus (Fairm.).

A beetle which has been known as the ginger weevil, was found in cane along with the cane-borer in a cane patch on the side of the mountain above Fagasa village. Quite a number of larvae were found, mostly in broken off canes lying on the ground and already somewhat bored by larvae of *Rhabdocnemis obscura*. A few pupae were found which were saved till they matured to the adult beetles. The identity of the species was verified by Dr. G. A. K. Marshall of the Imperial Bureau of Entomology.

Longicorn beetle.

A few larvae of a Longicorn beetle were found in dead canes on the ground in the same cane patch at Fagasa. These were not reared, so their identity is not known. They were probably some dead-wood borer, and not a particular cane insect, probably only attacking dead canes.

Melanitis leda Linn.

On two occasions the larva of this butterfly was found feeding on cane leaves. One of them was reared, thus proving

its identity. It is a green caterpillar, probably a special cane insect, though not numerous enough to be considered a pest. I do not know if it feeds on other plants than cane. It occurs in Fiji, and quite widely distributed in the South Pacific.

Cosmopteryx dulcivora Meyr.

The larva of some small species of moth was found boring in the midribs of cane leaves, fairly common, but not specially injurious. I failed to rear any adults, but it is likely to be the species here given which occurs in Fiji with similar habits.

Mealy bugs: Pseudococcus sacchari and P. calceolariae.

Both of these species of mealy bugs are found, the former more common than the latter. Both feed on the cane stalk at the nodes, inside of the leaf sheaths. No parasites were found associated with these, nor ladybeetles feeding on them.

Aleyrodes bergii (Sign.).

In several different places colonies of an Aleyrodid were found on cane. They were usually on the underside of the leaf and near the base, and in quite dense clusters of a few hundred insects and occupying a space of two to three inches along the leaf. They were not numerous enough to cause any significant injury. This species also occurs in Fiji.

Diaspine scale.

In the cane patch at Fagasa, a few stalks of cane were found having a scale on them near the joints. Not numerous enough for injury.. The species has not been determined.

Coconut Insects.

Oryctes rhinoceros Linn.

The rhinoceros beetle seems to be considered the most important of all insects that affect the coconut in Samoa. The injury is done by the large adult bettles feeding and burrowing in the growing crown of the coconut tree, where they may cause such injury as to result in the death of the tree, or they may only mutilate the undeveloped leaves so that they cannot become fully developed and of proper service to the tree, or it may be that the undeveloped fruiting clusters are so much

injured as to prevent the bearing of nuts. The appearance of the newer mutilated leaves serves to indicate when and where the beetle is prevalent. The larvae or grubs are not injurious but feed in dead and rotting stumps and logs.

Searching out these grubs and destroying them is the chief control measure being practiced. It seems to be quite effective when persistently and thoroughly carried out. One day per week is designated as "beetle day," on which the natives are required to make special search for these grubs. Many thousands of them are thus found by chopping up old logs and stumps. Their eggs are also found in this way, and a few of the beetles themselves, all of which are destroyed. Much benefit is derived in this way, but the work would be greatly facilitated if the coconut groves were kept free of the native jungle of brush and vines that has such a tendency of rapidly choking up the space beneath the coconut trees. On account of this undergrowth there is great difficulty in finding the breeding places of the beetles and many will escape detection and thus enough grubs go through to maturity to keep the beetle continuously going.

Rhabdocnemis obscura (Boisd.).

The sugar-cane borer is found quite commonly in coconut trees. The beetles may be found behind the bases of the leaves where they can readily hide among the fibrous matter, but the grubs were usually found in the bases of the leafstalks, and mostly in those that had been cut off, leaving a stub remaining on the tree. These cut-off ends provide a place where the adult beetles could conveniently lay their eggs, which accounts for the grubs being more often found in such positions. On account of this habit of feeding in these places, this weevil is not of important injury to the coconut trees.

Diocalandra taitensis (Guer.).

The Tahiti coconut weevil was found quite abundantly in places. It is much smaller than the sugar-cane borer. Its larvae feed in the edges of the lower part of the leaf stalk, and as it is the older leaves that are most often attacked, they are not significantly injurious to the trees. They, too, are likely to be more abundant in stubs of cut-off leaves.

Promecotheca reichii Baly.

This is a Hispid beetle whose larvae are leaf-miners in the leaflets of coconut. The egg is laid on the surface of the leaf, and the young larva, on hatching, bores into the leaf and feeds on the inner green part of the leaf, and producing a dead spot on the leaf where the green matter has been eaten away. The larva transforms to a pupa and eventually to the adult beetle within the mine in the leaf. This was not observed to be abundant enough to be particularly injurious.

Leaf Caterpillar.

Everywhere the coconut leaves showed evidences of the feeding of some insect which ate off the surface in small spots, leaving one epidermis of the leaf and giving the appearance of numerous small dead spots on the leaflets. No insects were found actually doing this eating, but it was considered as being the work of caterpillars of some small moth which was out of season at the time I was there. I thought at the time that the appearance of the leaves was different from that caused by the little moth, *Levuana iridescens,* which injures coconut leaves so badly in Fiji.

Graeffea minor Br.

Stick insects were found feeding somewhat on coconut leaves in a few places. In feeding they consume the whole substance of the leaf, so that the leaflets have ragged edges, or may even be eaten down to the midrib. A larger species, *Graeffea cocophaga* (Newp.), is also said to feed on coconut leaves, but I failed to find any of these. The damage by these insects did not seem to amount to much.

Chrysomphalus rossi (Mask.).

This scale insect was found frequently on coconuts, occurring on or beneath the scales at the base of the nuts, also on other parts of the tree. It did not seem to be particularly injurious.

Scholastes bimaculatus Hendel.

This fly appears to be attached to the coconut, but perhaps not as a pest, as it apparently breeds in decaying nuts. The

fly is usually seen on fallen nuts lying under the trees. What I considered their eggs were found by thousands beneath the scales at the base of immature coconuts lying on the ground, that had fallen off accidentally by the wind, or had been partially eaten by the flying fox, which damages the young nuts on the trees a good deal. I also found very numerous small pink maggots feeding in the decaying husk of similar nuts lying on the ground, which I took to be the maggots of this fly. However, these conclusions are not to be given too much importance. Further observations are necessary to fully learn the life history and habits of the fly and its exact relations to coconuts.

Termites.

A species of termite that is very abundant in the forests of Samoa, builds large, black, rough-surfaced nests on the trunks of trees from one to ten feet or more from the ground. They feed in the trunks, also build narrow covered runs about on the surface of the tree trunk, often extending to a considerable elevation in the tree. Beneath these runs the termites feed on the bark.

Coconut trunks frequently bear these termite nests. A favorite position for the nest being at one of the numerous notches that have been cut into the trunks by the natives to facilitate climbing the trees for the nuts. Besides providing a place for the entrance of termites to the trunk, these notches also present opportunities for decay to set in which diminishes the productivity of the tree and shortens its life. This phase of it is probably more detrimental than the injury by the termites, and it seems to me that this practice of notching the trees should be discouraged.

Banana Pests.

Cosmopolites sordidus (Germ.).

The banana weevil was found in a number of places. Perhaps it has only lately become established and not yet generally spread. The larva of this beetle is a fat, white, legless grub which bores in the corm and base of banana stems. The adult is a black snout-beetle and may be found in the same places

and beneath the dried leaf bases at the base of banana stems. This pest is very destructive to bananas where it occurs in Fiji, Queensland, Java and probably most of the groups of islands between there and Samoa. Where numerous in the base of banana stems these are weakened and may easily fall over, or the plant prevented from normal growth and fruiting, and the young suckers may be entirely killed. This pest has become very serious in Fiji and it is very difficult to devise satisfactory methods of control. It is likely to increase to that condition in Samoa.

Nacoleia octasema Meyrick.

The banana scab moth is generally prevalent. The caterpillars of this moth feed among the flowers and the green bananas on the bunch. Where they feed on the surface of the young growing bananas it does not always prevent their growing to normal size, but the surface where eaten assumes a scabby appearance which is detrimental to the sale of the fruit. The bunches, too, are unattractive where littered up with the black frass from the caterpillars.

This pest occurs from Java to Queensland, Solomon Islands, and to Fiji and Samoa, and no doubt it occurs at all intervening islands. I think that it has not been previously reported in Samoa, and may be of somewhat recent introduction there. In Java, dusting with pyrethrum powder is said to be effective in controlling the pest. The pyrethrum is mixed one part to three parts of sifted wood ashes or lime, and dusted into the opening flower cluster or among the small growing bananas by means of a syringe-like duster.

Papaia Fruit-fly.

Dacus xanthodes Broun.

This fruit-fly was reared from immature fruits of papaia at Amauli towards the east end of Tutuila. I did not find it generally attacking papaias, but it is not confined to papaia as it has been reared from guavas and granadillas. Fruit-fly maggots were found in alligator pear, and in several kinds of native fruits in the forest, but none of these were reared, so we do not know if they were this species or other species of fruit-flies.

Taro Insects.

Chaerocampa celerio (Linn.).

The larvae of this medium-sized hawkmoth were occasionally found feeding on the leaves of taro, not numerous enough to be considered injurious, however. It occurs from India to Java, Borneo, Australia, and Fiji. The large, green caterpillars with a horn at the tail end may be readily picked off and killed when noticed.

Megamelus proserpina Kirk.

This is a small leafhopper found on the underside of the leaves, and often quite numerous though not specially injurious. It occurs in Fiji, Java, the Philippines and probably intervening regions.

Several other kinds of leafhoppers were collected on taro leaves, but were not considered as particularly attached to taro the same as *M. proserpina* is.

Aphidid.

An undetermined plant louse was also found on the leaves of taro, but not causing serious infestations.

Insects of Cucurbits.

Glyphodes indica Saund.

The larvae of this widely spread leaf-roller moth were occasionally found on cucumber vines, but in no case were they numerous enough to be considered a pest.

Aulocophora fabricii ?.

A leaf-beetle probably of this species was quite abundant on squash and pumpkin vines.

As nearly all of the insects above mentioned do not occur in the Hawaiian Islands, and as some of them are serious pests where they are, we may consider ourselves fortunate if they can be kept from reaching our islands.

Of the ten insects on sugar-cane mentioned, only three are at present infesting cane in Hawaii, the borer and the two mealybugs. Some of the others, although not serious pests on cane

in Samoa, might possibly become pests if they reach Hawaii, the same as the leafhopper from Australia became such a bad pest, whereas it was not a bad one in Australia.

The most of the coconut insects are not present in Hawaii either. The leaf-roller that we do have, however, causes the leaves to look more dilapidated than they do in Samoa with several kinds of insects feeding on them. Our one pest on coconut leaves is too much, we surely do not want any more.

The banana borer and the banana scab moth would ruin the banana industry in Hawaii if they should gain access here, and there is no telling what the papaia fruit-fly might do here, as it has been reported bred from pineapples from Fiji, though not fully substantiated.

As Samoa is the closest tropical neighbor from which steamers are coming regularly, it is the most likely place from which some of the already widely distributed tropical insect pests could accidentally reach Hawaii, and makes it urgent that a constant lookout be maintained to prevent as long as possible any more such pests arriving here.