NOTES ON SOME FULGOROIDEA OF GUAM

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The species of Guam leafhoppers collected in 1936 and included in this paper were determined chiefly by comparison with types in the collection of the Hawaiian Sugar Planters' Experiment Station, before the balance of the Fulgoroidea and Jassoidea was sent to Z. P. Metcalf for study. A number of new species were found by Dr. Metcalf, especially among the Jassoidea which were nearly all new species. As noted below, a few species in the lot are associated with crop plants and can be rated as pests.

Family DICTYOPHORIDAE

Dictyophora nakanonis Matsumura, Sapporo Nat. Hist. Soc., Trans. 3: 109, 1910; Melichar, Mon. Dictyophoriden, 130, 1912.

Piti, April 30, Usinger, May 2, on *Physalis,* Swezey, May 3, 31, Swezey, May 23, on *Emilia,* Usinger, June 13, on sugar cane, Swezey, July 26, Swezey, Nov. 14, on *Glochidion,* Swezey; Inarajan, May 7, Swezey; Agana, June 6, Swezey; Dandan, July 17, Swezey; Orote Peninsula, Sept. 27, on *Pipturus* and *Sida,* Swezey. More specimens were collected on the *Physalis* weed than on any other plant. The nymphs occurred on this plant also. We found this insect widely distributed in Guam, quite general in habits and never numerous enough on any one plant to be injurious.

This rather large fulgorid with a long prolongation of the head was determined by P. W. Oman, by comparison with U. S. National Museum specimens from the Philippines determined by Dr. L. Melichar as *nakanonis.* It is closely similar to *D. pallida* (Donovan) which has a wide range in the Orient from India to China, Formosa, Philippines, Java, Sumatra, and Borneo, and is described under several different names. Dr. Oman states that it is possible that on further study of this group, *nakanonis* and *pallida* may prove identical.

Family CIXIIDAE

1. **Myndus palawanensis** Muir, Philippine Jour. Sci. 22: 162, pl. 1, fig. 3, 1923.

This species was described from Palawan, Mindanao, and Borneo, and also occurs in Ceram and Larat. It was not previously recorded in Guam. We found it abundant on *Pandanus* leaves in two localities: Santa Rosa Peak, May 19, Swezey; Barrigada, June 12, Usinger. In the records of its occurrence in the Philippines and East Indies, no mention was made of its food plant.

2. **Myndus seminiger** Muir, Ins. Samoa 2(1): 6, fig. 6, 1927.

Described from Samoa and hitherto not recorded elsewhere. It also occurred on *Pandanus* in Guam, but not as abundantly as the preceding species. Tarague, May 17, Swezey; Santa Rosa Peak, May 19, Swezey; Machanao, June 4, Swezey, Usinger; Orote, Aug. 2, Swezey.

Family ARAEOPIDAE

The leafhoppers of this family which we collected are apparently all widely distributed immigrants. The majority of them are found on grasses. A few which may be rated as pests are confined to particular plants such as sugar cane, corn, rice, and taro, each of which has a single species attached to it. The species on cane, however, was rare, and never found in sufficient numbers to be injurious.

1. **Perkinsiella thompsoni** Muir, Haw. Ent. Soc., Proc. 2: 240, 1913.

Piti, May 2; Fonte Valley, Aug. 7; Dededo, Aug. 11. All by Swezey.

This sugar cane leafhopper was described from specimens collected in Guam by Fullaway in 1911. It was later collected more abundantly by Muir in Java, which is more likely its home. Eventually it may be found on intervening islands. We found it scarce in Guam. It was never conspicuous or numerous enough to be injurious to the cane.

Whenever eggs were found, they were heavily parasitized by a mymarid which apparently is the same species which was introduced from Queensland to Hawaii in 1904 (*Paranagrus optabilis* Perkins). At Sinajana, June 8, of 43 eggs examined, 80 percent were parasitized. At Fonte Valley, Aug. 7, the few eggs found were all parasitized. At Dededo, Aug. 11, eggs examined were 78 percent parasitized. At the Agricultural School Farm, Piti, April 30, one exit hole of *Ootetrastichus* was seen in a cane leaf, but no other evidence of this parasite was found. It is apparent that *Paranagrus* has sufficient control of this leafhopper to prevent its being a pest.

2. **Peregrinus maidis** (Ashmead).

Delphax maidis Ashmead, Psyche 5: 323, 1890.

Peregrinus maidis, Kirkaldy, Entomologist 37: 176, 1904.

The corn leafhopper was first recorded from Florida where it was noted as an immigrant pest in 1888. It is now known wherever corn is grown in the tropics. It was reported in Guam by Fullaway in 1911 as a pest on corn, though not so injurious as it is in Hawaii. Its greatest importance lies in the fact that it transmits a streak disease which stunts the growth of the corn plants and prevents production of ears. The variety of corn grown in Guam is mostly resistant to this disease, but some examples of it are occasionally seen. The leafhoppers were usually to be found in small numbers on corn

in all districts, but our collections include them from only a few places: Dededo, May 11, Usinger; Merizo, June 11, Swezey; Piti, July 21, 31, Swezey.

At Dededo, an egg parasite was reared which was determined by A. B. Gahan as *Anagrus flaveolus* Waterhouse. A small green bug, *Cyrtorhinus lividipennis* Reuter, is associated with the corn leafhopper, feeding by sucking the eggs where inserted into the midribs of the leaves. It is no doubt effective in the control of the leafhopper, keeping it from becoming so abundant as to be a serious pest.

3. **Nilaparvata lugens** (Stål).

Delphax lugens Stål, Öfv. K. Vet.-Akad. Förh., 246, 1854.

Delphax sordescens Motschulsky, Soc. Nat. Moscou, Bull. **36**: 109, 1863.

Nilaparvata greeni Distant, Fauna Brit. India, Rhynch. **3**: 473, fig. 260, 1906.

Dicranotropis anderida Kirkaldy, Haw. Sugar Plant. Assoc. Expt. Sta., Ent. Bull. **3**: 133, 1907.

Nilaparvata lugens (Stål), Metcalf, Cat. Hemip., Fulgoroidea (3): 296, 1943.

In 1936, we found the rice leafhopper wherever rice was growing. Our collections of it were as follows: Inarajan, May 7, Bryan, Swezey, Usinger; Inarajan, June 8, Sept. 30, Swezey; Merizo, Oct. 2, Swezey; Piti, Sept. 1, Nov. 22, Swezey; Atantano, Sept. 3, Swezey. At Inarajan, Sept. 30, the leafhoppers were so numerous in rice seedling plots as to ruin the young plants. At that time they were coming to lights by hundreds in the village more than half a mile distant. At Merizo, Oct. 2, they were abundant in the seedling plots, but not destructive. In the evening of Nov. 30, this leafhopper was swarming at the electric lights on the dock at Piti.

This is one of several leafhoppers known on rice in the Orient. This particular one has a wide distribution, and is known under different names in different places from India, Ceylon, Java, and the Philippines. On the authority of Muir, the names given above are synonyms (Haw. Sugar Plant. Assoc. Expt. Sta., Ent. Bull. **15**: 16, 17, 1924), and *lugens* Stål has priority of date.

This rice leafhopper must have been a rather recent immigrant in Guam, for the first record I have found of it was in the Governor's Report for 1934, where a *Megamelus* is reported on rice at Merizo, Piti, Asan, Atantano, and Agat. As these include nearly all the localities where rice is grown, this leafhopper must have been already generally distributed. There was no mention of it in entomological notes of the Guam Experiment Station reports, which were issued up to the time the station was discontinued in 1932.

Usually the little green mirid bug *Cyrtorhinus lividipennis* was associated with infestations of this leafhopper, and no doubt feeds on its eggs as it does

on the corn leafhopper eggs. At Inarajan, June 8, several leafhoppers were collected having dryinid larvae attached, and one male dryinid was reared. Its identity is unknown. Two species of ladybeetles were usually common in rice fields (*Harmonia arcuata* and *Coelophora inaequalis*) and are thought to feed to some extent on the leafhoppers.

4. **Megamelus proserpina** Kirkaldy, Haw. Sugar Plant. Assoc. Expt. Sta., Ent. Bull. 3: 147, pl. 10, figs. 5-7, pl. 12, figs. 19-21, 1907.

Gulch near Mt. Tenjo, May 3; Agana, May 15; Merizo, Oct. 2; Dededo, Nov. 8; Libugon, Nov. 10. All by Swezey.

The taro leafhopper was described from Suva, Fiji, without mention of food plant. It is now known as a taro pest in Samoa, Niue, Queensland, Amboina, Java, the Philippines, and Hawaii. It was first reported in Guam in 1924. In 1927, under the name *Megamelus* sp., it was reported as epidemic, and its attacks were followed by a fungus disease (*Gloeosporium* sp.) that often ruined the entire crop. In 1936 I did not see any serious injury by the taro leafhopper in Guam. In fact, it was rather scarce on dryland taro, the predominant variety grown. In a few places where there were small plantings of wet taro by ditches the leafhopper was very abundant, but did not seem to affect the taro seriously.

A dryinid parasite attacks this leafhopper to a slight extent. Parasitized leafhoppers and parasite cocoons were found on taro leaves at Dededo, Merizo, and Libugon. Three female dryinids and one male were obtained from these cocoons. It is the same species (*Haplogonatopus vitiensis* Perkins) which is now attacking the taro leafhopper in Hawaii. It was introduced from Fiji in 1906 as a parasite for the sugar cane leafhopper.

Attempts were made to breed out egg parasites, but none were obtained. Two fungus diseases killed some of the leafhoppers, the dead ones adhering to the leaves.

5. **Stenocranus agamopsyche** Kirkaldy, Haw. Sugar Plant. Assoc. Expt. Sta., Ent. Bull. 1(9): 409, 1906; 3: 138, pl. 11, figs. 1-4, pl. 17, figs. 6-7, 1907.

Agana Swamp, May 15, Swezey, Usinger; gully near Mt. Chachao, May 16, Swezey; Fonte Valley, Aug. 7, Swezey; Piti, Sept. 21, Swezey.

This leafhopper was described from Queensland where it occurred on grasses and sedges. It was not previously known in Guam. We found it sparsely on a large swamp reed (*Trichoon roxburgii*).

At Agana Swamp, eight parasites were obtained from the eggs of this leafhopper. They are an undetermined species of the trichogrammatid genus *Oligosita*.

6. Liburnia ochrias (Kirkaldy).

"Delphax" ochrias Kirkaldy, Haw. Sugar Plant. Assoc. Expt. Sta., Ent. Bull. 3 : 157, 1907.

Sogata ochrias, Muir, Ins. Samoa 2(1) : 12, 1927.

Liburnia ochrias, Metcalf, Cat. Hemip., Fulgoroidea (3) : 366, 1943.

A grass leafhopper, described from Fiji and Australia. Also known from Samoa, and now recorded from Guam, where it was swept from low grasses. It was very abundant on *Sporobolus virginicus* on the beach at Fadian, Aug. 19, Swezey. A few were collected also on grass by the roadside near Piti, May 23 and Mt. Tenjo, May 3, Swezey.

7. Liburnia eupompe (Kirkaldy).

"Delphax" eupompe Kirkaldy, Haw. Sugar Plant. Assoc. Expt. Sta., Ent. Bull. 3 : 162, pl. 10, figs. 3-4, pl. 12, figs. 16-18, 1907.

Sogata eupompe, Muir, Ins. Samoa 2(1) : 12, 1927.

Liburnia eupompe, Metcalf, Cat. Hemip., Fulgoroidea (3) : 355, 1943.

Described from Fiji and Australia. Also known from Samoa, and now recorded from Guam. Five specimens swept from grass at beach, Inarajan, May 7, Usinger; Mt. Tenjo, May 3, Usinger, Swezey; Agat, May 20, on grass at beach, Swezey, Usinger; Piti, May 1, Swezey; Fadian, Aug. 19, very abundant on *Sporobolus virginicus* on beach, the males all macropterous and the females mostly brachypterous, Swezey. Three specimens from Inarajan and one from Agat were parasitized by a stylopid, possibly *Elenchoides perkinsi* Pierce, a species recorded as abundant on delphacids in Fiji and Queensland under the name *Elenchus tenuicornis,* a misidentification according to Pierce, who names it as above.

8. Liburnia kirkaldyi (Muir).

Kelisia kirkaldyi Muir, Haw. Ent. Soc., Proc. 3 : 329, 1917.

Sogata kirkaldyi Muir, Ins. Samoa 2(1) : 12, 1927.

Liburnia kirkaldyi, Metcalf, Cat. Hemip., Fulgoroidea (3) : 363, 1943.

Described from Fiji. Occurs also in Samoa, Queensland, Philippines, and Formosa. Now recorded for the first time in Guam, swept from low grasses, Upi trail, May 5, Swezey; Agat, May 20, Swezey; Agana, May 25, Usinger.

9. Liburnia paludum (Kirkaldy).

Kelisia paludum Kirkaldy, Fauna Hawaiiensis 2(7) : 579, 1910.

Sogata paludum, Muir, Ins. Samoa 2(1) : 12, 1927.

Liburnia paludum, Metcalf, Cat. Hemip., Fulgoroidea (3) : 366, 1943.

This leafhopper was described from Hawaii, and is now known to occur in Samoa, Fiji, Queensland, Java, Ceylon, and Philippines. This is its first record in Guam, where it occurs in low grasses. Collected at the following places: Upi trail, May 5, Swezey; Agana, May 25, Usinger; Piti, Nov. 2 and 5, abundant in lawn grass, Swezey.

10. Chloriona albotristriata (Kirkaldy).

"Delphax" albotristriatus Kirkaldy, Haw. Sugar Plant. Assoc. Expt. Sta., Ent. Bull. 3 : 154, pl. 10, fig. 15, pl. 14, figs. 1-3, 1907.

Chloriona albotristriata, Metcalf, Cat. Hemip., Fulgoroidea (3) : 322, 1943.

Described from Queensland, and now recorded from Guam for the first time. Five specimens swept from grass at beach, Inarajan, May 7, Usinger.

11. Dicranotropis cognata Muir, Haw. Ent. Soc., Proc. 2 : 317, pl. 6, figs. 34, 34a, 1917; Ins. Samoa 2(1) : 13, 1927.

Another widely distributed species, described from Fiji, Queensland, and Philippines, later known in Samoa and now in Guam. Piti, May 1, on *Paspalum orbiculare,* Usinger, Swezey; Mt. Tenjo, May 3, Swezey, Usinger.

12. Dicranotropis nigropunctata (Motschulsky).

Mestus ? nigropunctatus Motschulsky, Soc. Nat. Moscou, Bull. 36(3) : 112, 1863.

Dicranotropis nigropunctatus, Melichar, Hom. Fauna Ceylon, 160, pl. 3, fig. 12a, 1903.

Dicranotropis nigropunctata, Metcalf, Cat. Hemip., Fulgoroidea (3) : 240, 1943.

This grass leafhopper was previously known in Ceylon and Java and is now recorded from Guam. Upi trail, May 5, Swezey, Usinger; Agat, May 20, Swezey.

13. Delphacodes dryope (Kirkaldy).

"Delphax" dryope Kirkaldy, Haw. Sugar Plant. Assoc. Expt. Sta., Ent. Bull. 3 : 154, 1907.

Delphacodes dryope, Muir, Haw. Ent. Soc., Proc. 3 : 333, 1917.

Described from Fiji and Queensland. Known to occur also in Samoa, and now recorded from Guam. Upi trail, May 5, on grass, Swezey; Taragüe, May 17, on grass, Swezey; Piti, Nov. 5, swept from lawn grass, Swezey.

14. Ugyops samoaensis Muir, Haw. Ent. Soc., Proc. 4 : 573, fig. 10, 1921.

Described from Samoa and Niue. Our collections were from general sweeping on trees and shrubs in several regions. Sometimes only young stages were obtained. Piti, April 30, on *Hibiscus tiliaceus,* Usinger; Upi trail, May 5, Bryan, Usinger; Dededo, May 11, on *Piper guahamense,* Swezey; gully near Mt. Chachao, May 16, on *Cycas circinalis* and *Discocalyx megacarpa,* Swezey; Umatac, May 28, on *Thespesia populnea,* Swezey; Agat, May 31, on *Thespesia populnea* and *Calophyllum inophyllum,* Swezey, Usinger; Inarajan, June 8, one specimen on cane, Swezey; Fadian, Aug. 19, on *Pemphis acidula,* more numerous than any of the other records, Swezey.

15. **Ugyops kinbergi** Stål, Freg. Eugenies Resa, Ins. **4**: 274, pl. 4, fig. 2, 1859.

A much larger species, collected by individuals from the following places: Talofofo, April 1, Bryan; Yigo, April 13, Bryan; Tarague, April 19, Bryan; Upi trail, May 5, Usinger; Barrigada, July 12, on *Intsia bijuga,* Swezey; Machanao, Nov. 25, Swezey.

Described from Ponape, Caroline Islands, and also recorded from Java.

FAMILY MEENOPLIDAE

1. **Nisia atrovenosa** (Lethierry).

Meenoplus atrovenosus Lethierry, Mus. Civ. Stor. Nat. Genova **26**: 466, 1888.

Nisia atrovenosa, Melichar, Hom. Fauna Ceylon, 53, 1903.

This species has a wide distribution in Indo-Malaya, Africa, and Australia, and has been recorded from Samoa. Not previously recorded in Guam. We found it abundant on *Scirpus lacustris* in a few places: Sasa, June 20, Usinger; Sumay Road, June 22, Swezey; Agana swamp, June 26, Swezey.

FAMILY DERBIDAE

1. **Lamenia caliginea** (Stål).

Delphax caliginea Stål, Öfv. K. Vet.-Akad. Förh., 246, 1854.

Lamenia caliginea Stål, Freg. Eugenies Resa, Ins., Hem. **4**: 277, 1859.

Ritidian Point, April 15, 16, Bryan; Mt. Alifan, April 20, Bryan; Upi Trail, May 5, Usinger; Agat, May 20, on *Hernandia* and grass, Swezey; Agat, May 31, on *Calophyllum,* Usinger; Santa Rosa Peak, May 19, on mango, Swezey; Machanao, June 4, Usinger; Machanao, June 30, Swezey; Talofofo, June 17, Swezey; Barrigada, July 22, Swezey; Inarajan, July 25, on *Barringtonia racemosa,* Swezey; Machanao, August 6, Sept. 22, Nov. 25, Swezey; Asan, August 22, Swezey; Dededo, Nov. 8, on taro, Swezey; Mata, Nov. 11, on banana, Swezey; Tumon, Nov. 13, on mango, Swezey.

This species was described from Tahiti. It also occurs in others of the Society Islands, Samoa, Ellice Islands, Tonga, and Funafuti. It was collected in Guam by Fullaway in 1911. Described by Muir as *Thyrocephalus fullawayi,* it was later synonymized by him with Stål's species. We collected it on quite a variety of trees and plants, but never abundantly.

2. **Proutista moesta** (Westwood).

Derbe moesta Westwood, Ann. Mag. Nat. Hist. II, **7**: 209, 1851.

Proutista moesta, Muir, Philippine Jour. Sci. **12D**: 95, 1917.

Piti, June 13, on cane, Swezey; Piti, July 30, on banana, Swezey; Piti, Sept. 1, Sept. 17, on cane, Swezey.

Described from India, and occurs also in Assam, Ceylon, and the Philippines. It is recorded on sugar cane at Los Banos. The few that we found in Guam were chiefly on sugar cane.

Family ISSIDAE

Capelopterum punctatellum Melichar, Mon. Issiden, 212, 1906.

Ritidian Point, April 22, Bryan; June 2, on *Pandanus,* Usinger; Upi trail, May 5, Swezey, Usinger; Mt. Chachao, May 16, on *Cycas,* Swezey; Santa Rosa, May 19, Usinger; Orote Peninsula, May 24, on *Psychotria,* Usinger; Machanao, June 2, Swezey, June 4, Usinger; Aug. 6, on *Piper,* Swezey; Paasan, June 15, Usinger; Talofofo, June 19, on *Premna,* Usinger; Mt. Alifan, June 27, Usinger.

Described from Solomon Islands, and I have found no other record of its occurrence. Our 15 specimens are somewhat variable, but agree well with Melichar's description. We collected them by general sweeping on various trees and shrubs in the forest, pretty generally distributed; a few nymphs were obtained also.