PART VIII.

ALEYRODIDAE OF HAWAII AND FIJI

WITH DESCRIPTIONS OF NEW SPECIES.

By Jacob Kotinsky.

INTRODUCTION.

The Aleyrodid fauna of Hawaii is not very rich in species, six in all, and none of these is indigenous. But four of them are new to science and are herewith described. One of them, *A. vaporariorum*, has a very extensive distribution, while an Aleyrodid on coffee, once so abundant on these Islands, is now practically extinct.

Of the seven Fijian Aleyrodids herein mentioned four were previously recorded, one is new to the islands and two are new to science and described herewith. During his visit there in 1905-1906 Mr. F. Muir of the Hawaiian Sugar Planters' Station collected three species, viz: *Aleyrodes bergii*, *leakii* and one new species. In Mr. Koebele's Coccid collection in this office a vial was found containing another new species collected in Levuka, Fiji, several years ago. Fiji being on the route of steamers plying between here and the Antipodes and having no resident entomologist, a knowledge of its insect fauna is of importance to us locally. While few Aleyrodids are known to be of great economic importance, we cannot state with certainty that we are to remain permanently immune. Our *A. giffardi* on citrus, unchecked as it is here, is no inconsiderable factor in the life of the trees it inhabits. Should citrus culture extend on these islands and this Aleyrodid spread with it, the insect would doubtless have to be reckoned with. The Fijian Aleyrodid (*A. fijiensis*) if introduced may prove a menace to our numerous Leguminosae, particularly the Algeroba (*Prosopis juliflora*) forest from which we derive at present so much wealth in the shape of honey, cattle food, and fire-wood. A knowledge of its existence there and its appearance will serve as a guide in the inspection of plants from those islands, and the exclusion of a possible pest.

Aleyrodes vaporariorum Westw.

On Lantana on all the islands of the group collected by A. Koebele and B. M. Newell.

Aleyrodes sp.

On Coffee. Very scarce at present (see note p. 96).

Aleyrodes giffardi, n. sp.

Plate I, figs. 1*a–d*.

Egg.—Pyriform about 195 microns long, and 90 microns at widest point, uniformly dark brown in color. Apparently no pedicel, fastened on the point in an erect position upon the surface of the leaf.

Pupa case.—In situ by surface light under low power compound microscope body green, eyes purplish red. Vasiform orifice area brownish, lingua and posterior pair of setae dark brown. Subelliptical, truncate in front. About 1.26 mm. long by 63 mm. wide. Slightly convex, rectangular area between longitudinal ridges, head and v. orifice—somewhat concave. Ridges are about $\frac{1}{3}$ distance from medio-dorsal line, which is keeled and crossed by the sutures between segments. No exudation whatever either lateral or dorsal. Empty pupa case white, translucent. Four setae arise from tubercles on each side of the medio-dorsal line, one in front of each eye, two on the thorax, and one at caudal cleft. Back of the head a suture entirely across the body. A flat striated margin lines each side of pupa from this suture to the anal cleft, slightly widening posteriorly. This marginal band remains adhering to the leaf when the empty case disappears. Altogether the case looks very much like a young Lecaniid and only a careful examination of the anal region reveals the true affinity of the insect.

Vasiform orifice elongate triangular with rounded angles; inner lateral margin crenate; outwardly lined on each side by a band of chitin which extends to caudal extremity. Operculum very small, lunar in outline, finely punctate. Lingua club-shaped, about $\frac{4}{5}$ length of orifice, minutely punctate, with a

small knob at apex; a brush of hairs or spines extends upward toward apical end of lingua.

Adult female.—Length about 0.69 mm.; forewing 0.84 by 0.315 mm., hind femur 0.19 mm.; hind tibia 0.36 mm.; hind tarsus, 0.165 mm.; color, sulfur yellow, body sometimes orange. Eyes undivided but somewhat constricted about the middle, dark brownish-red in color. Foretibia $\frac{7}{12}$ length of hind tibia, foretarsus $\frac{2}{3}$ length of hind tarsus. Antennal segmentation uncertain; joint one subpyriform, the others elongate, corrugated.

Adult male.—Eye less constricted than in female; genital claspers protruding, ends of these setaceous.

Habitat.—An introduced species found on citrus trees in several gardens in Honolulu. Becomes very abundant and the copious honey dew mixed with sooty fungus blackens the leaves giving them a hideous appearance. It is a pleasure to name it in honor of Mr. W. M. Giffard who first brought attention to its existence here.

Type material of adults and pupae mounted on slides and in situ, in the office collection (No. 459); Cotypes in author's and U. S. Bureau of Entomology collections.

Aleyrodes kirkaldyi n. sp.

Plate I, figs. 2*a–d.*

Egg.—Size about 180 by 90 microns, yellowish, suboval; pedicel 75 microns long, attached near middle of basal end.

Pupa case.—Size 1.25 by .95 mm. subcircular, somewhat narrower caudad, broadly rounded cephalad, widest just caudad of middle. In situ greenish yellow in color; after clearing, colorless except fusco-ferruginous marks each side and near median line of dorsum of thorax and abdomen to orifice, purplish eye spots and caudal portion of vasiform orifice which is lemon yellow. No lateral fringe, nor waxy secretion of any kind. Finely striated by lines radiating from area occupied by inclosed pupa toward margin; striated area also sloping in same direction from somewhat elevated plateau of pupal area, Margin crenate, separated from rest of case forming a narrow border all around.

Vasiform orifice oval, inner margin of caudal half crenate. Operculum nearly covers lower $\frac{2}{3}$ of orifice,nearly semicircular: lingua a little longer than operculum, distal $\frac{2}{3}$ minutely punctate and hinged on basal third which is bifurcated basally.

Adult female about 1.23 mm. long, forewing 1.0x0.48 mm. 26 eggs inside abdomen all disposed with pedicel toward center. Color of body orange, wings yellowish white, mealy. Eyes dark reddish, dumbbell shape, upper lobes smaller.

Habitat.—Occurs abundantly on unknown trailing shrub, *Beaumontja grandiflora*, *Morinda citrifolia*, and Catalonian Jessamine; Honolulu, Hawaii, collected by the author and Mr. F. W. Terry. Also Lihue, Kauai (Kotinsky) on Jessamine from Japan (?).

Types (Balsam slides of eggs, pupae and adults, also adults and pupa cases in situ and free in dry cells) in the office collection (No. 110). Cotypes in collections of author and the U. S. Bureau of Entomology.

Note.—No parasites of this species were observed though strangely, it is most abundant on Jessamine, and only sparingly on the other plants mentioned. The question of parasites is an important one in Hawaii, since some species, like *A. vaporariorum* on Lanatana and an undetermined species on coffee, once very abundant, are very scarce at present, doubtless owing to parasites introduced by Mr. Koebele. So scarce indeed is the Aleyrodid on coffee that persistent search revealed no adequate material, even for identification of either host or parasite.

It is a pleasant task to name this species after Mr. G. W. Kirkaldy, owing to whose encouragement and helpful suggestions this paper was undertaken and completed.

Aleyrodes hibisci n. sp.

Plate I, figs. 3*a–d*.

Egg.—75 microns wide and 255 microns long, including pedicel which is 75 microns long. Cylindrical, obtusely tapering apically, widest at base of apical cone; truncate basally. Greenish yellow in color. Very numerous on under side of leaf where adults in numbers are found resting and ovipositing.

Pupa case.—810x720 microns, oval, lemon yellow; no fringe or waxy covering. Margin crenate, caudal end incised; four setae each side of medio-dorsal line; one, the longest, on anterior margin of pupa, within; one at suture between abdomen and thorax; one just anterior of vasiform orifice, and one just anterior of caudal margin. Semicircular, chitinous identation on margin roughly opposite anterior spiracle.

Vasiform orifice roughly rectangular, wider than long; operculum similar in outline, $\frac{4}{5}$ length. Lingua trilobed, lower half extending beyond orifice.

Adult female 665 microns long, wing 810x300 microns. Antennae seven jointed; joint two, bulbous 40x24 microns; three–76 microns long; four 20 microns; 5=4; 6–28 microns, 7–60 microns long; eyes dark reddish within a frame of yellow facets along the border, kidney shaped, indentation anterior. Abdomen lemon yellow, thorax and head sometimes pale orange, wings white, mealy.

Habitat.—Abundant on "Hau" (*Paritium tiliaceum*), less so on *Hibiscus rosa-sinensis* in Honolulu and Hilo. Collected by B. M. Newell and the author.

Type material and slides in office collection (No. 745). Cotype material in collections of author and U. S. Bureau of Entomology.

Note.—The insect is very severely parasitized by *Eretmocerus corni* Hald., as kindly determined for me by Dr. Perkins. The parasite is always present in large numbers in company with the Aleyrodid, and it is by mere chance that sufficient material of the latter was collected about a year ago. Both host and parasites attain maximum numbers about autumn.

Aleyrodes sonchi, n. sp.

Plate I, figs. 4*a–d.*

Egg.—Green with irregular punctures, subelliptical, 244 microns long, including pedicel which is 20 microns long; width 80 microns. Eggs laid in semicircle, and area covered with white meal. Before hatching eggs turn dark.

Pupa case.—Opaque greenish in life, transparent in balsam. Subovate, 945 microns long, 525 wide surrounded by a fringe of glassy rods which dissolve in heated balsam, nearly as long

as the pupa is wide. These rods are equidistant from each other, originating from conical papillae arranged dorsally about depressed margin of the case. Pupa slightly elevated above leaf, and quite flat, uniformly thickening as pupa approaches maturity. Apex of abdomen terminates in two inwardly curved setae.

Vascular orifice subovate, truncate caudad and cephalad, slightly convex laterally. Operculum about half as long as orifice, width equal to length. Lingua about $\frac{3}{4}$ length of orifice, stout, punctate. Distal half with four circles of four lobes each, and a broad one at terminus. Four setae originated at base of caudal lobe and project beyond lingua.

Adult female.—1.29 mm. long, wing .98 by .42 mm. Body and appendages lemon yellow, wings mealy white; eyes very dark reddish, notched anterior at about point of usual division. Other parts of body as usual.

Habitat.—Honolulu, on Sow-thistle (*Sonchus oleraceus*), O. H. Swezey and author, collectors; also Kailua, Kauai, (Kotinsky). Very badly parasitized by *Encarsia* sp. (new ?), especially in the autumn, so that both are very scarce during the winter. In spring, however, they appear again.

Type material and slides in office collection (No. 726). Cotypes in collections of author and U. S. Bureau of Entomology.

FIJIAN ALEYRODIDAE.

Aleyrodes bergii (Sign.).

Sugar cane; Rewa, Fiji (F. Muir, 1905).

Aleyrodes leakii Peal.

Unknown plant; Suva, Fiji (F. Muir, 1905).

Aleyrodes comata, *sacchars*, and *Aleyrodicus holmesii* were also recorded from there (vide "Catalogue" ante).

Aleyrodes calophylli, n. sp.

Plate I, figs. 5*a–d*.

Egg.—A number of eggs was found attached to the leaf in the midst of the pupae, but it is not certain that they were laid by the Aleyrodid here described. The description is

given, however, for comparison in future observations. It is elongate- oval, curved, not petiolate, lying flat, or standing on end upon the leaf, minutely punctured, rather brown in color; 225 microns long, 90 microns wide.

Larva.—1st instar: Oval, brown, spiny, though not so numerous as pupa, with a medio-dorsal ridge. Body resting on a narrow fringe of white waxy matter.

Pupa case (dry in situ).—960 microns long,640 microns wide; oval, black, shining, with brown spines projecting in all directions, mainly upwards. Elevated medio-longitudinal ridge on dorsum divides in two the cavity formed by the elevated margins. Margin with white waxy fringe, upon which the case rests and most of which remains attached to the host when pupa is removed, leaving an oval white ring. This fringe is composed of numerous short fine rods fused together into a continuous band.

Mounted in balsam it is dark brown with darker median line and margin, especially anteriorly where it is opaque. Margin fringed with a series of tuberculate projections the apices of which are also minutely tuberculate. Divided by the median line is a symmetrical series of spines, their arrangement and comparative lengths as shown in the illustration. (Plate I, fig. 5*b*).

Vascular orifice broader than long nearly rectangular,36 microns wide, 28 long, bounded by a heavily chitinized band; immediately cephalad is a band of hard chitin rounded into knobs at each end. Operculum nearly fills the orifice. The entire organ, however, is so dark that the various portions were discerned with difficulty, and the lingua could not be made out.

Adult not observed.

Habitat: On *Calophyllum inophyllum* at Levuka, Fiji. Collected by A. Koebele (No number) 30, X, '99.

Type slides and material in the office collection (No. 843). Cotype material in U. S. Bureau of Entomology and author's collections.

Aleyrodes fijiensis n. sp.

Plate I, figs. 6*a–d.*

Egg.—The abdomen of the female was found distended with about a dozen eggs, the only eggs observed. These are comparatively large (225x105 microns) elongate oval, fairly uniform in size though not in shape, some being almost cylindrical, others rounded at ends, broadest in the middle; color rather dar kbrown.

Pupa case.—Broadly oval, about 1.5 mm. long, 1 mm. wide, varying from brown to dark brown in color, with margin light brown; abdominal sutures distinct and deep golden brown in color; no marginal fringe except a small white waxy tuft at the anal cleft. It is flat ventrally and distinctly convex dorsally; upon the elevated area rests a tall column of a white waxy or cottony substance. This column which is nomally erect though sometimes inclined cephalad is truncate at the top and irregularly square, and here it is divided into three areas as shown by the illustration, which is a camera lucida drawing. The height of the column is about $\frac{2}{3}$ the length of the pupa when fully developed, its area being about 0.5 mm. square. Caudad of this column is a fringe of white waxy or cottony filaments parallel with the margin of the pupa, consisting of about 4 plates to each side. The sheer perpendicular rise of this column, its glassy white appearance and its peculiar structure distinguish this fine spices from any known.

In balsam under microscope the pupa case is straw colored, about 1230 microns long by 930 microns wide. The most characteristic structures upon it are the posterior spiracular openings in the usual place and a similar aperture at the posterior extremity, the vasiform orifice, the two irregular rows of gland-spines along the margin, the several rows of these each side of medio-dorsal line; and the intersegmental sutures. The gland-spines are of two types: 1st., lanceolate, originating from a circular prominence, most abundant along the margin, and 2nd., spatulate with a much broader base. Both types are hollow and evidently connected with glands beneath the epidermis.

Vascular orifice about 65 microns long by 52 microns wide and about 100 microns from caudal extremity. It is broadly ovate in outline with small indentation caudally, and in the unprepared pupa is situated on a prominence sloping from the table elevation to the lower level of the caudal extremity. At each side and a little cephalad are two prominent gland-spines, one of each of the kinds described above. The operculum is heart-shaped and nearly covers the orifice; the lingua is not very distinct, apparently spatulate, extending a little beyond the operculum. A small orifice is discernible immediately caudad of the lingua.

Adult female.—Body (excepting head, which was bent under) 1.12 mm. long. Forewing 1406 microns long, 700 microns wide. Immaculate, mealy, yellowish white. Abdomen, legs and antennae, except first two joints of the latter, testaceous; thorax, head and first two antennal joints, straw-yellow. Eyes slightly constricted, upper lobe considerably broader; reddish brown in color. Abdomen with about a dozen eggs distinctly seen ventrally; abdomen 750 microns long by about 325 microns wide.

Habitat.—Rewa, Fiji on pods and leaves of a Leguminous plant. (F. Muir (No. 50), '05).

Type: One female and numerous pupae in office collection (No. 826). Cotypes of pupae in collections of the U. S. Bureau of Entomology and the author.

EXPLANATION OF PLATE.

Plate I. (Original).

Fig. 1.—*Aleyrodes giffradi*, n. sp.

a, egg; *b*, pupa; *c*, vasiform orifice with surrounding area; *d*, male genitalia.

Fig. 2.—*Aleyrodes kirkaldyi*, n. sp.

a, egg; *b*, pupa; *c*, margin of pupa near spiracle; *d*, vasiform orifice *et al.*

Fig. 3.—*Aleyrodes hibisci*, n. sp.

a, egg; *b*, pupa case; *c*, vasiform orifice with appendages; *d*, male gentalia.

Fig. 4.—*Aleyrodes sonchi*, n. sp.

a, egg cluster; *b*, egg enlarged; *c*, pupa; *d*, vascular orifice *et al.*

Fig. 5.—*Aleyrodes calophylli* n. sp.

a. egg; *b*, pupa case; *c*, margin of pupa, more enlarged; *d*, vascular orifice *et al.*

Fig. 6.—*Aleyrodes fijiensis*, n. sp.

a, pupa in situ; *b*. pupa case, waxy cover removed; *c*, the two kinds of gland spines; *d*, vascular orifice *et al.*

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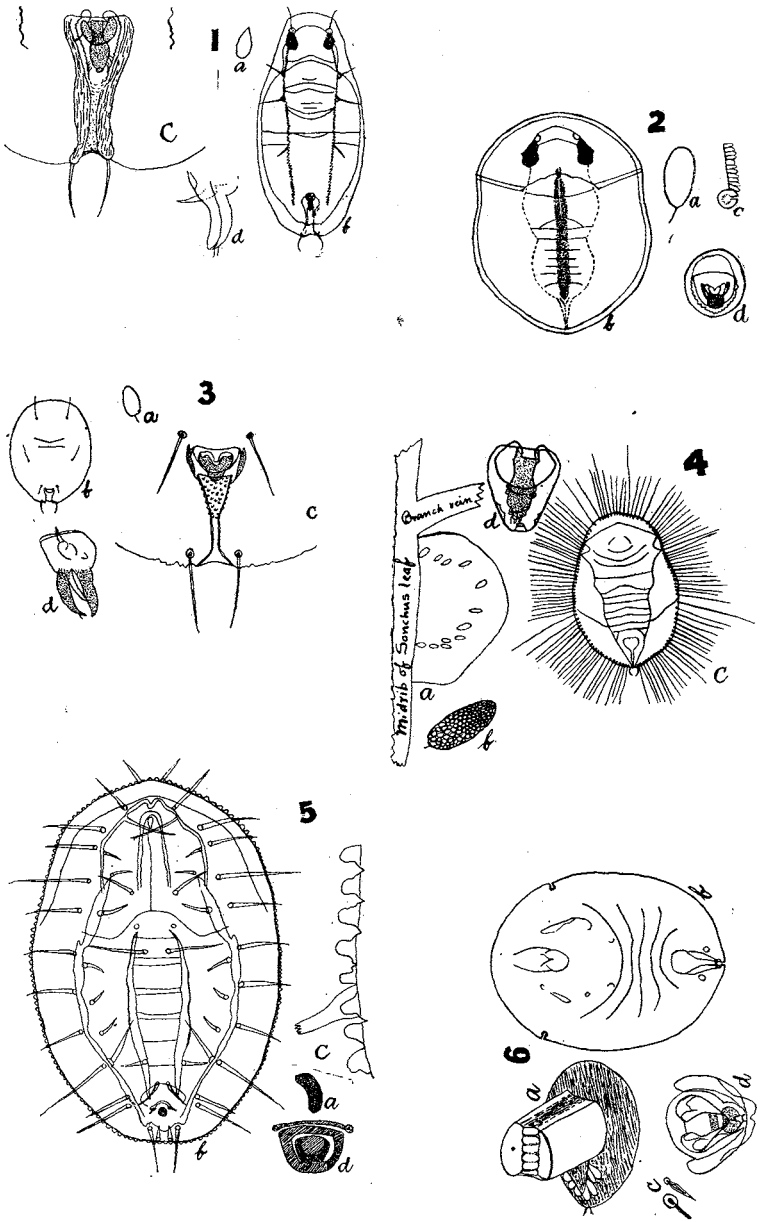
PLATE I.



KOTINSKY. NEW ALEYRODIDAE OF HAWAII AND FIJI.

ADDENDA TO BIBLIOGRAPHY

Since the foregoing pages were in the press, I have seen the following, or notices of them:

HOWARD, L. O: "New genera and species of Aphelininæ....," Bull. Tech. Ent. U. S. Agr., **12**, pp. 67–88 (July 12, 1907).

p. 70 and 76 *Alberus pulchriceps* [p. 83 of Cat.] is an *Azotus.*

p. 74. *Mesidia mexicana* (f. 4)
p. 77. *Encarsia portoricensis*
p. 78. *E. pergandiella* and *townsendi*
p. 79. *E. quaintancei*
} on *Aleyrodes* spp.

MAXWELL-LEFROY, H: "The more important insects injurious to Indian Agriculture," Mem. Agr. India, Entom. I. 245 (June, 1907) *Aleurodes barodensis.*

QUAINTANCE, A. L: Proc. Ent. Soc. Washington, VIII. 107–8 (Aug. 12, 1907). *Aleyrodes citri* (?) from China.

TULLGREN, A: Ueber einige Arten der Familie Aleurodidæ," Arkiv Zool. for 1907, 18 pp. and 27 figs. I have not seen the original, and am indebted for the notice to Naturæ Novitates XXIX, 282 (May, 1907).

WOODWORTH, C. W: "White fly in California," Circ. Univ. Calif. Agr. Sta. 30 pp. 1–16, figs. 1–12. (June, 1907).

ID: "White fly Eradication," Circ. 32 pp. 1–15, figs. 1–11. (July, 1907).

Both these deal with *A. citri.*