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ART. XVIII.—*On some Aleurodidæ from New Zealand and Fiji.*

By W. M. MASKELL, F.R.M.S., Corr. Mem. Royal Society of South Australia.

[Read before the Wellington Philosophical Society, 2nd October, 1889.]

Plate XIII.

THE *Aleurodidæ* are a family of homopterous insects which may be considered as intermediate between *Coccididæ* and *Aphidæ*. From both (as also from *Psyllidæ*) they differ in their divided eyes; from Coccids they are easily distinguished by the presence in the adults of both sexes of four wings; from Aphides they differ in the characters of their younger stages, and by the form and venation of their wings.

These insects are almost all very minute. The adults fly somewhat vigorously, and sometimes in summer may be seen hovering in clouds round trees. Their name is derived from the coating of white floury meal (*ἀλεύρον* = flour) with which the wings in most species are covered. The larvæ and pupæ are always attached to plants; and in these states it is difficult at first sight to distinguish them from Coccids. Indeed, the form of an orifice situated near the abdominal extremity is about the only mark by which, in many cases, to identify an Aleurode pupa. Many of these pupæ are fairly thick and easily seen, but many others are so thin and translucent that when dry they can scarcely be detected on a leaf, and when wetted by rain or otherwise become quite invisible. They are very commonly mistaken for Coccids. I have frequently had them sent to me as such, and in 1878 I included two of them, under the generic name of *Asterochiton*, amongst Coccids ("Trans. N.Z. Inst.," 1878, vol. xi., p. 214). It requires examination under a strong lens or a microscope to make out

the form of the orifice just mentioned, and to distinguish the pupæ from—say, some kind of *Lecanium* or *Ctenochiton*.

The adult *Aleurodidæ* in most species are very much alike: the differences—an extra patch or so on the wings, or a slight variation in colour, or some peculiarity in the division of the eyes—are so small that practically the specific distinctions may be best studied in the larvæ and pupæ. Even these are not always separated by clearly-marked characters recognisable without close examination; and, on the whole, the family presents many difficulties to the student.

The bibliography of the *Aleurodidæ* is not extensive at the best; and, so far as my own studies are concerned, the only modern works available to me are Dr. Signoret's "Monographie sur les Aleurodes," 1867, and a paper by Mr. J. Douglas on a new species ("Entom. Mo. Mag.," May, 1888). Signoret enumerates and summarises some thirty writers, from Réaumur to Frauenfeld (1867), who have given various notes on the family; but most of these are either inaccurate or too brief.

As far as I can ascertain from the authors mentioned, there is only one genus, *Aleurodes*, of these insects; and to that genus I have attributed the five species described in this paper.

#### Genus ALEURODES, Latreille.

Insects with four wings in both sexes in the adult state. Eyes divided; a single ocellus near each eye. Antennæ of seven joints. Wings horizontal, white, floury, often patched with brown; forewing having only one median longitudinal vein, with a short basal branch. Tarsi of two joints; claws two, with a third spiny process between them. Abdomen exhibiting a tubercular process, dorsally, on the last segment. Pupæ arboreal, stationary, enclosed in a waxy test which exhibits a subovate orifice near the abdominal extremity.

#### *Aleurodes sacchari*, sp. nov. Plate XIII., figs. 1-10.

Adult female insect brown, patched with dark-yellow; antennæ and legs yellow. Body rather thick; length about  $\frac{1}{20}$  in.; expanse of wings nearly  $\frac{1}{8}$  in. Forewings white, strongly marked with dark-brown patches; one patch is at the base of the wing, and two others form clear transverse bands on the surface, leaving the tip of the wing white; there are also many smaller scattered spots. Hindwings only very faintly marked with brown spots. Median longitudinal vein of forewing strongly marked, angular; basal branch fainter, short. Abdomen having on the last segment, dorsally, a very short process (cornicle); extremity sharp, trifold, turned downwards, bearing a few short hairs at the tip. Antennæ of seven joints; the first two very short, smooth, and thick; the third

much longer; the rest subequal, a little shorter than the third; all the five last are slender, numerously ringed, and bear very short hairs. Legs very slender, longish; tibia and tarsus numerously ringed, the tibia longer than the two joints of the tarsus together. Eyes brown or dark-red, slightly convex, faceted, divided in the middle by a single median smooth space.

Adult male similar in general form and colour to the female, but smaller; length about  $\frac{1}{2}$  in. Wings proportionately much shorter than those of the female, not extending in repose beyond the abdomen. Abdomen exhibiting the dorsal cornicle, and ending in two rather slender cylindrical forcipate processes enclosing the penis, which is curved and slender.

Pupa stationary, enclosed in a rather solid yellow test, about  $\frac{1}{2}$  in. long. Viewed dorsally, the test is elliptical, the pupa appearing indistinctly through it; the thoracic portion brown, the abdominal region obscurely segmented; the abdominal orifice subcircular; there are several shortish hairs on the edge and three pairs of longer ones on the surface, one pair at the head, one median, and one at the cornicle. Viewed ventrally, the rudimentary feet can be detected. Viewed sideways, the test is of considerable thickness; the rudimentary organs project slightly on one surface and the cornicle on the other.

Larva elliptical, about  $\frac{1}{5}$  in. long, yellow; generally resembling the pupa, but thinner, and capable of moving. Legs short, weak, and slender. Antennæ very slender, and apparently of four joints (or six?).

Eggs oval. I cannot detect any peduncle, although this seems to be usual in the genus.

*Hab.* In Fiji, on sugar-cane, and rarely also on stems of grass. Mr. R. L. Holmes, of Bua, has been kind enough to send me a number of specimens.

Signoret describes ("Monographie," pp. 395-399) three species having large brown patches on the forewings—*A. bergii*, Sign., *A. abutilonea*, Haldeman, and *A. phalænoides*, Blanchard. The original description of this last, a Chilean insect living on *Cestrum parqui*, is too vague and brief for comparison, the pupa not being mentioned. Haldeman's species, on *Abutilon*, in Pennsylvania, has a circular dark patch at the tip of the forewing. The other, *A. bergii*, lives on sugar-cane in Mauritius, and seems to be closely allied to the Fijian species. Signoret had only seen the male insect, and this agrees with ours in the shortness of the wings, in the joints of the antennæ, and in one or two other particulars. At the same time, there are important differences. The wings of *A. bergii* are stated to be narrow, which those of *A. sacchari* are not, and to have their surface covered with "blackish spots, of which some are

agglomerated, especially at the tip, where they form almost a patch;” and the vein is straight: whereas the dark patches in *A. sacchari* form distinct transverse bands, leaving the tip of the wing white, and the vein is conspicuously angular. Signoret’s description of the wings of *A. bergii*—“spotted with black throughout the whole length”—means indeed something quite different from the bands of *A. sacchari*; and on the whole I shall leave the Fijian insect as distinct, although probably the sugar-cane of Fiji may have been imported to that country from Mauritius originally, and in that case may have taken its Aleurode with it.

**Aleurodes papillifer**, sp. nov. Plate XIII., figs. 11–17.

Adult insect very light yellow; length about  $\frac{1}{30}$  in. Eyes red, distinctly divided, the faceted portions elongated and scarcely touching; ocellus just above each eye. Head and prothorax bent distinctly downwards. Antennæ slender, with seven joints; the first two short, thick, and smooth, the rest slender and numerousy ringed; the third joint is the longest; the last bears two minute spines at the tip. Feet normal. Wings white, immaculate; on the margins many short fine hairs. Last segment of the abdomen rather long; cornicle normal.

Pupa yellow, rather thin; irregularly elliptical; length about  $\frac{1}{27}$  in.; surrounded by a long, white, thin, close fringe of waxy secretion. Abdominal orifice elongate. On the dorsal surface are twenty short, thick, conical papillæ, from which spring thickish waxy tubes; twelve of these are on the edge, the other eight arranged in two longitudinal dorsal series, four being near the cephalic extremity, and four on the abdominal region. Abdominal segments indistinct.

*Hab.* In New Zealand, on *Pittosporum eugenioides*, *Geniostoma ligustrifolium*, and other trees; sometimes found in countless thousands hovering about the branches.

Two European insects, *A. lonicerae*, Walker, and *A. rubi*, Sign., exhibit on the dorsum of the pupa longish hairs arranged similarly to those here described; but these hairs are slender and do not spring from thick, short papillæ. Moreover, in both of them the forewings have distinct dark patches, whereas the wing of *A. papillifer* is quite free from marks.

**Aleurodes asplenii**, sp. nov. Plate XIII., figs. 18–20.

Adult insect light-yellow, often with a greenish tinge; length about  $\frac{1}{25}$  in. General form normal; last segment of abdomen rather short. Antennæ rather long, with seven joints, of which the two first are smooth, the rest numerousy ringed; the second joint is three times as long as the first;

the third is very long; the last bears at the tip two minute spines. Wings white, immaculate. Eyes red, simply divided.

Pupa white; elliptical; rather thick, with perpendicular sides; edges smooth, without hairs; dorsum slightly convex.

Larva yellow; elliptical; very thin; dorsum flat; abdominal segments indistinct; orifice ovate. Margin surrounded by a very long white fringe of loose, rather thick, waxy threads, many of which are as long as the whole breadth of the test; amongst these threads there is often a good deal of white waxy meal. No threads usually on the dorsum, but sometimes one or two may be observed on the cephalic region.

*Hab.* On *Asplenium lucidum* and other ferns, in New Zealand.

*A. vaporariorum*, Westwood, a species originally from Brazil, but apparently common in hothouses in Europe, exhibits a loose fringe of threads similar to that of our insect in the larval stage; but these threads are, with the exception of some of extreme length, much shorter than those of *A. asplenii*, and there are, moreover, many of them on the dorsal surface. I find, also, no mention in the description of Westwood's species (Sign., "Monog.," p. 387) of any great difference between the larva and the pupa. Usually, amongst *Aleurodidæ*, it is not possible to distinguish exactly between these two states; the metamorphosis takes place so gradually, and the general characters are so similar, that authors seem to write indiscriminately of one and the other. But in *A. asplenii* the white, hairless, thick pupa is so different from the yellow, thin larva, with long fringe, that they are quite distinct. A further character differentiating our species may be the adult antenna, which is very long, whereas in *A. vaporariorum* it is exceptionally short.

***Aleurodes melicyti*, sp. nov.** Plate XIII., figs. 21–24.

*Asterochiton aureus*, mihi ("Trans. N.Z. Inst.," 1878, p. 216).

Adult insect yellow, slightly patched with brown; length about  $\frac{1}{20}$  in. General form normal. Antennæ rather long; second joint three times as long as the first; third joint rather thick, the rest slender; all numerously ringed except the two first, and bearing very short, fine hairs; on the last two minute spines at the tip. Feet normal. Rostrum short, but there is a mentum of great length, reaching to the first segment of the abdomen, trimerous, the middle joint the longest, the last conical. Wings white, probably immaculate, but there may be a faint patch near the tip.

Pupa almost circular, very thin, flat; colour of test rich-golden or orange, the pupa dark-brown; the rudimentary legs

and abdominal segments are rather plainly visible. Surface of test striated, and there are four patches of brown radiating from the pupa in the middle towards the edges; in these patches are several circular, small, tubercular marks. The edge of the test is dark-brown, seemingly containing a number of minute tubercles; but there is no sign of a fringe. Length of test about  $\frac{1}{16}$  in.

*Hab.* In New Zealand, on *Melicytus ramiflorus*.

This is a large and, from its rich colour, a handsome species in the pupa stage. It seems to be nearest to *A. proletella*, Linn., which has not, however, the radiating patches with small tubercles on the dorsum of the pupa. Misled by the apparent similarity to a Lecanid insect, I included this species, in 1878, amongst Coccids.

**Aleurodes fagi**, sp. nov. Plate XIII., figs. 25, 26.

Pupa dull-yellow; elliptical; length about  $\frac{1}{20}$  in.; rather thick, with perpendicular sides which are slightly overlapped by the dorsal disk; enclosed insect indistinctly visible, the abdominal segments rather clearly marked. Dorsum slightly convex, finely striated. No fringe, but round the edge are twenty-four rather strong hairs, at about equal intervals.

*Hab.* In New Zealand, on *Fagus menziesii*. Specimens sent to me by Mr. R. Raithby, of Inangahua.

The arrangement of the hairs, and the size of the dorsal disk in this pupa as compared with the ventral surface, seem to be distinguishing characters. I have not seen the adult.

**Aleurodes simplex**, sp. nov. Plate XIII., fig. 27.

Pupa very light yellow, sometimes nearly white; elliptical, very slightly convex, texture very thin; length about  $\frac{1}{3}$  in. Rudimentary organs scarcely to be made out. Edge rather thicker than the rest, and finely striated, but there is no fringe. Abdominal extremity distinctly cleft (as in the Coccid genus *Lecanium*); abdominal orifice elongated, situated at the inner end of the cleft. On the dorsal region are several hairs, which do not spring from conical papillæ.

Adult unknown.

*Hab.* On *Pittosporum eugenioides*, *Coprosma lucida*, and several other trees in New Zealand.

This species in the general form of the pupa resembles *A. rubi*, Signoret, and *A. fragariae*, Walker, and both of these have similar dorsal hairs; but the abdominal cleft appears to be distinctive.

[In 1878 ("Trans. N.Z. Inst.," vol. xi., p. 215) I included amongst Coccids two insects really *Aleurodidæ*, under the generic name of *Asterochiton*. *Ast. aureus* is *Aleurodes melicyti*

of the present paper; *Ast. lecanioides* appears to have been made up of both *Aleurodes papillifer* and *A. simplex*.]

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ART. XIX.—*The Wattle-blight (Icerya purchasi) in Tasmania, and its Natural Enemies.*

By JAS. HUDSON, M.B.

[Read before the Nelson Philosophical Society, 4th April, 1889.]

THE ravages of this blight on our acacias and wattle-trees are well known. It seems to have a special liking for plants of the natural order *Leguminosæ* (gorse and broom, &c.), but it also attacks, and that most disastrously, orange- and lemon-trees. I know many instances of lemon-trees in Auckland and Nelson which formerly bore splendidly, but which now, owing to this blight, give their owners scarcely any fruit. You may frequently find it also in rose-bushes, and it is said to affect pines, cypresses, and grass. The insect, like most of the *Coccididæ*, is at first active; soon, however, it bores through the bark of some twig, which it selects, with its proboscis, and