

Whiteflies Known to Occur on Bananas (Hemiptera: Aleyrodidae)

John Dooley & Dr. Greg Evans, USDA/APHIS/PPQ

Image from Dr. JON H. MARTIN (NHM, London)
Whiteflies of Belize (Hemiptera: Aleyrodidae).
Part 1 — introduction and account of the subfamily
Aleyrodicinae Quaintance & Baker

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Aleyrodicus pulvinatus (Maskell)

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The following is a key to the species of whiteflies (Hemiptera-Sternorrhyncha-Aleyrodidae) known to occur on bananas (*Musa* spp.) worldwide. Two important sources of information are Mound & Halsey (1978), and the Whitefly Taxonomic and Ecological Website (online by clicking this [Link](#));

the URL is: (http://www.sel.barc.usda.gov:591/1WF/whitefly_catalog.htm).

All images are tools for identification and for education only. Some are under copyright protection.

This identification key only treats the puparia known to occur on banana leaves. The adults may be associated with the fruits, but unable to separate adult genera at this time). The diagnostic characters given for the puparia do not necessarily distinguish these genera and species from those found on other host plants. In addition, a description of the genus is provided for taxa where only the generic name of the specimen is reported to occur on banana. More detailed descriptions of the genera and species, and their geographical distribution and host plants are given in the data sheets. Readers are referred to Crop Protection Compendium, and PIN 309 data resources to access more extensive and/or supplemental data.

Morphology and Terminology

- T1 – T3 refers to the pro-, meso-, and metathoracic segments.
- A₁ - A₈ refers to the abdominal segments 1 to 8.
- *** refers to non-reportable status

Aleurodicinae:	<i>Aleurodicus cocois</i> (Curtis)	<i>Aleurodicus dispersus</i> Russell,
	<i>Aleurodicus dugesii</i>	<i>Aleurodicus pulvinatus</i> (Maskell)
	<i>Aleurodicus talamacensis</i> Martin	<i>Lecanoideus floccissimus</i> Martin
	<i>Metaleurodicus bahiensis</i> Hempel	
Aleyrodinae:	<i>Aleurocanthus woglumi</i> Ashby	<i>Aleurocerus flavimarginatus</i> Bondar
	<i>Aleurocerus musae</i> Russell	<i>Aleurocerus palmae</i> Russell
	<i>Aleurolobus musae</i> Corbett	<i>Aleurothrixus floccosus</i> *** Maskell
	<i>Aleurotrachelus granosus</i> Bondar	<i>Aleyrodes spiraeoides</i> Quaintance***
	<i>Crenidorsum lasangensis</i> Martin	<i>Dialeurodes doveri</i> Corbett
	<i>Dialeurodes joholensis</i> Corbett	<i>Dialeurodes musae</i> Corbett
	<i>Dialeuropora decempunctata</i> Takahashi	<i>Tetraleurodes acaciae</i> Quaintance***
	<i>Tetraleurodes mori</i> Quaintance***	

Key to the Whiteflies (Hemiptera-Sternorrhyncha-Aleyrodidae) Occurring on Banana

(Based upon the characters found in the puparium: 4th nymphal stage)

- | | | |
|--------|--|---|
| 1. | Compound pores present; legs terminating in a claw-like appendage, lingula usually elongate extending beyond vasiform orifice and with 2 pairs of setae at apex (Aleurodicinae)..... | 2 |
| 1' | Compound pores absent; legs terminating in an adhesive pad-like appendage; lingula usually short not extending beyond vasiform orifice and with 1 pair of setae at apex (Aleyrodinae)..... | 9 |
| 2(1) | Submedian cephalothoracic pair of setae absent ; star-shaped pores present | |
| | <i>Metaleurodicus bahiensis</i> Hempel | |
| 2' | Submedian cephalothoracic pairs of setae present..... | <i>Aleurodicus</i> & <i>Lecanoideus</i>3 |
| 3(2) | Dorsum with 4 pairs of <u>abdominal</u> compound pores..... | 4 |
| 3' | Dorsum with 6 pairs of <u>abdominal</u> compound pores present..... | 5 |
| 4(3) | Distinct submarginal ring of double-rimmed pores present; septate pores densely distributed between and adjacent to compound pores | <i>Aleurodicus dispersus</i> Russell |
| 4' | Lacking distinct submarginal ring of double-rimmed pores; septate pores sparsely distributed between and adjacent to compound pores | <i>Lecanoideus floccissimus</i> Martin |
| 5(3) | Lingula extending to and sometimes overlaps posterior margin | <i>Aleurodicus dugesii</i> Bondar |
| 5' | Lingula terminates well before posterior margin | 6 |
| 6(5) | Double-rimmed pores absent on dorsal submargin..... | 7 |
| 6' | Double-rimmed pores present on dorsal submargin..... | 8 |
| 7(6) | Lingula extending at least half way between the vasiform orifice to the posterior margin..... | <i>Aleurodicus pulvinatus</i> (Maskell) |
| 7' | Lingula extending less than half the distance between the vasiform orifice to the posterior margin | <i>Aleurodicus cocois</i> (Curtis) |
| 8(6) | Lingula apex bifid (forked); several small, septate pores present on the dorsal disc arranged in distinct chain-like rows across the submedian areas of the cephalothorax and abdominal segments II-VII..... | <i>Aleurodicus talamancensis</i> Martin |
| 8' | Lingula apex slightly rounded to acute; septate pores on the dorsal disc present, but fewer and not arranged as above..... | <i>Aleurodicus trinidadensis</i> Quaintance & Baker |
| 9(1). | Dorsal submargin with a row of 11 pairs of <u>long</u> spines in addition to subdorsal pairs; puparium black and shiny with margin coarsely dentate..... | <i>Aleurocanthus woglumi</i> Ashby |
| 9' | Dorsal spines absent (setae may be present); puparium pale to blackish | 10 |
| 10(9) | Bifid horned process present dorsally from A ₈ (puparium black with dentate margin) | <i>Aleurocerus</i> . 11 |
| 10' | Horned process absent (check several specimens) (puparium black to pale) | 13 |
| 11(10) | Cuticle uniformly black; submarginal glands square | <i>Aleurocerus musae</i> Russell |
| 11' | Margin yellowish to pale, rest of cuticle black; submarginal glands narrowly conical | 12 |
| 12(11) | Submarginal glands narrowly conical; transverse molting suture ends opposite T ₂ /T ₃ suture..... | <i>Aleurocerus flavomarginatus</i> Bondar |
| 12' | Submarginal glands broadly conical to thimble-shaped; transverse molting suture ends opposite the midpoint | <i>Aleurocerus palmae</i> Russell |
| 13(10) | Dorsum with 5 pairs of large discoidal pores | <i>Dialeuropora decempunctata</i> Takahashi |
| 13' | Dorsum lacking large discoidal pores..... | 14 |

14(13)	Puparium dark brown or black; subdorsal or submedian (not ventral) fold present	15
14'	Puparium pale to light brown; disjuncted subdorsal or parallel pair of submedian thoracic folds present or absent	19
15(14)	Cephalothoracic submedian pair of dorsal folds present	<i>Aleurotrachelus granosus</i> Bondar
15	Subdorsal fold present, disjuncted or concentric, complete or terminates at level of vasiform orifice	16
16(15)	Subsalsal disjuncted fold present, almost complete encompassing the entire body extending below the vasiform orifice; dentate margin with a row of submarginal glands at the base of the teeth appearing as two rows of teeth; live specimens usually very flocculent	<i>Aleurothrixus floccosus</i> (Maskell)
16'	Subsalsal concentric fold present, terminating at the level of the vasiform orifice	17
17(16)	Caudal cleft with four teeth and thoracic clefts with one tooth; thoracic tracheal furrow spotted; large trilobed sclerotized area surrounding the vasiform orifice	<i>Aleurolobus musae</i> Corbett
17'	Thoracic and caudal tracheal clefts and furrows not modified as above; submarginal transverse microtubercular bands present; lacking trilobed sclerotized area	<i>Tetraleurodes</i> ...18
18(16)	Dorsal submarginal gland tubercles present; cephalothorax with 3 pairs of ventral setae;; A ₈ without cluster of 3-8 subdorsal pores	<i>Tetraleurodes acaciae</i> (Quaintance)
18'	Dorsal submarginal gland tubercles absent; cephalic ventral setae absent; dorsal submargin with V-shaped, pale glandular areas at base of teeth; A ₈ with cluster of 3-8 subdorsal pores.....	<i>Tetraleurodes mori</i> (Quaintance)
19(14)	Subdorsal or submedian folds present	20
19'	Folds absent; margin crenulate to nearly smooth	21
20(19)	Dorsal submedian area of cephalothorax and anterior abdominal segments with a pair of longitudinal folds; cuticle from pale to light brown in color.....	<i>Crenidorsum lasangenensis</i> Martin
20'	Subsalsal disjuncted fold present, almost complete encompassing the entire body extending below the vasiform orifice; dentate margin with a row of submarginal glands at the base of the teeth appearing as two rows of teeth; live specimens usually very flocculent	<i>Aleurothrixus floccosus</i> (Maskell)
21(19)	Puparial cuticle pale to yellowish with tracheal and/or anal cleft not modified	<i>Aleyrodes spiraeoides</i> (Quaintance)
21'	Puparial cuticle pale to yellowish or unknown with tracheal and/or anal cleft modified	<i>Dialeurodes</i> 22
22	Cephalothoracic and caudal setae not evident; tracheal pores open at margin, but folds indistinct; caudal pore and furrow present and recessed toward vasiform orifice; caudal furrow marked with granules in transverse regular rows	<i>Dialeurodes joholensis</i> (Corbett)
22'	Cephalothoracic and caudal setae evident; tracheal pores open at margin; thoracic & caudal folds present and not marked with granules in transverse regular rows	23
23(22)	Cephalothoracic and caudal setae very elongate; caudal furrow present terminating in a marginal concavity; operculum rounded posteriorly (cuticle color unknown).....	<i>Dialeurodes musae</i> (Corbett)
23'	Cephalothoracic setae short (evident by their bases); caudal setae elongate; operculum truncated posteriorly cuticle color unknown	<i>Dialeurodes doveri</i> (Corbett)

Aleurodicus

Validation characters: Live puparium usually light in color and covered by copious amounts of wax; slide mounted puparium show terminal claws present on legs; dorsum with 5-7 pairs of compound pores including the cephalic pair, each with a central process (in species known to occur bananas); simple pores discoidal, wide rimmed, double-rimmed, septate shaped or absent; dorsal submargin with 12 pairs of hair-like setae; cephalic and/or the prothoracic setae present or absent; vasiform orifice cordate (heart-shaped) with lingula always exerted beyond the vasiform orifice and with 2 pairs of setae at apex.

Comparison – ***Aleurodicus***, ***Lecanoideus*** and ***Metaleurodicus*** are the only genera of the subfamily Aleurodicinae known to occur on bananas. *Aleurodicus* can be distinguished from ***Metaleurodicus*** by having a pair of dorsal submedian cephalothoracic setae, the dorsum with 5-7 pairs of compound pores including the cephalic pair, each with a central process, and the anteriormost 5 pores similar in size and shape, and the absence of star shaped (3-5) loculate pores along the submarginal area of the dorsum; as opposed to ***Metaleurodicus bahiensis*** (Hempel) lacking a pair of dorsal submedian cephalothoracic setae, the dorsum with 7 pairs of compound pores including the cephalic pair with the caudal three abdominal compound pores reduced in size and cylindrical in shape, and star shaped (3-5) loculate pores present.

Aleurodicus cocois (Curtis)

Field characters: Live puparium elliptical and elevated, pale yellow with white waxy secretions, often found in dense populations on lower leaf surface.

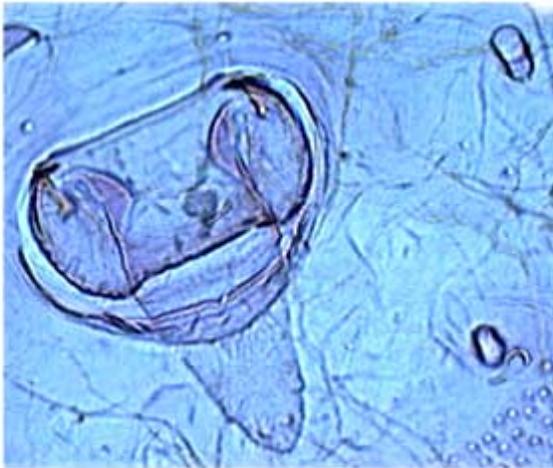
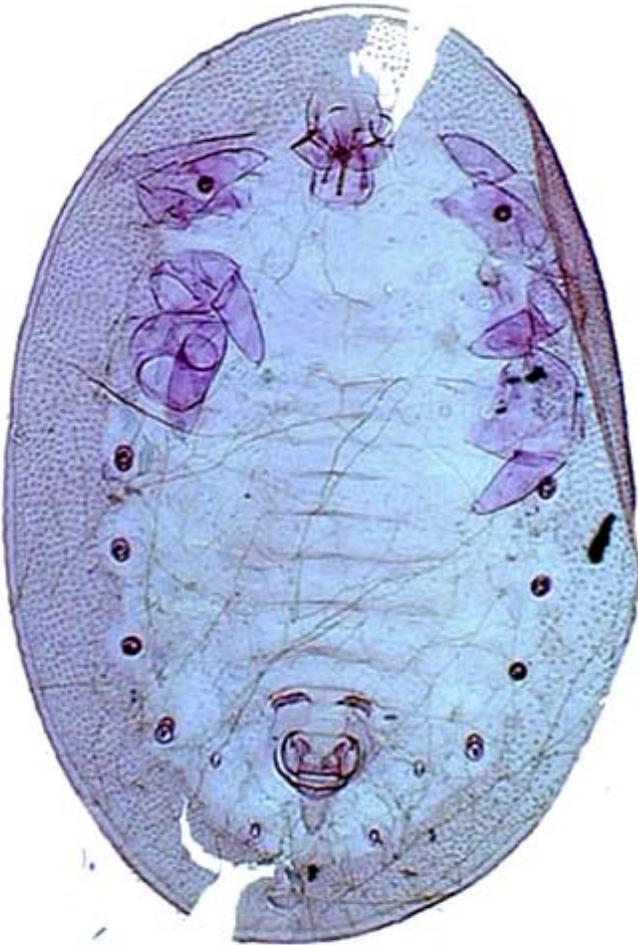
Validation & Slide mounted characters: Pupal case with 7 pairs of compound pores; cephalic and 2 caudal pairs reduced in size, smaller than anterior 4 abdominal pores. Submarginal simple pore band present, extending between abdominal compound pores; submarginal double-rimmed pores absent; dorsal septate pores present.

Comparison - Differs from ***Aleurodicus talamacensis*** Martin, ***Aleurodicus trinidadensis*** Quaintance & Baker by the absence of submarginal double-rimmed pores, and from ***Aleurodicus pulvinatus*** (Maskell) by its shorter lingula extending less than half the distance between the vasiform orifice to the posterior margin; whereas in the former it extends more than half the distance to the margin.

U.S. quarantine notes – Reportable.

Hosts - Anacardiaceae: *Anacardium occidentale*;
Annonaceae: *Annona muricata*, *Annona reticulata* & *Annona squamosa*;
Arecaceae: *Cocos nucifera*, *Elaeis* sp, *Washingtonia robusta*;
Chrysobalanaceae: *Chrysobalanus icaco*, *Licania (Moquilea) tomentosa*;
Combretaceae: *Terminalia catappa*;
Euphorbiaceae: *Hevea brasiliensis*;
Heliconiaceae: *Heliconia* sp.;
Lauraceae: *Persea americana*;
Leguminosae: *Brya ebenus*;
Moraceae: *Ficus* sp.;
Musaceae: *Musa paradisiaca*;
Myrtaceae: *Psidium guajave*;
Piperaceae: *Piper nigrum*;
Polygonaceae: *Coccoloba uvifera*;
Rubiaceae: *Richardia pacifica*;
Rutaceae: *Citrus reticulata*;
Sterculiaceae: *Theobroma cacao*.

Distribution - Australasian: Hawaii; Nearctic: Mexico; Neotropical: Anguilla, Antigua and Barbuda, Barbados, Brazil, Bolivia, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Guyana, Grenada, Guadeloupe, Guyana, Honduras, Jamaica, Martinique, Montserrat, Panama, Peru, Puerto Rico, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Venezuela, Virgin Islands.



The slide from the Systematic Entomology Lab.
The image by PPQ (John Dooley)

((For additional information on Host & Distribution see Crop Protection Compendium, Mound & Halsey 1978 and the Whitefly Taxonomic and Ecological Website.

Aleurodicus dispersus Russell



Field characters: Live mature puparium with copious amounts of a white, cottony secretion extending upward and outward from the dorsum; some fluffy, some waxy and in ribbons as long as, or longer than, width of body; a white, glasslike waxy rod arising from each compound pore, 3-4 times longer than width of body; a band of whitish, translucent, striated wax extending from ventral submargin to leaf. Nearly flat dorsally; young pupae flat but mature ones with ventral surface swollen and surrounded by a band of wax.

Validation & Slide mounted characters: Dorsum with 4 pairs of abdominal compound pores, decreasing in size from A3 to A6 (absent from A7 and A8), the last pair (on A6) slightly larger than the prothoracic pores with caudal pair of compound pores below the level of the vasiform orifice; lateral margin smooth.

Dorsal margin with a single row of 8-shaped pores; submargin with double-rimmed pores in a single row; wide-rimmed pores distributed 1 or 2 deep between septate and double-rimmed pores; wide-rimmed pores in a single row between the 8-shaped and the double-rimmed pores; septate pores present in median and submedian area of most segments, but absent from A1, usually absent from median area of A7 between pockets (1 rarely present), and absent from A8 anterior to but present below the vasiform orifice. Lingula is oval shape. Caudal setae located within a row of double-rimmed pores.

U.S. quarantine notes – Reportable.

Comparison – Differs from other *Aleurodicus* species found on banana by having only 4 pairs of abdominal compound pores versus 6 pairs in the other species. **U.S. quarantine notes** – Reportable [is this reportable? It's common in Florida]



Aleurodicus dispersus Russell
PPQ-South San Francisco

Host- Polyphagus including *Musa spp.*

Distribution- Widespread

(For additional information on Host & Distribution see Crop Protection Compendium, Mound & Halsey 1978 & Dr. Evans Whitefly Link).

Aleurodicus dugesii Cockerell ***



Image from DPI, Fl. Courtesy: Dr. Greg Hodges

Field Characters: Pupal case ovoid or subelliptical in shape.

Validation & slide mounted characters: 7 pairs of compound pores with the posterior two abdominal pairs reduced & bell-shaped; with or without long central processes in larger compound pores.

Double-rimmed pores (with faint inner rim) scarcely scattered on submargin, not septate and widely spaced; submarginal wide band of wide-rimmed pores present.

Lingula wider than the diameter of the anterior abdominal compound pores; usually overlapping the posterior margin of the pupal case. Vasiform orifice cordate; the operculum hemispherical; lingual width subequal to or wider than the diameter of the anterior abdominal compound pores; usually overlapping the posterior margin of the pupal case.

U.S. quarantine notes – Reportable (Probably the second most important pest in the Aleurodicinae).

Host- Polyphagus including *Musa spp.*

Distribution- Afrotropical: **Canary Islands**; Australasian: **Hawaii**; Nearctic: **United States-** (Az, Ca, FL, La, Tx); Neotropical: **Belize, Guatemala, Mexico, Nicaragua, Venezuela.**

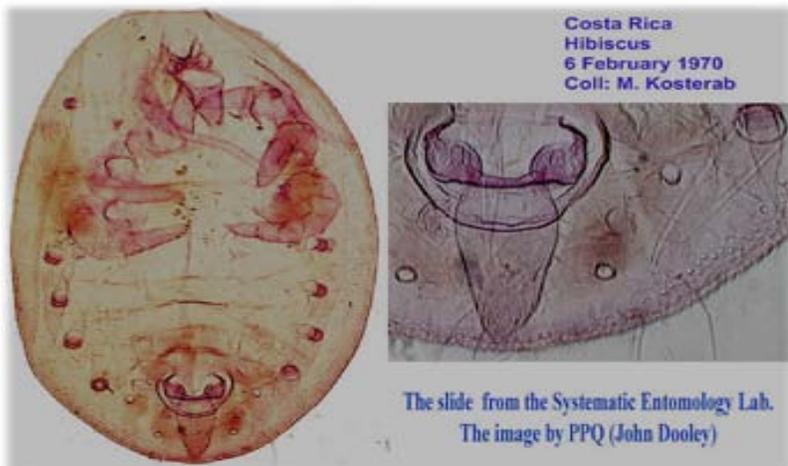
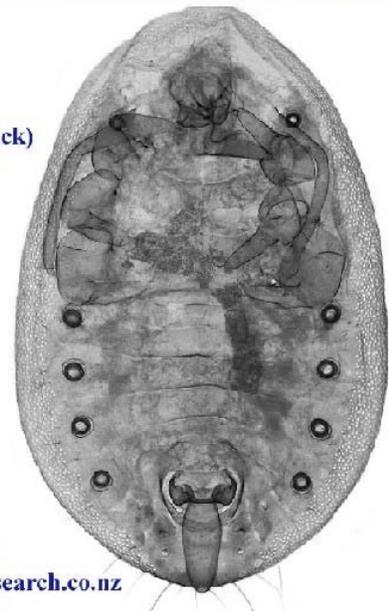


Image from Dr. Jon Martin (NHM, London) **Whiteflies of Belize (Part 1)** Zootaxa 681 12 October 2004 ISBN 1-877354-60-0 (paperback) ISBN 1-877354-61-9 (Online)

***Aleurodicus dugesii* (Ckll)**



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Aleurodicus pulvinatus (Maskell)



The slide from the Systematic Entomology Lab.
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Field Characters:

Validation & slide mounted characters: Live puparium with 7 pairs of compound pores with the central processes of the caudal two pairs subequal in size; anterior 4 abdominal compound pores about half as wide as lingula or less; double-rimmed pores absent; lingula rounded apically, short not extending to posterior margin of cauda; operculum finely spinulose.

Comparison - Differs from *Aleurodicus dispersus* Russell by having 6 pairs of abdominal compound pores versus 4 pairs; from *A. talamacensis* and *A. trinidadensis* by the absence of submarginal double-rimmed pores; and from *A. cocois* (Curtis) which has the lingula extending at least half way between the vasiform orifice and the posterior margin.

U.S. quarantine notes – Reportable.

Hosts - Annonaceae: *Annona squamosa*; Araceae: *Montrichardia aculeate*; Chrysobalanaceae: *Chrysobalanus icaco*, *Hura crepitans*, *Licania tomentosa*; Clusiaceae: *Vismia brasiliensis*, *Vismia sp.*; Euphorbiaceae: *Jatropha sp.*; Lauraceae: *Persea americana*; Moraceae: *Ficus bengalensis*; Musaceae: *Musa*; Myrtaceae: *Psidium guajave*; Palmae: *Cocos nucifera*; Piperaceae: *Piper nigrum*; Polygonaceae: *Coccoloba uvifera*; Rubiaceae: *Coffea canephora*; Sapindaceae: *Melicoccus bijugatus*; Sterculiaceae: *Theobroma sp.*

Distribution - Nearctic: Mexico, Neotropical: Antigua, Belize, Bolivia, Brazil, Costa Rica, Colombia, Ecuador, El Salvador, Guyana, Honduras, Nicaragua, Panama, Peru, St. Kitts and Nevis, Trinidad, Surinam, and Venezuela.

(For additional information on Host & Distribution see Crop Protection Compendium, Mound & Halsey 1978 & Dr. Evans Whitefly Link).

Aleurodicus talamacensis Martin

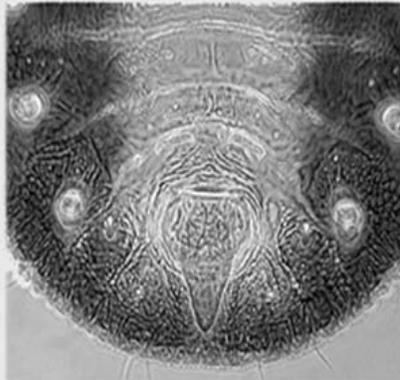
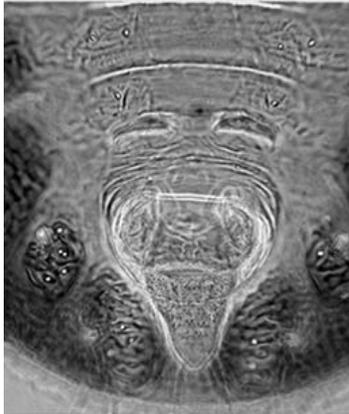


On Musa



On Orchids

Images from
Dr. Jon Martin
NHM, London



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Field characters: on banana the pupae with a narrow ring and a thin narrow dorsal covering of wax. Often the positions of the cicatrices and large compound pores marked by dark waxfree spots.

Validation & slide mounted characters: Live puparium dorsum with 7 pairs of compound pores, cephalic and first four pairs of abdominal pores large, and the last two posterior pairs reduced, with those on A7 twice as long as those on A8; central processes dagger-shaped, and protruding beyond pore rim; vasiform orifice broadly cordate, laterally thickened and almost completely covered by operculum (with rugose surface), with lingula (apically acute and finely bifid) exerted slightly beyond posterior margin of orifice; submargin narrow with a crowded band of wide-rimmed pores present but not mesally lobed toward compound pores; puparium dark with large central pale region, with 2-3 bright pores present in the vicinity of each large compound pore.

Comparison – *A. talamacensis* is very similar to *Aleurodicus trinidadensis* Quaintance & Baker but differs in having a much greater number of small septate pores on the dorsal disc arranged in distinct chain-like rows across the submedian areas of the cephalothorax and abdominal segments II-VII.

U.S. quarantine notes – Reportable.

Host- Musaceae: *Musa* sp.; Orchidaceae: ?*Maxillaria* sp.

Distribution- Neotropical: Costa Rica



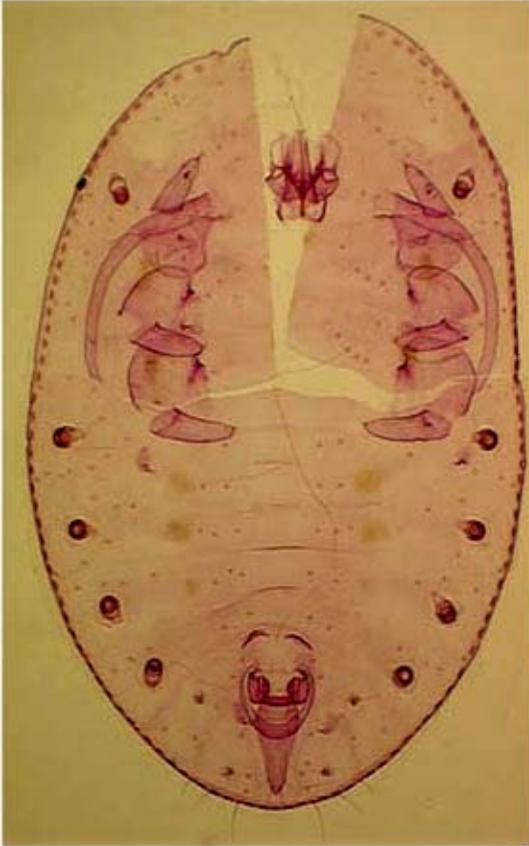
On Musa

On Orchids

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(For additional information on Host & Distribution see Jon Martin's "*Aleurodicus talamacensis* a new whitefly species damaging plantation bananas...": Zootaxa 843: 1-10, 2005).

Aleurodicus trinidadensis Quaintance & Baker



Field Characters: Oval in shape. Shape elliptical and broadest about the area with the first abdominal compound pore.

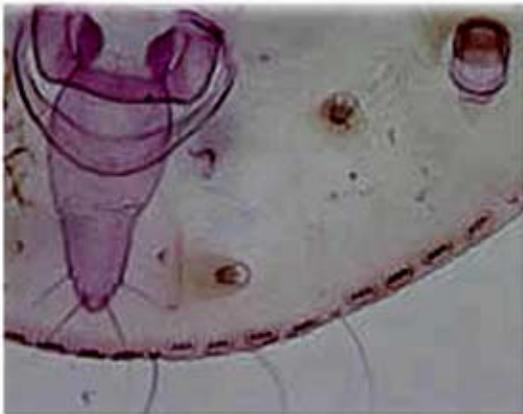
Validation & slide mounted characters: with lateral margin crenulate to smooth. Dorsum with 7 pairs of compound pores with caudal two pairs of compound pores subcylindrical and about half the diameter of the anterior four abdominal pairs with central processes subequal in size and shape to others. Dorsal septate pores oval-shaped and smaller than double rimmed pores (that are in a regularly spaced row); lateral margin with a row of simple discoidal pores.

Comparison – *A. trinidadensis* is very similar to *Aleurodicus talamacensis* Martin et al but differs by having a reduced number of small septate pores on the dorsal disc (best to compare specimens). No number given as absolutes.

U.S. quarantine notes – Reportable.

Host- Arecaceae: *Cocos nucifera*;
Asteraceae: *Eupatorium odoratum*;
Musaceae: *Musa sapientum*.

Distribution- Neotropical: Colombia, Grenada, Trinidad & Tobago



The slide from the

Systematic Entomology Lab.

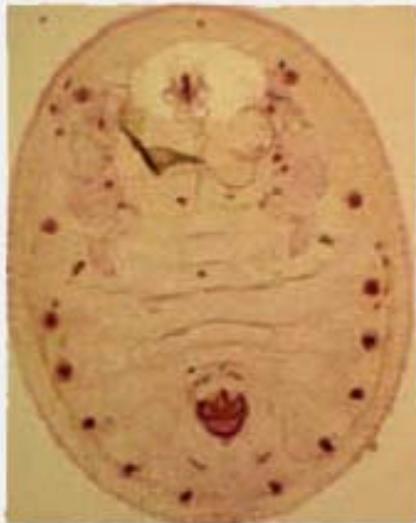
The image by PPQ (John Dooley)

(For additional information on Host & Distribution see Mound & Halsey 1978 & Dr. Evans Whitefly Link).

Metaleurodicus

Validation characters: Terminal claw present on each leg; row of 12 pairs of submarginal setae including the caudal pair. Four or six pairs of abdominal and one cephalic pair of compound pores without cone-shaped central process. Paired submedian cephalothoracic setae absent. Dorsal disc without distinct groupings of simple pores, but large numbers may be equally distributed; four or five loculate pores, "stellate or cruciate" shaped, occur at least on the abdomen in two species (*M. cardini* Back & *Metaleurodicus griseus* Dozier or somewhat diamond-shaped in one species (*M. minimus* Quaintance); Vasiform orifice shape varies from subcordate to triangular; lingula is inserted or exerted (glossary definition), setose, and with two pair of setae.

Metaleurodicus bahiensis Hempel



Field characters: Puparia are light brown with a yellow spot on each side of the abdomen, thin & transparent, flat, elliptical with the posterior end slightly more pointed than the anterior. Margin with a narrow fringe of white wax.

Validation & slide mounted characters: Seven pairs of compound pores including the cephalic pair. Abdominal pairs in a concentric arc pattern on each side with the cephalic & anterior three compound pores subequal and the posterior three abdominal pores reduced in size and cylinder-shaped.

Vasiform orifice cordate; the operculum hemispherical; the lingula inserted within the vasiform orifice or slightly exerted.

Vasiform orifice cordate; the operculum hemispherical; the lingula inserted within the vasiform orifice or slightly exerted.

Dorsum with 5 pairs of long setae (1 pr. cephalic, 2 pr. thoracic, and 2 pr. Abdominal)

Comparison - Since this is the only species within the genus that attack bananas, it can be confused with *Aleurodicus*. However, this species has the caudal three compound pore pairs reduced slightly and cylindrical in shape.

U.S. quarantine notes – Reportable.

Host- Arecaceae: *Cocos nucifera*;
Musaceae: *Musa sapientum*;
Moraceae: *Artocarpus heterophyllus*;
Rutaceae: *Citrus*;

Distribution-Neotropical: Brazil, Colombia, Guyana



Slide from the Systematic
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Image from PPQ, San Francisco
(J. Dooley)

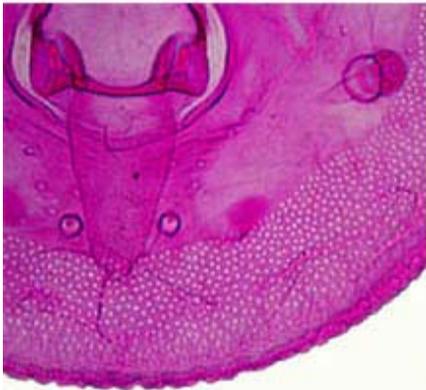
(For additional information on Host & Distribution see Mound & Halsey 1978 & Dr. Evans Whitefly Link).

Lecanoideus

Slide mounted characteristics: margin curved down (deflexed) to various degrees; normally with 5 pairs of compound pores (except one species has an additional pair medially on A_8). Five large pairs of compound pores are well developed with a cone-shaped central process.

Lecanoideus floccissimus Martin

Lecanoideus floccissimus Martin
on *Ficus bengalensis*
ex Tenerife
May 1996
SEL collection



Slide is from the Systematic Entomology Lab. The image by PPQ (John Dooley)

Field characters: puparia yellowish but colony concealed under copious amounts of white wax consisting of thick curls and long coarse strands.

Validation & slide mounted characters: margin slightly deflexed; posterior marginal setae long, lacks anterior marginal setae; submarginal setae present in 12 pairs; 3 pairs of submedian setae present on cephalothorax and A_8 ; central processes on large compound pores pointed posteromesad; small pair of compound pores on A_8 ; submargin with a broad row of simple wide-rimmed disc pores; submedian cuticle smooth with ovoid septate pores

Comparison - similar to other species (banana not known as a host), differing by the presence of small pair of compound pores near the median line on A_8 .

U.S. quarantine notes – Reportable.

Host- Polyphagous including Musaceae: *Musa acuminata*, *Musa sp.* & *Strelitzia nicolai*, and *S. reginae*. Also polyphagous including Rutaceae.

Distribution- Afrotropical: Canary Islands,
Neotropical: Ecuador, Peru (conversation with Dr. Greg Evans)

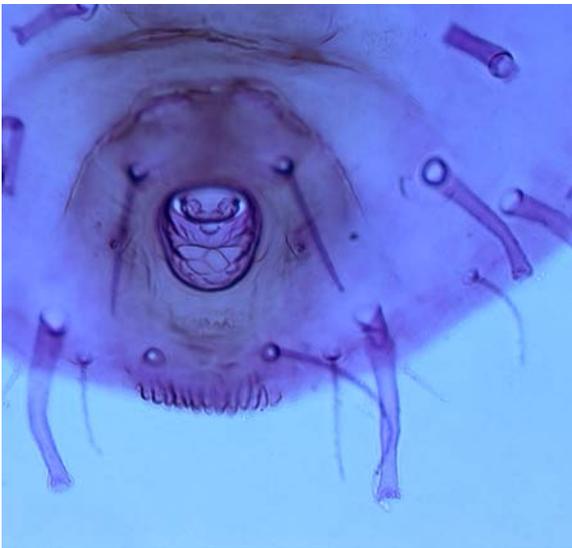
(For additional information on Host & Distribution see Jour.Nat.Hist, 1997, 31, 1261-1272 Jon Martin & Dr. Evans Whitefly Link).

Aleurocanthus

Validation characters: This genus is known for its very black color of the puparium; with numerous spines projecting from the submargin to the submedian; a noticeable dentate margin in the species that attack bananas; and the spiraling ovipositing of the eggs in a characteristic way.

Slide mounted pupal characteristics: Puparia normally oval-shaped; color normally dark or blackish but may be light, often with sparsely distributed wax; dorsal disc covered with stout glandular spines of various length with acute or blunt apices distributed from the submargin to a more complex disc array of the spines. The male puparia is much smaller than the female puparia (dimorphic).

Comparison - Spinal structure may be considered by some as homologous structures similar to the siphon-like tubes in ***Siphoninus*** and ***Aleurothrixus antidesmae*** Takahashi. Related to the ***Xenaleyrodes*** [Martin, 1999] except that the spines are submarginal only and the puparial margin deflexed. The stout spines should not be confused with robust dorsal disc setae (e.g. Aleurotuba)



Siphoninus (left)



Aleurothrixus antidesmae (right)

Aleurocanthus woglumi Ashby



Field Characters: Puparia black, convex and with numerous spines projecting from the submargin and the dorsal disc. Dorsal spines obvious and acute.

Validation & slide mounted characters: Puparia black with dentate margin of large teeth about 3.5 to 5 teeth per 0.1 mm; 11 pairs of dorsal acute submarginal spines present with 3rd posterior pair usually doubled; adhesion pads present as the terminating appendage of the legs.

U.S. quarantine notes – Reportable.

Host- Polyphagous with 35 plant families attacked

Distribution- Widespread

Comparison – The color of the puparia and the distribution and number of pairs of spines, separate this species from the other species.



PPQ: Slide from (Honolulu)
Image by J.Dooley (San Francisco)

Aleurocerus

Field characters: Puparia normally black; oval-rotund-shaped; sometimes with a narrow fringe of white wax on the black puparia.

Validation & slide mounted characters: puparia requires bleaching for slide mounting; vasiform orifice obscured with a bifid horned process (since it sometimes breaks off during the slide mounting technique, best to observe several specimens).

Aleurocerus flavomarginatus Bondar

Field characters: Shape elliptical with a dentate margin. Dark brown in color.

Validation & slide mounted Characters: margin yellowish to pale with rest of the puparia black. Submarginal glands present, narrowly conical with strongly convergent margins; transverse molting suture terminates opposite T_2/T_3 suture; horned process weakly projected.

Comparison - This is one of three species known to attack bananas. The puparia cuticle is dark brown to black with the margin pale and the transverse molting suture terminating opposite T_2/T_3 suture.

U.S. quarantine notes – Reportable.

Host- Arecaceae: *Cocos* sp.; Musaceae: *Musa* sp.

Distribution- Neotropical: Trinidad

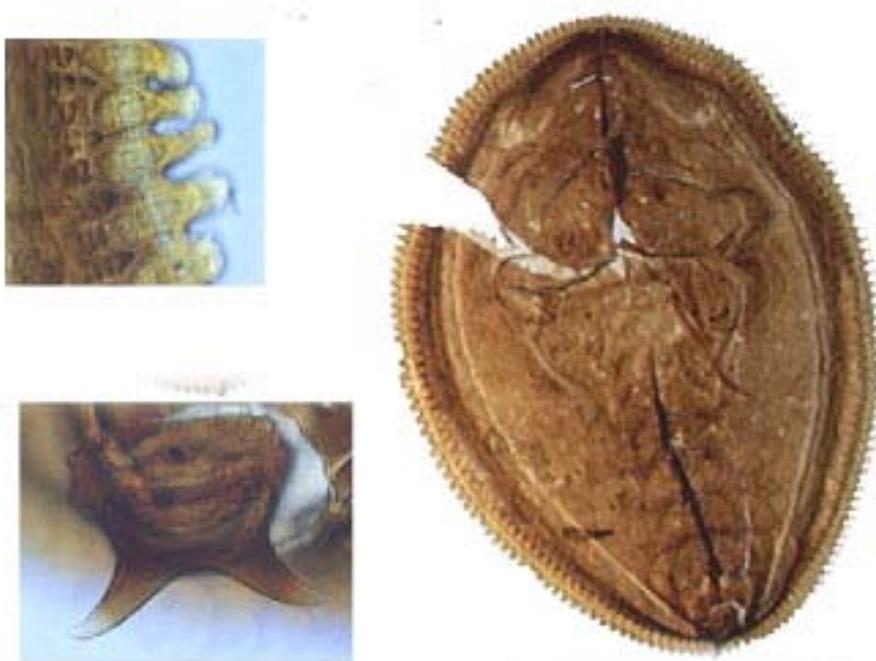


Image by JDooley (PPQ, APHIS, USDA)
Slide from Systematic Entomology Lab, ARS, USDA

Aleurocerus musae Russell

Field characters: Shape elliptical with a dentate margin. Dark brown in color.

Validation & slide mounted Characters: margin black to dark brown as the rest of the puparia. Submarginal glands present, nearly square or rectangular apically truncate with lateral margins parallel; submarginal transverse ridges each with 2 rows of spinules; alternate ridges with a strong tooth at the distal end.

Comparison - This is one of three species known to attack bananas. The puparia cuticle is entirely dark brown to black separating it from the other two species. The only ones studied in which the proximal ends of the submarginal glands are separated from adjacent glands and blend into the transverse ridges.

U.S. quarantine notes – Reportable.

Host- Musaceae: *Musa paradisiaca*.

Distribution- Neotropical: Guatemala

Aleurocerus musae

Mexico

Alpinia purpurata

24-IV-1997 El Paso 050465 Tx

S.E.L.



**Image by JDooley (PPQ, APHIS, USDA)
Slide from Systematic Entomology Lab, ARS, USDA**

Aleurocerus palmae Russell

Field characters: Shape elliptical with a dentate margin. Dark brown in color.

Validation & slide mounted Characters: margin yellowish to pale with rest of the puparia black. Submarginal glands present, varying from broadly conical (with margins moderately convergent & apices moderately curved) to thimble-shaped (with lateral margins nearly parallel and apices broadly curved);

Comparison - This is one of three species known to attack bananas. Margin pale contrasting sharply to the rest of the cuticle; transverse molting suture terminates opposite its midpoint, not the T₂/T₃ suture; closely related to ***A. flavimarginatus*** Bondar.

U.S. quarantine notes – Reportable.

Host- Arecaceae, Areceae, Bromeliaceae, Orchidaceae-& .Musaceae: *Musa paradisiaca*.

Distribution- Nearctic: Mexico; Neotropical: Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Nicaragua, Panama, Peru

Aleurocerus palmae

Mexico
Palm fronds
Houston 07172 Tx
May 5, 1954
S.E.L.

Horned lingula

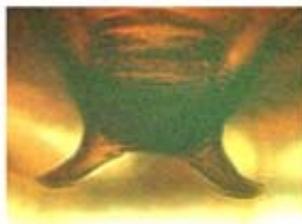


Image by JDooley (PPQ, APHIS, USDA)
Slide from Systematic Entomology Lab, ARS, USDA

Aleurolobus

Field characters: Puparia normally black or brown, sometimes pale; oval-rotund-shaped; sometimes with a narrow fringe of white wax on the black puparia; about 50 species are described.

Validation & slide mounted characters: Margin crenulated and sometimes modified at the thoracic & caudal tracheal openings usually modified with combs of teeth (from 2 to several) and some ventral stippling present in the tracheal folds.

A concentric dorsal suture-like fold present separating the submargin from the dorsal disk extending to the caudal furrow. Easy to confuse with a ventral fold.

Cephalic, first & eighth abdominal segment, and caudal pairs of setae present; variable number of submarginal setae present.

Vasiform orifice elongate-cordate to rounded-triangular containing a lingula (inserted) and usually partially, but not completely obscured by a similarly shaped operculum.

Aleurolobus musae Corbett



Field characters: Shape elliptical with a dentate margin. Brown in color.

Validation & slide mounted Characters: Adhesion pads present, not claws terminating the legs. Dentate margin; tracheal pore defined as a single tooth as the tracheal furrow is marked by spotting or stippling; caudal furrow also appears dotted.

Subdorsal fold present but irregular and interrupted and associated with 9 pairs of short setae. Thoracic and abdominal sutures present and evident

One pair submedian setae present on the cephalothorax and A-1 segment.

Vasiform orifice cordate shaped with a reticulated surface with four prominent teeth projecting from the posterior margin.

Comparison - This is the only *Aleurolobus* species known to attack bananas. The puparia cuticle is dark brown to black with the thoracic cleft/pore having only one tooth. If pale in color or more than one thoracic cleft tooth, it is not *A. musae* Corbett.



U.S. quarantine notes – Reportable.

Host- Musaceae: *Musa paradisiaca*, *M. sapientum*

Distribution- Australasia: Malaysia; Palaeartic: India

(For additional information on Host & Distribution see Mound & Halsey 1978 & Dr. Evans Whitefly Link).

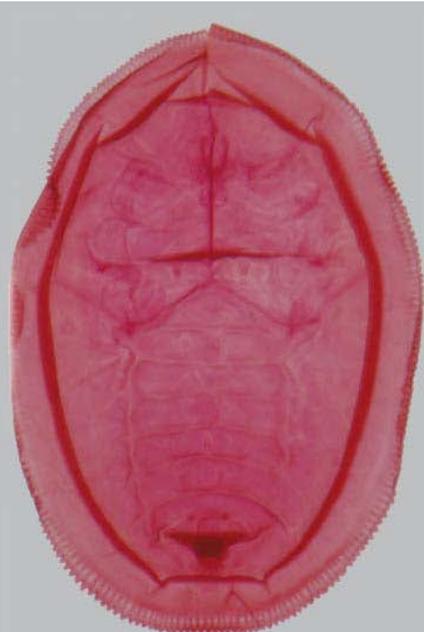
Aleurothrixus

Validation & slide mounted characters: Dorsal disc separated from wide submarginal area by a rather disjunct complex but complete fold; setal pairs present on the metathorax, abdominal segment 8, and caudal segment; submargin with 7 pairs of spine-like setae present from cephalothorax to several anterior abdominal segments; abdominal rachis usually absent, but if present without lateral arms.

Vasiform orifice transversely-elliptical. Margin evenly toothed with a basal gland giving the appearance of a double row of teeth

Comparison -

*Aleurothrixus floccosus**** Maskell



Field characters: Puparia oval, translucent and usually pale (sometimes tan to dark); secretes copious, white and wooly wax secretions may be heavy along with honeydew distorting body shape.

Validation & slide mounted characters: Adhesion pad, not claw, present as the terminal appendage for each leg. Margin dentate with a submarginal row of glands giving the appearance of two rows of marginal teeth.

A complete subdorsal fold present from the cephalothorax to below the vasiform orifice that is not uniformly concentric.

Frequently with a “comb of hairs” radiating and branching from directly below the vasiform orifice.

Comparison - Not close to any other known Aleyrodid found on bananas.

U.S. quarantine notes –Non-Reportable.

Host- Polyphagus

Distribution- Widespread



Slide and Image by
PPQ, San Francisco (J. Dooley)

(For additional information on Host & Distribution see Crop Protection Compendium, Mound & Halsey 1978 & Dr. Evans Whitefly Link).

Aleurotrachelus

Field characters: Puparia ovoid, black (requiring bleaching before slide mounting), with margin dentate.

Validation & slide mounted characters: Dentate margin, not differentiated at caudal or thoracic marginal openings with glands present at the base of the marginal teeth giving the appearance of a double row of teeth; longitudinal fold on the cephalothorax sometimes present separating the dorsal disc; Rhachis present with or without arms; cephalic setae present or absent, A₈ and caudal setae present; A1 setae thickened and close to median lone; vasiform orifice subcircular to subchordate, longer than wide with an exerted lingula or it is obscured by operculum.

Aleurotrachelus granosus Bondar



Slide from Systematic Entomology Lab
Image by PPQ, Beltsville (Dr. Greg Evans)

Field characters: Puparia suboval in shape, with a slight narrowing in the region of the thorax; coloration pale, yellow to brown with a clear margin that is fringed with white wax and fibers.

Validation & slide mounted characters: Body length approximately 0.705 mm, width 0.426 mm. The cephalothoracic region dorsum with an acute median carina that continues into the abdominal region with a cylindrical fold, elongate in the posterior apex, where the vasiform orifice is found.

The vasiform orifice is subquadrate, with rounded angles [edges]. The operculum occupies two-thirds of the orifice, allowing the tip of the lingula visible, which is pilose [hairy] and inserted. Near the base of the orifice is found a pair of strong spines, and at the caudal apex of the same plate a pair of very fine setae. On the third segment of the thorax, on the dorsum, there is a pair of little developed setae.

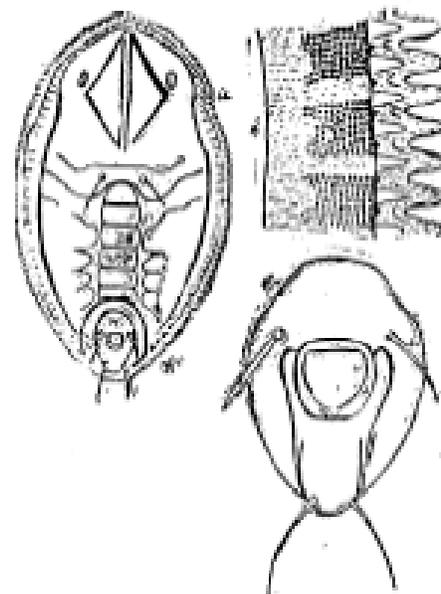
On the dorsal disk and separated from the submargin by a strong fold that extends to the two sides. Small pores on the submarginal ridge are visible, placed in long columns [rows], transversing the ridge. In stained specimens these pores appear as small black granulations, that are placed in slightly curved lines, one next to the other, forming lines and that can be seen easily for their transparency, characterizing well this species. These granulations are, with all certainty, the small pores that generate the abundant production of white wax and fibers that cover the insect. The margin of the pale individuals, are infusate and hyaline, with rounded teeth that are separated at narrow intervals separating the teeth

U.S. quarantine notes –Reportable.

Host: Musaceae: *Musa sp.*; Sterculiaceae: *Theobroma cacao*

Distribution: Neotropical: Brazil

Illustration to the right under copyright protection;
Bondar, 1923 (in Portuguese)



(For additional information on Host & Distribution see Bondar (1923),

Mound & Halsey 1978 & Dr. Evans Whitefly Link).

Aleyrodes

Validation & slide mounted characters:

Pupal Characteristics: Puparia flat, usually pale with crenulate/smooth margin. Caudal cleft & furrow absent; thoracic ventral tracheal folds and cleft absent.

Aleyrodes spiraeoides (Quaintance)



Field characters: Puparia pale, colorless to yellowish; broadly elliptical in shape; lacking the thoracic and caudal tracheal clefts & furrows.

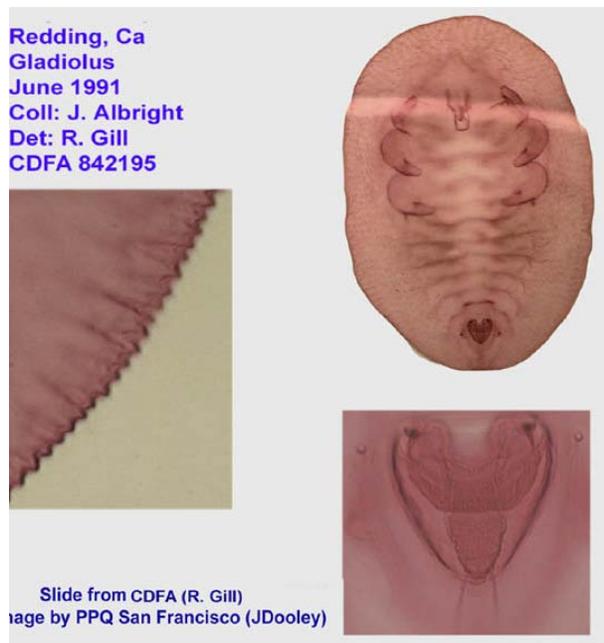
Validation & slide mounted characters: dorsum without papillae or pores; thoracic segments somewhat obscure; vasiform orifice as long as broad with operculum covering no more than half of orifice; lingua inserted, spatulate, extending to margin with two long setae exerting from orifice.

Comparison- Only species of *Aleyrodes* that attacks bananas.

U.S. quarantine notes –Non-Reportable.

Host: Polyphagus, new host-Musa from CDFA (Gillian Watson by conversation).

Origin: Nearctic: Mexico, USA
Neotropical: Venezuela



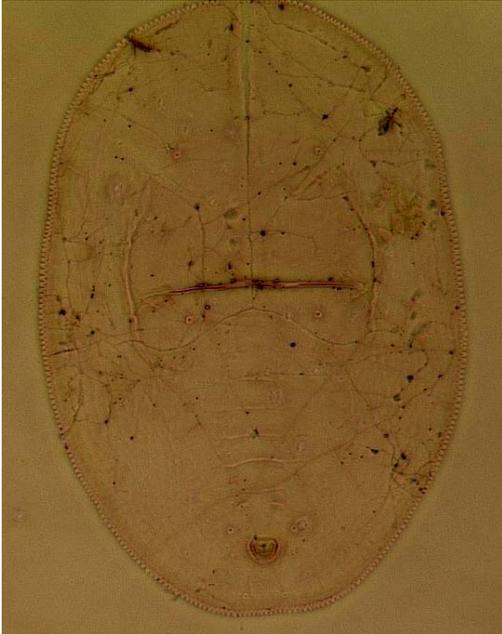
(For additional information on Host & Distribution see Crop Protection Compendium, Mound & Halsey 1978 & Dr. Evans Whitefly Link).

Crenidorsum

Validation characters:

Pupal Characteristics: Puparia flat, usually pale but sometimes dark; margin dentate; concentric dorsal fold replaced by two subdorsal longitudinal sutures from the cephalothoracic region to the anterior abdominal segments. Caudal furrow absent; thoracic ventral tracheal folds absent.

***Crenidorsum lasangensis* Martin**



Field characters: Puparia pale, colorless; shape almost oval except straightened-out at the thoracic and caudal tracheal cleft areas.

Validation & slide mounted characters: Margin dentate with one row of teeth present; a pair of longitudinal subdorsal furrows present on thorax but becoming indistinct on abdomen; tracheal and caudal clefts and furrows on dorsum not differentiated; thoracic tracheal furrows on venter differentiated by patch of fine stipples from foreleg to margin only; T2 & T3 legs only with minute broad spine present; derm finely rugose from submedian area to the margin; well-marked pairs of abdominal submedian depressions present on abdomen & thorax; abdominal median areas finely spinulose; pore pairs present formed by large dorsal discoidal pores with an associated porettes; an exserted, spinulose, and club-shaped lingula present; single pairs of cephalic, A1, A8 and caudal setae present;

Comparison- May be separated from Aleurotrachelus because of a pale cuticle. Similar to Aleurotulus because of a pale cuticle and an exserted, spinulose, and club-shaped lingula.



U.S. quarantine notes – Reportable.

Host- Musaceae: *Musa*

Distribution- Australasia: New Guinea

Slide from Systematic Entomology Lab, ARS
Image by PPQ (Dr. Greg Evans), at S.E.L.

(For additional information see “The whitefly of New Guinea”, “ Dr. Jon Martin 1985).

Dialeurodes

Validation characters: Puparia normally pale, sometimes variously pigmented, rarely black or brown shape is oval to rotund the most speciose genus with more than 140 taxa described.

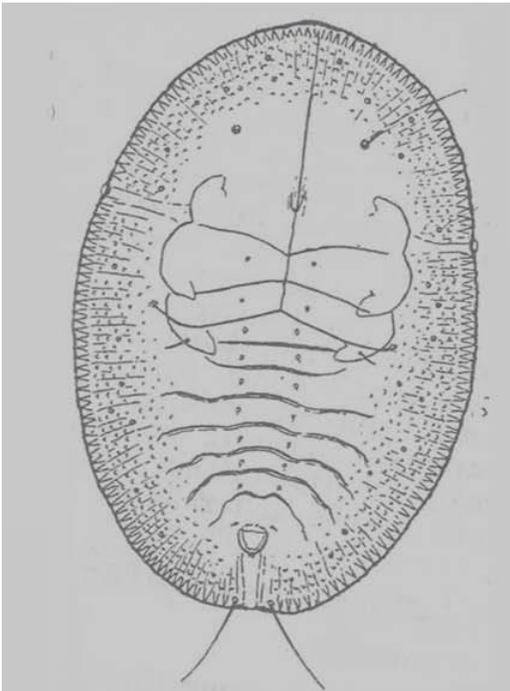
Pupal Characteristics: Margin crenulated and modified at the thoracic & caudal tracheal openings usually marked with pores (dentate or smooth internal) and sometimes with variously shaped stippling (pore or polygonal reticulations) present in the tracheal folds.

Lacks a concentric dorsal suture-like fold separating the submargin from the dorsal disk.

Cephalic, eighth abdominal & caudal segments, each with a pair of setae present first abdominal segment with or without a pair of setae. 12 to 14 subdorsal or submarginal setae present.

Vasiform orifice small, broadly elliptical or subcircular containing a lingula is inserted, but sometimes protrudes beyond the posterior margin of the orifice completely covered by the operculum.

Dialeurodes doveri Corbett



Citation: Corbett 1935b
Author(s): Corbett, G. H.
Publication Year: 1935
Title: Malayan Aleurodidae
Journal: J. fed. Malay St. Mus
Volume/Page(s): 17: 722-852
Description Page: 774

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Tel. 603 6201 0688 Fax 603
62015679
Email: <gowri@arkib.gov.my>
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identification purposes only).

Field characters: Field characteristics: Puparia elliptical, flat, without waxy secretions, and slightly pointed anteriorly. No indication of the derm cuticle coloration.

Validation & slide mounted characters: Margin finely crenulate with the thoracic marginal pore area emarginated; pore rounded without any crenulations; tracheal folds not marked and somewhat indistinct; caudal fold unmarked and broadly delineated terminating into a concave disc without crenulations.

Midthoracic suture extends to margin while transverse terminates in a small pore just beyond legs; small discoidal pores as follows: sparsely distributed between margin and subdorsum, a pair of pores submedially on each abdominal segment.

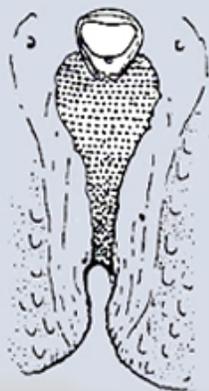
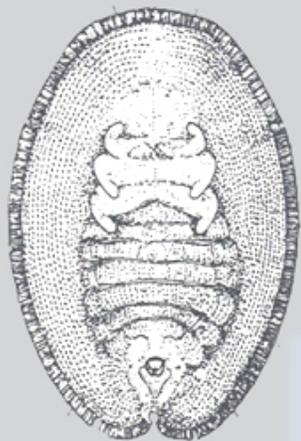
Chaetotaxy as follows: pair of setae anteriorly on the cephalothorax, a pair on abdominal segment 1, and a long caudal pair.

Vasiform orifice subcordate with an anterior margin straight and a posterior margin rounded; operculum with posterior margin truncate.

U.S. quarantine notes – Reportable.

Host- Musaceae: *Musa sapientum*

Distribution- Australasia: Malaysia



Citation: Corbett 1935b
Author(s): Corbett, G. H.
Publication Year: 1935
Title: Malayan Aleurodidae
Journal: J. fed. Malay St. Mus
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identification puposes only).

Field characteristics: Puparia elliptical and occurs solitary on underside of leaf and yellowish in color.

Validation & slide mounted characters: Tracheal pores open but folds indistinct; caudal fold pyriform expanding lateral to the vasiform orifice and stippled with rows of transverse granules.

Marginal area slightly differentiated with a ring of about 60 very minute spines; abdominal segments distinct.

Vasiform orifice subcordate with the posterior median area possibly notched; inner & lateral areas unarmed-without teeth; a pair of fine.

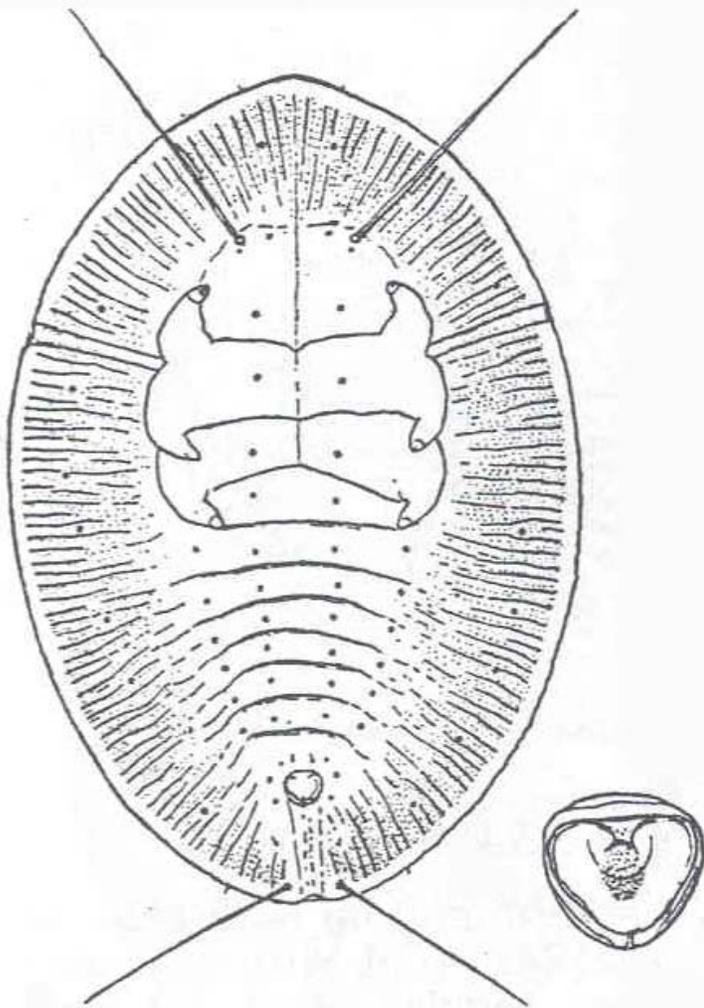
Chaetotaxy: small setae present on the anterior and posterior margin of the puparia;

Comparison - no specimens available to compare.

U.S. quarantine notes – Reportable.

Host- Musaceae: *Musa sapientum*

Distribution- Australasia: Malaysia



Field characters: appearance on leaf unknown.

Validation & slide mounted characters: Elliptical, pointed anteriorly, slightly emarginated at the thoracic pore area and recessed posteriorly; margin finely crenulate with expanding striae from margin to subdorsum; tracheal pores without crenulations and the tracheal fold unmarked and extends to legs.

Midthoracic suture to margin and transverse suture to subdorsum; long flagelliform setal pairs present one pair at the cephalothorax and one at the caudal fold termination point; first abdominal segment may have setae represented only by their bases; caudal fold anteriorly wider and narrows into a marginal conclavity.

Ring of small circular pores present in margin & submargin with similar pores on the submedian areas of the thorax, abdomen and in the subdorsum; vasiform orifice subcordate with posterior wall divided and unarmed; operculum fills orifice and rounded posteriorly.

Comparison- no specimens available to compare .

U.S. quarantine notes – Reportable.

Host- Musaceae: *Musa sapientum*

Distribution- Australasia: Malaysia

Citation: Corbett 1935b
Author(s): Corbett, G. H.
Publication Year: 1935
Title: Malayan Aleurodidae
Journal: J. fed. Malay St. Mus
Volume/Page(s): 17: 722-852
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Dialeuropora

Field characters: Puparia normally oval-shaped, pale in color.

Validation & slide mounted characters: thoracic and caudal clefts usually present. One to five pairs of large discoidal pores present.

Dialeuropora decempunctata Takahashi



Field characters: Puparia elliptical in shape; derm yellowish to whitish or transparent.

Validation & slide mounted characters: Pupal Characteristics: Characteristic large simple pores numbering 5 pairs; thoracic and caudal clefts platelike with indistinct or shallow furrows; 12 pairs of submarginal setae; vasiform orifice broadly subcordate.

Comparison - Large pores can be mistaken for compound pores in the subfamily Aleurodicinae. However the legs terminate into adhesion pads, not claws.

U.S. quarantine notes – Reportable.

Host- Annonaceae: *Annona cherimola*, *A. squamosa*;
Boraginaceae: *Cordia myxa*; Fabaceae: *Dalbergia sissoo*;
Lauraceae: *Cinnamomum sp.*; *Machilus sp.*, *Persea gratissima*;
Moraceae: *Streblus asper*; Musaceae: *Musa sapientum*;
Rosaceae: *Prunus sp.*, *Rosa sp.*; Rhamnaceae: *Alphitonia sp.*

Distribution- Australasia: Malaysia, New Guinea; New Caledonia;
Oriental: Cambodia; Sri Lanka; Taiwan; Thailand; Palaeartic:
India; Pakistan

(For additional information on Host & Distribution see Quaintance & Baker 1917, Mound & Halsey 1978 & Dr. Evans Whitefly Link).

Tetraleurodes

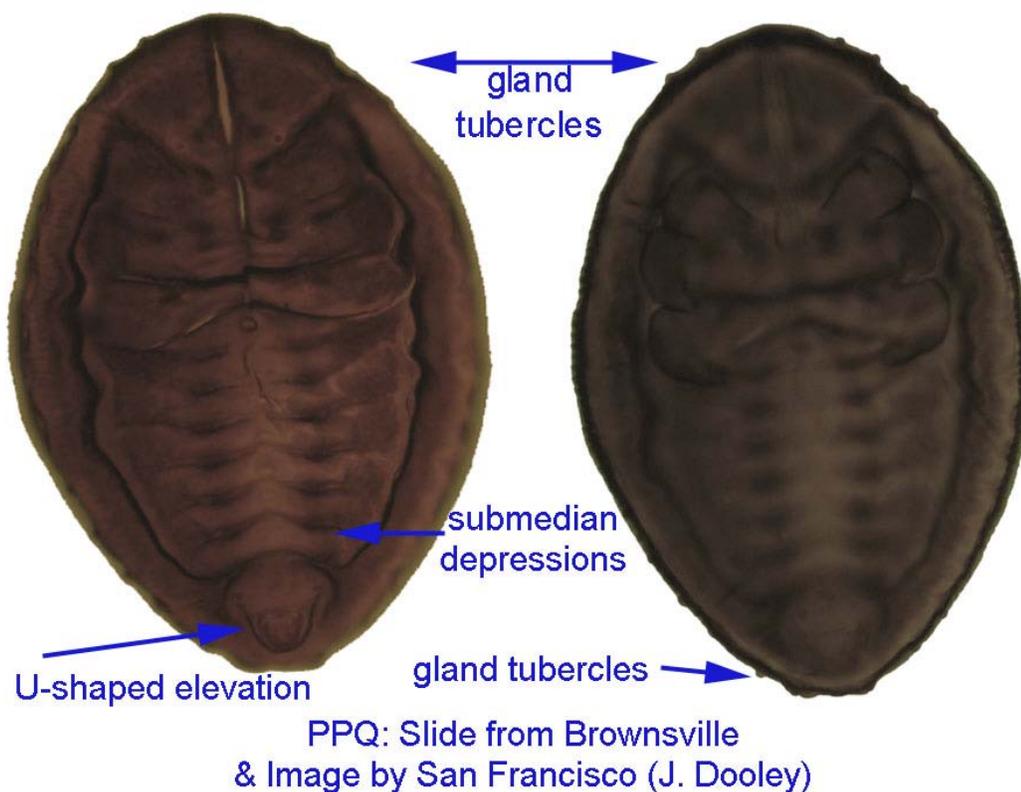
Field characters: Puparia normally oval-shaped, dark brown to black (requiring bleaching for slide examination) with a peripheral ring of white wax (with the dorsal disc lacking any waxy secretions).

Validation & slide mounted characters: Slide mounted specimens normally oval-shaped & margin (dentate or crenulated), not deflexed. The thoracic and caudal marginal folds not differentiated from the rest of the margin; the marginal teeth or crenulations more regularly distributed. Caudal furrow absent; ventrally the caudal & thoracic furrows may have a slight pattern. A distinct submarginal-concentric fold separates the dorsal disc from the submargin; the submarginal area sculptured mesally with fine furrows and ridges; submargin with or without a row of gland tubercles. Cephalic setae present or absent; caudal & 8th abdominal with a pair of setae. Vasiform orifice subcordate and slightly elevated; operculum covers the orifice totally obscuring the lingula.

Comparison - can be superficially confused with:

- ***Aleurocanthus***, but lacks acute spines.
- ***Aleurotrachelus***, but the lingula is simple or hidden by the operculum whereas in ***Aleurotrachelus*** it may be exerted and knobbed; nor is ***Aleurotrachelus*** known to occur on bananas.

Tetraleurodes acaciae Quaintance***



Field characters: Oval with submargin and dorsal disc strongly elevated, shiny black color; with or lacking wax along subdorsal ridge and wax fringe subequal in width about 1/6 as wide as pupal case.

Validation & slide mounted characters: submargin with gland tubercles; cephalothorax with 3 pairs of setae; abdominal segment VIII separated from the anterior segments by intersegmental line that extends to submarginal fold; vasiform orifice on protruding "U" shaped elevation of A₈. abdominal submedian depressions well developed.

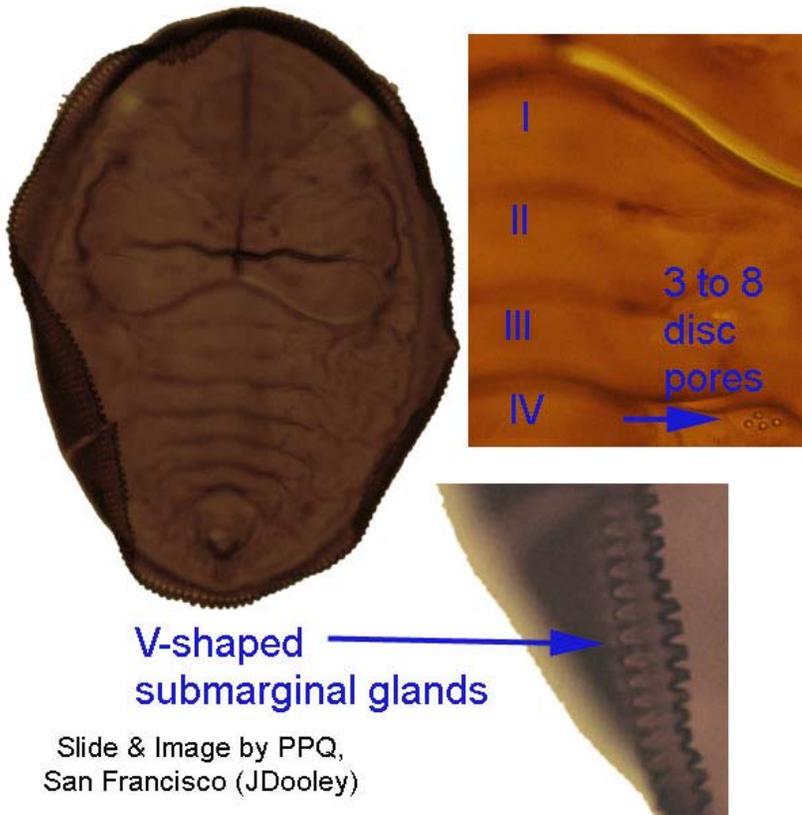
U.S. quarantine notes – Non-Reportable.

Host- Musaceae: Polyphagus including *Musa* sp.; primarily several genera of Fabaceae.

Distribution- Nearctic: Mexico, USA(AZ, CA, FL, TX); Neotropical: Belize, Costa Rica, Dominican Republic, El Salvador, Jamaica, Nicaragua, Panama, Puerto Rico, Trinidad, Venezuela

(For additional information on Host & Distribution see, Mound & Halsey 1978 & Dr. Evans Whitefly Link).

Tetraleurodes mori Quaintance***



Field characters: shape elliptical, color black; sometimes with a peripheral ring of wax in a ragged pattern.

Validation & slide mounted characters: Margin dentate; absence of submarginal gland tubercles, but with a V- or U-shaped glandular area bordered mesad by microtubercular band present extending to the subdorsal fold.

Cephalic pair of submedian setae absent; other two pairs of thoracic setae present. Legs with a narrow band of spinules along the mesal base of the legs, and with a terminal appendage in the form of an adhesion pad. Operculum lacking the posterior notch; abdomen lacks the well-defined submedian (oval) depressions.

Comparison - Easily separated from the other species, by lacking submarginal gland tubercles & the cephalic pair of setae; and the presence of 3 to 8 discoidal pores present subdorsally on A₄.

U.S. quarantine notes –Not reportable.

Host- Polyphagous

Distribution- Nearctic: Mexico, USA(AZ, CA, CT, FL, MA, OH, Washington DC, VA

Neotropical: Cuba, Jamaica

(For additional information on Host & Distribution see Quaintance *The Canadian Entomologist* Vol. XXXI, 1899, Mound & Halsey 1978 & Dr. Evans Whitefly Link).