ALEYROIDIDAE
TRAINING MODULE

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ALEYRODIDAE TRAINING CLASS

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HISTORY OF WHITEFLY TAXONOMY

From the beginning of taxonomic entomology, the family Aleyrodidae have been poorly neglected. The first whitefly described may have been *Aleyrodes proletella* Linnaeus by Carolus Linnaeus (Carl Linne’) circa 1700’s in Sweden. He was the father of our present day nomenclature system: Systema Naturae in 1735 naming all organisms by genus and species.

Kirkaldi first catalogued the species representing the family Aleyrodidae (Homoptera) in 1907. In the following year Quaintance provided a checklist of those species (in 1908). Kirkaldi catalogued 150 species in two genera whereas Quaintance referred to 156 species in three genera. Quaintance and Baker laid out the basis for the present generic classification in 1913 and 1914 dividing the group into three subfamilies: containing one, four and 18 genera respectively.
As of 1978 large numbers have already been described by Takahashi in the Oriental Region, Bondar in the Neotropical Region (Brazil in 1923), and Cohic in the Ethiopian Region:

- More than 1156 species in 126 genera have been described.

The most broad taxonomic works include: Revision of Aleyrodidae of Belize (parts 1 & 2 by Dr. Jon Martin 2005) describing new genera and species, Whiteflies of the Mediterranean Basin (Dr. Jon Martin 2001); Aleyrodidae from Central America and Colombia (thesis by Rafael Caballero, 1992) and Whiteflies of Australia (Dr. Lawrence Mound and Dr. Jon Martin).

Others with significant contributions include L. Russell (S.E.L. retired) describing the Trialeurodini and the Aleurocerus groups); S. Nakahara (S.E.L. retired) describing the North American species of Tetraleurodes; Ben-Dov for the Aleyrodids of Israel; David and Singh for the oriental region, including India; Kotinsky, Misra, and Corbett to name a few.
The classification historically has always been based on the pupal, 4th immature stage, not the adult because the pupal stage is sessile making it much easier to collect on and to identify the pest and the host plant. The pupal stage has many more definitive morphological structures than the adult stages making it easier to separate the genera and species. However, some species (Bemisia tabaci Gennadius, and Trialeurodes spp. as examples) vary in these structures considerably due to their type of plant cuticle (hairy or smooth side of the leaf).
Whiteflies are distributed worldwide with the tropics (63%) and the temperate zone (37%). They occur from the tropics to the deserts of the great Southwest. They are reported from the following biogeographical areas:

- Afrotropical
- Australasian
- Nearctic
- Neotropical
- Oriental
- Palaearctic

Reference: http://tpittaway.tripod.com/sphinx/intro.htm
COLLECT & PREPARE SPECIMENS

Try to collect as many specimens as possible including several life stages. Sometimes two or more pests are intercepted on the same host. If many stages are collected, please submit mounted and unmounted.

Please try to collect and submit males (OK even if not associated with immatures). May add to Ray Gill's key to the adult Aleyrodids known from California.

If you need to forward without making a slide, please package them in this way:

- Immature forms (including pupa) should be submitted dried and pressed, if possible. Never send in a plastic envelope since this acts as an incubator for fungi.
- Adult males and females should be submitted in 70-95% alcohol since they are soft bodied.
 Usually the egg is elongate to oval, but sometimes reniform. The eggs sometimes are sculptured. Cohic in 1968 used this character to separate species. The distal end varies from broadly rounded to acute. The basal end has a pedicel with which the female attaches the egg to the host. According to Despande (1936), Poinar (1965), and Paulson and Beardsley (1985) the pedicel serves as a conduit for moisture to protect the egg. The female inserts the stalk normally through the stomata opening. Egg laying patterns can also be used to recognize different groups. For more information review Gill's Whiteflies of California.
IMMATURE FORMS
(crawler to 3rd stage)

List of diagnostic structures, Con’t:

The crawler stage is mobile with

- Well developed, 3 segmented legs
- Two-segmented antenna with the apical segment elongated

Resource: WHITEFLIES OF CALIFORNIA: Revised 1989       Ray Gill (Retired, CDFA)
IMMATURE FORMS (crawler to 3rd stage)

The 2nd & 3rd stage nymphs are sessile with
Reduced operculum and lingula

- In the 2nd and 3rd stages the legs and antenna are reduced to one segment
- Legs normally oriented toward margin not down or toward median
IMMATURE FORMS
(pupa or 4th stage)

The classification has always been based on the 4th immature stage, pupa, not the adult because the pupa being sessile are much easier to collect making it easier to identify the host plant. Methods to separate the pupal from earlier stages:

- The orientation of the thoracic legs (outwards versus inwards).
- The antennal segment numbers and length of the apical segment will separate the pupa from the crawler stage.

The pupal stage has many more definitive morphological structures than the adult stages making it easier to separate the genera and species.

Some species (*Bemisia tabaci* Gennadius, and *Trialeurodes* spp. as examples) vary in these structures considerably do to their type of plant leaf cuticle whether hairy or smooth.
Fig. 27. Generalized illustration showing dorsal setal and sutural locations in whitefly pupae in the subfamily Aleyrodinae.
<table>
<thead>
<tr>
<th>Aleurodicinae</th>
<th>Aleyrodinae</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Terminal claws</strong> on legs usually present</td>
<td><strong>Adhesion pads</strong> on legs always present</td>
</tr>
<tr>
<td>One genus absent (<em>Stenaleyrodes</em>)</td>
<td>Compound pores always absent</td>
</tr>
<tr>
<td>Compound-style pores present; absent in few genera</td>
<td>May have large discoidal pores</td>
</tr>
<tr>
<td>2 pairs setae on lingula</td>
<td>(e.g. <em>Dialeuropora</em>)</td>
</tr>
<tr>
<td>Antenna <em>usually</em> extends to T3</td>
<td>1 pair setae on lingula</td>
</tr>
<tr>
<td></td>
<td>Antenna <em>usually</em> extends to T1</td>
</tr>
</tbody>
</table>
IMMATURE FORMS (pupa or 4th stage) Con't

List of diagnostic structures:

Terminal leg appendage: separates the two subfamilies

- Absent (Aleurodicinae: *Stenaleyrodes*) or may be obscured (Aleyrodinae or Aleurodicinae, right image)

- Claw (Aleurodicinae)

- pad (Aleyrodinae)
<table>
<thead>
<tr>
<th>Aleurodicinae</th>
<th>Aleyrodinae</th>
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<td>Antenna usually extends to T1</td>
</tr>
</tbody>
</table>

- **Leonardius**
- **Synaleurodicus**
- **Aleurodicus**
- **Lecanoideus**
- **Azuraleurodicus**
- **Bakerius**
- **Paraleyrodes**
- **Eudialeurodicus**
- **Metaleurodicus**

*Images of species and shapes are shown.*
**IMMATURE FORMS** (pupa or 4\textsuperscript{th} stage)

<table>
<thead>
<tr>
<th>Compound-style pores + or –</th>
<th>Compound-style pores absent</th>
</tr>
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<td>1 pair setae on lingula</td>
</tr>
<tr>
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<td>Antenna usually extends to T1</td>
</tr>
</tbody>
</table>

Antennae length and number of segments:

- Elongated extending as far as the metathoracic legs (\textit{usually} Aleurodicinae)
- Short extending at most to the prothoracic legs (\textit{usually} Aleyrodinae)
IMMATURE FORMS
(pupa or 4th stage) Con’t

List of diagnostic structures:

Pore types:

- Compound style pores: size, position and alignment are diagnostic for genera and species
  - Agglomerate type: Leonardius and Synaleurodicus
  
  - Other type may be any size from reduced to enlarged
    - With or without central process
    - May also be cup shape
    - Do not confuse with large simple discoidal pores, such as in Diaeuropora
IMMATURE FORMS
(pupa or 4th stage)

List of diagnostic structures: Compound pores

Central lumen including processes diverse or lacking:

• Cone shaped
• Rod shape (splines) arising from the outer annulus (*Paraleyrodes*)
• Flower pedal style arising from the outer annulus (*Paraleyrodes*)
• If lacking, the internal form varies from empty to an intricate stylized design. Caveat-splines or cones may be reduced or lost (during processing)

with splines/cells

cone or dagger-like
creticulations
IMMATURE FORMS
(pupa or 4\textsuperscript{th} stage)

List of diagnostic structures: Compound pores

Central lumen including processes diverse or lacking:

Do not confuse with disc pores (Dialeuropora): this genus is known for one to 5 large disc pores.
IMMATURE FORMS 
(pupa or 4th stage)

List of diagnostic structures:

Central Processes with or lacking annuli (rings): Con’t

- Absent or cone, dagger, spike or whip shaped

Cone-shaped:
- Aleurodicus
- Lecanoideus

whip or spine shape

Dagger or spike-shaped:
- Azuraleurodicus
- Bakerius

no central processes
IMMATURE FORMS  
(pupa or 4\textsuperscript{th} stage)

List of diagnostic structures:

Central Processes with or lacking annuli (rings): Con’t (*Paraleyrodes*)

- Rod shape (splines) arising from the outer annulus; or,
- Flower pedal style arising from the outer annulus (*Paraleyrodes*); or
- If lacking, the internal form varies from empty to an intricate stylized design. Caveat-splines or cones may be reduced or lost (during processing)
IMMATURE FORMS (pupa or 4th stage) Con’t

List of diagnostic structures:

Pore types con’t: Simple pores

- Simple discoidal pores that may be solitary, in clusters, bands, or scattered (lower left image)
- Specialized pore shapes:
  - Octagonal shaped pores are present as a submarginal row within one Aleurodicine genus
  - Stellate & loculate (star shape) pores
IMMATURE FORMS
(pupa or 4th stage) Con’t

List of diagnostic structures: Lingula

- Exserted

- Inserted

- Number of pairs of apical setae: 2 pairs (Aleurodicinae) or 1 pair (Aleyrodinae)
List of diagnostic structures

**Operculum** structure partially to completely covers the vasiform orifice: shape and size.

- Triangular to sub rectangular shape
- Obscure part of or the entire lingula
IMMATURE FORMS (pupa or 4th stage) Con’t

List of diagnostic structures

Margin:

- Most common shape:
  - Crenulate
  - Dentate (teeth-like)
IMMATURE FORMS
(pupa or 4th stage) Con’t

List of diagnostic structures - Margin: Con’t

The tracheal margin
smooth or indistinct, invaginated, comb, plate, or pore-like

dentate & dentate cleft
crenate & dentate cleft
IMMATURE FORMS
(pupa. stage 4)
Thoracic and Caudal Marginal Pore Area

Resource: WHITEFLIES OF CALIFORNIA:
Revised 1989       Ray Gill (CDFA)
List of diagnostic structures:

Pore types:

Compound style pores: size, position and alignment are diagnostic for genera and species

- Agglomerate type: Leonardius and Synaleurodicus

- Other type may be any size from reduced to enlarged
  - With or without central process
  - May also be cup shape
  - Do not confuse with large simple discoidal pores, such as in Dialeuropora
IMMATURE FORMS (pupa or 4th stage) Con’t

List of diagnostic structures:

Pore types con’t: Simple pores

• Simple discoidal pores that may be solitary, in clusters, bands, or scattered (lower left image)
• Specialized pore shapes:
  – Octagonal shaped pores are present as a submarginal row within one Aleurodicine genus
  – Stellate & loculate (star shape) pores
IMMATURE FORMS  
(pupa or 4th stage) Con’t

List of diagnostic structures: setae, siphons, or spines

Setae.

• Setae present or absent on dorsum or venter. May take various shapes from one to two segmented; slender & whip-like to robust and apically & or basally inflated..
IMMATURE FORMS (pupa or 4th stage) Con’t

List of diagnostic structures:
Siphon shape tubes or Spines:

- *Aleurothrixus antidesmae* Takahashi (below right image) & *Siphoninus* spp. (below left image)

- Spines present in a few genera (may be apically acute, blunt, or flared), : *Aleurocanthus* commonly intercepted (right image)
List of diagnostic structures:

Other structures, con’t:
- Ventral and subdorsal furrows, folds (lower right), and grooves
- Granules (lower left)
IMMATURE FORMS
(pupa or 4th stage) Con’t

List of diagnostic structures:

Other structures, con’t:

– Granules (lower left), transverse ridges
IMMATURE FORMS (pupa or 4th stage) Con’t

List of diagnostic structures:

Other structures, con’t:

- Papillae/tubercles: bullet to flat reniform shape in several genera (most common in the tribe Trialeurodini forming a submarginal row)
- Tubercles may be present scattered over entire surface (lower left)
- Polygonal structures within the thoracic or caudal furrows
IMMATURE FORMS (pupa or 4\textsuperscript{th} stage) Con’t

List of diagnostic structures:

Other structures, con’t:

- Tubercles may be present scattered over entire surface
- Polygonal structures within the thoracic or caudal furrows
### Aleurodicinae

<table>
<thead>
<tr>
<th>Terminal claws on legs + or -</th>
<th>Compound-type pores + or –</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Aleurodicus *</td>
<td>* Acaudaleyrodes *</td>
</tr>
<tr>
<td>* Aleuronudus</td>
<td>* Agrostaleyrodes gen. nov.</td>
</tr>
<tr>
<td>* Austroaleurodicus</td>
<td>* Aleurocanthus *</td>
</tr>
<tr>
<td>* Azuraleurodicus</td>
<td>* Aleurochitin</td>
</tr>
<tr>
<td>* Bakerius</td>
<td>* Aleurocerus *</td>
</tr>
<tr>
<td>* Bondaria (now Dialeurodicus)</td>
<td>* Aleuroclava *</td>
</tr>
<tr>
<td>* Ceralleurodicus *</td>
<td>* Aleurocybotus &amp; Vasdavidius</td>
</tr>
<tr>
<td>* Dialeurodicus *</td>
<td>* Aleurolobus *</td>
</tr>
<tr>
<td>* Eudialeurodicus</td>
<td>* Aleuroglandulus *</td>
</tr>
<tr>
<td>* Lecanoideus *</td>
<td>* Aleuroparadoxus *</td>
</tr>
<tr>
<td>* Leonardius</td>
<td>* Aleuroplatus *</td>
</tr>
<tr>
<td>* Metaleurodicus *</td>
<td>* Aleuropleurocelus *</td>
</tr>
<tr>
<td>* Nealeurodicus</td>
<td>* Aleurothrixus *</td>
</tr>
<tr>
<td>* Nipaleyrodes</td>
<td>* Aleurotithius</td>
</tr>
<tr>
<td><strong>Aleurodicinae</strong></td>
<td><strong>Aleyrodinae</strong></td>
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</tr>
<tr>
<td>Terminal claws on legs + or -</td>
<td>Adhesive pads on legs</td>
</tr>
<tr>
<td>Compound-type pores + or –</td>
<td>Compound pores absent</td>
</tr>
<tr>
<td>* Intercepted in quarantine</td>
<td>* Intercepted in quarantine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Octaleurodicus</strong> *</th>
<th><strong>Aleurotrachelus</strong> *</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paraleyrodes</strong> *</td>
<td><strong>Aleurotuba</strong> *</td>
</tr>
<tr>
<td><strong>Septaleurodicus</strong> (only adults described)</td>
<td><strong>Aleurotuberculatus</strong> * (now <strong>Aleuroclava</strong>)</td>
</tr>
<tr>
<td><strong>Stenaleyrodes</strong></td>
<td><strong>Aleurotulus</strong> *</td>
</tr>
<tr>
<td><strong>Synaleurodicus</strong></td>
<td><strong>Aleurovitreus</strong> gen. nov.</td>
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<tr>
<td></td>
<td><strong>Aleyrodes</strong> *</td>
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<tr>
<td></td>
<td><strong>Asialyrodes</strong></td>
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<tr>
<td></td>
<td><strong>Asterobemisia</strong> *</td>
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<td></td>
<td><strong>Bemisia</strong> *</td>
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<td></td>
<td><strong>Crenidorsum</strong> *</td>
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<tr>
<td></td>
<td><strong>Dialeurodes</strong> *</td>
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<td></td>
<td><strong>Dialeuropora</strong> *</td>
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<tr>
<td></td>
<td><strong>Dialeurolonga</strong> *</td>
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<tr>
<td></td>
<td><strong>Disiphon</strong></td>
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<td></td>
<td><strong>Martiniella</strong> * (now <strong>Aleuroclava</strong>)</td>
</tr>
<tr>
<td>Aleurodicinae</td>
<td>Aleyrodinae</td>
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<td>-----------------------</td>
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<td>Terminal claws on legs + or -</td>
<td>Adhesive pads on legs</td>
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<td>Compound-type pores + or –</td>
<td>Compound pores pores absent</td>
</tr>
<tr>
<td>* intercepted in quarantine</td>
<td>* intercepted in quarantine</td>
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<tr>
<td></td>
<td>Minutaleyrodes *</td>
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<tr>
<td></td>
<td>Odontaleyrodes *</td>
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<tr>
<td></td>
<td>Orchamoplatus *</td>
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<td></td>
<td>Peracchius gen.nov.</td>
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<tr>
<td></td>
<td>Paraleurolobus *</td>
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<td></td>
<td>Pealius *</td>
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<td></td>
<td>Rusostigma *</td>
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<td>Singhius</td>
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<td></td>
<td>Siphoninus *</td>
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<td></td>
<td>Tetraleurodes *</td>
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<tr>
<td></td>
<td>Tetralicia *</td>
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<tr>
<td></td>
<td>Trialeurodes *</td>
</tr>
<tr>
<td></td>
<td>Trialeurolonga gen.nov.</td>
</tr>
</tbody>
</table>
ADULTS

List of diagnostic structures:
- Wings: front wings with vein forked or not

Antennae
- 4 to 7 segments
- Variously shaped sensoria: primary, cone, or banded shapes

Eyes
- Upper & lower ocular lobes divided or connected by ommatidium

Genitalia
- Aedeagus (including associated claspers) and ovipositors

Paronychium
- Spine like or thickened

Setal brushes and combs on meso- and metatibia
- Brush is a double set of brushes on the inner and outer lateral edges of the tibia just distad of mid length.
- Comb is a unique linear group of setae that are normally smaller, less sclerotized, and closer together. This occurs along the dorsal or dorsal lateral surface of the tibia.

Ventral abdominal wax plates
- Numbers of pairs depend on subfamily and gender.
ADULTS (Wing Venation)

Major differences exist between the adults of the Aleurodicinae and the Aleyrodinae: reduced or strong wing venation; number of wax plates per sex; and the shape of the tarsal paronychium. Little work has been done with the adults since 1913 when Quaintance and Baker classified the two subfamilies according to wing venation.

<table>
<thead>
<tr>
<th>Aleyrodinae</th>
<th>Aleurodicinae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced:</td>
<td>Strongly developed:</td>
</tr>
<tr>
<td>Costal-subcostal veins</td>
<td>Costal-subcostal veins</td>
</tr>
<tr>
<td>Rs (R1 short or absent)</td>
<td>RS, R1</td>
</tr>
<tr>
<td>Occasionally with cubital veins</td>
<td>Cubitus veins</td>
</tr>
</tbody>
</table>

Note: Paraleyrodes -(the pupa have Aleurodicinae traits while the adults have Aleyrodinae traits).
ADULTS (Wing Venation)

Aleyrodinae
Fore-wing not forked

Aleurodicinae
Fore-wing forked

exception is *Paraleyrodes*
ADULTS

Antennae con’t

Antennae normally 7 segmented

- *Paraleurodes* male, with 4 terminal segments fused forming three segments.
- *Aleurocybotus* adult male if elongated, slender, & curved
- Antennal sensoria consist of primary sensoria, and sensorial cones or annulated flat sensoria.
  
  - Types of sensoria: Primary, flattened band shaped, cone-shaped (difficult to observe cone sensor unless mounted in hoyers per CDFA.

* Aleurocybotus

* Dialeurodes citri

Annulated flat sensoria
ADULTS

Compound Eyes: may be generic or specific. Occasionally, when the sections are linked, the number of ommatidia connecting the upper and lower sections may also be significant.

- Consists of numerous ommatidia forming upper and lower lobes.
- Eye lobes either divided or connected by one or more ommatidia.

Resource: Ray Gill, CDFA

Image by John Dooley, PPQ
ADULTS

Genitalia:

The aedeagus & the pair of claspers provide useful taxonomic features, but only in the male with one exception of the female ovipositor.

- In *Paraleyrodes* the apex of the aedeagus exhibit shapes unique to a particular species (left image).
- In *Aleurothrixus floccosus* (Maskell) the dorsal surface of the aedeagus has a sub basal, dorsal protuberance (2nd from left image)
- In *Aleurothitius* the female ovipositor is long and extended (2nd from right image)
- Normal ovipositor (right image)
ADULTS

Tarsal paronychium:

• Thin & spine like for the Aleyrodnidae.
• Thickened & micro setae on plantar surface for the Aleurodicinae.

----Paronychium between claws
ADULTS

Tibial combs occur on the metatibia only.

- Only *Aleurothrixus floccosus* female has two rows of combs.
ADULTS

Tibial brushes on the meso and metatibia only.

2 setae in brush

3 or more setae in the brush
ADULTS

Ventral abdominal wax plates

Aleyrodinae
- 4 plates (males)
- 2 plates (female)

Aleurodicinae
- 3 plates (males)
- 4 plates (females)
Glossary

- Adhesion pads are cushion-like structures that form the apical terminal appendage of the legs.
  - They are present only in the immature form of the Aleyrodinae subfamily.
- Agglomerate pores are a type of compound pores for the purposes of this key consisting of sub-circular to oval large pore-like structures with a clear margin containing a central cluster of small pore-like or papillae.
  - according to Quaintance (1917) "consist of a clear marginal area and a central area composed of numerous small papillae or rod-like pores, giving this area the appearance of a brush."
  - according to Caballero, "simple pore arranged in a restricted circle, giving the appearance of a compound pore; there is a large, chitin process in the center..."
- Annulus (plural, annuli) refers to the structure in compound pores composed of a ring of facets or "spinneret" cells that resemble variable shaped facets or cells.
- Central process are structures, if present, that rise from the center (central lumen) of a compound pore in the form of splines (rods), cones, spikes or other shapes.
- Cordate vasiform orifice refers to the "heart-like" shape of the orifice.
Glossary

• Claws are hook-like structures that form the apical terminal appendage of the leg.
  • They are present in the immature stages of the Aleurodicinae subfamily of whiteflies and the adult stages of all whiteflies.

• Compound pore (for the purposes of this key) are the following:
  • a small to large invaginated gland with none to several distinct spinneret cells (or loculi) arranged in a circular fashion at the lumen (central base) at its base. A central process may be absent or emerge from the central lumen in the form of splines (rods), cones, spikes or other shapes.
  • small circular or sub circular glands enclosing a cluster of pitting or papillae-like structures, also known as agglomerate compound pores.
  • Caveat: do not confuse with large simple discoidal pores found in *Dialeuropora* species.

• Disc (discoidal) pores are a minute to large, circular, pore without locules, spinneret cells, central processes, other ornamentation or patterns occurring on the sub medial, sub dorsal or sub marginal dorsal surface.

• Double-rimmed simple pore is a circular pore along the sub margin with a light, central portion encircled by a dark rim which is also encircled the same but lighter rim.
Glossary

- Exserted lingula refers to the lingula projecting beyond the posterior margin of the vasiform orifice.
- Inserted lingula refers to the lingula contained within the vasiform orifice.
- Lingula is the dorsal organ that is attached within the vasiform orifice with a pointed, paddle, or tongue shaped appearance; considered an organ to remove fecal material. It may be contained within (inserted) or extend beyond the orifice (exserted). It only occurs in the Aleyrodidae and is found in all but the egg stage.
- Octagonal pores are sub circular complex pores with the central area taking the shape of a star (consisting of 8 cells).
- Operculum is the plate or cover-like structure that partly or completely covers the vasiform orifice. It may cover the lingula partially or completely.
- Reniform septate pore is a simple kidney shaped pore with a raised or flush.
- Septate simple pore is a circular or sub circular, slightly tuberculate and faintly porous pore with a rim much darker than the center and a bar-like line extending bisecting the pore.
Glossary

• Terminal (apical) appendages of the legs consists of either an adhesion pad or a claw: "adhesion pad" (cushion-like and usually hyaline) structures for only the immature stages of the Aleyrodinae.
  • claws are found only in the immature Aleurodicinae subfamily and replace the pads in the adult stage.
  • claws are found only in the immature Aleurodicinae subfamily and replace the pads in the adult stage.
  • All adults have claws.
• Vasiform orifice is the dorsal anal opening on the last abdominal segment; covered by the plate-like operculum enclosing partly or completely the lingula.
• Wide rim pore is a circular or sub circular, sometimes sub marginal, with the rim as wide or wider than the center's diameter.