Insect Scatology

Diagnosing the activity of insects based on their “leavings”
Insects leave behind....

- Body parts
- Secreted materials (silk, wax)
- Excreted matter (frass, honeydew, etc.)
METAMORPHOSIS

exuvium

instar III

MOLTING

instar IV
Chewing insects typically consume the old cast skin to recover nutrients.
Plant-feeding Arthropods that feed with sucking mouthparts

- **Hemiptera** (true bugs, aphids, leafhoppers, whiteflies, mealybugs, scales, etc.)
- **Thysanoptera** (thrips)
- **Acari** (mites)
Aphid shedding previous exoskeleton (cast skin)
Diagnostic: Cast Skins remain after aphids molt
Plant bug nymphs
Greenhouse whitefly
Armored Scales  Family Diaspididae
Soft Scales  Families Coccidae, Eriococcidae and others
Like aphids, soft scales suck sap from the phloem and excrete honeydew.
Silk

Webbing can be visible with outbreak populations

The amount of silk produced varies among spider mite species
Wax as body covering
Mealybugs

Wax covers the body and is used to create an egg sac
Hawthorn mealybug and associated wax
Woolly Aphids
Old cast skins and egg shells are good diagnostics for spider mites.
Insect excrement will be based on:

- Feeding habit
  - Chewing
  - Sucking
- Type of food
- Where it feeds
Honeydew production
Honeydew Producing Insects*

- Aphids
- Soft scales
- Leafhoppers (phloem feeders)
- Psyllids (some)
- Whiteflies
- Mealybugs

*All suck sap from the phloem*
Like aphids, soft scales suck sap from the phloem and excrete honeydew.
Pear psylla

Honeylocust leafhopper
Sooty Molds

Ubiquitous fungi that grow on honeydew contaminated surfaces
Sooty mold associated with high numbers of whiteflies
Ants and Aphids – A Mutualistic Relationship

- Aphids provide food – *honeydew*
- Ants provide protection
Honeydew Producing Insects*

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*All suck sap from the phloem
Leafcurling aphid – Leafcurl ash aphid
Excrement is covered with wax. This keeps the insects from being covered with honeydew.
Within the confines of the gall honeydew is covered with wax and forms balls.

Transition to lerp?
Lerps

Wax-coated pellets
Potato/tomato Psyllid
“Psyllid sugar” is a unique and diagnostic excrement it produces.
Excrement of boxwood psyllid (Eastern US species)
Tar Spots

Produced by mesophyll-feeding insects and mites
Lace Bugs

Hemiptera: Tingidae
Flecking wounds are symptomatic on the upper leaf surface
“Tar spots” and old cast skins are symptomatic on the lower leaf surface.
Order Thysanoptera

Thrips
Thrips injuries – Silvery scars with small dark fecal spots
Leafhoppers

Hemiptera: Cicadellidae
Injuries Produced by Leafhoppers

- Removal of sap (phloem feeders)
- Stippling leaf injuries (mesophyll feeders)
- Hopperburns (*Empoasca* spp.)
- Transmission of phytoplasmas (phloem and xylem feeders)
Stippling injuries produced by leafhoppers that feed on the mesophyll
Leafhopper injuries to Virginia creeper and grapes are caused by several species.
Spider Mites?

Acari: Tetranychidae
Xylem-feeders

Spittlebugs and sharpshooter leafhoppers
Spittlebugs (Cercopidae)
Adult spittlebugs (froghoppers)
Sharpshooter leafhoppers feed on the xylem.

They will flick watery droplets as they feed.
Fly Specks
Fly specks
Musca domestica

Vomitus

Feces
INSTANT HAND SANITIZER

Kills 99.99% of most common germs
Rub onto hands until dry.
Shore Flies
Shore Fly (left) versus Fungus Gnat (right)
‘Fly specks’ associated with shore flies
Algae is the food of larval stages of shore flies
Flower (Syrphid) Flies
Syrphid egg in aphid colony
Syrphid fly larvae are common predators of aphids.
Syrphid fly larvae excrete tarry smears amongst aphid colonies
Meconium

Material excreted immediately following adult emergence
Meconium is excreted after a butterfly or moth emerges from the pupa
Meconium from cabbage looper
The army cutworm and “rectal loading”
Frass Produced by Lepidoptera
Frass produced by gypsy moth

Caterpillar, frass pictures by Phil Nixon
Leaf/Needle-feeding Sawflies
Frass Produced by Coleoptera
Some beetle larvae carry their frass
Photograph courtesy of Bruce Watt
Frass Produced by Grasshoppers
Frass Associated with Wood Boring Insects
Characteristic shavings produced by tunneling of Asian ambrosia beetles
Termites carry in soil mixed with feces
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New York Herald Tribune

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