

Insect Identification

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Taxonomy: science of classifying organisms

Names help humans organize and talk about things.

However, you don't have to be a taxonomist to make **correct, effective** management identifications.

The Basic Organization

**Multiple common names:
clown or snakeweed
grasshopper**

- Kingdom - Animalia
- Phylum - Arthropoda
- Class - Insecta
- Order - Orthoptera
- Family - Acrididae
- Genus - *Hesperotettix*
- Species - *viridis*



The Critical Categories

- Kingdom - Animalia
- Phylum - Arthropoda
- Class – Insecta
- Order - Orthoptera
- Family - Acrididae
- Genus - *Hesperotettix*
- Species - *viridis*

The Importance of Insect Order and Family identification

1. ID books are organized around these classification levels.
2. Many times, Family level ID is sufficient for management.
3. For genus or species level ID you need specialized taxonomic keys (if available) or expert assistance.

How you can identify insects

- Know the basic body forms of adult and immature insects.

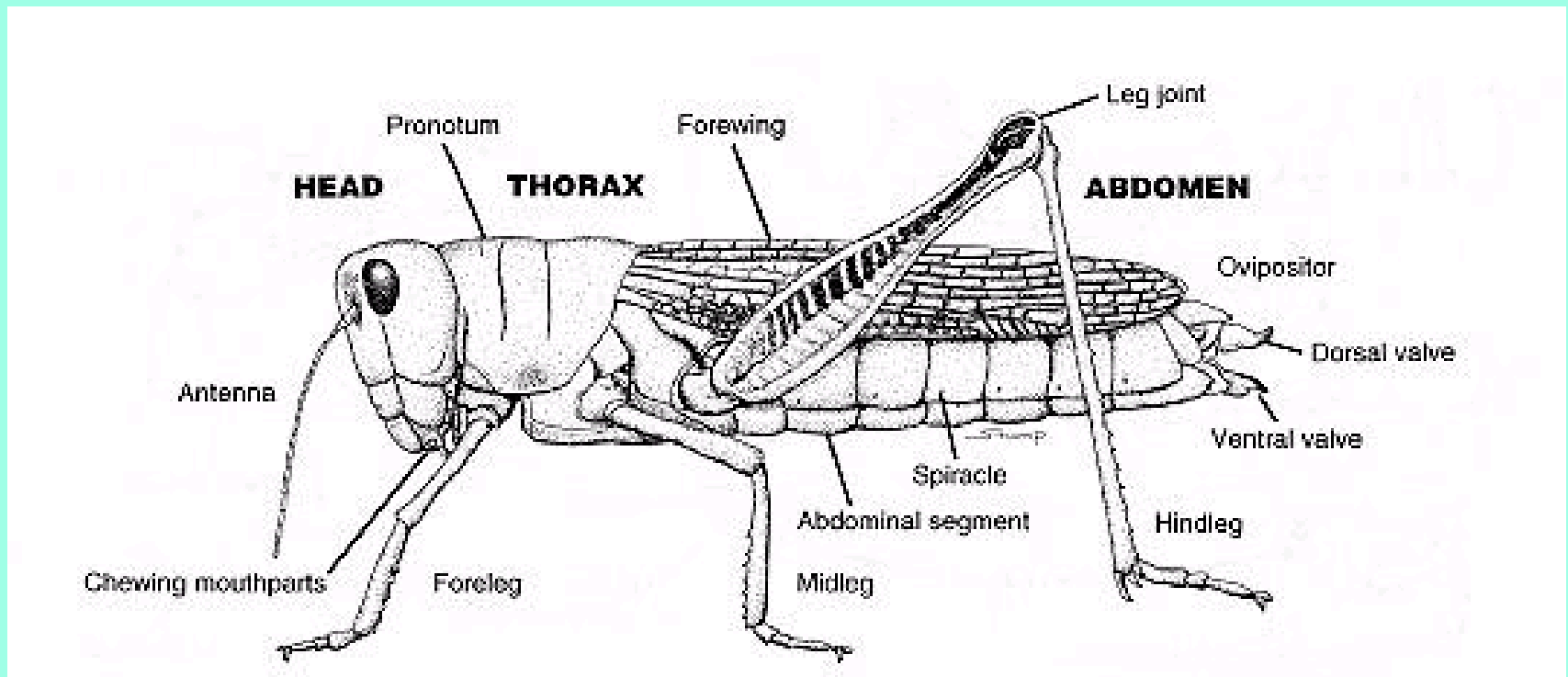
The Diagnostic Characteristics of:

Class Insecta

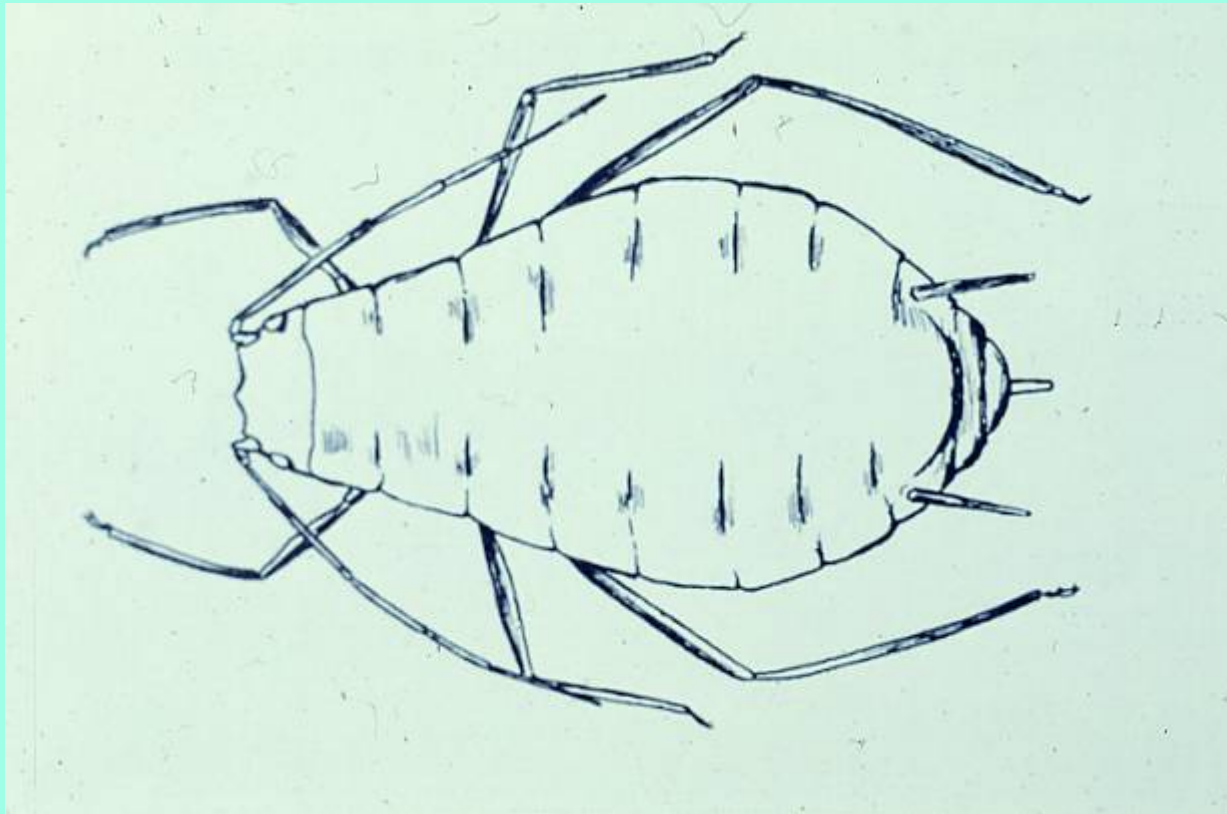
Adult Insect Characters:

- 3 pairs of legs
- 3 body regions (head, thorax, abdomen)
- Zero, 1, or 2 pairs of wings
- 1 pair of antennae

The Diagnostic Characteristics of Insecta:



The Diagnostic Characteristics of Insecta?



How you can identify insects

- Know the basic body parts used as diagnostic characters.

HEAD -

- COMPOUND EYES (SIZE, SHAPE, COLOR)
- SIMPLE EYES (OCELLI) - IF PRESENT
- **TYPE OF ANTENNAE:**



Thread-like (filiform)
/many beetles,
some moths, grasshoppers/



Elbowed
/ants,
some wasps/



Aristate
/true flies/



Clubbed
/butterflies/



Plumose
/some moths,
some beetles/

VERY important! - TYPE OF MOUTHPARTS:

determine feeding damage



Mandibles (chewing)
/wasps, beetles, dragonflies,
grasshoppers, cockroaches/



Proboscis (sucking)
/butterflies, moths, bees/



Piercing-sucking beak
/true bugs, predatory flies/

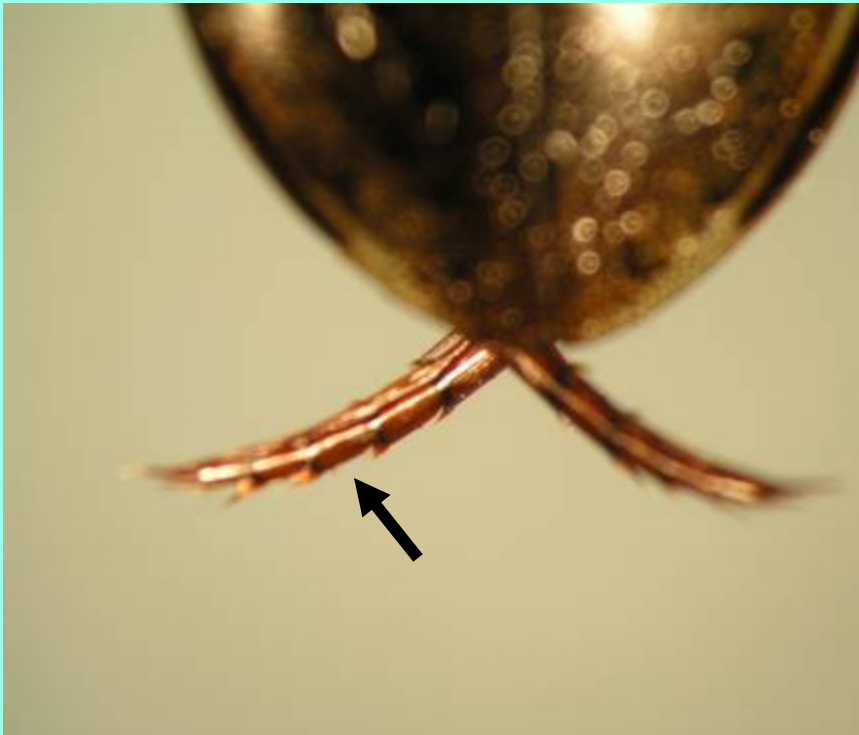


Sponging
/true flies/

Tarsi = Feet

shaped for swimming

shaped for climbing



How you can identify insects

- Know the basic body forms of adult and immature insects.

Insect Life Cycles

Immature insect's forms and features can vary greatly from the adult stage.



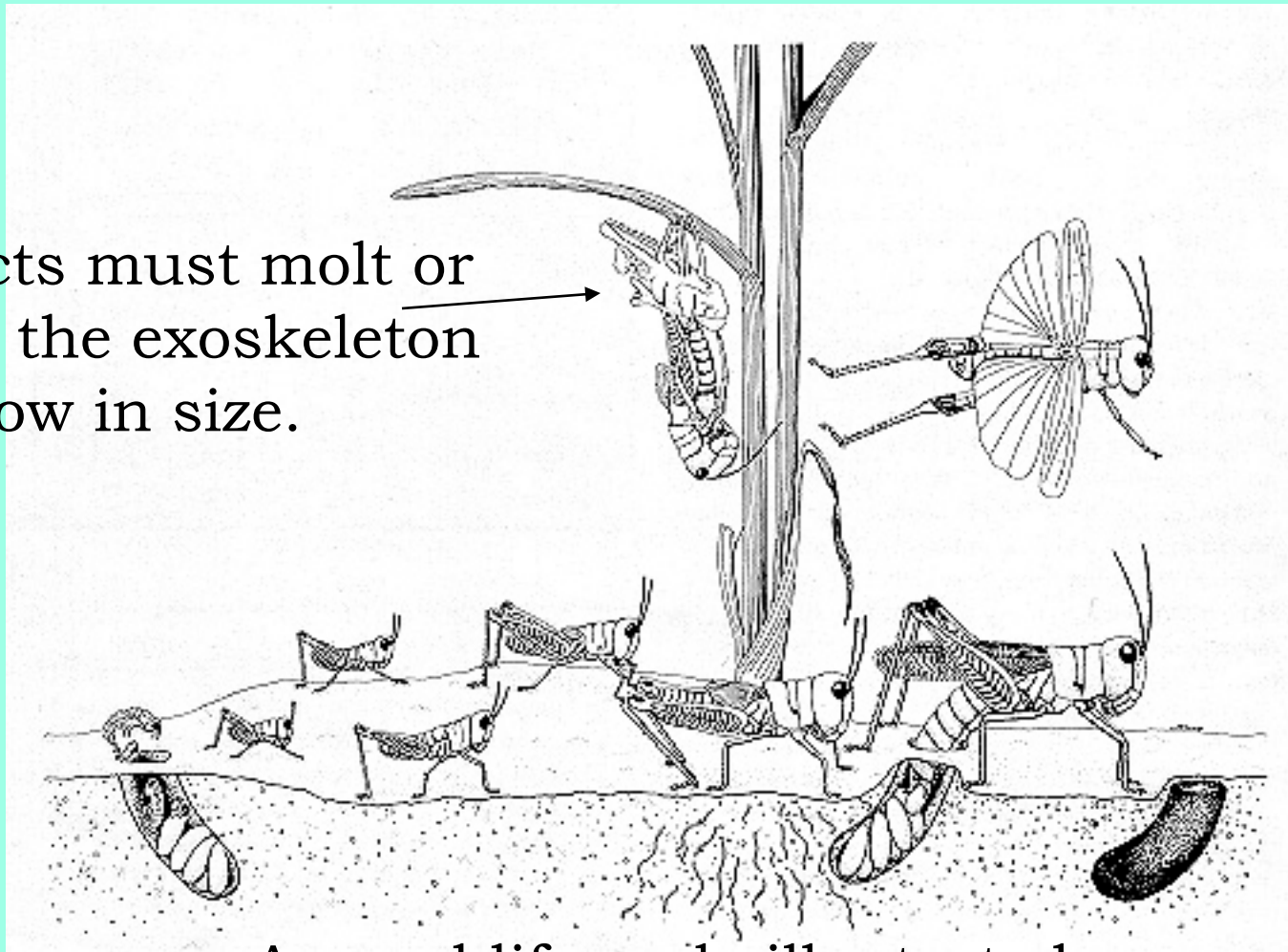
Immature dragonfly



Adult dragonfly

Simple Metamorphosis

Insects must molt or shed the exoskeleton to grow in size.



Annual life cycle illustrated.

Complete Metamorphosis

Monarch
butterfly adult



egg



larva or caterpillar



chrysalis or pupa

Insect Larvae forms



Vermiform – no legs,
worm-like; grub or maggot.

Bronze birch borer



Insect Larvae forms

Vermiform – with no head capsule, just hooks



a.k.a. maggot

House fly



Insect Larvae forms

Vermiform – with head capsule no legs



fungus gnat

by Mark Ascerno

Insect Larvae forms



Campodeiform – legs well developed, mobile.

7-spotted lady beetle



Sevenspotted Lady Beetle (*Coccinella septempunctata* Linnaeus)
Photo By: Kansas Department of Agriculture 7/11/2003 ImageID: 18754
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Insect Larvae forms



Scarabaeiform – have legs but limited locomotion.



Tenlined June beetle

Tenlined June Beetle (*Polyphylla decemlineata* (Say))
Photo By: Kansas Department of Agriculture 7/11/2003 ImageID: 18341
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Insect Larvae forms



Sugarbeet wireworm larva

Click beetle
Elateridae Family

Elateriform – long, hardened, cylindrical body with short legs.



Corn Wireworm(*Aeolus* sp.)
Photo By: Kansas Department of Agriculture 7/11/2003 ImageID: 18523
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Insect Larvae forms



Currier (2)
Black Swallowtail (Papilio polyxenes asterius)
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Black Swallowtail larva
and adult.

Eruciform – six thoracic legs
with abdominal prolegs for
movement.



Black Swallowtail (Papilio polyxenes asterius Stoll)
Photo by: Kansas Department of Agriculture 7/21/2003 ImageID: 21134
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How you can identify insects

- Get good guide books for general and specialized uses. Some ID books are written specifically on plant pest and use the plant species and damage done to determine species.

Some good books:

- Peterson Field Guides: Insects
- Photographic Atlas of Entomology and Guide To Insect Identification
- How to Know the Immature Insects
- Insects and Diseases of Woody Plants of the Central Rockies*
- Pests of the West *

Book title list hand-out .

Peterson's Field Guide Orders

- 26 Orders: Many Orders won't be encountered or noticed because of their size, habitat, or life cycle. Some new classifications and new insect Orders in current literature, but it is a good general reference.



**Principle Insect Orders of
Horticultural Importance**

Order Orthoptera - Grasshoppers, Crickets, Katydid, *Mantids, *Walkingsticks, *Cockroaches



Photo of Grasshopper (Dasylabus bicolor pictus) (Thomson)
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Photo of Grasshopper (Dasylabus pictus) (Thomson)
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Photo of Mantid (Stagmomantis carolina) (Cahoon)
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Photo of Cockroach (Blattella germanica) (Linnaeus)
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Photo of Walkingstick (Zoniopoda sp.) (Linnaeus)
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*These are now separate Orders in new classifications; Mantodea, Phasmatodea, Blattaria, respectively.

Order Orthoptera - Suborder Caelifera

“short antennae”



Pictured Grasshopper (*Doetylotum bicolor pictum* (Thomas))
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pygmy grasshopper not a pest

Order Orthoptera - Suborder Ensifera - Crickets, Katydid

Mormon cricket



Jerusalem cricket



Mole cricket



Order Orthoptera - *Mantids



Carolina Mantid(*Stagmomantis carolina* (Johannson))
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*Now Order Mantodea in new classifications.

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Order Orthoptera - *Walkingsticks



Walkingstick(*Diaperomera velii* Walsh)
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*Now Order Phasmatodea in new classifications.

Order Orthoptera - *Cockroaches



German Cockroach (*Blattella germanica* (Linnaeus))
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*Now Order Blattaria in new classifications.

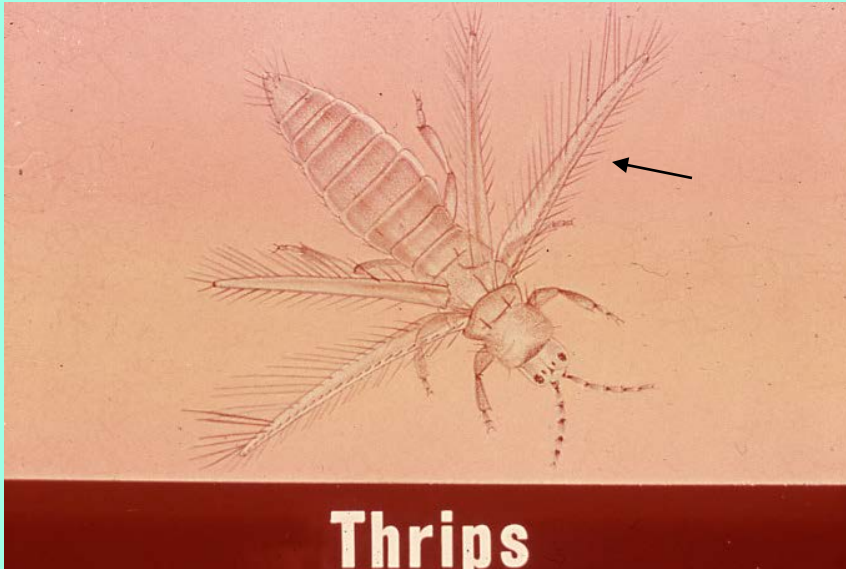
Order Dermaptera - Earwigs

“skin-wing”



Order Thysanoptera - Thrips

“fringe-wing”



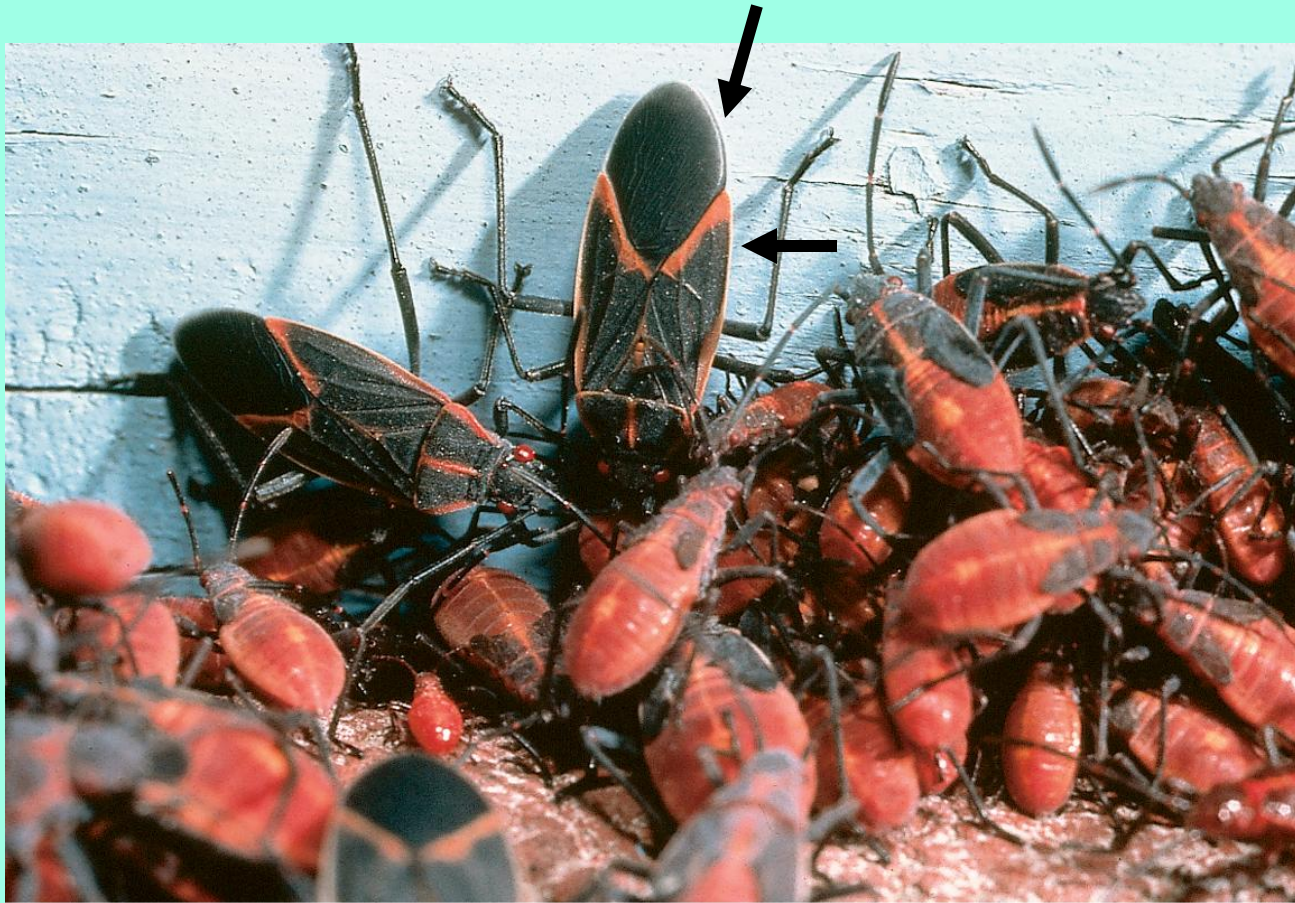
Fringe of hairs around wings is a diagnostic character. Not all species have wings and the nymphs don't either.

Common thrips scrap off the top layer of leaves and feed. Can be human pests and cause skin irritation.



Order Hemiptera - True Bugs

“half-wing”



Boxelder Bug(*Boisea trivittata* (Say))

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Order Hemiptera - True Bugs



two texture wings



Beak starts from front of head and folds back when not in use.

Order Homoptera - Hoppers

“same-wing”



Piercing sucking beak from
base of head

Adult and nymph

Order Homoptera - Aphids



Flora Aphid (Acyrtosiphon sp.)
Photo: 10/10/10 10/10/10 10/10/10
Kansas State University
Small Photo: 10/10/10 10/10/10
10/10/10/10/10

Order Homoptera – Cicadas aka periodic locusts



Periodical Cicada (*Magicicada septendecim* (Linnaeus))
Photo by: Ward Upham, 6/3/2003 ImageID: 23255
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Order Homoptera – Hoppers and Planthoppers



Watercress Sharpshooter(*Draeculacephala mollipes* (Say))
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Order Homoptera - Whiteflies



Greenhouse Whitefly (*Trialeurodes vaporariorum* (Westwood))
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Order Homoptera - Scale Insects

“Soft Scale” example



Cottony Maple Scale (*Pulvinaria innumerabilis* (Rothwarf))
Photo by: Kansas Department of Agriculture, 2000903 Inagaki 17889
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“Hard Scale” example



San Jose Scale (*Quadraspidiotus perniciosus* (Comstock))
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Immobile as adults, females, secrete hard or soft covering

Order Homoptera - Mealybugs

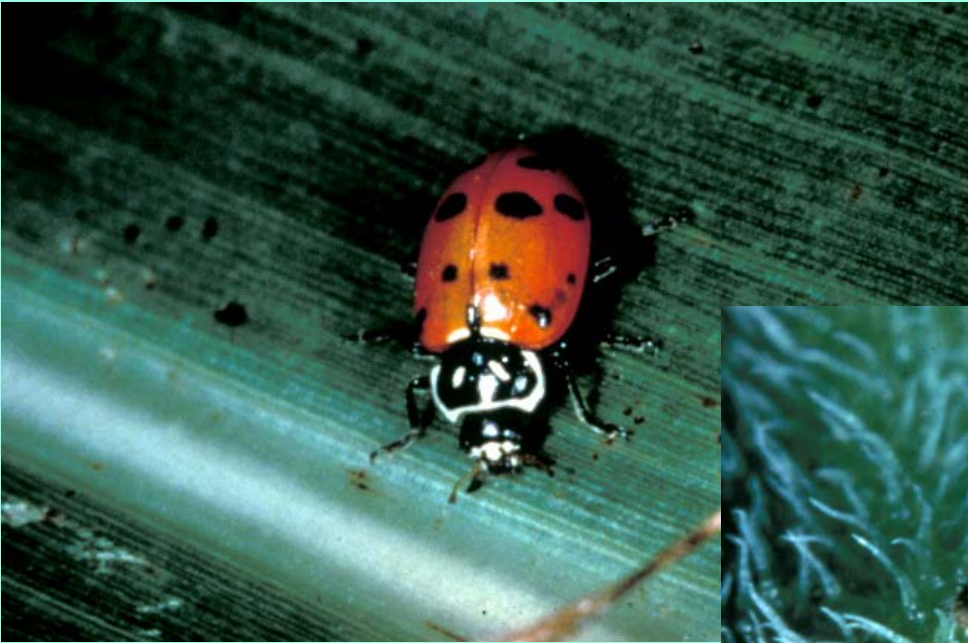


Longtailed Mealybug(*Pseudococcus longispinus* (Targioni-Tozzetti))
Photo By: Kansas Department of Agriculture 7/10/2003 ImageID: 17795
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secret waxy covering over their bodies

Order Coleoptera - Beetles

“sheath-wing”



Ladybird adult

Ladybird larva



Coleoptera - Beetles

Front wings are called elytra and meet in a straight line.

Typical front wings spread slightly.

A few have short front wings.



Order Lepidoptera - Butterflies and Moths

“scale-wing”



Eastern Tent Caterpillar (*Malacosoma americanum* (Fabricius))
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A close-up photograph of a plant stem, likely a grass or similar species, showing numerous small, white, seed-like structures (achenes) attached to the stem. Some of these structures are dark brown, possibly indicating they are mature or have been eaten. The background is a soft, out-of-focus light blue-grey.

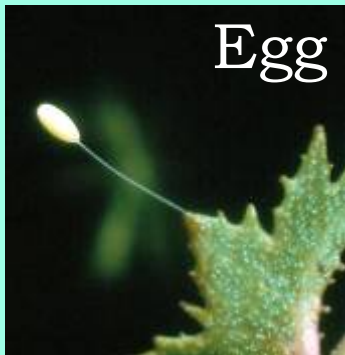
**Butterflies and Moths
have wing scales that
give color and pattern to
the wings**

Order Neuroptera - Lacewings

“nerve-wing”



Both adults (left) and larvae (below) are beneficial predators.



Order Diptera - Flies

“two-wing”

This Robber fly from Asilidae mimics a bee for defense.



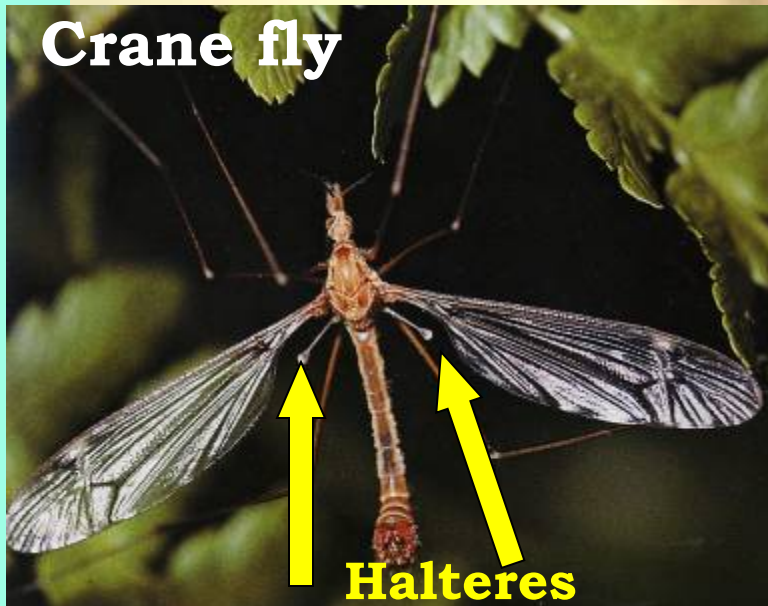
Robber Fly (*Laphria grossa* Fabricius)
Photo By: Kansas Department of Agriculture 7/22/2003 ImageID: 21894
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Syrphid fly larva
hunting for aphids.

Order Diptera - Flies

Modified and reduced hind wings called Halteres are the diagnostic character



Crane fly

Halteres

Hymenoptera - Bees

“membrane-wing”

Adult

Larvae in cells



Hymenoptera - Non-stinging Wasps



many tiny, very
specialized species
are found in nature

A dead aphid, killed by the wasp larvae
developing inside it.

Hymenoptera - Stinging Wasps



Voracious predators
of other insects.

Have warning coloration

2 pairs of wings,
“Wasp waist”

MCES

Hymenoptera - Ants



Western Harvester Ant (*Pogonomyrmex occidentalis* (Cresson))
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The thin connection between the thorax and abdomen has one or two humps in all ants.

Hymenoptera - Sawflies

The worst plant pests in the Order. They lack the wasp waist of other members of the Order.



Adult

Plant feeding larvae



European Pine Sawfly (Neodiprion sertifer) (Goffroy)
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