



## CMG GardenNotes #313 Insect Orders

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### **Anoplura** Sucking Lice

- Feeds by sucking blood from mammals.
- Some species (head lice and crabs lice) feed on humans.

**Metamorphosis:** Simple/Gradual

**Features:** [Figure 1]

- Wingless
- Mouthparts: Piercing/sucking, designed to feed on blood.
- Body: Small head with larger, pear-shaped thorax and nine segmented abdomen.



Figure 1. Sucking lice

## ***Blattaria*** (Subclass of *Dictyoptera*)

### **Cockroaches and Woodroaches**

- Most species are found in warmer subtropical to tropical climates.
- The German, Oriental and American cockroach are indoor pests.
- Woodroaches live outdoors feeding on decaying bark and other debris.

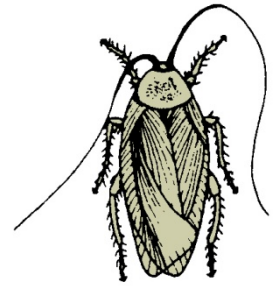


Figure 2. American cockroach

#### **Metamorphosis:** Simple/Gradual

#### **Features:** [Figure 2]

- Body: Flattened
- Antennae: Long, thread-like
- Mouthparts: Chewing
- Wings: If present, are thickened, semi-transparent with distinct veins and lay flat.

## ***Coleoptera***

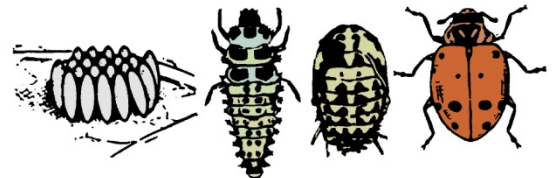
### **Beetles and Weevils**

- *Coleoptera* is the largest order of insects with 290,000 species worldwide and some 24,000 species in North America.
- Many species are plant feeders; some are predaceous (ground and lady beetles), scavengers (scarab and hide beetles), or aquatic.
- The term *weevil* refers to a snout beetle.

#### **Metamorphosis:** Complete

[Figure 3]

Figure 3. Coleoptera metamorphosis (left to right): egg, grub, pupa, and adult



#### **Adults:**

- Wings: two pair
  - Front pair, called *elytra*, are greatly thickened and shell-like (form fitting) and make a straight line down the back when at rest.
  - Hind wings are membranous and protected by the front pair.
  - A few beetles are wingless, or have only the front pair.
- Mouthparts: Chewing
- Antennae: Noticeable, generally quite stout
- Cerci (tail-like appendage): None

#### **Larva:**

- Legs:
  - Larva that feed externally on plants are the typical “grub” with head capsule, three pair of legs on thorax, and no prolegs on the abdomen. [Figure 4]

- Some larva that feed internally in plants (e.g., bark beetles, and wood borers) may be maggot-like with no head capsule and no legs.
- Mouthparts:** Chewing

Figure 4. Grub with head capsule, three pair of legs on the thorax, and no prolegs on abdomen.



**Beneficial families include:**

- Blister beetles, *Meloidae*
- Carrion beetles, *Silphidae*
- Checkered beetles, *Eleridae*
- Darkling beetles, *Tenebrionidae*
- Fireflies, *Lampyridae*
- Ground beetles, *Carabidae*
- Lady beetles, *Coccinellidae*
- Rove beetles, *Staphylinidae*
- Scarab beetles, *Scarabaeidae*
- Soldier beetles, *Cantharidae*
- Tiger beetles, *Cicindelidae*

**Pest families include:**

- Bark and ambrosia beetles, *Scolytidae*
- Blister beetles, *Meloidae*
- Carpet beetles, *Dermestidae*
- Click beetles or wireworms, *Elateridae*
- Ground beetles, *Carabidae*
- Leaf beetles, *Chrysomelidae*
- Longhorned beetles or roundheaded borers, *Cerambycidae*
- Metallic wood beetles or flatheaded borers, *Buprestidae*
- Sap beetles, *Nitidulidae*
- Scarab beetles including rose chafer, *Scarabaeidae*
- Seed beetles, *Bruchidae*
- Weevils, *Curculionidae*

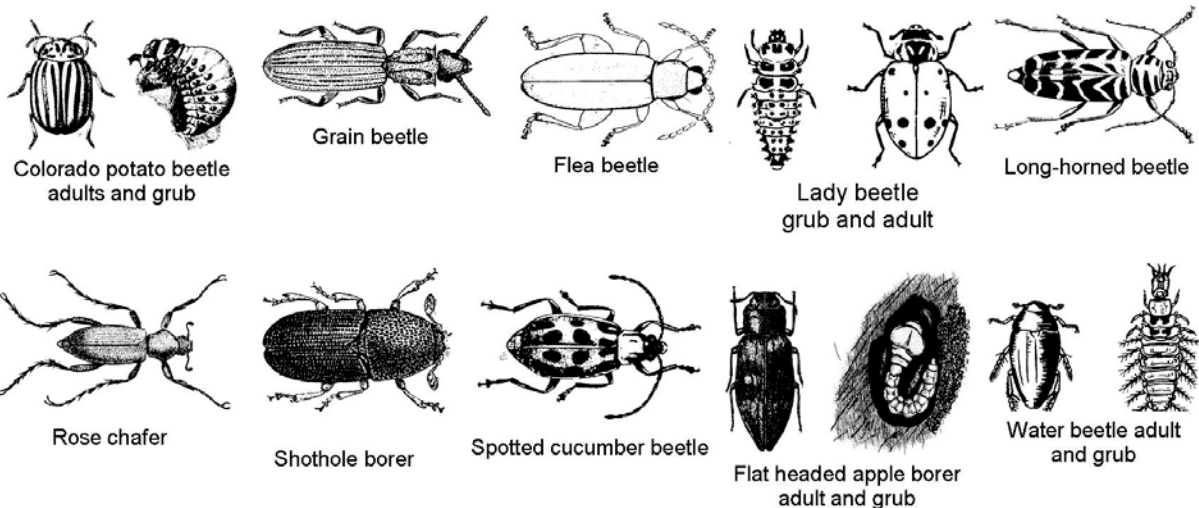


Figure 5. Examples of common beetles

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## *Collembola* Springtails

- Very tiny (1-2 mm) soft-bodied insect almost always associated with soil.
- Very common but rarely observed due to tiny size.
- Most feed on algae, fungi, and other organic matter. Some are predators of other insects and mites found in the soil.

**Metamorphosis:** None

**Features:** [Figure 6]

- Wingless
- Mouthparts: Chewing
- “Springtail”: (furcula) often present, used to jump.



Figure 6. Springtail

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## *Dermaptera* Earwigs

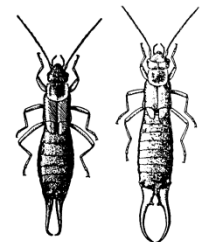
- Introduced from Europe as a biological control.

**Metamorphosis:** Simple/Gradual

**Features:** [Figure 7]

- Mouthparts: Chewing; generally feed on decaying organic matter, occasionally on plants and insects.
- Wings: 2 pair
  - Front wings are short, leathery, without venation and meet in a straight line down the back when at rest.
  - Hind wings are membranous, broad, with veins radiating from a center, folded both lengthwise and crosswise when at rest.
  - Note: Wings can be confused with those of beetles, but beetles do not have forceps-like cerci (tail-like appendage).
- Body: Elongated, flattened insects
- Cerci: Strong moveable forceps-like cerci on the abdomen end. Cerci cannot produce a painful pinch, but the mouthparts can.
- Habit: Over-winters as adults. During the day, earwigs hide in dark, moist areas. They are often assumed to cause a plant problem when they may simply be hiding on or near the plant.

Figure 7. Earwigs: Female (left) has straight cerci, male (right) has curved cerci.



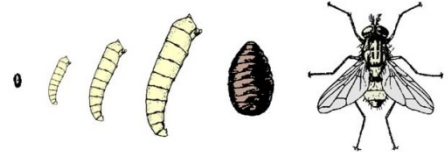
## *Diptera*

### Flies, Gnats, Midges, and Mosquitoes

- Around 99,000 species worldwide, with some 17,000 in North America.
- Feeding habits vary widely, for example
  - Scavenger (house fly, blow fly)
  - Blood sucking (mosquitoes)
  - Plant galls (gall midges)
  - Predators (flower flies, robber flies)
  - Aquatic

#### **Metamorphosis:** Complete [Figure 8]

Figure 8. Complete metamorphosis of flies.



#### **Adults** [Figures 8-10]

- **Wings:** One pair, membranous
  - One pair is a quick identification for *Diptera*.
  - Note: Count the wings! Some *Diptera* look like bees or wasps. Some *Hymenoptera* (bees and wasps) look like flies. *Diptera* has one pair. *Hymenoptera* have two pair, the hind pair is typically smaller and hidden under the front pair.
- **Mouthparts:** Highly variable
  - Sponging (house fly)
  - Cutting-lapping (horse fly)
  - Piercing-sucking (mosquito)
- **Body:** Typically soft bodied and often hairy.

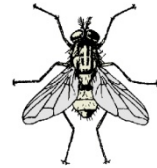


Figure 9. House fly.

#### **Larva** [Figures 8 and 10]

- Vary greatly in appearance.
- Larva of advanced forms, like the house fly, are *maggot* type
  - No head capsule
  - Mouth hooks
  - Legless
- Lower forms, such as mosquitoes, have a head capsule.

#### **Pupa:** Typically pupate in last skin of larva.

#### **Beneficial families include:**

- Bee flies, *Bombyliidae*
- Crane flies, *Tipulidae*
- Gall gnats *Cecidomyiidae*
- Robber flies, *Asilidae*
- Syrphid or flower flies, *Syrphidae*
- Tachinid flies, *Tachinidae*

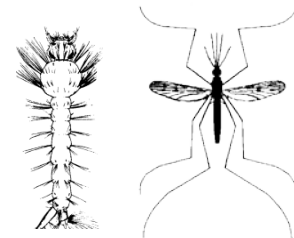


Figure 10. Mosquito maggot and adult.

**Pest families include:**

- Cabbage, onion, and seed corn maggots, beet leaf miner, *Anthomyiids*
- Biting midges, *Certopogonidae*
- Black flies, *Simuliidae*
- Blow flies, *Calliphoridae*
- Crane flies, *Tipulidae*
- Fruit flies, *Tephritidae*
- Gall gnats *Cecidomyiidae*
- Horse and deer flies, *Tabanidae*
- Horse bot flies, *Hippoboscidae*
- Leafminer flies, *Agromyzidae*
- Mosquitoes, *Culicidae*
- Muscids (house flies), *Muscidae*
- Sand flies (no-see-ums), *Psychodidae*
- Syrphid or flower flies, *Syrphidae*
- Vinegar flies, *Drosophilidae*

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***Ephemeroptera***

**Mayflies**

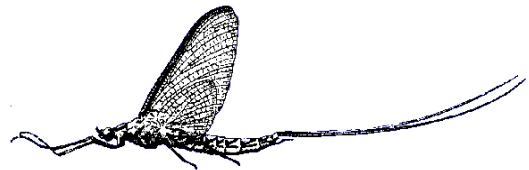
- Small aquatic naiads found in the bottom of streams and lakes. Serves as a source of food for fish.
- No interaction with gardening activities.

**Metamorphosis:** Simple/Incomplete

**Adults:** [Figure 11]

- Wings: two pair
  - Front wings large and triangular shaped.
  - Hind wings small and rounded.
  - Wings held vertically over body.
- Antennae: Small, bristle-like
- Filaments: Two very long tail-like filaments.
- Mouthparts: Adults do not feed and only live a few days.

Figure 11. Mayfly adult



**Naiads:** [Figure 12]

- Body: Aquatic naiads vary in shape, most are broad, and have functional gills along the sides of the abdomen.
- Mouthparts: Chewing.
- Molting: Frequent; 20 to 60 times

Figure 12. Mayfly naiad .



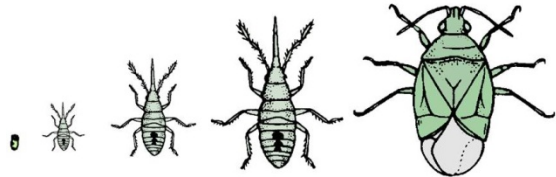
## ***Hemiptera Order, Suborder: Heteroptera*** **TRUE BUGS: Plant Bugs, Squash Bugs, Stink Bugs**

Note: Research has led to the re-ordering of insects. True bugs are the Hemiptera order, but now have their own suborder. In older references you will still find Hemiptera without the suborders.

- This order includes many important insect predators.

**Metamorphosis:** Simple/Gradual [Figure 13]

Figure 13.  
Metamorphosis of stink bugs.



**Features:** [Figure 14]

- **Mouthparts:** Piercing-sucking
  - Jointed beak is typically visible, and originates from top of head in front of eyes.
- **Wings:** two pair
  - Front wings (called *hemelytra*) are thickened at base and membranous at end.
  - Hind wings are membranous.
  - When at rest, the wings overlap at the tips forming a large triangular plate (the *scutellum*) on the back.
- **Body:** Usually broad and somewhat flattened

**Beneficial families include:**

- Ambush bugs, *Phymatidae*
- Assassin bugs, *Reduviidae*
- Coreids, *Coreidae*
- Damsel bugs, *Nabidae*
- Flower or minute pirate bugs, *Antocoridae*
- Leaf or plant bugs, *Miridae*
- Stink bugs, *Pentatomidae*

**Pest families include:**

- Chinch and lygus bugs, *Lygaeidae*
- Coreids, squash bugs, *Coreidae*
- Lace bugs, *Tingidae*
- Stink bugs, *Pentatomidae*

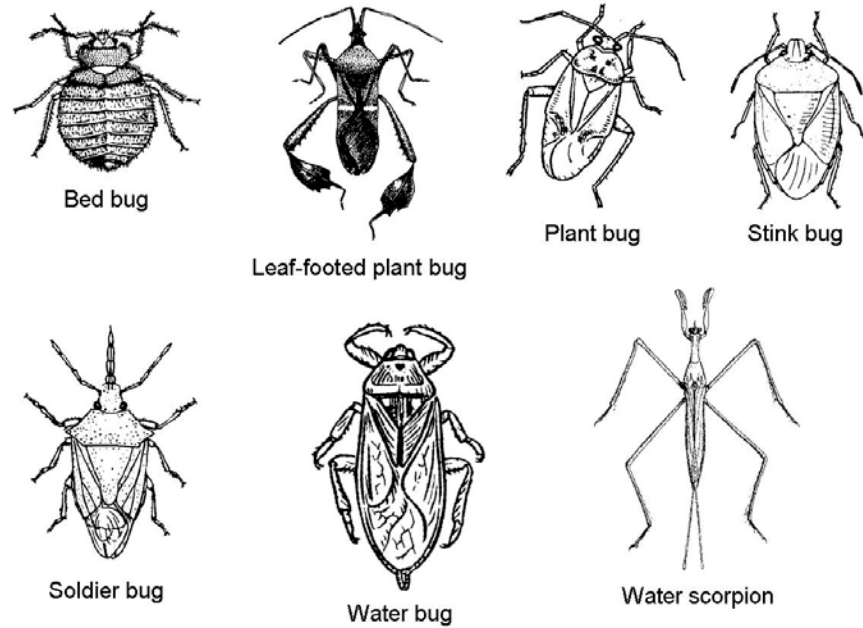


Figure 14. Examples of common *Hemiptera* (true bugs)

***Hemiptera* Order, Suborder: *Auchenorrhyncha***

***Hemiptera* Order, Suborder: *Sternorrhynca***

**Aphids, Cicadas, Leafhoppers, Mealybugs, Scale and Whiteflies**

Note: Research has led to the re-ordering of insects. These insects used to be in their own order, Homoptera, but are now a sub-order of Hemiptera. You will still find references to Homoptera. You may also still find references to Hemiptera without the suborders.

- All species are plant feeders, often feeding on phloem sap.
- Excretion of honeydew is common to many members of the order.
- Insects of this order are carriers of several plant pathogens.

**Metamorphosis:** Simple/Gradual

- Nymphs and adults similar in appearance (except male scales and whiteflies).

**Features:** [Figure 15]

- Mouthparts: Piercing-sucking
  - *Auchenorrhyncha* mouthparts arise from under the head; *Sternorrhyncha* mouthparts arise from between the forelegs. The jointed beak-like mouthparts not easily visible.
  - Note:** In contrast, in the *Heteroptera* suborder, mouthparts are more visible and originate from top of head, in front of eyes.
- Wings: two pair
  - Membranous
  - Typically held roof-like at rest
  - Many forms are wingless



- Nymphs have no wings, but wing pads may be observed on some older nymphs.

**Pest families include:**

**Suborder Auchenorrhyncha:**

- Cicadas, *Cicadidae*
- Leafhoppers, *Cicadellidae*
- Planthoppers, superfamily *Fulgoroidea*
- Spittlebugs, *Cercopidae*
- Treehoppers, *Membracidae*

**Suborder Sternorrhyncha:**

- Adelgids, *Phylloxeridae*
- Aphids, *Aphididae*
- Armored scales, *Diaspididae*
- Mealybugs, *Pseudococcidae*
- Psyllids (many gall insects), *Psyllidae*
- Soft scale, *Coccidae*
- Whiteflies, *Aleyrodidae*

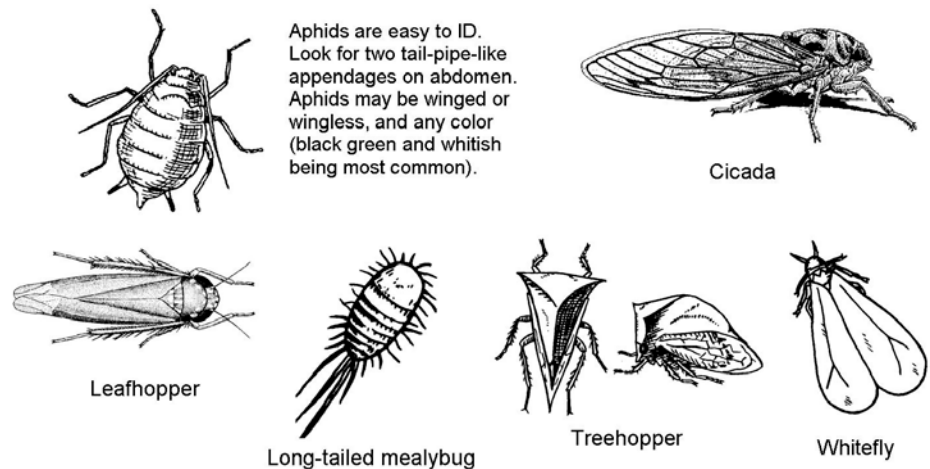


Figure 15. Examples of common *Hemiptera* in either *Auchenorrhyncha* or *Sternorrhyncha*

## ***Hymenoptera***

### **Ants, Bees, Horntails, Sawflies, and Wasps**

- Large order with some 103,000 species worldwide and 18,000 in North America.
- Order includes many important parasites and predators.
- This order has the most highly developed insect behaviors and social patterns.
- Most species live in nests.

**Metamorphosis:** Complete

### **Adults** [Figure 16]

- Wings: 2 pair, membranous
  - Hind wing is usually smaller and often hidden under front wing.
  - Front and hind wings may be attached.
- Mouthparts: Typically chewing or chewing-sucking
- Body: Most species have a distinct constriction between the thorax and abdomen (wasp waist). The sawfly/horntail group does not have a “wasp waist”).
- Antennae: Jointed, sometimes elbowed
- Stinger: Female abdomen usually provided with a saw, piercing organ, or stinger.

### **Larva**

- Larvae of most species are rarely observed, often developing in a nest or as an internal parasite.
- Head: Distinct head capsule
- Legs: None (except sawfly larva)
  - Sawfly larva look like caterpillars but have six-plus pair of prolegs.
  - Note: Caterpillars (*Lepidoptera*) have five or fewer pair prolegs.
  - Some sawfly larva are legless and slug-like.
- Mouthparts: Chewing

### **Wasp or Bee?**

**Wasps** have a slender and thin body, a narrow waist, slender, cylindrical legs and a skin that generally lacks much hair. Yellow jackets, bald-faced hornets, and paper wasps are the most common wasps encountered by people.

Wasps are predators, feeding on insects and other arthropods. During late summer and autumn when insect prey becomes more scarce, many wasps become scavengers and are especially attracted to sweets and other carbohydrates.

**Bees** are robust-bodied and very hairy compared with wasps. The hair on bees is branched giving them a fuzzy or soft appearance. Their hind legs are flattened, with bristle-fringed areas for collecting and transporting pollen. Bees laden with pollen will appear to have yellow hind legs because of the pollen loads. Bees are vegetarians, feeding on nectar and pollen.

### **Beneficial families include:**

- Ants and parasitic wasps, superfamily *Scolioidea*
- Bees, superfamily *Apoidea*
- Chalcid wasps, *Chalcidoidea*
- Digger wasps, superfamily *Sphecoidea*
- Ichneumon and braconid wasps, superfamily *Ichneumonoidea*
- Social wasps, superfamily *Vespoidea*

### **Pest families include:**

- Ants, superfamily *Scolioidea*
- Gall wasps, superfamily *Cynipoidea*

- Horntails, superfamily *Siricoidea*
- Sawflies, *Tenthredinoidea*
- Social wasps, superfamily *Vespoidea*

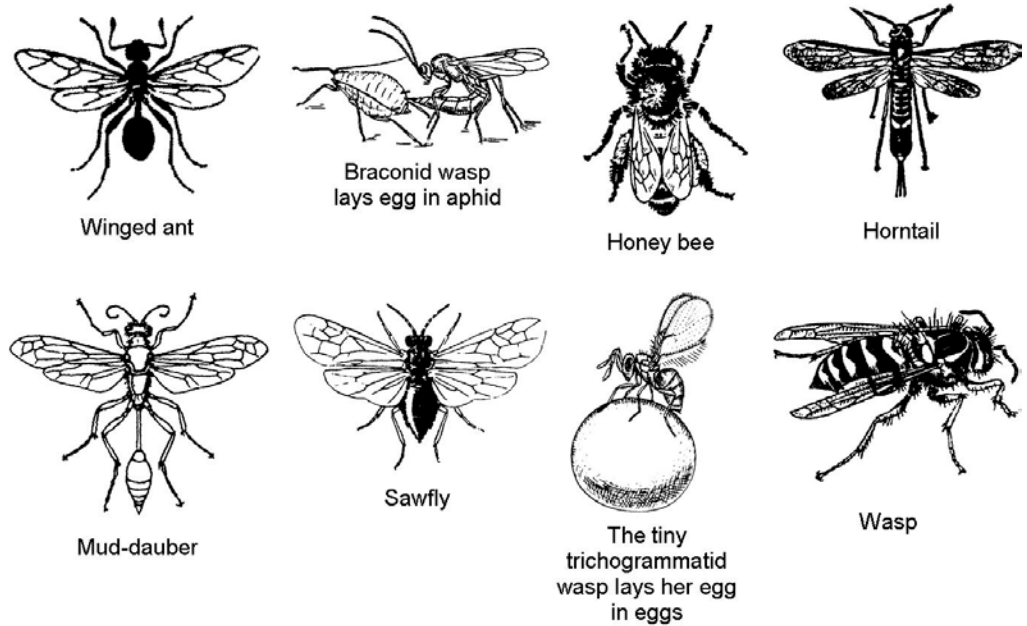


Figure 16. Examples of common *Hymenoptera*

## *Isoptera* Termites

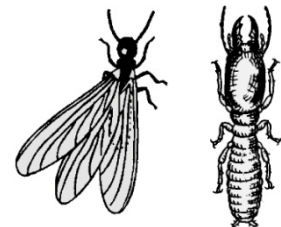
- Termites are social insects living in colonies. Colorado species live below ground.
- Workers avoid exposure and are rarely seen except when disturbed. Only the winged reproductive adults leave the colony.

**Metamorphosis:** Simple/Gradual

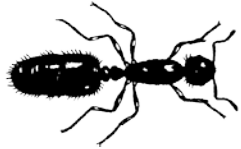

**Features:** [Figure 17]

- Color: Creamy white
- Wings: two pair that are the same size and longer than the body.
- Body: rectangular-shaped with NO constriction (wasp waist) between thorax and abdomen.
- Antennae: Straight and beaded
- Mouthparts: Chewing

Figure 17. Winged adult termite (left), and worker termite (right)



## Ant or Termite?

	<u>Ant</u>	<u>Termite</u>
		
<b>Color</b>	Black, red, yellowish, etc.	Creamy white
<b>Waistline</b>	"Wasp waist"	No constriction
<b>Antennae</b>	Jointed, sometimes elbowed	Straight and bead-like
<b>Wings on adult</b>	Front wing larger and hind wing smaller; wings may be attached.	Front and hind wings same size, longer than body.
<b>Worker's body</b>	Typical "ant" shape	Rectangular body with large chewing mouthparts
<b>Observed</b>	Commonly seen crawling around	Worker termite rarely seen except when disturbed.

## *Lepidoptera* Butterflies and Moths

**Metamorphosis:** Complete

**Adults** [Figure 18]

- Wings: Two pair
  - Typically covered with small overlapping scales.
  - Often but not always highly colored.
- Mouthparts: Coiled sucking tube designed to siphon fluids like nectar.
  - Some adults do not feed.

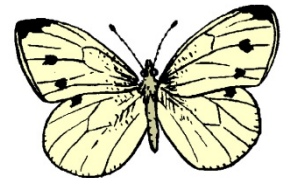
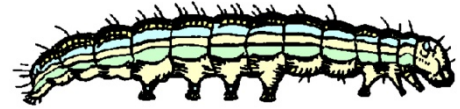


Figure 18. The wings of butterflies and moths are generally covered with colorful scales.

**Larva: Caterpillars** [Figure 19]

- Legs: Three pair on thorax
- Prolegs: Up to five pair of prolegs (fleshy leg-like appendage with crochet-like hooks on the end which helps hold the insect to plants).
  - Note: Sawfly larva look like caterpillars but typically have six or more pair prolegs.
- Decorations: Often highly colored or decorated with spines or other appendages.
- Mouthparts: Chewing, with voracious appetites.

Figure 19. Caterpillars (larval stage of Lepidoptera) have three pair of jointed legs on the thorax plus up to five pair of prolegs on the abdomen.



### Pupa

- Cocoon, made of silk spun from saliva glands

### Families of interest include:

- Bagworm moths, *Psychidae*
- Carpenterworm moths, *Cossidae*
- Clearwing moths (squash vine borer, lilac borer), *Sesiidae*
- Giant silkworm moths, *Saturniidae*
- Leafrollers, *Tortricidae*
- Measuringworms, *Geometridae*
- Monarch, viceroy, red admiral, morningcloak and angelwings butterflies, *Nymphalidae*
- Noctuids (cutworms, armyworms, fruitworms, corn earworm, cabbage loopers), *Noctuidae*
- Olethreutid moths, *Olethreutidae*
- Prominents (redhumped caterpillars), *Notodontidae*
- Pyralids (corn borer, sod webworm, meal moths), *Pyralidae*
- Royal moths, *Citheroniidae*
- Silkworm moths, *Bombycidae*
- Sphinx or hawk moth, hornworms, *Sphingidae*
- Swallowtail or parsleyworm, *Papilionidae*
- Tent caterpillars, *Lasiocampidae*
- Tineids, (cloths moths), *Tineidae*
- Tussock moths, *Lymantriidae*
- White or yellow butterflies (imported cabbageworm), *Pieridae*

## *Mallophaga* Chewing or Biting Lice

- Tiny parasite of birds and some mammals.
- Feeds on blood, feathers, hair, skin, or sebaceous fluids.

**Metamorphosis:** Simple/Gradual

**Features:** [Figure 20]

- Flattened, oval
- Head larger than thorax
- Antenna short
- Eyes very small or absent
- No wings
- Legs short and modified to hold to feathers or fur
- Lives only on hosts

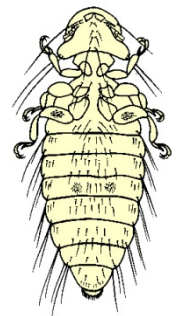


Figure 20. Chewing lice.

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## ***Mantodea***

### **Mantids**

- Predators of other insects, which they capture with front legs and eat.
- Winter is spent in the egg mass covered with a tough polystyrene-like coat.

**Metamorphosis:** Simple/Gradual

**Features:** [Figure 21]

- Legs: Foreleg designed for grasping and holding prey
- Body: Elongated
- Mouthparts: Chewing
- Antennae: Long, thread-like
- Wings: If present, are leathery and over abdomen. Absent in nymphs.

Figure 21. Mantid



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## ***Neuroptera***

### **Antlion, Lacewing, Snakeflies, and Dobsonflies**

- Order includes many important predators.
- No harmful species are known.
- The antlion is the larva of the common lacewing. Some forms are aquatic.

**Metamorphosis:** Complete

**Adults** [Figure 22]

- Wings: Two pairs
  - Membranous, similar in size and texture
  - Large membranous wing, usually with many veins and cross veins.
  - Held roof-like over body when at rest.
- Mouthparts: Chewing; some are predators, while others feed on nectar or pollen.
- Cerci: None
- Tarsus (foot): Five segments

Figure 22. Lacewings: Left: adult, Right: Antlion (lacewing larva)



**Larva** [Figure 23]

- Mouthparts: Forward-projecting curved pointed jaws designed to grasp prey, which they crush and suck out the insides.

- Body: Often elongated
- Legs: Three pair

Figure 23. Antlion (lacewing larva)



## *Odonata*

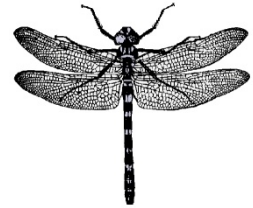
### Dragonflies and Damselflies

#### **Metamorphosis:** Simple/Incomplete

#### **Adults** [Figure 24]

- Eyes: Very large eyes that may cover much of head.
- Wings: Two pair
  - Large, elongated, highly veined.
  - Dragonflies hold wings horizontally when at rest. Damselflies project wings back over body when at rest.
- Mouthparts: Chewing, prominent, used to capture and consume winged prey in flight.
- Antennae: Small, bristle-like

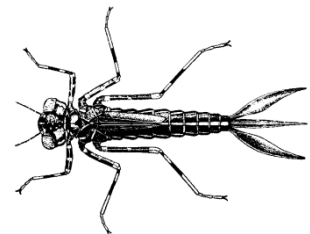
Figure 24. Dragonfly adult



#### **Naiads** [Figure 25]

- Aquatic insect that feeds on mosquito larva and other aquatic life
- Eyes: Large
- Mouthparts: Uniquely hinged jaw that can project forward to capture prey.
- Gills: Three leaf-like gills at end of abdomen (damselfly only.)

Figure 25. Dragonfly naiad



## *Orthoptera*

### Crickets, Grasshoppers, and Katydid

- Note: Older books place mantids (*Mantodea*), walking sticks (*Phasmida*) and roaches (*Blattaria*) in the order *Orthoptera*.
- Most are plant feeders. A few are predators or scavengers.

#### **Metamorphosis:** Simple/Gradual

#### **Features** [Figure 26]

- Mouthparts: Chewing
- Wings: Two pair
  - Front wings more or less parchment-like with distinct venations.
  - Hind wings membranous and folded fan-like when at rest.
  - Wings may be used to make sounds.
- Legs: Hind legs enlarged for jumping.
- Cerci (tail-like appendages): 1 pair on most adults

**Pest families include:**

- Crickets, *Gryllidae*
- Short-horned grasshoppers, *Acrididae*
- Long-horned grasshoppers (katydids, meadow grasshoppers, and Mormon crickets), *Tettigoniidae*



Figure 26. Orthoptera (left to right): grasshopper, cricket, and katydid.

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***Phasmida***

**Walking Stick**

- Feeds on plant leaves.
- Stick-like form provides camouflage.

**Metamorphosis:** Simple/Gradual

**Features:** [Figure 27]

- Body: Very elongated, stick-like
- Mouthparts: Chewing
- Wings: typically none

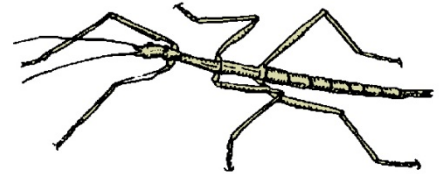


Figure 27. Walking stick

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***Plecoptera***

**Stoneflies**

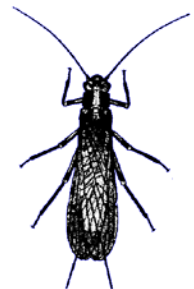
- Aquatic naiads cling to stones in streams and serve as food for other aquatic insects and fish.
- There is no direct interaction with gardening activities.

**Metamorphosis:** Simple/Incomplete

**Adults** [Figure 28]

- Wings: Two pair, elongated wings fold flat over body when at rest.
- Antennae: Long, filament-like
- Filament: (tail-like): Two

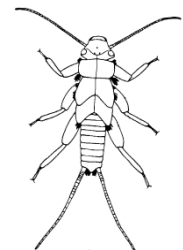
Figure 28 Stonefly adult



**Naiads** [Figure 29]

- Aquatic naiad typically found under stones in rivers and lake shores.

Figure 29. Stonefly naiad.





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***Psocoptera***  
**Psocids or Booklice**

- Common but inconspicuous insect rarely observed due to tiny size.
- Found in warm, damp places feeding on molds, fungi, cereals, pollen, etc.
- Occasionally invade the home.

**Metamorphosis:** Simple/Gradual

**Features:** [Figure 30]

- Size: Tiny, less than 1/8 inch
- Wings: Two pair on some adults
  - Held roof-like over body when at rest
  - Front pair larger
  - Veins prominent
  - Non-winged specimens common
- Mouthparts: Chewing
- Antennae: Slender and as long or longer than body

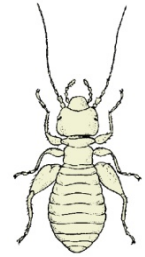


Figure 30. Booklice

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***Siphonaptera***  
**Fleas**

- Household pest of pets and people.

**Metamorphosis:** Complete

**Adults** [Figure 31]

- Size: Less than 1/8 inch
- Wingless
- Body: Flattened sideways, dark colored, covered with bristles that project backwards
- Mouthparts: Piercing/sucking, designed to suck blood.

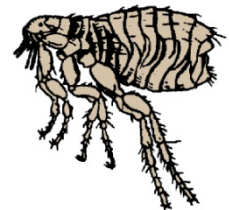


Figure 31. Flea

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***Thysanoptera***  
**Thrips**

- It is a very common insect, but due to tiny size is rarely observed.
- Feeding leaves the plant looking scarred, as they rasp the leaf or flower surface and suck the fluids.

**Metamorphosis:** Simple/Gradual

**Features:** [Figure 32]

- Wings: Two pair
  - Slender wings fringed with hairs

- Often absent.
- Mouthparts: Rasping-sucking; typically feed on flowers and leaves.
- Tarsi (feet): One or two segmented, each with a balloon-like structure on the end.
- Size: Minute, less than 1/8 inch long.

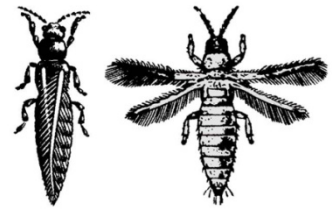


Figure 32. Thrips

## *Trichoptera* Caddisflies

- Aquatic naiad.
- Not associated with gardening activities.

**Metamorphosis:** Simple/Incomplete

**Adults** [Figure 33]

- Wings: Two pair
  - Covered with fine hairs
  - Held roof-like over body at rest
  - Resemble moths with hairy wings.
- Antennae: Extended back over body

Figure 33. Caddisfly



**Naiads**

- Aquatic naiad
- Some live in cases constructed of silk, pebbles, sticks, and leaves. Others construct silken nests.
- Some are free-living and actively hunt other insects.

## *Zygentomaa* Silverfish and Firebrats

- Found in cool, moist, dark places.
- General feeder on starches and carbohydrates, including paper, wall paper, vegetables and grain products.

**Metamorphosis:** None

**Features:** [Figure 34]

- Size: Small, 1/4" to 1/2"
- Wingless
- Mouthparts: Chewing
- Cerci: Pair, long tail-like
- Active, fast moving

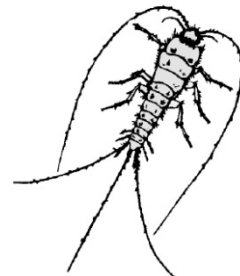


Figure 34. Silverfish

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Line drawings from USDA. Revised by Mary Small, Colorado State University.

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