

The Insect Orders III: Thysanoptera through Neuroptera

Lecture 7 spans the following orders:

- Thysanoptera: The thrips
 - Coleoptera: The beetles
 - Neuroptera: Alderflies, dobsonflies, fishflies, snakeflies, lacewings, antlions, and owlflies
 - Mecoptera: Scorpionflies and hangingflies (Covering Mecoptera here is “out of sequence” evolutionarily, but the order resembles the Neuroptera and it is convenient to present it here.)
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Thysanoptera: The thrips



A thrips (diagrammatically) and many thrips on the flower of a daisy (with an immature lygus bug in the middle).

Thysan = fringed; ptera = wing; refers to the fringed wings of thrips
(The plural *and the singular form* of this term is thrips ... there is no such thing as a "thrip.")

Web sites to check:

[Thysanoptera on Wikipedia](#)

[Thysanoptera on the NCSU General Entomology page](#)

Description and identification:

Adults:

- Mouthparts: Rasping / sucking
- Size: Less than 3 mm (1/8 inch)
- Wings: 4 or none; elongate and narrow; without veins but fringed with hairs
- Other distinguishing characteristics: Short antennae; asymmetrical mouthparts form a conical beak.

Immatures: Similar to adults.

Metamorphosis: "Intermediate" – immatures resemble adults, and wings develop externally, at least in part, but some wing development is internal, and there is a quiescent pupal stage that precedes the adult. Some authorities refer to immature stages as nymphs; others call them larvae.

Habitat: In debris or on vegetation. This order includes species that feed on plants, other insects, and decaying debris.

Pest or Beneficial Status: Several pests of greenhouse and crop plants, including eastern and western flower thrips, onion thrips, gladiolus thrips, greenhouse thrips, and pear thrips. Some transmit plant viruses (such as tomato spotted wilt virus). Other species are beneficial predators.



Western flower thrips (Texas A & M University).

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Coleoptera: The beetles



Coleomegilla maculata (photo by Mike Jeffords)

Coleo = sheath; ptera = wings; refers to the elytra

Web sites to check:

[The beetles at Wikipedia](#)

[Coleoptera on the NCSU General Entomology page](#)

Description and identification:

Adults:

- Mouthparts: Chewing
- Size: Minute to huge
- Wings: 4 or wingless; forewings modified to form hardened elytra
- Other distinguishing characteristics: Antennae usually include 11 segments. Key characters for identification include insertion of the hind coxae; antennal form; tarsal formula; and modifications of the elytra.

Immatures (larvae): NOT similar to adults. Various forms all have a head capsule; most have chewing mouthparts with no obvious labrum, and 1 pair of thoracic spiracles

Metamorphosis: Complete. Larvae and adults often do not share the same habitat.

Habitats: Everywhere ... most are plant feeders, but some are predaceous; the order contains aquatic and terrestrial groups.

Pest or Beneficial Status: Many important pests; several groups are predators on pest species.

Major suborders are **Adephaga** and **Polyphaga**.

IN THE ADEPHAGA, [the first abdominal sternite is divided by the hind coxae, the hind trochanters are large and offset toward the midline, and the hind femora nearly touch the coxae.](#) (Most have 5-5-5 tarsal formula and filiform antennae.) The largest family in the suborder Adephaga is the Carabidae, the ground beetles and tiger beetles. The tiger beetles previously were placed in a separate family, the Cicindelidae, but they are now considered to be a subfamily (Cicindelinae) of the carabids. Aquatic families in this suborder include Dytiscidae (predaceous diving beetles), Gyrinidae (whirligig beetles), and Haliplidae (crawling water beetles).

Family Carabidae:



A ground beetle (Carabidae)

Most carabids are dark, shiny, elongate, and somewhat flattened, and with grooved elytra. Most are predaceous on other insects. Examples: [Scaphinotus](#), [Carabus](#), and [Calosoma](#). [Calosoma](#) species are bright and metallic and are called caterpillar hunters or fiery hunters; they feed especially on caterpillars, including the gypsy moth. *Stenolophus lecontei*, the seedcorn beetle, and *Clivina impressifrons*, the slender seedcorn beetle, feed on corn seeds before they can germinate.

Subfamily Cicindelinae: the tiger beetles

Most are metallic or iridescent and are fast runners. Adults and larvae are predaceous; larvae make deep burrows and wait for prey. [Hooks on the dorsal surface of the larva's abdomen](#) hold it in place as it lurches for large prey.



Six-spotted tiger beetle (University of Kentucky)

SUBORDER POLYPHAGA:

Family Staphylinidae: The rove beetles

Long, slender beetles with short elytra. They resemble earwigs but lack pincer-like cerci. Adults and larvae are predaceous (some parasitic). This is one of the largest families of beetles in North America.



Rove beetles

Family Cerambycidae: The long-horned beetles



Longhorned beetles

Larvae of cerambycids are called round-headed wood borers. Many species are pests of trees, although several attack trees already in decline. Species in the genus *Monoctonus* transmit pine wilt nematodes. The introduced [Asian longhorned beetle](#) is still a great concern in the Chicago area, though eradication efforts appear to have been generally successful there. Check additional illustrations of the [cottonwood borer](#) and the [Monoctonus species known as pine sawyer beetles](#).

Family Buprestidae: The metallic wood-boring beetles

Larvae are called flat-headed wood borers. Most are around 20 mm long (~3/4 inch); many are metallic blue, green, or coppery in color. Larvae of most bore under bark. A species in the Pacific Northwest, the [golden buprestid](#), may take many years to complete its life cycle in wood and eventually emerge from logs used to build homes several years earlier. An example from the Midwest is the native [bronze birch borer](#). The buprestid in the news in recent years is the emerald ash borer, an exotic species that kills otherwise healthy ash trees.



Emerald ash borer larva and adult (Michigan Department of Agriculture)

Family Meloidae: The blister beetles

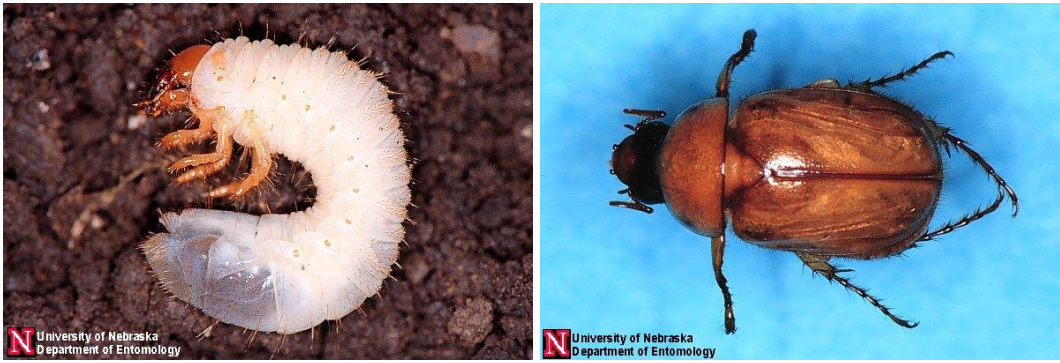
Blister beetles have soft elytra and elongate bodies. Adults produce cantharidin, a caustic ["blistering" agent that also is toxic to horses when adult blister beetles are present in baled hay](#).



A blister beetle

Family Scarabeidae: The scarabs (larvae are called white grubs)

Adults are heavy-bodied, with lamellate antennae (with plate-like "segments"); hind tibiae dilated, with the outer edge toothed or scalloped. Subfamilies include those with larvae that are dung-feeders and those that are pests of crops (white grubs feeding on roots). Examples include [Phyllophaga](#) species (perennial white grubs), [Cyclocephala immaculata](#) (southern masked chafer or annual white grub), [Popillia japonica](#), the [Japanese beetle](#), and [Cotinus nitida](#) ([green June beetle](#)).



Annual white grub larva and adult (University of Nebraska)

Family Elateridae: [The click beetles](#) (larvae are wireworms)

Adults are elongate, parallel-sided, and rounded at each end. Rear corners of the pronotum extend back as points or spines. Most have serrate antennae. A "clicking" mechanism is present on the underside of the thorax; when placed on their "backs," it allows them to pop into the air and right themselves. Larvae are slender, hard-bodied, and shiny. Examples include [wireworms](#) in the genera *Conoderus* and *Limonius*.

Family Lampyridae: The fireflies or lightningbugs

Adults are elongate, with soft elytra. The pronotum extends over most or all of the head. They produce "cold light" -- 90 percent efficient. Firefly flashing is initiated by flying males; females respond to those with the right interval. Larvae and adults are predaceous; some adults also feed on pollen. See [the fireflies on Wikipedia](#) and specifically the entry on [Photuris](#), a firefly femme fatale.

Family Dermestidae: The skin beetles

Dermestids are scavengers on furs, leather, wool, cereal grains, and carrion (and insect collections). Adults are small, oval beetles with clubbed antennae. Larvae have tufts of hair protruding from the thorax and abdomen. Important pests include the [carpet beetles](#) (*Attagenus* and *Anthrenus* spp.), the [larder beetle](#), *Dermestes lardarius*, and the [khapra beetle](#), *Trogoderma granarium*.



Trogoderma sp.

Family Coccinellidae: The lady beetles (or lady bird beetles, or ladybugs)

Adults are oval and convex, usually brightly colored. An expanded pronotum covers most or all of the head. Almost all are predaceous as adults and larvae; many prefer aphids; some are specialists as predators of mites or mealybugs. Adults overwinter. Examples include: convergent lady beetle, [Hippodamia](#)

[convergens](#), seven-spotted lady beetle, *Coccinella septempunctata*, spotted lay beetle, *Coleomegilla maculata*, and one pest species, the [Mexican bean beetle](#), *Epilachna varivestis*.



Coccinella septempunctata

Also see the [Lady Beetles fact sheets from Cornell University](#).

Family Chrysomelidae: The leaf beetles

Adults are small and oval, many are brightly colored. Different species exhibit very different morphological features and life histories. Examples: [asparagus beetle](#), [bean leaf beetle](#), *Ceratoma trifurcate*, [Colorado potato beetle](#), *Leptinotarsa decemlineata*, the [corn rootworms](#), *Diabrotica* spp., and the [elm leaf beetle](#), *Xanthogaleruca luteola*.



Western and northern corn rootworm beetles

Family Curculionidae: The snout beetles, weevils, and bark beetles.



Rice weevil

In adult weevils, an elongate snout bears small, chewing mouthparts that are mostly hidden, and tarsi are 5-segmented but appear 4-segmented. Larvae are whitish, generally c-shaped and legless. Examples include: [alfalfa weevil](#), *Hypera positca*, [sweet potato weevil](#), *Cylas formicarius elegantulus*, [black vine weevil](#), *Otiorhynchus sulcatus*, [pales weevil](#), *Hylobius pales* (a pest in pine plantations), and the rice weevil, *Sitophilus oryzae*.

Subfamily Scolytinae: The bark beetles, engravers, and ambrosia beetles

Adults are small and cylindrical, with short, geniculate (elbowed), clubbed antennae. The head projects more or less downward from the prothorax. Bark beetles feed on the inner bark of trees; ambrosia beetles feed on ambrosial fungus that they cultivate. Many feed in dying trees, but some kill otherwise healthy trees, especially conifers. Examples include: [mountain pine beetle](#), *Dendroctonus ponderosae*, and the [elm bark beetles in the genus Scolytus](#).



Smaller European elm bark beetle (Louisiana State Arthropod Museum)

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Neuroptera: Alderflies, dobsonflies, fishflies, snakeflies, lacewings, antlions, and owlflies

Neuro = Nerve or net; ptera = wings; refers to the fine net-like veins of the wings

Web sites to check:

[Neuroptera on Wikipedia](#)

Description and identification:

Adults:

- Mouthparts: Chewing (sort of)
- Size: Medium to Large
- Wings: 4; forewings and hind wings are similar in size with numerous net-like cross veins.
- Antennae long and filiform (hair-like), clavate (club-like), or pectinate (comb-like); no cerci.

Immatures (larvae): “Campodeiform”: 3 pairs of thoracic legs, active, predaceous. Most have mandibles and maxillae modified for grasping and suck prey juices; some with true chewing mouthparts; labrum present.

Metamorphosis: Complete

Habitat: On vegetation, some are aquatic. Predaceous.

Pest or Beneficial Status: Some are important biotic / biological control agents.

Family Corydalidae: The dobsonflies; larvae are called hellgrammites; used for fish bait, the larvae can inflict a painful bite.



Dobsonfly male (photo from the Iowa State University IPM site) and larva (hellgrammite).

The family Raphidiidae includes the snakeflies; the family Mantispidae is the [mantisflies](#).



A snakefly

Family Chrysopidae: The lacewings, including *Chrysopa* spp. Eggs are laid singly on stalks (to prevent sibling cannibalism); larvae (called aphid lions) feed on aphids. Adults lay their eggs where aphid honeydew is present.



Lacewing eggs, larva, and adult

See the [lacewing fact sheet](#) from Cornell University.

Family Myrmeleontidae: [The antlions](#). Adults resemble damselflies but are softer bodied and have longer, club-like antennae. They are weak fliers that are attracted to light; the wings are spotted in some species. See the web site listed above.



Antlion larva (University of Kentucky) and adult (Oklahoma Biological Survey)

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Mecoptera: Scorpionflies and hangingflies



Male scorpionfly (North Carolina State University)

Meco = long; ptera = wings

Web sites to check:

[Mecoptera on the NCSU General Entomology page](#)

Larvae and adults of the *Panorpa* species common in North America feed primarily on dead insects, and they usually are found on low-lying plants at the edges of woods or beneath deciduous trees.