

Taxonomy of Insects

Lecture (5)

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Lecture Topics

- **Order: Hemiptera**
 - **Suborder: Homoptera**
 - **Suborder: Heteroptera**

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Exopterygota (Order: Hemiptera)

Suborder: Homoptera

Life history and Ecology

- They have piercing/sucking mouthparts and feed by withdrawing sap from vascular plants.
- Opisthognathous insects, the proboscis is shorter than that found in true bugs (suborder Heteroptera).
- Although some Homoptera are secondarily wingless, the majority have membranous wings fold tent-like over the body at rest.



Exopterygota (Order: Hemiptera)

- Many species have complex life cycles involving more than one host plant.
- Winged and wingless forms of the same species may develop at different times of the year.
- Asexual reproduction (parthenogenesis) is common.
- In most of the Homoptera, a portion of the digestive system is modified into a filter chamber to ingest and process large volumes of plant sap. Only a small volume of filtered plant sap used in insect feeding. Many species of ants provide care and protection for the homopterans in exchange for the honeydew they excrete.

Exopterygota (Order: Hemiptera)

- It is difficult to generalize about the biology of these insects. Cicadas are the largest members of this suborder. As nymphs, they live underground and feed on the roots of trees and shrubs. Some species complete development in as little as four years, but others have a 13- or 17-year life cycle. In contrast, the aphids are tiny, soft-bodied insects with multiple generations per year.
- Development: Hemimetabola, i.e. incomplete metamorphosis (egg, nymph, adult).



Exopterygota (Order: Hemiptera)

Appearance of Immatures

- Structurally similar to adults.
- Always lacking wings.



Appearance of Adults

- Antennae slender or bristle-like.
- Proboscis short, arising near lower back margin of head.
- Front wings, when present, uniform in texture; at rest, wings fold tent-like over the abdomen.



Exopterygota (Order: Hemiptera)

Classification (Major families)

Cicadellidae (Leafhoppers)

- The largest family of Homoptera and includes many pests of plants.
- Leafhoppers are important carriers of plant diseases e.g., mycoplasmas (Bacteria).



Cicadidae (Cicadas)

- Nymphs live underground where they feed on the roots of trees.
- Adults are the largest members of the Homoptera.
- Males produce loud songs to attract a mate.



Exopterygota (Order: Hemiptera)

Aphididae (Aphids, Plantlice)

- Second largest family in the suborder Homoptera.
- Aphids are pests of plants and considered the most important carriers of viral plant diseases.



Psyllidae (Psyllids or Jumping Plant Lice)

- Small, aphid-like insects.
- Many species are covered with a woolly layer of wax.



Exopterygota (Order: Hemiptera)

Coccidae (Soft Scale insects)

- Most species are sedentary during most of their life cycle and secrete a protective covering over their bodies
- Among the most common pests of plants.



Aleyrodidae (Whiteflies)

- Body and wings of adults are covered with a white powdery wax.
- Nymphs attach to the undersides of leaves and become immobile, resembling scale insects.



Exopterygota (Order: Hemiptera)

Distribution:

- Abundant worldwide. All species are terrestrial herbivores.
- Approximately 60 families and 32,000 species worldwide.

Economic importance

- Homoptera are among the most abundant herbivores found in terrestrial habitats.
- Many species are pests of cultivated plants.
- Aphids and leafhoppers are important carriers of plant diseases.

Exopterygota (Order: Hemiptera)

Suborder: Heteroptera

Life history and Ecology

- Members of the suborder Heteroptera are known as “true bugs”.
- They have very distinctive front wings, called hemelytra, in which the basal half is leathery and the apical half is membranous. At rest, these wings cross over one another to lie flat along the insect’s back.
- They have piercing-sucking mouthparts (hypognathous) or anterior (prognathous).



Exopterygota (Order: Hemiptera)

- Heteroptera adapted to a broad range of habitats; terrestrial, aquatic and semi-aquatic.
- Terrestrial species are often associated with plants. Some species live as scavengers in the soil, caves or ant nests. others are predators on a variety of small arthropods. A few species even feed on the blood of vertebrates e.g., bed bugs.
- Aquatic Heteroptera can be found on the surface of both fresh and salt water, or beneath the water surface in nearly all freshwater habitats. Most of these insects are predators of other aquatic organisms.
- Development: incomplete metamorphosis (egg, nymph, adult).

Exopterygota (Order: Hemiptera)

Appearance of Immatures

- Structurally similar to adults
- Always lacking wings



Appearance of Adults

- Front wings with basal half leathery and apical half membranous (hemelytra).
- Pronotum usually large, trapezoidal or rounded.
- Triangular scutellum present behind pronotum.
- Wings lie flat on the back at rest, forming an “X”.
- Proboscis arising from front of head and curving below body when not in use.



Exopterygota (Order: Hemiptera)

Classification of Heteroptera (Major families)

Miridae (Plant Bugs)

- Most species feed on plants e.g., *Lygus lineolaris*
- Some are predaceous.



Lygaeidae (Seed Bugs)

- Most species are seed feeders.
- A few are predatory e.g., *Geocoris bullatis*



Pentatomidae (Stink Bugs)

- Most species are herbivores, some are predators.
- Have scent glands which can produce an unpleasant odor.



Exopterygota (Order: Hemiptera)

Distribution

- Common worldwide found in most terrestrial and freshwater habitats.
- Approximately 73 families and 50,000 species worldwide.

Economic Importance

- Plant feeding bugs are pests of many crop plants. They may cause localized injury to plant tissues, they may weaken plants by removing sap, and they may also transmit plant pathogens.
- Predatory species of Heteroptera are generally regarded as beneficial insects, but those that feed on blood may transmit human diseases.

Useful websites

<https://genent.cals.ncsu.edu/insect-identification/order-hemiptera-suborder-homoptera/>

<https://genent.cals.ncsu.edu/insect-identification/order-hemiptera-suborder-heteroptera/>

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Thanks for listening