Order Hemiptera

Suborders Auchenorrhyncha & Sternorrhyncha (formerly Order Homoptera)

Cicadas, leaf/plant/tree hoppers, psyllids, whiteflies, aphids, scales

Aphid mummies showing braconid wasp emergence holes. (341) Photo: John Davidson

Reddish "bumps" on leaf caused by spiny witch-hazel gall aphids. Photo: John Davidson

The reddish corrugation on the upper leaf surface is caused by *Hamamelistes spinosus*, spiny witch-hazel gall aphids. The overwintering eggs are laid on witch-hazel, *Hamamelis virginiana,* and hatch the following spring into nymphs that feed on buds causing a gall to form. Inside the gall a new generation of winged aphids develop which fly to birch where they give birth to a scale-like aphid that overwinters on birch twigs. The following spring they induce the leaf corrugations.

Wingless and winged aphids develop inside these corrugations and the winged aphids fly back to witch-hazel, giving birth to a generation of wingless males and females which mate and lay eggs which overwintering. This aphid requires two full years to complete all of its life cycle. Alternation of hosts is well known for other aphids, such as woolly apple aphid on apple and elm, woolly alder aphid on maple and alder, and green peach aphid on peach and many other hosts.

Order Hemiptera, Suborders Auchenorrhyncha and Sternorrhyncha

Aphids, scales, whiteflies, adelgids, leafhoppers, and planthoppers

The name Homoptera, derived from the Greek "*homo*" meaning uniform and "*ptera*" meaning wings, refers to the uniform texture of the front wings.

All members of the order Hemiptera are herbivores and have piercing/sucking mouthparts. The proboscis is shorter than that found in true bugs (suborder Heteroptera), and it emerges near the ventral posterior margin of the head capsule.

Although some insects in the suborder Sternorrhyncha are secondarily wingless (aphids, scales), the majority have membranous or uniformly textured wings that fold tent-like over the body at rest.

There is great diversity in the biology of these insects. Aphids are tiny, soft-bodied insects with multiple generations per year. 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 or parthenogenesis is common. The scale insects are very specialized. Females and males remain immobile, living beneath a cover of wax or cuticle that they secrete over themselves. Legs and antennae often disappear after the first molt. Only newly hatched nymphs and adult males look like other insects. Females grow to sexual maturity, mate, produce offspring, and die without leaving their protective covers.

In some of the suborder Sternorrhyncha (aphids and soft scales), a portion of the digestive system is modified into a filter chamber. This structure allows the insects to ingest and process large volumes of plant sap. Excess water, sugars, and certain amino acids bypass most of the midgut and are shunted directly into the hindgut for excretion as honeydew. Only a

small volume of filtered plant sap passes through the midgut for digestion and absorption. The honeydew attracts ants and beneficial parasitoids. Ants often care and protect aphids and scales in exchange for the honeydew they excrete

Morphology:

Adults

1. mouthparts: sucking; proboscis short, arising near lower back margin of head
2. antennae: antennae slender or bristle-like
3. legs: cursorial
4. body segments: three body segment, head, thorax, abdomen
5. tarsi: tarsi 1 or 3 segmented
6. wings: front wings, when present, uniform in texture; at rest, wings fold tent-like over the abdomen

Immatures (nymphs)

1. Immature stages called nymphs.
2. Feed in same habitat as adults.
3. Feed on same food as adults
4. Lack wings

Development: Incomplete metamorphosis (egg, nymph, adult)

Life history:

Habitats: Adapted to a broad range of terrestrial habitats

Feeding: Use piercing/sucking mouthparts to feed, on leaves, flowers, stems, bark

Importance in landscapes: Many species suck juices from plants and honeydew falls on cars, table to create a sticky mess. A number of families vector diseases.

Families:

Suborder Auchenorrhyncha

Cicadas (Family Cicadidae) Nymphs live underground where they feed on the roots of trees and shrubs. Adults are the largest members of the suborder Auchenorrhyncha. Males produce loud songs to attract a mate.

Leafhoppers (Family Cicadellidae) This is the largest family of the suborder Auchenorrhyncha and includes many pests of cultivated plants. Leafhoppers are important carriers of plant diseases especially mycoplasmas (MLO).

Treehoppers (Family Membracidae) Ecologically similar to leafhoppers, these insects have a large pronotum that extends over most of the body. They often resemble thorns or small twigs.

Spittlebugs or Froghoppers (Family Cercopidae) Nymphs live on plant stems and produce a frothy defensive secretion around themselves. Adults are similar to leafhoppers in size and general appearance.

Planthoppers (Family Fulgoridae) These insects are ecologically similar to leafhoppers and treehoppers. Many species are oddly shaped and cryptically colored.

Suborder Sternorrhyncha

Psyllids or Jumping Plant Lice (Family Psyllidae) Small, aphid-like insects with 3-segmented beaks and 10 segmented antennae. Many species are covered with a woolly layer of wax.

Whiteflies (Family Aleyrodidae) 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.

Aphids, Plantlice (Family Aphididae) Very large family. Many of these insects are pests of cultivated plants. Aphids are considered the most important carriers of viral plant diseases.

Soft Scale insects and mealybugs (Family Coccidae) Most species are sedentary during most of their life cycle and secrete a protective covering over their bodies. Adults have limited movement.

Armored scales (Family Diaspididae) Females live under protective covers. Males are often smaller. Adults can't move.

Mealybugs, felt scales (Family Eriococcidae) Adults and nymphs secret protective, waxy coverings. Nymphs and adults can move.

In the textbook, *IPM of Midwest Landscapes*

Pests of trees and shrubs

Order Hemiptera, Suborders Auchenorrhyncha and Sternorrhyncha: Aphids, cicadas and scales

Family Adelgidae, Pine and spruce aphids
Cooley spruce gall adelgid, *Adelges cooleyi*
Eastern spruce gall adelgid, *Adelges abietis*
hemlock woolly adelgid, *Adelges tsugae* pine
bark adelgid, *Pineus strobi*

Family Aphididae, Aphids
balsam twig aphid, *Mindarus abietinus*
honeysuckle witches' broom aphid, *Hyadaphis tataricae*
white pine aphid, *Cinara strobi*
woolly alder aphid, *Paraprociphilus tessellatus*
woolly apple aphid, *Eriosoma lanigerum*

Family Cercopidae, Froghoppers or spittlebugs spittlebugs, several species

Family Cicadellidae, Leafhoppers leafhoppers, several species

Family Coccidae, Soft, wax and tortoise scales
calico scale, *Eulecanium cerasorum*
cottony maple scale, *Pulvinaria innumerabilis*
European fruit lecanium scale, *Parthenolecanium corni*
Fletcher scale, *Parthenolecanium fletcheri*
pine tortoise scale, *Toumeyella parvicornis*
smaller spruce bud scale, *Physokermes hemicryphus*
tuliptree scale, *Toumeyella liriodendri*

Family Diaspididae, Armored scales

black pineleaf scale, *Nuculaspis californica*
euonymus scale, *Unaspis euonymi*
gloomy scale, *Melanaspis tenebricosa*
juniper scale, *Carulaspis juniperi*
obscure scale, *Melanaspis obscura*
oystershell scale, *Lepidosaphes ulmi*
pine needle scale, *Chionaspis pinifoliae*
scurfy scale, *Chionaspis furfura*
scurfy scale, elm, *Chionaspis americana*

Family Eriococcidae, Mealybugs, felt scales
European elm scale, *Gossyparia spuria*

Family Flatidae, Planthoppers planthoppers,
several species

Family Kermesidae, Gall-like coccids
pin oak kermes, *Allokermes galliformis*
pubescent leaf kermes, *Nanokermes pubescens*

Family Membracidae, Treehoppers treehoppers, several species

Family Psyllidae, Jumping plantlice or psyllids
hackberry nipple gall maker, *Pachypsylla celtidismamma*

Pests of turf

Order Hemiptera, Suborder Sternorrhyncha (formerly in Order Homoptera): Aphids

Family Aphididae, Aphids greenbug, *Schizaphis graminum*

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