

Order Hymenoptera: Sawflies, bees, wasps, ants, & parasitoids

The name Hymenoptera is derived from the Greek words “hymen” meaning membrane and “ptera” meaning wings. It is also a reference to Hymeno, the Greek god of marriage. The name is appropriate not only for the membranous nature of the wings, but also for the manner in which they are joined together by the hamuli.



Birch leafminer adult (Steven Katovich, Bugwood.org).



Birch leafminer larvae (Thérèse Arcand, Canadian Forest Service).

Herbivory is common among the primitive sawflies and horntails/wood wasps (suborder Symphyta), in the gall wasps (Cynipidae), and in some of the ants and bees. Most other Hymenoptera are predatory or parasitic. In addition to three pairs of legs on the thorax, of larvae, they have more than five pairs of fleshy abdominal prolegs that are structurally different from the thoracic legs. The large hunting wasps are agile predators that catch and paralyze insects (or spiders) as food for their offspring. The greatest diversity, though, is found among the many families of parasitoid wasps whose larvae feed internally on the living tissues of other arthropods (or their eggs). These insects eventually kill their host, but not before completing their own larval development within its body. Despite their small size and characteristically narrow host range, these wasps are highly abundant and exert a tremendous impact on the population dynamics of many other insect species.

Except for worker ants, most adult Hymenoptera have two pairs of wings. Front and hind wings are linked together by hooks (hamuli) along the leading edge of the hind wings that catch in a fold near the back of the front wings. In flight, both wings operate in unison to form a single aerodynamic surface.

Classification

Sawflies and horntails have a broad junction between thorax and abdomen.

Apocrita (ants, bees, and wasps) have a narrow junction between the thorax and abdomen.

Morphology

Adults

1. mouthparts: chewing; except in bees where maxillae and labium form a proboscis for collecting nectar
2. antennae: Genuiculate, hinged or bent like an elbow.
3. legs: cursorial

4. body segments: three body segment, head, thorax, abdomen; narrow junction (wasp waist) between thorax and abdomen - except in sawflies and horntails.
5. tarsi: 5 segmented
6. wings: Hind wings smaller than front wings, linked together by small hooks (hamuli). In flight, both wings operate together.
7. eyes: compound eyes well developed.

Immatures (larvae)

1. Sawflies: Eruciform (caterpillar-like); well-developed head capsule; chewing mouthparts; fleshy abdominal prolegs.
2. Bees and wasps: Grub-like; well-developed head; chewing mouthparts; legless and eyeless.
3. Parasitic wasps: Body form highly reduced; lacking head, eyes or appendages

Development: Complete metamorphosis (egg, larva, pupa, adult)

Life History

Habitats: Adapted to a broad range of terrestrial habitats.

Feeding: Sawflies feed on leaves; bees on pollen and nectar; wasps on other insects; parasitic wasps feed internally/externally on other insects.

Importance in landscapes: Some species are regarded as pests, such as ants on golf course; carpenter ants in structures, gall wasps, and wasps. Most are extremely beneficial, either as natural enemies of insect pests (parasitic wasps) or as pollinators of flowering plants (bees and wasps).

Families

Sawflies: Larvae feed on foliage or burrow into plant tissues. Conifer sawflies (Family Diprionidae)

Common sawflies (Family Tenthredinidae)

Stem sawflies (Family Cephidae)

Elm sawflies (Family Cimbicidae)

Horntails: Larvae are wood borers. horntails/wood wasps (Family Siricidae)

Parasitoid, Parasitic Wasps: Larvae are parasitoids of other insects.

parasitoid (Family Ichneumonidae) largest family of the Hymenoptera; parasitoids of other holometabolous insects (or spiders)

parasitoid (Family Braconidae) mostly parasitoids of lepidopterous larvae

parasitoid (Family Encyrtidae) mostly parasitoids of aphids and scale insects

parasitoid (Family Eulophidae) parasitoids of beetles, moths, and other insects

parasitoid (Family Trichogrammatidae)

Gall Wasps: Larvae are herbivores. They induce the formation of plant galls and live in or on these tissues. gall wasps (Family Cynipidae) most species live on oak trees

Predatory Wasps: Adults provision nest sites with prey that they catch and paralyze by stinging.

digger wasps (Family Sphecidae) prey on caterpillars and spiders

spider wasps (Family Pompiliidae) prey on spiders

tiphid wasps (Family Tiphidae) prey on beetle larvae

scoliid wasps (Family Scoliidae) prey on beetle larvae

potter wasps (Family Vespidae) (prey on caterpillars)

Social Wasps: True social insects. Paper-like nests are tended by sterile female workers. Yellowjackets, hornets, paper wasps (Family Vespidae)

Ants: True social insects. Wingless workers (sterile females) forage for provisions (vegetation, seeds, or other insects)

Ants (Family Formicidae)

Solitary Bees: Adults construct individual nests and provision them with plant materials (usually nectar or pollen).

sweat bees (Family Halictidae)

leafcutting bees (Family Megachilidae)

carpenter bees (Family Anthophoridae)

True social bees: Communal nest; overlapping generations in honeybees

Social Bees: bumble bees and honey bees (Family Apidae) Communal nests are built in the soil (bumble bees) or in cavities (honey bees). Workers (sterile females) forage for nectar and pollen.

In the textbook, *IPM of Midwest Landscapes*

Beneficial Hymenoptera: Predators and parasitoids Parasitic wasps, wasps, ants, and bees



Family Aphelinidae, Aphelinid wasps: whitefly parasitoid, *Encarsia formosa*

Family Braconidae, Braconid wasps: braconid wasp, several species, gypsy moth parasitoid, *Cotesia melanoscela*, imported cabbageworm parasitoid, *Cotesia glomerata*, tomato hornworm parasitoid, *Cotesia congregata*

Family Chalcididae, Chalcidid wasps or gall wasps: chalcidid wasp, several species

Family Encyrtidae, Encyrtid wasps, soft scale parasitoid, *Encyrtus fuscus*

Family Ichneumonidae, Ichneumonid wasps: ichneumonid wasp, several species

Family Scelionidae, Scelionid wasps scelionid wasp: several species

Family Trichogrammatidae, Trichogrammid wasps

Family Vespidae, Wasps: paper wasp, *Polistes* spp., potter wasp, several species
yellowjacket

Family Cynipidae, Gall wasps: oak cynipid galls, several species

Pests of trees and shrubs - Sawflies and Horntails

Family Diprionidae, Conifer sawflies: European pine sawfly, *Neodiprion sertifer*, introduced pine sawfly, *Diprion similis*, redheaded pine sawfly, *Neodiprion lecontei*, sawflies, several species, white pine sawfly, *Neodiprion pinetum*


Family Tenthredinidae, Common sawflies: birch leafminer, *Fenusa pusilla*, brownheaded ash sawfly, *Tomostethus multinctus*, dogwood sawfly, *Macremphytus tarsatus* dusky birch sawfly, *Croesus latitarsus* mountainash sawfly, *Pristiphora geniculate*, pear sawfly, *Caliroa cerasi*, yellowheaded spruce sawfly, *Pikonema alaskensis*

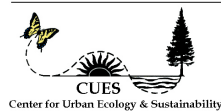
Family Cimbicidae, Elm sawflies: Elm sawfly, *Cimbex americana*, Not in book but you are responsible for knowing this species:

<https://www.forestryimages.org/collections/viewcollection.cfm?coll=765>

Family Siricidae, Horntails: Horntail/ pigeon tremex, *Tremex columba*, Not in book but you are responsible for knowing this species:

<https://www.forestryimages.org/collections/viewcollection.cfm?coll=223>

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