6. ORDER Hymenoptera: Bees Wasps & Ants

Etymology: Greek words "hymen" meaning membrane and "ptera" meaning wings. It is also a reference to Hymeno, the Greek god of marriage. The name refers to membranous nature of the wings, and the way they are "joined together as one" by the hamuli.

Holometabola i.e. complete metamorphosis

Key Characters:

- Wasp-waist present in ants, bees, and wasps
- Mandibulate mouthparts
- Triangular stigma in front wing of sawflies, horntails, and some wasps
- Hamuli (tiny hooks on hind wing) hold front and hind wings together

Two suborders:

1. Symphyta (sawflies and horntails) have a broad junction between thorax and abdomen
2. Apocrita (ants, bees, and wasps) have a narrow junction between the thorax and abdomen

Source: https://www.bobs-bugs.info/2014/01/02/hymenoptera-bees-wasps-ants-etc/

Economic Importance

Although some species are regarded as pests (sawflies, gall wasps, and some ants), most members of the Hymenoptera are extremely beneficial — either as natural enemies of insect pests (parasitic wasps) or as pollinators of flowering plants (bees and wasps).

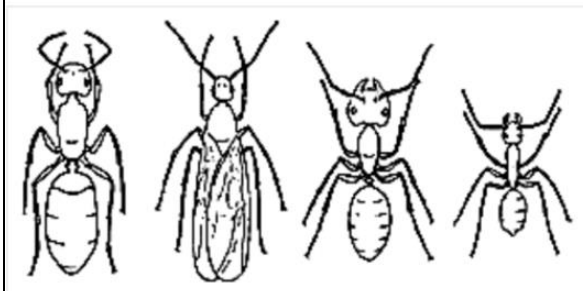
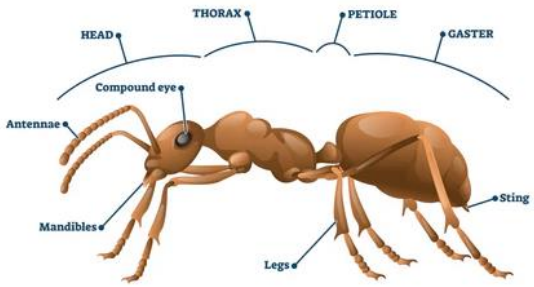
What are BEE Hotels?

Bee hotels are the insect equivalent of a birdhouse. Also known as bee condos, bee houses, or nest blocks, these structures provide nesting spaces for certain solitary bees and wasps. These species would ordinarily nest in hollow plant stems, holes in dead wood, or other natural nooks and crannies. A bee hotel simulates this nesting habitat by providing a bundle of hollow reeds or stems, or holes drilled in a wooden block. These nesting tunnels can be sheltered from weather and predators using a variety of structures

Source: https://content.ces.ncsu.edu/how-to-manage-a-successful-bee-hotel/what-is-a-bee-hotel

Suborder: Apocrita – Wasps, bees, and ants
(Narrow waist, diverse habits)

Superfamily: Formicoidea – Ants (LEARN MORE AT https://en.wikipedia.org/wiki/Ant)

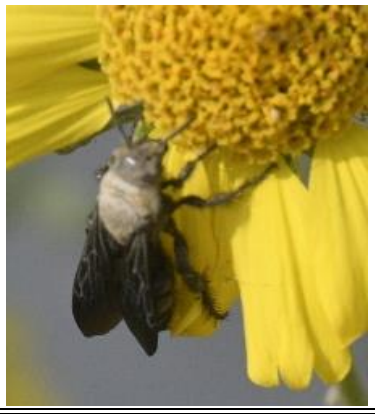
Family	Common Name	Key Features
Formicidae	Ants	Social insects, strong caste systems, elbowed antennae  Typical ant castes, from left to right: queen, winged male, major worker, minor worker Source: https://extension.umn.edu/insects-infest-homes/ants#ant-castes-41460  https://www.insectlore.com/blogs/ants/exploring-ant-anatomy-physiology?srsltid=AfmBOooT-LBkOpAvpBtin1B-ZeXzgJNDcGLnGGYYZrxoX0OwE5jjva-y

Superfamily: Apoidea – Bees and Some Wasps

Family	Common Name	Key Features
Apidae	Honeybees, bumblebees, carpenter bees 	Social or solitary; pollinators Long tongues
Megachilidae	Leafcutter and mason bees 	Solitary; carry pollen on belly cut leaves or use mud; 
Andrenidae	Mining bees	Solitary ground nesters; early spring pollinators
Halictidae Hal means salt.	Sweat bees 	Often metallic; some are social; attracted to salt. They are known as "sweat bees" because they are frequently found on human skin, particularly when it's moist with sweat, seeking the salt and moisture it provides  By skyfaller - CC BY 4.0, https://commons.wikimedia.org/w/index.php?curid=149802552

Superfamily: Vespoidea – Wasps and Ants

Family	Common Name	Key Features
Vespidae	Social wasps, paper wasps, hornets 	Strong fliers; build nests from chewed wood 
Mutillidae	Velvet ants 	Furry and wingless females; painful sting
Pompilidae	Spider wasps	Solitary; paralyse spiders for larval food 

Family	Common Name	Key Features
Scoliidae	Scoliid wasps	Parasitoids of beetle larvae; hairy bodies 
Tiphiidae	Tiphiid wasps  @dineshs https://www.inaturalist.org/observations/277363987	Parasitise soil-dwelling beetles; slender

Parasitic Superfamilies – Tiny Wasps

Family	Common Name	Key Features
Ichneumonidae	Ichneumon wasps 	Slender; long ovipositor; parasitoids of larvae/pupae

Family	Common Name	Key Features
Braconidae	Braconid wasps 	Similar to Ichneumons but smaller; parasitize hosts like aphids, caterpillars
Chalcididae	Chalcid wasps 	Very small; reduced wing venation; egg or larval parasitoids
Encyrtidae	 *Anagyrus lopezi* a wasp used for classical biological control of invasive cassava mealybug	Tiny; biological control agents; parasitise scale insects, etc.

Family	Common Name	Key Features
Trichogrammatidae	Minute egg parasitoids 	Microscopic; attack insect eggs; used in biocontrol
Mymaridae	Minute egg parasitoids/ fairyflies 	The smallest insects belong to this group. Wings are ore shaped with a fringe of hairs.

Classification of families based on their functional significance

Ecological Role	Important Families
Pollinators	Apidae, Halictidae, Megachilidae
Predators/Parasitoids	Ichneumonidae, Braconidae, Vespidae, Pompilidae
Plant Feeders	Tenthredinidae, Cimbicidae
Wood Borers	Siricidae
Social Insects	Formicidae, Apidae, Vespidae

- In the Hymenoptera, females develop from fertilized eggs and males develop from unfertilized eggs. Since females control whether or not an egg is fertilized, they can regulate the sex ratio of their offspring.
- The fairyflies (family Mymaridae) are the world's smallest insects. *Dicopomorpha echmepterygis* is considered the smallest insect in the world while in India it is *Kikiki huna*.
- Some species of cuckoo wasps (family Chrysididae) invade the nests of wasps or bees, kill the larvae they find, and deposit their own eggs on the stored provisions. This behavior is known as kleptoparasitism.
- Slave-maker ants raid the nests of other species to steal their pupae. When the stolen ants emerge as adults, they become workers in the slave-maker's colony.
- Some parasitic wasps swim beneath the water to lay their eggs on aquatic prey.
- Fig wasps (family Torymidae, subfamily Agaoninae) are the only insects that can pollinate fig trees. The wasp larvae, which develop in flower galls, become coated with fig pollen when they emerge as adults. They unwittingly cross-pollinate each flower they visit when laying eggs. The Smyrna fig is a commercial variety that does not produce any pollen. Its survival depends entirely upon *Blastophagus psene*, a wasp that develops in wild Caprifigs
- Bumble bees are only found in the himalayan region in India
- Three species of honey bees

Meat eating bees or Vulture bees

Trigona hypogea, Trigona necrophaga, and *Trigona crassipes* are the only three known bee species in the world that feed exclusively on carrion. Meat-eating bees made the news in late 2021, after a study examined the unique gut microbiomes of these unusual species.