

➤ **Family: Calliphoridae (Metallic fly or Blow fly)**

- 1- adults are commonly shiny with metallic colouring, often with blue, green, or black thoraces and abdomens
- 2- Antennae are three-segmented and aristate. The arista are plumose their entire length, and the second antennal segment is distinctly grooved.
- 3- Members of Calliphoridae have branched Rs 2 veins.
- 4- frontal sutures are present, and calypters are well developed.



❖ **Order: Hymenoptera (Bees, Ants, & Wasps)**

1. Mouthparts are primarily adapted for chewing-Lapping. Mandibles are very well developed. In bees both labium and maxillae are integrated to form the lapping tongue.
2. Thorax is modified for efficient flight. Pronotum is collar like. Mesothorax is enlarged. Metathorax is small. Both prothorax and metathorax are fused with mesothorax.
3. Wings are stiff and membranous. Fore wings are larger than hind wings. Wing venation is reduced. Both for wings and hindwings are coupled by a row of hooklets (hamuli) present on the leading edge of the hindwing.
4. Abdomen is basally constricted. The first abdominal segment is called propodeum. It is fused with metathorax. The first pair of abdominal spiracles is located in the propodeum. The second segment is known as pedicel which connects the thorax and abdomen. Abdomen beyond the pedicel is called gaster or metasoma.
5. Ovipositor is always present in females. It is variously modified for oviposition or stinging or sawing or piercing plant tissue.
6. Metamorphosis is complete. Often the grub is apodous and eucephalous. Larva is rarely eruciform. Pupa is exarate and frequently enclosed in a silken cocoon secreted from labial glands.

❖ Family: Apidae (Honey bees)

1. Body is covered with branching or plumose hairs.
2. Mouthparts are chewing and lapping type. Mandibles are suited for crushing and shaping wax for building combs.
3. Legs are specialized for pollen collection. Scopa (pollen basket) is present on hind tibia.
4. They are social insects with three castes viz., queen, drone and workers. Temporal separation of duties is noticed among workers.
5. honey bee *Apis mellifera* is a productive insect.

**❖ Family: Formicidae (Ants)**

1. They are common widespread insects.
2. Antennae are geniculate.
3. Mandibles are well developed.
4. Wings are present only in sexually mature forms.
5. Petiole may have one or two spines.
6. They are social insects with three castes viz., queen, males and workers. Workers are sterile females and they form the bulk of the colony. Exchange of food materials between adults and immature insects is common. After a mating flight queen alone finds a suitable nesting site. Wings break near the abscission suture near the base are nipped off by mandibles. Egg laying is started after divesting the wings. Usually the queen does not forage for food. During the initial phase of nest building it lives entirely on fat body reserves and products of wing muscle degeneration.
7. Many species have established symbiotic relationship with homopteran insects



❖ **Family: Vespidae (Pollen Wasps, Paper Wasps, Yellow Jacketsetc.)**

1. Lateral extensions of the pronotum reach the point of insertion of wings and do not form rounded lobes.
2. Abdomen is conical
3. They construct nest with 'wasp paper', a substance made from fragments of chewed wood mixed with saliva.
4. They are either solitary or social wasps.
5. They are generally predaceous on Lepidopteran caterpillars. Many paralysed caterpillars are stored in the cells of their nests. Eggs are suspended by a filament from the top of the nest and the cell is sealed.
6. Yellow banded wasp *Vespa cincta* is a bee enemy.



❖ **Family: Xylocopidae (Carpenter bees)**

1. They are large, robust bees.
2. Dorsum of the abdomen is bare.
3. Pollen baskets are absent in hindlegs. But brushes of hairs are present on hinglegs.
4. They build nests in dead logs and in live branches. They tunnel in all directions. They do not feed on wood. The tunnel is partitioned into several cells, separated by cemented wood chips. Pollen and nectar are placed in each cell together with one egg. The larvae hatch, feed, grow and pupate inside.
5. Adults are not aggressive and do not sting. They visit flowers and take nectar often by simply biting through the base of the flower instead of sipping from the top.



❖ **Order: Siphonaptera (Fleas)**

1. Insects without wings, small narrow flattened on the sides.
2. Sucking mouth parts.
3. Hind legs for jumping.

