

## HYMENOPTERA

Etymology : Hymen - membrane; ptera - wings.  
Hymeno - god of marriage; ptera - wings,  
(Marriage on the wings)  
(union of fore and hindwings by hamuli)

Common names :Ichneumonflies, Ants, Bees, Wasps.

### Characters

- ✓ Mouthparts are primarily adapted for chewing. Mandibles are very well developed. In bees both labium and maxillae are integrated to form the **lapping tongue**.
- ✓ Thorax is modified for efficient flight. Pronotum is collar like. Mesothorax is enlarged. Metathorax is small. Both prothorax and metathorax are fused with mesothorax.
- ✓ Wings are stiff and membranous. Forewings are larger than hindwings. Wing venation is reduced. Both forewings and hindwings are coupled by a row of hooklets (**hamuli**) present on the leading edge of the hindwing.
- ✓ 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**.
- ✓ Ovipositor is always present in females. It is variously modified for oviposition or stinging or sawing or piercing plant tissue.
- ✓ 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.
- ✓ Sex is determined by the fertilization of the eggs. Fertilized eggs develop into females and males are produced from unfertilized eggs. Males are haploid and females diploid.

## Classification

This order is subdivided into two suborders.

	<b>SYMPHYTA</b> <b>(Chalastogastra)</b>	<b>APOCRITA</b> <b>(Clistogastra)</b>
1.	Abdomen is broadly joined to the the thorax.	Abdomen is petiolated.
2.	Larva is a caterpillar and belongs to eruciform type	Larva is a grub and it belongs to apodous eucephalous type
3.	Stemmata are present	Stemmata are absent.
4.	Both thoracic and abdominal legs are present	Legs are absent
5.	Ovipositor is saw like and suited for piercing the plant tissue	Ovipositor is not saw like and is suited for piercing in para sitic groups or for stinging in other groups
6.	Behavioural sophistication is less	Behavioural sophistication is more.
7.	They are phytophagous	They are generally parasitic

### I.Suborder : SYMPHYTA

#### 1. TENTHREDINIDAE (Sawflies)

- ✓ They are wasp like insects.
- ✓ Abdomen is broadly joined to the thorax.
- ✓ The ovipositor is saw toothed and suited for slicing the plant tissue.
- ✓ Larvae is eruciform. It resembles a lepidopteran caterpillar. It has one pair of ocelli, papillae (reduced antenna) three pair of thoracic legs and 6-8 pairs of abdominal legs.

Prolegs lack crochets. They are external feeders on foliage. Larvae while feeding usually have posterior part of the body coiled over the edge of the leaf.

Mustard sawfly : *Athalia lugens proxima* is a defoliator of mustard and cruciferous vegetables.



## II. Suborder : APOCRITA

### 2. ICHNEUMONIDAE ( Ichneumonflies)

- ✓ Adults are diurnal and visit flowers.
- ✓ Trochanter is two segmented. Hind femur is with **trochantellus**
- ✓ Forewing has two recurrent veins.
- ✓ Petiole is curved and expanded at the apex.
- ✓ Sternites of the gaster are membranous
- ✓ Ovipositor is arising anterior to the tip of abdomen. It is often longer than the body and exerted out permanently.
- ✓ Larvae are mostly parasites and less frequently hyperparasites. They are solitary parasites. They spin cocoons in or outside the host. *Eriborus trochanteratus* is an exotic larval parasite of coconut black headed caterpillar.



### 3. BRACONIDAE (Braconid wasps)

- ✓ They are small, stout bodied insects
- ✓ Forewing has one recurrent vein.
- ✓ Petiole is neither curved nor expanded at the apex.
- ✓ Gaster is sessile or subsessile.
- ✓ Sternites of the gaster are partly membranous.
- ✓ Abdomen is as long as the head and thorax together
- ✓ They parasitize lepidopteran larvae commonly.
- ✓ They are gregarious parasites.
- ✓ In many species polyembryony is observed.
- ✓ Pupation occurs in silken cocoons either externally on the host or away from the host in groups. *Bracon brevicornis* is mass multiplied and released for the control of coconut black headed caterpillar.



#### 4. BETHYLIDAE

They are ant like, black coloured wasps.

Females of many species are wingless.

*Parasierola nephantidis* is a specific larval parasite on coconut black headed caterpillar.



#### 5. CHALCIDIDAE

- ✓ They are small to medium sized insects.
- ✓ Hind coxae are five to six times larger than forecoxae.
- ✓ Hind tibial spurs are larger than mid tibial spurs.
- ✓ Hind femora are larger with a row of short-teeth beneath.
- ✓ Wing venation is reduced to a single anterior vein.
- ✓ Ovipositor is short and straight.
- ✓ *Brachymeria* sp is a pupal parasite on coconut black headed caterpillar.



## 6. EULOPHIDAE

- ✓ They are minute pupal parasites.
- ✓ Forewing is narrower with pubescence on the wing lamina.
- ✓ Hairs are not arranged in rows.
- ✓ Ovipositor is present almost at the tip of the abdomen.
- ✓ *Tetrastichus israeli* is a gregarious pupal parasite commonly used for the control of coconut black headed caterpillar.



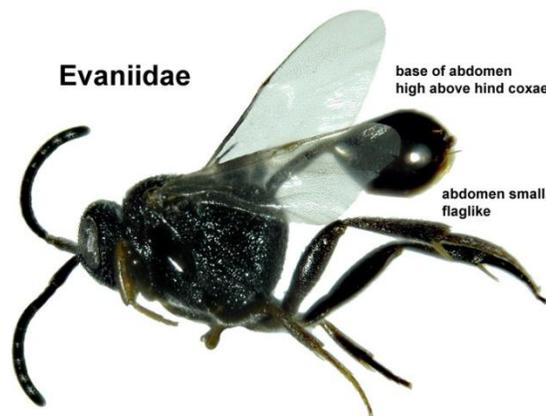
## 7. TRICHOGRAMMATIDAE

- ✓ They are very tiny insects (0.3 to 1.0 mm long)
- ✓ Tarsus is three segmented.
- ✓ Forewing is broad with pubescence (Microscopic hairs) in rows.
- ✓ Hindwing is reduced and fringed with hairs along the margins.
- ✓ They are mainly egg parasites on Lepidopteran insects.
- ✓ *Trichogramma sp.* is extensively used in the biological control of sugarcane moth borers.



### 8. EVANIIDAE (Ensign wasps)

- ✓ Petiole is long and abrupt.
- ✓ Gaster is short, compressed and attached to the propodeum by the slender petiole. It is carried almost like a flag.
- ✓ They are parasitic on the **ootheca** of cockroaches.



### 9. AGAONIDAE (Fig wasps)

- ✓ Male is apterous.
- ✓ Female is winged.
- ✓ Female has a long ovipositor
- ✓ Forelegs and hindlegs are stout.
- ✓ Middle legs are slender.

- ✓ They live inside fig receptacles and pollinate and fructify the flowers.

*Blastophaga pesenes* develops in the capri fig (wild) and pollinates symmyrna fig (edible cultivated fig).



#### 10. VESPIDAE (Yellow jackets, Hornets)

- ✓ Lateral extensions of the pronotum reach the point of insertion of wings and do not form rounded lobes.
- ✓ Abdomen is conical
- ✓ They construct nest with 'wasp paper', a substance made from fragments of chewed wood mixed with saliva.
- ✓ They are either solitary or social wasps.
- ✓ 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.
- ✓ Yellow banded wasp *Vespa cincta* is a bee enemy.



## 11. SPHECIDAE (Thread waisted wasp, Digger wasp, Mud dauber)

- ✓ Lateral extensions of the pronotum form rounded lobes
- ✓ Petiole is slender.
- ✓ Nests are constructed by using mud or dug out in ground. They use insects and spiders to provision their nests. Eggs are laid on the paralysed or killed host.



## 12. FORMICIDAE (Ants)

- ✓ They are common widespread insects.
- ✓ Antennae are geniculate.
- ✓ Mandibles are well developed.
- ✓ Wings are present only in sexually mature forms.
- ✓ Petiole may have one or two spines.
- ✓ 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.
- ✓ Many species have established symbiotic relationship with homopteran insects.

### 13. APIDAE (Honey bees)

- ✓ Body is covered with branching or plumose hairs.
- ✓ Mouthparts are chewing and lapping type. Mandibles are suited for crushing and shaping wax for building combs.
- ✓ Legs are specialized for pollen collection. Scopa (pollen basket) is present on hind tibia.
- ✓ They are social insects with three castes viz., queen, drone and workers. Temporal separation of duties is noticed among workers.

Indian honey bee *Apis indica* is a productive insect.



*Apis indica*



*Apis dorsata*



*Apis florea*

### 14. MEGACHILIDAE (Leaf cutter bees)

- ✓ They are solitary bees.
- ✓ Mandibles are sharp and scissors like.
- ✓ Pollen gathering hairs (scopa) are present on the venter of the abdomen.
- ✓ They cut circular or crescent shaped pieces of leaves of rose, redgram, guava etc. The cut pieces of leaves are used for preparing leaf lined cells. The provision for the brood consists of a mixture of pollen mixed with honey.
- ✓ Rose leaf cutter bee: *Megachile anthracena* is a pest on rose, redgram and guava.



### 15. XYLOCOPIDAE (Carpenter bees)

- ✓ They are large, robust bees.
- ✓ Dorsum of the abdomen is bare.
- ✓ Pollen baskets are absent in hindlegs. But brushes of hairs are present on hinglegs.
- ✓ 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.
- ✓ 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.

