HEMIPTERA - PENTATOMIDAE, COREIDAE, PYRRHOCORIDAE, LYGAEIDAE

Synonym : Rhynchota

Etymology :Hemi - half; ptera - wing

Common name :True bugs

General characters

- ✓ Head is opisthognathous.
- ✓ Mouthparts are piercing and sucking type. Two pairs of bristle like stylets which are the modified mandibles and maxillae are present. Stylets rest in the grooved labium or rostrum. Both labial palps and maxillary palps are atrophied.
- ✓ Mesothorax is represented dorsally by scutellum.
- ✓ Forewings are either uniformly thickened throughout or basally coriaceous and distally membranous,
- ✓ Cerci are always absent.
- ✓ Metamorphosis usually gradual; rarely complete.
- ✓ Alimentary canal is suitably modified to handle liquid food. (filter chamber)
- ✓ Salivary glands are universally present,
- ✓ Extra-oral digestion is apparently widespread.
- ✓ Abdominal ganglia fused with thoracic ganglia.

Classification: There are two suboders viz., Heteroptera and Homoptera.

	Heteroptera **(Hetero-different;ptera-wing)**	**Homoptera** **(Homo-uniform; ptera-wing)**
1.	Head is porrect or horizontal	Head is deflexed
2.	Bases of the forelegs do not touch the head	Bases of the forelegs touch the head
3.	Beak arises from the anterior part of the	Beak arises from the posterior part of the

	head	head
4.	Gular region of the head(midventral sclerotised part between labium and foramen magnum) well defined.	Gular region not clearly defined
5.	Pronotum usually greatly enlarged.	Pronotum is almost alway small and collar-like.
6.	Scutellum (triangular plate found between the wing bases) well developed	Scutellum not well developed.
7.	Forewings heavily sclerotized at the base and the apical half is membranous (Hemelytra)	Forewings are of uniform texture. They are frequently harder than hind pair.
8.	Wings are held flat over the the back at rest and the left and right side overlap on the abdomen.	Wings are held roof-like over the back and wings do not over lap.
9.	Honey dew secretion uncommon	Honey dew secretion common
10	Repungnatorial or odori- ferous or scent glands present.	Wax glands usually present.
11.	Both terrestrial and aquatic	Terrestrial.
12.	Herbivorous, predaceous or blood sucking.	Herbivorous.

IMPORTANT FAMILIES OF HETEROPTERA

1. GERRIDAE: (Jesus bugs, Water striders, or Pond skater) Slender, elongate insects.

- ✓ Forelegs are short, raptrorial and suited for capturing prey.
- ✓ Middle legs are long and useful in pushing.

- ✓ Hindlegs are long and useful in steering. Hind femur is very long and extends beyond the abdomen.
- ✓ Legs are fitted with fine non wetting hairs.
- ✓ They skate on water surface.
- ✓ They feed on insects falling on water surface.

2. REDUVIIADE : (Assassin bugs, Kissing bugs or cone nose bugs)

- ✓ Head is narrow and elongate, constricted behind the eye forming a neck.
- ✓ Beak is short, three segmented and fits into a groove in the pro-sternum.
- ✓ Abdomen is widened in the middle.
- ✓ Lateral margins of the abdominal segments are exposed beyond the wing
- ✓ Many are predaceous on other isects. eg. *Platymeris leavicollis* is a predator on coconut rhinoceros beetle. *Triatoma sp and Rhodnius prolixus* are the vectors of chagas disease caused by *Trypanasoma cruzi* which causes human trypanasomiasis.

3. CIMICIDAE (Bed bugs)

- ✓ Body is dorsoventrally flattened so that they can hide in cracks and crevices. Body is oval in outline.
- ✓ It is dull reddish brown incolour.
- ✓ Thorax is deeply notched in front to receive the short head upto bulging eyes.
- ✓ Hemelytra short and reduced to scale like pads.
- ✓ Hindwings are completely atrophied.
- ✓ Stink glands are located in the dorsal surface of first three abdominal segments.
- ✓ Male bed bugs pierce the integument of the female and inject the sperm into the haemocoel during copulation (**Haemocoelic** or **traumatic insemination**).
- ✓ Beg bugs hide in crevices of beds, furniture, etc., during theday and emerge at night to seek a blood meal.They are blood sucking ectoparasites on birds and mammals. They are known for their irritating bite. *Cimex lectularis and Cimex hemipterus* are two important species affecting man in temperate and tropical conditions respectively.

4. TINGIDAE (Lacewing bugs)

- ✓ Pronotum has lateral expansions with lace like sculpturing. Scutellum is concealed by pronotum.
- ✓ Forewings have elaborate lace like markings due to densely reticulate, raised wing venation.
- ✓ Nymphs differ consideraly from adults. They are usually spiny and lack lace like markings.

- ✓ Both nymphs and adults are found on the undersurface of the leaves in groups, suck the sap and produce white spotted apperance on the leaf.
- ✓ They secrete honey dew. e.g. Banana lecewing bug *Stephanitis typicus*.

5. MIRIDAE : (Plant bugs or Leaf bugs).

- ✓ Beak and antennae are four segmented.
- ✓ Hemelytra with distinct **corium**, **clavus** and **cuneus** (a triangular apical piece of the basal part of forewing). Forewings are tilted at the distinct angle posterior to abdomen. Loop veins are found in membrane. Wings are tilted downwards.
- ✓ Nymphs and adults feed on plant juice and some species cause phytotoxemia due to the injection of toxic saliva. A few are also predaceous. e.g. Tea musquito bug *Helopeltis antonii* causes cankerous wart like growth on guava fruits.

6. LYGAEIDAE (Seed bugs or Chinch bugs)

- ✓ Cuneus is absent in hemelytra.
- ✓ Membrane has a few irregular veins (4-5 veins) arising from a transverse basal vein.

e.g. Dusky cotton bug *Oxycarenus hyalinipennis* nymphs and adults suck the sap from seeds of injured or already opened bolls and reduce the seed quality.

7. PYRRHOCORIDAE (Red bugs or Stainers)

- ✓ They are elongate oval bugs.
- ✓ They show warning colouration. They are brightly marked with red and black.
- ✓ Membrane is with more branched veins and cells. e.g. Cotton stainer *Dysdercus cingulatus*.
- ✓ Feeding injury caused by these bugs leads to the contamination by the fungus *Nematospora* resulting in yellowish brown discolouration of the lint.

8. COREIDAE (Squash bugs or leaf footed bugs)

- ✓ Membrane with many branching veins arising from a transverse basal vein.
- ✓ Stink glands are found inside the metathorax and glands openings are found on the sides of the thorax between middle and hind coxae. They emit a bad odour.
- ✓ Hind tibia and tarsi are expanded and leaf like.
- ✓ The edge of the abdomen is raised and wings lie in a distinct depression.e.g. Pod bug, *Riptortus pedestris* nymphs and adults suck the sap from pods of pulses.

9. PENTATOMIDAE (Stink bugs or Shield bugs)

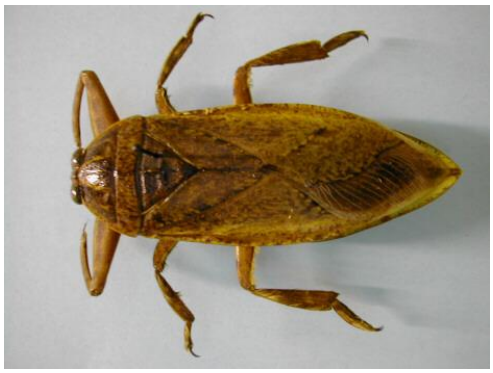
- ✓ Antenna is five segmented.
- ✓ Scutellum is prominent and shield like.
- ✓ Adults and nymphs produce a disagreeable odour from stink glands located in metathorax and abdomen respectively.
- ✓ Some are phytophagous and some are predaceous. e.g. Green stink bug *Nezara viridula* is a pest on millets.

10. NEPIDAE(Water scorpions)

- ✓ Forelegs are raptorial and suited for prey catching.
- ✓ Middle and hindlegs are suited for walking.
- ✓ A long caudal breathing tube formed by the cerci is present at the apex of the abdomen.
- ✓ They inflict a painful bite when handled.

11. BELOSTOMATIDAE(Giant water bugs or electric light bugs)

- ✓ They are large sized insects.
- ✓ Eyes are bead like.
- ✓ Antennae are concealed in ear-like pockets.
- ✓ Forelegs are raptorial and suited for capturing prey.
- ✓ Posterior legs are adapted for swimming.
- ✓ Tibia and tarsus are flattened and fringed with hairs.
- ✓ Abdomen with two short retractile apical appendages forming a terminal breathing tube.
- ✓ Dorsum of the abdomen is concave forming an air reservoir under the wings.
- ✓ They are positively phototropic. They are excellent fliers and swimmers.
- ✓ In some species eggs are laid on the back of the male.
- ✓ They suck the blood from toads, frogs, fishes and even human beings.



IMPORTANT FAMILIES OF HOMOPTERA

1. CICADIDAE (Cicadas)

- ✓ Males have sound producing organs at the base of the abdomen. Sound producing organs consist of a pair of large plates, the opercula covering the cavity containing structures producing sound. In the anterior part of the cavity benath each operculum is a yellowish membrane. A shinning mirror is located in the posterior part of the cavity. In the lateral wall of the cavity is an oval shaped ribbed structure, the tymbal. These are vibrated by strong muscles to produce sound. Each species has a characteristic song. Tympanum is present in both in sexes.
- ✓ Wings are transparent.
- ✓ Eggs are inserted into the tree twigs by the female.
- ✓ Nymphs drop to the ground, enter the soil and feed on root sap.
- ✓ Anterior femora of the nymph is thickened with spines beneath and are suited for digging the soil.
- ✓ Life cycle of periodical cicada lasts for 13-17 years.

2. MEMBRACIDAE(Tree hoppers or Cowbugs)

- ✓ They are structurally modified to resemble thorns or other plant parts.
- ✓ Pronotum is large and it covers the head.
- ✓ It is also extended backward over the abdomen.
- ✓ Wings are concealed by pronotum
- ✓ Pronotal process is either partially developed or absent in nymphs.
- ✓ Nymphs and adults suck tree sap and are commonly attended by ants for their honey dew.

3. CICADELLIDAE (Leaf hoppers or Jassids)

- ✓ Elongate insects with a wedge shaped body.
- ✓ Attractively coloured.
- ✓ Hind tibiae have a double row of spines.
- ✓ Ovipositor is well suited for lacerating the plant tissue.
- ✓ Nymphs and adults have the habit of running sidewise.

- ✓ They suck the plant sap and transmit diseases. eg. Green leaf hopper *Nephotettix virescens* transmits tungro disease in rice.

4. CERCOPIDAE(Spittle bug or Cuckoo-spilt or Frog hopper)

- ✓ Adults resemble tiny frogs.
- ✓ Hind tibiae with one or two lateral spines and a crown short spines at the tip.
- ✓ Nymphs are soft, whitish and live inside the forth.
- ✓ Froth comes from liquid freed from alimentary canal and from a mucilagenous substance created from the epidermal glands on the seventh and eight abdominal segments. These are beaten into froth by means of the caudal appendages of the insect. Spittle serves both as a protective device and a means of reducing evaporation.

5. DELPHACIDE (Plant hoppers)

- ✓ Large mobile flattened spur is present at the apex of hind tibia
- ✓ eg. Brown plant hopper *Nilaparvata lugens* causes hopper burn, transmits viral diseaes in rice.

6. LOPHOPIDAE

- ✓ Head is produced into a snout.
- ✓ Hind trochanter is directed backward
- ✓ Hind basitarsus is moderately long. e.g. Sugarcane leaf hopper *Pyrilla perpusilla* nymphs and adults suck the sap and reduce the quality and quantity of cane juice.

7. PSYLLIDAE (Jumping plant lice)

- ✓ Small active insect
- ✓ They resemble minute cicadas
- ✓ They move actively by leaping and flying.

- ✓ Hindleg is more muscular and suited for jumping.
- ✓ There is a prominent basal vein in the forewing formed by the fusion of radius, median and cubitus.
- ✓ Nymphs are sluggish. e.g. Subabul psyllid *Heteropsylla cubana* is a serious pest on subabul.

8. ALEYRODIDAE (Whiteflies)

- ✓ Minute insects which superficially resemble tiny moths.
- ✓ Wings are opaque and dusted with mealy white powdery wax. Wing venation is much reduced.
- ✓ Vasiform orifice is present in the last abdominal tergite. It is a conspicuous opening provided with an operculum. Beneath the operculum there is a tongue-like organ termed lingula. The anus opens at the base of the lingula through which honey dew is excreated in large amount.
- ✓ Immature instars are sessile, scale like, with waxy covering.
- ✓ Metamorphosis approaches the homometabolus type due to the presence of a quiescent stage prior to the emergence of adults.
- ✓ e.g. Cotton whitefly *Bemisia tabaci* transmits vein clearing disease in bhendi.

9. APHIDIDAE (Aphids or Plant lice or Greenflies)

- ✓ Body is pear shaped
- ✓ Both apterous and alate forms are found.
- ✓ A pair of cornicles or siphonculi or wax tubes is present in the dorsum of fifth or sixth abdominal segments which secretes wax like substance.
- ✓ They excrete copious amount of honey dew on which ants feed and sooty mould fungus grows.
- ✓ Aphids are known for their extraordinary fecundity, short life cycle and parthenogenitic reproduction. Life cycle is highly complex and it involve alternation of generation.
- ✓ They feed on plant sap and disseminate plant diseases.
- ✓ e.g. Cotton aphid *Aphis gossypii*.



10. COCCIDAE (Scale insects or Soft scales)

- ✓ Sexual dimorphism is present.
- ✓ **Male** : They are gnat like, with long antennae, lateral eye and vestigeal mouth parts.

- ✓ Mesothorax is enlarged bearing one pair of wings with on or two veins. Hind wings are reduced to halteres. A quiescent stage is present in the life history.
- ✓ **Female** : Body segmentation is indistinct. Body wall naked and covered with a waxy coating. They are wingless, legless and suck the plant sap.
- ✓ The first instar nymph is active and is known as crawler which moults and becomes legless. e.g. Coffee green scale *Coccus viridis*.

11. DIASPIDIDAE (Armoured scale)

- ✓ Adult female lacks antennae, legs, and wings.
- ✓ The body is covered by a hard, waxy, shell like substance
- ✓ e.g. Coconut scale *Aspidiotus destructor*.

12. KERRIDAE (Lac insect)

- ✓ Females are highly degenerate without legs, wings and antennae.
- ✓ The body is irregularly globular.
- ✓ Body is enclosed in a thick resinous cell.
- ✓ e.g. Lac insect *Laccifer lacca*. Dermal gland secretions of this insect provides the sticklac.

13. PSEUDOCOCCIDAE (Mealy bugs)

- ✓ Body is elongate oval in shape.
- ✓ Body segmentation is distinct.
- ✓ Body is covered by long radiating thread of mealy secretion.

- ✓ Functional legs are present in all instars.
- ✓ Wings are absent.
- ✓ e.g. Coconut mealy bug, *Pseudococcus longispinus*.
- ✓ Nymphs and adults suck the sap and affect the growth of spindle leaf.