

# **Insect classification and biodiversity**

## **ENT-304**

**Dr. Muhammad Arshad**  
**Department of Entomology,**  
**College of Agriculture, University of Sargodha**  
[makuaf@gmail.com](mailto:makuaf@gmail.com)

# HEMIPTERA (half wings)

The basal half of the front wing is somewhat thicker than the apical half.

They are commonly called **true bugs**

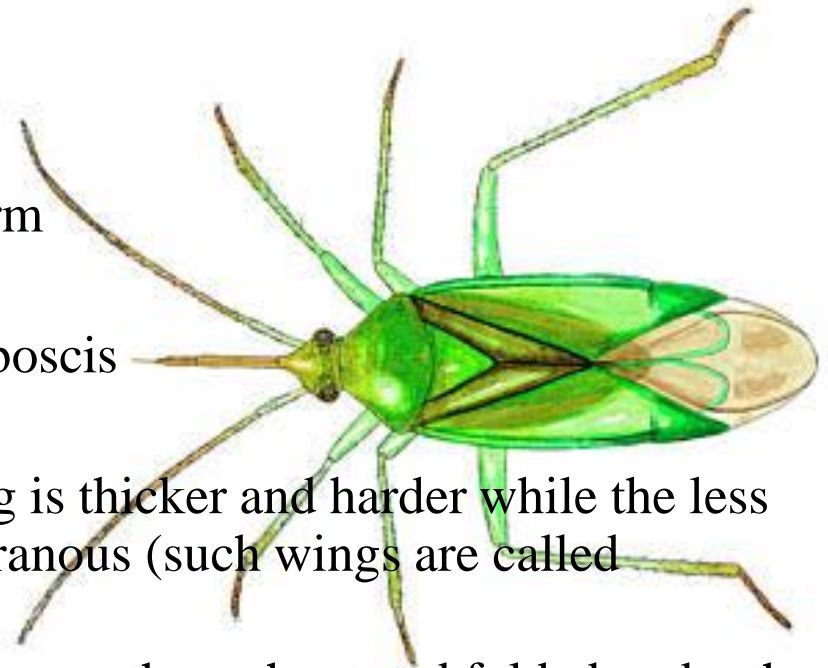
## Characters

### Head

- Antennae are long and usually filiform
- Mouthparts are piercing sucking
- Labium is modified into sucking proboscis

### Thorax:

- More than basal half of the front wing is thicker and harder while the less than apical half is very thin or membranous (such wings are called hemelytra).
- Hind wings are very thin and membranous throughout and folded under the front wings



# CLASSIFICATION (Two suborders)

## Suborder Gymnocerata

1. Antennae are long and not hidden in the grooves
2. Terrestrial bugs



## Suborder Cryptocerata

1. Antennae are short and hidden in the grooves on the lower side of the head
2. Aquatic bugs (water bugs)



**Scutellum**

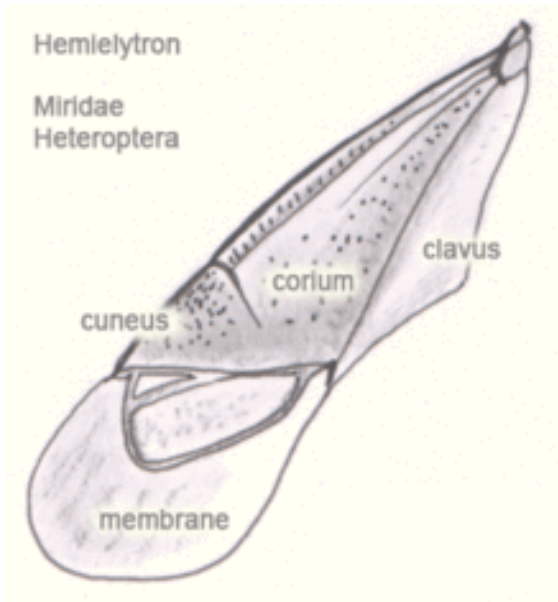
Triangular thick plate b/w forewing

**Corium**

Basal half of the forewings is thickened and leathery

**Cuneus**

Triangular-shaped region at the distal end



# Families of the suborder Gymnocerata

## Family Pentatomidae

(shield bugs, Kaduo bug, Moli bug, Green bug )

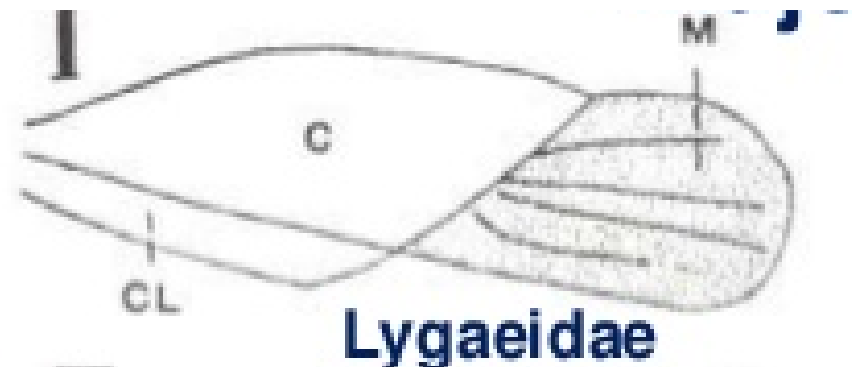
1. Antennae - 5 segmented.
2. Scutellum is large triangular



## Family Lygaeidae

(e.g. Dusky cotton bug, Sugarcane black bug).

1. Antennae and proboscis both are 4 segmented.
2. 4-5 simple veins are present in the membrane
3. Cuneus is absent



## Family Pyrrhocoridae

(**Stainers or red cotton bugs**) they stain the cotton lint

1. Marked with red and black.
2. They have 4 branched veins and cells in the membrane.

## Family Reduviidae

(**Assassin bugs e.g *Harpactor costalis***)

1. Head is narrow and elongate; posteriorly forming a neck like structure.

Proboscis is 3 segmented.

Abdomen is often widened at the base.

## Family Cimicidae (Bed bugs)

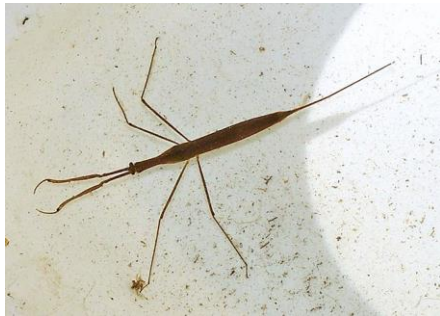
1. Ectoparasites
2. Their body is broadly oval.
3. Wingless.
4. Red in color



# Families of the suborder Cryptocerata

## Family Nepidae (Water scorpion)

1. Insects are of large size
2. Antennae are long and slender
3. Body is long, thin, cylindrical
4. A long slender respiratory tube is present at the end of abdomen
5. Front legs are raptorial



## Family Belostomatidae (Giant water bugs)

1. Bugs are very large sized with body flattened
2. Hind legs are gray flattened and fringed with long hairs for swimming

### Collection

These bugs are found on all types of vegetation, while the aquatic bugs can be collected from ponds, streams and water sources.

# HOMPTERA (similar wings)

Front wings are uniform throughout i.e. if thick; those are throughout thick, if thin, those are throughout thin. They are commonly called by many names such as **cicadas, whiteflies, aphids, scale insects, plant hoppers, leafhoppers etc.**

## Characters

### Head:

- Antennae are short and usually setaceous
- Mouthparts are modified into a sucking proboscis, which arises from the lower side of the head and projects backward

### Thorax:

- Forewings are uniform i.e. thin and thick throughout.
- Hind wings are membranous and thin
- Hind wings modified into halteres in some members. i.e. Male mango mealy bug
- Parthenogenetically reproduction/aphids
- False pupal stage - whiteflies



# Classification (Two suborders)

## **SUBORDER AUCHENORRHYNCHA**

1. Antennae are short and setaceous.
2. Tarsi are 3 segmented.

## **SUBORDER STERNORRHYNCHA**

1. Antennae are long and filiform.
2. Tarsi are 1 or 2 segmented.

# FAMILIES OF SUBORDER AUCHENORRYNCHA

## 1. Family Cicadidae (e.g. Cicadas)

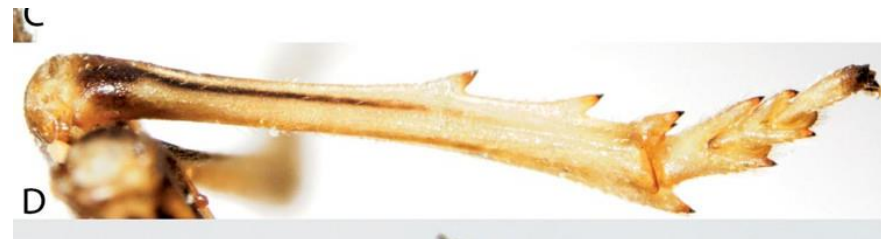
- Large size insects with beautiful colour pattern in the wings
- Males have two large drums like structures on the lower side of the abdomen for sound production

## 2. Family Cicadellidae (Leafhoppers or jassids)

- They are of small size – Yellow or greenish in color
- On hind tibia one or more rows of spines are present

## 3. Family Delphacidae (Planthoppers)

- On hind tibia there is a large flattened single spur at the apex



# FAMILIES OF SUBORDER STERNORRHYNCHA

## 1. Family Psyllidae (citrus psylla, *Diaphorina citri*)

- Long antennae
- Proboscis short and 3 segmented
- Winged insect

## 2. Family Aphididae (Aphids)

- They are winged or wingless.
- A pair of tubes is present on the upper side of the 5<sup>th</sup> abdominal tergum, these tubes are called **cornicles** or honey tubes.



Photo by sccgov.org



### 3. Family Aleyrodidae (whiteflies)

- Minute insects
- Wings are covered with white powder
- All wings have a single branched vein

### 4. Family Margarodidae (Mealybugs)

- In male, antennae are long and very hairy
- Hind wings in male are reduced to halteres
- Female is elongated and covered with white waxy powder



#### **Collection**

These insects are found on all types of vegetation

# Thysanoptera (Fringe of hairs-wings)

- Wings covered with hairs
- Thrips

## Characters

### Head

- Antenna short – moniliform
- Mouthparts – piercing sucking

### Thorax

- Wings modified into long, narrow rod like structure which are covered with hairs

### Abdomen

- Abdomen ends in a tubular structure which may be absent



thrips  
(Thysanoptera)

# Classification

## Suborder Terebrantia

- End of abdomen– rounded
- Female ovipositor saw like
- **Family Thripidae**

TEREBRANTIA



## Suborder Tubulifera

- End of abdomen – fair long tube
- Ovipositor is absent
- **Family Phlaeothripidae**

TUBULIFERA



## Collection

Found on all types of vegetables, crops, trees, and ornamental plants

**HOLOMETABOLA or ENDOPTERYGOTA**

# Neuroptera (Nerve wings)

- Wings are greatly veined
- Commonly called nerve winged insects

## CHARACTERS

### Head

- Antennae are long
- Mouthparts are of chewing type

### Thorax

- Wings are similar, greatly winged
- Between costa and subcosta there are many cross veins, which form a distinct border stripe

### Abdomen

- Cerci are absent





# Classification

## Family Chrysopidae (Green lacewings)

- Small size and predaceous insect, feed on aphids
- Green color with golden eyes
- Green wings when seen in light from different angles give different colors



## Family Mantispidae (e.g. *Mantispa* sp.)

- Resemble with mantids
- Have a long neck
- Front legs are very large and raptorial

## Family Myrmeleontidae (e.g. *Myrmeleon* sp.)

- Large size insects and resemble somewhat with dragonflies
- Length of antennae is equal to the head and thorax taken together
- Abdomen is long and slender



## **Collection**

Adults of these insects mostly attractive to light and can be collected from streetlights, or by using light traps in the crop fields. The young ones (larvae) can be collected and brought from different crops and habitat like sandy soil and reared in the lab.