# Hemiptera

**Includes:**

Assassin bugs, Lygus bug , Stink bug

Minute pirate bug , Big-eyed bug , Damsel bug

**Mouthparts:**

Piercing-Sucking

**Characterstics:**

The name Hemiptera means 'half wing': because of the forewing structure, partially hardened at the base and partially membranous.

# LEPIDOPTERA

- In the entire animal kingdom, insects form the largest group and Lepidoptera is the third largest order in the insect world (Zhang, 2013).
- This order has 1,57,424 known species under 15,578 genera comprising moths and butterflies (Zhang, 2011).

# Homoptera

**Includes:**

Leafhoppers

Treehoppers

Whiteflies

**Mouthparts:**

Sucking

**Characterstics**

The proboscis is shorter than that found in true bugs (Heteroptera). Although some Homoptera are secondarily wingless, the majority have membranous or uniformly textured wings that fold tent-like over the body at rest.

# Lepidoptera

**Includes:**

Butterflies and Moths

**Mouthparts:** Chewing – Caterpillars, Siphoning – adult.

**Characteristics:**

Derived from Greek word

Lepis: Scales

Pteron: Wings

The presence of scales that cover the body and wings. The scales are modified, flattened "hairs", and give butterflies and moths their wide variety of colors and patterns








# Coleoptera

**Includes:**

Blister beetle, Boll weevil, Darkling beetle, Dermestid beetle , Dung beetle, Lady beetle (Ladybird beetle), Striped June beetle

**Mouthparts:**

Chewing, Weevil- Piercing Sucking

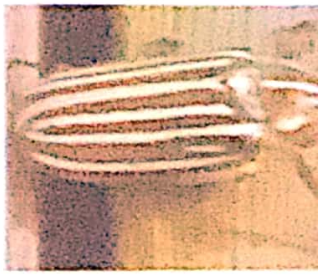
**Characteristics:**

Coleoptera, derived from the Greek words *"koleos"*- sheath and *"ptera"*- wings, refers to the modified front wings which serve as protective covers for the hind wings. **Largest order**. At rest, both elytra meet along the middle of the back, forming a straight line, the most distinctive characteristics of the order.









# Orthoptera

**Includes:**

Indian House Crickets

Field Cricket

Short-horned Grasshoppers

Katydid (Long-horned Grasshoppers)

**Mouthparts:**

Chewing and Biting

**Characteristics:**

Cylindrical Body, with elongated hindlegs and musculature adapted for jumping. The antennae have multiple joints and filiform type

# TYPES OF TAXONOMY

**Alpha Taxonomy** is the discipline of detecting, describing, and classifying new species, as well as revising the classification of previously described species.

**Beta Taxonomy**, the process of arranging taxa into higher categories with respect to their commonality of characters with other similar species.

**Gamma Taxonomy,** the study concerned with biological aspects of taxa, including intraspecific populations, speciation, and evolutionary rates and trends; using Phylogenetic studies.

# MOTH COLLECTION TECHNIQUES
# (LIGHT TRAPS)

@ google source

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@ BEL

Vertical Sheet Method

# Moths vs Butterflies

Sujata, 2018

@ google source

1. Moths tend to have flat wings while resting.

2. Moths are generally nocturnal, flying at night.

3. Hairy or feathery Antennae

1. Butterflies tend to fold their wings vertically up over their backs.

2. Butterflies are primarily diurnal, flying in the daytime.

3. Hooked shaped antennae

# WING VENATION

Wing venation is considered a stable and one of the diagnostic character for identification of moths and butterflies for the last 210 years.

The procedure includes the separation of wings from the adult of a species by giving an upward jerk with the help of a fine needle. The detached wings were dipped in 70% alcohol to make them soft. Descaling was done with the help of sodium hypochlorite (approx. 4% w/v available chlorine solution). The descaled wings were then washed with distilled water and stained in 70% alcoholic eosin for 12-14 hours. After staining, the wings were passed to the upgrading series of alcohol before mounting in Canada balsam. The diagrams of fore and hindwing venation were drawn with the help of trisimplex projector which were later on scanned so as to make these available for showing venation.