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FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES

ENT-121: Fundamentals of Entomology

Lecture 28: Agricultural Important Orders and families:

1. **Lepidoptera:**

Economically important families

1. **Papillionidae (Swallow tail butterflies):**
   - Iridescent black and strikingly marked with shades of yellow, red green or blue
   - Antennae clubbed, fore tibia with pads
   - Hind wing with a tail like prolongation which is marginal extension of vein M 3
   - Larvae is smooth with a series of fleshly dorsal tubercles
   - Pupa is chrysalis with two lateral cephalic projections Ex: Lemon butterfly, *Papilio demoleus*
2. **Nymphalidae (Brush footed and Emperor butterflies):**
   - Brightly colored with clubbed antennae
   - Forelegs reduced and vestigial, folded on to the thorax
   - The tarsi of forelegs are unjointed in males and 4 or 5 segmented in females
   - The short tibiae are covered with long hairs hence the name brush footed butterflies
   - Larvae with spines and a pair of anal processes directed backwards Ex: Evening Brown, *Melantis leda*
3. **Gelichiidae (Gelichiid moths):**
   - Small cryptic coloured moths
   - Forewings are narrower than the hind wings
   - Apical angle of the hind wing is pointed
   - Larvae feed under concealment
   - Labial palpi are long and upcurved Ex: Groundnut leaf miner, *Aproaerema modicella*
4. **Arctiidae (Tiger moths)**:
   - Body is stout and broad
   - Wings are brightly coloured with spots or bands
   - Hind wing with two anal veins.
   - Larvae are densely clothed with long hairs Ex: Red hairy caterpillar, *Amsacta albistiga*
5. **Noctuidae (Army worms, borers and cut worms)**:
   - Moths are cryptic and dull coloured
   - Insects are nocturnal and attracted to light
   - Proboscis is present and labial palp is long and well developed
   - Maxillary palpi minute

- Cu2 absent in both wings
- Larvae with all prolegs bearing crochets except in semiloopers in which first two pairs are wanting
- Pupation takes place in soil Ex: Tobacco caterpillar, *Spodoptera litura*

6. **Saturnidae (Tasar silk moths)**:
    - Very large coloured moths
    - Labial palpi is small and frenulum is absent
    - The larvae are stout, smooth and possession of scoli (characteristic feature)
    - Wings with transparent fenestrae or eye spots
    - Proboscis vestigial or absent
    - Antennae is pectinate in males and females
    - Pupation in silken cocoon Ex: Muga silk moth, *Antheraea assama*
7. **Sphingidae (Hawk moths):**
    - Large robust flying moths
    - Antennae hooked apically
    - Proboscis is extremely long and frenulum is well developed
    - Larvae with longitudinal and oblique stripes. They possess horn like process on the 8^{th} abdominal segment
    - Pupation inside cocoon Ex: Deaths' hawk moth, *Acherontia styx*
8. **Hesperiidae (Skippers):**
    - They derive their name from their erratic darting flight
    - Small, short, stout, somber coloured butterflies
    - Antennae is clavate with curved tip and widely separated at the base
    - Hind tibia usually with two pairs of apical spurs
    - Larvae with five pairs of prolegs bearing crotchets
    - Pupa is attached to leaf from anal end by a silken thread Ex: Paddy skipper, *Pelopidas mathians*
9. **Pyralidae (Snout moths):**
    - Small delicate moths with labial palpi projecting forward into a snout like structure
    - Fore wings are elongate or triangular
    - Cu 2 absent in forewing and present in hind wing
    - Legs are slender and long
    - Tympanum present at the base of the abdomen
    - Adult females provided with a tuft of hairs at the caudal extremity Ex: Indian meal moth, *Plodia interpunctella*
10. **Lycannidae (Blue coppers):**
    - Adults are small and brightly coloured, sometimes with a metallic gloss
    - The male's forelegs are reduced in size and lack claws
    - Tail like delicate prolongations are seen on the hind wings

- Larvae are often flattened rather than cylindrical, with glands that may produce secretions that attract and subdue ants Ex: Pomegranate butterfly, *Virachola isocrates.*

2. Coleoptera:

Suborders of Coleoptera 1. Polyphaga: It is by far the largest suborder, containing 85% of the known species, including rove beetles, scarabs, stag beetles, metallic wood - boring beetles, click beetles, fireflies, blister beetles, mealworms, ladybirds, leaf beetles, longhorn beetles, and weevils. Many are phytophagous.

2. Adephaga: It includes ground beetles, tiger beetles, predacious diving beetles, and whirligig beetles; most adephagans are predacious.

3. Myxophaga: It is a small suborder, members are small or minute, and associated with hygrometric habitats, drift material, or interstitial habitats among sand grains.

4. Archostemata: It contains several families of beetles, most associated with wood and these are not known to occur in India so far.

1. Chrysomelidae (Flea beetles):

- Adults are oval and convex, with metallic colouration
- Antennae widely separated at the base
- Prothorax is laterally marginated and narrow
- Legs are well adapted for running and jumping
- Elytra covers entire body, pygidium not exposed beyond elytra
- Third tarsal segment is bilobed Ex: Rice hispa, *Dicladispa armigera*

2. **Curculionidae (Weevils):**

- Head modified into long rostrum. Mouth parts at the tip of the rostrum
- Rostrum is well developed in females and used to bore hole for placing the eggs
- Labrum is absent, palps are reduced and mandibles are lacking or reduced.
- Antennae is clubbed, geniculate or calvate
- Larvae apodous and phytophagous Ex: Red palm weevil, *Rhynchophorus ferrugineus*

3. **Scarabaeidae (Dung beetles)**:

- Small to large, oval or convex body
- Head and prothorax with horns
- Antennae 8 - 10 segmented
- Elytra not usually completely covering the abdomen. Exposed area is called pygidium
- Hind tibia with spur
- Tarsus 5 segmented, front tibia dialted and toothed
- Larvae scarabaeiform, saprophytic or phtyophagous Ex: Coconut rhinoceros beetle, *Oryctes rhinoceros*

4. **Cerambycidae (Long horned beetles)**:

- Body long and cylindrical with attractive colouration
- Prothorax is narrow or as wide as mesothorax, usually spined or tuberculate.
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- Stidulatory organs on the hind margin of prothorax
- Antennae very long at least 2/3 of the body length
- Tarsi 5 segmented, tibia with 2 spurs
- Grubs are apodous, elongate, cylindrical, whitish and bore into woods Ex: Mango stem borer, *Batocera rufomaculata*

5. **Coccinellidae (Lady bird beetle)**:

- Adults are small, oval or spherical convex, brightly covered with coloured spots
- Head concealed in pronotum
- Tarsi 4 segmented and 3rd segment concealed in the deeply bilobed second segment
- Antennae short, clubbed 3 to 6 segmented
- Larvae campodeiform usually covered with minute tubercles or spines
- Both adults and grubs are predaceous on soft bodies insects and mites Ex: Lady bird beetle, *Coccinella septempunctata*.

Prasad, T.V. Handbook of Entomology (p. 38). Kindle Edition.