

Order Lepidoptera (Butterflies, Moths & Skippers)

1. Body, wings, appendages, are densely clothed with overlapping scales, which give colour, rigidity and strength. They insulate the body and smoothen air flow over the body.
2. Mouthparts in adults are of siphoning type. Mandibles are absent. The galeae of maxillae are greatly elongated and are held together by interlocking hooks and spines. The suctorial proboscis is coiled up like a watch spring and kept beneath the head when not in use.
3. Wings are membranous and are covered with overlapping pigmented scales. Forewings are larger than hind wings. Cross veins are few. Wings are coupled by either frenate or amplexiform type of wing coupling.
4. Larvae are polypod-eruciform type. Mouthparts are adapted for chewing with strong mandibles. A group of lateral ocelli is found on either side of the head. The antenna is short and three segmented. There are three pairs of five segmented thoracic legs ending in claws. Two to five pairs of fleshy unsegmented prolegs are found in the abdomen. At the bottom of the proleg, crochets are present.
5. Pupa is generally obtect. It is either naked or enclosed in a cocoon made out of soil, frass, silk or larval hairs.

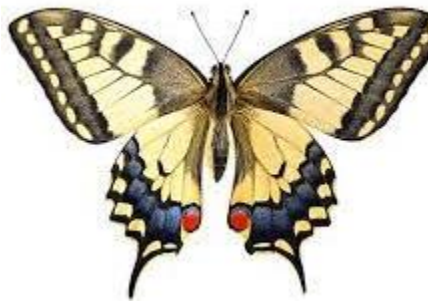
➤ Family: Nymphalidae (Brush footed butterflies)

1. Forelegs are short, functionless, hairy and folded on thorax.
2. Foretibia is short and covered with long hairs.
3. Larva is with many processes or spines on the body



➤ **Family: Papilionidae (Swallow tails)**

1. They are often large and brightly coloured.
2. Prothoracic legs have tibial epiphysis.
3. In many species hindwings has tail like prolongation.
4. Larval body is either smooth or with tubercles.
5. Retractable osmeteria are present on the prothoracic tergum of the caterpillar
e.g. Citrus butterfly , *Papilio demoleus*.



➤ **Family: Pieridae (whites or Sulphurs)**

1. They are white or yellow or orange coloured with black markings.
2. Larva is green, elongate and covered with fine hairs.
3. Larval body segments have annulets.



➤ **Family: Noctuidae (Noctua moths)**

1. They are medium sized, stoutly built moths.
2. They are nocturnal and attracted to light.
3. Labial palp is well developed.
4. Crochets on the larval prolegs are all of one size and arranged in semi-circle.



➤ **Family: Sphingidae (Hawk moths, Sphinx moths, Horn worms)**

1. They are large sized stoutly built moths.
2. Antenna is thick towards middle and hooked at the tip.
3. Proboscis is very long.
4. Forewings are elongated and pointed with very oblique outer margin.
5. Hindwings are reduced in width fitting into the indented margin of forewings. They are powerful fliers.
6. Larva is smooth with a middorsal horn (anal horn) on the eighth abdominal segment.



➤ **Family: Pterophoridae (Plume moths)**

1. They are small lightly built months
2. Forewings are elongate with two to four clefts or fissures.
3. Hindwings have three divisions
4. Legs are long, slender and armed with prominent tibial spurs.



➤ **Order: Coleoptera (Beetles & Weevils)**

1. They are minute to large sized insects.
2. Antenna is usually 11 segmented.
3. Mouthparts are chewing type. Mandibles are short with blunt teeth at the face in phytophagous group. In predators the mandibles are long, sharply pointed with blade like inner ridge. In pollen feeders teeth are absent and the mandibles are covered with stiff hairs.
4. Prothorax is large, distinct and mobile.
5. Mesothorax and metathorax are fused with the first abdominal segment.
6. Forewings are heavily sclerotised, veinless and hardened. They are called elytra. Forewings do not overlap and meet mid-dorsally to form a mid-dorsal line. It is not used for flight. They serve as a pair of convex shields to cover the hindwings and delicate tergites of abdomen.
7. Hindwings are membranous with few veins and are useful in flight. At rest they are folded transversely and kept beneath the elytra. In some weevils and ground beetles the forewings are fused and hindwings are atrophied.
8. A small part of the mesothorax known as scutellum remains exposed as a little triangle between the bases of elytra.
9. Cerci and a distinct ovipositor are absent.
10. Metamorphosis is complete. Larva are often called grubs.
11. Pupae are usually exarate and rarely found in cocoons.



❖ I) Suborder: Adepnaga

1. Beetles mostly predatory in habit, they feed on other, insects.
2. Antennae generally filiform.
3. Notopleural suture is present.
4. The Ist visible abdominal sternum is divided by the hind coxae and the posterior margin of this sternum does not extend completely across the abdomen.
- 5- Adepnaga includes families: **Cicindelidae**, **Carabidae** and **Dytiscidae**, and other families

❖ II) Suborder: Polyphaga

Characters:

1. The Ist visible abdominal sternum is not divided by the hind coxae and the posterior margin of this sternum extends completely across the abdomen.
2. Hind trochanters are small.
3. Notopleural suture is absent.
4. Polyphaga includes families: **Bruchidae**, **Curculionidae** (curculioni = weevils or snout beetles), **Tenebrionidae**, **Coccinellidae** (lady bird beetles), **Scarabaeidae**, and other families.

I) Suborder: Adepnaga

➤ Family: Cicindelidae (Tiger beetles)

1. Head is usually wider than prothorax.
2. Eyes are fairly larger and they have very keen vision.
3. Mandibles are sharply pointed, sickle shaped and acutely toothed for capturing the prey.
4. Legs are long and tarsi slender which enable to run fast.
5. Elytra usually have spots and stripes.
6. Larva excavates vertical pits for prey capture.
7. Both grubs and adults are active predators.

