



**ORDER:  
COLEOPTERA**



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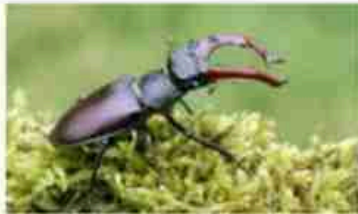
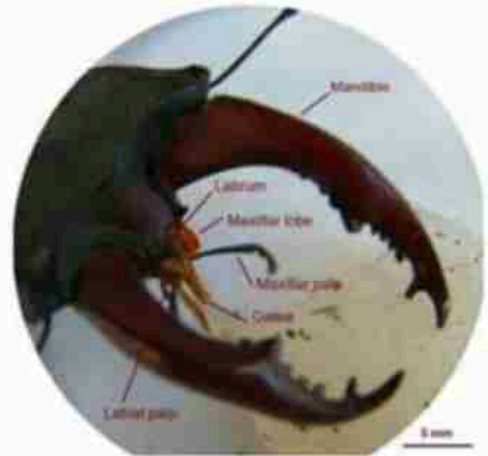
# COLEOPTERA

- Synonym : Elytroptera
- Etymology : Coleo - Sheath ; ptera-wing
- Common names : Beetles, Weevils



# Coleoptera

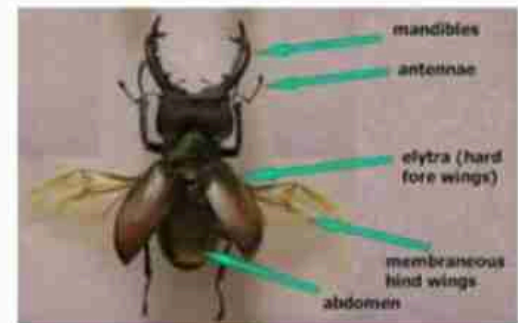
- Characters
- They are minute to large sized insects.
- Antenna is usually 11 segmented.
- Mouthparts are chewing type.
- Mandibles are short with blunt teeth at the mesal face in phytophagous group.
- In predators the mandibles are long, sharply pointed with blade like inner ridge.
- In pollen feeders teeth are absent and the mandibles are covered with stiff hairs.
- Prothorax is large, distinct and mobile.



# Coleoptera

## Characters

- Mesothorax and metathorax are fused with the first abdominal segment.
- 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.
- Hindwings are membranous with few veins and are useful in flight.
- At rest they are folded transversely and kept beneath the elytra.



## Characters

- In some weevils and ground beetles the forewings are fused and hindwings are atrophied.
- A small part of the mesothorax known as scutellum remains exposed as a little triangle between the bases of elytra.
- Cerci and a distinct ovipositor are absent.
- Metamorphosis is complete.
- Larva are often called grubs.
- Pupae are usually exarate and rarely found in cocoons.



## Coleoptera



## Classification

- It is the largest order. It includes predators, scavengers and many crop pests.
- They also damage stored products.
- This order is divided into two suborders, viz.,
- **Adephaga** (devourers) and **Polyphaga** (eaters of many things).
- Adephaga includes Cicindelidae, Carabidae and Dytiscidae.
- Other families listed out below come under Polyphaga.



## FAMILIES OF PREDATORS

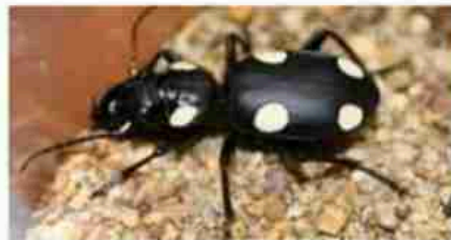
### 1. CICINDELIDAE (Tiger beetles)

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



## 2. CARABIDAE (Ground beetles)

- Adults are often black in colour and some brightly spotted.
- Some cannot fly because they have fused elytra and atrophied hindwings.
- Legs are suited for running.
- Larvae have caliper like mandibles, well developed legs and terminal cerci like structures called urogomphi.
- They are nocturnal. Ground beetles are voracious predators both as adults and larvae.
- They feed on soft bodied caterpillars and other insects.
- Six spotted carabid : *Anthia sexguttata*





### 3. DYTISCIDAE:

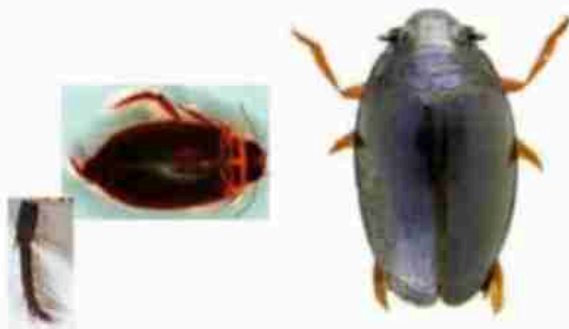
(True water beetles, Predaceous diving beetles)

- Body is long, oval, smooth and shiny.
- Head, thorax and abdomen are compactly joined.
- Antenna is filiform.
- In some male beetles the fore tarsi are provided with cup like suckers which are useful in clasping the mate.
- Hindlegs are flattened, fringed with hairs and suited for swimming.
- Air is stored beneath the elytra.
- Adults and larvae are aquatic predators



## 4. GYRINIDAE (Whirlinig beetles)

- They swim in erratic paths on water surface and exhibit gyrating motion.
- Compound eyes are completely divided by the front margin of the head into an upper and lower half so that the beetle appear to have two pairs of compound eyes.
- The dorsal pair is suited for aerial vision and the ventral pair is for aquatic vision.
- Forelegs are prehensile and long.
- Middle legs and hindlegs are natatorial.
- They are predators.



## 5. COCCINELLIDAE (Lady bird beetles)

- They are hemispherical.
- The body is convex above and flat below.
- Their body appearance resembles a split pea.
- Head is small, turned downward and received into a prominent notch of prothorax.
- Elytra is strongly convex, brightly coloured and variously spotted.
- Grubs are compodeiform and spiny.
- The last larval skin either cover the pupa or gets attached to the anal end of the pupa.
- Except the genus *Epilachna*, others are predators on aphids, scales, mites and whiteflies.



## 6. LAMPYRIDAE (Fireflies, Glow worms)

- They show sexual dimorphism.
- Male : head is concealed by the semicircular pronotum.
- Eyes are well developed and contiguous.
- Forewings are soft and flexible.
- They do not fully cover the abdomen.
- Photogenic organ is found in sixth and seventh abdominal segments.
- Female : Head is hidden by pronotum.
- Eyes are very much reduced.
- Wings are absent and is larviform.
- Photogenic organ is present in seventh abdominal segment.



## 6. LAMPYRIDAE (Fireflies, Glow worms)

- Larvae are with sickle like mandibles.
- They are carnivorous and feed on snails.
- Extra intestinal digestion is common in larvae.
- All life stages are luminous to varying degree.
- The luminescence is produced by the oxidation of a substance luciferin in the presence of an enzyme luciferase.
- The function of luminescence is to bring the sexes together.



## FAMILIES OF SCAVENGERS

### 1. SCARABAEIDAE (Scarabs, Dung beetles)

- Head is broad and flat. Mandibles are membranous and incapable of chewing.
- Many have spines and horns on head and prothorax.
- Forelegs are fossorial.
- Middle legs are widely separated
- Adults and larvae are scavengers.
- They feed upon the droppings of animals and human excreta.
- They roll the dung into balls and bury them in underground chambers.
- They use their head and forelegs for handling dung and digging pits in the soil.
- Head is used as an excavator and fore-tibia as shovel.
- They show remarkable parental care.
- Common Indian dung beetle : *Heliocopris bucephalus*



## 2. HYDROPHILIDAE (Water scavenger beetles)

- They are black or dull coloured.
- Body is convex above and flattened below.
- Antenna is clubbed and kept beneath the prothorax.
- Maxillary palps are long and look like antennae.
- Legs are evenly placed in the anterior part of the body.
- Middle legs are flattened and suited for swimming.
- Metasternum is produced into a spine posteriorly.
- Air is stored beneath the elytra and over the undersurface of the body.
- Adults and larvae feed on decomposing vegetable matter.



## FAMILIES OF STORED PRODUCT PESTS

### 1. ANOBIIDAE (Wood worms, Wood borers)

- Body is oval shaped or cylindrical.
- Head is concealed by pronotum which is helmet like.
- Grub is fleshy with larger abdominal segments.
- Cigarette beetle : *Lasioderma serricorne* is the most serious pest of tobacco in factories and cigar stores.





## 2. BOSTRYCHIDAE

- They are small, elongate and cylindrical beetles.
- Head is concealed by the pronotum which is hood like.
- Antenna is either smooth or sculptured.
- Lesser grain borer : *Rhizopertha dominica* larvae bore in to the stored grains and eat the inner contents completely.



### 3. BRUCHIDAE

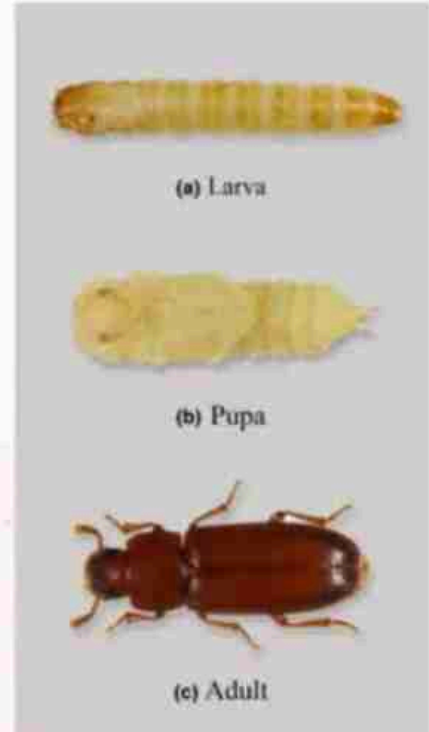
(Pulse beetles, Seed beetles)

- They are small, short beetles.
- Head is small and the snout is blunt.
- Antenna is serrate.
- Hind femur is thick.
- Elytra are short and do not cover the abdomen fully.
- Eggs are whitish, scale like and glued to the pods or seeds by a glutinous secretion.
- Grubs feed exclusively on seed legumes.
- Pupation occurs within the seed.
- Adult emerges by cutting a circular exit hole.
- Development is similar to hypermetamorphosis.
- Pulse beetle : *Callosobruchus chinensis*.
- It is a serious pest on stored pulses.



## 4. TENEBRIONIDAE (Meal worms)

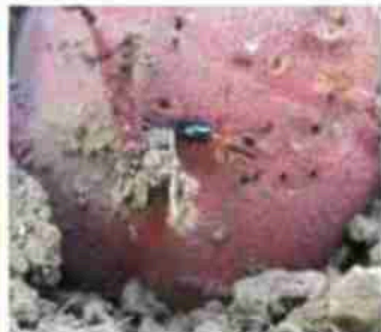
- Body is flat and elongate.
- Elytra is often sculptured.
- Legs are heteromerous with a tarsal formula of 5-5-4.
- Larvae are called meal worms.
- Red flour beetle : *Tribolium castaneum*.
- It is an important pest of milled products.



# FAMILIES OF CROP PESTS

## 1. APIONIDAE:

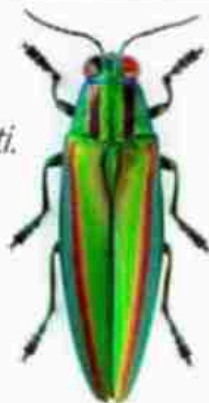
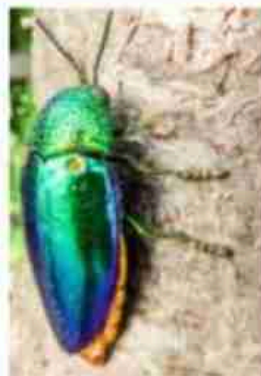
- Head is produced into a snout
- Antenna is not elbowed.
- Grubs are apodous.
- Sweet potato weevil : *Cylas formicarius*.
- It attacks sweet potato both in fields and in storage.



## 2. BUPRESTIDAE

(Jewel beetles, Metallic wood borers)

- They are often elongate hard bodied insects.
- Body regions have a metallic lusture
- Antenna is serrate.
- Larvae are called flat headed borers.
- Larval head is small and is entirely withdrawn into thorax.
- Prothorax is greatly expanded.
- Legs are absent.
- They tunnel beneath the bark or bore into stems or roots.
- Groundnut stem borer : *Sphenoptera perotetti*.
- The larva tunnels into the main root and kills the plants.



## 4. CASSIDIDAE (Tortoise beetles)

- Adults look like a small tortoise
- Head is concealed under the prothorax.
- Head is inferior in position.
- Prothorax and elytra are convex, wider and form a shell.
- Leg tips alone are exposed outside the shell.
- Larva is dorsally spiny to which excreta and exuviae are attached forming a faecal shield.
- Sweet potato beetle : *Aspidiomorpha miliaris*.
- They primarily feed on sweet potato.



## 5. CERAMBYCIDAE (Longicorn beetles)

- Body is cylindrical.
- Compound eyes are notched.
- Antenna is as long or longer than the beetle itself. Antenna can be flexed backwards.
- It is surrounded at the base by compound eye.
- Pronotum is with one to three laterally located spines.
- Grubs are called round headed borers.
- They are apodous but have psuedopods both on dorsal and ventral side.
- They are wood borers.
- They develop beneath the bark and
- tunnel into the branches or main stem.
- Mango stem borer : *Batocera rufomaculata*



## 6. CURCULIONIDAE (Weevils, snout beetles)

- Minute to large sized insects.
- Frons and vertex of the head are produced into snout.
- It is cylindrical and in some species larger than the beetle itself.
- Mouthparts (Mandibles and maxillae) are present at the tip of the snout.
- It is useful to feed on internal tissues of the plant and provide a place for egg laying.
- Antenna is geniculate and found usually in the middle of the snout.
- Grubs are apodous and eucephalous.
- Weevils are important crop pests occurring both in field and storage.
- Coconut red palm weevil: *Rhynchophorus ferrugineus*.





## 7. DYNASTIDAE

(Unicorn beetles, Rhinoceros beetles)

- Mandibles are bent, expanded, leaf like and visible from above.
- Horns are usually present in male in the head and thorax.
- **Coconut rhinoceros beetle: *Oryctes rhinoceros*.**
- Cephalic horns are found in both the sexes.
- In male the horn is longer and recurved.
- In female it is shorter and straight.
- Adults are injurious to coconut and grubs are found in dying palms and manure pits.



## 8. ELATERIDAE

(Click beetles, Wire worms)

- Body is elongate and cylindrical.
- Pronotum is rounded anteriorly and its posterior corners are sharply pointed.
- Adult is able to jump and land upon its feet while lying on its back.
- Each jump is accompanied by an audible clicking sound.
- Movement of prothorax makes the prosternal spine to slip into the mesosternal cavity.
- This causes the elytra to press against the surface and propel the beetle into air.
- Eggs are laid in soil.
- Grubs are long, cylindrical and tough skinned and called wireworms.
- They feed on roots.



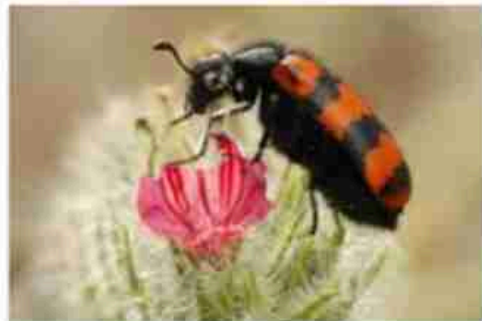
## 9. GALERUCIDAE (Pumpkin beetles)

- Antennae are closely approximated.
- Third tarsomere is deeply bilobed.
- Larvae are root feeders.
- Adults bite holes on leaves.
- Red pumpkin beetles : *Raphidopalpa foveicollis*.



## 10. MELOIDAE (Blister beetles, Oil beetles)

- They are cylindrical, soft bodied beetles.
- Head is connected to thorax by a distinct neck.
- Legs are heteromerous with a tarsal formula of 5-5-4.
- Claws show longitudinal splitting.
- Forewings are soft and leathery.
- They give off a fluid containing the oily principle catharidin, when disturbed which causes blisters.
- Development involves hypermetamorphosis.
- Eggs hatch into active triungulin larvae which may feed on eggs of grasshoppers.
- Adults feed on foliage and flowers.
- **Banded blister beetle : *Mylabris pustulata***



## 11. MELOLONTHIDAE (Chafer beetles, June beetles, White grubs)

- They are stout beetles with glossy surface.
- Head is small.
- Labrum is well sclerotised.
- Adults are attracted to light.
- They feed on tree foliage during night and hide in soil during day time.
- Larvae are scarabaeiform and root feeders.
- Groundnut white grub: *Holotrichia consanguinea*.
- It is a serious pest on groundnut under rainfed condition.





## References

- Insecta an Introduction. Ragumoorthi, K. N., V. Balasubramani, M. R. Srinivasan and N. Natarajan, 2003. A. E. Publications, Coimbatore
- Images were taken from the Internet