

# **Introductory Entomology**

**ENTO-5101**

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# What is Entomology?

- Entomology is the study of insects
- Entomology is concerned with the life history, biology, behavior, and ecology of insects.
- It is one of the few biological disciplines that includes study of both the organism in the environment and how to control them (e.g. agriculture).

# What is an Insect?

- It may seem like a simple question, but there is some confusion over what is and what is not an insect
- In order for the arthropod to be an insect, the specimen must have six legs - this is generally what separates them from other arthropods
- They also have three distinct body parts broken down into the head, abdomen and thorax.
- They may or may not have wings, or antennae, or both

# Introduction

- All living things divided into two main categories,
  - Animal kingdom
  - Plant kingdom

Animal kingdom further classified as:

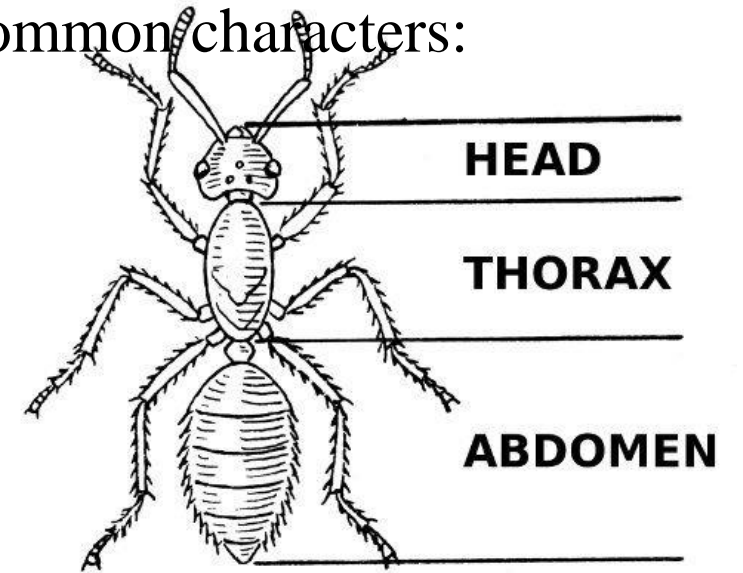
Kingdom → Phylum → Class → Order → Family → Genus → Species

# Characters of Phylum Arthropoda

The animals of Phylum Arthropoda have following important common characters:

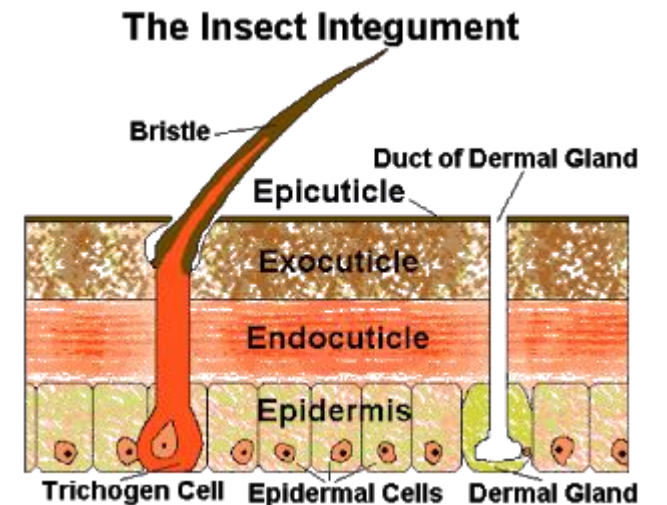
## 1. Segmented body:

- Body is made up of a number of joints or segments
- These segments are broadly grouped into two or three regions



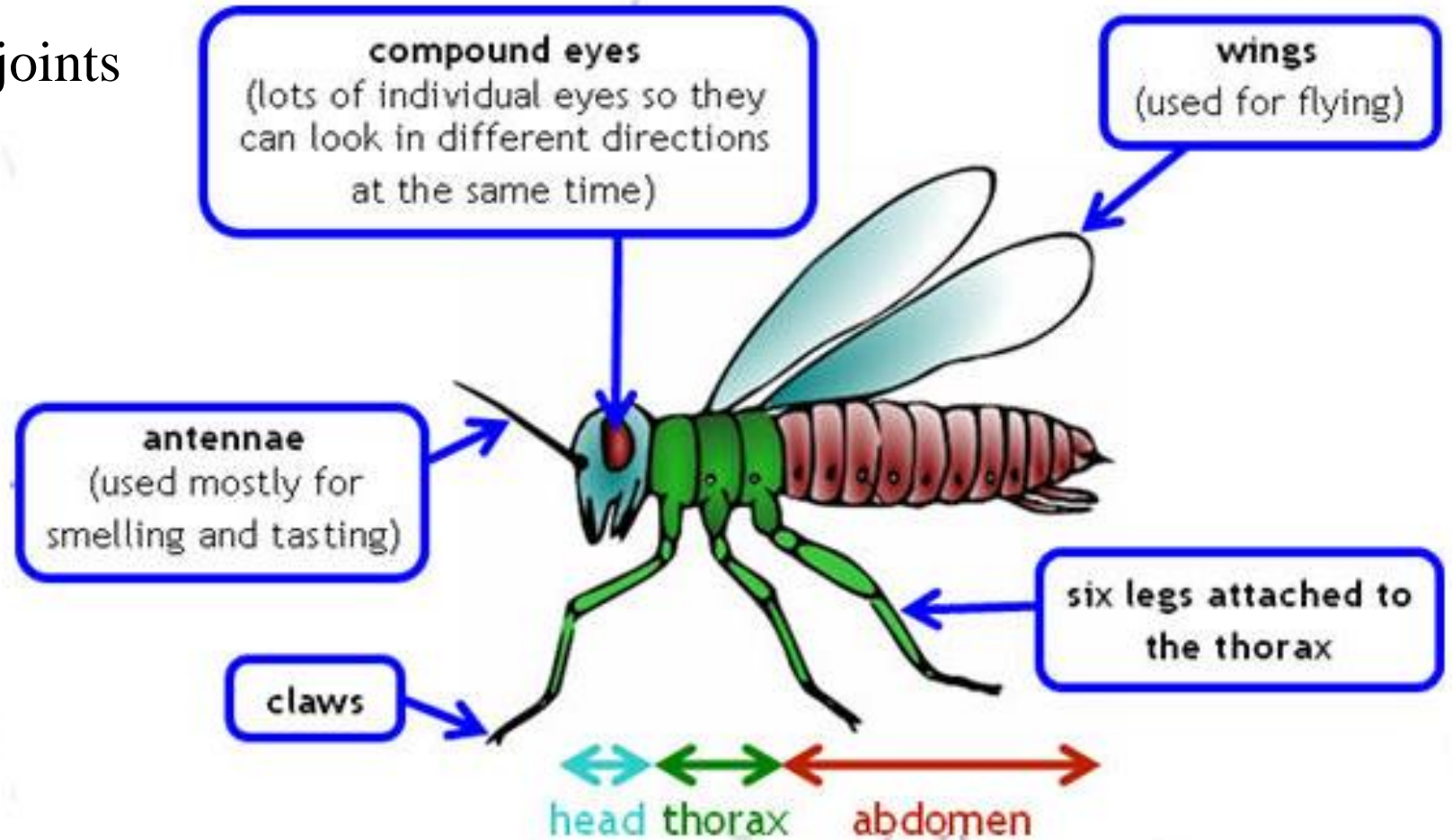
## 2. Sclerotised exoskeleton:

- They have a hardened outer covering of the body



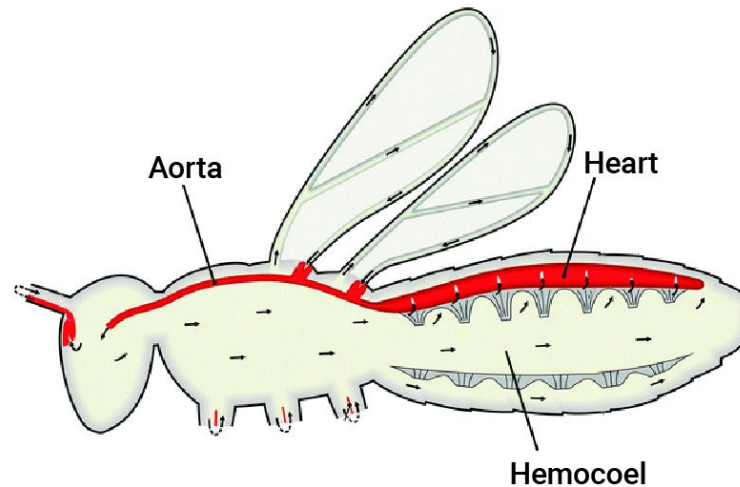
### 3. Paired jointed appendages:

- Body contains outgrowths in paired form
- These outgrowth made up of joints
- For example: Legs, Antennae



#### 4. Bilateral symmetry:

- The right and left sides of the body have normally similar structures



#### 5. Body cavity:

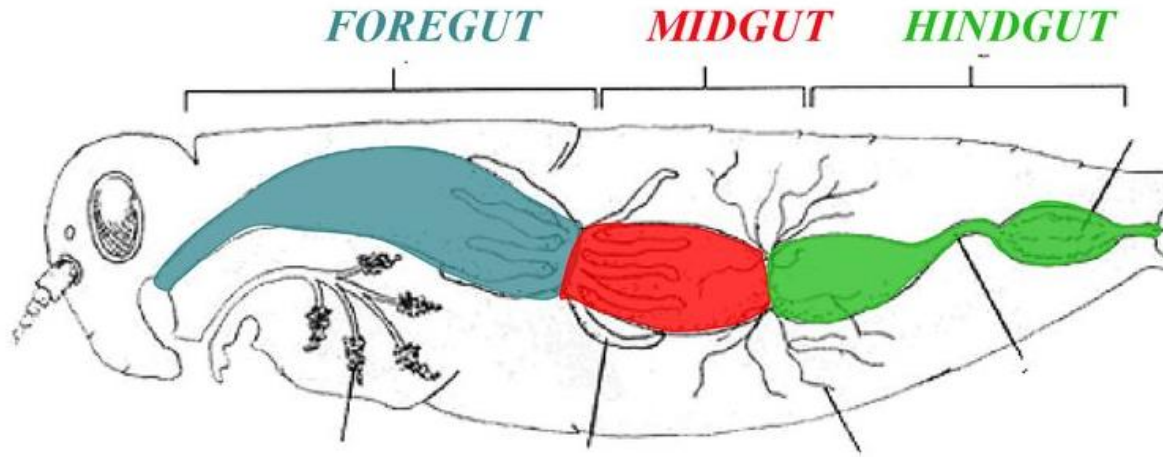
- The body cavity is called haemocoel as it is filled with haemolymph or blood





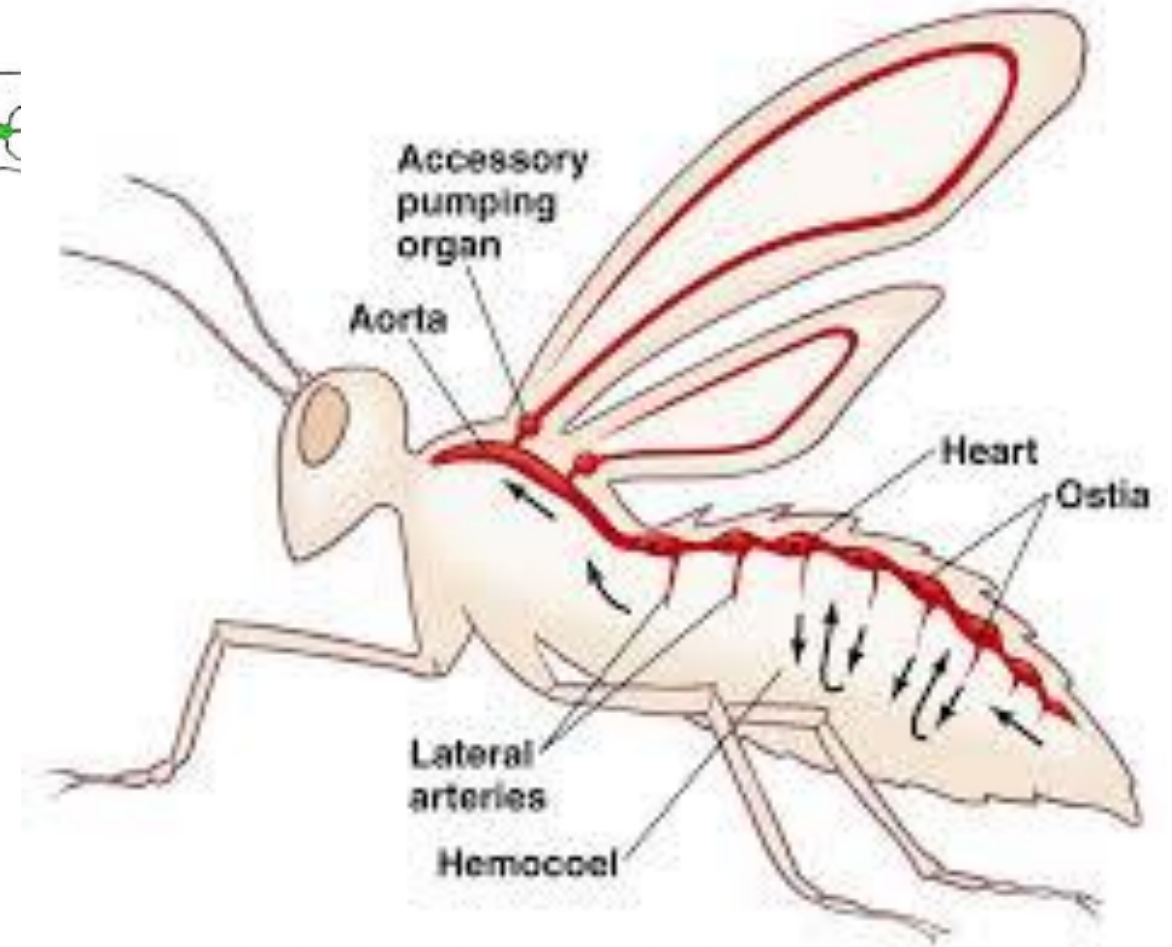
## 6. Division of gut:

- The alimentary canal or food tract is divided into fore gut, mid gut and hind gut



## 7. Dorsal blood vessel:

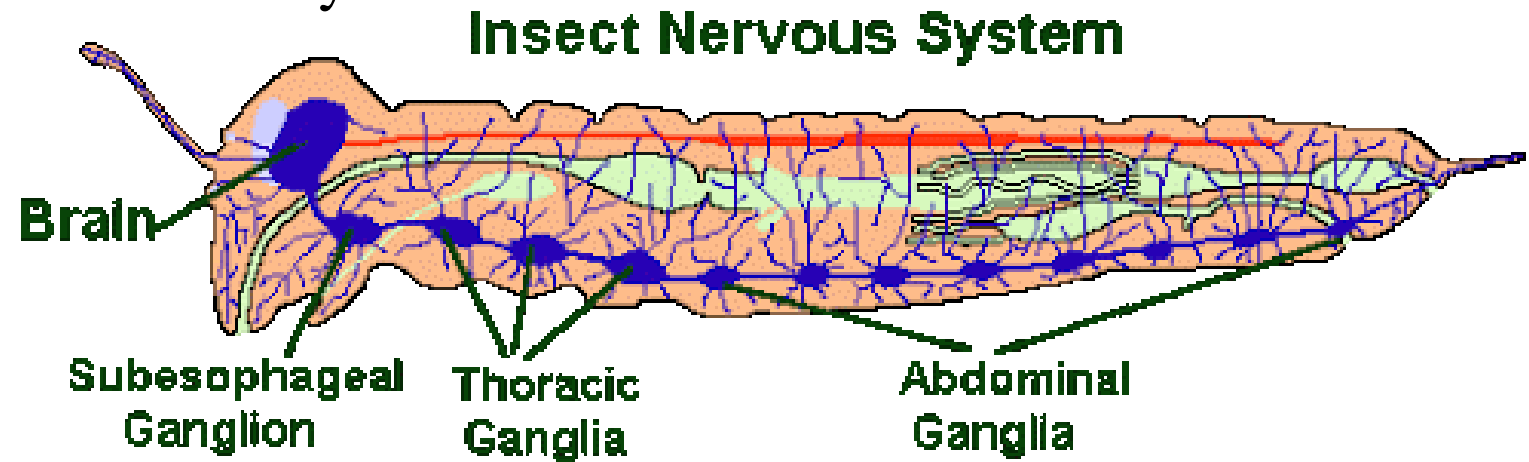
- The narrow tube-like dorsal vessel
- Presents in upper side of body





## 8. Ventral nervous system:

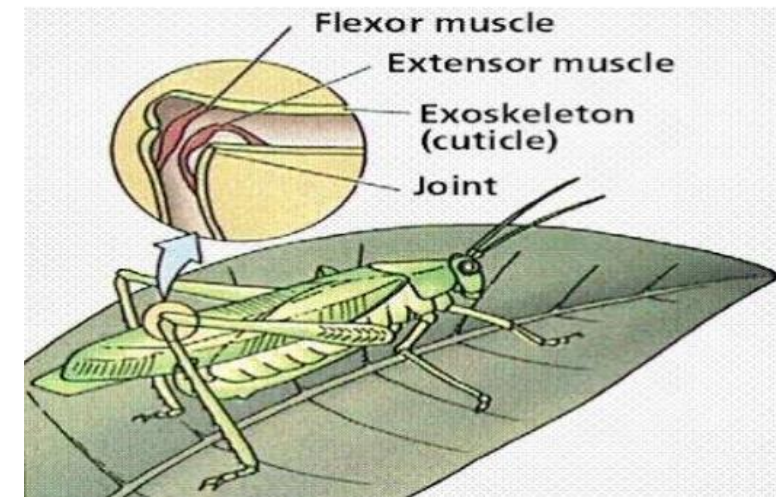
- Nervous system lies in lower part of the body



## 9. Striated muscles:

Body muscles are almost entirely made up of striated fibres (i. e. with alternate light and dark bands)

### THE MUSCULAR SYSTEM IN INSECTS



# Classification of Arthropoda

Major classes of living arthropods are as follows:

1. Onychophora
2. Class Chilopoda
3. Class Diplopoda
4. Class Symphyla
5. Pauropoda
6. Arachnida
7. Crustacea

## **8. Insecta**

# 1. Class Onychophora

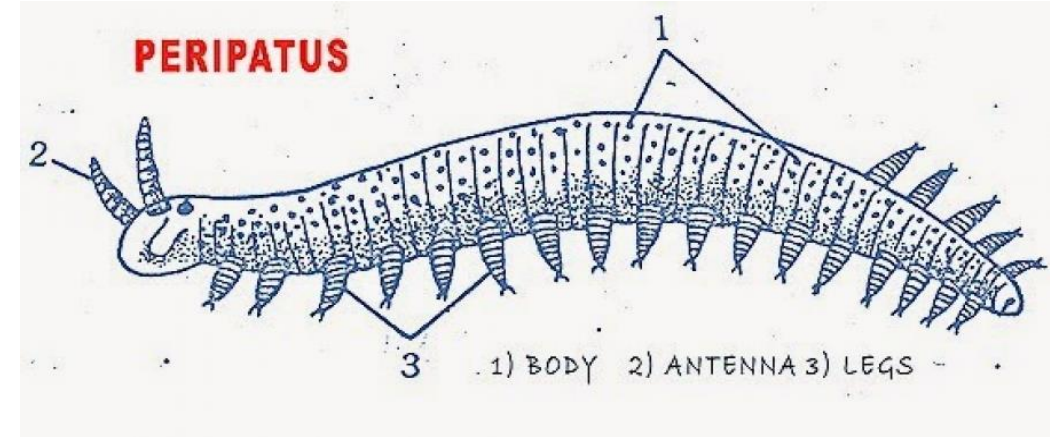
- Body is cylindrical and differentiated into head and trunk (e.g., Peripatus)

## Head contains:

- Pair of short ringed antennae, Circular mouth
- A pair of simple eye

## Trunk contains:

- At least 15 pairs of stumpy Leg
- Respiration is through tracheae





# 2. Chilopoda

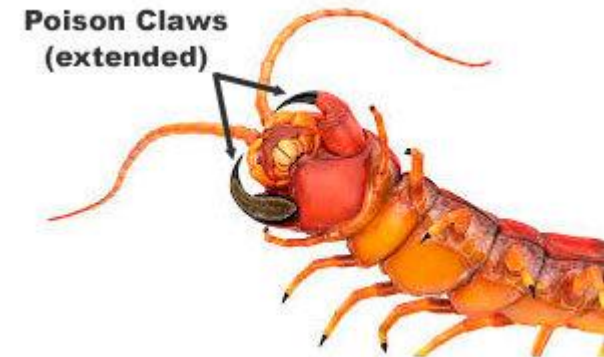
- Long, flattened body and divided into head and trunk (centipede, hundred-legged worms)

## Head bears:

- Pair of long antennae, two clusters of simple eyes

## Trunk carries

- Pair of legs on each segment,
- First pair modified as poison-claws
- Respiration through tracheae



# 3. Diplopoda

- Body cylindrical, divided into head and trunk (millipedes, thousand-legged worm)

## Head bears:

- Pair of short antennae
- Two clusters of simple eyes

## Trunk bears:

- Two pairs of legs on each segment EXCEPT the first four
- 1st is without and 2-4 each with a pair of legs
- Respiration is through tracheae





# 4. Symphyla

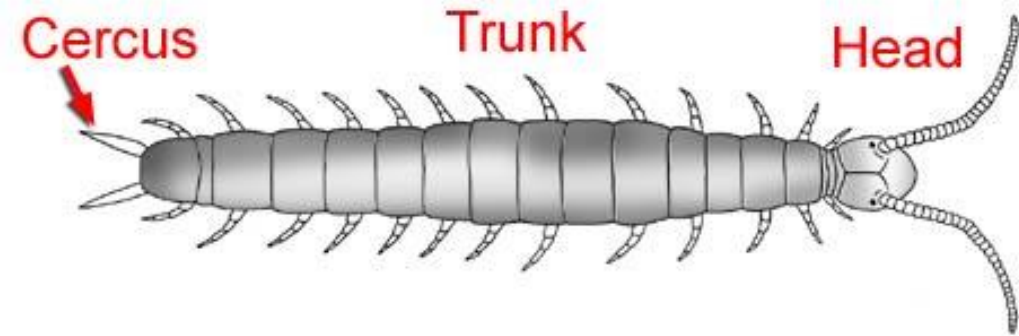
- Small arthropods, body divided into head and trunk (e.g., symphylans)

## Head bears:

- Pair of long antennae and no eyes

## Trunk bears:

- 12 pairs of legs and ends in a pair of stout cerci
- Tracheae are the respiratory organs



**Cerci** are paired appendages on the end of body of many arthropods, including insects and symphylans. Serve as sensory organs, but some serve as pinching weapons or as organs of copulation.

# 5. Pauropoda

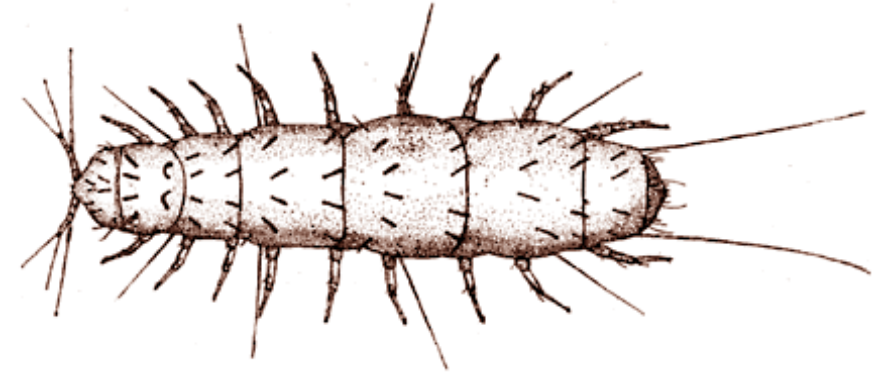
- Minute arthropods, body divided into head and trunk (e.g., pauropods)

## Head bears:

- Pair of 3-branched antennae and no eyes

## Trunk contains:

- 9 pairs of legs
- Tracheae are the respiratory organs





# 6. Arachnida

- It includes scorpions, spiders, ticks and mites.
- The body is divided into **cephalothorax and abdomen**
- In ticks and mites body segments totally fused
- Antennae absent, two to eight simple eyes
- Four pairs of walking legs
- The abdomen is long, segmented and with a terminal sting (in scorpion)



# 7. Crustacea

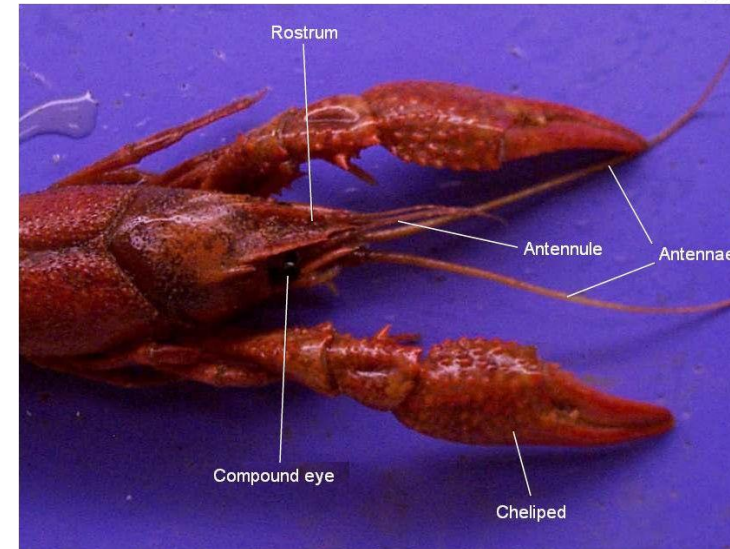
- Body divided into **cephalothorax and abdomen**
- It includes crayfish, crabs, prawns, lobsters, barnacles, etc.

## Cephalothorax bears:

- Two pairs of antennae (long antennae and short antennules)
- Pair of compound eyes
- Five pairs of walking legs
- First pair is modified into chelipeds having chelae or pincers at the end



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## The abdomen carries:

- Five pairs of swimming legs or swimmerets,
- A telson and uropods (absent in crab)
- They breathe through means of gills or through body wall

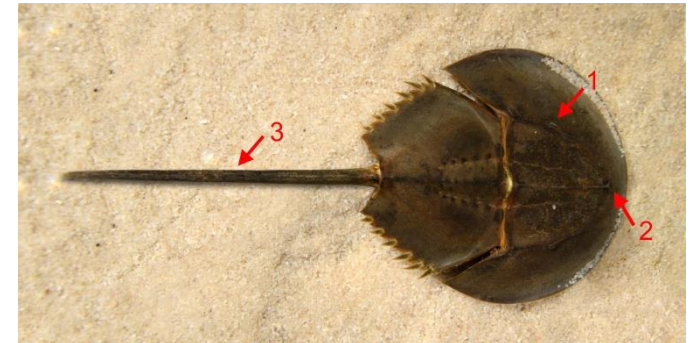


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**Uropods** = are often defined as the appendages of the last body segment of a crustacea, function is locomotion



**Telso**n = Last segment in the abdomen, tail like or a terminal appendage to it, in crustaceans, function is defense



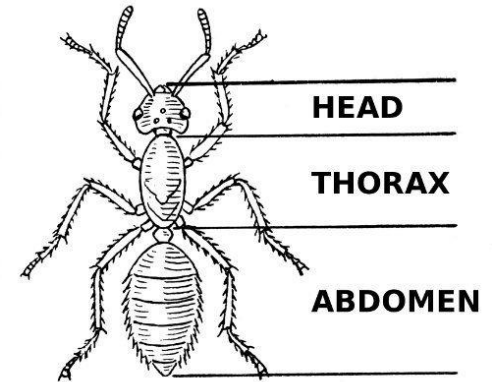
# 8. Insecta

- Body of an adult insect is normally divided into head, thorax and abdomen



## Head contains:

- Pair of antennae (absent in order Protura)
- Usually a pair of compound eyes, Mouthparts



## Thorax bears:

- Three pairs of legs, two pairs of wings

## Abdomen carries

- Generally a pair of cerci and genitalia

**Genitalia:** The male or female reproductive organs.



- The respiration is through tracheae which open out by means of spiracles

Examples:

- It includes insects (e.g. grasshoppers, bugs, butterflies, house flies, wasps and beetles)



- The subject which deals with insects is called **Entomology**

### **Insect:**

- Body divided into three regions, Head, thorax and abdomen
- Head bears a pair of antennae, compound eyes
- Thorax bears 2 pair of wings and 3 pair of legs
- Abdomen bears appendages like cerci etc.