

PHYLUM ARTHROPODA

All living things are divided into two main categories, the animal kingdom and the plant kingdom. The animal kingdom is further divided into several groups or phyla (sing. phylum), each phylum into many classes, each class into many orders, each order into many families, each family into many genera (sing. genus) and each genus into a number of species (sing. also species). These categories or taxa (sing. taxon) can be represented as below:

Kingdom

Phylum

Class

Order

Family

Genus

Species

CHARACTERS OF PHYLUM ARTHROPODA

The animals belonging to this largest phylum differ in structure but have the following important common characters:

1. **Segmented body:** The 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:** Some or all body segments of its members have outgrowths (e.g. antennae and legs) which are in pairs and made up of joints or pieces.
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 lies in the upper part of the body just beneath the body covering. It consists of a posterior heart and an anterior aorta.

8. **Ventral nervous system:** The central nervous system (Except brain) lies in the lower part of the body just inner to the body covering.

9. **Striated muscles:** The muscles of the body are almost entirely made up of striated fibres (i.e. with alternate light and dark bands).

CLASSIFICATION OF PHYLUM ARTHROPODA

The phylum Arthropoda has been classified differently by different authors but the major and widely accepted classes of the living arthropods are as follows:

1. **Class Onychophora** (Fig. 1A): It includes *Peripatus*, etc. The body is almost cylindrical, apparently unsegmented and differentiated into head and trunk. The head contains a pair of short, thick, ringed antennae, a pair of simple eyes, a pair of oral papillae and a circular mouth below. The trunk bears at least 15 pairs of stumpy legs. The respiration is through tracheae.

2. **Class Chilopoda** (Fig. 1B): It includes centipedes or hundred-legged worms. The body is long, flattened and divided into head and trunk. The head bears a pair of long antennae and usually two clusters of simple eyes. The trunk carries a pair of legs on each segment, the first pair modified as poison-claws. They respire through tracheae.

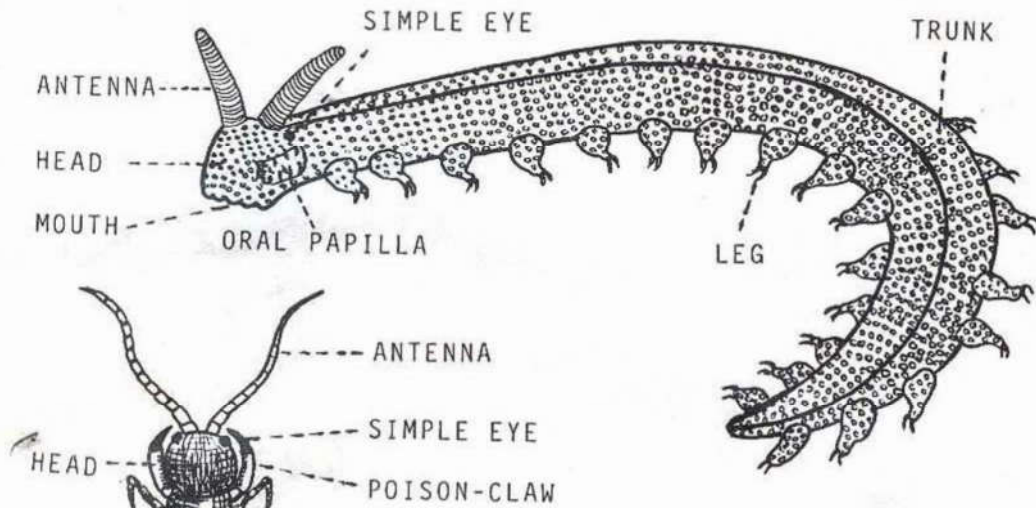
3. **Class Diplopoda** (Fig. 1C): It includes millipedes or thousand-legged worms. The body is long, cylindrical and divided into head and trunk. The head contains a pair of short antennae and usually two clusters of simple eyes. The trunk bears two pairs of legs on each segment except the first four (of which 1st is without and 2-4 each with a pair of legs). The respiration is through tracheae.

4. **Class Symphyla** (Fig. 2A): It includes symphylans. These are very small arthropods in which the body is divided into head and trunk. The head bears a pair of long antennae and no eyes. The trunk has 12 pairs of legs and ends in a pair of stout cerci (sing. cercus). Tracheae are the respiratory organs.

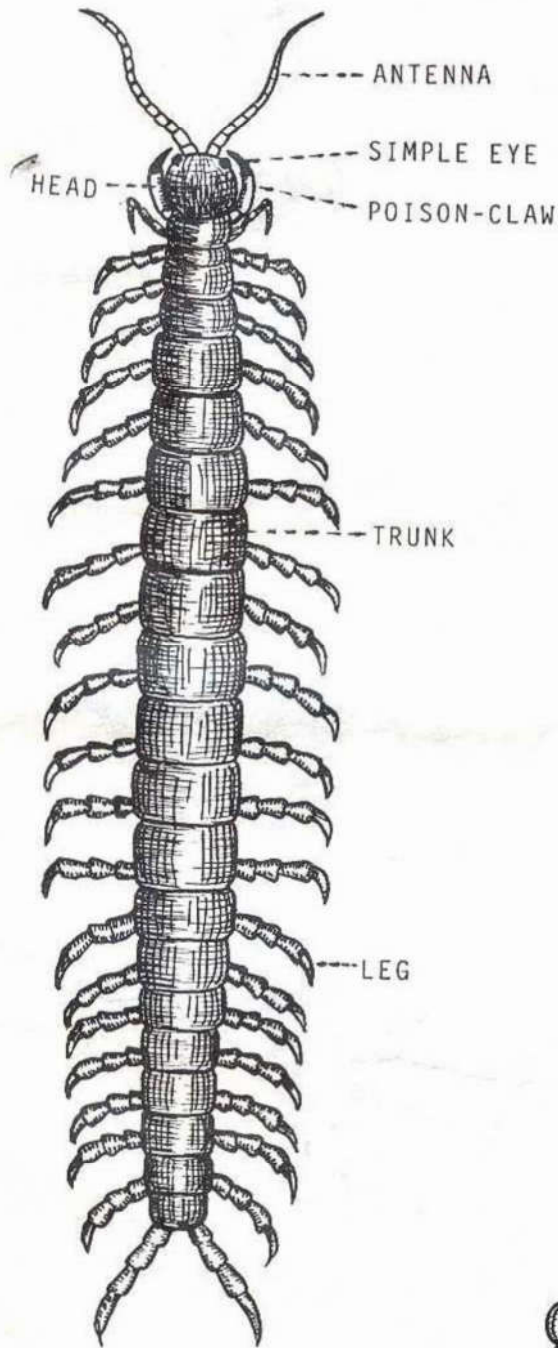
5. **Class Pauropoda** (Fig. 2B): It includes pauropods. These are minute arthropods with body divided into head and trunk. The head bears a pair of 3-branched antennae and no eyes. The trunk contains 9 pairs of legs. Tracheae are the respiratory organs.

6. **Class Arachnida** (Fig. 2C, D): It includes scorpions, spiders, ticks and mites. Examine the following characters in a scorpion and a mite and note the difference. The body is divided into cephalothorax (head + thorax) and abdomen (both divisions fused into a single structure in a mite). The cephalothorax bears a pair of very small chelicerae, a pair of pedipalpi (having pincers in scorpion), four pairs of walking legs, two to eight simple eyes and no antennae. The abdomen is long, segmented and with a terminal sting (in scorpion) or short, unsegmented and fused with the cephalothorax (in mite). They respire through book-lungs (i.e. leaf-like external gills present on the base of ventral side of abdomen), tracheae or body wall.

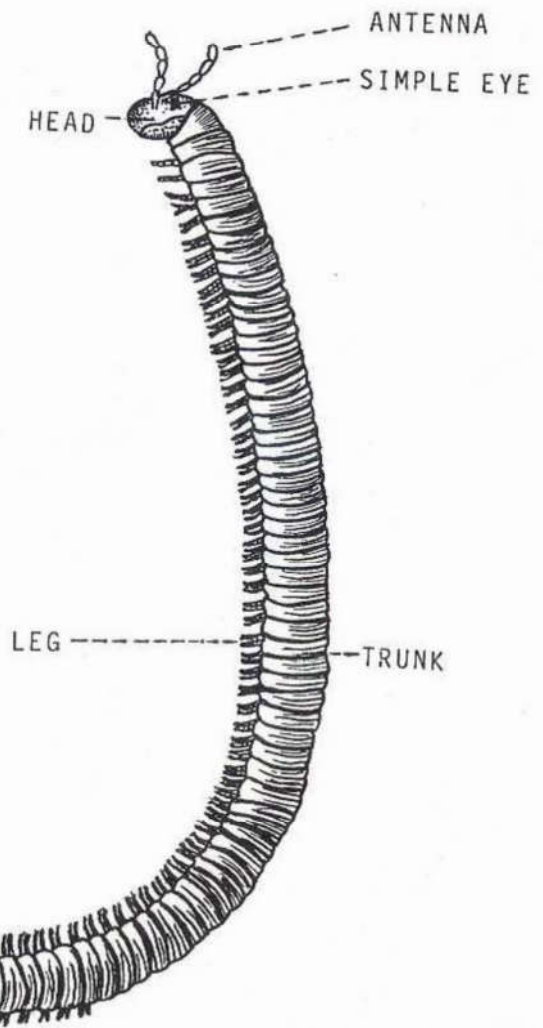
7. **Class Crustacea** (Fig. 3A, B): It includes crayfish, crabs, prawns, lobsters, barnacles, etc. Examine the following characters in a crayfish and a crab. The body is divided into cephalothorax (head + thorax) and abdomen.



A. PERIPATUS - *Onychophora*.

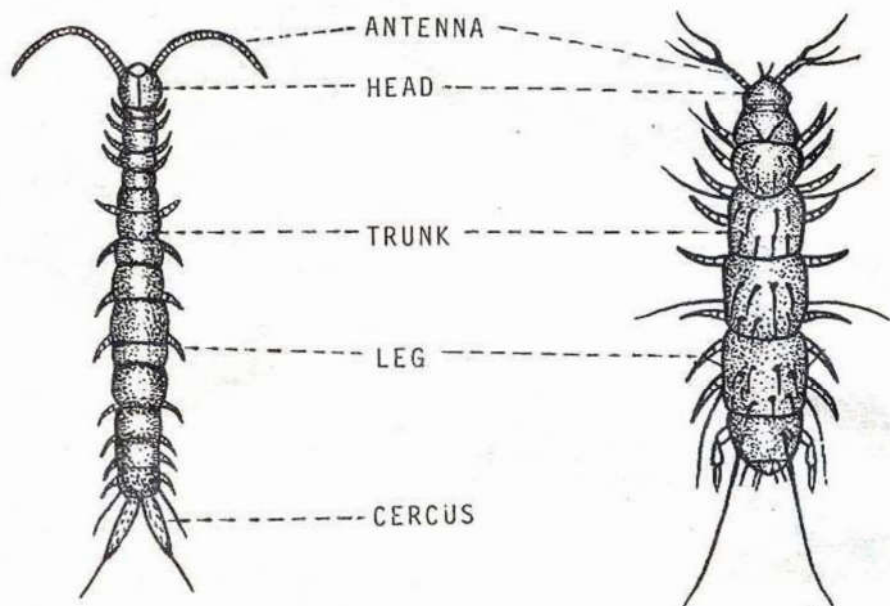


B. CENTIPEDE - *Chilopoda*



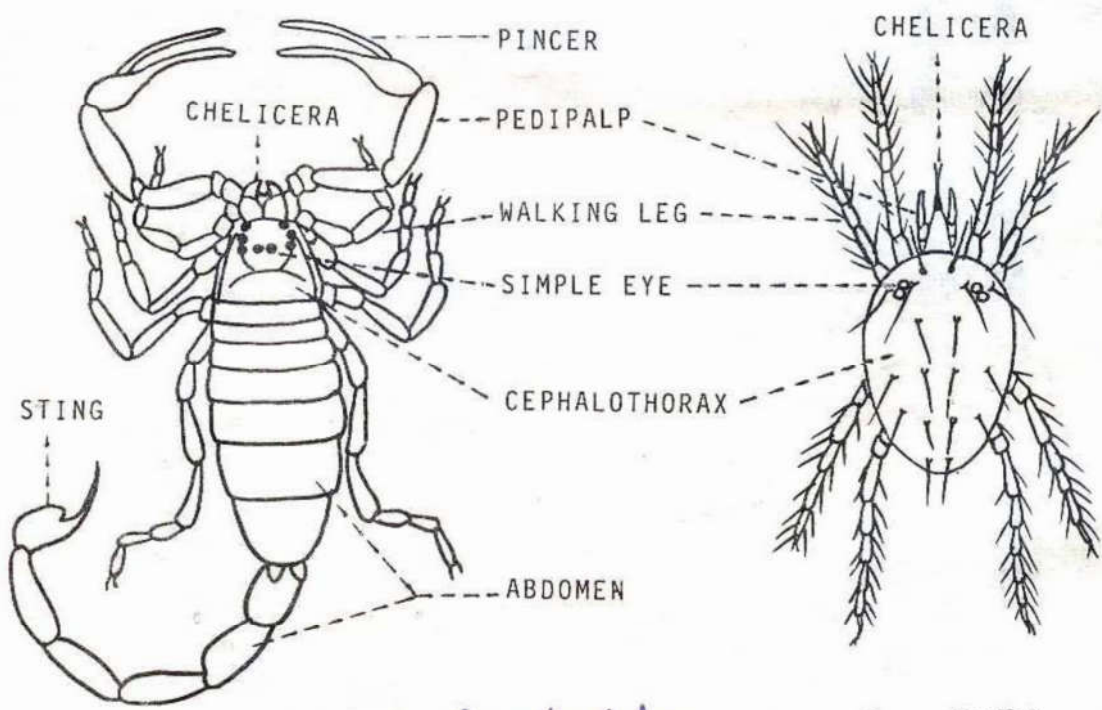
C. MILLIPEDE - *Diplopoda*.

FIG. 1. ARTHROPODS



A. SYMPHYLAN - *Symphyla*

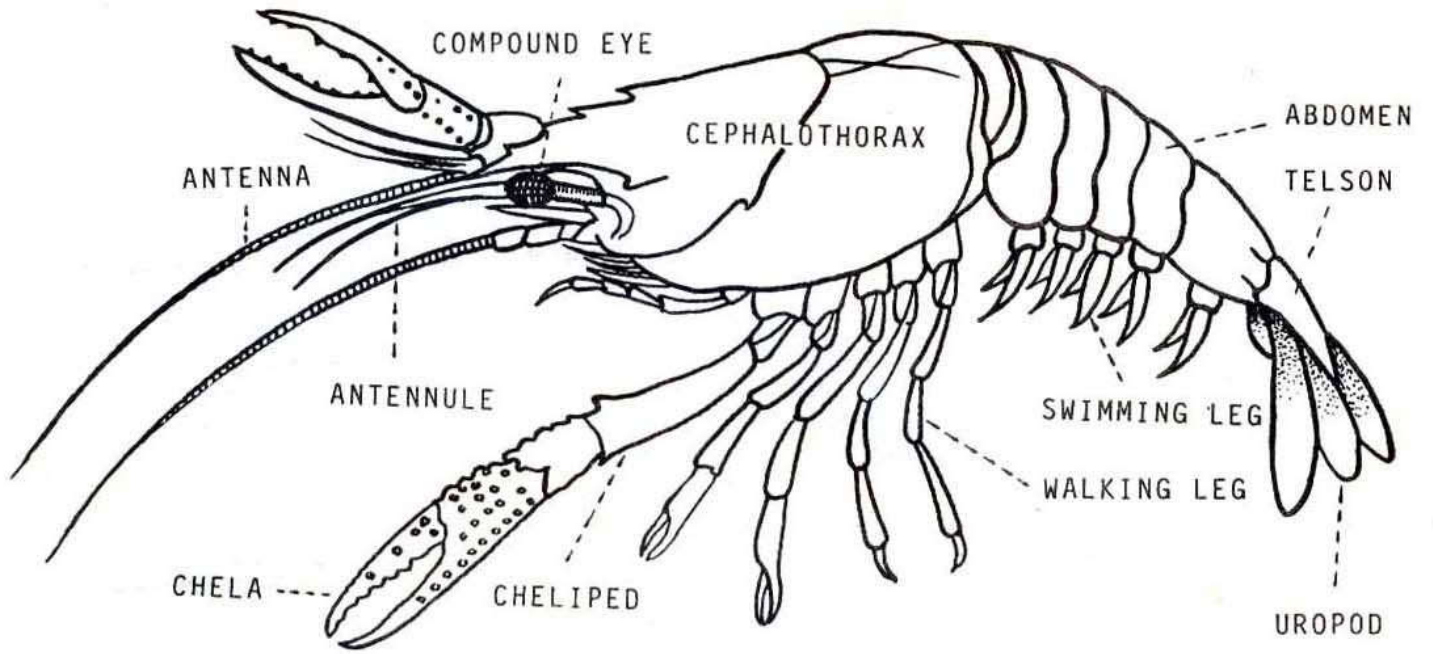
B. PAUROPOD - *Pauropoda*



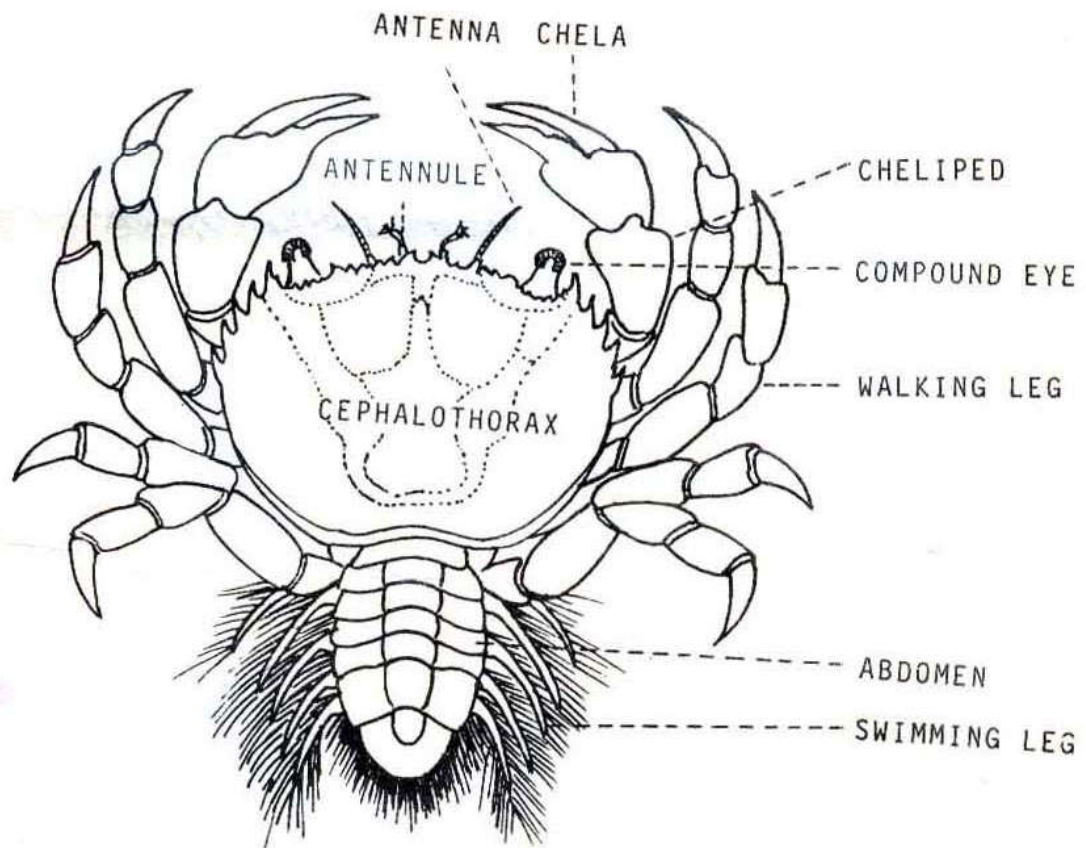
C. SCORPION - *Arachnida*

D. MITE

FIG. 2. ARTHROPODS



A. CRAYFISH - *Crustacea*.



B. CRAB - *Crustacea*.

FIG. 3. ARTHROPODS

The cephalothorax is covered by a hard carapace and bears two pairs of antennae (long antennae and short antennules), a pair of stalked compound eyes and five pairs of walking legs (the first pair is modified into chelipeds having chelae or pincers at the end). The abdomen carries five pairs of swimming legs or swimmerets, a telson and uropods (absent in crab). They breathe by means of gills or through body wall.

8. Class Insecta (Hexapoda) (Fig. 4): It includes insects (e.g. grasshoppers, bugs, butterflies, house flies, wasps and beetles). The body of an adult insect is normally divided into head, thorax and abdomen. The head contains a pair of antennae (absent in order Protura), usually a pair of compound eyes and mouthparts. The thorax bears three pairs of legs and usually one or two pairs of wings. The abdomen carries generally a pair of cerci and genitalia. The respiration is through tracheae which open out by means of spiracles.

Note: The subject which deals with insects is called entomology. To define insects as 6-legged animals seems unreliable because some mites (e.g. ber mite) have also three pairs of legs in the adult stage. The adult females of most scale insects and of the stylopids are altogether without legs.

Some important characters of the above classes are tabulated on the following page for a quick comparison.

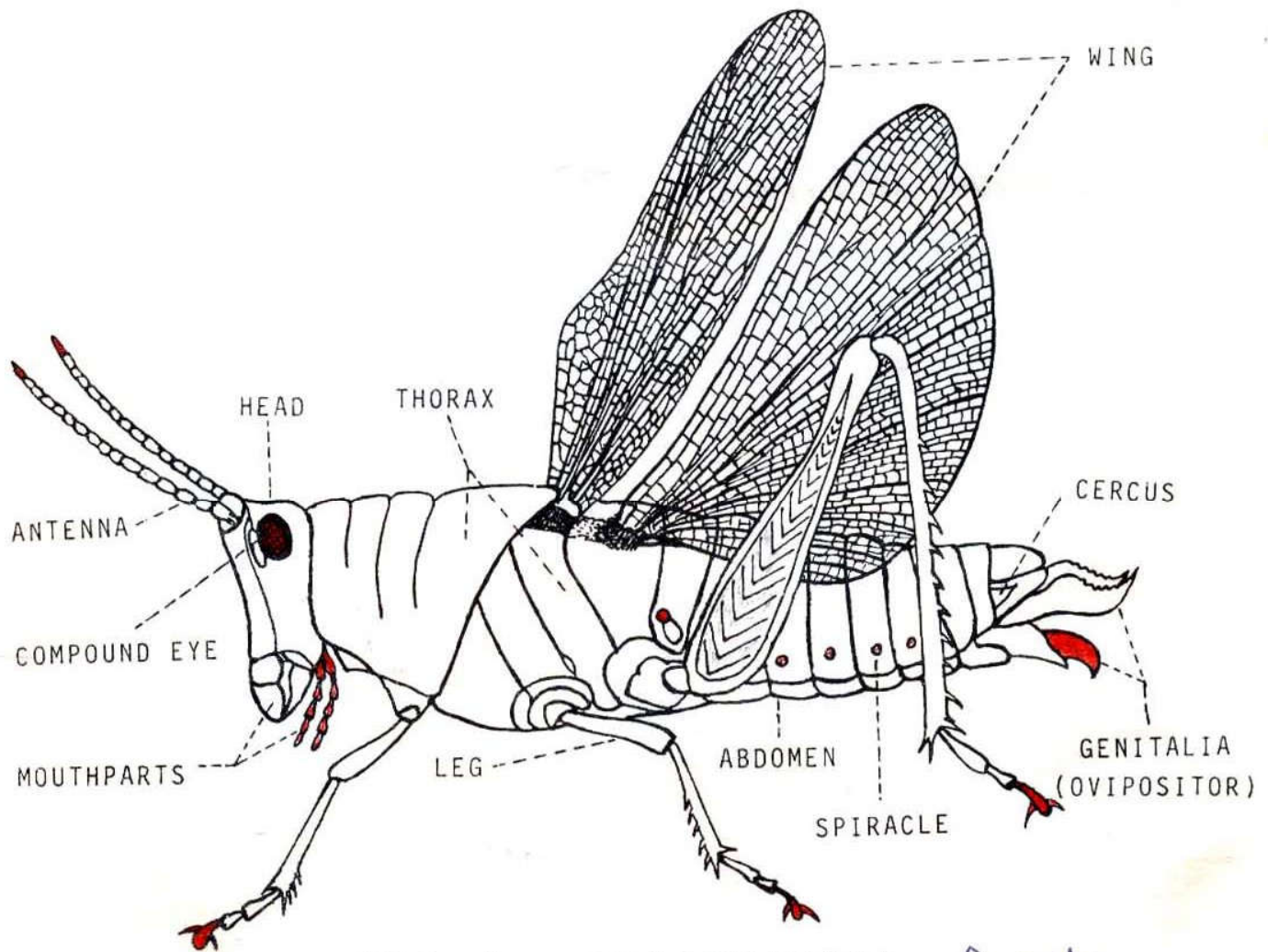


FIG. 4. GRASSHOPPER - *Insecta*.

Important characters of the major classes of Phylum Arthropoda

<u>Class</u>	<u>Body regions</u>	<u>Antennae (pairs)</u>	<u>Legs (pairs)</u>	<u>Nature of eyes</u>	<u>Respiratory organs</u>
1. Onychophora	Head and trunk (Thorax + Abdomen)	1	15 or more	Simple	Tracheae e.g. centipede.
2. Chilopoda	Head and trunk	1	15 or more (one pair per segment)	Simple (some times absent)	Tracheae e.g. centipede
3. Diplopoda	Head and trunk	1	25 or more (two pairs per segment except 1st four)	Simple (some times absent)	Tracheae e.g. millipede.
4. Symphyla	Head and trunk	1	12	Absent	Tracheae e.g. Symphylan
5. Pauropoda	Head and trunk	1	9	Absent	Tracheae e.g. pauropod.
6. Arachnida	(Head + Thorax) Cephalothorax and abdomen (fused in ticks and mites)	None	4	Simple (rarely absent)	Book-lungs, e.g. Scorpion. <u>tracheae or body wall</u>
7. Crustacea	Cephalothorax and abdomen	2	5 or more	Compound (often stalked)	Gills or body e.g. Crab. wall
8. Insecta	Head, thorax and abdomen	1 (absent in order Protura)	3	Compound to simple (rarely absent)	Tracheae e.g. Grasshopper.