(iii) The body is divided into head and trunk.
(iv) The head is with one pair branched antennae and unbranched mandibles and maxillae.
(v) The eyes are absent.
(vi) The legs are 9 to 10 pairs.
(vii) Genital pores ventral on 3rd trunk segment.
(viii) Trunk of 11 or 12 somites which are dorsally fused in pairs.
Example : Pauropus.

(6) Class—Insecta or Hexapoda :

It is the largest class of the phylum and the important characters are as follows :
(i) They are tracheate arthropods.
(ii) Body is divided into head, thorax and abdomen.
(iii) Breathing takes place through direct tracheae and tracheoles.
(iv) Head bears a pair of antennae, thorax bears 3 pairs of legs, usually one or two pairs of wings in the adult stage.
(v) The development is rarely direct and generally it is indirect (metamorphosis).
Example : Insects (housefly, grasshoppers).

Insects and their Characteristics

Insects are tracheate arthropods (Greek Arthron = segmented, podos = leg) in which the body is segmented with a relatively tough integument and jointed limbs.

The main characteristics of insects (*Latin insectum = having cut into*) are summarised below :

1. The body is bilaterally symmetrical (*i.e.* the longitudinal half is the mirror image of another half) and triploblastic (presence of three germ bands during embryonic development *viz.* ectoderm, mesoderm and endoderm).
2. The body is divided into three distinct regions the head, thorax and abdomen.
3. The exoskeleton or the integument is hard and the flexibility is because of the chitin present, thus the integument combines strength and rigidity with flexibility.
4. The head is formed by the fusion of six embryonic segments.
5. The anterior region of head is provided with the mouth parts adapted for biting and chewing, piercing and sucking, siphoning, sponging and chewing and lapping etc.
6. There is a pair of segmented antennae situated near the eyes except the order protura in which they are absent.
7. The throax consists of 3 segments *viz.*, pro-, meso- and meta- thorax having one pair of legs in each segment. The second and third thoracic segments carry a pair of wings. Usually there are two pairs of wings, but some times only one pair is functioning and the other is reduced, vestigial or absent.
8. The abdomen is comprised of 7 to 11 segments.
9. The alimentary canal is tubular in structure which opens anteriorly into the mouth and ends into the anus. In place of liver, there is a pair of salivary glands extending along the sides of alimentary tract and opens into the mouth.
10. Circulatory system is open type *i.e.*, the blood is circulated in the body through the lateral openings of the heart known as ostia.
11. The blood is devoid of red blood corpuscles and yellowish green in colour.
12. The respiratory system consists of tracheae which open exteriorly by means of paired spiracles.
13. The nervous system is composed of the ganglionic masses which are interconnected with nerve cord.

.. Excretion takes place by means of malpighian tubules, nephrocytes, oenocytes and the integument etc.

15. Reproduction is usually sexual, sometimes viviparous and parthenogenetic.
16. Sexes are separate, but in some insects the male and female reproductive organs are present in the same individual like cottony cushion scale (*Icerya purchasi*).
17. Metamorphosis is a common phenomenon in insects.
18. Sense organs, which are usually present in insects include compound eyes, auditory (organs of hearing), olfactory (organs of smell), tactile (organs for sense of touch), gustatory (taste organs), chordotonal (sound producing organs) and the light producing organs.

Relationships of Insects : The relationships of the insects with the other arthropod groups have been the subject of much discussion and widely differing views have been proposed. The insects come to very near with the crustacea and myriapoda by having mandibles and antennae and agree with the myriapods in having only a single pair of antennae, corresponding to the antennules of the crustacea. In the absence of any direct evidence from palaeontology, our conception of the ancestory of insects has to based upon whatever data can be seen from embryology and comparative morphology.

It is generally conceded that the Diplura and Thysanura are the most primitive insects. The Diplura are nearest related, through the Symphyla, with the ancestral stock from which the insects were presumably derived. The Thysanura, on the other hand, combine Dipluran features with those of the lower pterygota. Their ectognathous mouth parts, annulated antennae, segmented tarsi, together with the possession of compound eyes and ocelli, are characters which are shared with all of the more generalised winged orders. Furthermore, their general body-form prefigures that of the nymphs of those same orders. Reviewing the Arthropoda as a whole, it will be noted that :

1. The Onychophora are far removed from other Arthropoda since they show lower degree of development of those special feature that characterise the phylum as a whole. They rank more or less as a halfway class between the Arthropoda and annelidan ancestors.
2. The main evolutionary stem of the arthropods is represented by the Crustacea- Insecta-Myriapoda series which is characterised by a 6 segmented head (except some Myriapoda) bearing antennae, mandibles and maxillae. The Trilobita also have been placed with them.
3. The Arachnida have no differentiated head, the antennae are replaced by chelicerae and neither mandibles nor maxillae are present. It will be evident, therefore, that they represent a separate line of arthropod evolution and are not closely related to any of the other class.