

## GENERAL CHARACTER OF ASCHELMINTHES

Aschelminthes are pseudocoelomate, bilaterally symmetrical, triploblastic, unsegmented, vermiform, organ- system grade of construction with complete digestive tubes.

- They are mostly aquatic, free-living or parasitic.
- They are bilaterally symmetrical, unsegmented worms.
- The body is slender, vermiform and usually worm-like or flattened.
- They are usually small, even microscopic, while some reach a meter or more in length.
- They are triploblastic and pseudocoelomate with organ system grade of body organization.
- Body wall with a syncytial or cellular epidermis, externally covered with the thick cuticle of scleroprotein.
- [Cilia](#) are absent except anterior cilia of rotifers.
- Muscles include mostly longitudinal fibers.
- The digestive canal is straight and complete with a mouth, straight non-muscular intestine, and anus, pharynx muscular and highly specialized.
- Respiratory and circulatory systems are absent.
- Excretory system includes a system of canals, protonephridia (in some) for osmoregulation. Cloaca present in some.
- The nervous system is simple and consists of circumenteric nerve ring with anterior and posterior longitudinal nerves.
- Sense organ are in the form of pits, papillae, bristles, and eyespots.
- They are mostly dioecious i.e. sexes separate. Gonads and ducts single or double.
- Asexual reproduction doesn't occur in them.
- Eggs have a chitinous shell, cleavage determinate and spiral.
- Their life cycle is simple or complicated usually with no special larval stages.



## Classification of phylum Aschelminthes

This phylum includes a heterogeneous assemblage of different animals, hence it has been classified differently by different zoologists. The classification here is based and modification from L. H. Hymann (1951) but Storer and Usinger (1971) have regarded different classification of Aschelminthes as separate phyla and rank Aschelminthes as superphylum.

### Class 1. Nematoda (Gr., *nema*=thread+ *eidos*= form)

- Aquatic or terrestrial, free-living or parasitic, elongated roundworm.
- Body elongated, cylindrical and unsegmented.
- Body wall with thick cuticle, cellular or syncytial epidermis and longitudinal muscles in four bands.
- No cilia, no circulatory and respiratory system.
- The digestive system completes with **muscular pharynx** and
- Excretory system of glandular organs or canals or both.
- Nervous system with circumenteric ring and anterior and posterior nerves.
- Sense organs simple.
- Male with penial spicules and smaller than females.
- Gonads one or two. Male genital ducts lead into the cloaca, female genital duct with a separate opening.
- Fertilization
- Development is usually direct. No asexual reproduction or regeneration.
- Examples: *Ascaris*, *Necator*, *Wuchereria*, *Trichinella*.

### **Order 1. Enploidea**

- Not ringed cuticle, often cuticular bristles.
- Anterior end with 6 labial papillae.
- 10 to 12 bristles in one or two circlets.
- Esophagus into two parts, anterior muscular and posterior glandular.
- A pair of cephalic slits and cyathiform amphids.
- Examples: *Enoplus*, *Anticoma*, *Synonchus*.

### **Order 2. Dorylaimoidea**

- Smooth cuticle without bristles.
- Anterior end with two circlets of papillae of 6 and 10 each.
- Buccal cavity armed with a protrusible spear.
- The rear part of the pharynx enlarged.
- Cyathiform amphids.
- Examples: *Dorylamius*, *Tylencholaimus*, *Actinolaimus*.

### **Order 3. Mermithoidea**

- Smooth, filiform nematodes, parasitic in invertebrates (mainly insects) in juvenile stages of free-living as an adult in soil or water.
- Head sense organs reduced to papillae, usually six.
- Long, blind pharynx.
- Blind intestine, altered into a food storing organs.
- Cyathiform or reduced amphids.
- Examples: *Mermis*, *Paramermis*, *Aproctonema*.

### **Order 4. Chromadoroidea**

- The smooth or ringed cuticle.
- Usually, cuticle heavily ornamented with bristles, knobs, punctation.
- Pharynx with a posterior bulb.
- Amphids are spiral or derivable from a spiral.
- Examples: *Paracytholaimus*, *Paracanthonchus*.

### **Order 5. Araeolaimoidea**

- Smooth cuticle, sometimes bristles.
- Labial papillae present.
- Anterior end with 4 cephalic bristles.
- Spiral or loop-like amphids.
- Examples: *Plectus*, *Wilsonema*, *Odontophora*.

### **Order 6. Monhysteroidea**

- Smooth or slightly ringed cuticle, often provided with bristles.
- Anterior end with 4, 6 or 8 bristles.
- Circular amphids.
- Examples: *Cylindrolaimus*, *Siphonolaimus*.

### **Order 7. Desmoscalecoidea**

- Heavily ringed cuticle, with prominent bristles throughout or in a restricted area.
- Anterior end with 4 bristles.
- Crescentic amphids.
- Marine nematodes.
- Examples: *Desmoscolex*, *Tricoma*, *Greeffiella*.

### **Order 8. Rhabditoidea or Anguilluloidea**

- Free-living or parasitic
- The ringed or smooth cuticle.
- Pharynx with posterior bulb and also usually with swelling anterior to the nerve ring.
- No caudal glands.
- Small pockets amphids.
- Examples: *Rhabditis*, *Diploscapter*, *Diplogaster*.

### **Order 9. Rhabdiasoidea**

- Smooth nematodes with definite pharyngeal bulb.
- Hermaphrodites; pathogenesis also occurs.

- Parasitic stages in animals.
- Free-living stages may develop into males and females.
- Examples: *Rhabdias*, *Entomelas*.

#### **Order 10. Oxyuroidea**

- Valvulated pharynx with posterior bulb.
- Female with a long pointed tail; terminal parts of the female system often heavily muscularised.
- Male with one spicule or two equal spicules.
- Usually, caudal alae forming a cuticular brusa.
- Examples: *Oxyuris* or *Enterobius*.

#### **Order 11. Ascarioidea**

- Mouth surrounded by 3 prominent lips.
- Pharynx without posterior bulb or if present it is not Valvulated.
- Pharynx or intestine or both often with caeca.
- No buccal capsule.
- Blunt female tail; male without caudal alae and possesses two equal or nearly equal spicules.
- Examples: *Ascaris*.

#### **Order 12. Strongyloidea**

- Mouth without conspicuous lips but often with leaf crown.
- Pharynx without bulb.
- Females usually with ovijector.
- Male with copulatory brusa supported by muscular rays; typically, 13 in number.
- Examples: *Strongylus*, *Necator*, *Ancylostoma*.

#### **Order 13. Spiruroidea**

- Mouth usually contains 2 lateral lips; sometimes 4 or 6 small ones.
- Pharynx without bulb; anteriorly muscular and posteriorly glandular.
- Males without brays; spicules unequal and dissimilar.

- Examples: *Oxyspirura*, *Rictularia*, *Thelazia*.

#### **Order 14. Dracunculoidea**

- Without definite lips or cuticularized buccal capsules.
- Pharynx without bulb; anteriorly muscular and posteriorly glandular.
- The vulva is not functional usually present near or behind the middle of the body.
- Males with equal filiform spicules; brusa wanting.
- Examples: *Dracunculus*, *Philometra*, *Micropleura*.

#### **Order 15. Filarioidea**

- Filiform worm without lips.
- Small or rudimentary buccal capsules.
- The pharynx is anteriorly muscular and posteriorly glandular.
- Pharyngeal bulb absent.
- Vulva anterior in females.
- Brusa wanting, spicules unequal and dissimilar.
- Examples: *Wuchereria*, *Loa loa*.

#### **Order 16. Trichuroidea or Trichinelloidea**

- Body filiform anteriorly.
- Mouth without lips.
- Slender pharynx.
- Provided with a cirrus, spicule if present one only.
- Examples: *Trichinella*, *Trichuris*.

#### **Order 17. Dioctophymoidea**

- Moderate to very long-sized.
- Mouth without lips surrounded by 6, 12 or 18 papillae.
- Elongated pharynx without bulb.
- Male with muscular brusa but without rays.
- Examples: *Dictyophyme*, *Hystrichis*,

## **Class 2. Nematomorpha or Gordiacea (Gr., *nema*=thread+ *morphe*= shape)**

- **Hair worm**, found in freshwater. One genus (*Nectonema*) marine.
- Body very long, thin, slender and cylindrical.
- Body wall with thick cuticle bearing small papillae.
- Epidermis cellular, single-layered.
- The digestive system is complete in larva but degenerates in non-feeding adults. Cloaca present.
- Pseudocoel mostly filled with parenchyma.
- No circulatory, respiratory and excretory system.
- Nervous system with a circumenteric nerve ring and midventral nerve cord.
- Gonad and gonoducts paired. Oviducts also open into the cloaca.
- Juveniles parasitic in grasshoppers, crickets and other insects.
- Examples: *Gordius*, *Paragordius*, *Nectonema*.

### **Order 1. Cordioidea**

- Swimming bristles are wanting.
- Pseudocoel is filled with parenchyma.
- Paired gonads.
- Examples: *Paragordius*, *Gordius*.

### **Order 2. Nectonematoidea**

- Swimming bristles arranged in 2 rows.
- Unfilled pseudocoel.
- Only one gonad.
- Marine form.
- Examples: *Nectonema*.

## **Class 3. Rotifera (L., *rota*= wheel + *ferre*= to bear)**

- Microscopic animals found in ponds, lakes, and streams. Rarely in oceans, commonly called **wheel bearers**.
- Body wall thickened into stiff plates or **lorica** into which head may
- Anterior end with ciliated **corona (wheel organ)** used for feeding and locomotion.

- Post- anal foot with toes and adhesive glands for attachments.
- Body musculature includes longitudinal and transverse muscle bands and strands.
- The digestive system with a grinding organ, **mastax**, lined internally by a strong cuticle.
- The excretory system with two protonephridia and two Protonephridial tubes which empty into bladders.
- The nervous system of 3 major ganglia and nerves.
- Sensory organs antennae and eyespots.
- Male smaller than females. Parthenogenesis common.
- Female oviparous, no larval stages.
- Examples: *Philodina*, *Asplanchna*, *Rotaria*.

### **Order 1. Seisonacea**

- Body elongated with a long neck.
- Corona is small.
- Paired gonads.
- Found as commensals on crustaceans.
- Examples: *Seison*.

### **Order 2. Budelloidea**

- Corona usually with 2 trochal discs.
- Pedal glands more than two.
- Male degenerate; female with paired germovitellaria.
- Swimming or creeping form.
- Examples: *Rotaria* or *Rotifera*, *Philodina*, *Mniobia*.

### **Order 3. Monogonontea**

- Swimming or sessile forms.
- Male small or degenerate.
- Male usually with one testis.
- Female possesses single germovitellaria.
- Examples: *Mytilina*, *Limnias*.



#### **Class 4. Gastrotricha (L., *gaster*= stomach + *trichos*= hair)**

- Microscopic, marine or freshwater.
- Body wall with cuticle bearing short, curved, dorsal spines.
- Corona absent cilia on the ventral surface for locomotion.
- Posterior end forked and with adhesive tubes and glands for attachments.
- Body musculature includes 6 pairs of longitudinal muscles.
- Mouth surrounded by bristles.
- The pharynx is triradiate and muscular.
- The excretory system with 2 protonephridia.
- Nervous system with saddle-shaped ganglion and 2 lateral nerves.
- Dioecious or Monoecious; parthenogenetic female occurs.
- Development direct. Young and adult are alike.
- Examples: *Chaetonotus*, *Macrodasys*.

#### **Order 1. Macrodasyoidea**

- Marine worm-like forms.
- Many adhesive tubes.
- No protonephridia.
- Examples: *Macrodasys*.

#### **Order 2. Chaetonotoidea**

- Mostly freshwater forms found on vegetation.
- Adhesive tubes on the tail.
- One pair of protonephridia.
- Reproduction by parthenogenesis.
- Examples: *Chaetonotus*, *Neodesys*.

#### **Class 5. Kinorhyncha (Gr., *kineo*=more + *rhynchos*= beak)**

- Marine, microscopic worm-like.
- Superficial segmentation of body into 13 or 14 overlapping rings (Zonites).
- Body surface with spiny cuticle but no cilia.
- **Mouth cone** or head protrusible and covered with **scalids**.

- A pair of adhesive tubes in the front part of the ventral surface.
- Pseudocoel with fluid containing amoebocytes.
- A nerve ring with a ventral cord with a ganglion in each Zonite. Eyespots in some.
- The digestive system completes with salivary glands.
- Gonads as a pair of tubular sacs.
- Penial spicules in males.
- Fertilization internal. Metamorphosis with several larval stages.
- The development includes a series of juvenile stages.
- Examples: *Echinoderes*, *Pycnophyes*.

### **Order 1. Homalorhagida**

- Head and neck are both protrusible.
- Examples: *Trachydemus*.

### **Order 2. Cyclorhagida**

- The only head ring is protrusible.
- Examples: *Echinoderes*.