

ZOO 261 INVERTEBRATE ZOOLOGY

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Phylum NEMATODA (roundworms)

They are thread-like, cylindrical, round worms. They are triploblastic acoelomate animals. They are bilaterally symmetrical and unsegmented. There is a peculiar perivisceral cavity. The body is covered by a smooth non-chitinous cuticle. There is a single layer of longitudinal muscle underlying the epidermis. They are divided into four quadrants. The excretory system consists of two intracellular tubes with a single excretory pore. The alimentary canal is simple straight and opens by a mouth and an anus. Sexes are usually separate and gonads are tubular. No vascular or respiratory system. The cilia are absent even in the developmental stage.

Classification

Class Ascarididae e.g. Ascaris.

They have between three to six lips around the mouth. Males have curve posterior ends while female ends are straight. They have two spicules, they have no copulatory bursai.

Class Strongylidae e.g. Ancylostoma

These are nematodes with simple mouth without papillae. The males have two copulatory spicules and three bursai for ejaculation.

This phylum is one of the largest phyla in the animal kingdom as regards number of individuals and species. Its members live either freely in the sea, soil or decaying organic matter, or parasitically on other animals as well as plants i.e. they are parasitry both plants and animals. In spite of their very wide dispersal, their anatomy is remarkably simple and uniform.

Phylum ANNELIDA

Characteristics

1. Metamerically segmented worms.
2. Body wall with well developed outer circular and inner longitudinal layers of muscle with glandular epidermis.
3. Transparent thin, moist cuticle
4. Possession of chitinous chaetae which are borne on parapodia in some.
5. Possession of COMPLETE DIGESTIVE SYSTEM.
6. Respiration by skin or gills
7. Excretory system consists of segmentally arranged nephridia.
8. Well developed nervous system
9. May be hermaphrodite or of separate sexes
10. Presence of a trochophore larva in some, others have direct development.
11. Closed blood vascular system with haemoglobin.

There are three main classes

1. Class Polychaeta e.g Nereis
2. Class Oligochaeta e.g. Earthworm
3. Class Hirudinea e.g. Parasites, leeches

Class Polychaeta

Characteristics

1. Possession of parapodia on which are borne numerous chaetae
2. Possession of distinct head with eyes, palps and tentacles, cephalisation
3. No clitellum
4. Separate sexes
5. They are mostly marine.
6. They have trochophore larva.

Class Oligochaeta

Characteristics

1. No parapodia
2. Few setae
3. Possess clitellum
4. They are hermaphrodite
5. They have direct development
6. Their head is not clearly distinct.

Class Hirudinea

Characteristics

1. They are ectoparasites
2. Possession of anterior and posterior suckers
3. Body with fixed number of segments which is subdivided into annuli
4. No parapodia or chaeta
5. They are hermaphrodite, direct development.
6. They develop clitellum when sexually mature.
7. They have direct development.

Phylum ARTHROPODA

Characteristics

1. Triploblastic, coelomate, metametrically segmented.
2. Jointed appendages modified for various purposes.
3. Exoskeleton of chitin
4. Body usually divided into 3 regions, head, thorax and abdomen.
5. Possession of striated and non-striated muscles
6. Complete digestive system with mouth-parts for different methods of feeding
7. Open blood system, haemocyanin which are blue in colour
8. No nephridia
9. No cilia except in peripatus
10. Respiration is through body surface, spiracles, trachea, gills or lung books
11. Excretory system by green or antennary gland in aquatic ones and malpighian tubules in terrestrial ones.
12. Well developed nervous system
13. Sensory organs well developed consisting of eyes, antennae and antennules, balancing organs and in some auditory organs
14. Pronounced cephalisation with definite anterior end where sensory organs are concentrated.
15. Sexes nearly always separate
16. Some show metamorphosis

There are many classes of arthropods

Class Onychophora e.g. peripatus

Characteristics

1. Thin cuticle, soft muscular body wall
2. Longitudinal and circular muscles
3. Spiracles scattered, irregularly over the body
4. Cilia present in genital organs
5. Body wormlike and externally unsegmented with imperfectly jointed legs each with 2 claws
6. Possession of nephridia
7. Separate sexes, direct development.

Class Crustacea: Aquatic lobsters, crayfish, shrimps, crabs, water fleas and others.

Characteristics

1. Possession of gills.
2. Queen or antennary gland for excretion

3. Possess antennae and antennules
4. Well developed mouthparts
5. Appendages modified for swimming, walking and food capture
6. Body divided into two 2 regions, cephalothorax and abdomen
7. They possess exoskeleton

Class Myriapoda

Characteristics

1. possess tracheate, land living
2. Arthropods with elongated body
3. Possess a distinct head with a pair of antennae
4. Excretion by malpighian tubules.

Subclass Chilopoda ___ Centipedes

Subclass Diplopoda ___ Millipedes

Class Arachnides (scorpion, spiders, ticks, mites)

Characteristics

1. Arthropods with fully chitinised exoskeleton
2. They have two regions, proxoma and opisthosoma
3. Well developed appendages modified for various purposes, maybe sensory, prehensile or for walking but typically four pairs of walking appendages
4. Respiration by gill or lung books or by trachea
5. Excretion by coxal glands or malpighian tubules
6. Poison glands in some
7. Sexes separate with direct development
8. Possession of a pair of chelicerae (instead of antennae)

Class Insecta

Characteristics

1. The body is segmented
2. The body is covered by chitinous exoskeleton
3. Body divided into three regions, head, thorax and abdomen
4. On the head are found the following: - a pair of antennae, a pair of mandibles and 2 pairs of maxillae, adapted for sucking, biting, piercing, and chewing.
5. Two pairs of wing, some a pair, some none, when two pairs on meso and Meta thorax.
6. Three pairs of walking legs

7. Respiration is by trachea, branched spiracles
8. They have a complete digestive system, fore, mid and hind gut.
9. Salivary gland
10. An open circulatory system
11. Malpighian tubules open into the hind gut.
12. Nervous system
13. Possess a pair of large compound eye
14. Separate sexes. Internal fertilization
15. Complete or incomplete metamorphosis. When complete egg – larva – pupa – adult.
When incomplete egg – nymph – adult.
16. Pathonogenous , some of them reproduce by parthenogenesis in form of sexual reproduction

Insect have about 29 orders.

Success of insects

1. Small size
2. Produce large number of eggs
3. Exoskeleton for conservation of water
4. Possession of different types of mouthparts for chewing, piercing, sucker create less competition among the insects
5. Excretory product of uric acid, so they lose little or no water
6. Leg appendages modified for jumping, leaping and swimming. Locomotion.
7. A pair of large compound eyes for easy sight
8. Protective colouration or a mode of protection against enemies
9. Ability to live anywhere, air, land, water.
10. Possession of trachea for respiration
11. Possession of antennae for feeling
12. Possession of wings for flight, escape and colonization of the species and finding of food
13. Ability to metamorphosise the metamorphosis stages can exist on their own because of their possession of adaptations for their own survival e.g. gills and spiracles
14. Colonies, special insect, ability to live together and work as a committee with division of labour.

Economic importance of insects

Usefulness

1. Agents of pollination
2. Source of protein, source of food
3. Production of honey
4. Production of silk
5. Some enrich the soil
6. Some used as a means of biological control.

Harmful effects

1. Vectors of parasites, causing diseases, tsetse fly, mosquitoes
2. Pests of fresh, stored products
3. Some secrete poisons

Phylum MOLLUSCA

Characteristics

1. Soft body animals which are not segmented
2. Body enclosed in a mantle which secretes the shell
3. Some with ventral muscular foot
4. They have head with tentacles
5. Complete digestive system, radula, gills, lungs, body surface
6. Some are aquatic, marine and freshwater, terrestrial, some are parasitic
7. Possession of nephridia for excretion

Class Amphineura e.g. chiton

Characteristics

1. No tentacles, no eyes
2. Elongated body

Class Gastropoda e.g. Helix

Characteristics

1. Possess head with tentacles
2. Show spiral coiling and torsion
3. Possession of large flattened foot

Class Scaphopoda e.g. Dentalium

Characteristics

1. Live in a tubular shell opening at both ends
2. They have reduced foot

3. No tentacle

Class Lamellibranchiata e.g. Anodonta, mytilus

Characteristics

1. They have bivalve shell
2. Laterally compressed rudimental head.
3. No tentacles

Class Cephalopoda e.g. logilo, sepia, octopus

Characteristics

1. Well developed head with a crown of tentacles
2. Possess siphon
3. Chambered shell
4. Possess well developed eyes

Phylum Echinodermata

This phylum includes very peculiar forms which are quite different from the preceding ones. They are unsegmented coelomate animals which are radially symmetrical in the adult (usually five rayed), but bilaterally symmetrical in the larval stage.

They possess a DERMAL SKELETON which consists of calcareous ossicles (bones) that may develop short or long spines.

The nervous system is diffuse and remains attached to the epidermis.

No nephridia or any other special excretory organs.

The sexes are separate and gonads discharge by special ducts directly to the exterior.

The echinoderms are very common as fossil forms (since the Cambrian period) and are entirely marine.

None of them are parasitic.

The phylum Echinodermata is classified into two sub-phyla

Subphylum I Eleutherozoa

Subphylum II Pelmatozoa

The subphylums Eleutherozoa are free living forms, without a stalk, and have 4 living classes.

Class I Asterozoa e.g. Starfishes

Class II Ophiurozoa e.g. Bristle Stars

Class III Echinozoa e.g. Sea urchins

Class IV Holothurozoa e.g. Sea cucumbers

The subphylum Pelmatozoa are sessile forms, usually stalked, and are represented among the living echinoderms by the class Crinozoa e.g. Sea lilies and Sea feathers.

This phylum is of great interest on account of its affinity to the Phylum Chordata. Thus, 2 super phyla are recognized.

Super phylum I Annelid which include the phylum Annelids

Phylum Arthropods

Phylum Mollusca and

Super phylum II

Echinoderm made up of phylum Echinodermata and phylum Chordata.