Phylum Annelida- characteristics, classification

Annelida definition

Annelids are defined as triploblastic, bilaterally symmetrical, metamerically segmented, a coelomate worm with a thin flexible cuticle around the body.

Figure: Diagram of Phylum Annelida.

- They are mostly aquatic; marine or freshwater some terrestrial, burrowing or tubicolous, sedentary or free-living, some commensal and parasitic.
- The body is elongated, triploblastic, bilaterally symmetrical, truly coelomate and vermiform.
- The body is metamerically segmented; externally by transverse grooves and internally by septa into a number of divisions; each division is called a segment, metamere or somite.
- Body organization is of organ grade system.
- The epidermis is of a single layer of columnar epithelial cells, covered by thin cuticle not made of chitin.
- The body wall is contractile or dermo-muscular consisting of outer muscle fiber circular and inner longitudinal.
- Appendages are jointed when present.

- Locomotory organs are segmentally repeated chitinous bristles called setae or chaetae, embedded in the skin. It may be bored by lateral fleshy appendages or parapodia.
- The presence of true schizocoelous coelom usually divided into compartments by transverse septa. Mostly well-developed in leeches. Coelomic fluid with cells or corpuscles.
- The alimentary canal is straight tube-like, complete, extending from mouth to anus. Digestion is entirely extracellular.
- Respiration occurs through moist skin or gills of parapodia and head.
- The blood vascular system is a closed type. Blood is red due to the presence of hemoglobin or erythromycin dissolved in plasma.
- Excretion is by metamerically disposed coiled tubes; nephridia which communicate the coelom to the exterior.
- The nervous system consists of a pair of cerebral ganglia; brain and double ventral nerve cord having segmentally arranged ganglia and lateral nerves in each segment.
- Receptor organs include tactile organs, taste buds, statocysts, photoreceptor cells and sometimes eyes with lenses in some.
- They are monoecious i.e. hermaphroditic or sexes separate cleavage spiral and determinate; dioecious or unisexual form also present.
- Their development is direct in monoecious form but indirect in dioecious form.
- Larva, when present is a trochophore is characteristics in case of indirect development, while in others this stage is passed through development.
- Regeneration is common.
- Asexual reproduction occurs in some.

Classification of Phylum Annelida

About 8,700 known species of Annelida are divided into four main classes, primarily on the basis of presence and absence of parapodia, setae, metameres, and other morphological features.

Class 1- Polychaeta (Gr., poly=many, chaeta=bristles/hair)

- Chiefly marine, some freshwater.
- Carnivorous
- Body segmentation is internal and external.

- Head consists of prostomium and peristomium and bears eyes, tentacles cirri, and palps.
- Setae numerous on lateral parapodia.
- The clitellum is absent.
- Cirri or branchiae or both may be present for respiration.
- The coelom is spacious usually divided by intersegmental septa.
- The alimentary canal provided with the eversible buccal region and protrusible pharynx.
- The excretory organ is segmentally paired nephridia.
- Sexes separate. Gonads temporary and in many segments.
- Fertilization external.
- Asexual reproduction by lateral budding.
- Trochophore larva present.

Polychaeta divided into two subclasses, Errantia and sedentaria after Fauvel (1959). However, according to Dab (1963), this division is artificial and not a natural one.

Subclass 1. Errantia

- Free-swimming, crawling, burrowing or tube-dwelling and predatory polychaetes.
- Segmentation similar, except at anterior and posterior ends.
- The prostomium is distinct with sensory organs.
- Parapodia, provided with cirri, are equally developed throughout.
- Pharynx protrusible, enlarged and usually with jaws and teeth.
- Examples: *Nereis*, *Aphrodite*, *Polynoe*, *Phyllodoce*, *Tomopteris*, *Syllis*, *Eunice*, *Histriobdella.*

Subclass 2. Sedentaraia

- Burrowing and tube-dwelling form.
- Body made of 2 or more regions, with unlike segments and parapodia.
- Head is small or much modified without eyes and tentacles, prostomium small.
- No acicula and compound setae.
- Pharynx non-protrusible without jaws and teeth.
- Gills, when present, localized to the anterior segments.

- Feeding on plankton or organic detritus.
- Examples: *Chaetopterus, Arenicola, Owenia, Sabella, Terebella, Sabellaria, Pomatocerous.*

Class 2- Oligochaeta (Gr., oligos=few+ chaete=hair)

- Mostly terrestrial or some freshwater forms.
- Body with conspicuous external and internal segmentation.
- Head indistinct, without sensory organs.
- Setae few, embedded in the skin.
- Parapodia absent.
- Glandular clitellum present for cocoon formation.
- The pharynx is not eversible and without jaws.
- Hermaphroditic i.e. sexes united.
- Testes anterior to ovaries.
- Development is direct. fertilization external (in cocoon); no larval stage.

Order 1. Archioligochaeta

- Mostly freshwater form.
- The body consists of a few segments.
- Setae are present in bundles.
- The gizzard is poorly developed, non-muscular or absent.
- The clitellum is simpler consists of a single layer of cells and situated far towards.
- Eyespots are frequently present.
- Male reproductive openings lie in front of female reproductive openings.
- Reproduction asexual and sexual.
- Examples: *Tubifex, Aelosoma.*

Order 2. Neooligochaeta

- Usually terrestrial forms.
- The body is large and many segmented.
- Setae are managed in a lumbricine Manner.
- The gizzard is well developed.

- The clitellum is composed of two or more layers of cells and never begins before twelfth segments.
- Female genital aperture is always on the 14^{th} segment and the male pore lies a few segments behind them.
- Vasa differentia are elongated extending over 3 or 4 segments.
- Eyespots are never developed.
- Reproduction sexual. Asexual reproduction is not known.
- Examples: *Pheretima*, *Eutypheus*, *Megascolex*, *Lumbricus*.

Class 3- Hirudinea (L., hirudo= a leech)

- Mostly ectoparasitic, blood-sucking or carnivorous. Few are marine, freshwater or terrestrial.
- The body is elongated and usually flattened and dorso-ventrally or cylindrical.
- The body consists of a fixed number of segments (33). Each segment breaks up into 2 to 4 rings or annuli.
- Segmentation external without internal septa.
- Par podia and setae are absent.
- Both anterior and posterior ends of the body with ventrally situated suckers.
- The mouth opens on the ventral surface on anterior suckers, while anus opens dorsal to the posterior suckers.
- Coelom much reduced due to filling by botryoidal tissues, and form haemocoelomic sinuses.
- Hermaphrodite with one male and one female gonopore.
- Fertilization internal.
- Asexual reproduction is not known.
- Eggs are always laid in cocoons.
- Development is direct without a free-swimming larval stage.

Order 1. Acanthobdellida

- Mostly parasitic on the fins of salmon fishes.
- The body comprises 30 segments only.
- They are primitive, without anterior suckers, proboscis, and jaws.
- Double rows of setae are present in 5 anterior segments.

- The body cavity is spacious and incompletely divided by septa.
- The vascular system consists of the dorsal and ventral vessels.
- Nephridial opening situated on the surface between the segments.
- Examples: a single genus and species (*Acanthobdella*) parasitic on salmon.

Order 2. Rhynchobdellida

- Parasites on snails, frogs and fishes, marine and freshwater form.
- Each typical body segment consists of 3,6 or 12 rings.
- The mouth is a small median aperture situated in the anterior suckers.
- A protrusible proboscis with no jaws.
- Coelom without compartments.
- Blood vascular system separated from coelomic sinuses.
- Blood is colorless.
- Examples: *Placobdella, Helobdella, Piscicola, Branchellion.*

Order 3. Gnathobdellia

- Freshwater and terrestrial form. Ectoparasitic blood-sucking leeches.
- Each typical body segment consists of 5 rings or annuli.
- Anterior suckers with 3 jaws, 1 median dorsal and 2 ventrolateral.
- The proboscis is absent.
- Blood is red-colored.
- Botryoidal tissues present.
- Examples: *Hirudo, Hirudinaria, Haemadipsa, Herpobdella*.

Order 4. Pharyngobdellida

- Terrestrial and aquatic. Some predaceous.
- Pharynx non- protrusible. No teeth but one ore two styles may be present.
- Examples: *Erpobdella, Dina.*

Class 4- Archiannellida (Gr., arch=first)

- Exclusively marine form.
- Body elongated and worm-like.

- Setae and parapodia are usually absent.
- External segmentation is slightly marked by faint, while internal segmentation is marked by coelomic septa.
- Prostomium bears 2 or 3 tentacles.
- Sexes usually separate, hermaphrodite.
- Usually trochophore larva.
- Examples: *Polygordius*, *Dinophilus*, *Protodrilus.*