

Hello students, welcome to this session and I am Sheena Paul teaching at Government College of Arts, Science and Commerce, Quepem. Today I'll be dealing with the subtopic: General characters and phylum Annelida. This module is a part of the Unit 6: Phylum Annelida of the First Year Zoology paper: Diversity of Nonchordates and Cell Biology.

The outline of this module is introduction to phylum Annelida, salient features of phylum Annelida and general characters of the phylum Annelida.

At the end of this module the students would be able to define Annelida with examples, enumerate the salient features of Annelida and describe the general characters of phylum Annelida.

Annelida, in the earlier times were included along with other worms in a group called Vermes by the early zoologists. Later on, they were separated from the other worms by Cuvier in 1798 from the unsegmented worms. The term Annelida was used for the first time by Lamarck in 1899 for the higher segmented worms which includes the annelids. The word Annelida may either be derived from the Latin word *annellus*, which means little ring or from the French language *anneuler*, which means to arrange in rings. This refers to the main characteristic feature of the phylum Annelida wherein the body is divided into segments. Annelids are elongated, bilaterally symmetrical triploblastic, metamerically segmented, and coelomate worms, which is with a thin flexible cuticle dermomyocardial body wall with chitinous setae embedded in it, usually having a closed blood vascular system and segmentally arranged nephridia. Paired appendages when present are not jointed.

The salient features of annelids include metameric segmentation which is appearing for the first time in the animal kingdom wherein the body gets divided into a series of segments. They show cephalization, which is formation of a distinct head region, a true coelomic cavity, a cavity which is lined by mesodermal cells. They show the presence of nephridia for the purpose of excretion and for the first time there is a closed blood vascular system wherein blood flows within closed channels called as blood vessels. Examples of annelids includes nereis, earthworms and leeches.

These are the diagram of earthworm, nereis and leech.

General characters of Annelida:

Let's begin with the habitat. Annelids are mostly aquatic marine as well as freshwater species. Some are terrestrial which are found in moist soil and generally they burrow and live in tubes in the soil. They may be sedentary or free living, commensalistic and parasitic forms are also seen among the annelids. The body in annelids is soft, triploblastic, meaning it is derived from 3 germ layers that is, the ectoderm, endoderm and mesoderm. They show bilaterally symmetrical bodies elongate and vermiform.

Cephalization, which is actually the formation of a distinct head region, is seen in some forms.

Metamerism is another exclusive feature which is seen in annelids. The body is segmented externally by the presence of transverse grooves as well as internally by the septa into a number of divisions. Each of these divisions of the body be called either as a somite, a metamere, or a segment. The first segment of the body of annelids is the peristomium or the head. At the anterior end of the peristomium, there is an outgrowth which is called as the prostomium. Annelids have reached the organ system grade of organization, wherein there are well developed organ systems to carry out the different functions which are vital for life. Another aspect seen in annelids are the setae and the parapodia, which are organs of actually carrying out the process of locomotion except in leeches. The annelids show the presence of segmentally arranged unjointed chitinous bristle like structures, which are called either as setae or as chaetae and serve for locomotion. The setae can be arranged on the body of the annelids in two ways:

Either there may be arranged in two pairs on either side of the body segment, which is called as the lumbricine arrangement or may be placed in a ring in each segment which is called as the perichaetine arrangement. Look at the first diagram. The first diagram indicates the perichaetine arrangement of the chaetae where the setae are arranged in a ring all around the body segment and in the lumbricine arrangement, the setae are arranged in two pairs on either side of the body. In addition to setae/chaetae, in some annelids, they show the presence of unjointed segmentally arranged locomotory structures, which are called as parapodia. Look at the second diagram on this page. That is the diagram of a parapodium. The Parapodium is divided into 2 lobes: it has an upper notopodium and the lower neuropodium. The notopodium on its outer edge shows the presence of a small finger like projection called as the dorsal cirrus. Similarly, the ventral neuropodium on its ventral surface also shows the presence of a small finger like projection called as a ventral cirrus. Running through the body of the parapodium, there are two dark brown coloured rod like structures called as acicula to which are attached the setae/chaetae. The body wall of annelids is dermomuscular and highly contractile. It comprises of a thin, moist noncellular cuticle followed by a single layer epidermis. Beneath the epidermis is arranged the circular and longitudinal muscles. The body cavity is a true coelomic cavity which is seen for the first time in case of annelids. This body cavity is lined internally by mesodermal cells. This coelomic cavity in annelids is also divided into compartments by septa and the cavity is filled with a fluid called as coelomic fluid which contains the presence of different types of cells. The digestive system in annelids is a complete system. It is in the form of a straight tube leading from a ventral mouth at the anterior end to a terminal anus at the posterior end of the body. Digestion. In case of annelids is exclusively extracellular. Respiration is carried out in most annelids through the general body surface which is termed as cutaneous respiration, while in some forms, respiration is also carried out through gills, which is termed as branchial respiration. The blood vascular system in annelids is well developed and is of the closed type which is made up of definite blood vessels. They are the first animals to have a closed vascular system. Blood in case of annelids is red in colour due to the presence of either haemoglobin or the erythrocrurin pigments which are dissolved in the plasma. Free amoeboid cells are seen in the blood of annelids. Red blood cells are absent. The excretory system in annelids comprises of metamerically arranged coiled tubular structures which are termed as nephridia. These nephridia open at one end into the coelomic cavity through an aperture which is called as the nephrostome and at the other end they open to the exterior through an aperture termed nephridiopore. Nephridia help in removal of nitrogenous waste products from the circulatory fluids and also helps in osmoregulation in annelids. Ammonia is the chief excretory product and therefore they are called as ammonotelic organisms. This first diagram is that of a nephridium. It's a coiled tubular structure. As you can see, anteriorly, it shows the presence of the nephrostome and posteriorly it shows the presence of the nephridiopore. In case of annelids the nervous system is well developed, comprises of a nerve ring, a double ventral nerve cord and nerves. The nerve ring in annelids is made up of a pair of supra pharyngeal ganglia, a pair of circum pharyngeal connectives which go around the pharynx and meet below it in a pair of sub pharyngeal ganglia. So, these three components together forms the nerve ring: the supra pharyngeal ganglia circumpharyngeal connectives and the subpharyngeal ganglia. Emerging out from the sub pharyngeal ganglion is a double ventral nerve cord. In each body segment, the nerve cord forms a swelling which is called as the terminal segmental ganglion.

Nerves which emerge out from the nerve ring innervate the head region while the nerves that come out from each segmental ganglia supply the organs of the segment. In case of annelids, there are different types of sense organs present. There are tactile receptors which are sensitive to touch, gustatoreceptors, which are receptors of taste and photoreceptors which are sensitive to light. Some annelids also show the presence of statocysts which are organs of equilibrium and maintenance of balance. In case of annelids, we come across both monoecious as well as dioecious forms. Monoecious forms are individuals wherein both the type of gametes, that is ova and sperms, are produced within the same individual, whereas in dioecious forms only one type of gamete is formed. The gonads in annelids develop from the coelomic epithelium. The gametes pass out of the body either through the nephridia or through coelomo ducts. In monoecious forms development is direct while in dioecious forms, development is indirect with a larval stage called trochophore larva. In some forms asexual reproduction is also seen. These are the references which are used in the making of this module. Thank you.