

BIOLOGY

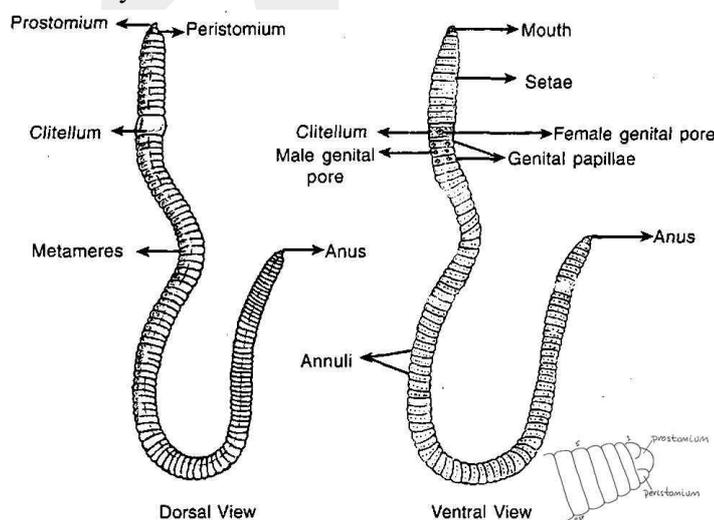
CLASS NOTES FOR CBSE

Chapter 07. Structural Organisation in Animals

01. Earthworm

There are several species of earthworms known today. Out of which 13 species of earthworm (*Pheretima*) are found in Indian soil. Out of these *Pheretima posthuma* is the common Indian earthworm. Other genera include *Drawida* and *Megascolex* occurring in Southern Indian and *Eutyphaeus* which is found in the Gangetic plain of North India. Common genus of Europe and North America is *Lumbricus*.

Pheretima posthuma is fossorial animal, i.e. it lives in burrows made up of moist soil. It is nocturnal in habit. *Pheretima* is a clod-blooded animal, with natural lifespan that varies from three and a half year to 10 years.



02. External Morphology

The animal has a glistening dark brown body, due to pigment porphyrin. It protects the earthworm from UV radiation. Body of earthworm is divided into 100-120 segments or metameres or somites. The first segment is buccal segment or peristomium which bears a slit-like mouth. It is dorsally covered with a fleshy process called **prostomium**. It helps in digging burrows and is also sensory in nature. Earthworm lacks distinct head and sense organs like eyes, cirri and tentacles. In a mature worm, a thick band of glandular tissue called **clitellum** is found around 14-16 segments. Due to its presence the body of earthworm is divided into preclitellar,



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clitellar and postclitellar regions, Out of this, clitellar region has glands whose secretions help in the formation of cocoon or egg capsule. It is protective structure in which eggs are fertilised.

03. Body Wall

The body wall of Pheretima has four layers from outside to inside as follows

- (i) **Cuticle layer** is the outermost thin elastic and non-cellular layer made up of collagenous protein forming fibres and a polysaccharide with small amount of gelatin. It is a protective layer secreted by underlying epidermis.
- (ii) **Epidermis layer** is single layered of columnar cells resting on basement membrane. It contains supporting cells, gland cells (mucous and albumin), basal cell and sensory cells.
- (iii) The **muscle layer** having an outer thin, circular muscle fibre layer and an inner thick longitudinal muscle fibre layer. All muscle fibres are smooth type.
- (iv) **Parietal peritoneum** or **Parietal layer** or **Coelomic epithelium** lies below the longitudinal muscle layer. It secretes coelomic fluid. Along with all these layers the locomotory organs, i.e. setae are also present. These are S-shaped structures and present in specialised pouches called **saetal sacs**. The body wall protects internal organs and prevents excessive evaporation. It also aids in sensory functions and excretion through the nephridiopores present in it.

04. Digestive System

The alimentary canal of *Pheretima* is complete and well-differentiated. It comprises of buccal chamber, pharynx, oesophagus, gizzard, stomach and intestine. Gizzard is the main grinding organ of alimentary canal. Its wall has hard and thick circular muscle layer. Stomach contains calciferous glands to neutralise the humic acid of soil. The longest and widest part of alimentary canal is intestine.

05. Coelom

The body of earthworm is schizocoelic type, i.e. the formed by splitting of mesodermal band. It is divided into small segments with the help of intersegmental septa. The coelomic fluid is alkaline and colourless. It serves as the hydraulic or hydrostatic skeleton in initial segments. Thus, helps in locomotion. It contains following four types of coelomic corpuscles besides water, salts, proteins.

These are as follows

- (i) **Phagocytes** or **Eleocytes** are the largest and most numerous cells. These are amoeboid in nature and engulf harmful germs.



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- (ii) **Mucocytes** are elongated cells with fan-like processes. Their function is unknown.
- (iii) **Circular cells** which are nucleated and make up about 10% of total corpuscles. These may also be called leucocytes.
- (iv) **Chloragogen cells** are yellow, star-shaped cells. These are related to storage and synthesis of glycogen, fat, deamination of amino acids and urea formation. Hence, they are comparable to vertebrate liver.

06. Process of Digestion

Earthworm feeds on dead organic matter, i.e. humus. The suction action of buccal chamber and oesophagus are helpful in the ingestion of food. Digestion is extracellular. Undigested food and soil are eliminated through the anus to outside in the form of worm castings, i.e. faecal pellets.

07. Respiratory System

The animal is aerobic and gaseous exchange takes place through the general body surface (cutaneous gaseous exchange). The skin is kept moist by the moisture of the soil, secretion of mucus by epidermal gland cells and the coelomic fluid oozing out through the dorsal pores.

08. Circulatory System

Earthworm has a closed type of circulatory system consisting of blood, blood vessels, heart and plexus. In earthworm, blood flows in well-organised vessels, which run all along the length of the body. *Major blood vessels of earthworm are*

- (i) **Dorsal blood vessel**
- (ii) **Ventral blood vessel**

Earthworm's blood is red due to dissolution of haemoglobin into plasma. It has leukocytes only as corpuscles. The pharyngeal mass of 4th, 5th and 6th segments has small red coloured follicular bodies. These bodies are called **blood glands** and are involved in the manufacture of blood.

09. Excretory System

It is made up of many segmentally arranged microscopic coiled tubes called **nephridia**. In *Pheretima*, three types of nephridia are seen. *They are*

- (i) **Pharyngeal nephridia**

These are seen as paired tufts on either side of pharynx and oesophagus in the 4th, 5th, and 6th segments. These open into alimentary canal, so these are enteronephric.



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