B.Sc Part-1 Zoology (H) Paper-1 Group-A Topic-Canal System of Sponges Lecture Notes By Dr. Arjun Pratap Singh

CANAL SYSTEM IN SPONGES

Body of all **sponges** is the perforated by large number of apertures through which water enters Inside body and flows through a **system** of criss-crossing **canals** collectively forming the **canal system** which is a characteristic feature of poriferans. ... Sycon type, with flagellated radial **canals**

Body of all sponges is the perforated by large number of apertures through which water enters Inside body and flows through a system of criss-crossing canals collectively forming the canal system which is a characteristic feature of poriferans. Following types of canal systems are found in sponges:

- Ascon type, with flagellated spongocoel
- Sycon type, with flagellated radial canals
- Leucon type, with flagellated chambers
- Rhagon type, with conical shape and broad base

ASCON TYPE

This is the simplest type of canal system and is found in *Leucosolenia* and other homocoela. Ostia are present on the surface of body and lead directly into the spongocoel, which is lined by flagellated choanocyte cells. Spongocoel opens to the outside through a narrow circular opening, the *osculum* located at the distal free end of the sponge body. Water enters through ostia into spongocoel and goes out of body through the *osculum*.

SYCON TYPE

This type of canal system is a characteristic of syconoid sponges, e.g. *Scypha* and *Grantia*. Body wall is secondarily folded to form incurrent and radial canals, which open into the spongocoel by an opening called *apopyle*. Both types of canals are interconnected by minute pores called *prosopyles*. Incurrent pores or *ostia* are found on the outer surface of body and open into the incurrent canals, which lead into adjacent radial canals through minute openings called *prospyles*. Radial canals are the flagellated chambers that open into central spongocoel

by internal openings called *apopyles*. Spongocoel is a narrow, without flagellated cells but is lined by pinacocytes and opens to exterior through the osculum.

In more complex sycon type, as found in *Grantia*, the incurrent canals travel along an irregular course through the tissue and connect to the radial canals, thus forming large sub-dermal spaces.

LEUCON TYPE

In this case, the radial canals get divided into small rounded or oval flagellated chambers by further folding of the body wall. This is a characteristic feature of the leuconoid sponges such as *Spongilla*. Incurrent canals open into flagellated chambers through *prosopyles*. Flagellated chambers, in their turn, communicate with excurrent canals through *apopyles*. Excurrent canals are formed as a result of division of spongocoel which has almost disappeared in these sponges. Thus excurrent canals communicate with the outside through a small spongocoel and an *osculum*.

This type of canal system has varying degree of complexity of canals and based on that it can be classified into the following three types:

- **Eurypyloustype:** In this type, the flagellated chambers communicate directly by broad apertures called the *apopyles*, with the excurrent canals. Incurrent canal brings water into the flagellate chamber through *prosopyle*. E.g. *Plakina*
- **Aphodaltype:** In this type, the *apopyle* is drawn out as a narrow canal, called *aphodus*, which connects the flagellated chamber with excurrent canal. Here also incurrent canal brings water into the flagellate chamber. E.g. *Geodia*.
- **DiplodalType:** In some sponges, besides aphodus, another narrow tube, called prosodus, is present between incurrent canal and flagellated chamber. E.g., *Spongilla* and *Oscarella*.

RHAGON TYPE

In Demospongiae, leuconoid condition is derived from the larval stage, called *rhagon* as found in *Spongilla*. The body is conical and tent like in shape, tapering towards the *osculum*. The spongocoel is bordered by oval flagellated chambers opening into it by *apopyles*. Mesenchyme is considerably thick and is traversed by incurrent canals and subdermal cavity. Water enters

into the subdermal cavity through ostium and then enters the incurrent canal or it can be called *prosodus*. Flagellate chambers are connected to the spongocoel through the excurrent canal or it can be called *aphodus*. This canal system is primitive as compared to *diplodal* type and when the larva grows transformed to *diplodal* type.

Significance of Canal System

The flagella of choanocytes beat to produce a water current, which enters the sponogocoel through ostia. It carries food particles and oxygen and sweeps away the metabolic wastes through *osculum*. Therefore, the canal system serves the function of food collection, respiration and excretion. In simple type of canal system, there is lesser number of cells and thin body wall but as the canal system becomes more complex, the number of flagellated cells increases and the force to draw water current is increased. The *syconoid* canal system is therefore more efficient than the *asconoid* type and the *leuconoid* type is the most efficient.