

What is canal system?

A distinguishing feature of all sponges is the perforation of body surface by numerous apertures for the ingress and egress of water current. Inside body, water current flows through a certain system of spaces collectively forming the canal system.

Function of water current.

The most vital role in physiology of sponges is played by water current on which their life depends. All exchanges between sponge body and external medium are maintained by means of this current. Food and oxygen are brought into body and excreta and reproductive bodies carried out. This current is caused by beating of flagella of collar cells.

Types of canal system.

The arrangement and complexity of internal channels vary considerably in different sponges. Accordingly canal system has been divided into three types: ascon, sycon and leucon.

1. Ascon type. It is the simplest type of canal system which is found in asconoid sponges, like *Leucosolenia*, and in olynthus stage (in the development of all syconoid sponges).

Its body surface is pierced by a large number of minute openings called incurrent pores or ostia. These pores are intracellular spaces within tube-like cells, the

porocytes, which extend radially into and open directly into spongocoel. The single, large, spacious central cavity in the sponge body. It is lined by flagellated collar cells or choanocytes. Spongocoel opens to outside through narrow circular opening, the osculum, located at distal free end, and often fringed with large monoaxon spicules.

Surrounding sea water enters the canal system through ostia. Flow of water is maintained by the beating of flagella of collar cells. Rate of flow is slow, because the large spongocoel contains much water which cannot be pushed out readily through a single osculum. Course taken by water current in the body of sponge may be shown as under:

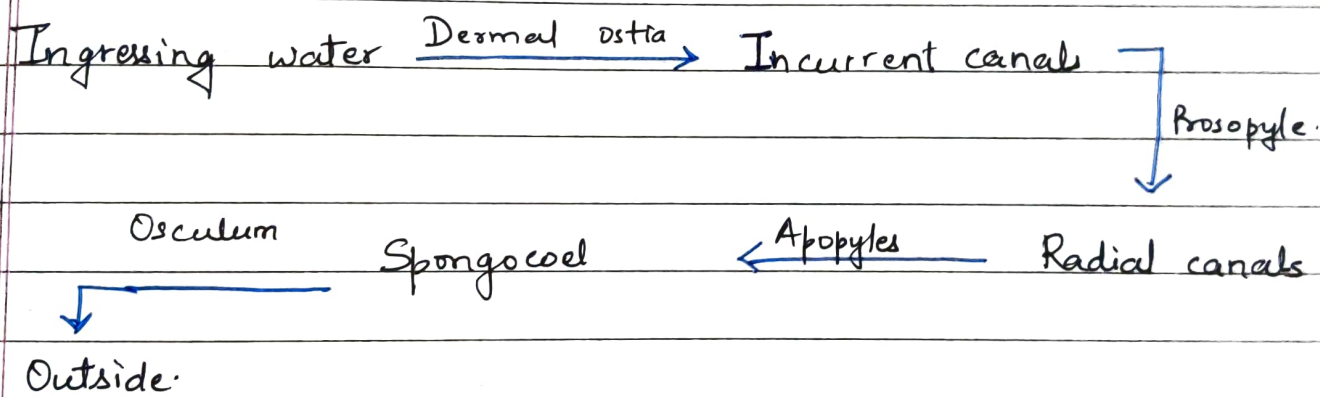
Ingressing water  $\xrightarrow[\text{ostia}]{\text{through}}$  Spongocoel  $\xrightarrow[\text{osculum}]{\text{through}}$  To outside.

2. Sycon type. Sycon type of canal system is a more complex system of pores and canals and is characteristic of syconoid sponges, like Scypha (= Sycon), Grantia. It can be theoretically derived by Asconoid type by horizontal folding of its wall. Embryonic development of Scypha clearly shows the asconoid pattern converting into syconoid pattern. Body wall of syconoid sponges includes two types of canal incurrent canal and radial canals paralleling and alternating with each other. Both types of canal end blindly into body wall but are



interconnected by minute pores. Incurrent pores or dermal ostia, found on outer surface of body, open into incurrent canals. These canals are non-flagellated, as they are lined by pinacocytes, and lead into adjacent radial canals through minute opening called prosopyles. It is not clear whether prosopyles are channels through porocytes but it is definite that, in the adult, they are simple intercellular spaces. Radial canals are flagellated chambers, as only they are lined by choanocytes. These canals open into central spongocoel by internal ostia or apopyles. Spongocoel is a narrow, non-flagellated cavity lined by pinacocytes. It opens to exterior through a excurrent pore, the osculum similar to that of ascum type.

Course of water ~~may~~ may be represented as given below:

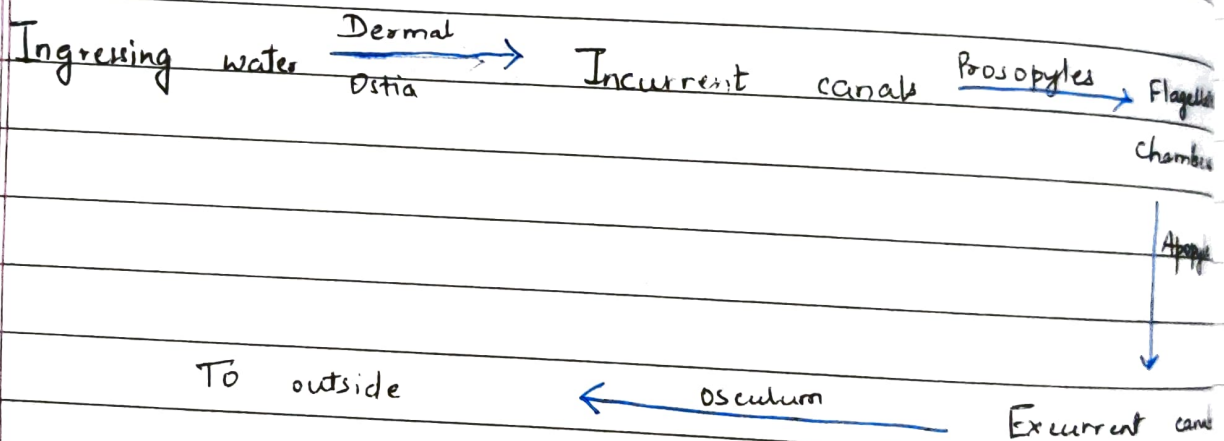


In more complex sycon type, as illustrated by *Girantia*, the incurrent canals are irregular, branching and anastomosing forming large subdermal spaces. This is due to development of cortex, involving pinacoderm and mesenchyme, spreading over the entire outer surface of sponge.

3. Leucon type :- As a result of further folding of body wall, the sycon type gives rise to a still more complex canal system - the leucon tube.

This is the characteristic of leuconoid sponges, such as Spongilla. Here, radial symmetry is lost and canal system has become very irregular. Flagellated chambers are small, spherical and lined by choanocytes. Other lines or spaces are lined by choanocytes and pinacocytes. Incurrent canals open into flagellated chambers through prosopyles. Flagellated chambers, in their turn, communicate with excurrent canals through apopyles. Excurrent canals are developed as a result of shrinkage and division of spongocoel which has disappeared. Thus excurrent canal communicates with the outside through an osculum.

Course taken by water current is as follows:



Though leucon type of canal system appears to be the modification of sycon type, in many calcareous sponges, leucon type is derived directly without passing through ascon and sycon type in their embryogeny. In dermospongiae, leuconoid is derived from a larval stage called rhagon. Spongocoel of rhagon is surrounded by flagellated chambers opening into it through very wide apopyles.