

Canal System in Sponges

Definition:

The body of the sponge is traversed by numerous canals opening to the outside by many minute pores. These canals and pores of sponges constitute the **canal system**.

Functions of canal system:

The canal system creates water current to flow in and out of the sponges continuously. This water current has the following functions:

- Respiration:** The cells absorb O_2 from the water current and give out CO_2 .
- Nutrition:** The water current brings in food particles.
- Excretion:** Nitrogenous waste products and faeces are washed out through the water current.
- Reproduction:** The water current carries the gametes from one sponge to another sponge.

Types of Canal System

There are four types of canal system in sponges. They are as follows:

1. Ascon type
2. Sycon type
3. Leucon type
4. Rhagon type

1. Ascon Type:

The Ascon type of canal system is the simplest of all types. Asconoid type of canal system is found only in few sponges eg. *Olynthus*, *Leucosolenia*. These animals are radially symmetrical vase-like body consisting of a thin wall enclosing a large cavity called **spongocoel**. The spongocoel opens to the outside by a large circular opening called **osculum**.

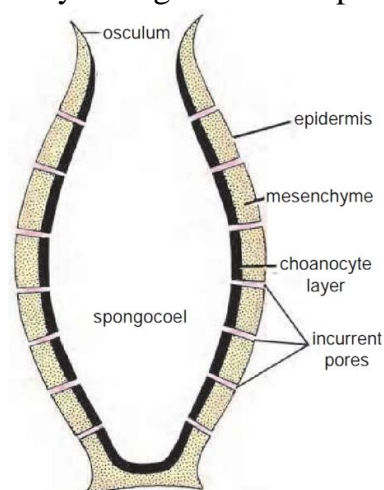
The body wall is thin and consists of an outer epidermis **pinacoderm** and an inner endodermis, the **choanoderm** separated by a jelly-like non-cellular layer of **mesenchyme**. The inner lining of the spongocoel is composed of **choanocytes**. The beating of the flagella of the choanocytes creates a **water current**.

The wall of these sponges is perforated by numerous pores called **ostia** which pass through the lumen of cells called **porocytes**.

Water enters into the spongocoel through ostia and water current impelled by the flagella of the choanocytes passes out through the osculum,

The water flows in the following route:

Ostia → *Spongocoel* → *Osculum*



2. Sycon Type:

Sycon type is formed by the outpushing of the wall of an asconoid sponge at regular intervals. The sycon type of canal system is seen in sponges like Sycon, Sycetta etc.

There are two types of sycon type of canal system. They are

- a) Sycon type without cortex
- b) Sycon type with cortex

a) Sycon type without cortex

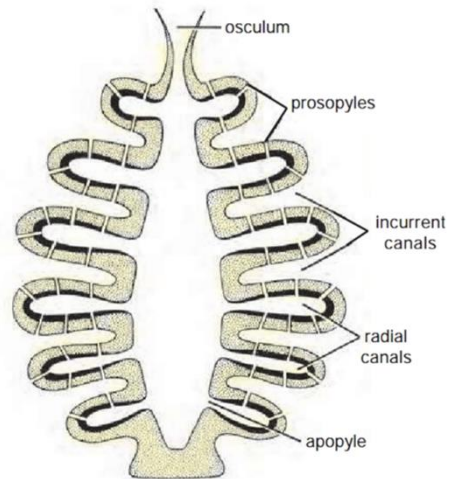
It is found in Sycetta. Syconoid type is formed by the outpushing of the wall of an ascon sponge at regular intervals, these finger-like outgrowths are called **radial canals**. The inner side of the radial canal is lined with **choanocytes**.

Between the radial canal there is another canal called **incurrent canal**. The incurrent canals open into radial canal by minute pores called **prosopyles**.

The radial canals open into the spongocoel by openings called **apopyles**. The spongocoel opens out by the **osculum**.

The water flows in the following route:

Incurrent canal → Prosopyle → Radial Canal → Apopyle → Spongocoel → Osculum



b) Sycon type with cortex

This type is found in Sycon. Sycon type is formed by the outpushing of the wall of an ascon sponge at regular intervals, these finger-like outgrowths are called **radial canals**. The inner side of the radial canal is lined with **choanocytes**.

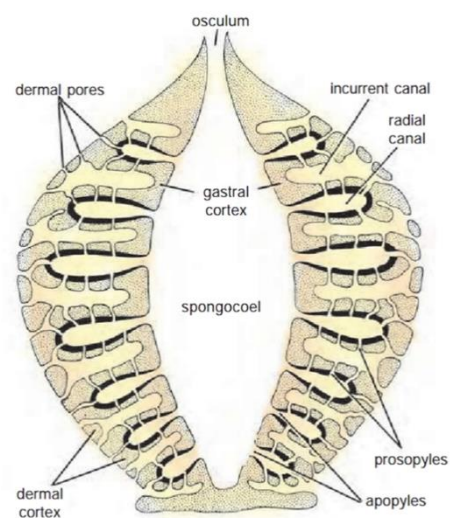
Between the radial canal, there is another canal called **incurrent canal**. The incurrent canals open into radial canal by minute pores called **prosopyles**.

The epidermis and mesenchyme spread over the outer surface to form a **cortex**. The free end of the incurrent canal opens outside through the cortex by minute pores called **dermal ostia**.

The radial canals open into the spongocoel by openings called **apopyles**. The spongocoel opens out by the **osculum**.

The water flows in the following route:

Dermal ostia → Incurrent canal → Prosopyle → Radial Canal → Apopyle → Spongocoel → Osculum



3. Leucon type:

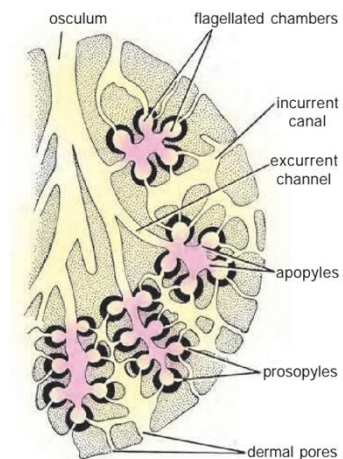
As a result of further folding of the body wall, the radial canal of the sycon type evaginates into many small flagellated chambers giving rise to a more complex canal system, the **leucon type**. Here radial symmetry is lost and irregular. Flagellated chambers are small, spherical and lined by **choanocytes**. All other spaces are lined by **pinacocytes**. The **dermal ostia** open into **subdermal spaces**. The subdermal spaces open into **incurrent canals**. Incurrent canals open into flagellated chambers through **prosopyles**. Flagellated chambers communicate with excurrent canals through **apopyles**. The excurrent canals open into **spongocoel** and open outside by an **osculum**.

There are three kinds of leucon type of canal system namely: a) Euryphylous type b) Aphodal type and c) Diplodal type

- a) **Euryphylous type:** It is the simplest and most primitive leucon type of canal system. In this type, the flagellated chambers open directly into the excurrent canals by **apopyles**. E.g. *Tetilla*, *Leucilla*

The water flows in the following route:

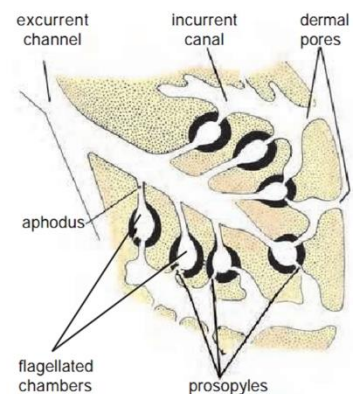
Dermal ostia → Subdermal spaces → Incurrent canal → Prosopyle → Flagellated chamber → Apopyle → Excurrent canal → Spongocoel → Osculum



- b) **Aphodal type:** In this type, the apopyle is drawn out as a narrow canal, called **aphodus**. This connects the flagellated chamber with the excurrent canal. E.g. *Geodia*, *Stelletta*.

The water flows in the following route:

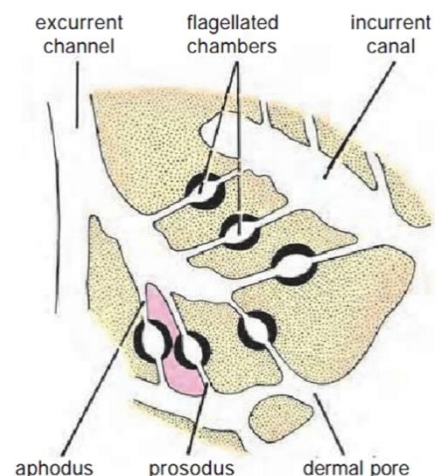
Dermal ostia → Subdermal spaces → Incurrent canal → Prosopyle → Flagellated chamber → Aphodus → Excurrent canal → Spongocoel → Osculum



- c) **Diplodal type:** In some sponges, besides aphodus, another narrow tube, called **prosodus**, is present between incurrent canal and flagellated chamber. The pattern is called the diplodal type. E.g. *Spongilla*, *Oscarella*.

The water flows in the following route:

Dermal ostia → Subdermal spaces → Incurrent canal → Prosodus → Flagellated chamber → Aphodus → Excurrent canal → Spongocoel → Osculum



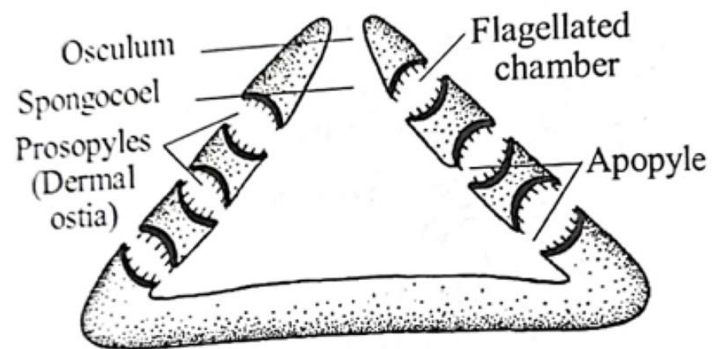
4. Rhagon type:

This type of canal system is found in **Rhagon** which is the larval form of Spongilla.

The rhagon is **conical** in shape. It is broad at the base and pointed at the apex. Here the **radial canal** is in the form of rounded chambers called **flagellated chambers**.

The flagellated chambers open to the outside by **dermal ostia** or **prosopyles** and they open into the spongocoel by an opening called **apopyles**.

The spongocoel opens to the outside by the **osculum**.



The water flows in the following route:

Dermal ostia → Prosopyles → Flagellated chamber → Apopyles → Spongocoel → Osculum