CANAL SYSTEM IN SPONGES

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INTRODUCTION

- Sponges, the members of the phylum porifera, are a basal metazoa clade as a sister of the diploblasts. They are multicellular organisms that have bodies full of pores and channels allowing water to circulate through them.
- Sponges have a unique feeding system among animals. Instead of mouths they have tiny pores in their outer walls through which water is drawn. cells in the sponge walls filter food from the water as the water is pumped through the body and osculum.
- The most important structure is the system of canals and chambers, called a water canal system through which water circulates to bring food and oxygen to the sponge.
- Water-current system also helps disperse gametes and larvae and remove wastes.

What is water canal system

- All the cavities of the body transversed by the currents of water, which nourish the sponge from the time it enters by the pores until it passes out by the osculum, are collectively termed as canal system.
- There are perforations of body surface by numerous apertures for the ingress And agress of water currents.
- Water current flows through a certain system of spaces collectively forming the canal system.

SIGNIFICANCE

- The flagella of choanocytes beat to produce a water current, which enters the spongocoel through ostia.
- It carries food particles and oxygen 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 are increased and the force to draw water current is increased.

TYPES OF CANAL SYSTEM

1. Ascon or Asconoid type with flagellated spongocoel.
2. Sycon or Syconoid type with flagellated radial canals.
3. Leucon or Leuconoid type flagellated chambers.

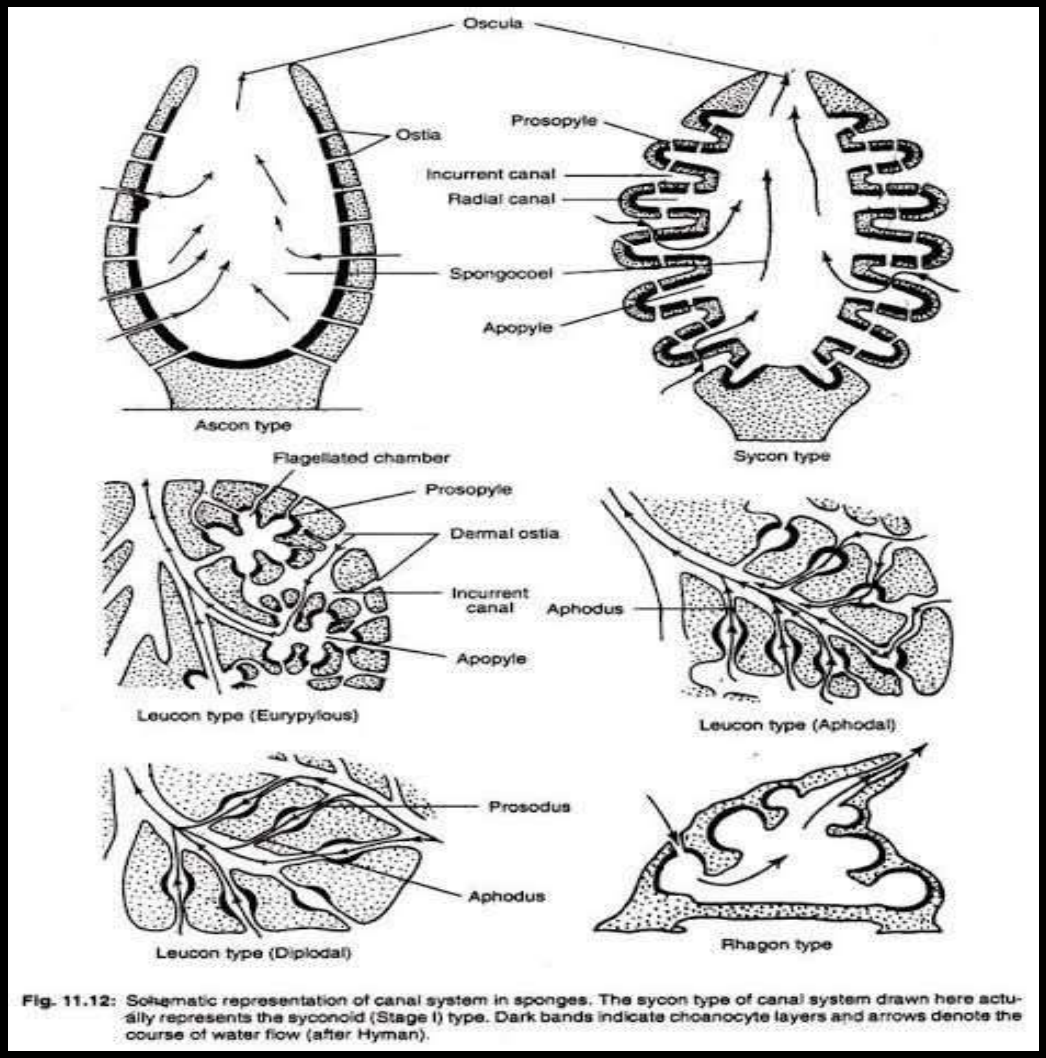
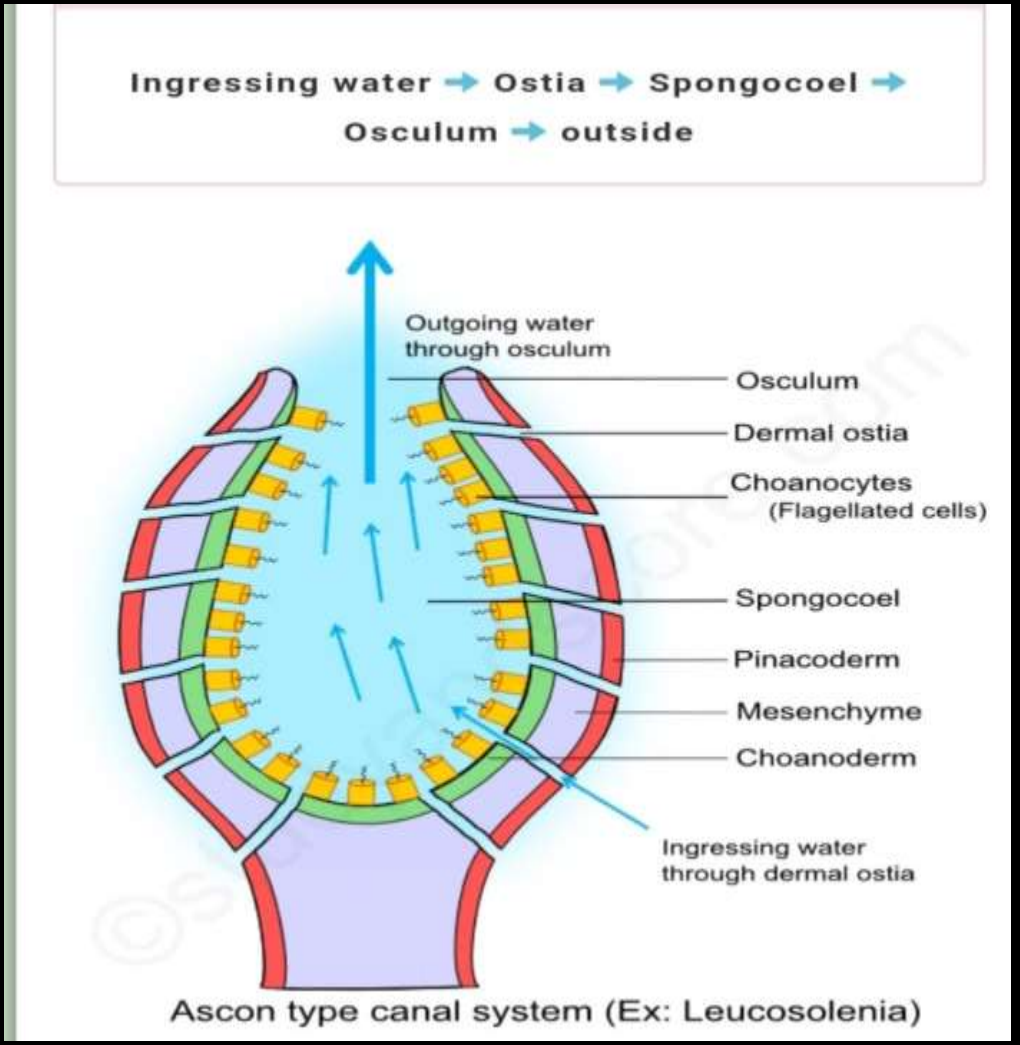


Fig. 11.12: Schematic representation of canal system in sponges. The sycon type of canal system drawn here actually represents the syconoid (Stage I) type. Dark bands indicate choanocyte layers and arrows denote the course of water flow (after Hyman).

ASCON TYPE OF CANAL SYSTEM

- The simplest type of canal system.
- Found in leucosolenia and other homocoela.
- Ostia are present on the surface of body and directly into the spongocoel.
- Spongocoel lined by flagellated choanocytes.
- Spongocel opens to the outside through a narrow circular opening the osculum.
- Water enters through ostia into spongocoel and goes out of body through osculum.



Ascon type canal system (Ex: Leucosolenia)

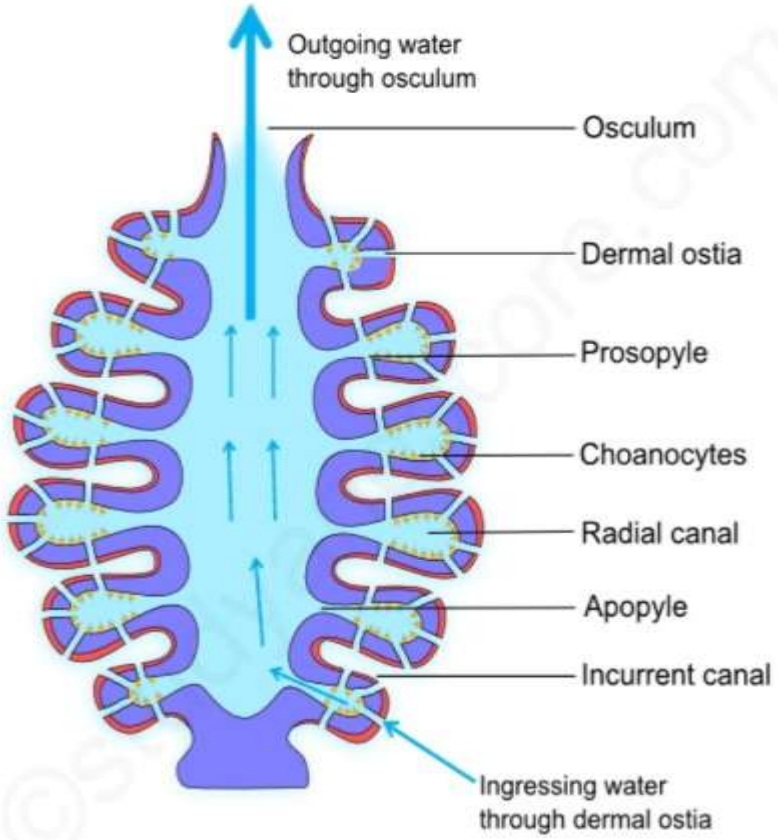
SYCONOID CANAL SYSTEM

- A characteristic of syconoid sponges e.g., Scypha and grantia.
- Body wall is secondarily folded to form incurrent and radial canals.
- Radial canals open into spongocoel by an opening called apopyle.
- Both types of canals are inter connected by minute pores called prosopyles.
- Incurrent pores or ostia are found on the outer surface of body and open into the incurrent canals.
- Incurrent canals lead into adjacent radial canals through minute openings called prosopyles.
- Radial canals are flagellated chambers that open into central spongocoel by internal openings called apopyles.
- Spongocoel is a narrow, without flagellated cells, but is lines by pinacocytes and open 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.

LEUCONOID CANAL SYSTEM

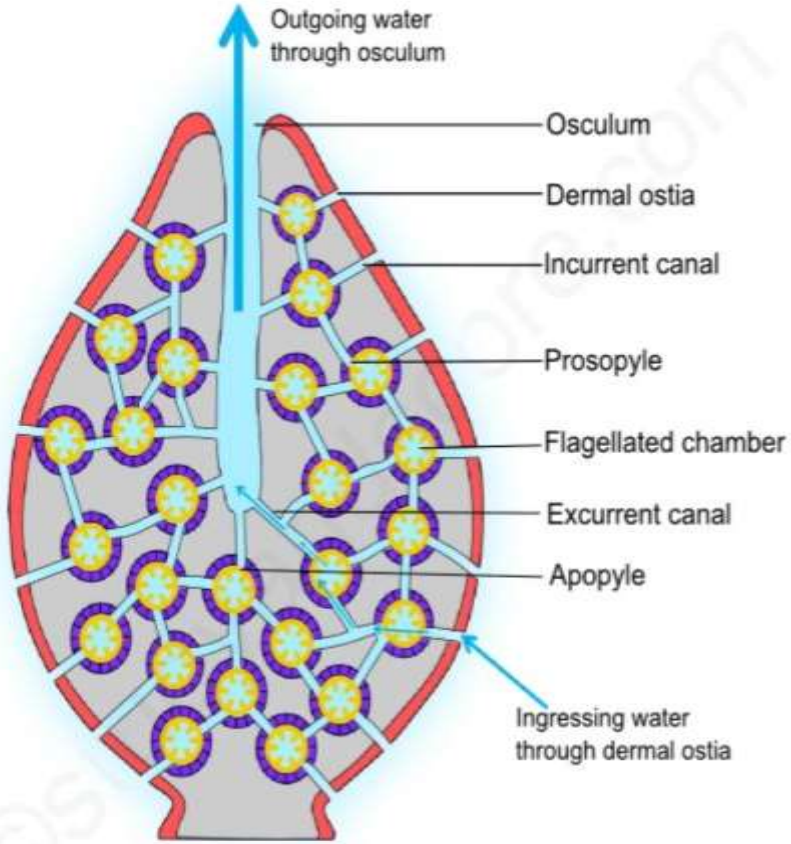
- The radial canals get divided into small rounded or oval flagellated chambers by further folding of todlls.
- Found in spongilla.
- Incurrent canals open into flagellated chambers through prosopyles.
- Flagellated chambers, in their turn communicate with excurrent canals through apopyles.
- Excurrent 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.
- Has varying degree of complexity of canals.

Ingressing water ➜ dermal ostia ➜ incurrent canal ➜ Prosopyles ➜ Radial canals ➜ Apopyles ➜ Spongocoel ➜ Osculum ➜ Outside



Sycon type canal system (Ex: Scypha)

Ingressing water ➜ dermal ostia ➜ incurrent canal ➜ Prosopyles ➜ Flagellated chambers ➜ Apopyles ➜ excurrent canals ➜ Osculum ➜ Outside



Leucon type canal system (Ex: Spongilla)

- Based on that it can be classified into the following three types:
- **EURYPYLOUS TYPE:** The flagellated chambers communicate directly by broad apertures called the apopyles, with the excurrent canals. Incurrent canals bring water into the flagellated chamber through prosopyle.
- Current of water takes the following rout: ostia-incurrent canals-prosopyle-flagellated chambers-apopyles-excurrent canals-spongocoel-oscula-out.
- E.g.- plakina, leucilla.
- **AHODAL TYPE:** Flagellated chambers are small and rounded.
- The apopyle is drawn out as narrow canal, called aphodus.
- Aphodus connects the flagellated chambers with the excurrent canal.
- Incurrent canal brings water into the flagellate chamber.
- The relation of water current is: ostia-incurrent canals-prosopyles-flagellated chambers-aphodus-excurrent canals-spongocoel-oscula-out.
- E.g.- Geodia.

DIPLODAL TYPE: Besides aphodus, another narrow tube, called prosodus is present between incurrent canal and flagellated chamber.
Current of water follows: ostia-incurrent canals-prosodus-flagellated chambers-aphodus-excurrent canal-spongocoel-oscula-out. Eg-spongilla, Oscarella.
RHAGON TYPE: Rhagon is more or less triangular pyramid like.
Generally it said that leuconoid type of canal system is derieved from asconoid and syconoid types in calcareous sponges However in Demospongia, this system is formed from a larval stage called Rhagon. Hence this is called as rhagon type of canal system. Rhagon type is not found in adult sponge because leucon and rhagon are used as synonyms.

Thank you