numerous monoaxon

CANAL SYSTEM IN SPONGE

Q. 2. Give an account of canal system of Sycon and explain the mechanism and importance of circulation of water through it.

(Gorakhpur 1995; Bundelkhand 92 94; Kanpur 93, 95, 2000; Kumaon 96; Agra 2000)

Describe the canal system of Sycon. State how it is related with the process of nutrition in the sponge.

(Lucknow 1990; Meerut 91; Bundelkhand 93; Agra 93; Utkal 96)

Explain the physiological importance of canal system in sponges. Describe the canal system of Sycon. *(Meerut 1990; Avadh 90)*

Describe canal system of Sycon.

(Meerut 1993, 97, 2000; Purvanchal 96; Rohilkhand 96; Bundelkhand 95, 97)

Give an account of the structure and physiology of the canal system in Sycon. *(Lucknow 1996)*

Canal System

The body wall of sponges is folded to produce a complex system of pores and canals for the entrance of water current. Depending upon the arrangement of these canals in sponges, the canal system is of many types. *Scypha (Sycon)* represents **Sycon type** of canal system. Its various components are as follows :

1. Ostia or dermal pores–The external grooves of body surface is covered by a thin **pore membrane.** It bears two or more openings, the **ostia** or the **dermal pores.** These pores are surrounded by contractile **myocytes.** These can reduce the diameter of dermal pores and thus regulate the amount of incoming water. These open into the incurrent canals.

2. Incurrent canals–These are narrow spaces placed radially between adjacent radial canals and resemble them in shape and size. These are lined with **pinacocytes.** These open to the outside through ostia but are blind at their inner ends.

3. Prosopyles–Incurrent canals communicate with radial canals through **prosopyles.** Each prosopyle is a perforation in a single tubular cell, the **porocyte.**

4. Radial or flagellated canals–The body wall of *Scypha* invaginates to form

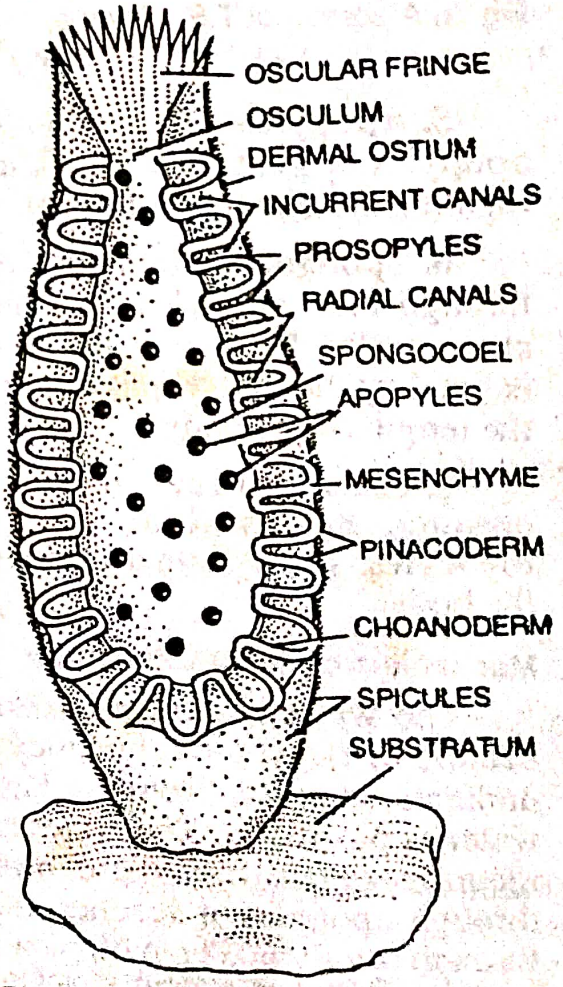

Fig. 2. *Scypha*. L.S. of a single cylinder to show internal structure and canal system.

thimble-shaped chambers. These chambers are lined by **flagellated choanocytes** and are called **flagellated chambers** or **radial canals.** The raidal canals and the incurrent canals lie parallel and alternate to each other being separated by the mesenchyme. They are arranged in such a way that in vertical section of the body wall, each radial canal appears to be surrounded by four incurrent canals and likewise each incurrent canal is surrounded by four radial canals. Radial canals end blindly at their outer ends but open into spongocoel at their inner ends.

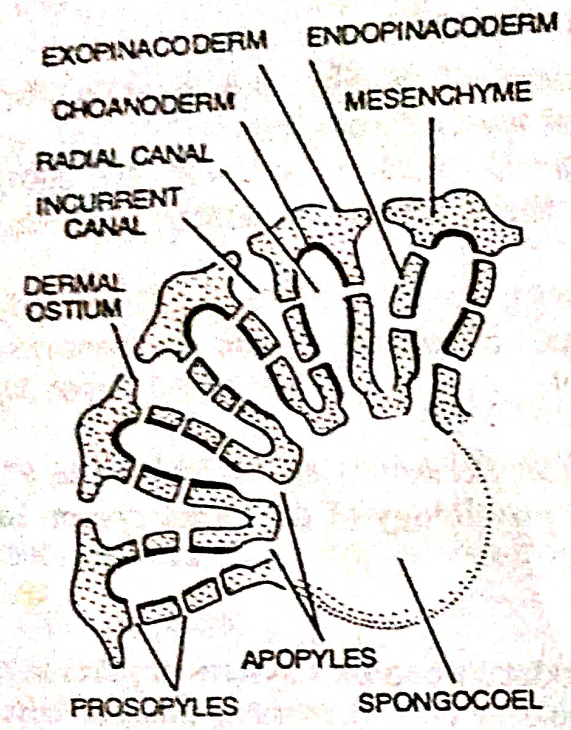

Fig. 3. A portion of T.S. *Scypha.*

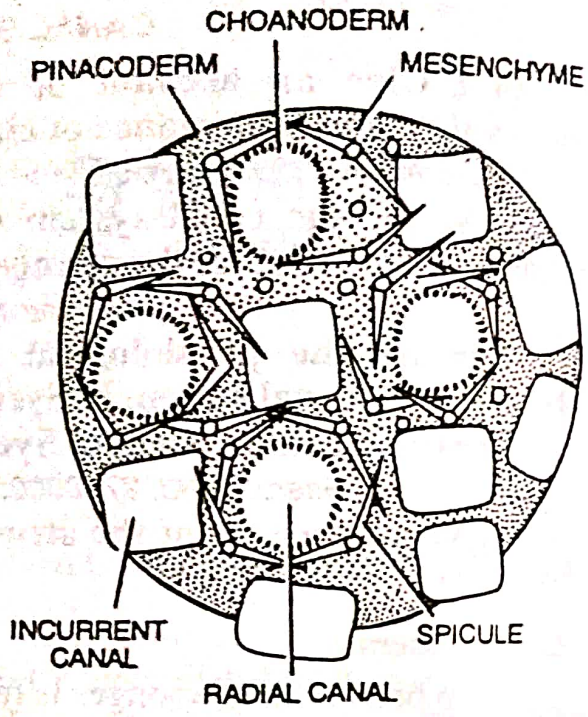

Fig. 4. *Scypha.* A tangential section of a portion of body wall showing arrangement of incurrent and radial canals.

5. Apopyles–The openings of radial canals into spongocoel are called **apopyles** or **gastric ostia.** These are surrounded by contractile myocytes which regulate the diameter of the apopyles.

6. Spongocoel–It is the large central cavity into which the radial canals open through their apopyles. In *Leucosolenia,* the spongocoel is lined by flagellated choanocytes. In *Scypha,* the choanocytes line the radial canals and the spongocoel is lined by the flattened **pinacocytes.** The spongocoel is the central space all along the length of the body.

7. Osculum–The spongocoel opens to the outside through a terminal opening, the **osculum.** The osculum is surrounded by special contractile **myocytes.** These form a **sphincter** which regulates the rate of flow of water from the body.

Mechanism of Water Circulation

The water current is produced and water is pumped into the body by the beating of flagella of choanocytes which line the radial canals. A wave of spiral undulations passes from the base to the tip of each flagellum independently and water is pushed in. The water current enters the body through the ostia into the incurrent canals, from there through the prosopyles into the radial canals and then through apopyles it reaches the spongocoel and is discharged to the exterior through osculum. The path of water current can be represented as follows :

Exterior → (dermal ostium) → **Incurrent canal** → (Prosopyle) → **Radial canal** → (apopyle) → **Excurrent canal** → (gastric ostium) → **Paragastric cavity** → (osculum) → **Exterior**

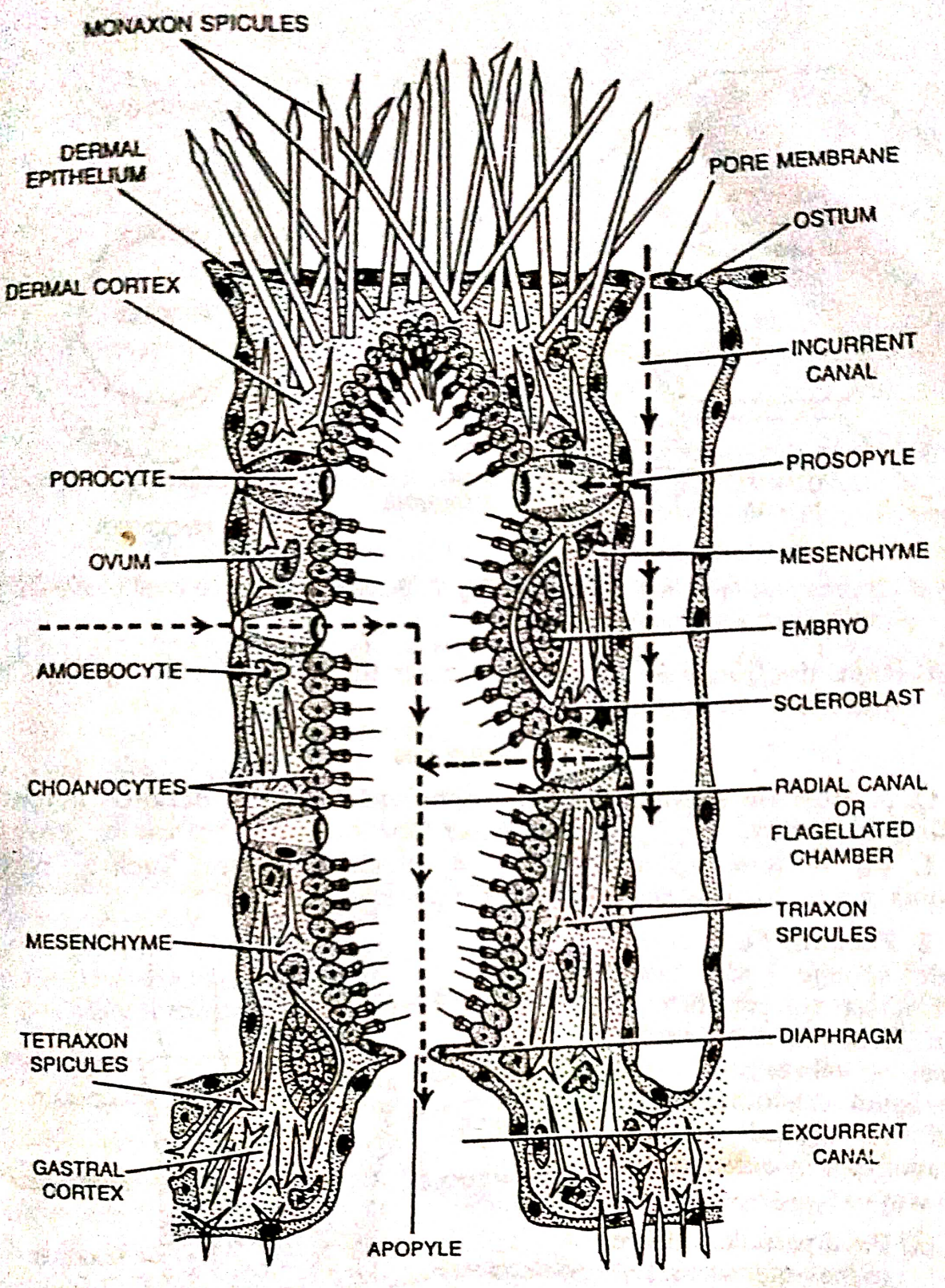

Fig. 5. *Scypha.* Diagrammatic section of body wall showing one incurrent and one raidal canal.

Importance of Water Circulation or Canal System

The water current is of great physiological importance because it serves the following purposes :

(a) **Nutrition**–It brings food in.

(b) **Respiration**–The water entering the body is rich in oxygen and facilitates exchange of gases.

(c) **Excretion**–While leaving the body, the water current removes CO_2 and nitrogenous products.

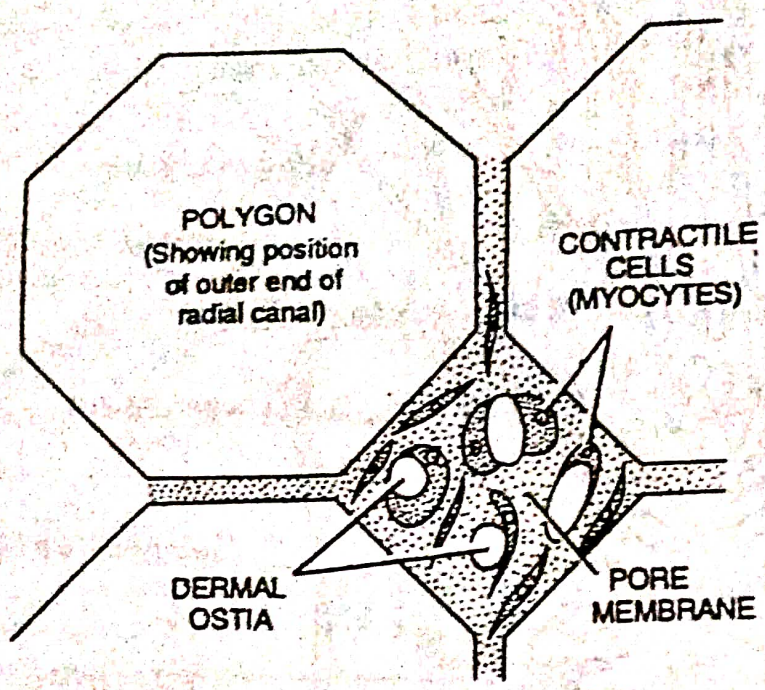

Fig. 6. *Scypha :* Surface view of pore membrane showing ostia.

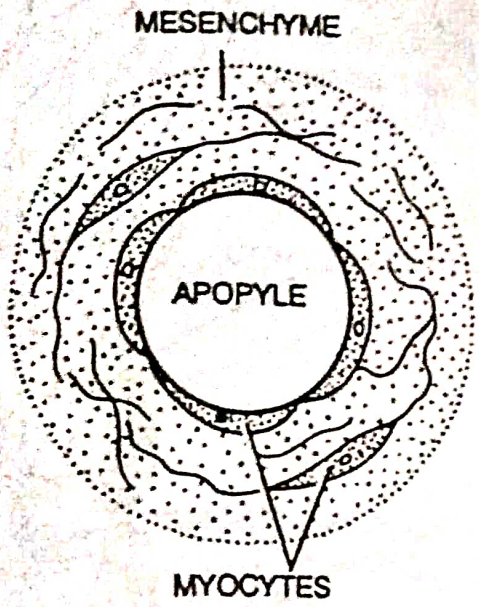

Fig. 7. *Schypha :* Apopyle lined by myocytes.

(d) Reproduction–The spermatozoa enter the body of other sponges along with the water current.