

Topic: Sponges

Submitted to: Dr. Muhammad Wajid

Presented by: Muhammad Ahmad

BS (Hons) Zoology

UNIVERSITY OF OKARA



Sponges



What is a sponge?



Sponges are asymmetrical aquatic animals that have a variety of colors, shapes, and sizes.

What is a sponge?



Although sponges do not resemble more familiar animals, they carry on the same life processes as all animals.

Many are bright shades of red, orange, yellow, and green.

Sponges are pore-bearers

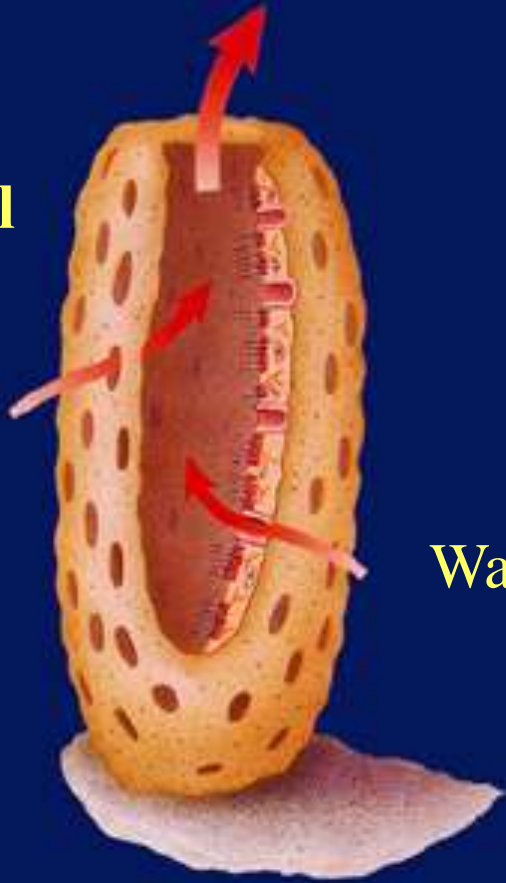
Sponges are classified in the invertebrate phylum **Porifera**, which means “pore bearer.”

Most live in marine biomes, but about 150 species can be found in freshwater environments.

Sponges are pore-bearers

Water out

Central cavity



Water in

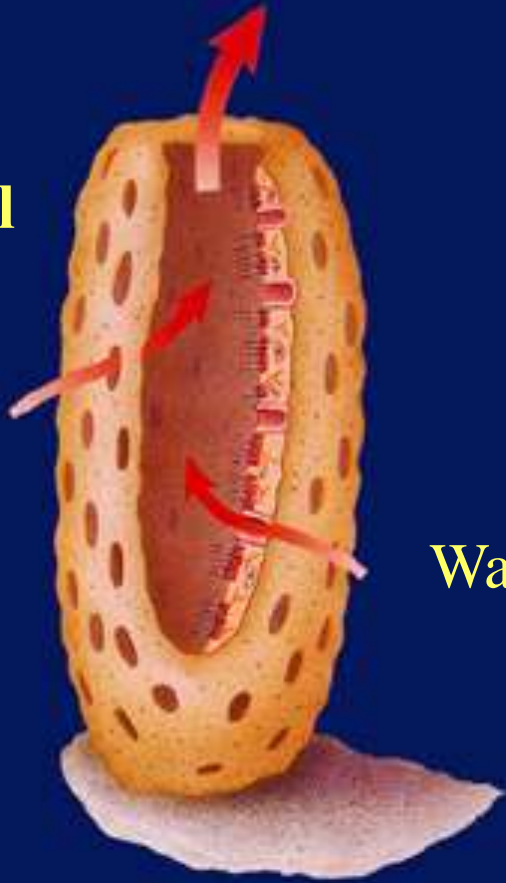
Sponges are mainly sessile organisms.

Because most adult sponges can't travel in search of food, they get their food by a process called filter feeding.

Sponges are pore-bearers

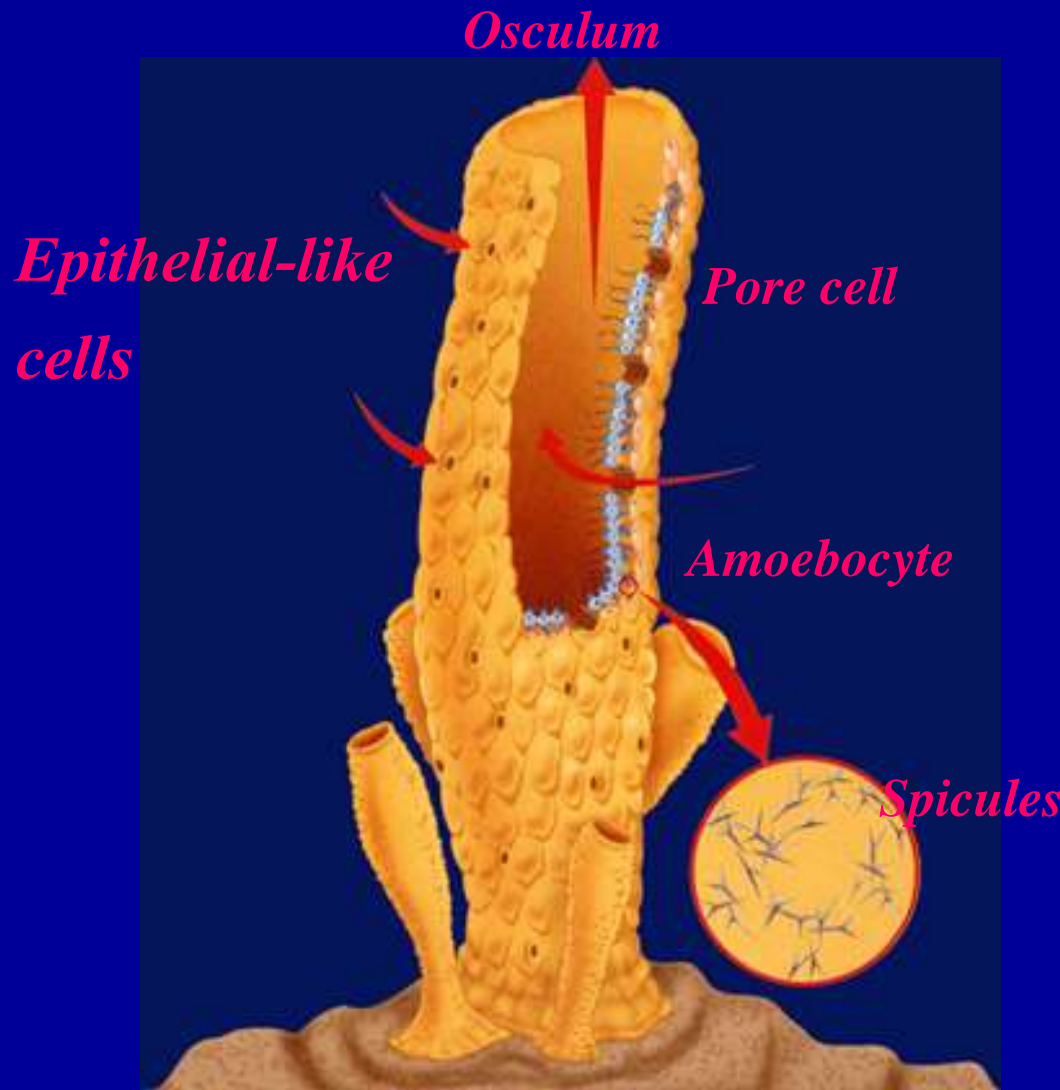
Water out

Central
cavity



Water in

Filter feeding is a method in which an organism feeds by filtering small particles of food from water that pass by or through some part of the organism.



Direction of water flow through a sponge: Water flows IN through the pore cells and OUT through the osculum

General physiology

Pinacocytes: ‘skin cells’, thin, leathery and tightly packed.

Choanocytes: Striking resemblance to choanoflagellates (a single-celled protist). Their function is to create active pumping of water and major site of nutrient uptake.

Archaeocytes: These cells are “totipotent”. They can change into all of the other types of cells. Ingest and digest food caught by choanocyte collars.

Sclerocytes: Create and excrete spicules.

Feeding

- Sponges feed on fine particulate material in the inflowing water.
- Food particles generally range from 5 to 50 μm and are phagocytized by archeocytes.
- After digestion is complete, the archeocytes and associated wastes are expelled into the water.

Cell organization in sponges

For some sponge species, if you took a living sponge and put it through a sieve, not only would the sponge's cells be alive and separated out, but these cells would come together to form new sponges.

It can take several weeks for the sponge's cells to reorganize themselves.

Types of cells

CELL TYPES, BODY WALL AND SKELETONS

- Sponges have simple bodies. But still sponges are more than colonies of independent cells. The sponges also have specialized cells. Therefore, division of labour is present in them. Following types of cells are present in phylum porifera.
- 1. **Pinacocytes**: Pinacocytes are thin walled and flat cells. They line the outer surface of a sponge. Pinacocytes are slightly contractile. Their contraction can change the shape of some sponges. Some pinacocytes forms tube like contractile **porocytes**. Porocytes regulate water circulation. The openings of the porocytes are pathways tiw water movement of water through the body wall.
- 2. **Mesohyl**: Mesohyl is a jelly like layer present below the pinacocytes. Amoeboid cells are present in it. These cells are called **mesenchyma cells**. The mesenchyma cells freely move in the mesohyl. These cells are specialized for reproduction, secreting skeletal elements, transporting and storing food and forming contractile rings around openings in the sponge wall.

Types of Cells

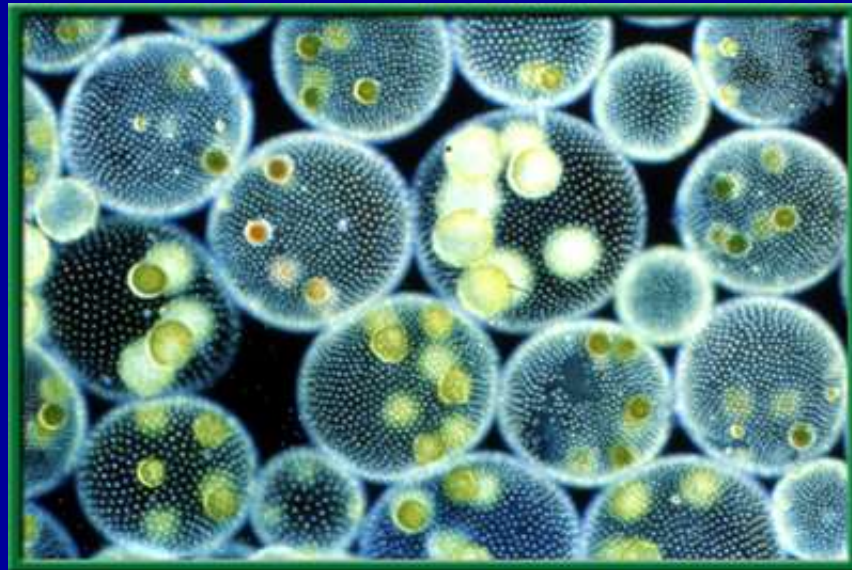
- 3. **Choanocytes:** Choanocytes or collar cells are present below the mesohyl. They form the lining of the inner chamber. Choanocytes are flagellated cells. They have a collar like ring of microvilli surrounding a flagellum. Microfilaments connect the microvilli. It forms a netlike structure within the collar. The flagellum creates water currents through the sponge. The collar filters microscopic food particles from the water.

Collar cells are also present in a group of protists called choanoflagellates. Choanocytes are present in sponges and choanoflagellates. It suggests an evolutionary link between these groups.

Cell organization in sponges

Many biologists hypothesize that sponges evolved directly from colonial, flagellated protists, such as *Volvox*.

Volvox



Cell organization in sponges

More importantly, sponges exhibit a major step in the evolution of animals—the change from unicellular life to a division of labor among groups of organized cells.



Reproduction in sponges

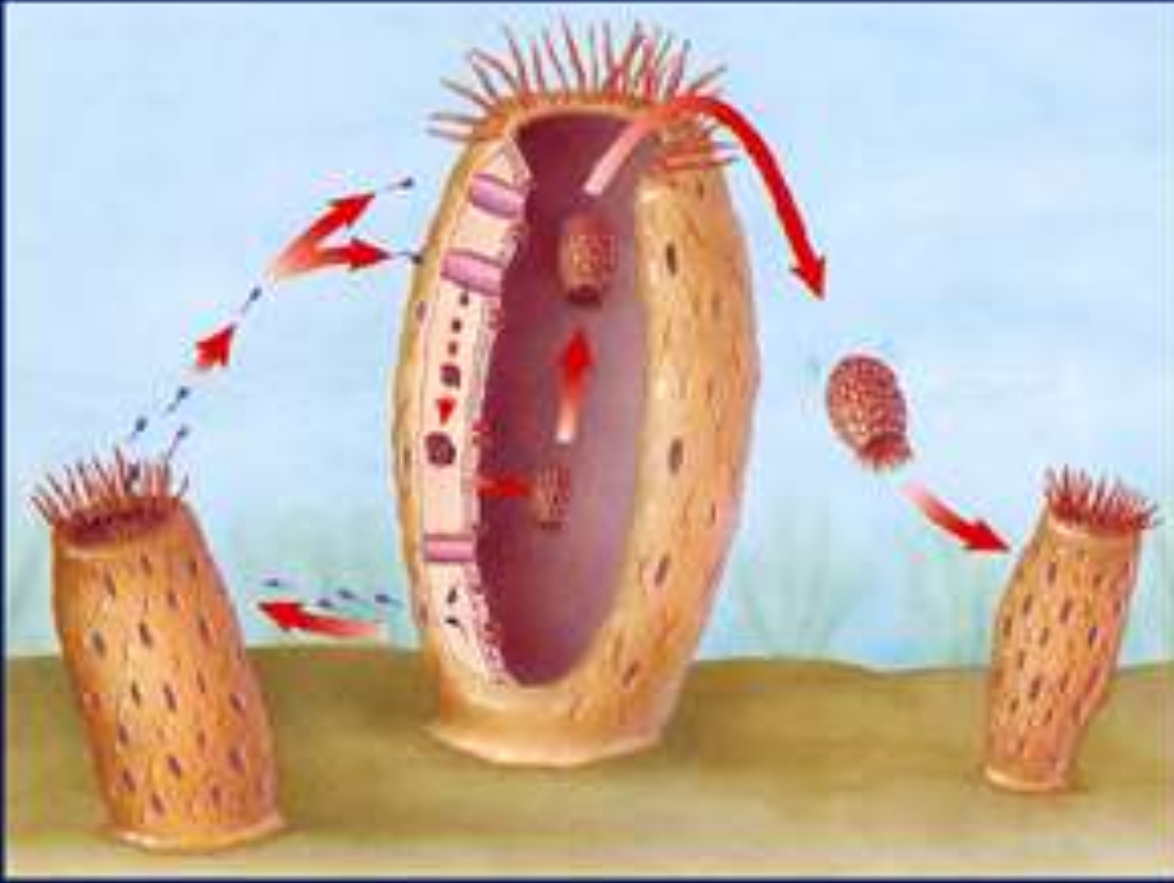
Most sponges reproduce sexually.

Some sponges have separate sexes, but most sponges are **hermaphrodites**.

A hermaphrodite is an animal that can produce both eggs and sperm.



Reproduction in sponges



In sponges, the **collar cells** collect and transfer sperm to amoebocytes.

The amoebocytes then transport the sperm to ripe eggs.

Support and defense systems in sponges

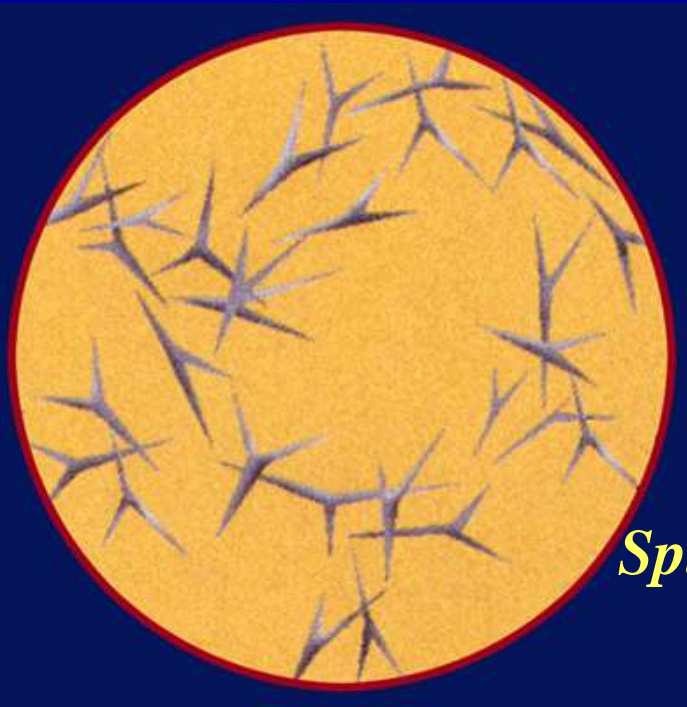
Sponges are soft-bodied invertebrates, that can be found at depths of about 8500 m.



Their internal structure gives them support and can help protect them from predators.

Support and defense systems in sponges

Some sponges have sharp, hard **spicules** located between the cell layers.



Spicules

Spicules may be made of glasslike material or of calcium carbonate.

Common Sponges



Barrel Sponges



Finger Sponges



Tube Sponges



Rope Sponges

THANKS