

BIOL 160. INVERTEBRATE SYSTEMATICS

LESSON 4. PARAZOA

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Sub-kingdom METAZOA

- This is the 1st taxon under Kingdom Animalia.
- Metazoa is made up of many celled organism; multicellular.
- However, not all multicell organisms are organized.
- Thus, parazoans are not well organized while eumetazoans are organized with tissue formation and have fixed shapes.

BRANCH PARAZOA

- Parazoans are multi-celled.
- No co-ordination among the cells.
- Absence of neural cells linking the individual cells.
- They are sessile organisms and depend on water currents through their canal systems to obtain their food.
- Organisms are made up of loose aggregation of cells but these cells do not coordinate in their activities.



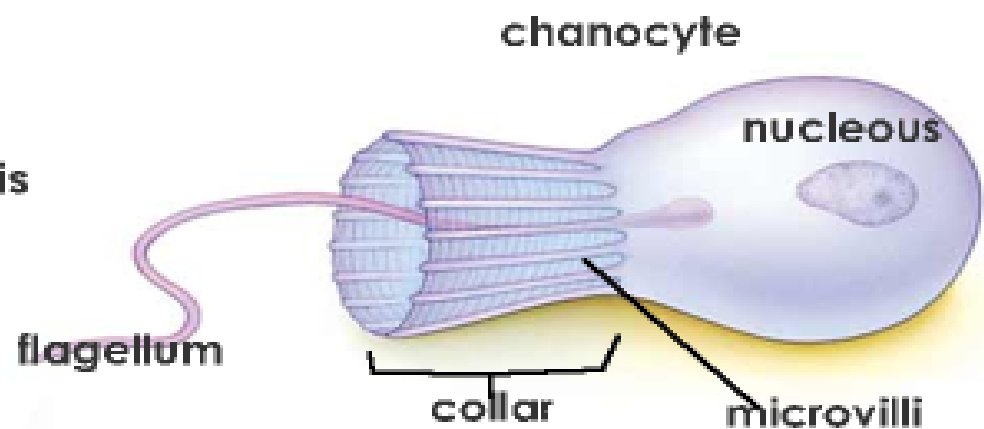
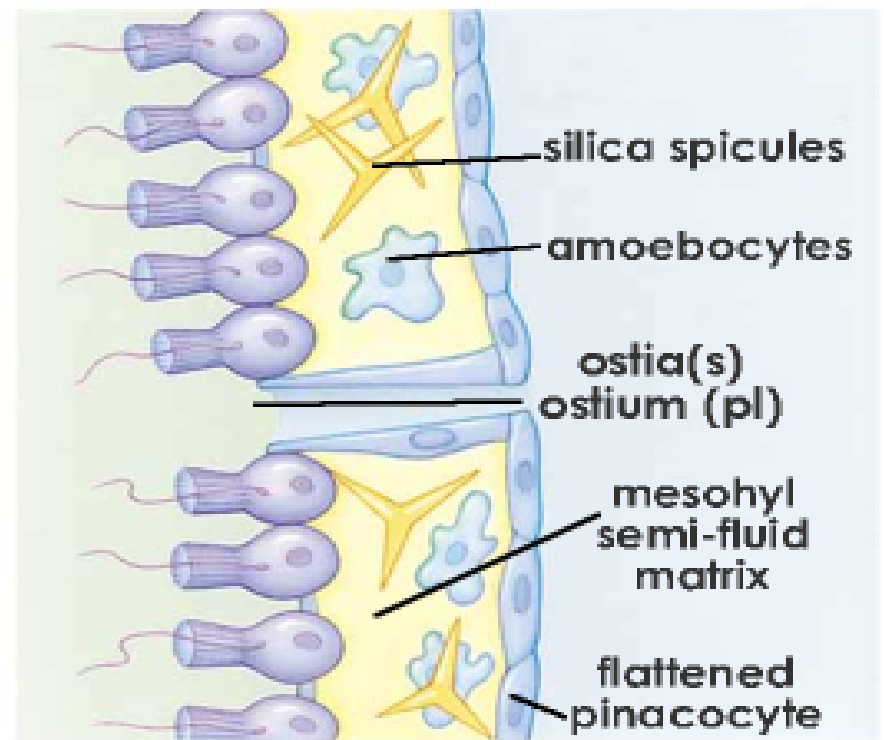
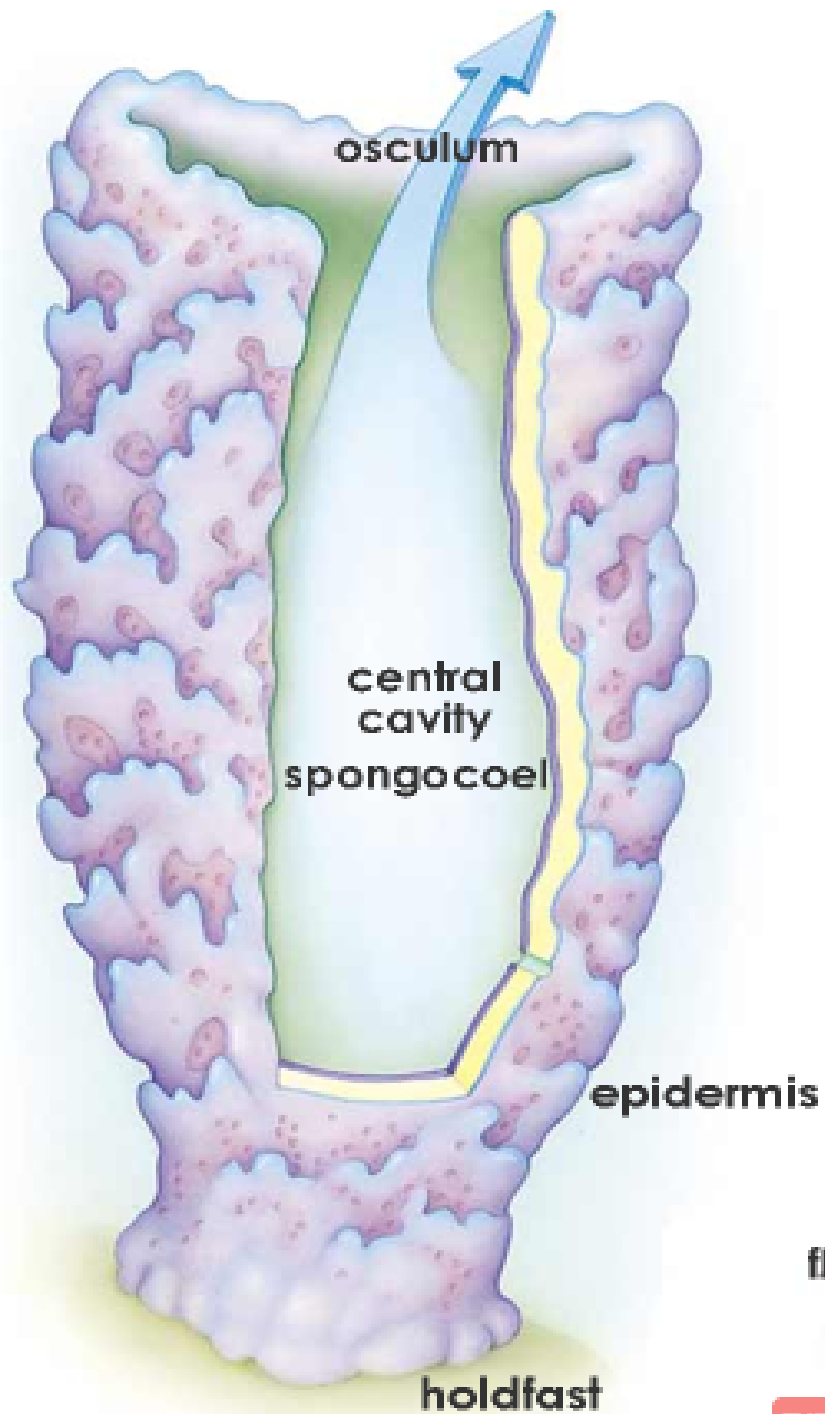
- All the cells /most of them are independent in their activities.
- Organisms are asymmetric/ have no symmetry.
- They attain any shape depending on the design of the stalk they form.
- They are mostly aquatic/marine.
- They have no organ nor tissue.
- Digestion is intra-cellular.
- Excretion and respiration is by diffusion.
- HAS ONLY ONE PHYLUM



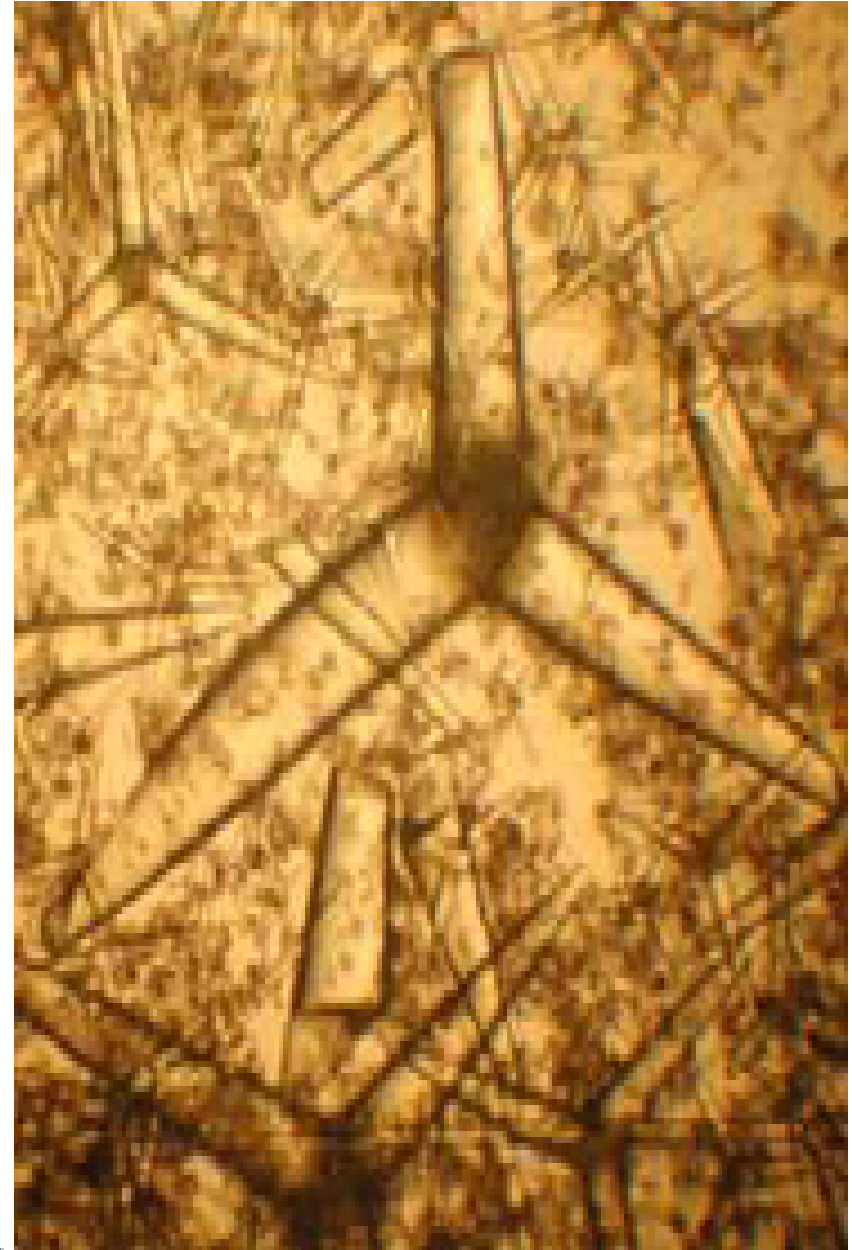
STRUCTURE OF PORIFERS

- Body structure is made up of two layer of cells with a middle mosaic fluid.
- Outer layer is made up of pinacocyte cells which are flattened.
- The inner layer is made up of flagellated cells; choanocytes.
- The middle mosaic layer contains metabolic fluids, amoeboid cells and skeletal substances.





- Types of amoeboid cells; amoebocytes, spongocytes, sclerocytes, collencytes, oocytes, lophocytes and archaeocytes.
- Archaeocytes can differentiate into any of these cell types.



- Types of skeletal substances;
- calcareous spicules, siliceous spicules, fibrillar collagen and spongin fibrils.
- Some of the pinacocytes become modified into pores/ canals and referred to as porocytes.
- The porocytes that regulate their pores are called myocytes.



- Water enters the organism through these pores bringing food materials.
- The pores are called ostium / (ostia).
- The water gathers into a middle opening/space called spongocoel before leaving the organism through a relatively larger opening called the osculum.
- The organism is defined by the type of canal systems that they exhibit.

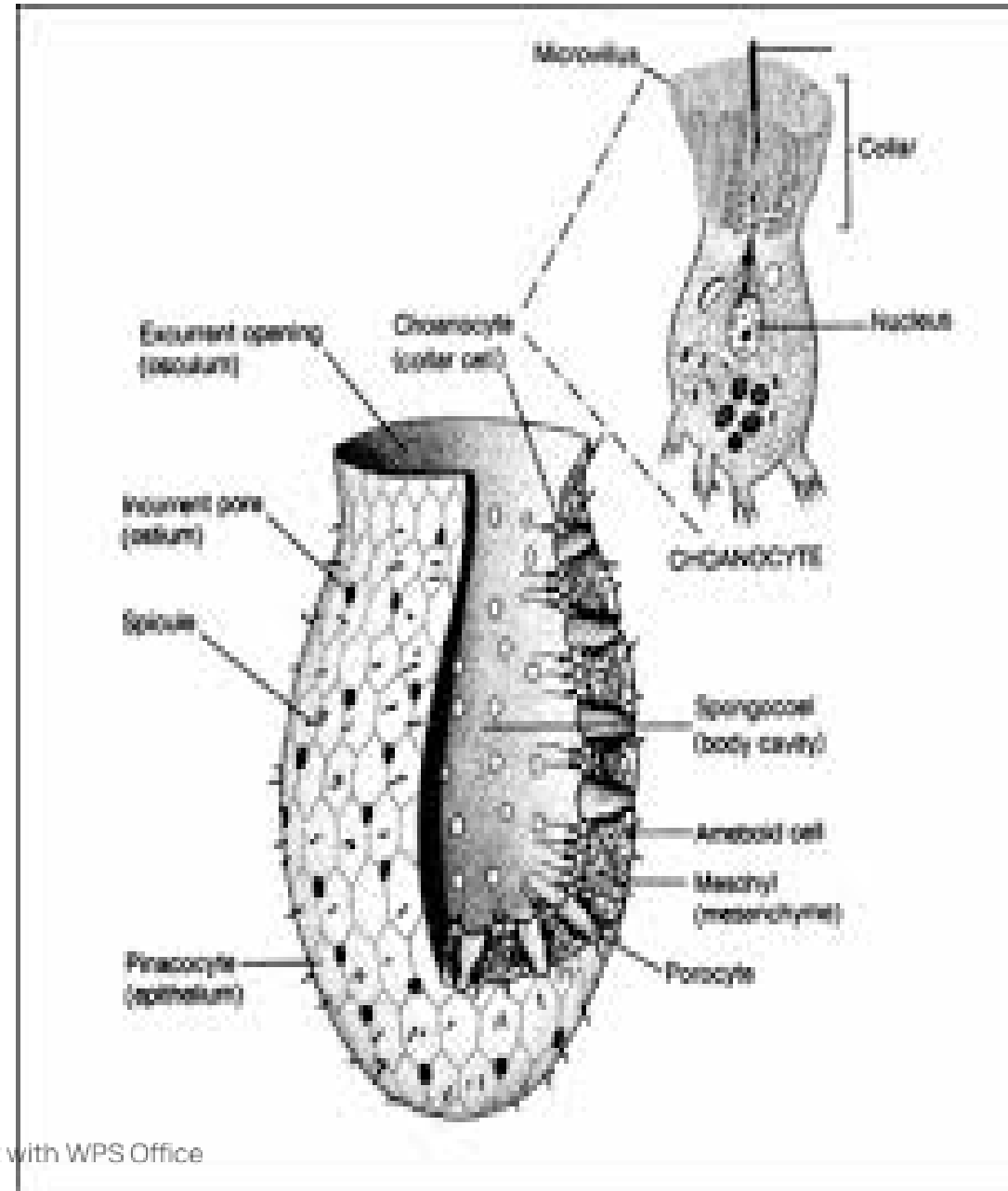


CANAL SYSTEMS IN PORIFERA

- There are 3 canal systems in porifers.
- The simplest is asconoidal, followed by syconoidal and leuconoidal canals.

Asconoidal canal
are in vase-like organisms.

Eg. **Lecosolenia sp.**
and **Ascon sp.**



- It is simplest and least common sponge body form. **Have flagellated spongocoel.**
- Ascon sponges are vase like. Ostia are the outer openings of **porocytes**.
- The porocytes open directly into spongocoel. **Choanocytes line the spongocoel.**
- The movements of flagella of choanocytes draw water into the spongocoel through the ostia.
- Water leaves the sponge through the osculum. **Osculum** is a single large

Syconoidal canal

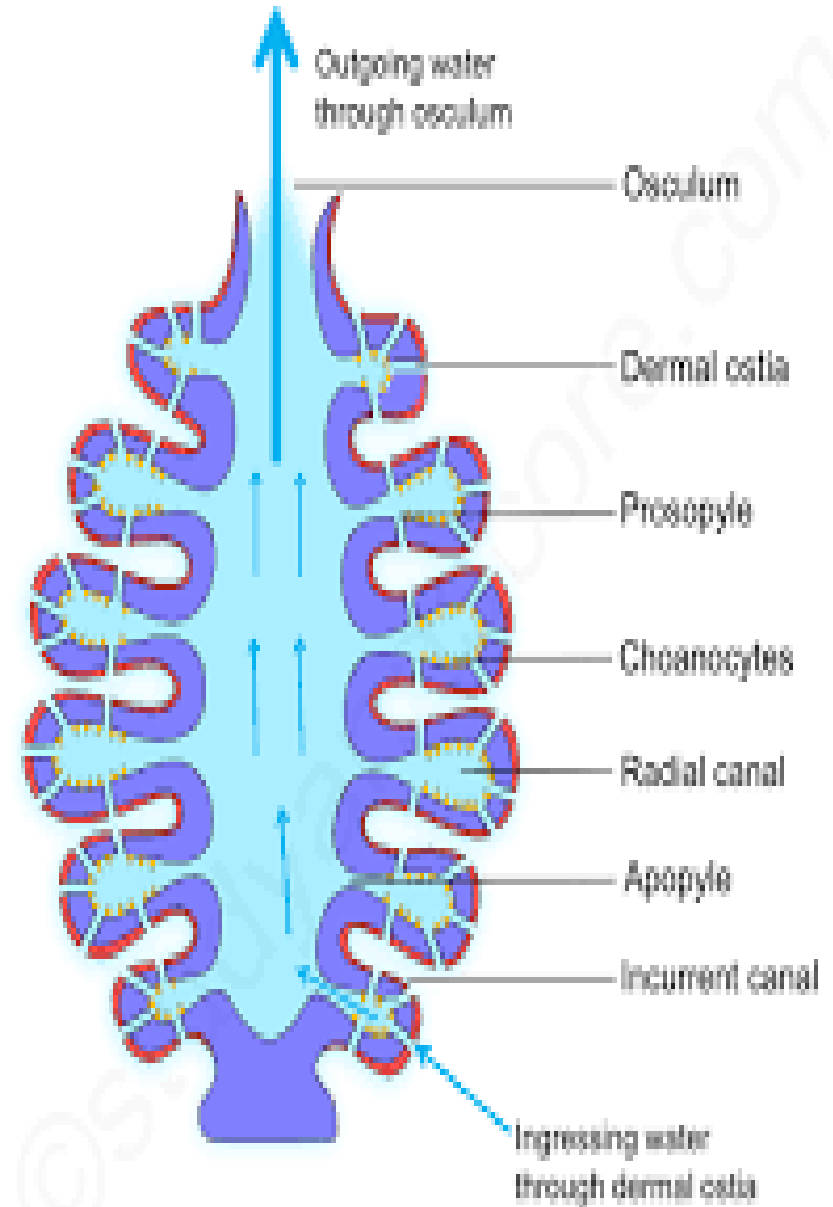
The sponge wall is folded in the **sycon body form. Have flagellated canals.**

Following canals are formed by the folding of its wall:

- **(a) Incurrent canal:** The invaginations of the body wall of sycon form incurrent canals. Water enters into incurrent canal through **dermal pores**.
- **(b) Spongocoel:** The radial canals lead to spongocoel. It finally moves out the **osculum**



.c. Radial canal: Pores in the wall of incurrent wall connect incurrent canals with radial canals. **Choanocytes line the radial canals.** The beating of flagella of choanocytes moves water through incurrent radial canals and spongocoel..

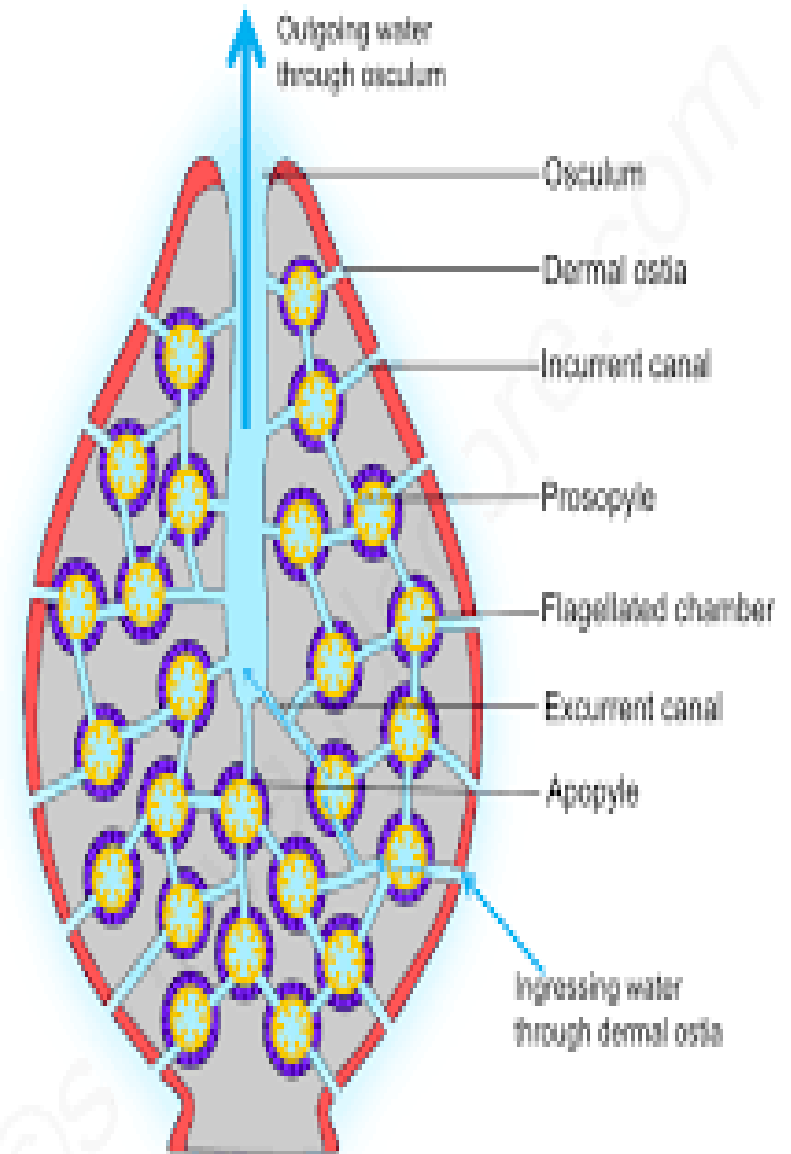


Sycon type canal system (Ex: Scypha)



Leuconoidal canal

- **Leucon** sponges have an extensively branched canal system. **Have flagellated chambers.**
Boy has -
- **Branched incurrent canal:**
Water enters the branched incurrent canals through ostia.
- **Choanocytes chamber:**
Incurrent canal lead into choanocytes-lined

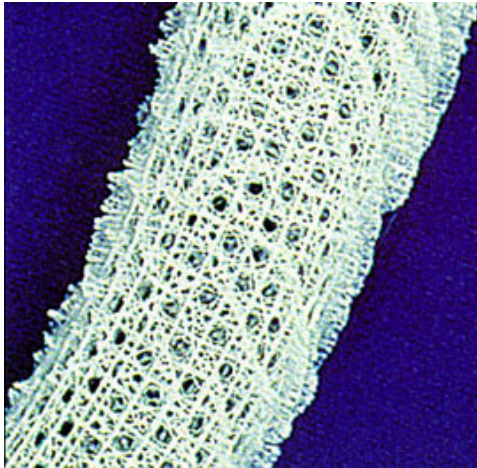


Leucon type canal system (Ex: Spongilla)

- **Excurrent canal:**
- Choanocyte chamber open into the chambers of excurrent canals .
- A large number of chambers and canals are present in leucon type.
- Therefore, spongocoel is absent in them.
- They have many osculum for water leaving the sponge



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ABSENTEEISM

- Ibrahim Adams kofi, Cephas mawuko, Edward ?
- Ashitey D., Philomina Agyeman, Anim Devilina
- Pearl Gyenin, Wilberforce Thomas, Unicorn Nancy
- Clifford ? , Azantelow Ivy, Otu Josephine
- Lawrencia Iartey, Kunyelewise Alexander
- Janet Azinongo, Prah elemelic Mawuenyafia
- Youfegan Rebona, Tawia Antipas, Osei josephine
- Adutwumwaa Wendy, Sampson Cronk
- Asante Nsia Lewinsky, Sam calvina wilgenia
- Janet Dede Nyengor, Sekyere Christabel snr



- Darkoh Akomea, Sekyere Christabel snr
 - Boadi Princess, Lordina Boakye, Smith Henry
 - Asiedu Sizzie, Afriyie Rebecca, Dake Maxwell
-
- Cell 2 members -1 each
 - Cell 26 members -2 each
 - Cell 28 members -2 each
 - Cell 19 members -2 each except Esther Adoma



Reproduction

They exhibit both sexual and asexuals.

- 1. Sexual Reproduction
- Most sponges are monoecious. But individual sponges produce eggs and sperm at different times. Therefore, they do not self-fertilized.
- (a) Gametogenesis: Certain choanocytes lose their collars and flagella. They undergo and form flagellated sperm. Other choanocytes (and amoeboid cells) undergo meiosis and form eggs.

- (b) **Fertilization:** Eggs are retained in the mesohyl of the parent.
- Sperm cells pass from one sponge through the osculum and enter another sponge with the incurrent water.
- Sperm are trapped by choanocytes. Sperm is covered into a vacuole in choanocytes. The choanocytes lose their collar and flagellum and become amoeboid cells.
- It transports sperm into the eggs and zygote is formed.



- (c) **Development:**
- Early development occurs in the **mesohyl.**
- Cleavage occurs in zygote. A flagellated larval stage is formed. These larvae may be **parenchymula larva or amphiblastula larva.**
- The larva becomes free. The water currents carry the larva out of the parent sponge.
- It freely swims for **two days.**
- Then the larva settles on the substrate and develops into the adult body form.



2. Asexual reproduction

- (a) Gemmule formation:
- Asexual reproduction takes place by gemmules formation.
- Gemmule is a resistant capsule containing masses of amoeboid cells.
- The parent sponge dies in the winter and it releases gemmules.
- Gemmules can survive both in freezing and drying condition.
- The conditions become favorable in the spring.



- Now the amoeboid cells come out through a tiny opening called the **micropyle**.
- It develops into a sponge.
- **(b) Regeneration:**
Some sponges possess great powers of **regeneration**.
Portions of a sponge are cut or broken.
The broken piece forms new sponge.



Classification of Porifers

- Organisms are classified with regards to the skeletal materials and arrangement in them.
- Some may be made up only of siliceous materials.
- Other may be of calcareous, spongin and carbonates .
- There are 3 or 4 Classes ;
- Class Calcarea (Calcispongiae), Hexactinella (Hyalonspongiae), Demonspongiae, and Sclerospongiae



- KINGDOM S.KINGDOM BRANCH
PHYLUM

- Animalia ----- Metazoa ----- Parazoa -----
Porifera



- | <u>CLASS</u> | <u>S.CLASS</u> | <u>ORDER</u> | <u>Eg.</u> |
|------------------|------------------------|----------------------------|---------------------|
| | Calcaronea (Homocoela) | | Sycon, Leucosolenia |
| • Calcareo | Clacinea (Heterocoela) | | Leucetta, Clathrina |
| • Hexactinella | Hexacticophora | | Euplectella sp |
| | Amphidiscophora | | Hyalonema sp |
| • Demonspongiae | Tetractinella | Carnosa, Choritida | Axinella |
| | | Myxospongia | Oscarella |
| | Keratosa | | Halichondria |
| | Monaxomida | Hadromerida, Haplosclerida | |
| | | Halichondrida, | |
| | | Poiscilosclerida | |
| • Sclerospongiae | | | Sclerospongia |



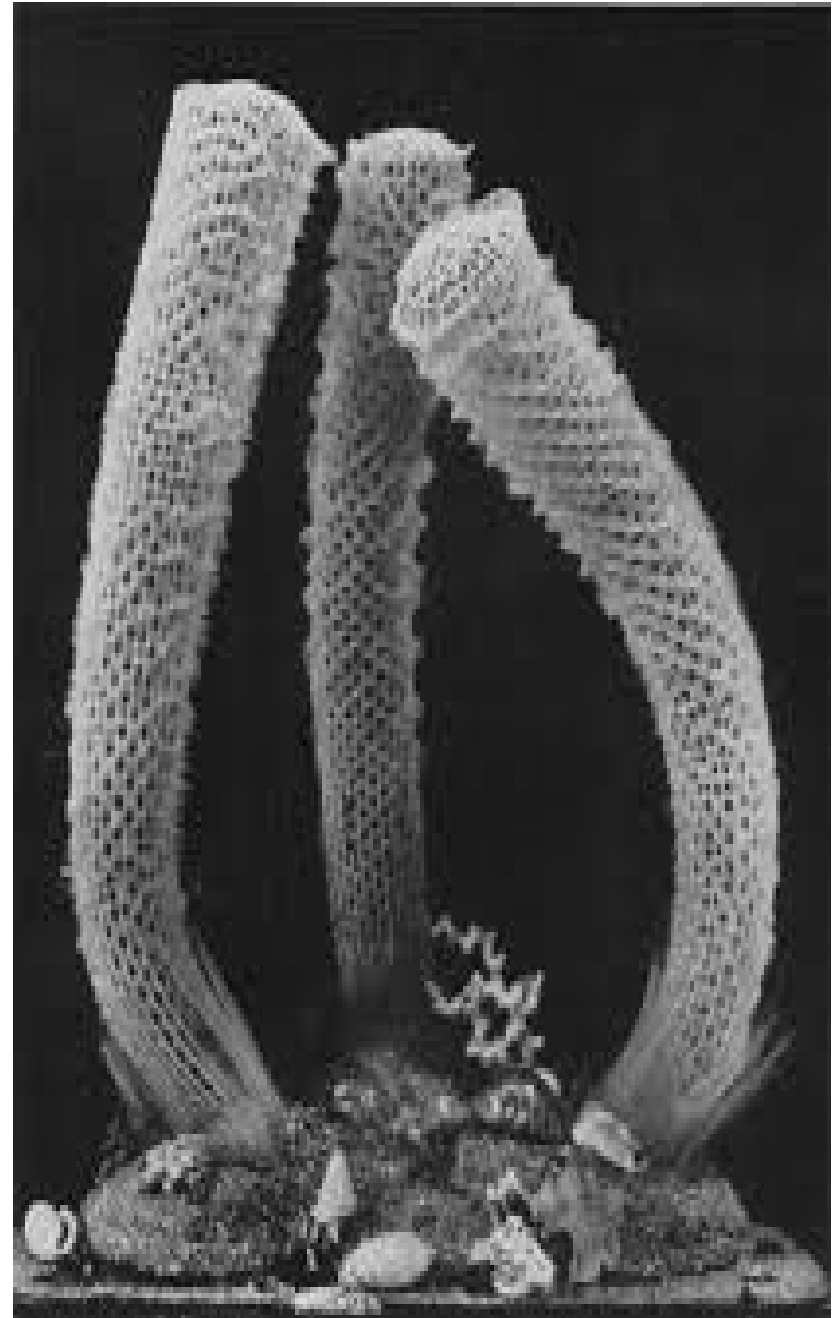
Class Calcarea

- Sponge skeleton made of calcium carbonate.
Spicules are straight or six rays
- May be of all water canals
- Eg. Leucosolenia, Clathrina, Sycon



Class Hexactinella

- Known as **glass sponges**.
- **Skeleton is 6-rayed bound together.**
- Body has a single, continuous **syncytial pattern called trabecular reticulum.**
- Eg. Euplectella sp.



Class Demonspongiae

- They include 76.2-90% of all species of sponges.
- They are sponges with a soft body that covers a hard, often massive skeleton made of calcium carbonate, either aragonite or calcite.
- They are predominantly leuconoid in structure
- Their "skeletons" are made of spicules consisting of fibers of the protein spongin, the mineral silica, or both.

- The spicules are either simple or four-rayed.

- Demonspongiae are often brightly coloured.

- They can be found at all depths in both fresh and salt water.

- Sclerospongiae was curved out of Demonspongiae.

- The only fresh water

Demonspongiae is found in the family Spongillidae

Class Sclerospondiae

- These are the coralline sponges, which are mostly known from fossils.
- sponges have a skeleton constructed from calcium carbonate, silica and spongin
- They have a thin, living layer covering a massive underlying skeleton of aragonite-silica and spongin which support the cells.
- There are a few modern species, e.g. *Sclerospongia* sp



Summary Characteristics of the classes

Type of cells	<u>Spicules</u>	<u>Spongin</u> fibers	Massive exoskeleton	Body form	
<u>Calcarea</u>	Single nucleus, single external membrane	<u>Calcite</u> May be individual or large masses	Never	Common. Made of calcite if present.	Asconoid, syconoid, leuconoid or solenoid [‡]
<u>Hexactinellida</u>	Mostly <u>syncytia</u> in all species	<u>Silica</u> May be individual or fused	Never	Never	Leuconoid
<u>Demospongiae</u>	Single nucleus, single external membrane	Silica	In many species	In some species. Made of <u>aragonite</u> if present. [‡]	Leuconoid
<u>Homoscleromorpha</u>	Single nucleus, single external membrane	Silica [‡]	In many species	Never	Sylleibid or leuconoid



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THANKS

