

# **BIOL 160. INVERTEBRATE SYSTEMATICS**

## **LESSON 4. PARAZOA**

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# Sub-kingdom METAZOA

- This is the 1<sup>st</sup> 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 eumatozoans are organized with tissue formation and have fixed shapes.



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# 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.



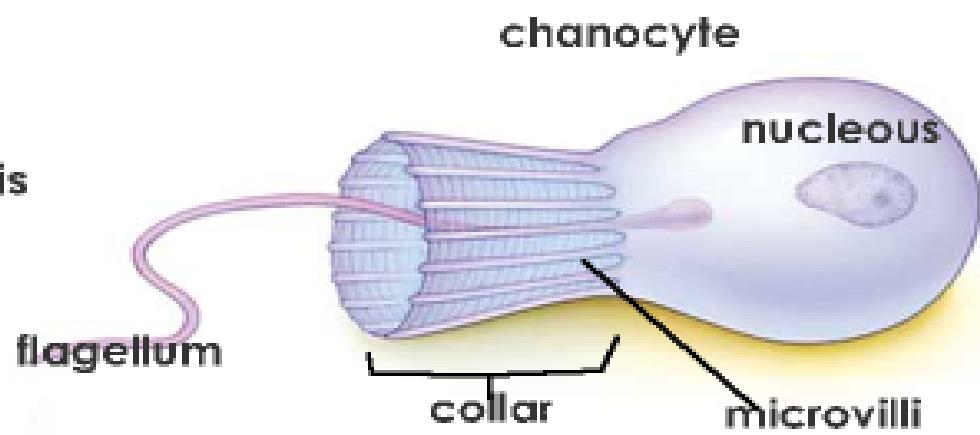
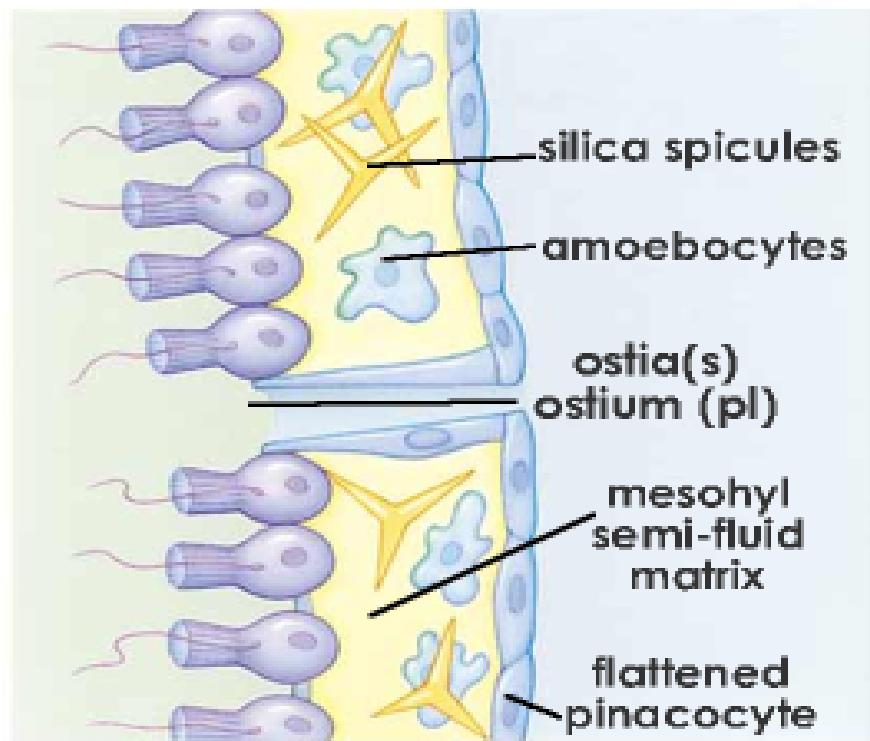
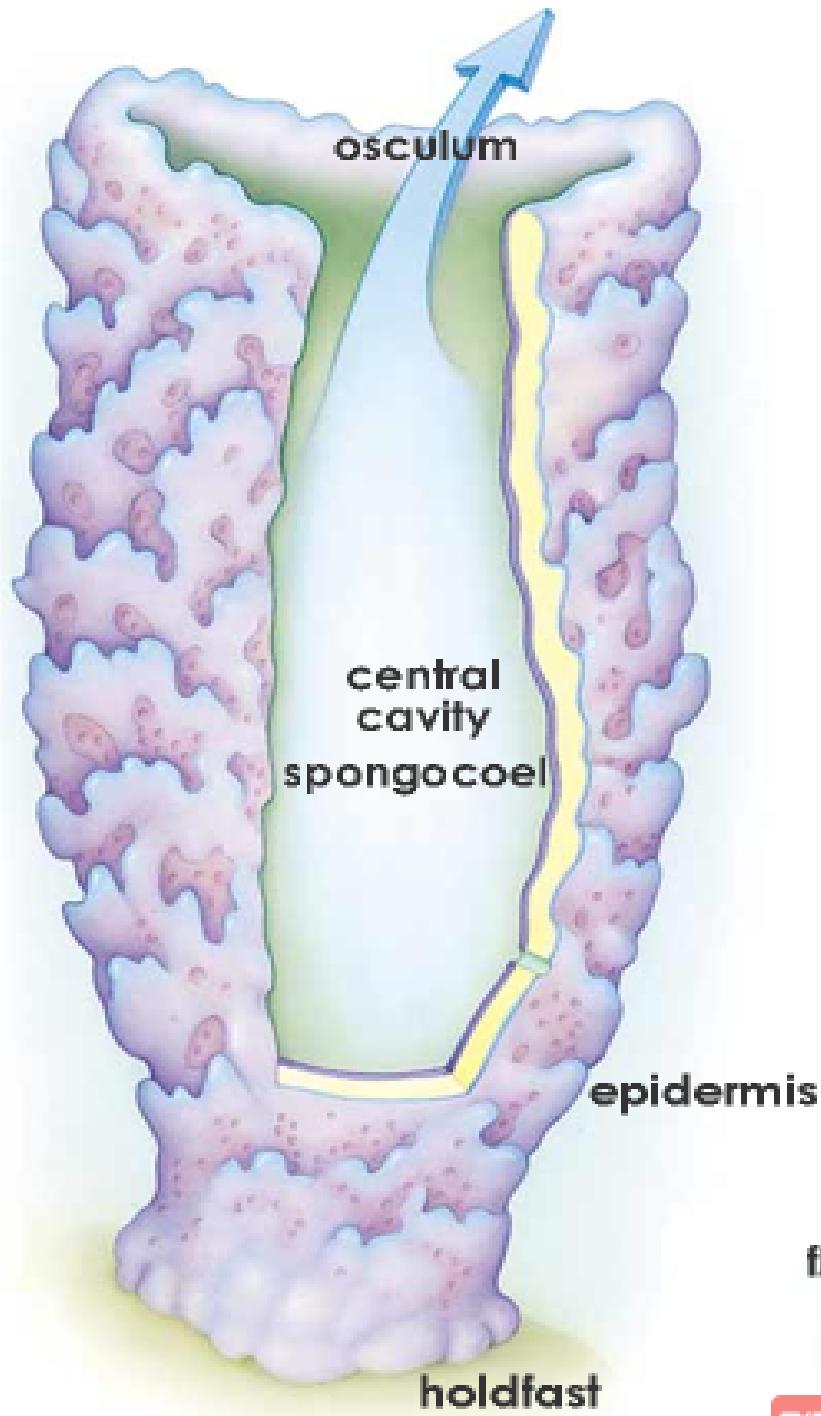
- All the cells /most of them are independent in their activities.
- Organisms are asymmetric/ have no symmetry.
- They attain any shape depending on the design of the stalk they form.
- They are mostly aquatic/marine.
- They have no organ nor tissue.
- Digestion is intra-cellular.
- Excretion and respiration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



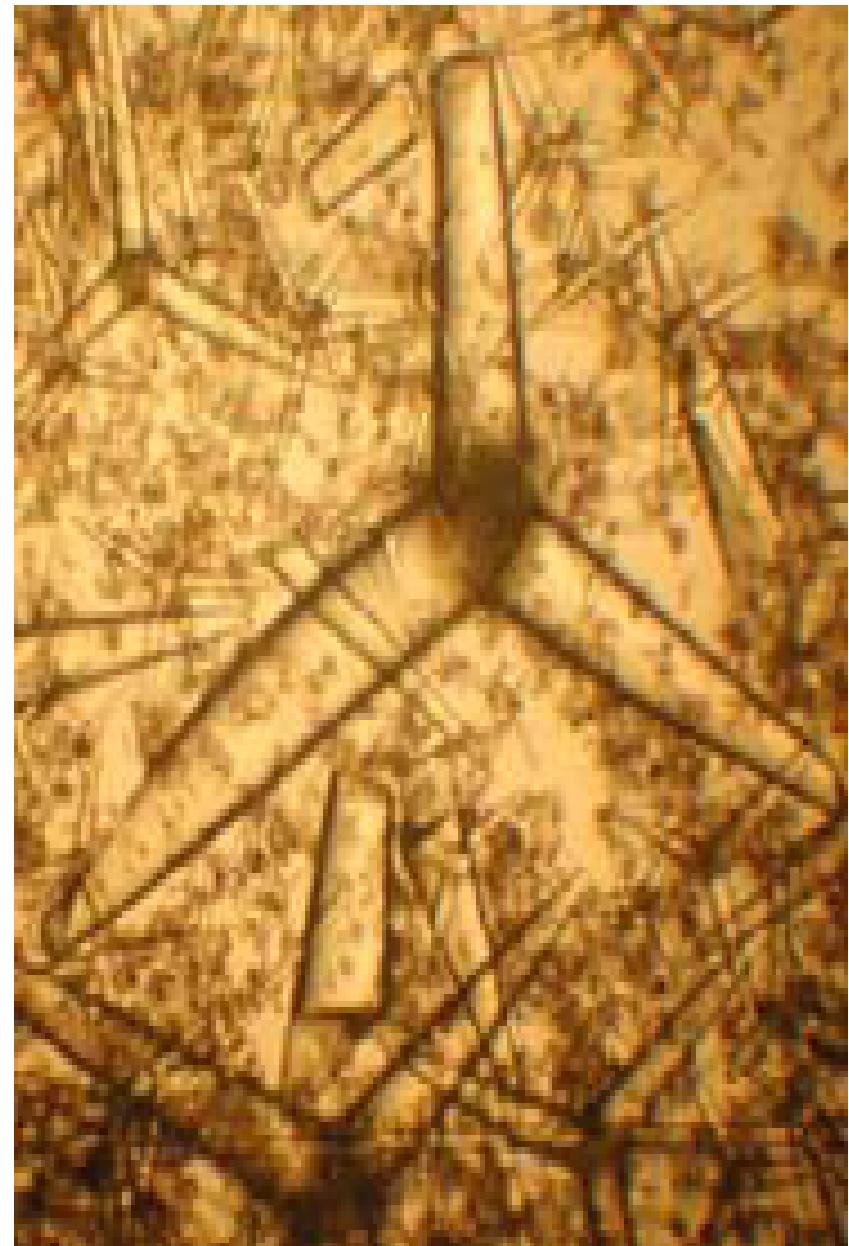
# STRUCTURE OF PORIFERS

- 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.
- Achaeocytes can differentiate into any of these cells 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.

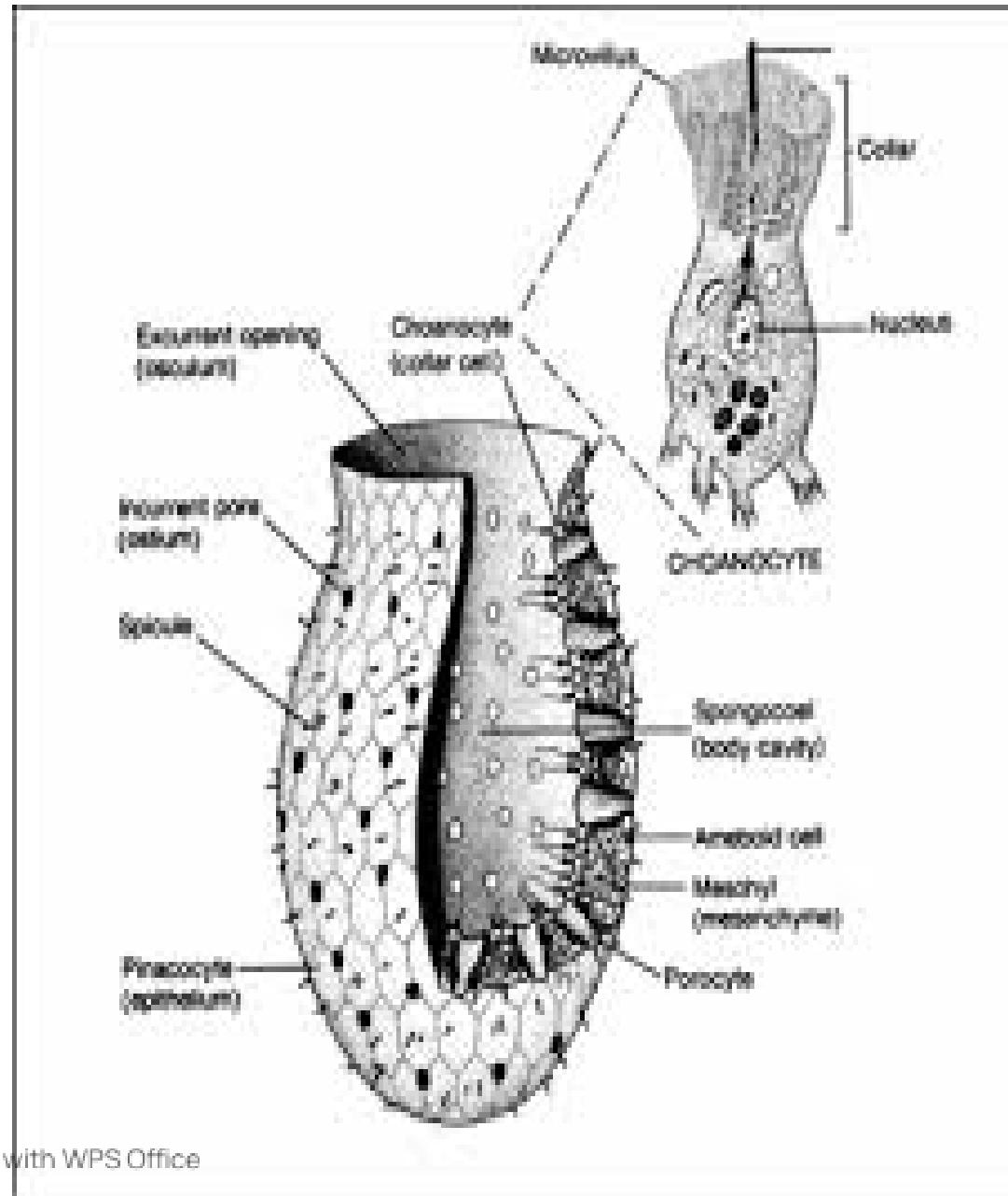


# CANAL SYSTEMS IN PORIFERA

- 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

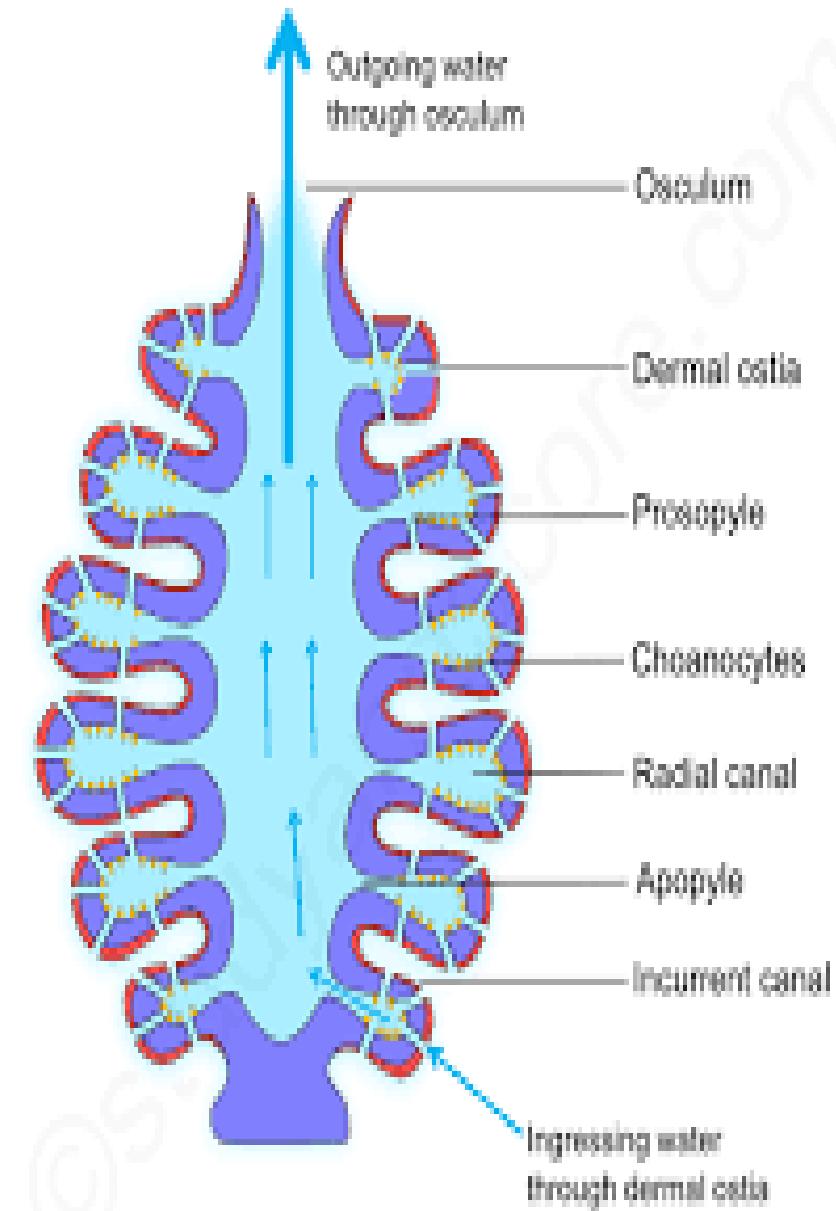
The sponge wall is folded in the sycon body form. Have flagellated canals.

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



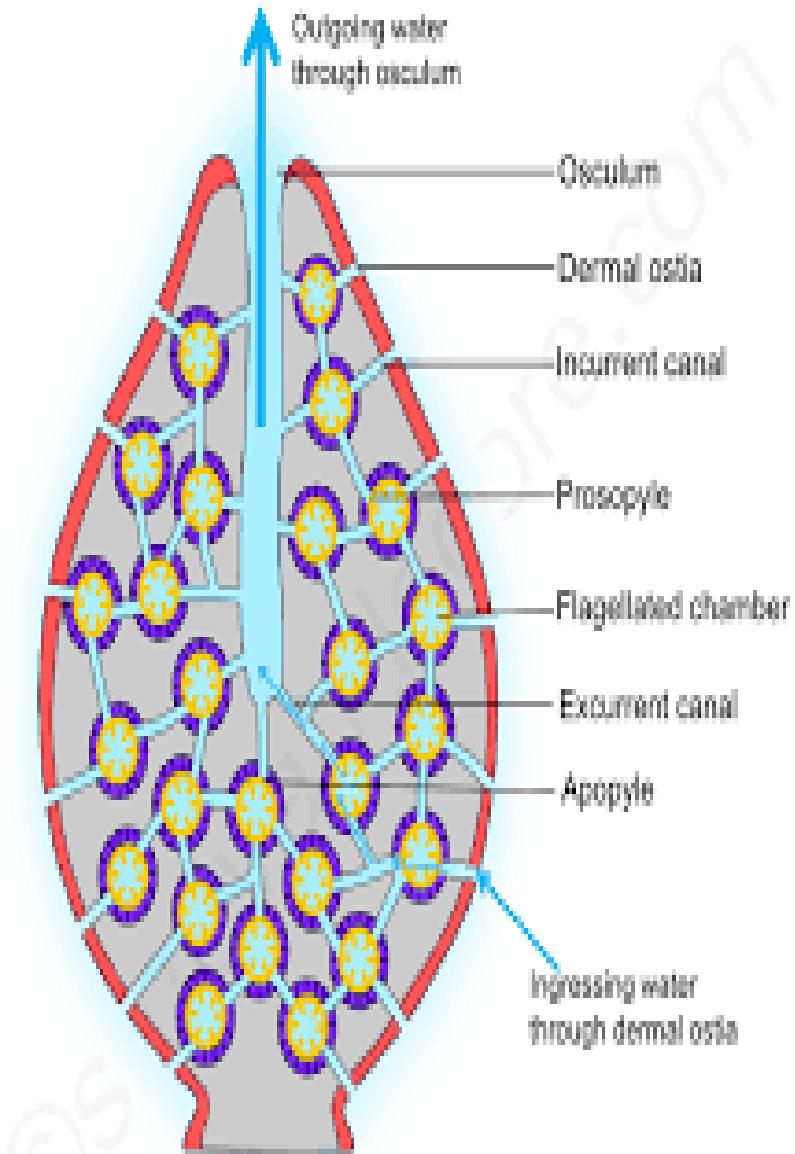
.c. Radial canal: Pores in the wall of incurrent wall connect incurrent canals with radial canals. Choanoeytes line the radial canals. The beating of flagella of choanocytes moves water through incurrent radial canals and spongocoel..



# Leuconoidal canal

- **Leucon** sponges have an extensively branched canal system. **Have flagellated chambers.**  
Boy has -

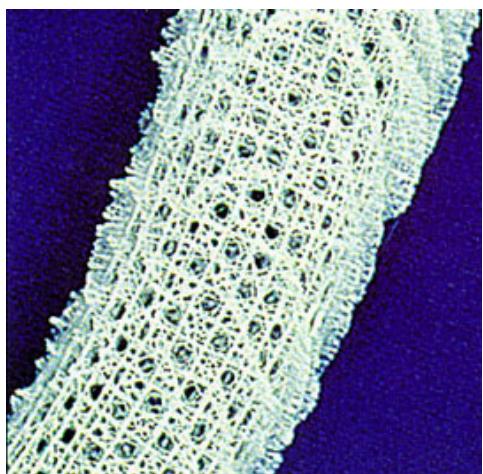
- **Branched incurrent canal:**  
Water enters the branched incurrent canals through ostia.
- **Choanocytes chamber:**  
Incurrent canal lead into choanocytes-lined



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 osculums 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 lartey, Kunyelewose 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



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# 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 passes 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



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<u>CLASS</u>	<u>S.CLASS</u>	<u>ORDER</u>	<u>Eg.</u>
	Calcaronea (Homocoela)	Sycon, Leucosolenia	
Calcarea	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	



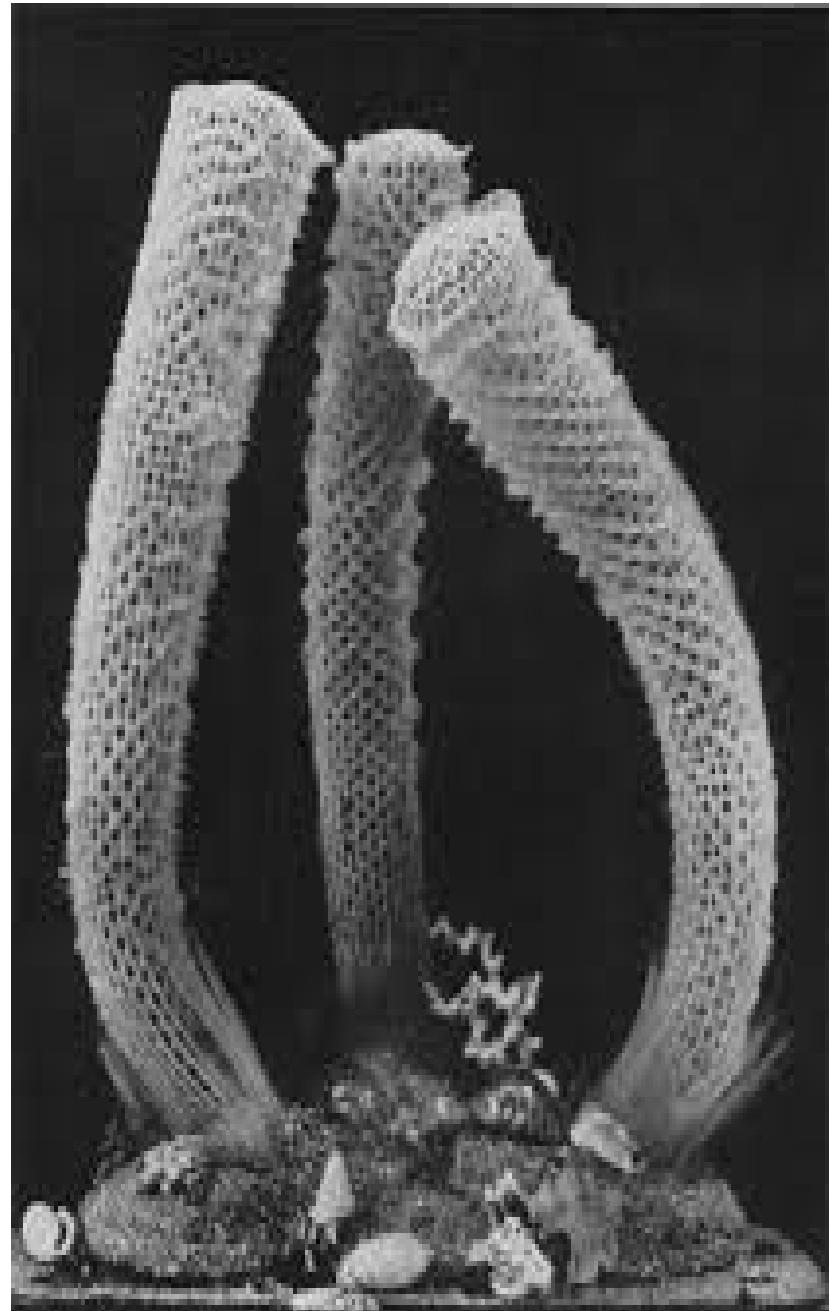
# Class Calcarea

- 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.

- Demospongiae are often brightly coloured.

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

- Sclerospongiae was curved out of Demospongiae.

- The only fresh water

Demospongiae 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



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# 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 <sup>[1]</sup>
<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. <sup>[1]</sup>	Leuconoid
<u>Homoscleromorpha</u>	Single nucleus, single external membrane	Silica <sup>[2]</sup>	In many species	Never	Sylleibid or leuconoid

THANKS



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