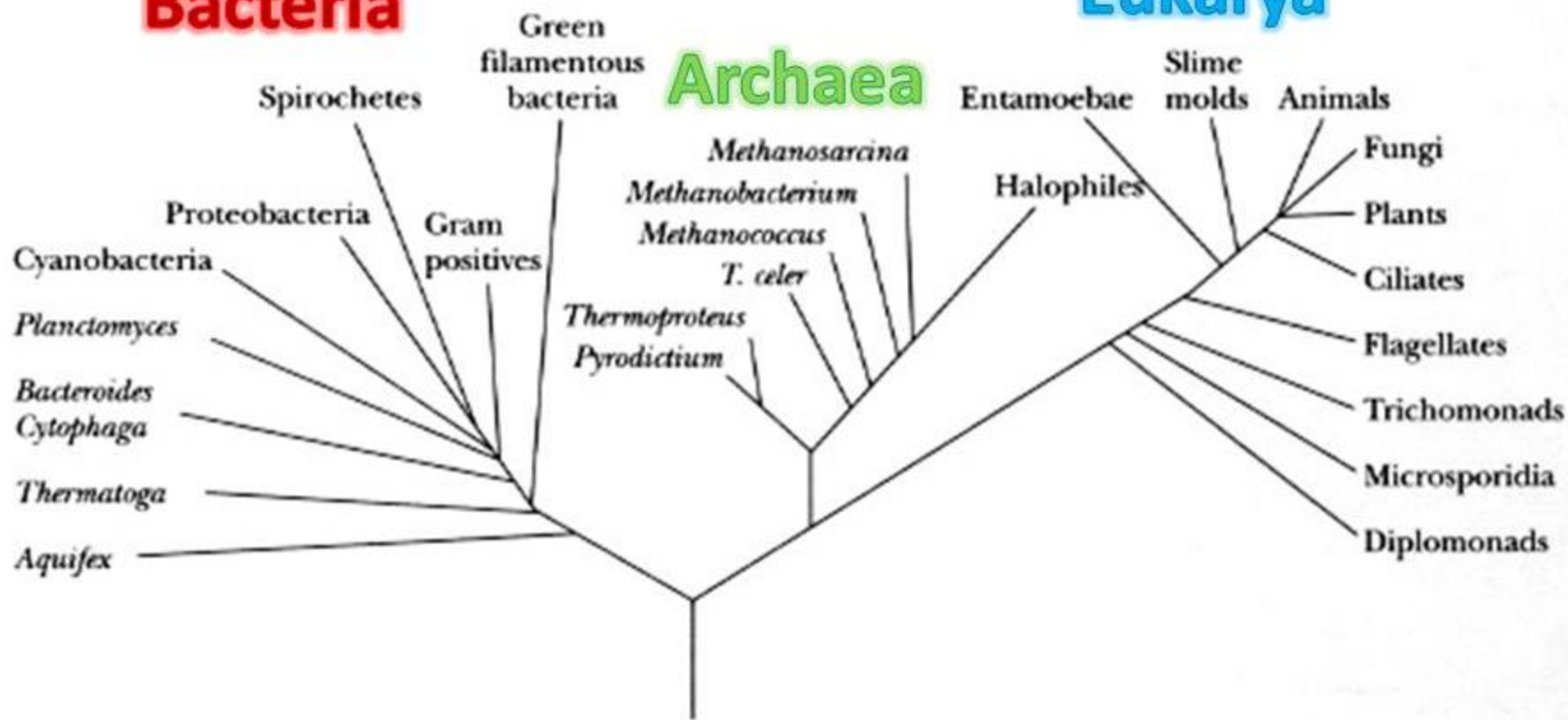
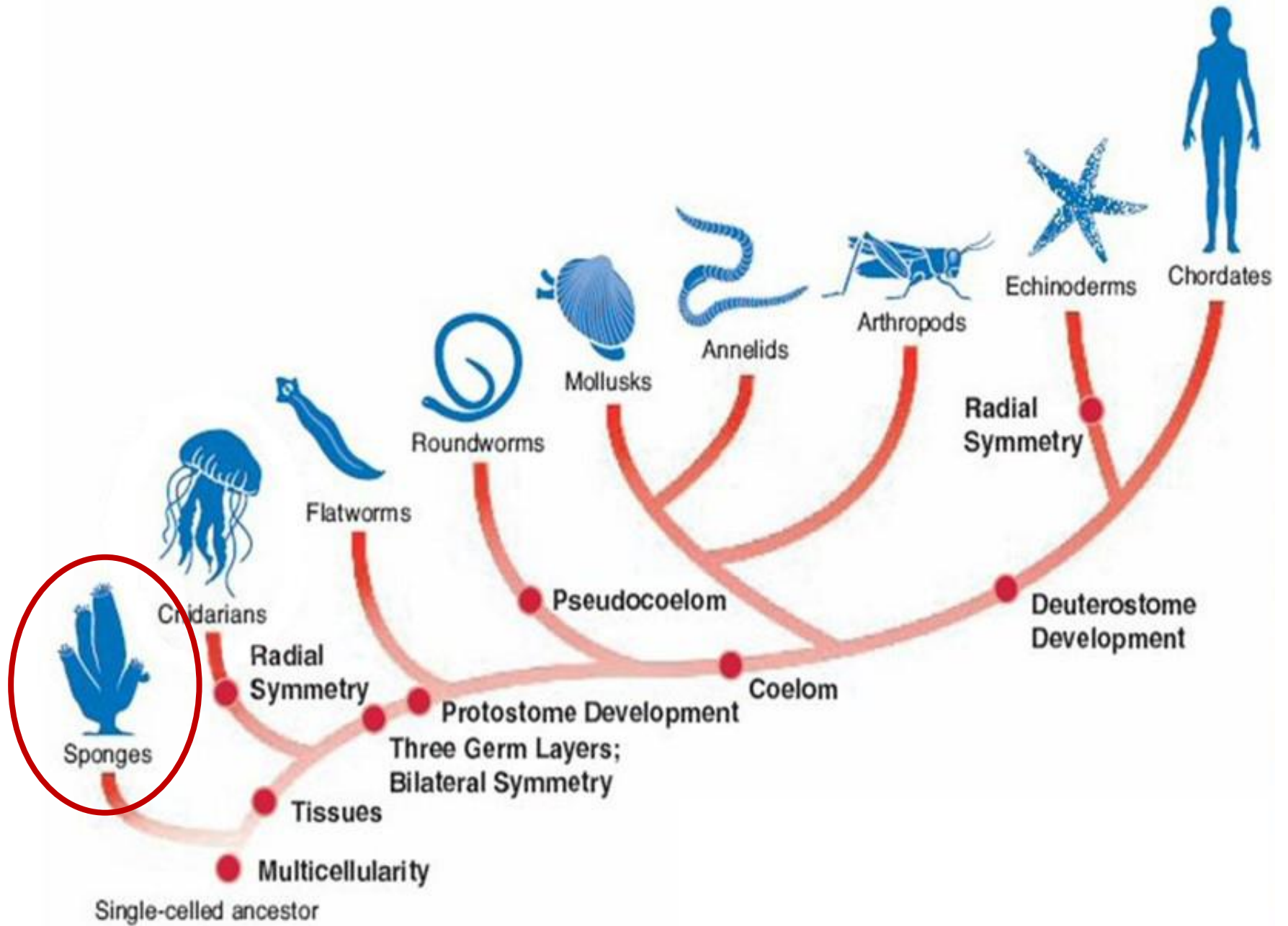


Bacteria

Eukarya





PHYLUM PORIFERA

SPONGES

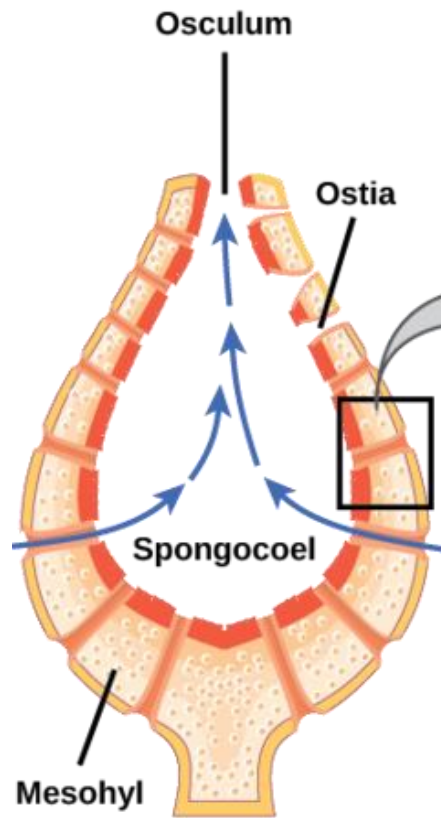


Sponges: key characteristics

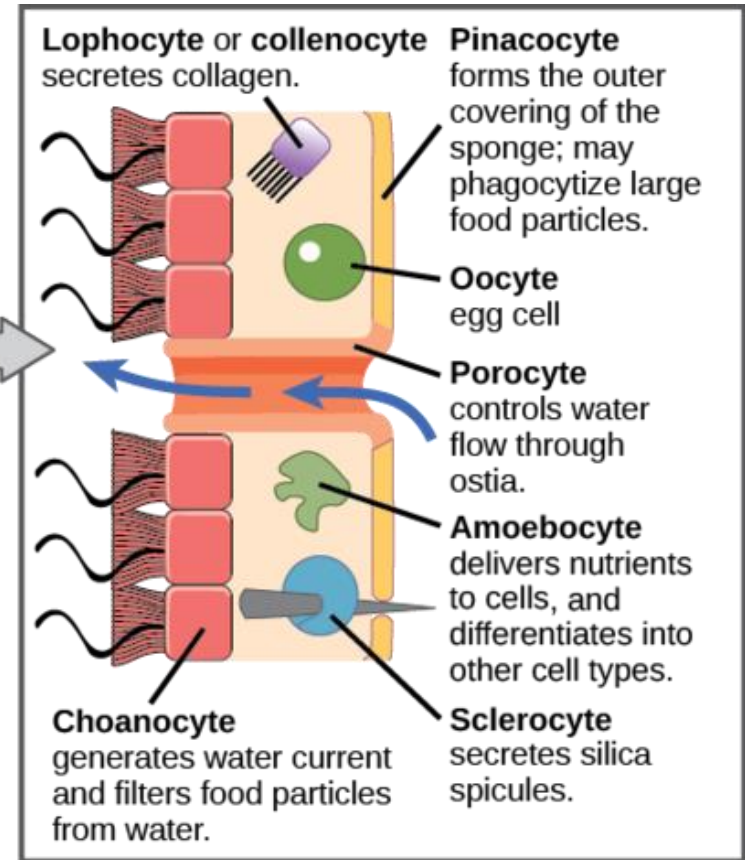
- Eukaryotic
- Multicellular
- Cells are totipotent
- Asymmetrical
- Sessile filter feeders
- No true tissues or germ layers
- Aquiferous system
- Spicules
- Specialized cells: choanocytes and amoebocytes

Totipotent Cells

Sponges have different types of cells (not testable unless mentioned later)



(a) Basic sponge body plan



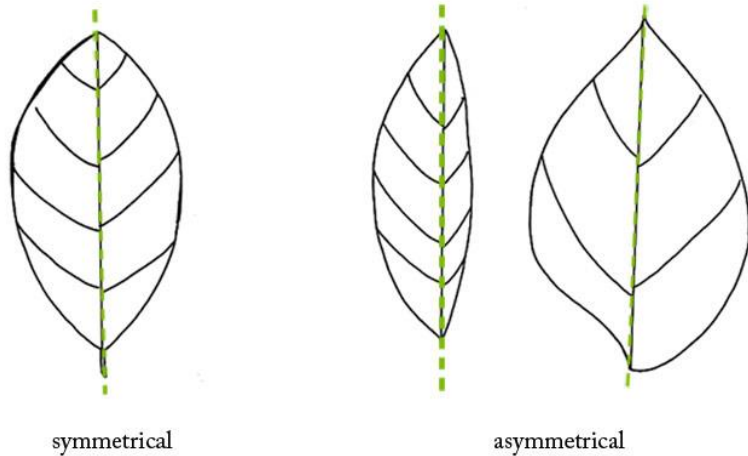
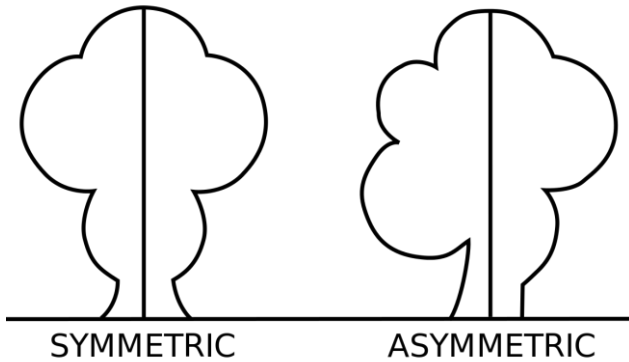
(b) Some sponge cell types

Totipotent Cells

Cells are **totipotent**: able to differentiate into different types/specialties, then redifferentiate as needed

- Run a sponge through sieve → let cells grow → new sponges!
- All of a sponge's cells can change to do all functions

Symmetry

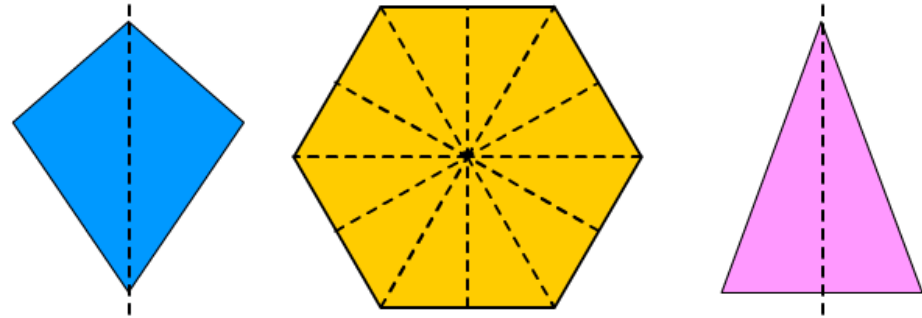


symmetry

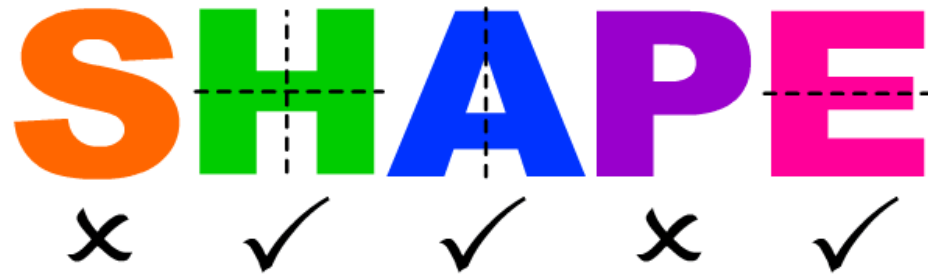
Symmetry is having one side that exactly mirrors the other.



A line of symmetry divides a symmetrical shape in half.



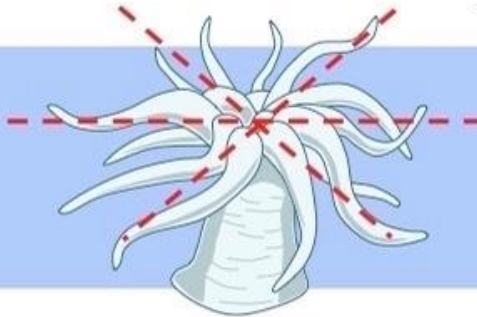
An object may have more than one line of symmetry.



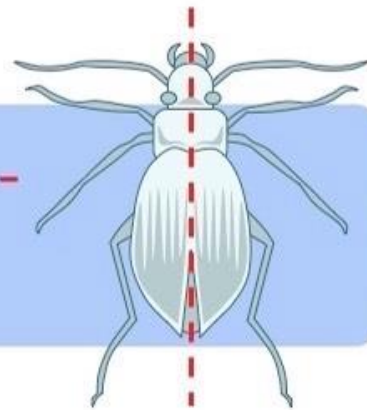
Sponges are asymmetrical



No symmetry
(e.g. *Porifera*)



Radial symmetry
(e.g. *Cnidaria*)



Bilateral symmetry
(e.g. *Arthropod*)



Sessile Filter Feeders

https://www.youtube.com/watch?v=Jktu0NGlgOc&feature=emb_title&ab_channel=KarynMurphy



Sessile Filter Feeders

- **Sessile:** fixed in one place, unable to move
- **Filter feeder:** strains suspended food particles and matter from water
- Other non-sponge examples of filter feeders: whale shark, krill, barnacle

Review

1. What phylum are sponges in?
2. Are sponges eukaryotic or prokaryotic?
3. Are sponges multicellular, unicellular, or both?
4. What makes sponge cells special?
5. What symmetry do sponges exhibit?
6. Sponges are 'sessile filter feeders'. What does this mean?

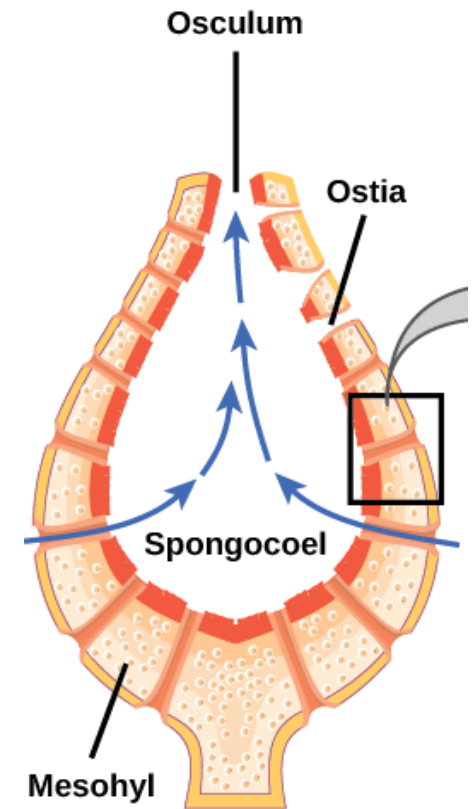
Sponge Anatomy

Mesohyl: gelatinous matrix in a sponge. Contains cells, spicules, and non-living jelly.

Ostia (sing. ostium): an external pore where water enters

Osculum: main opening

Spongocoel: central chamber



(a) Basic sponge body plan

Aquiferous System

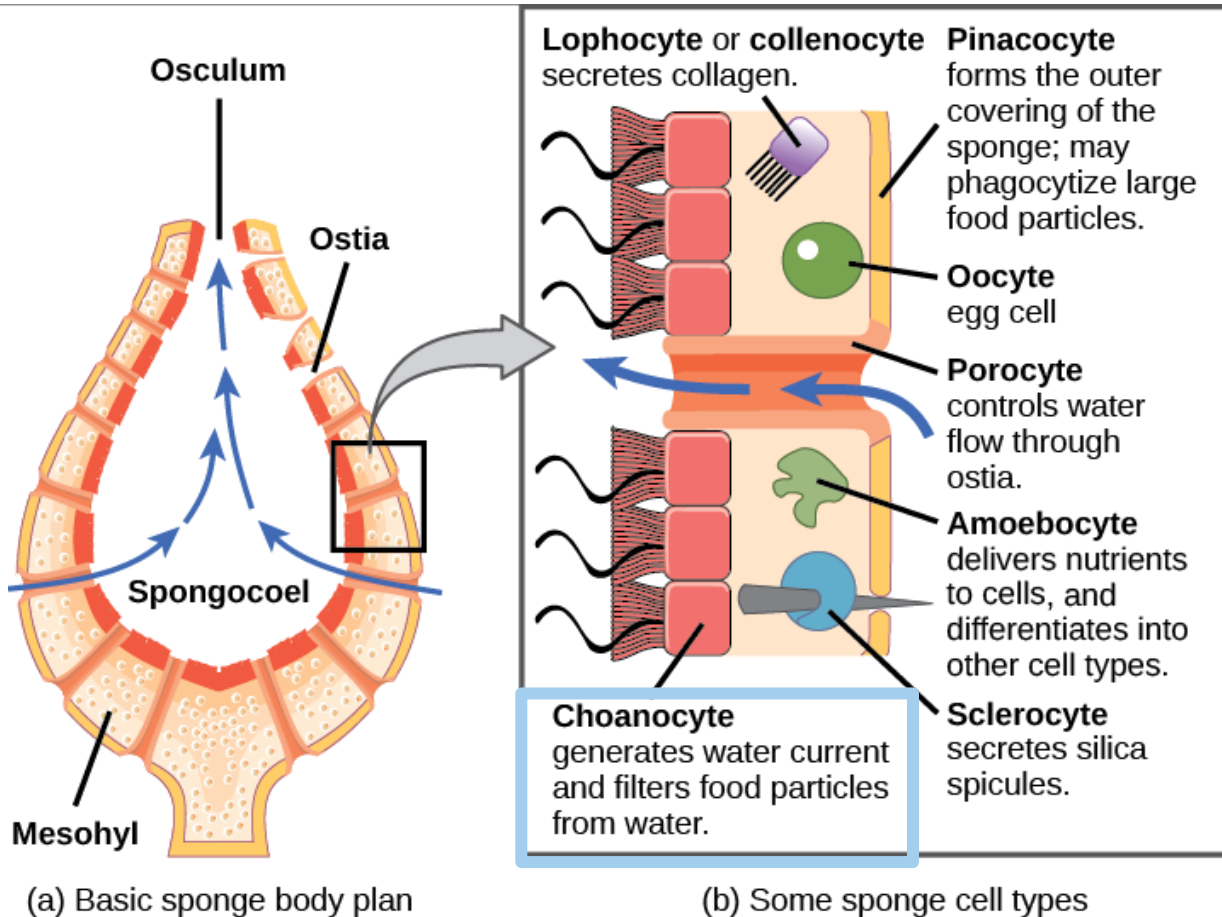
Aquiferous system: system of pores and channels that allow water flow to filter-feed

- **Choanocytes** pump water
- Water enters through **ostia**, flows into the **spongocoel**, then out through **osculum**

Video:

<https://www.youtube.com/watch?v=pTZ211cljX8>

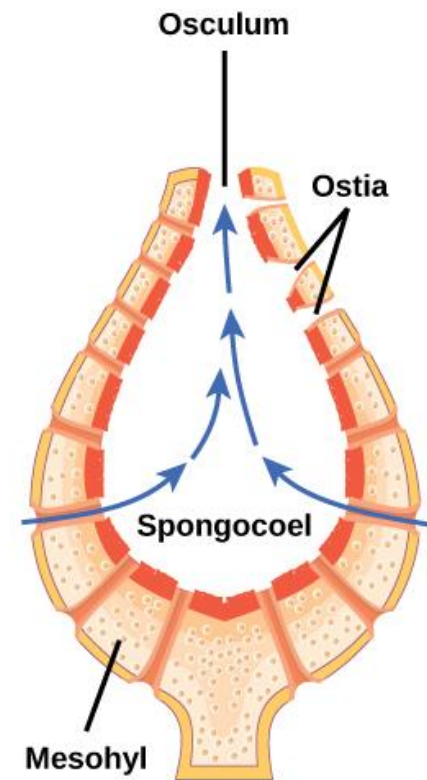
Aquiferous System



Don't memorize cell types except choanocyte, amoebocyte

Discussion

1. Why are sponges so absorbent?
2. Where is water flow the fastest: at the ostia or at the osculum?



Basic sponge body plan

Spicule

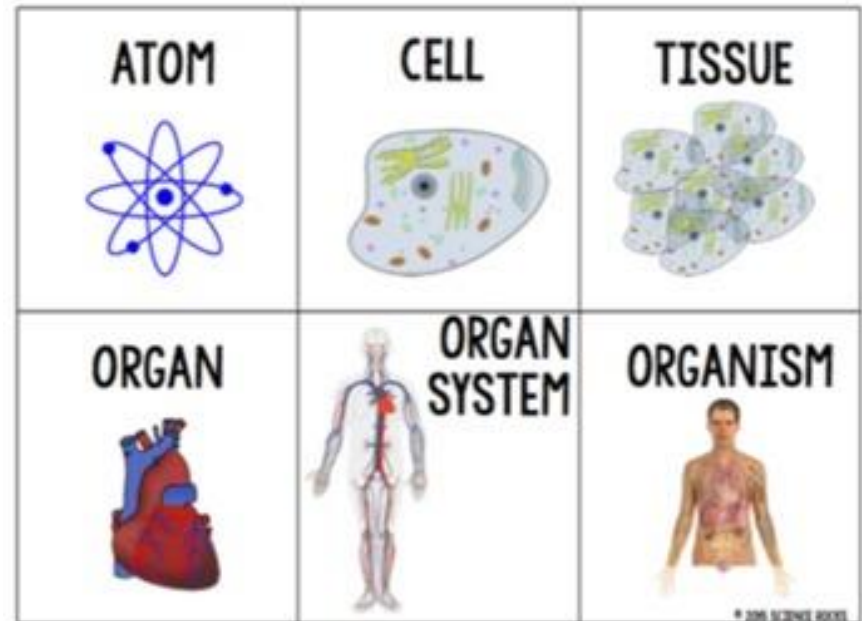
- A small, hard structure only found in sponges
- Most commonly made from SiO_2 (silicon dioxide)
- Provides structure and protection
- A defining taxonomic trait



“No true tissues”

Tissue:

- Level of organization between cell and organ
- Similar cells working together on a common function



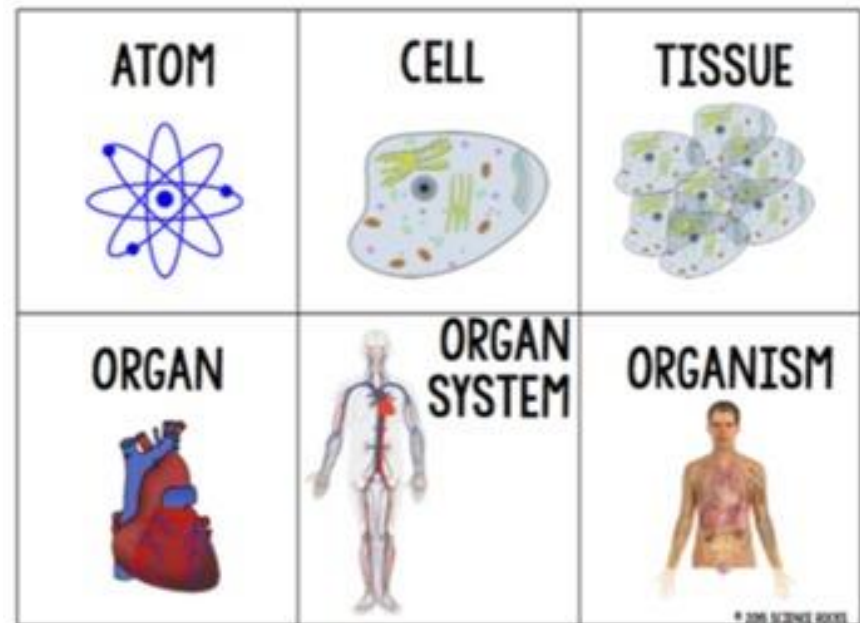
“No true tissues”

Sponges:

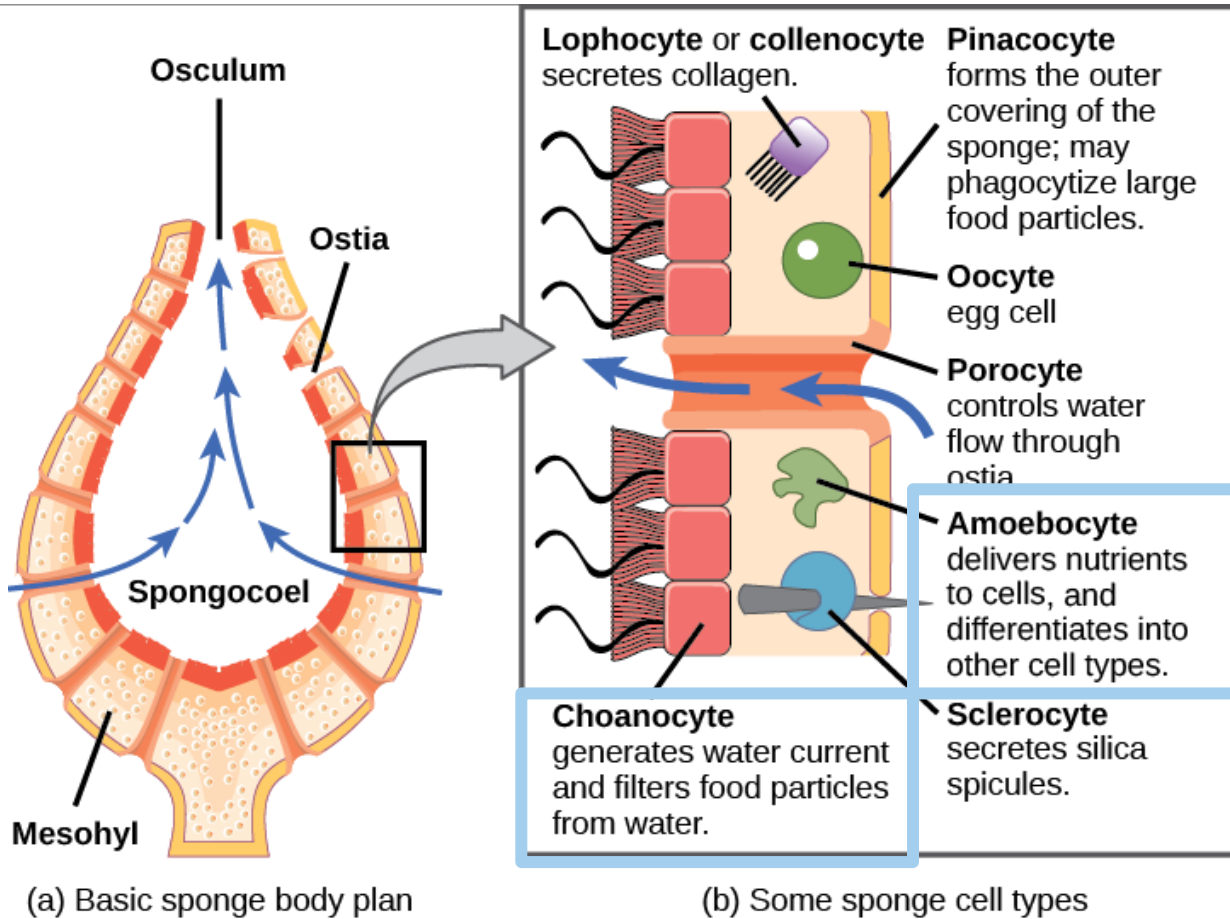
- Although multicellular, cells work independently

Totipotency:

- Sponge cells do not *need* to work together
- No ‘benefit’ arises from working together on similar tasks



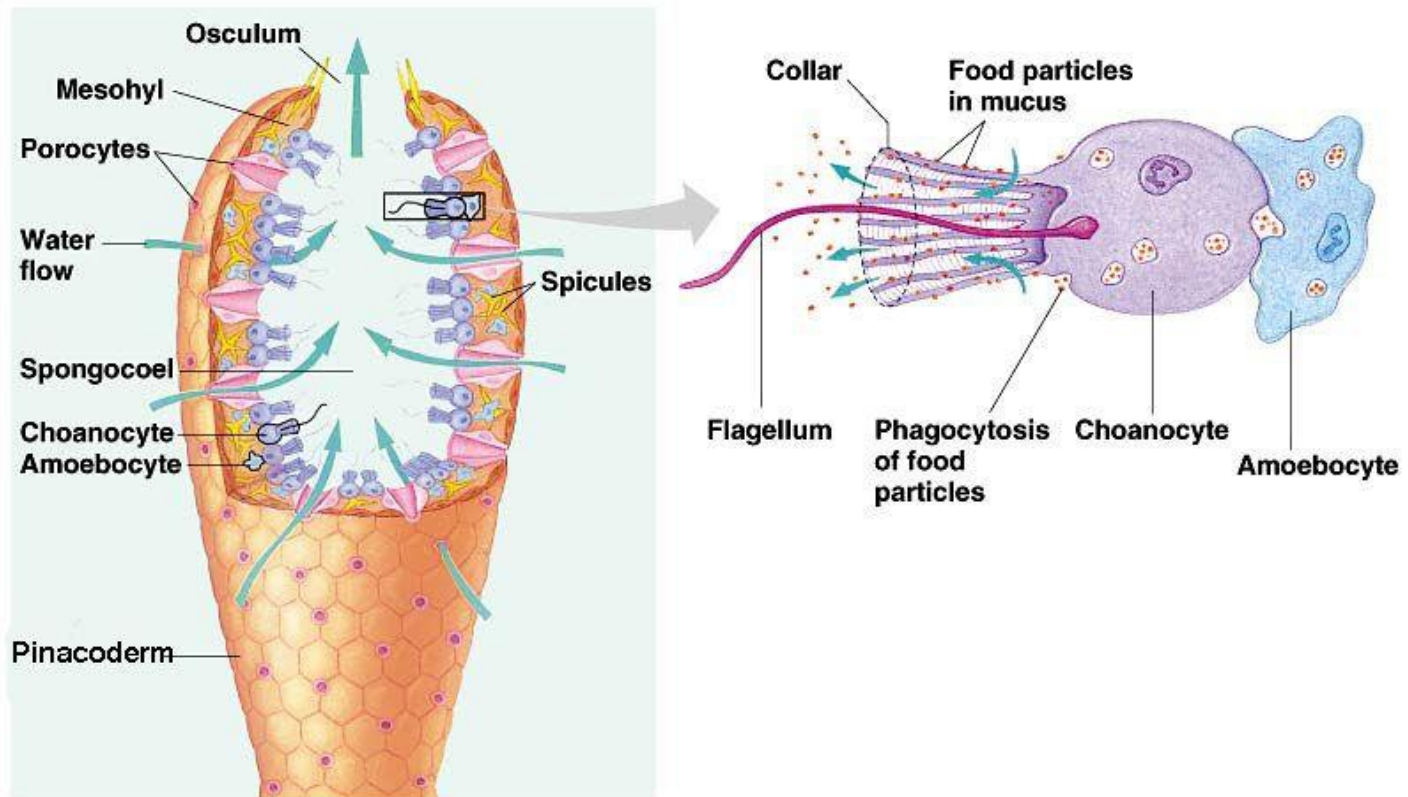
Specialized Cells



Don't memorize cell types except choanocyte, amoebocyte

Specialized Cells

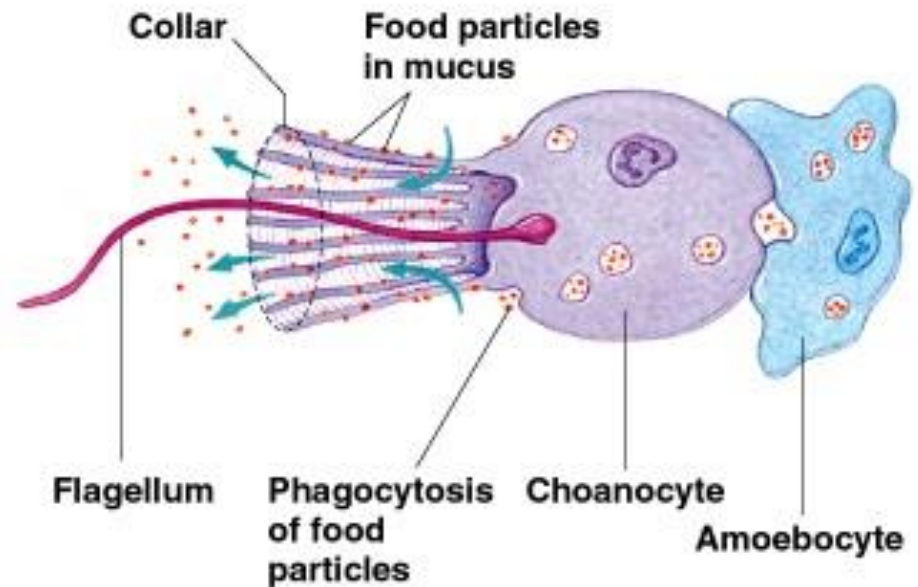
Choanocyte:



Specialized Cells

Choanocyte:

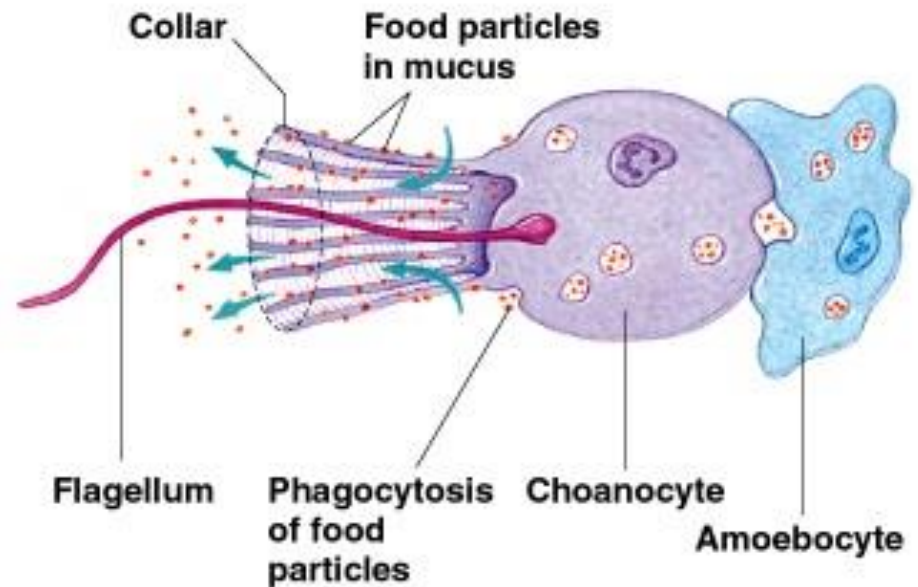
- Lines a sponge's inner surface
- Has a flagellum that beats to pump water into the sponge
- Food particles trapped in collar; choanocyte filters and ingests these particles
- Also known as 'collar cell'



Specialized Cells

Amoebocyte

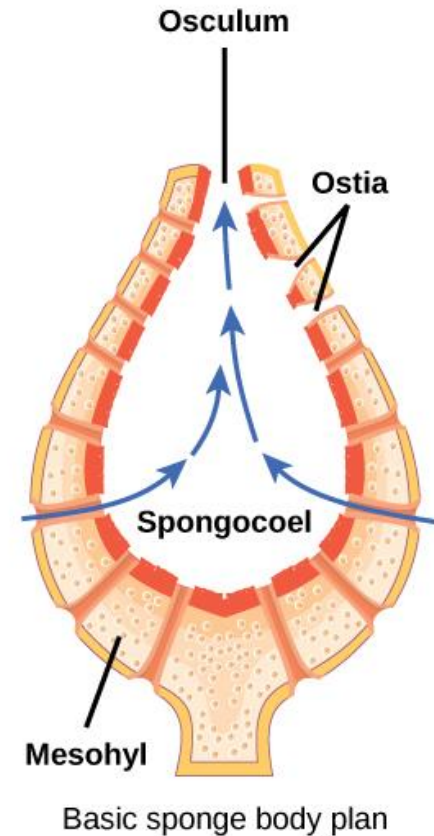
- Is “ameboid” ...can crawl throughout mesohyl to other cells
- Collects excess nutrients from choanocytes, delivers nutrients to other cells*



* Although we will not learn about them, there *are* other cell types in the sponge!

Discussion

1. Explain how choanocytes and amoebocytes work together to provide nutrients to all the cells in the sponge.
2. Where are choanocytes located? Why do you suppose this is the case?



Key vocabulary

- Sponge
- Phylum Porifera
- Totipotent
- Asymmetry/asymmetrical
- Sessile
- Filter feeder
- Osculum
- Ostia (sing. Ostium)
- Mesohyl
- Spongocoel
- Tissue
- Aquiferous system
- Spicule
- Choanocyte
- Amoebocyte