PHYLUM PORIFERA

Sponges

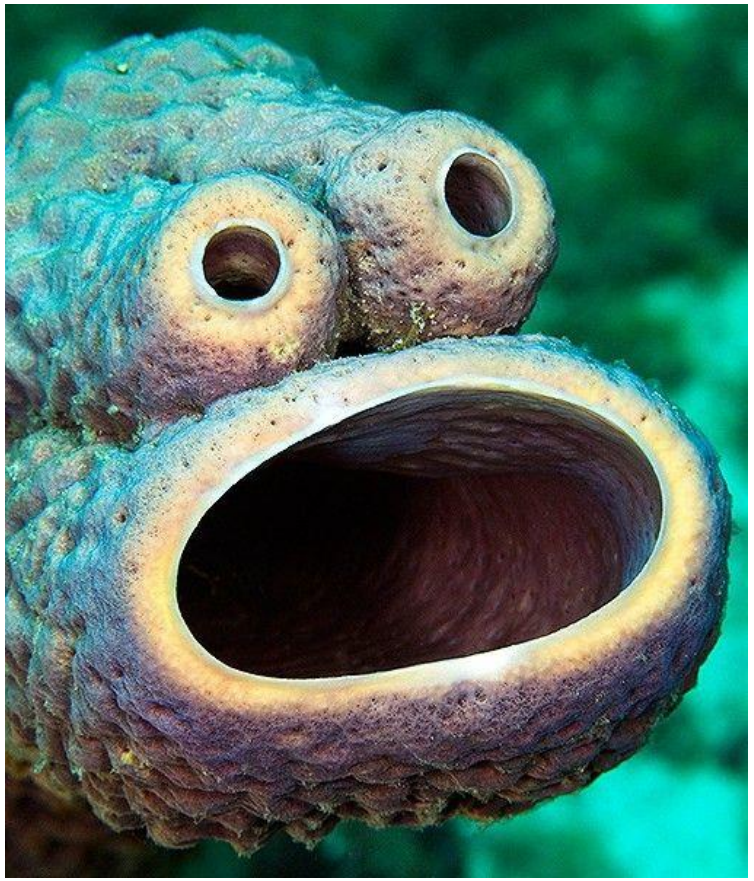
Simple Animals

SPONGES

- Simplest and most unusual animals
- Most ancient animals
  - Around 540 million years old
- Aquatic animals
  - Ocean and fresh water
- Variety of colours, shapes and sizes
- Porifera means “pore bearer”
- Sessile

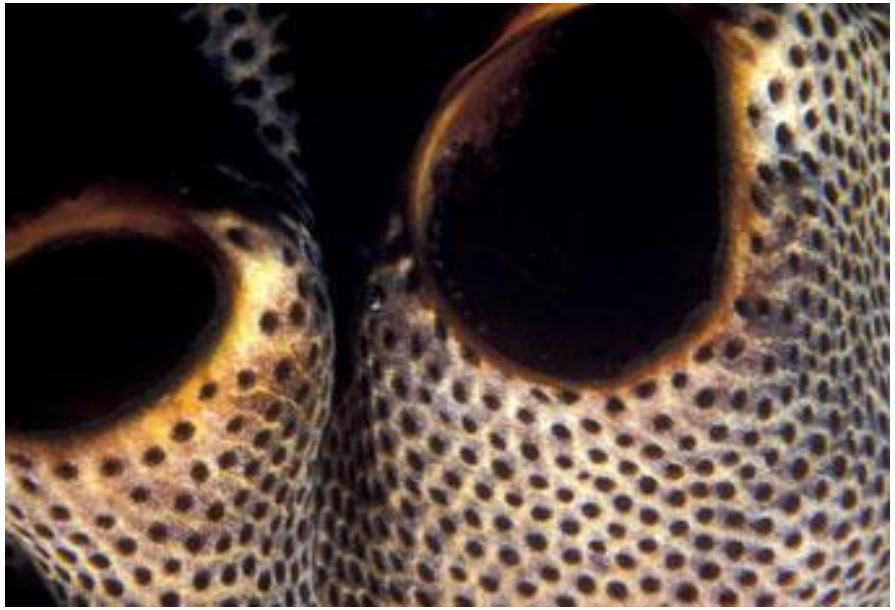
WHY IS A SPONGE AN ANIMAL?

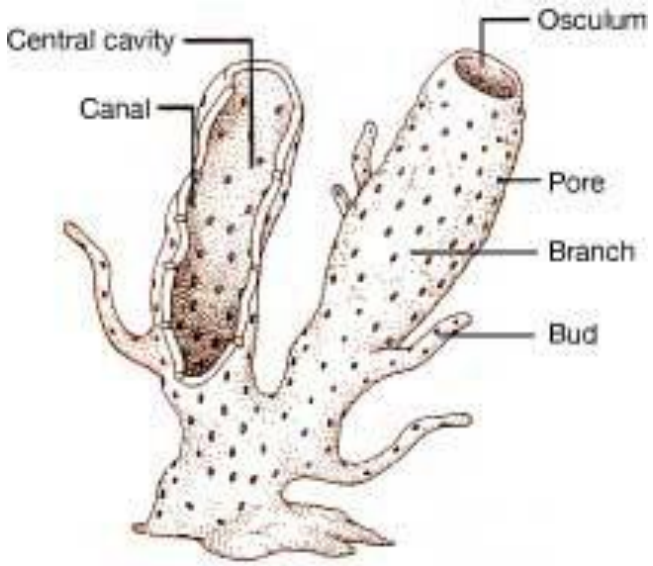
- Heterotrophic
- Multicellular
- No cell wall
- A few specialized cells



"PORE BEARERS"

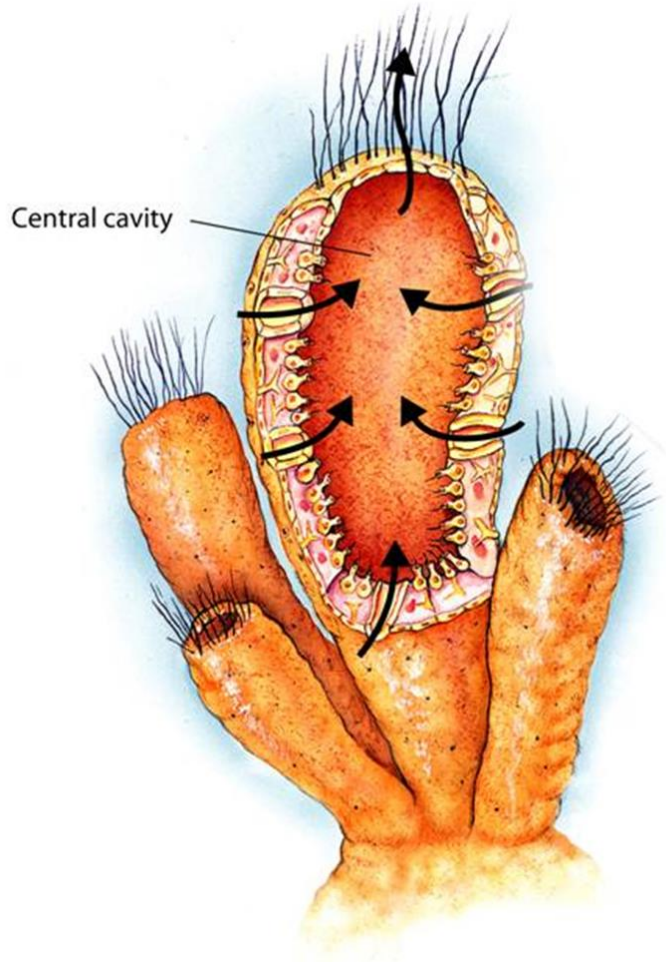
- Sponges have tiny openings/pores all over their bodies





BODY PLAN

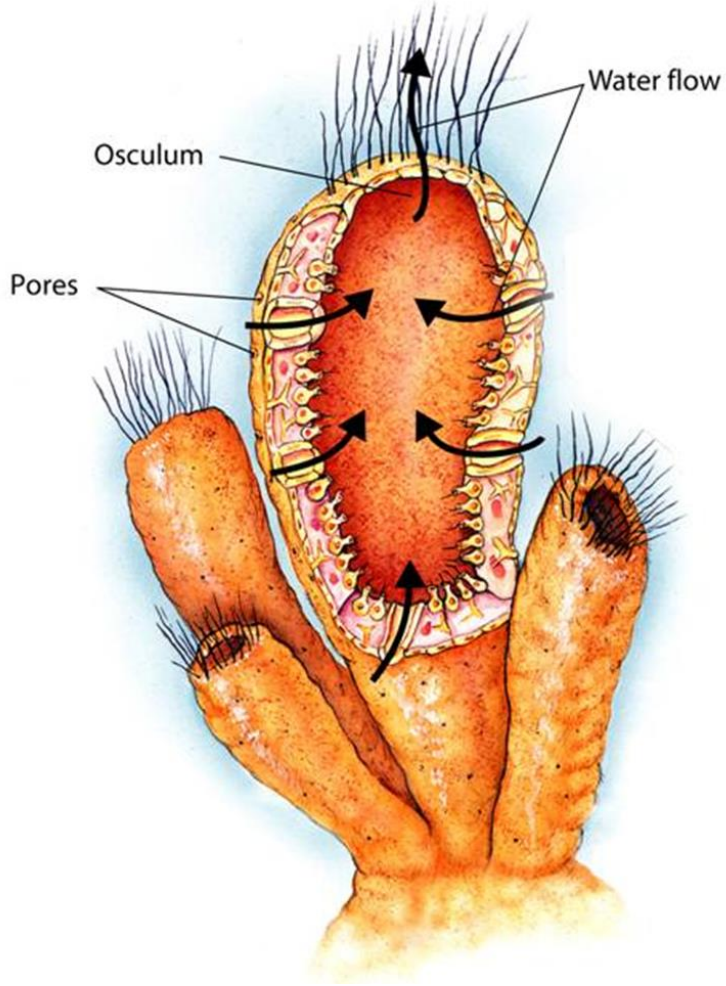
- Asymmetrical
- Only two layers
  - Endoderm and ectoderm
- No body cavity
- Large cylindrical water pump
- Body forms around a wall around a large central cavity in which water is continually circulated
- Movement of water through a sponge provides a simple mechanism for feeding, respiration, circulation and excretion



STRUCTURE AND FUNCTION

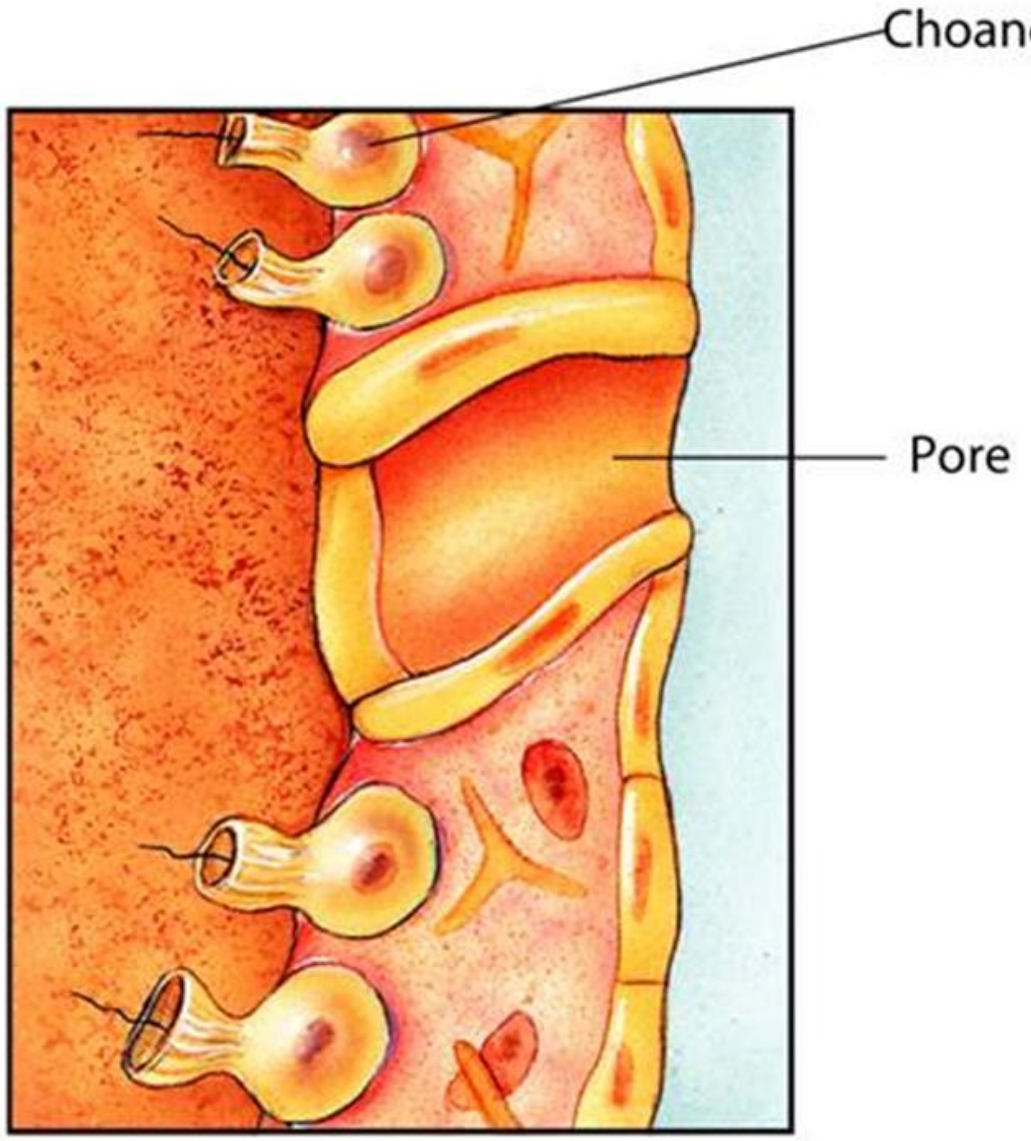
- Water enters through pores located in the body wall
- Leaves through the **osculum**
  - a large hole at the top of the sponge.

- Function
  - Expels water and wastes



- **Choanocytes**
  - Specialized cells with flagella

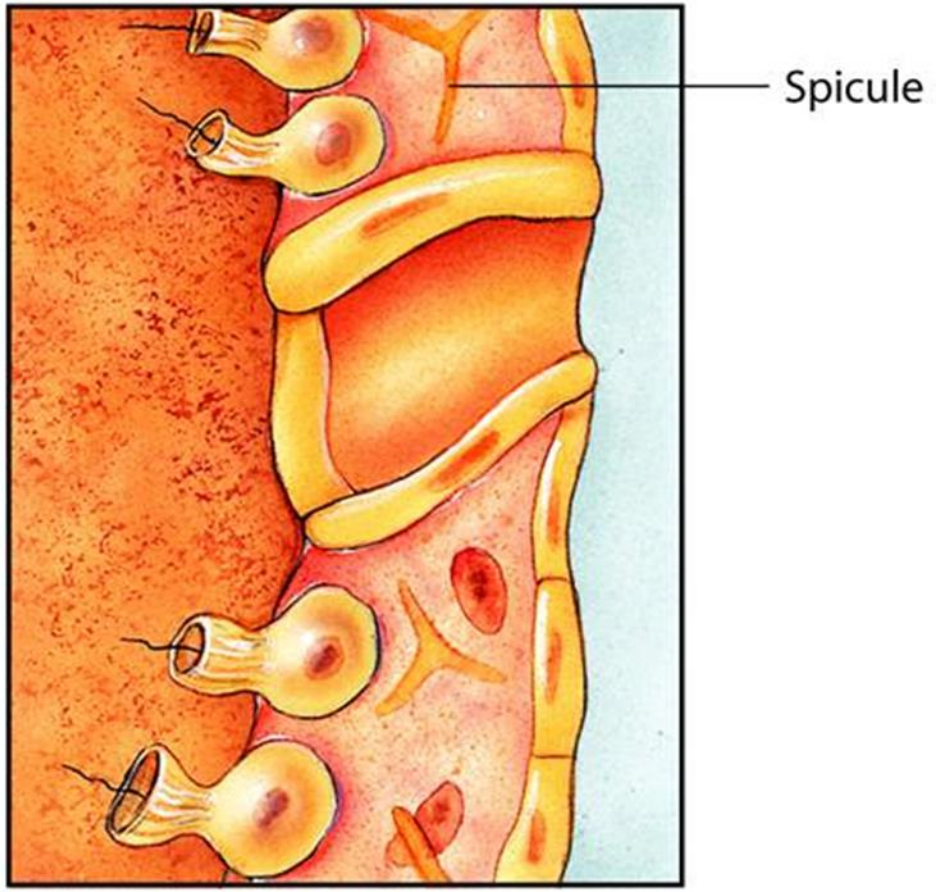
- **Function:**
  - use flagella to move a steady current of water through the sponge.



SKELETON

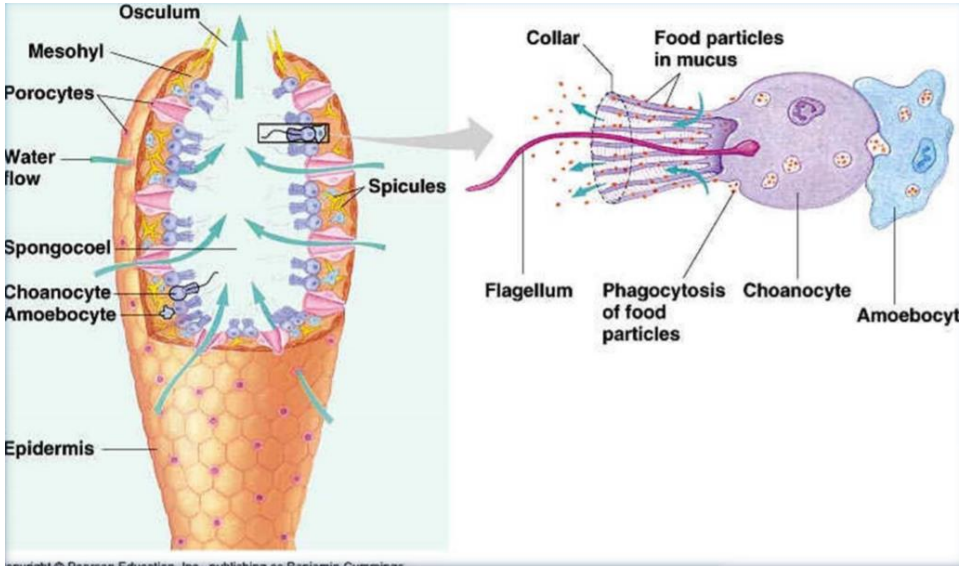
- Harder sponges
  - Made of spiny spicules
    - **spicule** is a spike-shaped structure made of calcium carbonate or silica.

- Spicules are made by **archaeocytes**
  - specialized cells that move around within the walls of the sponge

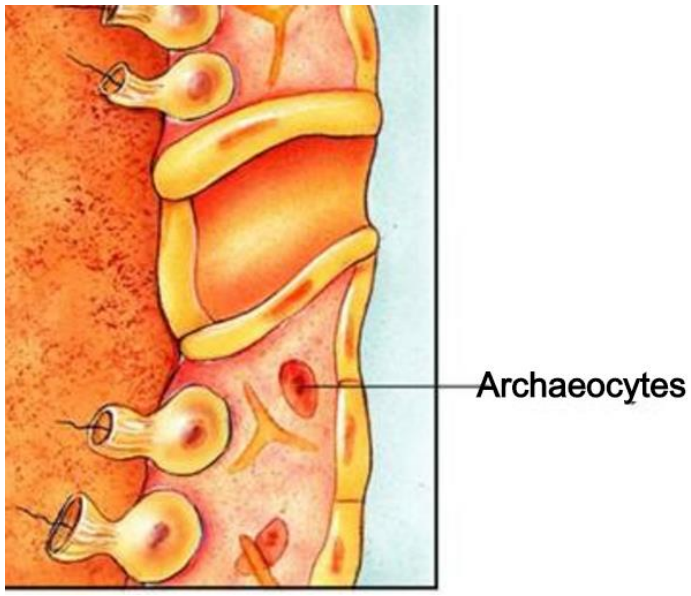


- Softer sponges
  - Internal skeleton made of spongin
    - Network of flexible protein fibers
- These softer sponges are harvested and used as natural bath sponges

FEEDING

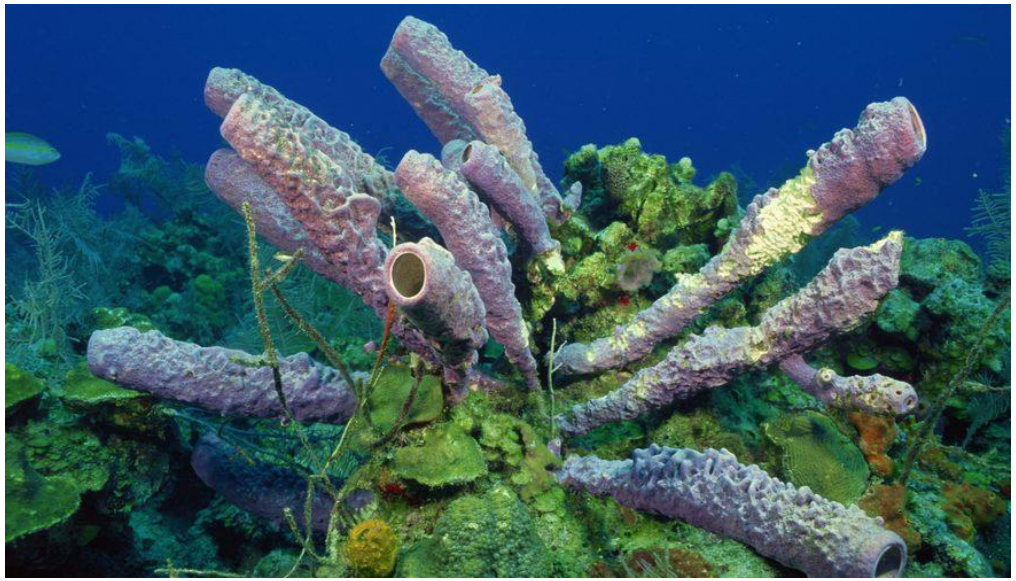


- Feeding
  - No mouth or gut
  - Sponges are filter feeders.
  - Intracellular digestion
    - As water moves through the sponge, food particles are trapped and engulfed by choanocytes
      - Particles are then passed on to archaeocytes (amoebocytes)
- Rely on movement of water
    - Complete the digestive process and transport digested food throughout the sponge



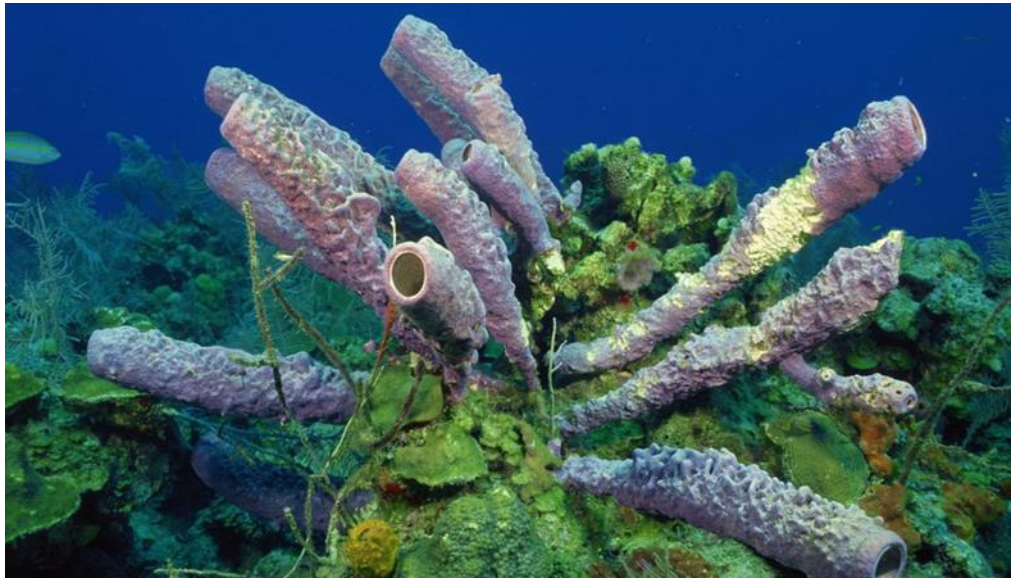
RESPIRATION, CIRCULATION & EXCRETION

- As water moves through the body oxygen from the water diffuses into the surrounding cells
- Carbon dioxide and wastes(ammonia) diffuse into the water and are carried away



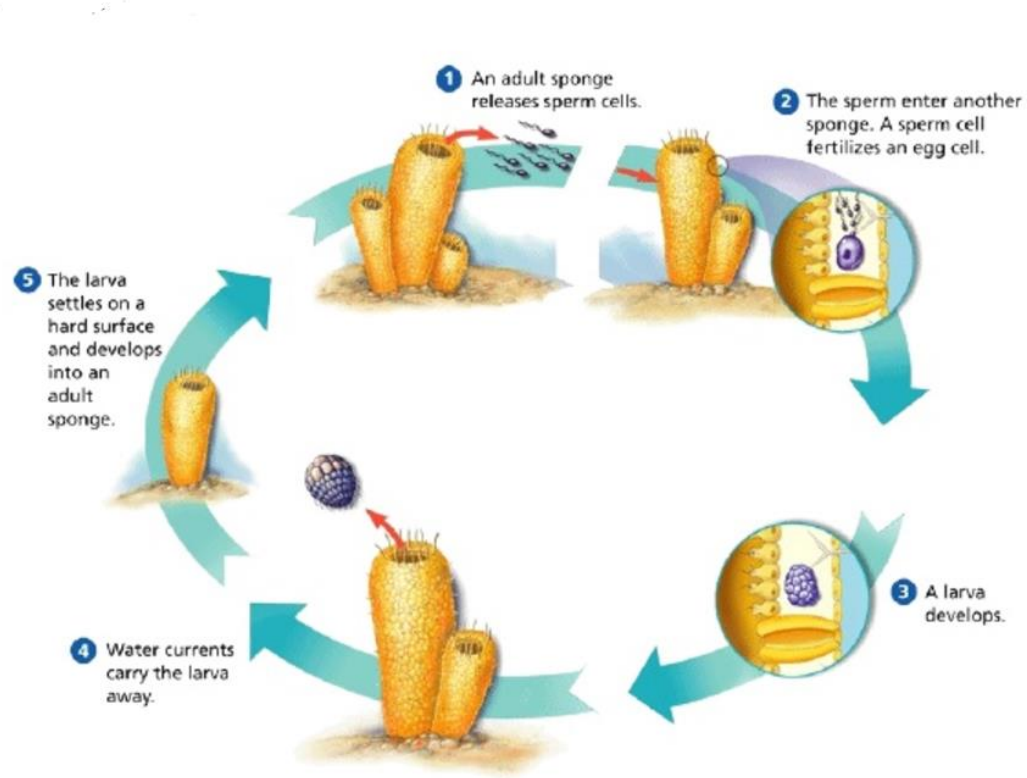
RESPONSE

- Do not have a nervous system
- Produce toxins to prevent potential predators



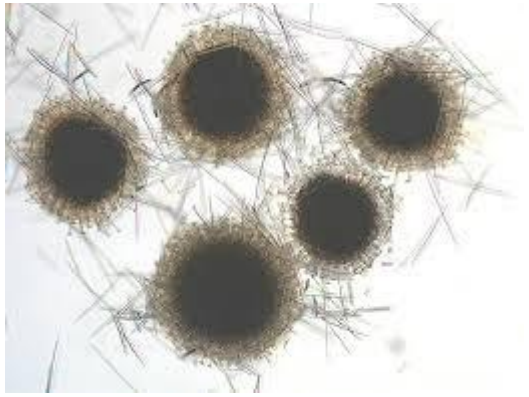
REPRODUCTION

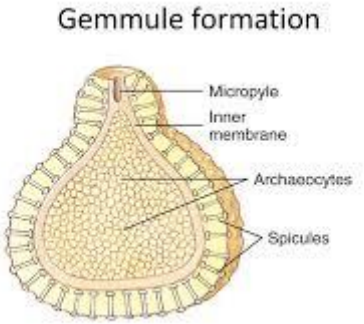
- Reproduce both sexually and asexually
- A single sponge can produce both sperm and egg
- Eggs are fertilized inside a sponges body
  - Internal fertilization
- Sperm are released from one sponge
  - Carried by water currents to pores of another sponge
    - Archaeocytes carry sperm to egg
      - Zygote forms, develops into larva
        - Larva is an immature stage of an organism that looks different from its adult form
        - Larva are motile, carried by currents to a new location



ASEXUAL REPRODUCTION

- Budding
  - Part of a sponge breaks off of parent
    - Settles to the sea floor and grows into a new sponge
- Gemmule production
  - Occurs when harsh environmental conditions exist
  - Gemmules are groups of archeocytes surrounded by a tough layer of spicules
- When conditions become favourable
  - Gemmule grows into new sponge





ECOLOGY OF SPONGES

- Sponges are important in aquatic ecology.
- They provide habitats for marine animals
  - snails, sea stars, and shrimp
- Symbiotic relationships
  - Commensalism
    - Habitats
  - Mutualism
    - Partnerships with photosynthetic bacteria, algae, protists
      - Photosynthetic organisms provide food/oxygen
      - Sponges proved protected area

- https://www.youtube.com/watch?v=m8a0oNsDEx8