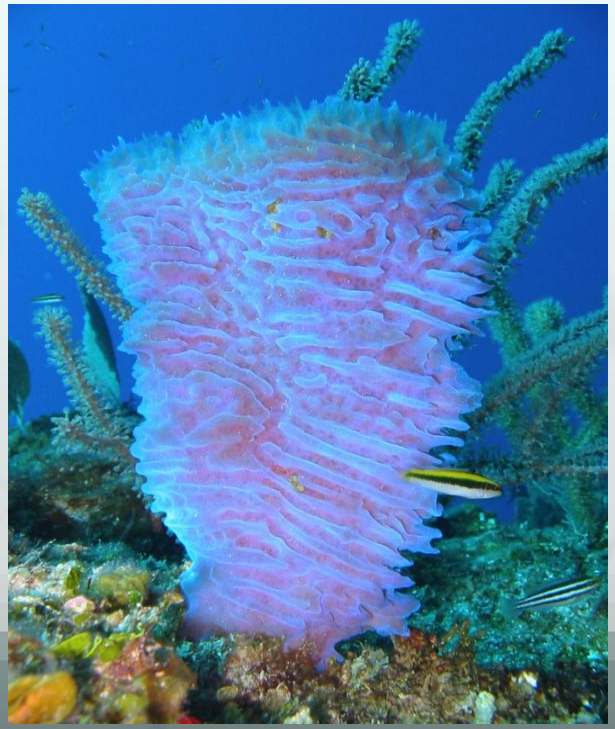
Phylum – Porifera
The Sponges

Taxonomy

- Kingdom – Animalia
  - Subkingdom – Parazoa (lacks tissues)
    - Phylum – Porifera (pores)



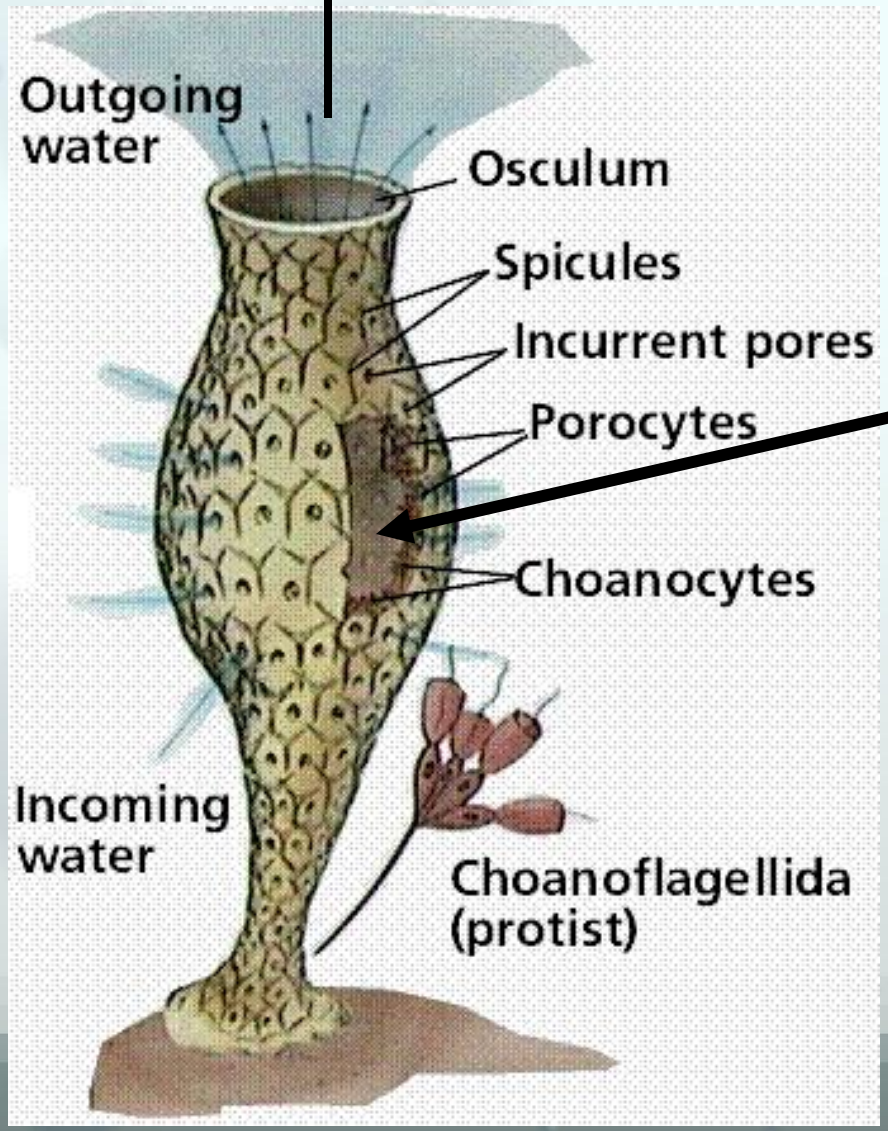
Characteristics

- Simplest of all animals
- Contain specialized cells but no other organization level
- Most are marine
- Saltwater sponges are brightly colored
- Freshwater sponges are small and dull green color
- Size – 2 meters to 2 cm

Characteristics

- **Porifera** means pore-bearing
- **Water** enters through pores bringing in **food and oxygen**
- **Filter feeders** on plankton
- **Osculum** – large opening at the top where excess water leaves

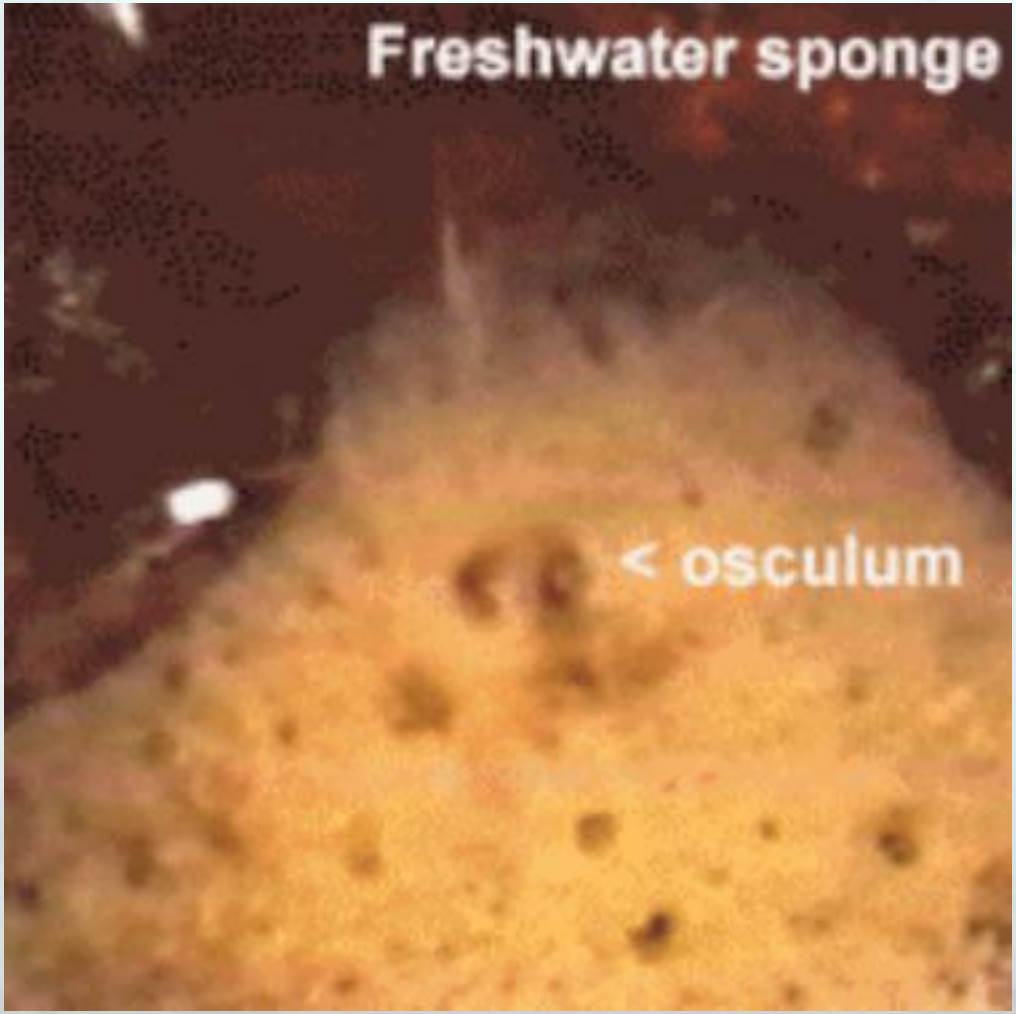
Water Flow Through the Sponge



WATER IN

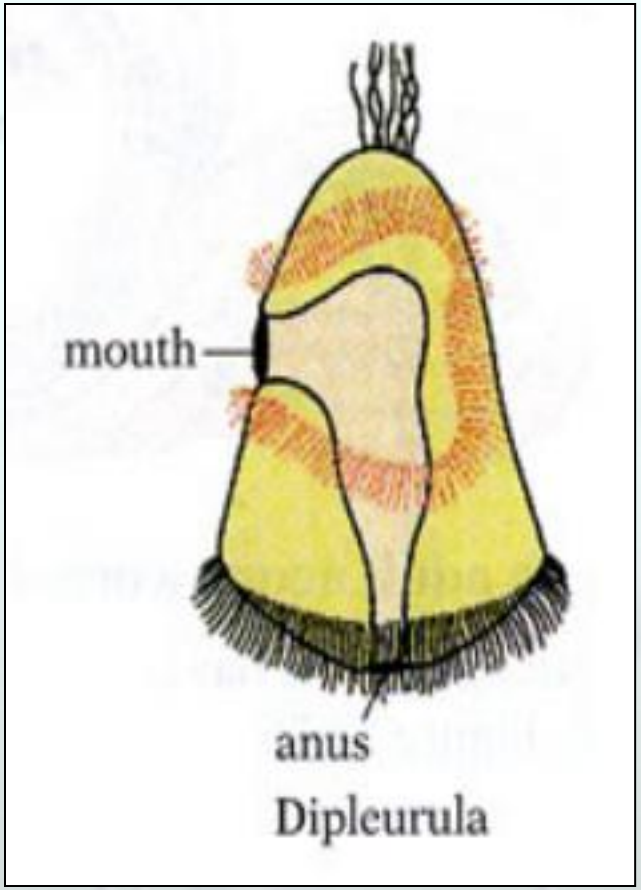
Osculum

Water Flow Through Sponge



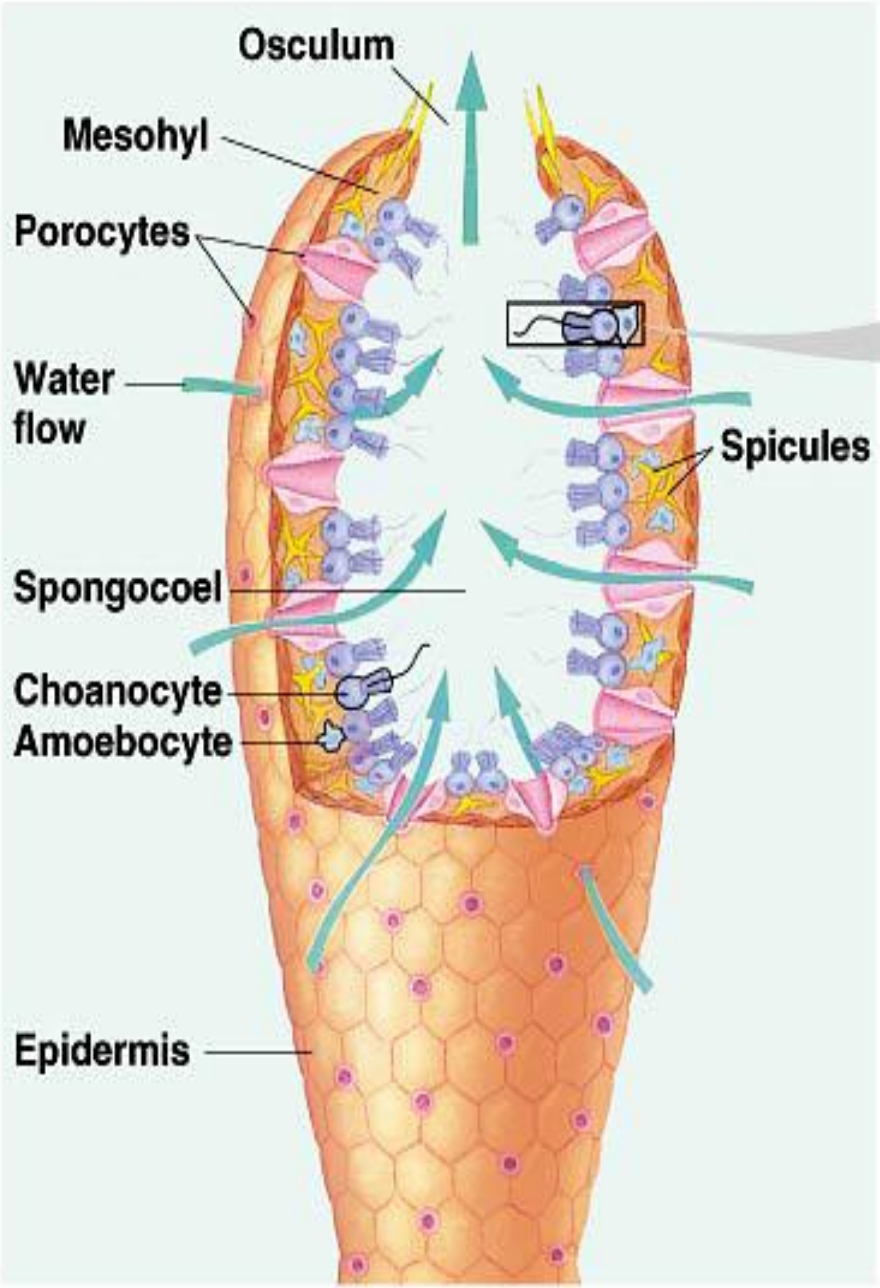
Characteristics

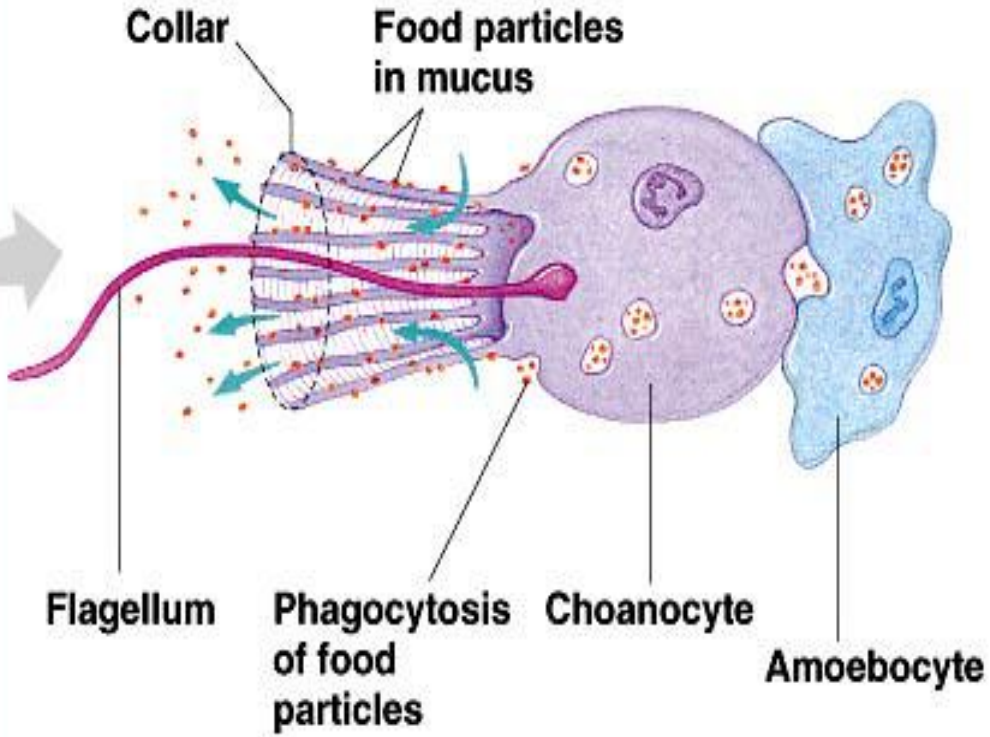
- **Asymmetrical**
- **Sessile** as adults (attach to rocks)
- Free-swimming larval stage called **Dipleurula**
- Also reproduce by **fragmentation** (pieces break off & form a new sponge)



Sponge Body Structure

- Inside body cavity of sponge is **hollow**
- Called the **Spongocoel**
- Have 2 cell layers:
  - Outer **epidermis**
  - Inner **endoderm**
- Jelly-like material between cell layers called **mesenchyme**

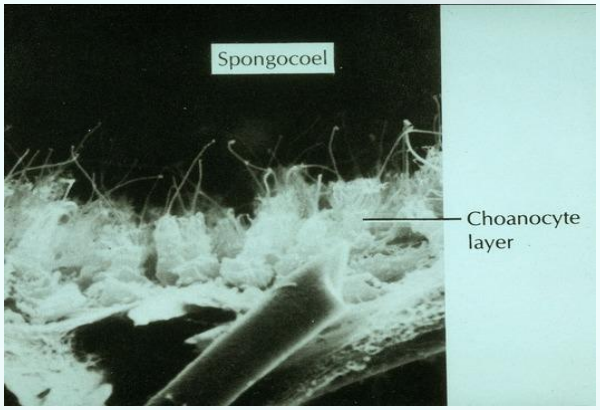


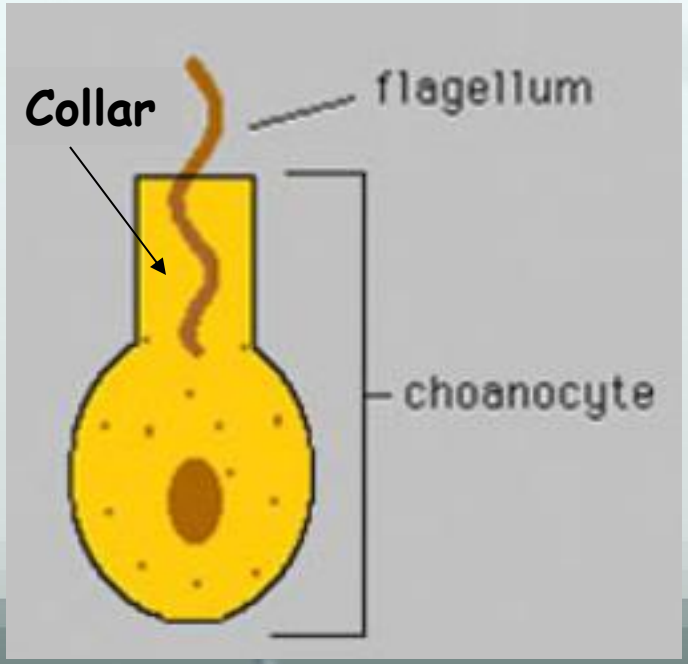


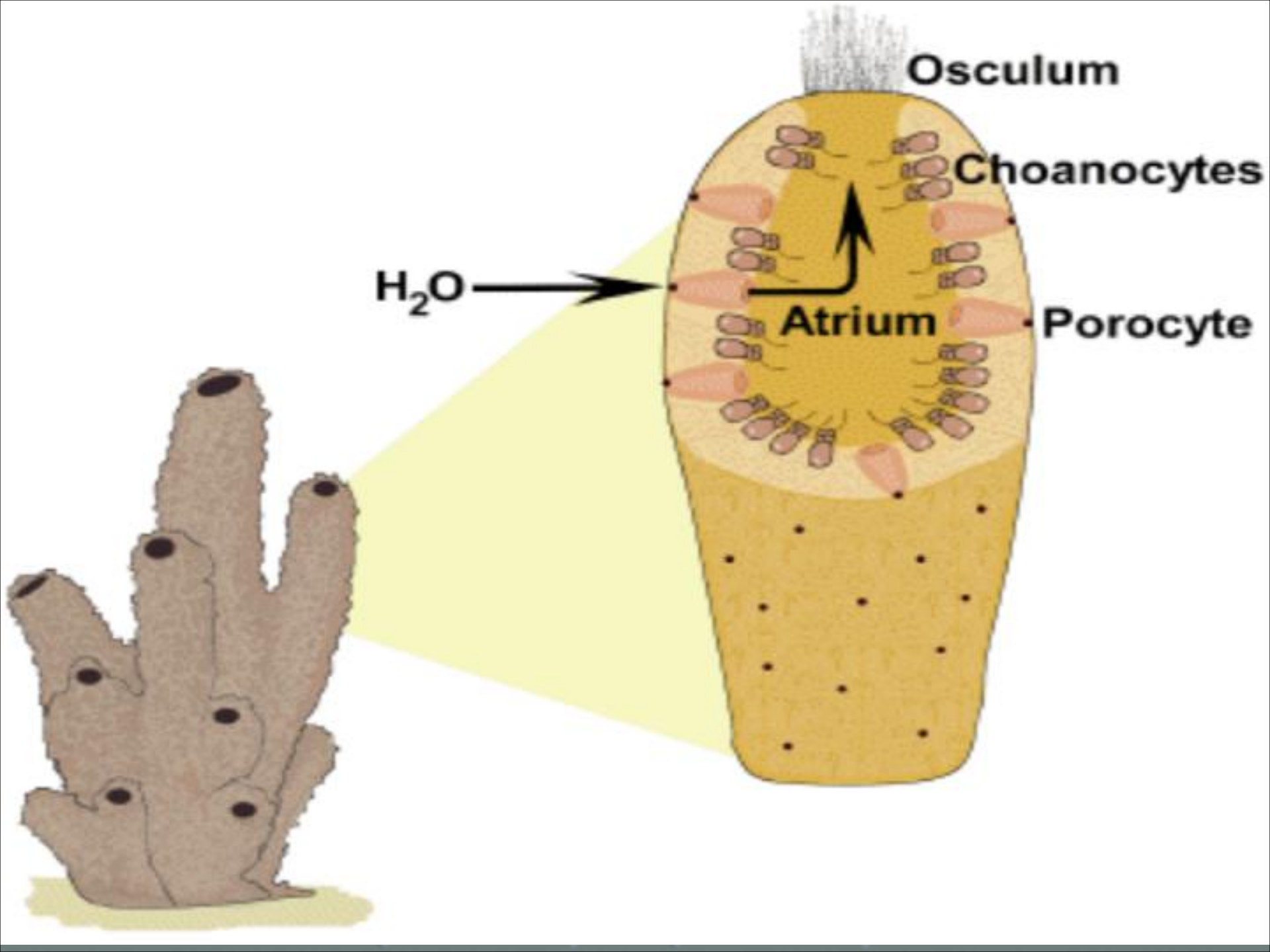
- **Choanocytes** line the gastrovascular cavity & capture food
- **Amebocytes** digest & distribute food

Specialized Cells

- **Choanocytes** (collar cells) line inside of body cavity (spongocoel)
- Have **flagella** that spins to pull in water & food
- **Collar** traps **plankton** (food) from water

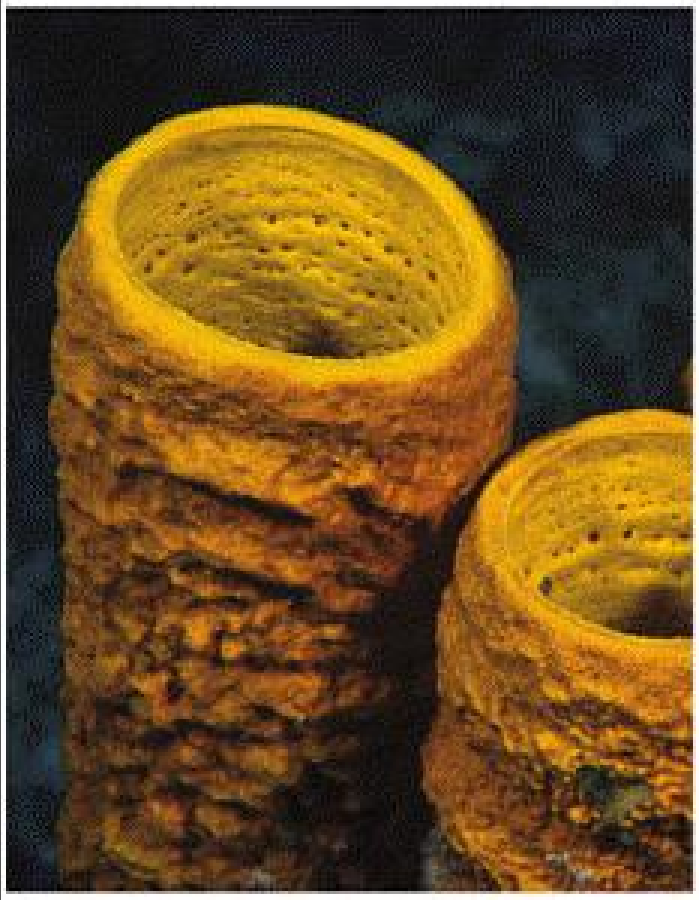




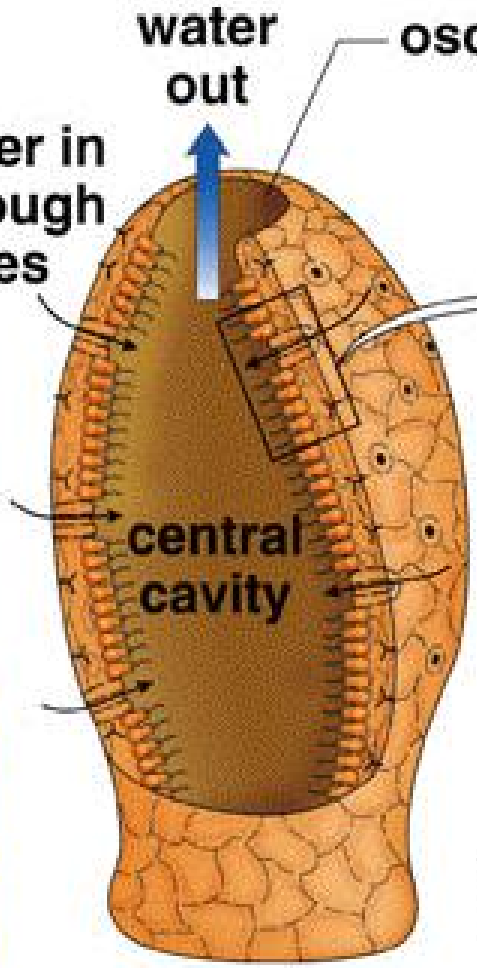

Osculum
Choanocytes
H_2O
Atrium
Porocyte

Other Specialized Cells

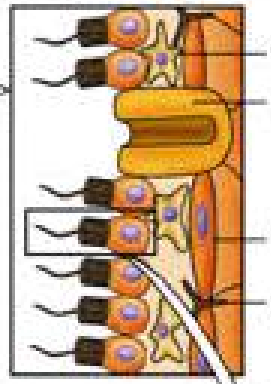
- Amebocytes:
  - Pick up food from choanocytes
  - Finish digestion
  - Move through the mesenchyme & take food to other cells

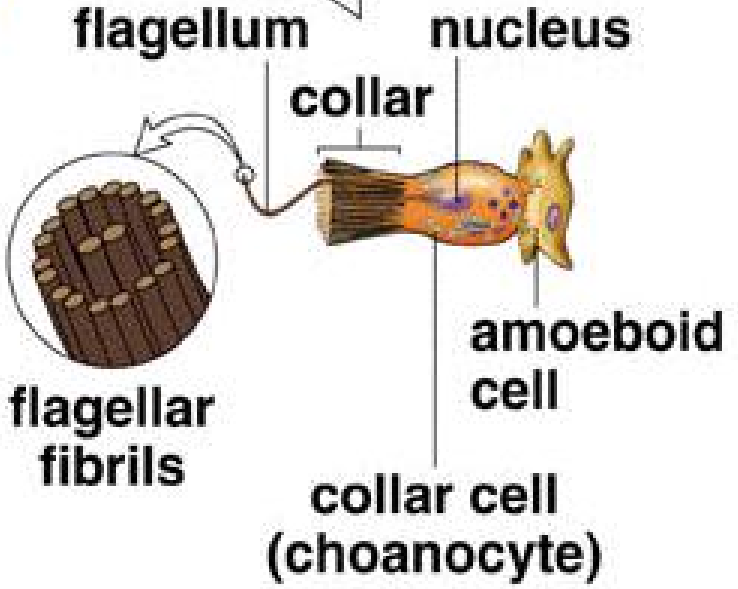


a. Yellow tube sponge, *Aplysina fistularis*



b. Sponge organization

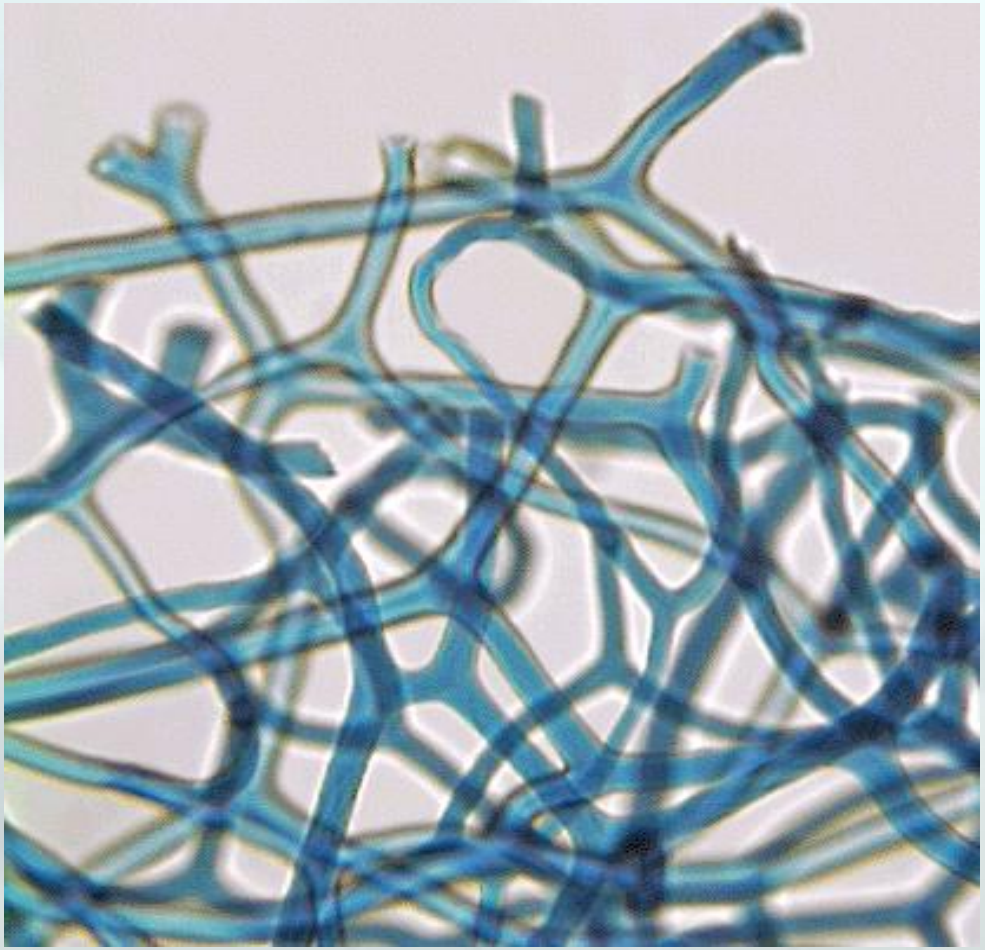




Skeletal Structure of the Sponge

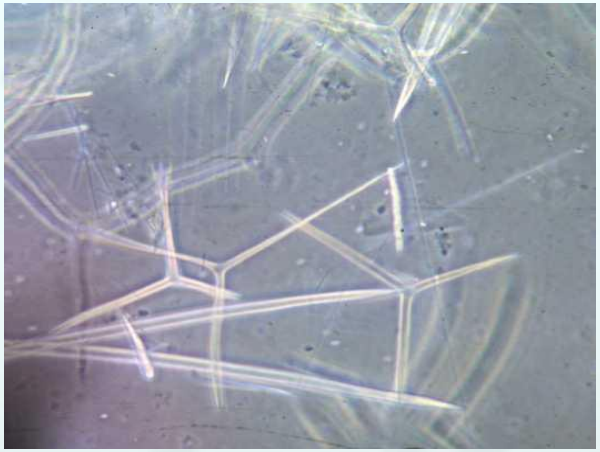
- Skeleton made of network of protein fibers called **Spongin**
- **Spicules** are hard spear or star-shaped structures
- Spicules made of **$CaCO_3$** (limestone) or **silica** (glass)

Sponge Skeletons

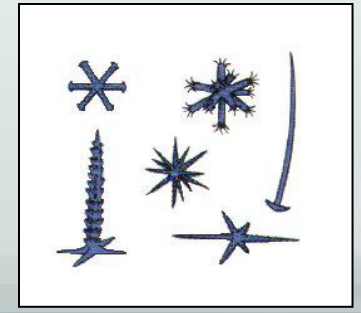


SPONGIN

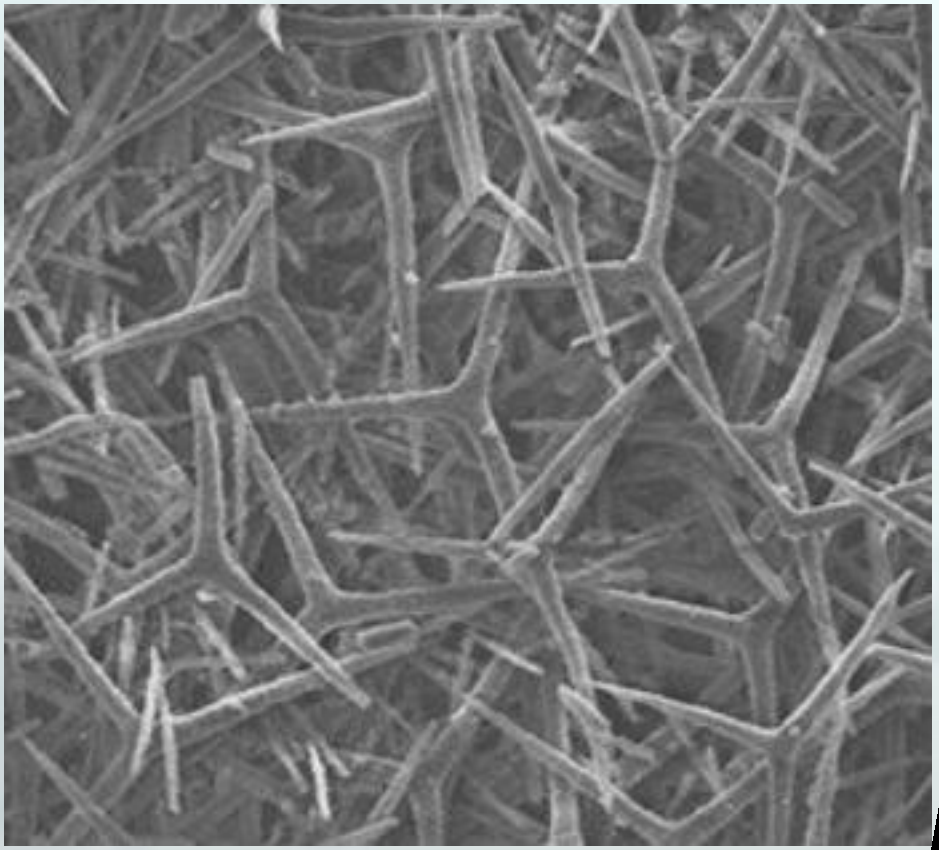
Silica Spicules



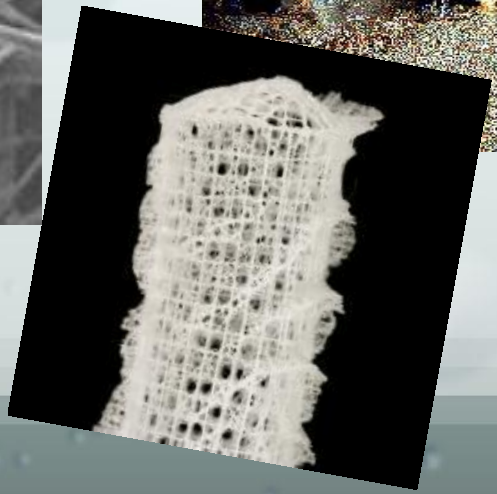
Limestone Spicules

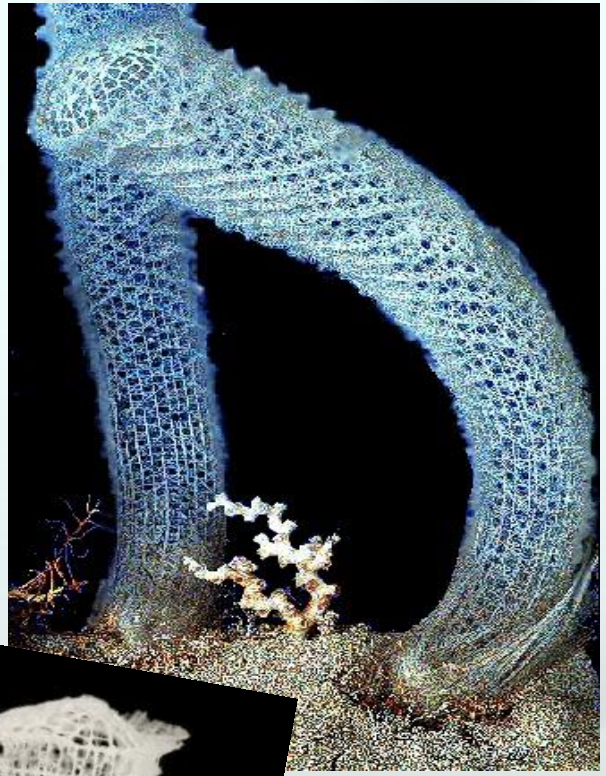


Sponge Skeletons



SPICULES





VENUS FLOWER BASKET

Sponge Reproduction

- Sponges can **regenerate** (regrow) lost body parts through mitotic cell division (asexual)
- Sponges also reproduce **asexually by budding**

Sponge Reproduction

- Sponges are hermaphrodites (produce both eggs & sperm)
- Sponges reproduce Sexually by releasing eggs & sperm into the water from the Osculum
- Cross-fertilize each other's eggs

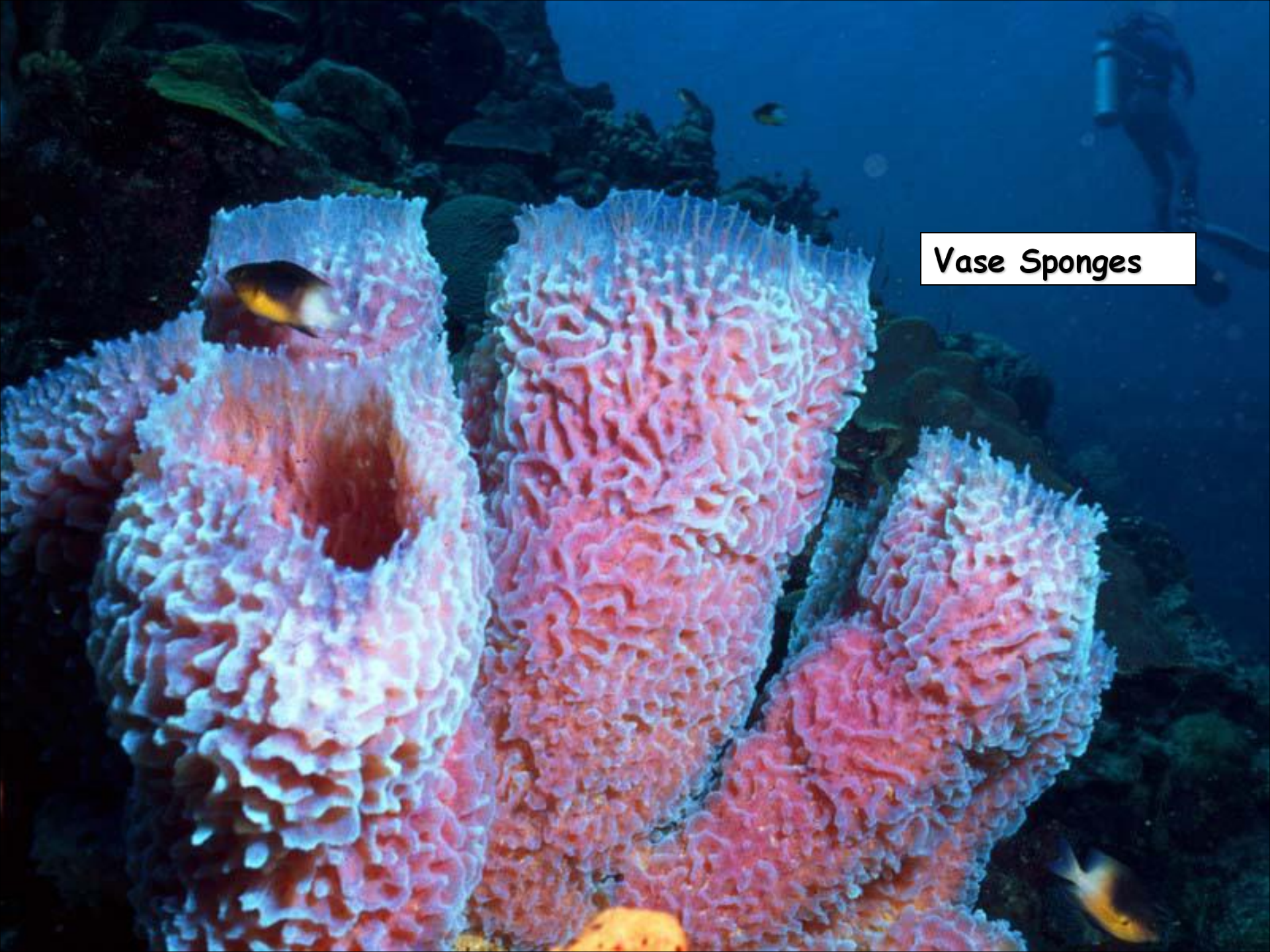
Sponge releasing eggs & sperm

Surviving Harsh Conditions

- **Gemmules** are specialized buds made to survive harsh weather (hot or cold)
- Contain **food, amebocytes**, and a **protective covering** of spicules
- Released when a **sponge dies**
- Resist **dessication** (drying out)
- Become adult sponge **conditions become favorable**


Branching Tube Sponge


Stove Pipe Sponge


Vase Sponges


Barrel Sponges

Ball Sponges

Rope Sponges