



Sponges

A Detailed Approach

What makes a sponge?

- Asymmetrical or superficially radially symmetrical
- Three cell types
- Central cavity, or branching chambers
- No tissues or organs

Cell types 1

- Pinacocytes
 - Outer surface
 - Mildly contractile
 - May change shape of sponge
 - Porocytes – tubelike and contractile, reg. water

Cell Types 2

- Mesohyl (Gr. *meso*, middle + *hyl*, matter)
 - Jellylike layer
 - Mesenchyme cells
 - Amoebocytes/archaeocytes
 - Reproduction
 - Building skeleton
 - Food transport and storage
 - Contractile rings around openings

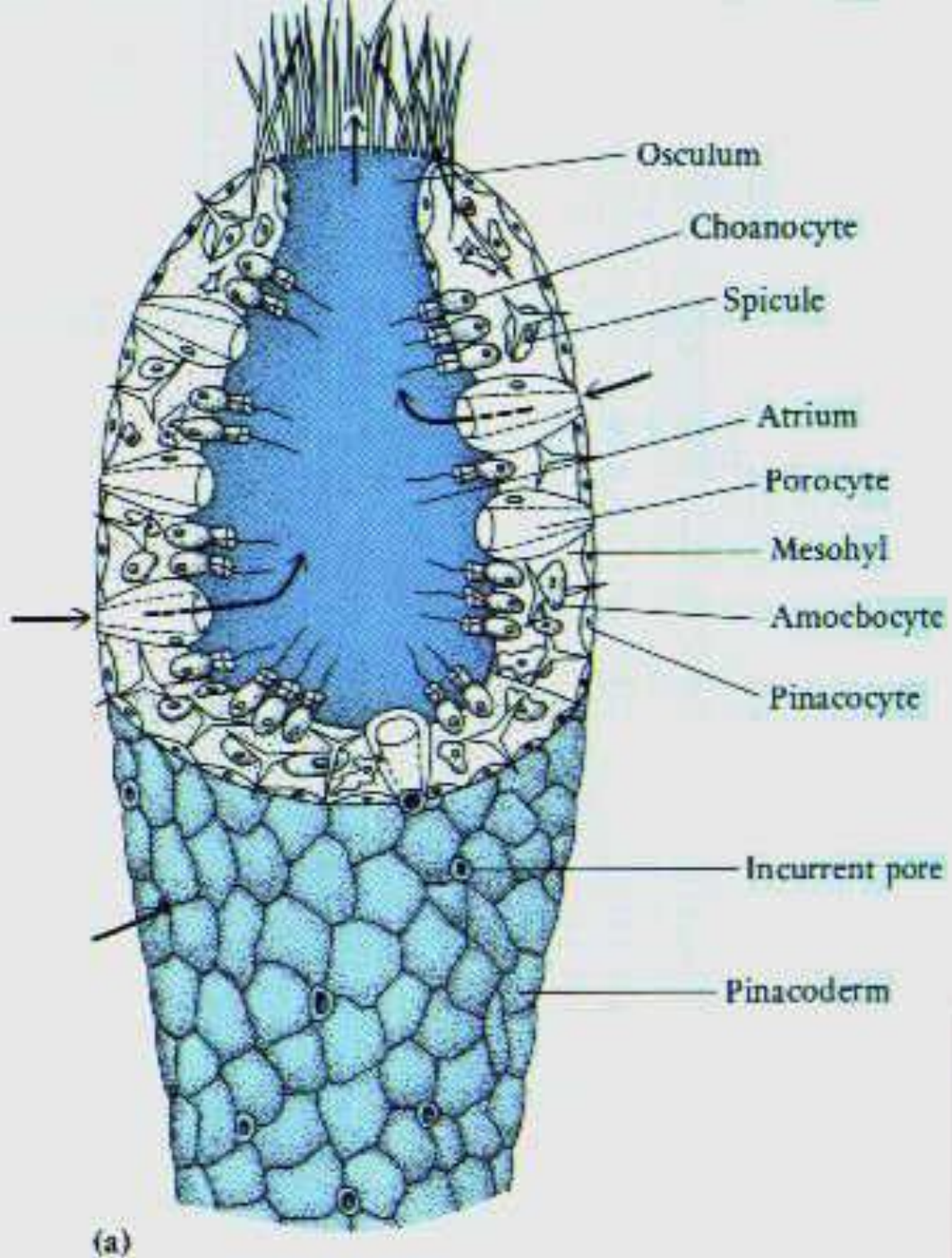
Cell Types 3

- Choanocytes (Gr. *choane*, funnel + *cyte*, cell)
 - Flagellated, collared cell
 - Pulls water into sponge
 - Filters out food

Skeleton

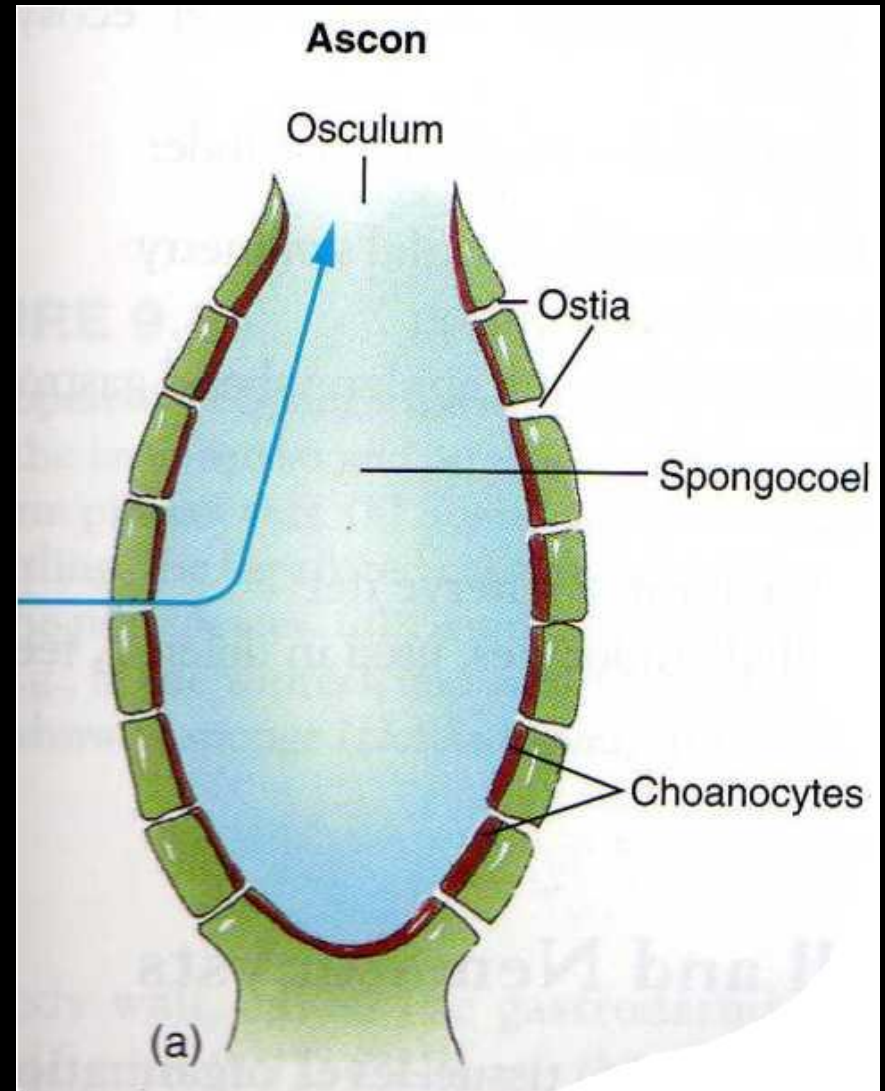
- Spicules
 - Microscopic needlelike spikes
 - Made of calcium carbonate or silica
 - Variety of shapes
- Spongin
 - Fibrous protein made of collagen
 - Commercial sponges

Voila!



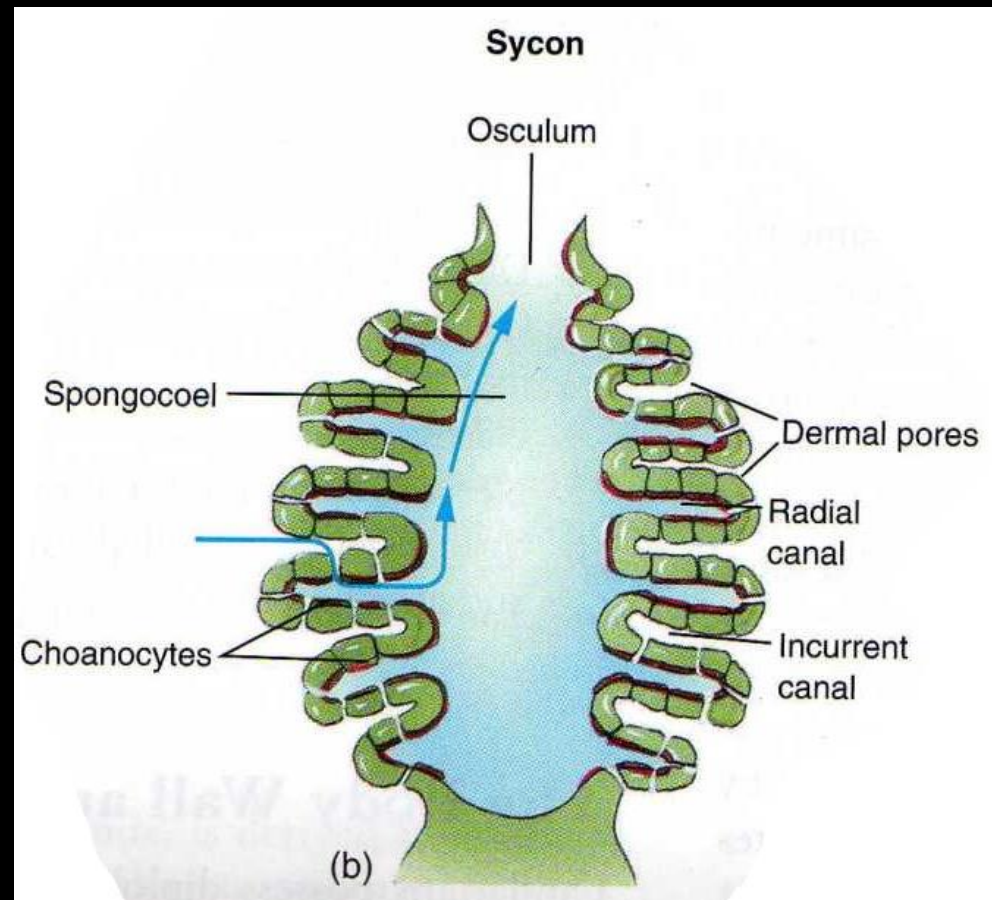
Body Forms 1

- Ascon form
 - Vase like
 - Simplest and least common
- Ostia – Outer opening of porocyte
- Spongocoel – Central cavity



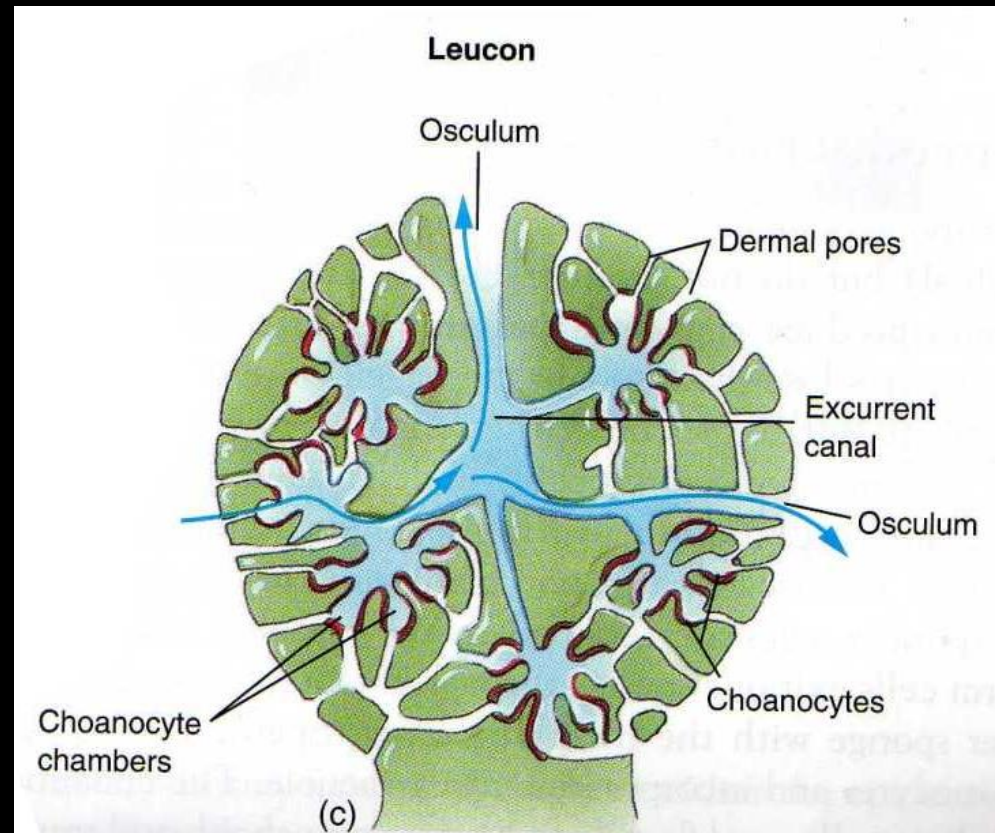
Body Forms 2

- Sycon form
 - Outer wall appears folded
 - Water enters through dermal pores
 - Incurrent canals
 - Radial canals



Body Forms 3

- Leucon form
 - Most common
 - Extensive branched canal system
 - Excurrent canals



Maintenance Functions

- Sponges draw their prey in slowly
- Large populations decrease turbidity of coastal waters
- Small leucon sponge 1 cm diameter and 10 cm tall can filter 20 L of water a day!

Extreme Feeding (for sponges)

- Some deep sea sponges are carnivorous, eating small crustaceans
- Pinacocytes lining incurrent canals may phagocytize larger food particles



Response

- No nerve cells
- Responses are reactions of individual cells
- Water circulation
 - At maximum just before sunset
 - Sunlight inhibits constriction of cells around ostia

Response (cont'd)

- Water circulation may cease
- Choanocytes stop working simultaneously
- Signals some kind of internal communication

Sexual Reproduction

- Most sponges are monecious (both sexes at same time)
- Self fertilization is rare
- Produce egg and sperm at different times

Sexual Reproduction (cont'd)

- Choanocytes lose collar and undergo meiosis to form sperm
- Choanocytes and/or amoeboid cells undergo meiosis to form eggs

Sexual Reproduction (cont'd)

- Sperm and eggs are released via oscula
- Fertilization often occurs in the ocean
- In some sponges, eggs stay in the mesohyl
- Choanocytes become amoeboid and carry sperm to egg

Larva

- Spend no more than 2 days motile before settling down

Asexual Reproduction

- More common in freshwater sponges
- When parent sponge dies in winter, releases gemmules

Asexual Reproduction (cont'd)

- Gemmules
 - Contain masses of amoeboid cells
 - Survive freezing and drying
 - Waits for good conditions
 - Amoeboid cells stream out of a tiny opening called the micropyle to form a sponge

Regeneration

- Small portions separated from original can grow into a new sponge