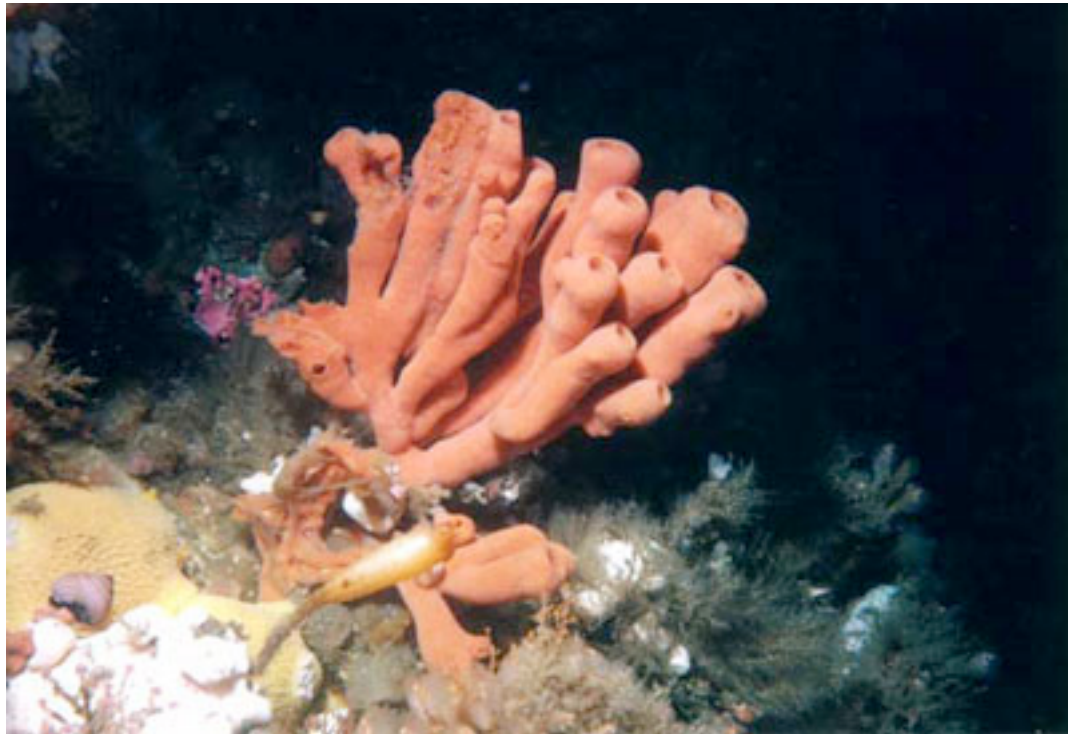
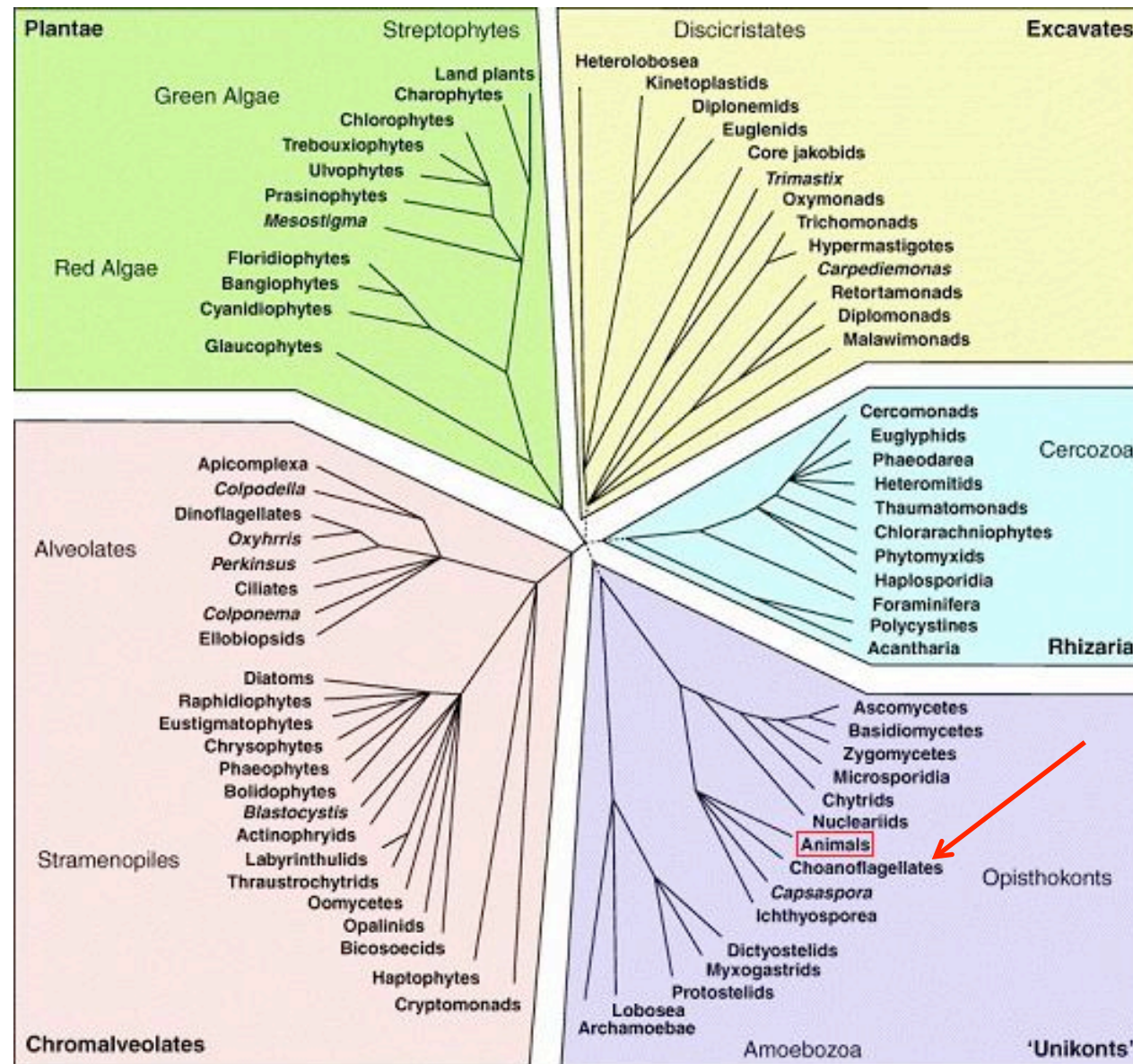


Diversity of Life – Animals

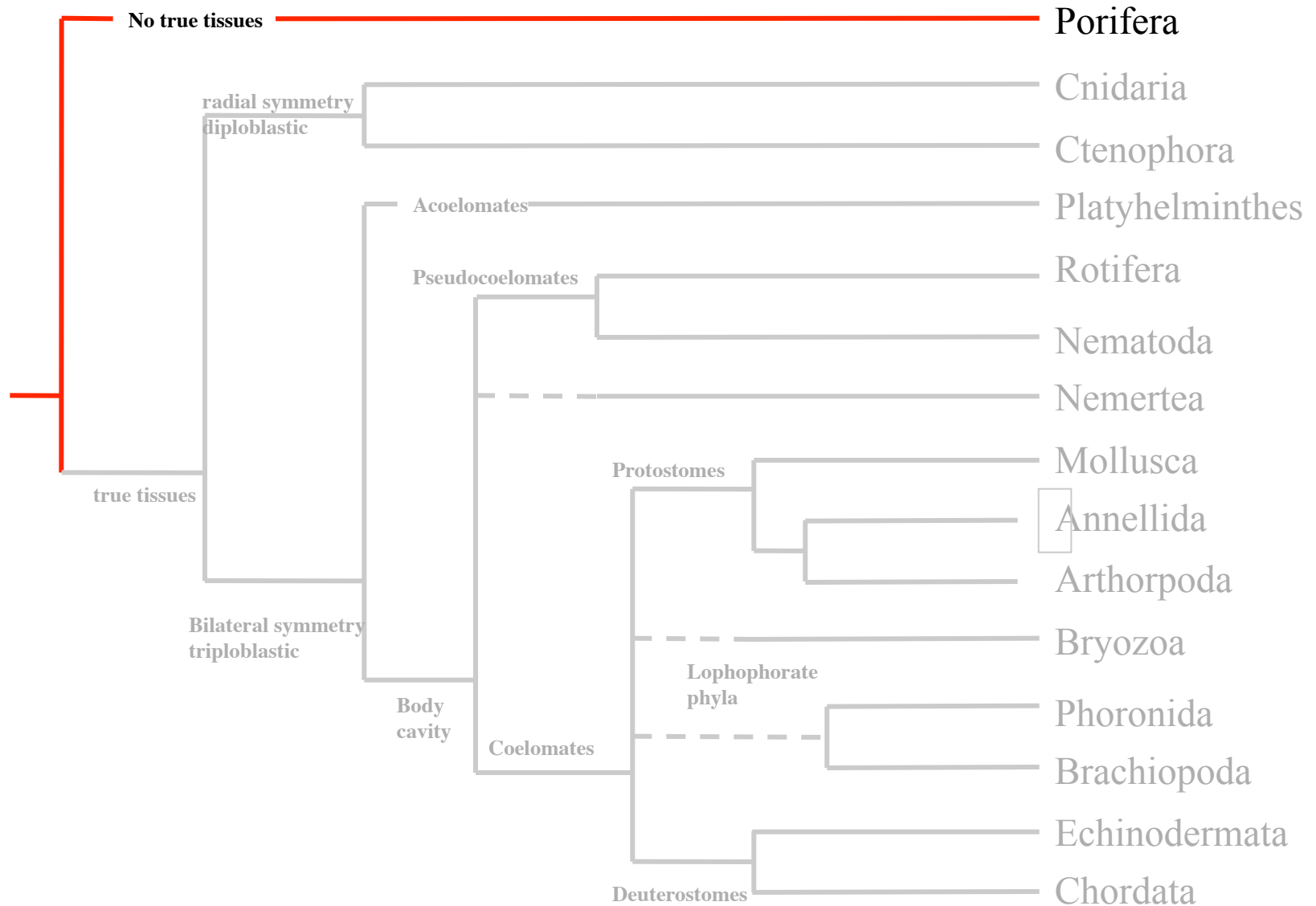
PORIFERA – The Sponges



A Phylogeny of the Eukaryotes



A Phylogeny of the Animal Phyla



First Step – Evolution of Multicellularity

Three Theories

1. Symbiotic Theory: Two or more unrelated organisms "cooperated" in a symbiotic relationship - became so specialized and dependent on one another that they fused genetically into a single organism.

Validity?

Unlikely – lots of symbiotic relationships with no genetic fusion

2. Syncytial Theory: Multinucleate protists or slime molds may have evolved cellular membranes between their floating nuclei (organisms with multinucleate cytoplasms are said to be syncytial).

Validity?

Unlikely – nuclei in syncytial organisms have different functions

First Step – Evolution of Multicellularity

Three Theories

Colonial Theory: Involves symbiosis within a species - such relationships can be seen in extant species (*Volvox*, etc.).

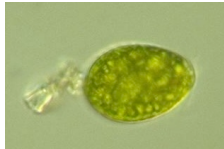
Validity

Theory with the most evidence supporting it.

First Step – Evolution of Multicellularity

Three Theories

Colonial Theory – Hypothesized steps



Chlamydomonas



Euglena

1. Flagellated protists

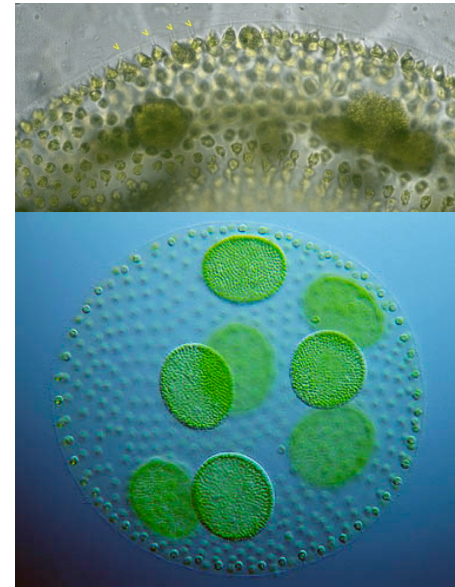


Pandorina



Eudorina

2. Groups of flagellated cells surrounded by a capsule



Volvox

3. Large colonial groups

Choanoflagellates

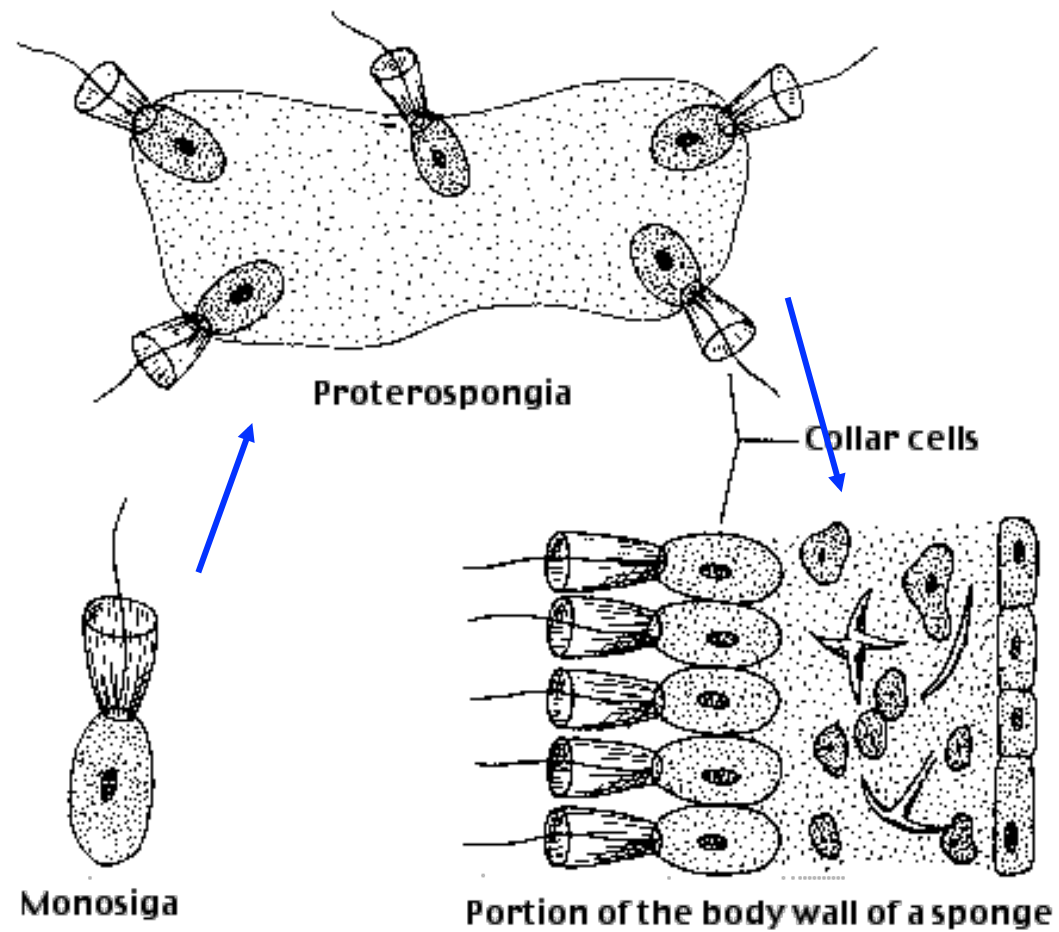


Choanoflagellates



Monosiga

Hypothesized Origins of Sponges



Porifera - the sponges

- Description

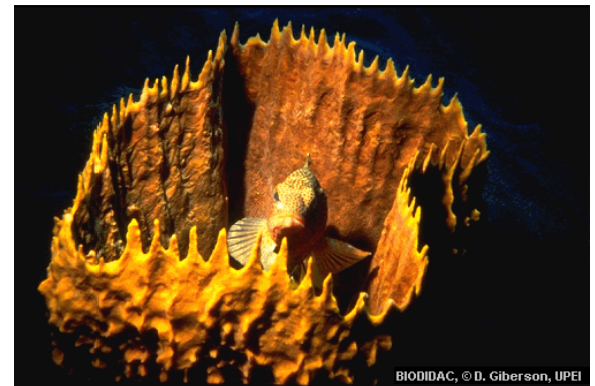
Sponges are

- sessile (= don't move)
- have no true tissue
- suspension feeders



Porifera - the sponges

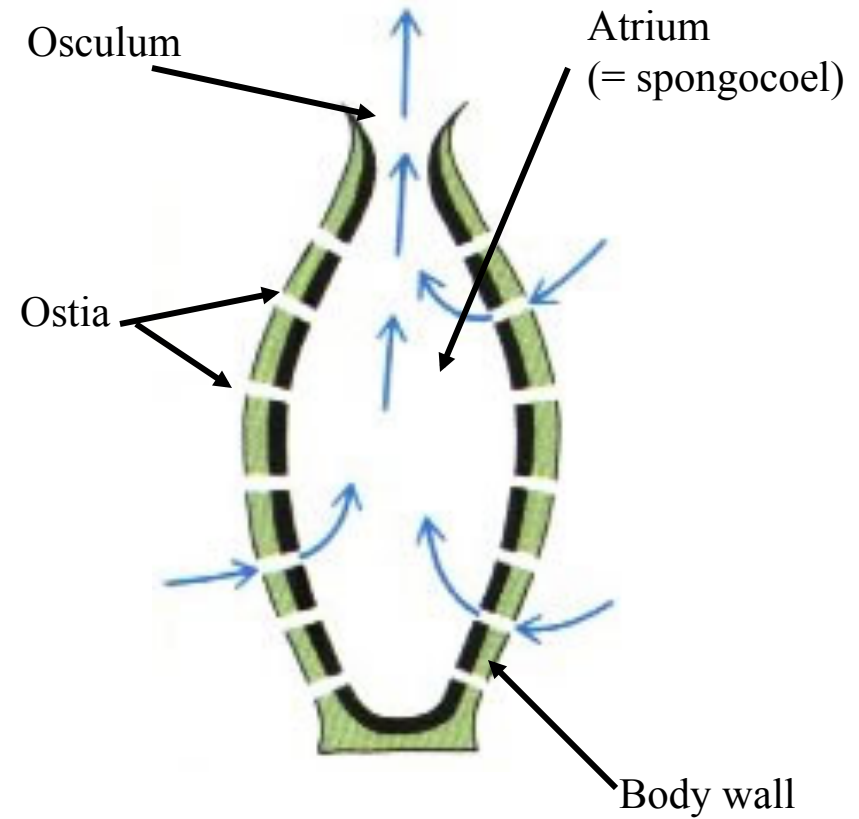
Come in a wide variety of shapes and sizes



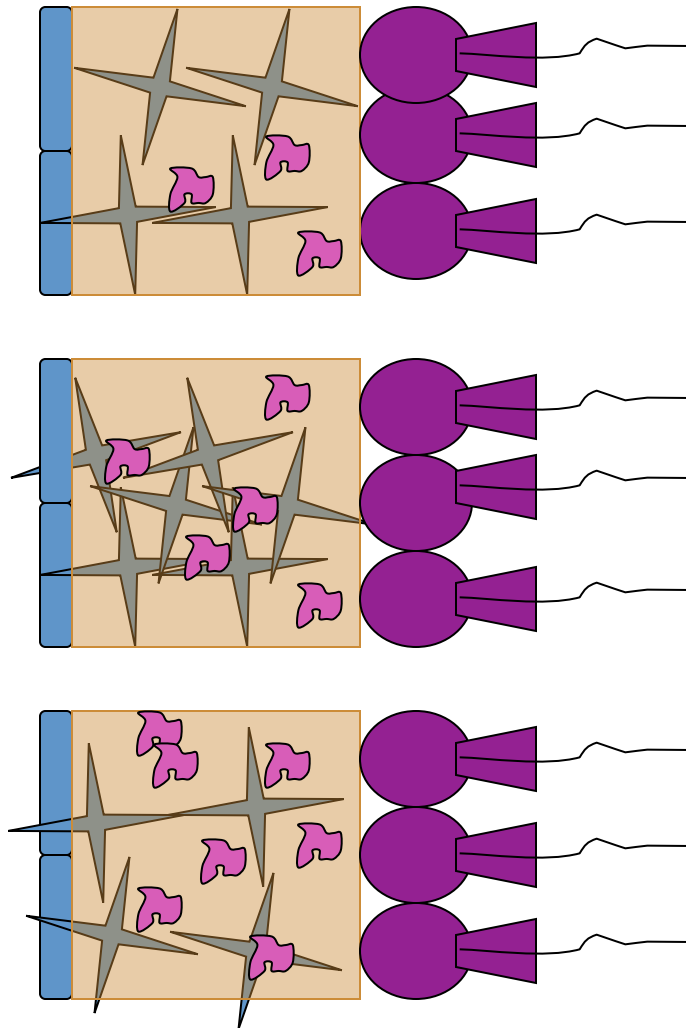
Sponge structure



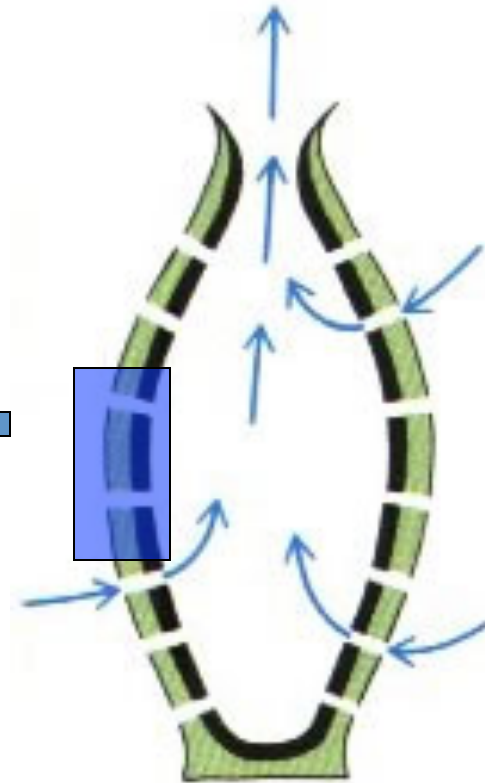
1. **General structure**
2. **Cell types**
3. **Support**
4. **Water flow and feeding**
5. **Reproduction**



Sponge structure - Cell types

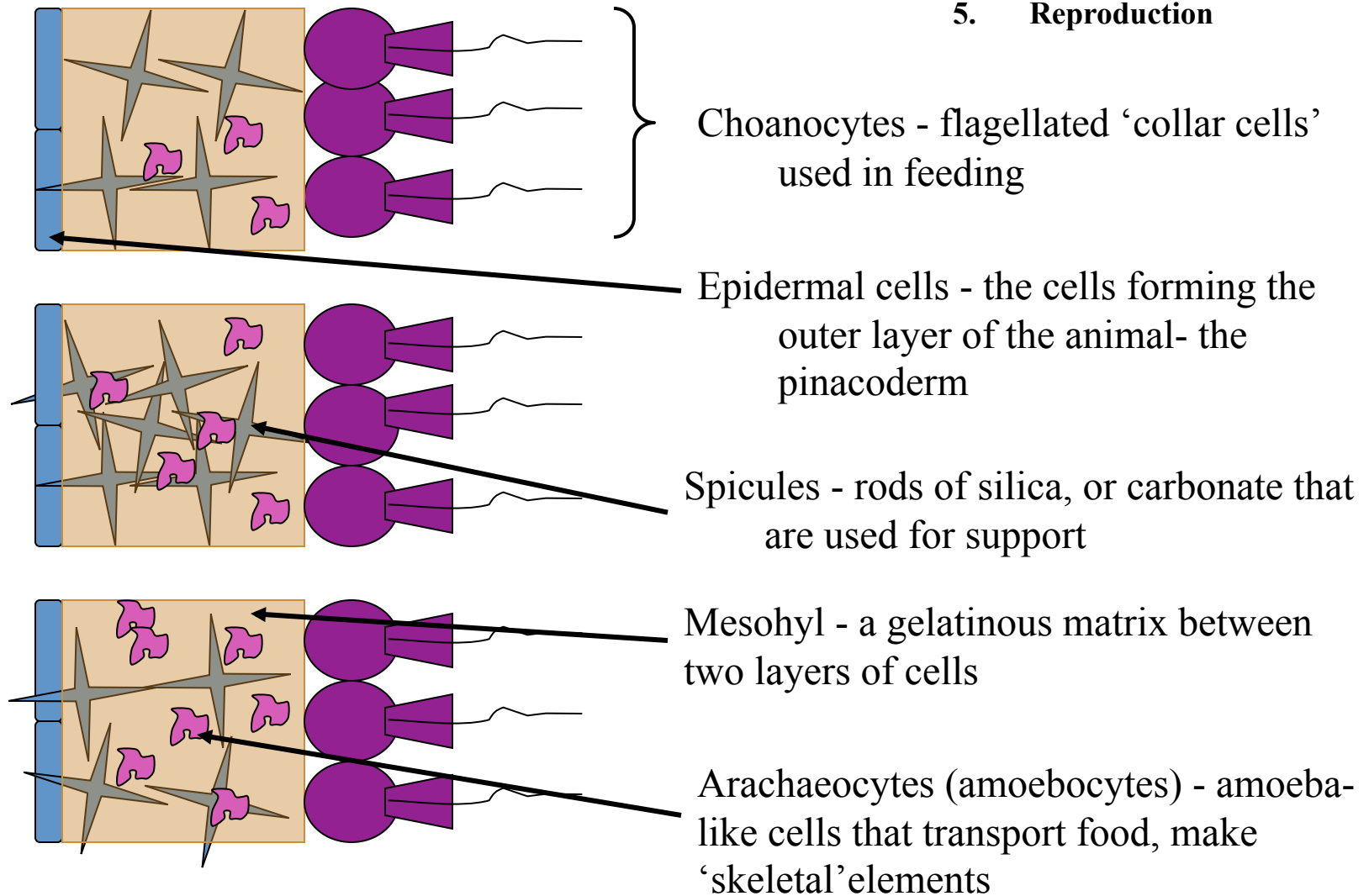


1. **General structure**
2. **Cell types**
3. **Support**
4. **Water flow and feeding**
5. **Reproduction**



Sponge structure - Cell types

1. General structure
2. **Cell types**
3. Support
4. Water flow and feeding
5. Reproduction



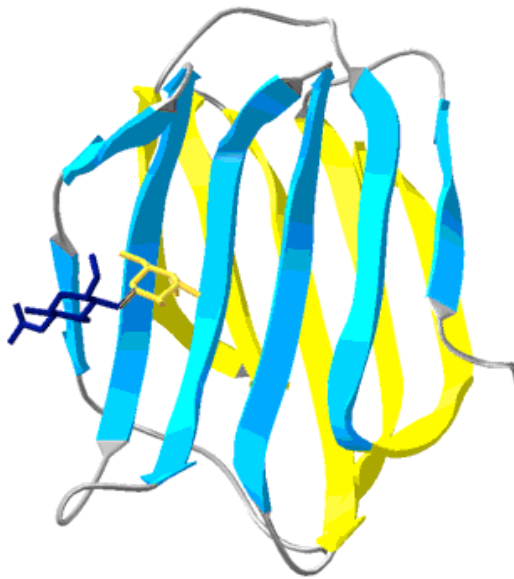
Sponge structure - Support

1. General structure
2. Cell types
3. **Support**
4. Water flow and feeding
5. Reproduction

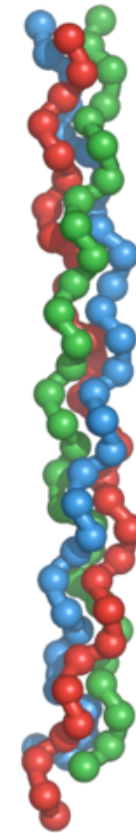
Mesohyl - gelatinous matrix



Fibrinonectin



Galectin

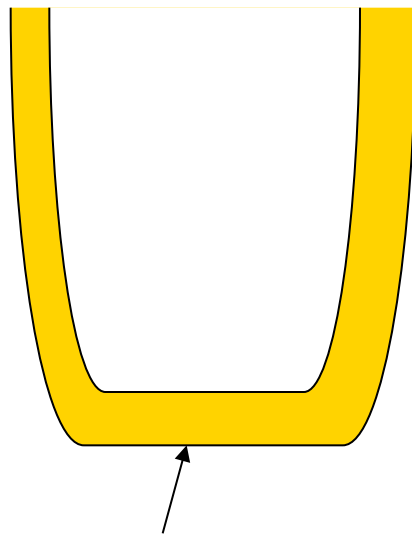


Collagen

Sponge structure - Support

1. General structure
2. Cell types
3. **Support**
4. Water flow and feeding
5. Reproduction

Without support the mesohyl would collapse

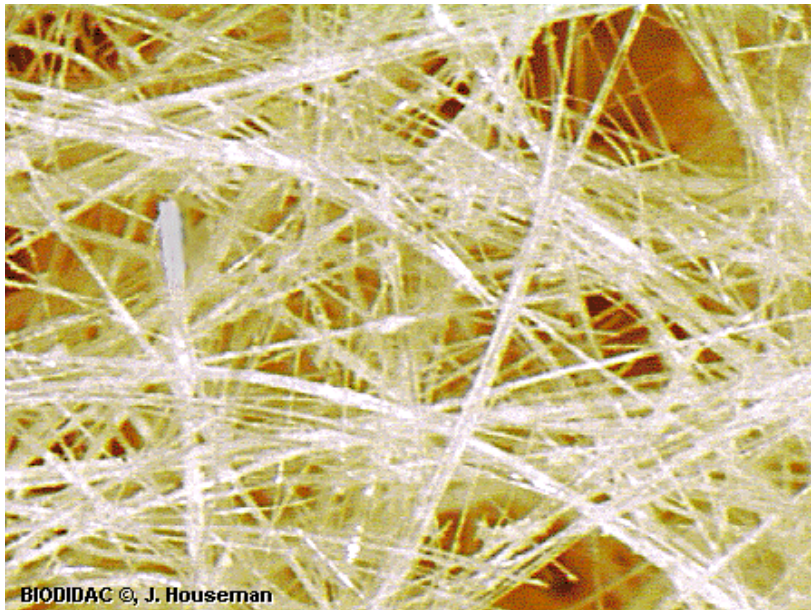


mesohyl

Sponge structure - Support

1. General structure
2. Cell types
3. **Support**
4. Water flow and feeding
5. Reproduction

Sponges get support from a network of **spicules** embedded in the mesohyl



Same principle as putting straw in mud bricks



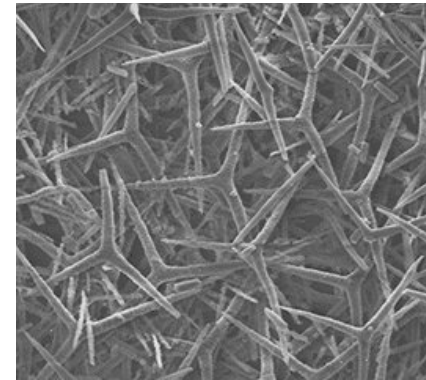
Sponge structure - Support

1. General structure
2. Cell types
3. **Support**
4. Water flow and feeding
5. Reproduction

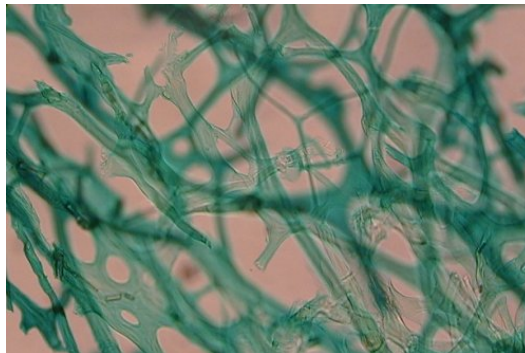
Spicules can be made from different materials



Siliceous [Silica (SiO_2)]



Calcareous [Calcium (CaCO_3)]

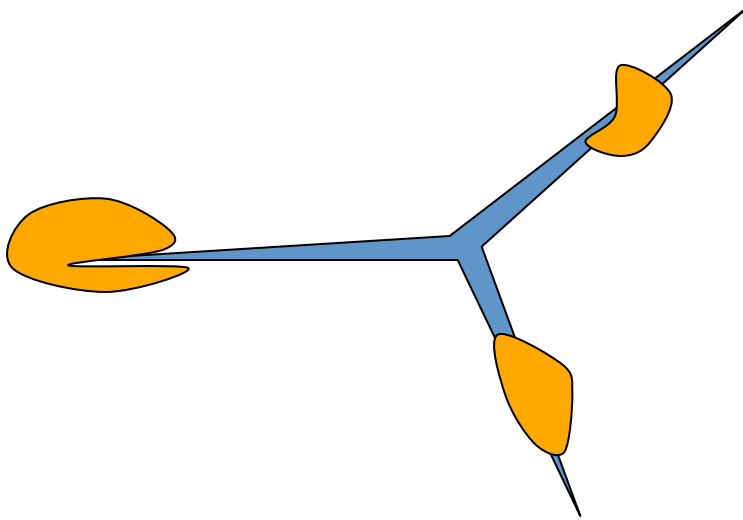


Spongin [Protein]

Sponge structure - Support

1. General structure
2. Cell types
3. **Support**
4. Water flow and feeding
5. Reproduction

Spicules can be made from different materials

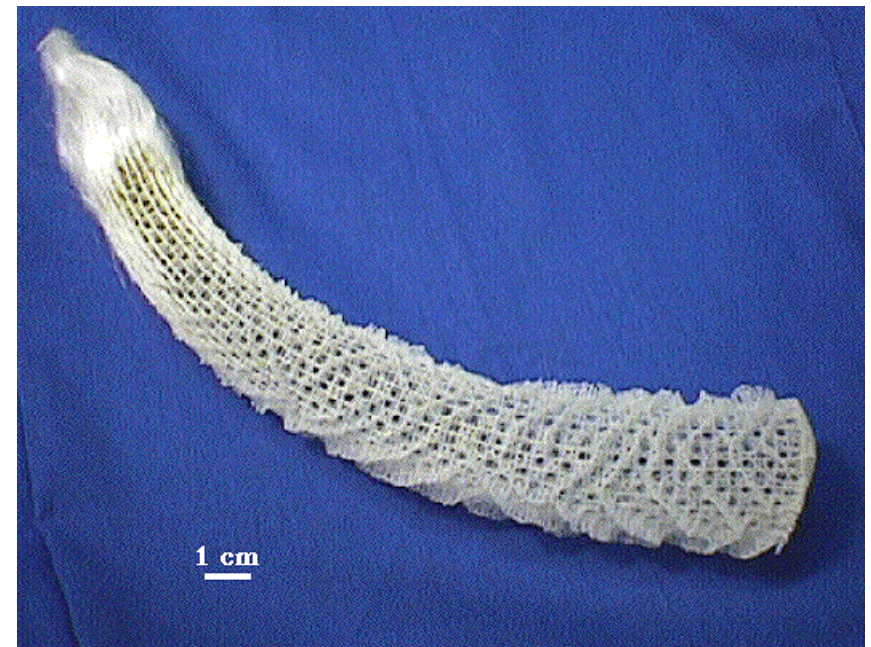
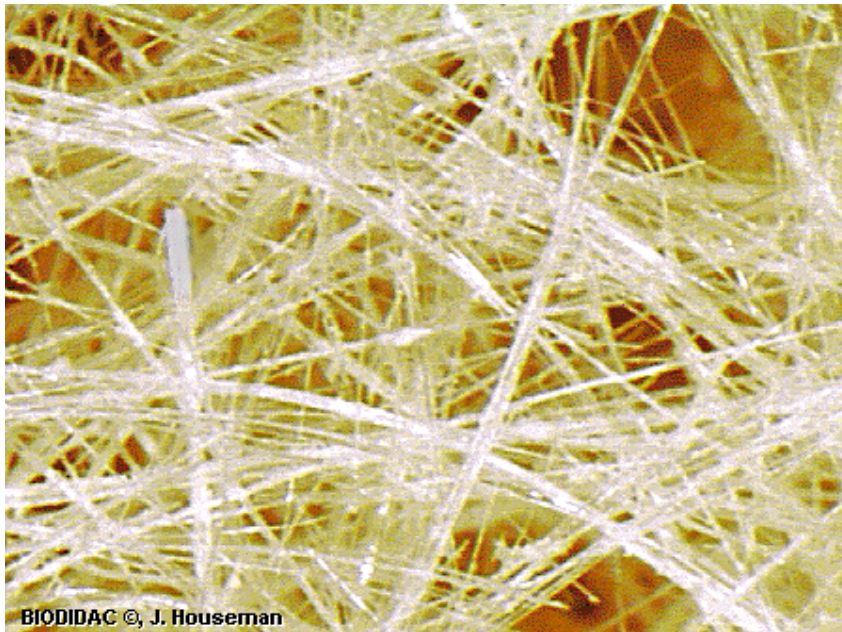


-siliceous and calcareous
spicules are secreted by
specialized amoebocytes

Sponge structure - Support

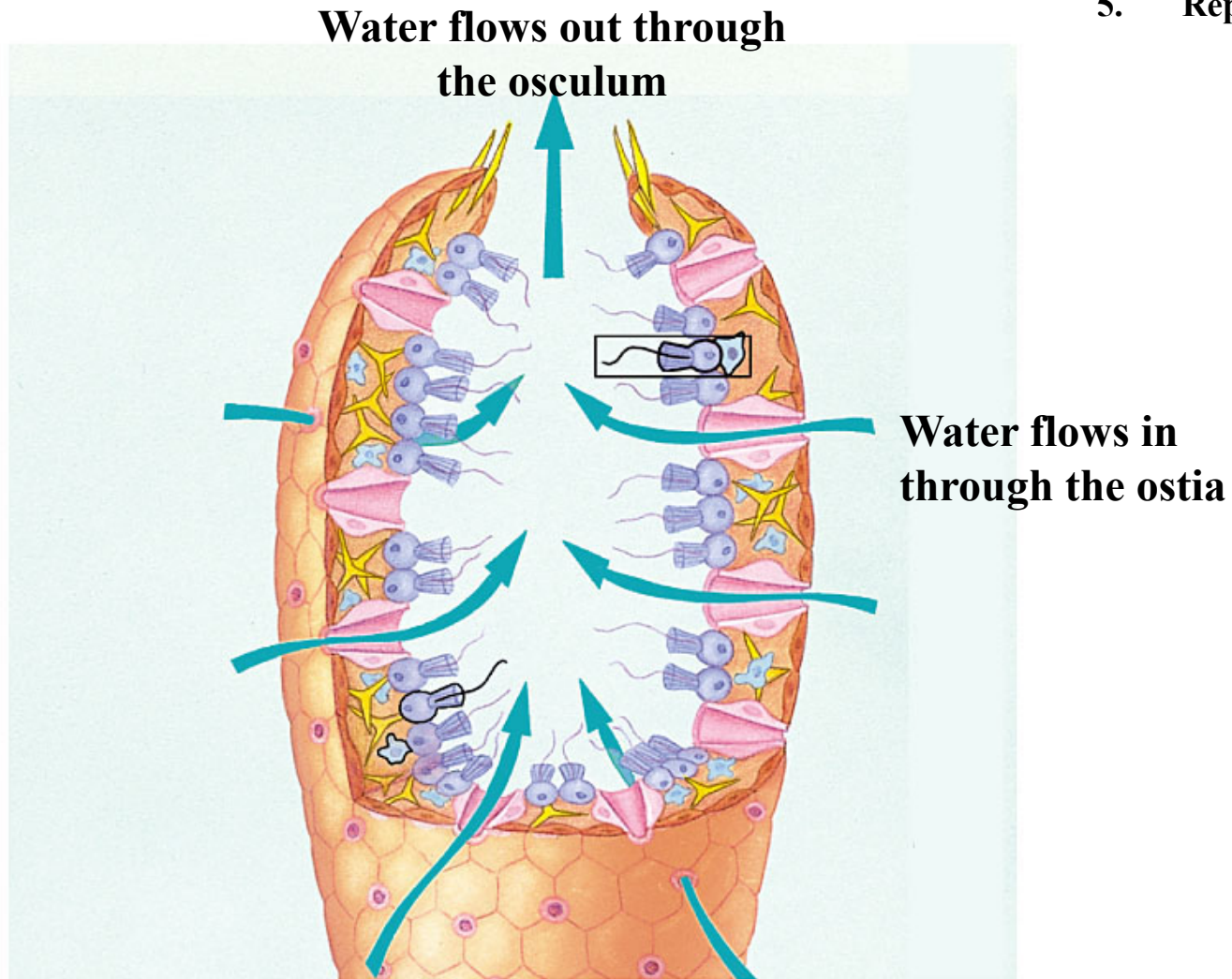
1. General structure
2. Cell types
3. **Support**
4. Water flow and feeding
5. Reproduction

Arrangement of spicules can be haphazard or very precise



Sponge structure - Feeding

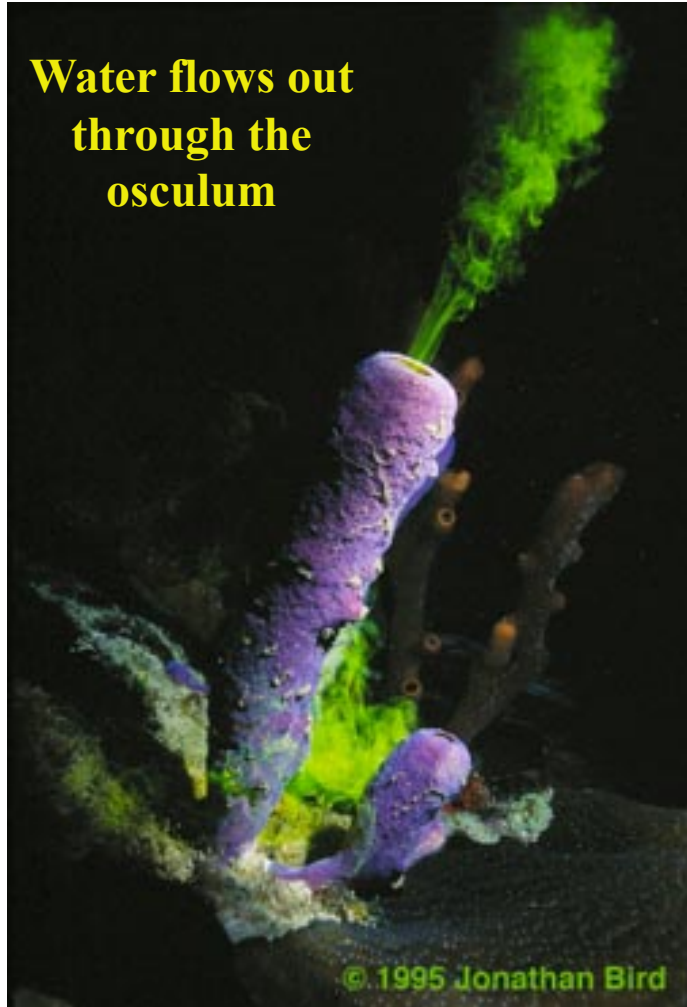
1. General structure
2. Cell types
3. Support
4. **Water flow and feeding**
5. Reproduction



Sponge structure - Feeding

1. General structure
2. Cell types
3. Support
4. **Water flow and feeding**
5. Reproduction

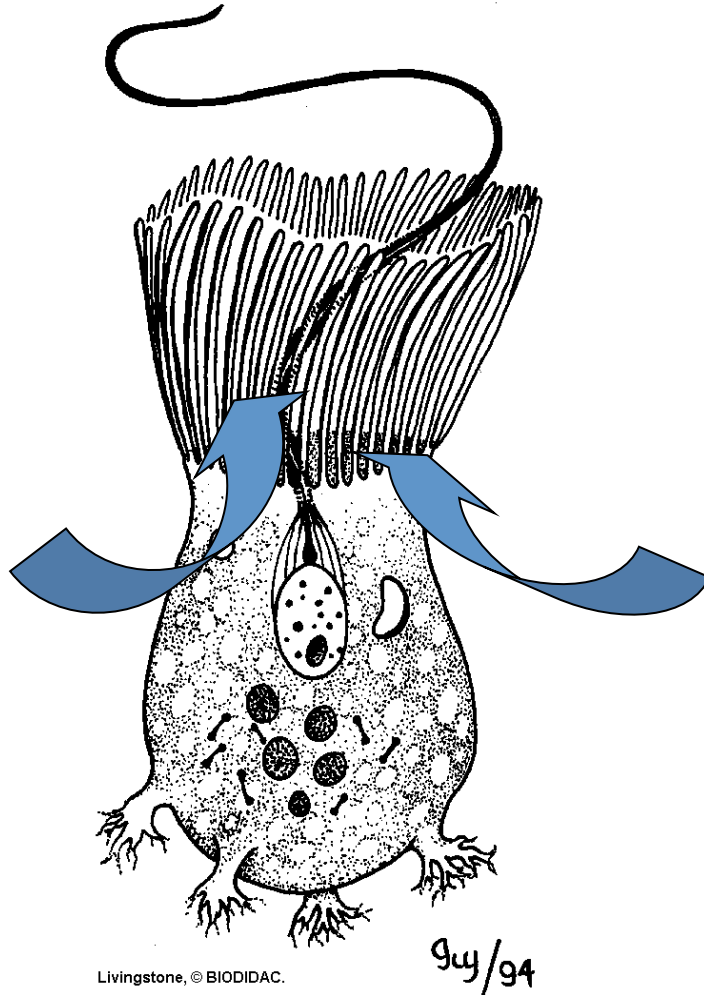
**Water flows out
through the
osculum**



**Water flows in
through the ostia**

Sponge structure - Feeding

1. General structure
2. Cell types
3. Support
4. **Water flow and feeding**
5. Reproduction



Water flow is generated
by the beating of the flagella
in the choanocytes

Sponge structure - Feeding

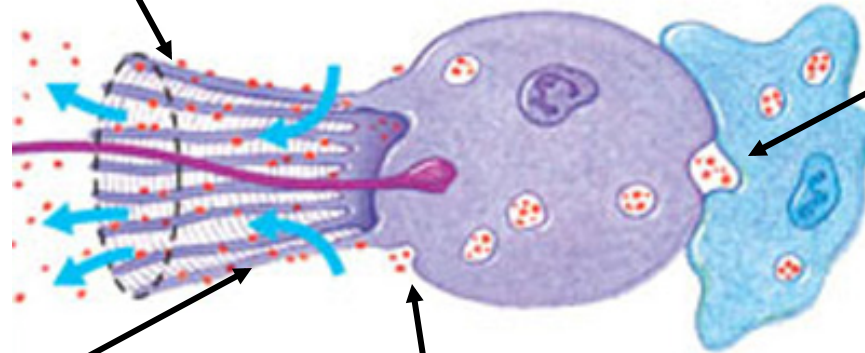
1. General structure
2. Cell types
3. Support
4. **Water flow and feeding**
5. Reproduction

Food particles trapped on collar

Food particles transferred to ameobocyte

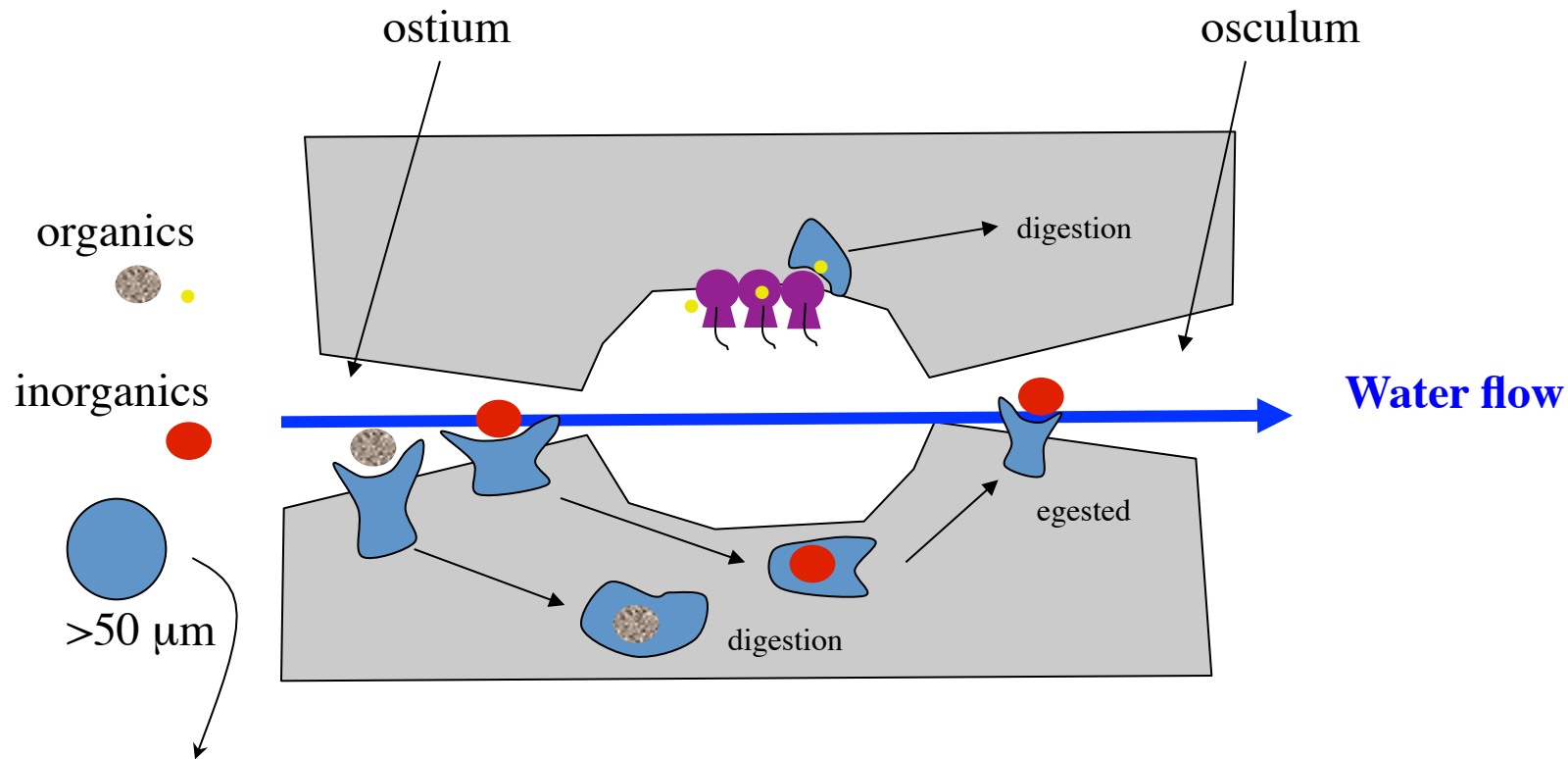
Food particles transported down the collar

Food particles absorbed by cell



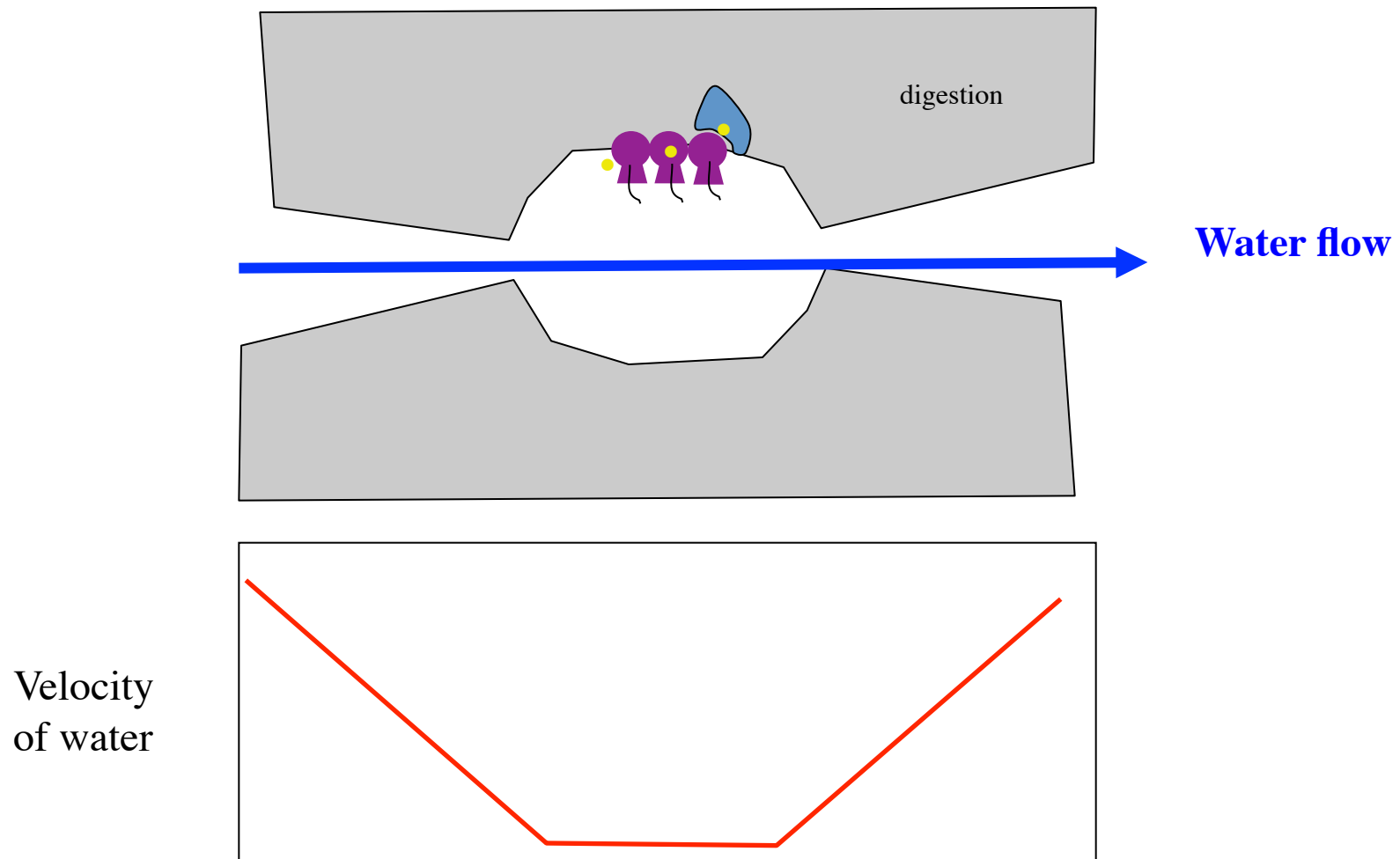
Sponge structure - Feeding

1. General structure
2. Cell types
3. Support
4. **Water flow and feeding**
5. Reproduction

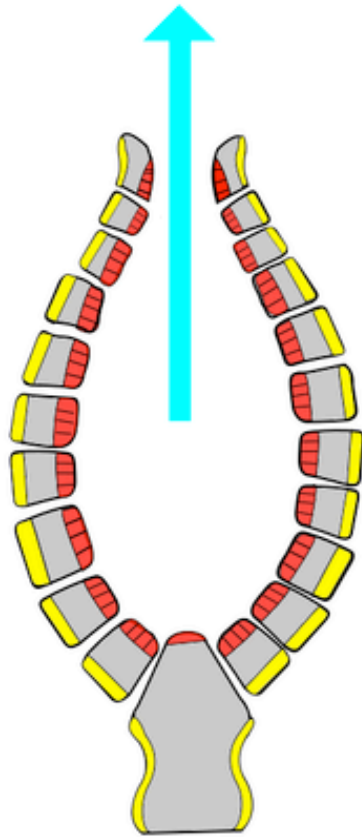


Sponge structure - Feeding

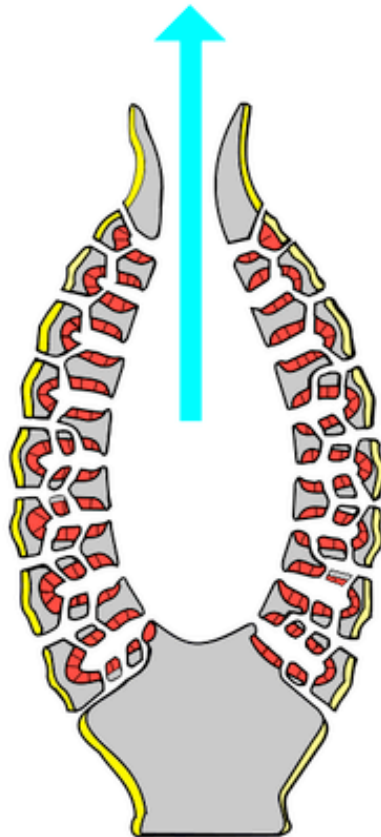
1. General structure
2. Cell types
3. Support
4. **Water flow and feeding**
5. Reproduction



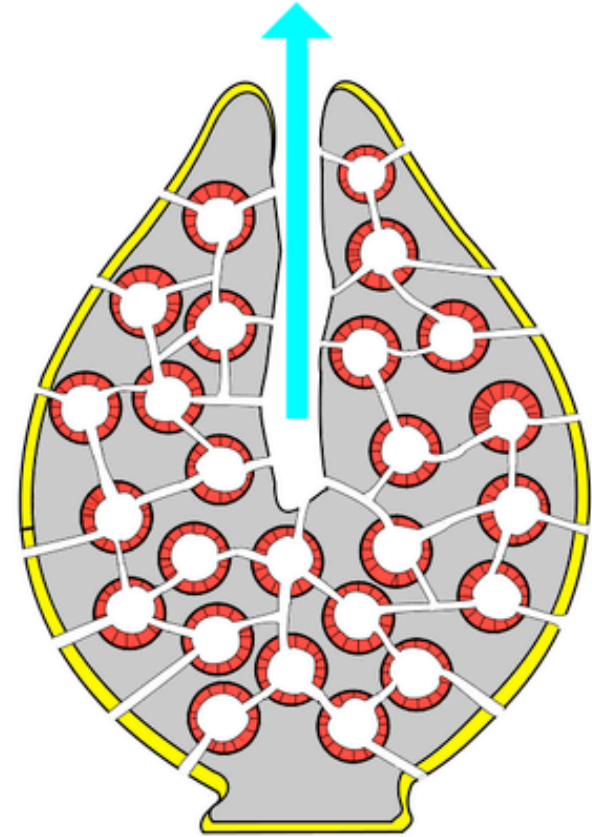
Types of Sponges



Asconoid



Syconoid



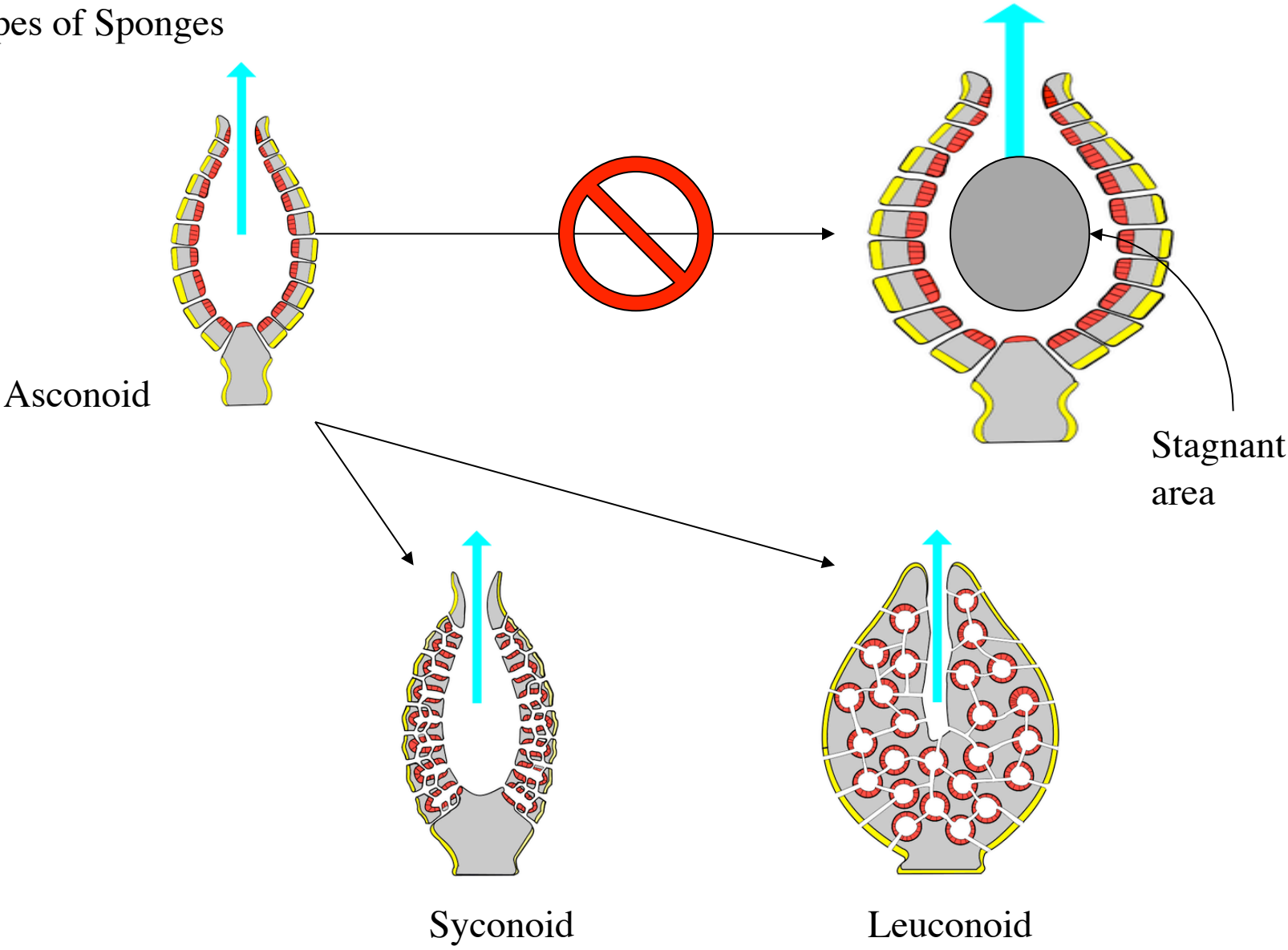
Leuconoid

Increase in efficiency



Increase in SA/Vol ratio

Types of Sponges

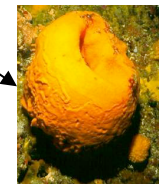
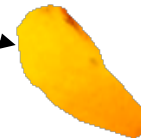


Sponge Reproduction

1. General structure
2. Cell types
3. Support
4. Water flow and feeding
5. **Reproduction**

1. Asexual

a. Fragmentation

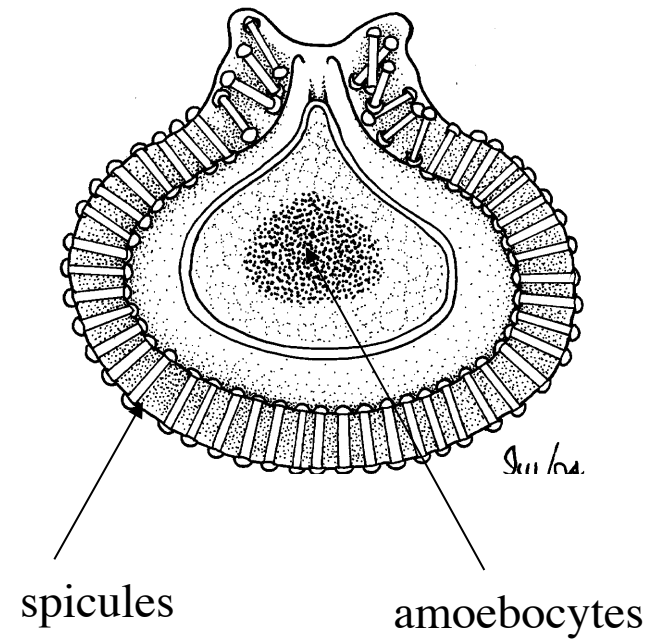
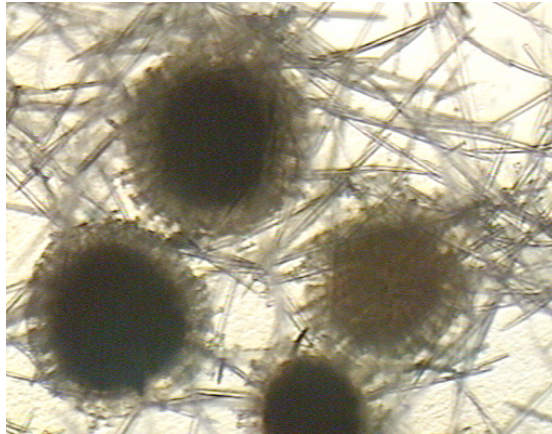


Sponge Reproduction

1. General structure
2. Cell types
3. Support
4. Water flow and feeding
5. **Reproduction**

1. Asexual

- a. Fragmentation
- b. Budding
- c. Gemmules



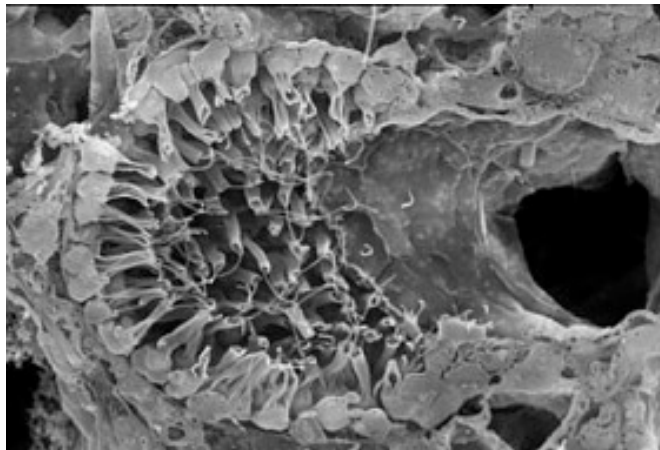
Sponge Reproduction

2. Sexual

All sponges are hermaphrodites

Development of sperm

1. General structure
2. Cell types
3. Support
4. Water flow and feeding
5. **Reproduction**



choanocyte
chamber



choanocyte

or

Sink into mesohyl → Form spermatocyst

Sponge Reproduction

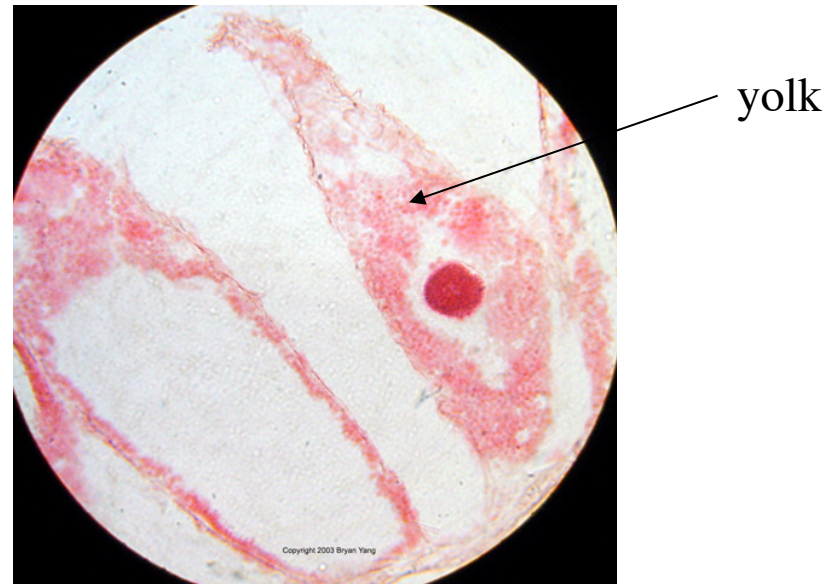
2. Sexual

All sponges are hermaphrodites

Development of eggs

1. General structure
2. Cell types
3. Support
4. Water flow and feeding
5. **Reproduction**

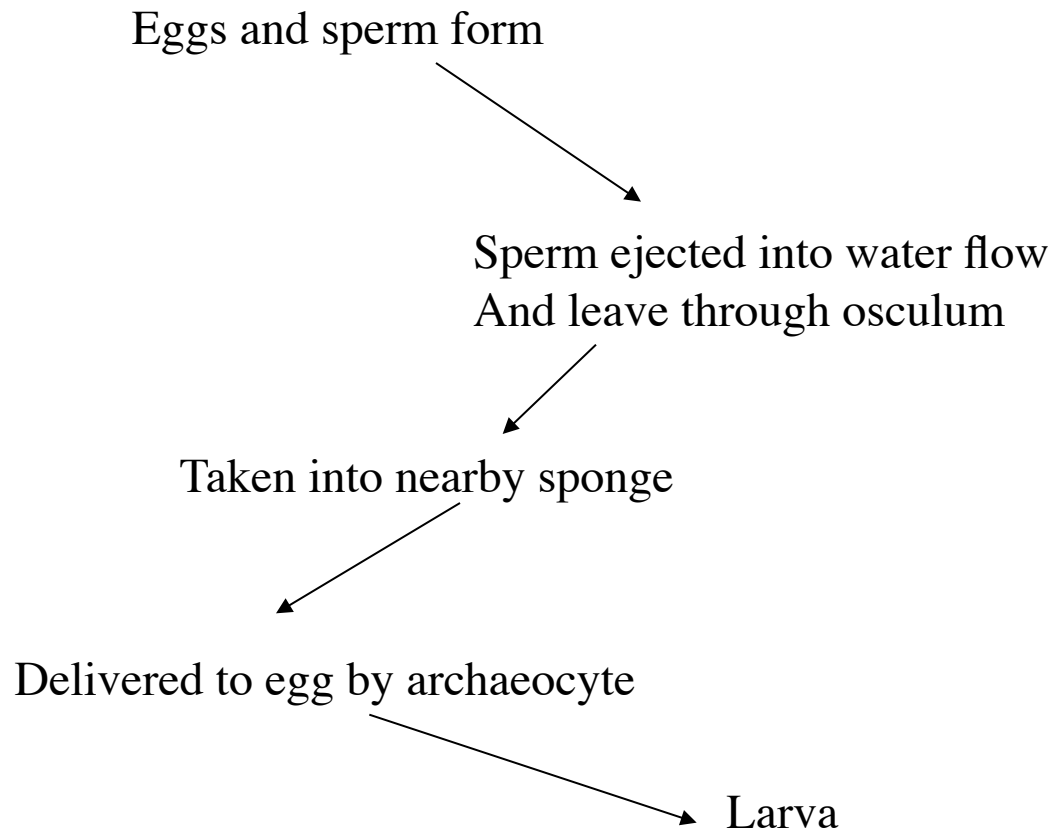
archaeocyte → engulfs adjacent cells (yolk)



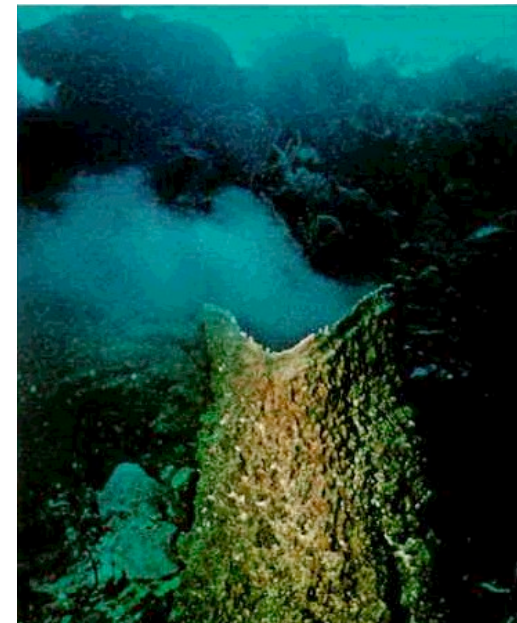
Sponge Reproduction

2. Sexual

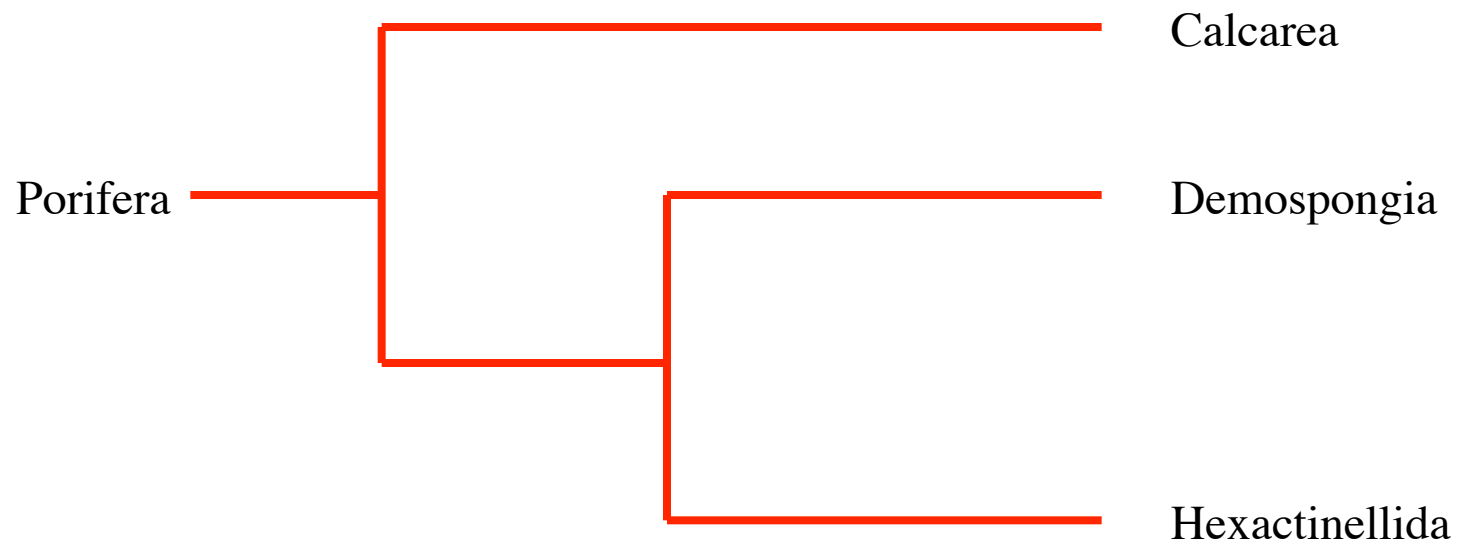
All sponges are hermaphrodites



1. General structure
2. Cell types
3. Support
4. Water flow and feeding
5. **Reproduction**



Classification of Sponges



Numbers of species

