**Biology 102**

**Laboratory 4: Porifera & Cnidaria**

**Reading**:

*Inquiry into life*: Laboratory Manual – p. 377 – 387

**A: Taxonomy:**

Phylum Porifera (Sponges: p. 379 - 383)

Class Calcarea – Calcareous sponges

*Grantia*

Class Hexactinellidae – Glass sponges

Class Demospongiae – Horny sponges

Phylum Cnidaria (p. 383 – 387)

Class Hydrozoa (Hydriods and Siphonophores)

*Hydra*

*Obelia*

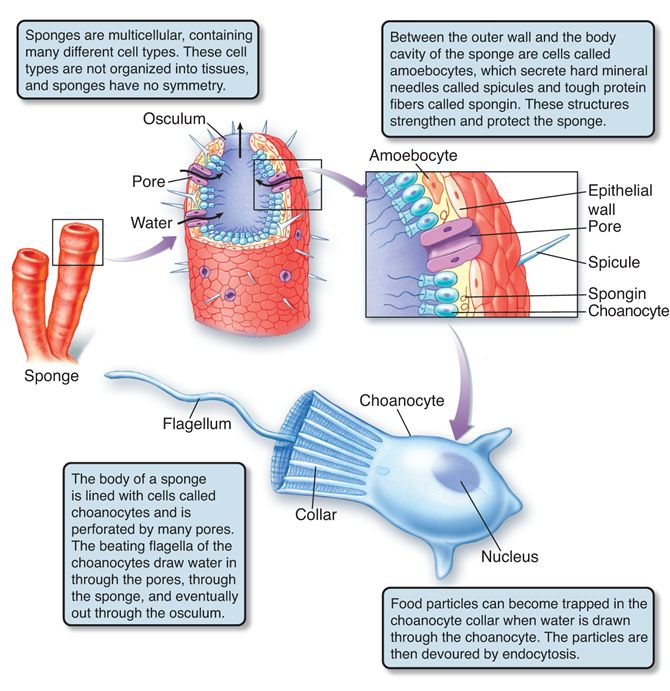
Class Scyphoza (True Jellyfish)  
  
 Class Anthozoa (Sea Anemones and Corals)

**B: Introduction**

In today’s lab, we will begin our journey into the animal kingdom. We will be investigating Sponges and Cnidarias, which are are invertebrates and lack a true body cavity.

***Porifera***

Porifera is latin for “pore bearing”. Sponges are multicelluar and have **a cellular level of organization.** Their cells do not form well organized and distinct layers, which means they lack tissues, organs, and organ systems. Adult sponges are **sessile,** meaningthey are **permanently attached** to their environment and not capable of moving. Because they are sessile, sponges have several adaptations for feeding.

Sponges are characterized as **filter feeders**, consuming bacteria size food particles that are floating in the water column. Examine the pore bearing structure located in the figure to understand how water flows through a sponge. The wall of a sponge has three types of cells: **epidermal** cells, **amoebocytes**, and **choanocytes.** To feed, this system of cells is able to move nutrient and oxygen rich water through the pores. Water enters through the pores and exits through the **osculum**. Choanocytes are **flagellated cells** that line the interior of the sponge, creating water currents with the flagellum, and filter food particles from the water column.

**Things to know:**

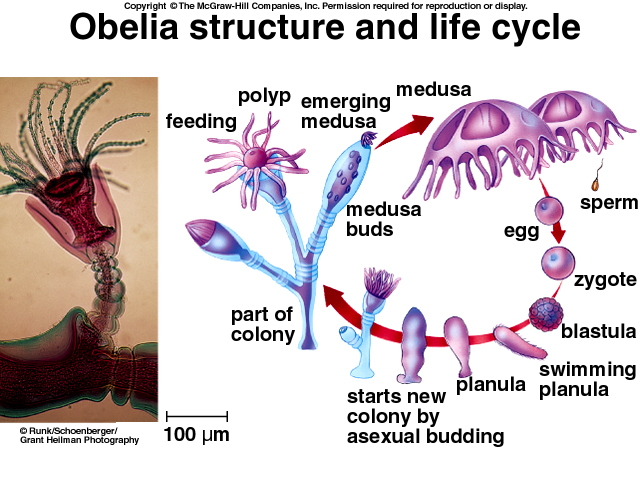
* Function of epidermal cells
* Function of choanocytes
* Function of amoebocytes
* How does water flow though a sponge?
* What are spicules?
* How does species in Porifera feed?

***Cnidaria***

Species in the phylum Cnidaria are characterized by having **tissue level of organization**. Their body plant is diploblastic, meaning they are composed of two germ layers. The outer epidermal tissue is derived from **embryonic ectoderm** and the inner epidermal tissue layer is derived from **embryonic endoderm**. There is a gelatinous connective tissue layer, **mesoglea**, which is between the ectoderm and endoderm. The mouth is the only opening to the gastrovascular cavity (coelenteron). The mouth is usually surrounded by **tentacles** that contain **nematocysts.**

All species in Cnidaria have specialized stinging cell called **nematocysts**. Each nematocysts develops in interstitial cells and has a small trigger-like projection that is sensitive to chemical or mechanical simulation by food, prey, or enemies. **Gland cells** produce mucoid secretions and digestive enzymes. Gland cells are located in the epidermal and gastrodermal layer.

The Cnidarian life cycleis composed of a free swimming medusa (sexual) or an attached polyp (asexual). In lab, we will be examining *Obelia* to better understand the Cnidarian life cycle.



**Things to know:**

* What is the polyp stage?
* What is the medusa stage?
* What are the specialized cells?
* Diploblastic
  + Endoderm
  + Mesoglea
  + Ectoderm

**C. Procedure**:

1. Prepared Slides: *Grantia c.s., Granita* spicules, *Hydra c.s.*, *Obelia*
2. Preserved specimens:
   1. Sponges (Glass, Bath, and Calcarerous sponges)
   2. Cnidaria (Sea anemone, jellyfish, and corals)
3. Live organisms: *Hydra* (predator) and *Dafnia* (prey)
4. ***Grantia* –** Obtain a prepared cross section (c.s) slide of the sponge, *Grantia.* Before observing with a microscope, hold the slide up to the light in the laboratory and notice how the cross section looks circular to the naked eye. This shows the **radial symmetry** of the sponge.   
     
   Observe the slide under low power, and you should notice that the majority of the sponge is a large, empty, cavity. This is called the **spongocoel**. Now focus on the body wall, you should see two canals. The canal that is open to the outside via the **ostium** (pores) is the **incurrent canal**. The other canal, which opens to the **spongocoel**, is called the **radial canal**. Before you draw the *Grantia* c.s., examine a preserve sponge and visualize cutting the sponge and making a cross section slide.

Draw *Grantia* (c.s.) and identify **spongocoel, incurrent canal,** and **radial canal.**

1. ***Grantia*****spicules –** Examine the (w.m.) slide of *Grantia* spicules. You should notice that spicules are rigid, geometric, and transparent. The spicules that you observe have three rays and are calcium carbonate. Spicules are embedded in the walls of sponges to provide support.  
     
   Draw and identify *Grantia* spicules .
2. **Preserved sponges:**
   1. **Calcarea sponges**
   2. **Hexactinellidae sponges**
   3. **Demospongiae sponges**
3. ***Hydra*** – Obtain a live *Hydra* and prepared cross section of *Hydra*. This hydrozoan characterizes the polyp form for the phylum Cnidaria. Using low power (40x), label the **mouth, basal disk, epidermis,** and **tentacle.** For the cross section, identify and label **body wall, epidermis, gastrodermis, gastrovascular cavity (coelenterons),** and **mesoglea**. See page 384 for a labeled diagram.

Describe the movement of the live *Hydra***.**

1. **Predator prey:** ***Live Hydra and Live Daphnia***: Obtain a watch glass and add live *Hydra* and *Daphnia*. Using a dissecting microscope, **observe** and **describe** the interactions between *Daphnia* and *Hydra*.
2. ***Obelia* colony *–*** Obtain a whole mount (w.m.) of a colonial hydroid*, Obelia****.*** We are using *Obelia* as example of the typical hydrozoan life cycle. See page 383 in your lab manual for the life cycle of *Obelia*.
   1. *Polyp generation:* The feeding polyp is called **gastrozooid**, which contains the **hydranth** and **tentacles** around the mouth. The feeding polyp uses tentacles to capture prey and sting it using **nematocyst** cells.   
        
      The **gonozooid** is the reproductive structure and produce **medusae** via asexual budding. Draw and identify the polyp and medusa stage for *Obelia*.
   2. *Medusa generation*: Hydrozoan medusa are free swimming, sexually reproducing individuals. When you think of jellyfish, you are probably thinking of the medusa generation. The saucer like body is called the **bell**. The upper, convex, side is called the **exumbrella** and the lower, concave, surface is called the **subumbrella**. The **mouth** is in the center of the **subumbrella** and is surrounded by four **oral arms**.
   3. **Follow the lab hand out for what to draw and label.**
3. **Preserved Cnidarians:**
   1. **Sea Anemone**
   2. **Jellyfish**
   3. **Coral**