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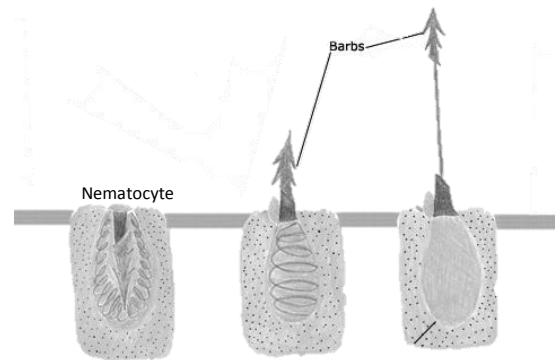
PHYSIOLOGY OF AIPTASIA AND CORAL

OVERVIEW: In this lab, we will observe some of the key cellular components of the anemone *Aiptasia*, including *nematocytes* and *zooxanthellae*.

INTRODUCTION: Coral and *Aiptasia* (a type of anemone) are very different species, but how are they similar?

Both are animals in the phylum *Cnidaria* (pronounced nahee-dair-ee-uh), which also includes all species of jellyfish. Cnidarians are notable for their relatively simple physical structure: most are only a few cells thick and don't have the complex organ systems of *Bilaterians* (humans, dogs, birds, etc.). However, Cnidarians do have some simple muscular and nervous systems used to find and capture food.

Notably, Cnidarians are the only animals with *cnidocytes*, also known as ***nematocytes***. These are cells that can fire a retractable organelle at prey or predator, like a harpoon. The barbs of the organelle contain a toxin that can stun or even kill its target. If you ever touch a stinging jellyfish's tentacles, you'll cause the hundreds of *nematocytes* on those tentacles to fire, stinging you with their microscopic, toxic harpoons. Certain parts of coral and *Aiptasia* are covered in *nematocytes*, as we will see later in this lab.



Most importantly, both coral and *Aiptasia* often exist in an endosymbiotic relationship with algae known as ***zooxanthellae***. The algae cells live inside of coral and *Aiptasia* cells.

But why do that? Well, coral and *Aiptasia* cells provide a safe environment and waste for *zooxanthellae* to live and eat, and *zooxanthellae* perform *photosynthesis* to produce nutrients for the host cells. Without the algae, coral and

Aiptasia will die. This kind of mutually beneficial relationship is called *endosymbiosis*.

“ENDO”=inside (one cell inside another), “SYMBIOSIS”=biological relationship

SAFETY

We will be working with anesthetic magnesium chloride; please wear proper safety attire (goggles and gloves) if handling this chemical
Be aware that the nematocytes should be incapacitated if you touch them, but if they are not, they will not harm you. Aiptasia stings are too small to cause serious damage.

MATERIALS

- Aiptasia
- Anesthetic Magnesium Chloride
- Microscope
- Scissors
- Glass container
- Microscope slide
- Cover Slip
- Pipette

Procedure

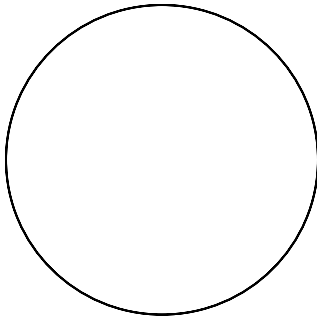
1. Obtain a dish containing one Aiptasia polyp in water. Use the forceps to gently touch the Aiptasia’s tentacles and body—don’t damage it. Make some observations about its body structure and responses to stimuli below:

2. Using a pipette, add 50mL of anesthetic to the dish, mixing it with the water. Try not to hit or damage the Aiptasia polyp in the process
 - a. The anesthetic “puts the polyp to sleep,” which will make it easier to remove a tentacle
3. Have a glass microscope slide and a coverslip ready.
 - a. This is where the tentacle will go.
4. After adding the anesthetic, touch the Aiptasia with the forceps to see if it responds with movement. If it does, wait a few moments. If it does not respond, move to step 5.
5. Use the scissors to cut several Aiptasia tentacles off of the polyp. Cut close to the body so that you get as long of a tentacle as possible, but don’t cut the polyp’s body.
6. Pick up the tentacles by suctioning them into a pipette with a little bit of water
7. Dispense tentacles onto middle of microscope slide and cover with coverslip
8. Prepare microscope:
 - a. Decrease magnification to lowest setting and lower the stage with the coarse adjustment knob
 - b. Plug in and turn light on. Adjust diaphragm to highest setting

9. Place microscope slide on stage. Use coarse adjustment knob to bring tentacle into focus. Center tentacle in field of view.

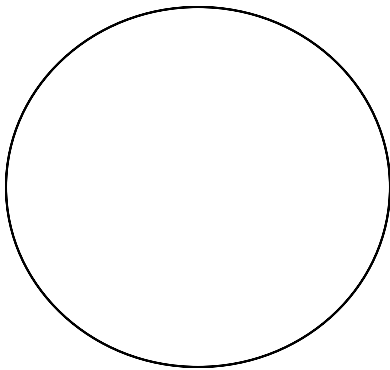
10. Increase magnification to 100X.

- a. Focus tentacle using fine adjustment knob.
- b. Move tentacle so that end of tentacle is in field of vision
- c. Draw what you see and make observations below. Can you identify the zooxanthellae or nematocytes?



11. Increase magnification to 100X.

- a. Focus tentacle using fine adjustment knob.
- b. Move tentacle so that end of tentacle is in field of vision
- c. Draw what you see and make observations below. Can you identify the zooxanthellae or nematocytes?



Questions:

- 1. Based on what you know of coral, how do you think Aiptasia and coral are different? Similar?
- 2. Could Aiptasia or coral survive without zooxanthellae? Why or why not?