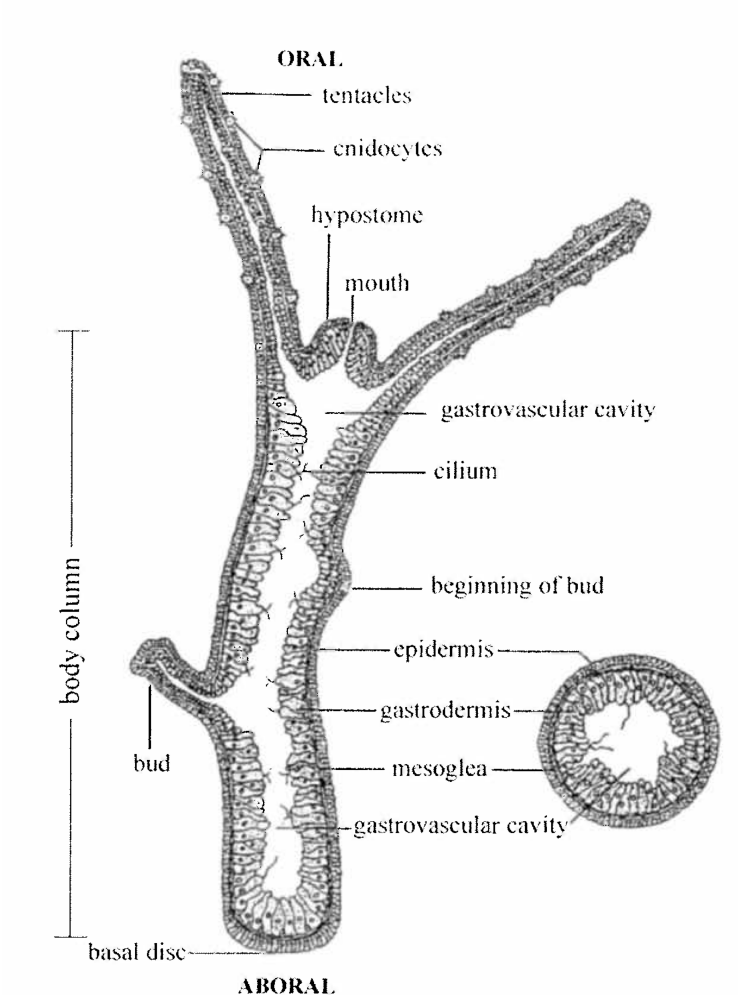
Name: _____ Date: _____

Lab: Hydra Observation

Note: Parts of this protocol were taken from the McGill University BIO 111 handbook



Kingdom: Anamalia
Phylum: Cnidiaria
Class: Hydrozoa
Order: Anthoathecata
Family: Hydridae
Species: There are many different species of hydra that exist (Hydra Americana, Hydra beijingensis, Hydra cauliculata, etc.)

Did you know: The phylum Cnidaria includes the hydras, jellyfishes, and sea anemones.

Goal: To observe the behaviours of the hydra.

Note: You should not have to view your hydra using the 400X magnification. If that is necessary, you will need to use a flat slide and cover slip. **DO NOT ALLOW THE OBJECTIVE LENS TO TOUCH THE SLIDE.**

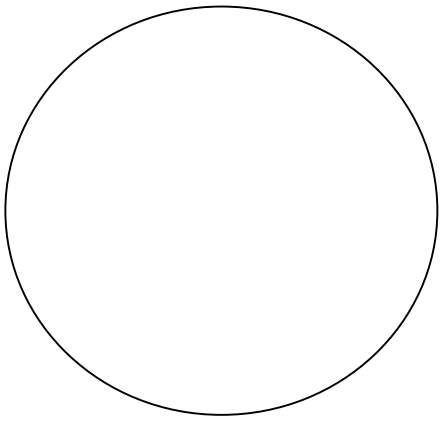
Materials:

- Depression Slides
- Flat slides and cover slips
- Hydra
- Daphnia
- Acetic Acid
- Pipettes

Task 1:

1. Using a depression slide, obtain a sample of water containing at least 1 hydra in it.
2. Bring the hydra to your station and turn on the microscope.
3. Under **low power**, focus your microscope until the hydra is clearly visible.

Sketch: Sketch the hydra. Label the basal disk, tentacles, stalk (body), and gastrovascular cavity.



Hydra Movement:

If not disturbed the hydra will attach itself to the bottom of the slide and extend its tentacles and bud column. If your hydra has contracted in a ball leave it alone for a few minutes.

The Hydra may move in one of several ways, by gliding on its foot, by inching along with its tentacles and foot, by somersaulting from foot, to tentacles or by floating on a bubble of gas secreted by the foot.

Question 1: What is the biological name for the foot of the hydra, with which the hydra can attach itself to surfaces?

_____.

Question 2: What type of movement did you observe?

Task 2:
Using a pipette, probe the hydra gently and observe its reaction.

Note: You are to bring the pipette close to its tentacles or body column gently touching the hydra.

Question 3: How did the hydra react to the probe?

Task 3:

Feeding Behaviour:

Like other cnidarians, hydra are carnivores. They capture prey using their tentacles and subdue them with toxic stings of the nematocysts. The food is transferred to their mouth, partially digested in the gastrovascular cavity, and then absorbed by gastrodermal cells. There intracellular digestion occurs. Undigested material is voided through the mouth.

Add some small crustaceans, Daphnia, to the water and watch the feeding reaction of Hydra. Your hydra may catch the crustaceans in its tentacles and eventually eat them.

If your hydra does not respond to food, add some acetic acid (vinegar) solution to the water then observe them under the microscope. The acid should induce the hydra to discharge their nematocysts from within their cnidocytes. The nematocyst capsules contain harpoon- like structures have a filament with a barb on the end.

THIS WILL ALSO KILL YOUR HYDRA, SO YOU WILL NOT OBSERVE ANY OTHER SIGNS OF LIFE AFTER THIS.

Question 4: Does the hydra actively move to capture its prey or does it sit and wait for the prey to bump into its tentacles?

Question 5: How does the radial symmetry of your hydra help them in their feeding strategy?

Task 4: Under low power, continue to look for the hydra's cnidocytes.

6. Draw what you see:

Task 5:
Reproduction: Examine your hydra for the ovaries/testes, or buds.

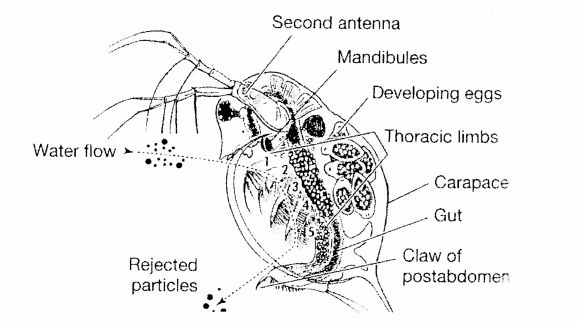
Question 7: Are any of these reproductive parts present on your hydra? Explain what you see.

Question 8: Describe the environmental conditions that would favor sexual over asexual reproduction in hydra. What is the probable evolutionary reason for having two different reproductive strategies?

Background information about the Daphnia:

Daphnia magma is a microcrustacean within the Phylum Arthropoda and is a common organism in the plankton of lakes and western North America.

Daphnea magma and other zooplanktonic organisms are herbivores and feed on microalgae, bacteria and detritus. D. magma are very efficient filter feeders and are one of the larger forms of zooplankton in North American lakes.

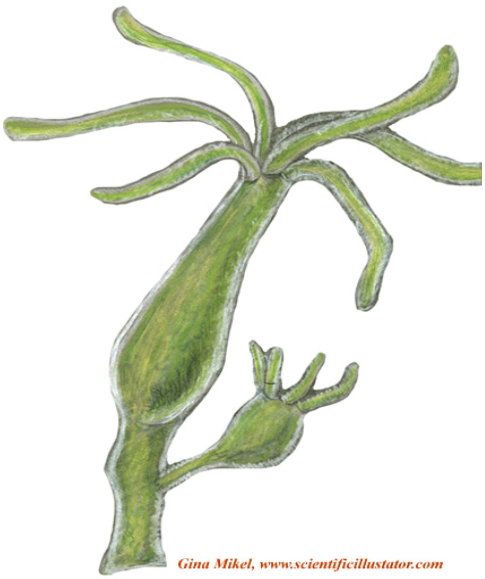


Daphnia are animals often eaten by hydra, but they also have another important role in the ecosystem. For many lakes, the clear water phase is a time during the summer when the algae abundance in the water is greatly reduced. In fact, biologists have tried promoting large populations of zooplankton (especially daphnia) as a way of reducing the unsightly algae blooms and increasing the clarity of lake water. In order to do this, biologists must reduce the fish populations that feed on zooplankton, often called planktivores. This approach to lake management by biologists is often referred to as biomanipulation.

Question 9: Explain the daphnia's place within the food chain and the ecosystem.

Question 10: How does biomanipulation impact with the place of the daphnia within the ecosystem?

Hydra Observation: Pre-Lab



Background Information: The hydra is very thin-only two cells thick at any point of its body wall. Hydra live in fresh water and prey on small water fleas that swim by. They attach themselves to a surface and grab their prey with their tentacles, when touched. .Use pp. 499-501 in your text book (23.3) to find out more about hydra and the Phylum they belong to.

1. **The hydra is in which phylum of the Kingdom Animalia? _____**
2. **Besides the hydra, what are other examples of animals in this phylum (Name 2)?**

   _____
3. **What features are the animals in this phylum known for?**

Respect for Living Organisms: Please remember that the hydras in this lab are living animals. When performing labs with live specimens, be sure to handle them correctly to avoid unnecessary suffering of the specimen.

Other interesting details-

1. First you will observe the hydra under the lowest power of the microscope. Look at your notes to identify as many features of the hydra as you can find. Look for its tentacles, mouth, and gastrovascular cavity. Also note whether its mouth and tentacles face upward or downward.

2. Second you will look at the tentacles under medium power. Do NOT use the high power objective. The small, round cells that can be seen on the tentacles are stinging cells (cnidocytes).. The cnidocytes have a capsule called a nematocyst containing a long coiled thread (the

threads are too small to be seen). When touched, the thread shoots out of the nematocyst and injects poison when it touches the prey.

3. Working Together: One person in the group should watch through the microscope while the other person gently uses a pipette (with a wider opening) to add a few daphnia to the well slide containing the hydra. Observe your slide and also other lab group's slide and record your observations of what happens.

   If the hydra refuses to feed, you will still be able to see its nematocysts react by adding some vinegar to the water. BY DOING THIS, IT WILL KILL YOUR HYDRA, SO IT IS TO BE DONE ONLY IF NECESSARY.

CLEAN UP: When you are finished, put the hydra back into its culture. Wash and dry the depression slide and return it to the paper towel by the sink.

Hydra Post- Lab Analysis:

1. Why is it challenging to focus on the hydra with the microscope?

2. What are 2 reasons you should NOT use the high power objective for observing the hydra?

3. Does the hydra seem to react favorably or unfavorably to all the moving around and the light?

4. What supports the hydra's body and gives the hydra its shape? Explain.

5. How does the hydra sense its prey and respond to stimuli?

6. Which body part does the hydra use to grab its prey?
   _____

7. Which body part does the hydra use to paralyze its prey?
   _____

8. In which body part does the hydra digest its prey?
   _____

9. **Research Question:** Look up and describe the process of how a hydra feeds (in detail)?