

## Aquatic Ecosystems Research Project

### OBJECTIVE

The living organisms in our world are varied in form, complexity, and diversity. During the course of the semester we will be looking at how this diversity meets the needs of organisms for nutrient procurement, gas exchange, excretion, and reproduction. This project will allow you to observe the diversity of life in a dynamic environment.

### BACKGROUND

Life on Earth is diverse and ubiquitous, filling large and small niches but limited by temperature, water, and energy resources. Individual organisms live in a community where they are competing for space and resources. The complexity of these communities can vary depending on location. Warm wet environments generally have greater species diversity than cold or dry environments.

The pool of water, which forms after a rain on a previously dry sidewalk, will in a short time flourish with many tiny organisms. The bark on a tree harbors many microorganisms, which are usually dormant when the bark is dry. When wetted these organisms come to life but are only visible with the microscope-aided eye. In ponds, organisms are stratified at different levels in the water—all occupying different niches. You can go anywhere in the environment, collect organic material, give it moisture and nutrients and watch the many small organisms grow and compete among themselves for resources.

### PROCEDURE

Work in groups of two students. Each group will have a MicroAquarium to study an aquatic microecosystem.

### Setting up your MicroAquarium

In the lab will be an assortment of waters collected from various sources that can be used in your MicroAquarium. You can also collect your own material. Let your instructor know if you want to do the latter. Record the source of material used in your aquarium.

You could set up two *identical* micro-aquaria, monitor both, and at a later date alter one by introducing a new species.

1. Obtain a MicroAquarium.
2. Place one of the provided colored dots on the left hand side edge and write your initials on the dot.
3. A thin layer of **sediment** (0–5 mm) resting in the bottom of an upright MicroAquarium provides food and habitat for many invertebrates. A coffee stirrer can be used to position substrates in the bottom. Excessive solid matter can reduce visibility into the microcosm.
4. Using a micropipette, extract water from one of the containers on the lab bench or from the water you collected.
  - a. Extract enough water from the **bottom** of the container to fill the MicroAquarium tank about 1/3 full.
  - b. Extract the next 1/3 of water for your tank from the **middle** layer.
  - c. Then fill the rest of your tank with water from the **surface**.
5. Decorate it with some plant or other objects provided.
6. Replenish evaporative water loss as needed (ca. every 10 days) with distilled water.

Food will be added by the instructor at a later date.

### **Observing the contents of your MicroAquarium**

You can observe the contents of the Micro-Aquarium with a dissecting or compound microscope.

1. Remove the stand and lid from the MicroAquarium tank.
2. Gently lay the tank on the microscope stage with the open end away from you. Capillary action will keep the water in. When using the compound scope you can place it in the slide holder and move the tank with the appropriate knobs. On the dissecting scope lay the tank flat and manipulate it with your fingers.

### **Things to look for and record**

The tank will have living organisms and various forms of debris. You are to observe the *living* organisms

1. Stationary vs. moving organisms.
2. If moving, a description of motion.
3. Single celled vs. multicellular organisms
4. Chlorophyll green vs. non-green organisms.
5. Habitat preference of the different organisms – bottom, middle or top
6. For each organism record:
  - a. Identify it if possible or carefully sketch it so you can recognize it in subsequent observations.
  - b. Record the number observed.
7. Is the water evaporating? Did you add water?
8. When and what food was added.

### **Observing your MicroAquarium weekly**

You are to come and observe your Micro-Aquarium at least once a week over the next nine weeks.

Make some of the following observations.

1. What changes have occurred from the last observation?
2. Have the numbers of each organism increased, decreased or stayed about the same?
3. Are there dead organisms in the bottom layer of the tank?

### **Your Weekly Log**

Your wiki log is an open notebook of your activities while working on this project. You should add to your log each week – each week's entry should appear before Monday of the following week.

1. Things you should include
  - a. The name of the water source you used including other objects you might have added.
  - b. Observations you make each week from your MicroAquarium.
  - c. Images of organisms: A minimum of four images are to be included. All images should be yours. **NO IMAGES FROM THE WEB** or copied from other sources. For each image, cite a source for its identification.
  - d. When searching for information on the web include URLs you found useful and what information was pertinent to your project.
  - e. A list of the organisms found in your MicroAquarium, numbers observed, date when first observed and date when last observed.
2. Other pertinent comments, questions, or images you want to add are up to you.
3. Make sure you compose complete sentences with correct spelling and grammar because your instructor will read this information.