

**Activity: Micro Magic**

**Grade Level:** Grade 4

**Major Emphasis:** Microscope Skills-Living/Non-living

**Major Curriculum Area:** Science

**Related Curriculum Areas:**

Refer to Outdoor Education Curriculum Matrix 3-5

Social Studies

Language Arts

**Program Indicators: (DL2,3,4)**

1. The students will differentiate between living and non-living things.
2. The students will follow procedures for the use and care of the microscope.
3. The students will compare and contrast the structures of animal cells, plant cells and protista.

**Student Outcomes: (DL2)** The student will:

1. demonstrate correct water sampling procedures.
2. use a microscope to observe things not visible to the naked eye.
3. demonstrate specific microscope skills.
4. locate and identify microscopic living and non-living things.

**Readiness: (DL2)**

1. Identify the parts of a microscope and how they work. (Refer to Supplement D)
2. Introduce vocabulary:

adaptation	power/magnification
focus	slide
mirror	zooplankton
tube	phytoplankton
stage	algae
eyepiece	
3. View filmstrips available from Media Services:
  - a. #04222 "Microscopic Life and Microscopes," National Geographic Society.
  - b. #11600 "Hand Lenses and Microscope Techniques," Encyclopedia Britannica Educational.
4. Prepare a wet-mount slide.
5. Identify the characteristics of living things. Contact The Living Culture Center at the Carrie Weedon Science Center for living samples.

## Materials:

plankton nets	microscopes	sample jars
trowels	slides	pencils
dip nets	eye droppers	data sheets
tote trays	identification charts	Protoslo
sequence chain poster		

## Procedures:

### Activity A: Collecting the Water Samples

1. Discuss the types of equipment to be used. Demonstrate the proper sampling procedures for the plankton tow, rock scraping and dip net. (Refer to Supplement A)
2. Describe water sampling collection sites. Where would you expect to find more evidence of living things; in shallow, quiet water or in deep, moving water? Explain.
3. Use a plankton net to obtain a surface sample.
4. Use a dip net to obtain a shoreline sample.
5. Use a trowel and tote tray to obtain a rock scrape sample. What kind of life would you expect to find on rocks; living, non-living or both?

### Activity B: Observing the Water Samples

1. Return the water samples to the laboratory for observations using the microscopes.
2. Review microscope skills with the following instructions to the students:
  - a. adjust the angle of the mirror for the proper viewing.
  - b. change the power or magnification (*begin with lowest power*).
  - c. adjust the focus knob until the field of vision is clear.
3. Use a previously prepared sample slide to have the students practice the above skills. A slide with the letter "e" or prepared plankton slides can be used.
4. Follow the procedure as outlined in Supplement B for the use of the microscope.
5. Use the eyedropper to place a drop of the sample on a slide and observe it under the microscope.
6. Discuss the students' observations by asking the following questions. **(DL2&3)**
  - a. Can you describe what you see?
  - b. Does it move?
  - c. Can you identify color and are there any patterns present?
  - d. Is the color significant in determining whether it is a plant or animal?
  - e. Did you observe it eating?
  - f. Did you observe any other characteristics of living things?
  - g. How would your water sample look if you collected it in summer, fall, winter, spring? Why?
7. Attempt to identify some of the microscopic organisms observed. (Refer to Supplement C)

### Summary: (DL3)

1. Using a graphic organizer, construct a food chain (sequence chain). Be sure to include microscopic life.
2. Discuss the importance of microscopic life to the food chain. What are some of the dangers to microscopic life and how can we help protect them? Use the following examples:
  - a. too many nutrients from farm and lawn run-off.
  - b. too much sediment blocking light needed for photosynthesis.
  - c. toxic chemicals in the water which are eaten and passed through the food chain.

### Follow-Up:

1. Use the Living Culture Center specimens to examine plant and animal cells. (DL3&4)
2. Take and examine water sample from various sources (fish tank, pond, stream, faucet, etc.). Compare and contrast these samples via the use of graphic organizers. (DL3)
3. Examine prepared slides of a variety of water organisms. (DL2)
4. Learn and sing the song "The Sunshine Bankers," by Tom Wisner.

### Extension Activities: (DL2&3)

1. Create a mind movie of what life would be like as a zooplankton drifting with the currents, eating and being eaten. Write a paragraph describing what life as a zooplankton would be like.
2. Using "The Sunshine Bankers," information about food chains and food webs, construct a visual depiction of a food web.
3. Complete the NatureScope Diving Into Oceans activity, "A Web on the Wall."
4. Make a list of other tools that help us to explore our environment such as telescopes, binoculars, hand lenses, periscopes and snorkeling masks.
5. Use magnifying glasses as simple magnification tools to explore the environment.
6. Create riddles describing living and non-living things.
7. Have students draw their own concept of how the world must appear to a microscopic animal.
8. Discuss how everyday behavior of humans might affect microscopic plants and animals (i.e. pollution).

### Teacher Resources:

#### Books:

- < \*Eco-Acts, A Manual of Ecological Activities, Ford, Phyllis, p 44.
- < \*Exploring Environments, High Rock Conservation Center of the Staten Island Institute of Arts and Sciences, p 79, p 19.
- < \*Invertebrate Zoology, Barnes, 591.
- < \*Marine Invertebrates, Fries, 591.92.
- < \*Pond Life, A Golden Guide.

- < \*Life in the Chesapeake Bay, Lippson & Lippson, 917.52.
- < \*The Chesapeake Bay in Maryland, An Atlas of Natural Resources, Lippson, 917.52.
- < \*Diving into Oceans, NatureScope.
- < \*The Changing Chesapeake, Chesapeake Bay Estuary Program, U.S. Fish & Wildlife Svc, p 24.

Filmstrip:

- < \*"Animal Life in a Drop of Water," 592.

Video:

- < \*"It Happened Today on the Chesapeake Bay," Billy B.

Supplementary Materials:

- < \*"The Sunshine Bankers" song, Tom Wisner.
- < \*OBIS, Delta Education, Pond and Lakes Module.
- < \*OBIS, Delta Education, Forest Module.

## Sampling Procedures

### Plankton Tow

**Materials:** plankton net, sample jar

**Procedure:**

1. Throw plankton net into the water. Be sure to stand firmly on the end of the tow line.
2. Pull the net back toward you or move a few steps along the dock with the net submerged just below the surface.
3. Pull the net in slowly so the sample does not spill from the collecting tube.
4. Do not allow the net to sink to the bottom, to prevent getting a sample tube of mud or sand.
5. Make sure the net is towing properly with the collection tube extending behind it.
6. To concentrate your sample, repeat the procedure at least ten times. The sample will become concentrated at the end of the tube.
7. Place the sample jar upside down in the plankton net. Turn the net upside down and allow water from the tube to fill the jar.
8. Observe the sample under the microscope.

### Rock Scrapings

**Materials:** trowels, tote trays, sample jars

**Procedure:**

1. Locate rocks near the water's edge.
2. Put a small amount of water into the sample jar and the tote tray.
3. Using the trowel, gently scrape any encrusted material, sediment or plants into the tote tray.
4. Gently rinse the trowel in the water in the tote tray.
5. Pour all sampled materials from the tote tray into the sample jar.
6. Observe the collected sample under the microscope.

### Dip Net Sampling

**Materials:** dip net, sample jar

**Procedure:**

1. Select a quiet shallow area of water to sample, preferably near shoreline grasses.
2. Gently place the net into the water and dip or scoop the net through the water.
3. Lift the net out of the water and place specimen in a jar of water.
4. Take the sample back to the lab and observe under the microscope.

## **Procedure for the Use of the Zoom Microscope**

1. Run your finger over the slide to make sure that the concave side is up.
2. Place a small drop of the sample onto the slide with an eyedropper.
3. Place the slide on the microscope stage.
4. Make sure the specimen on the slide is over the hole in the stage.
5. Start with the lowest power adjustment, 50X.
6. Look through the eyepiece and adjust the mirror until light can be seen.
7. Adjust the focus knob until the specimen is clearly in view.
8. Move the slide around on the stage to locate the specimen.
9. If the specimen is too active, use one drop of Protoslo to slow the activity.
10. Identify the specimens using plankton charts and handouts.
11. To observe larger specimens, use a petri dish and a magnifying lens or dissecting microscope.

### **Parts of the Microscope**

## **Common Zooplankton of the Chesapeake Bay**

## **Common Phytoplankton of the Chesapeake Bay**

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