



Pond

Activity 2: Exploring Microscopic Pond Life

Before beginning focused explorations on various aspects of microscopic biology, it is useful and interesting to simply experience some of the abundance and diversity of life within the microscopic world. In this activity, you will consider the diversity of life found in pond water by searching for specific organisms and by identifying other organisms. You will refer back to this activity and build upon it in subsequent activities.

Purpose:

To become familiar with some the diversity of microscopic life found in pond water, such that you have a “touchstone” for later investigations

Overview:

The teacher presents an image of a microscopic organism, projecting it in front of the class, and challenges students to use hardcopy and/or online resources to (1) identify the organism and (2) look for the organism in their own sample of pond water. Students then locate other organisms within their pond water, photograph and/or take brief movies of the organisms, identify them if possible, and present their own challenges—e.g., identify and look for this—to other student in the class.

Time:

One to two (50 minute) sessions

Materials:

- *Swift* Digital Microscopes
- Computer(s)
- Pond water (and means of collecting, such as a turkey baster and jars; see *Preparation*)
- Toothpick (optional)
- Textbooks and other resources
- 3% Methyl cellulose solution (optional; see Activity 10)
- Microscope slides and cover slips
- Projector (for one computer)
- Pipettes or eyedroppers

Textbook Matching:

A summary of the textbook alignments is provided at the end of this guide.

BSCS Biology: An Ecological Approach

- *Chapter 23: Aquatic Ecosystems; 23.1 — Ponds Are Shallow Enough for Rooted Plants*
- *Appendix Four: A Catalog of Living Things*

Glencoe Science Biology (National Geographic)

- *Chapter 3: Communities, Biomes, and Ecosystems; Section 3.3 — Aquatic Ecosystems: Freshwater Ecosystems*
- *Reference Handbook (Six-Kingdom Classification)*

McDougal Littell Biology (Stephen Nowicki)

- *Chapter 15: The Biosphere; 15.5 — Estuaries and Freshwater Ecosystems*
- *Appendix A: Classification*

Prentice Hall Biology (Miller and Levine)

- *Chapter 4: Ecosystems and Communities: 4-4 — Aquatic Ecosystems*
- *Appendix E: Classification*

Notes:

- Microscope slides dry out. And, exposed to the microscope light source, they dry out faster and heat up. The light source on the *Swift* Digital Microscope is an LED, or Light-Emitting Diode. It is very bright, at 3 watts, but also relatively cool; this minimizes, but does not eliminate, the drying and heating problems. Thus, whenever organisms are studied, it is important to prepare slides shortly before they are examined and not leave the slides on the microscope for too long.
- When students challenge each other, you can have them swap slides; this ensures that the searchers do actually have the organisms they are searching for, though it also precludes any learning related to how common the organisms might be.

Preparation:

1. Collect samples of water from a pond or other body of water. Look for water that appears greenish or contains dead and decaying vegetation. Also, as possible, collect samples from different locations and/or depths within the body of water, as different organisms will live in different places. For example, *Amoeba* are more likely to be found near the bottom of a pond. If you are unable to obtain pond water for any reason, appropriate samples can be cultured or ordered. (Note: Pond water will be used again in later activities; it can be kept, with proper storage and care, or you can gather new samples.)
2. Prepare a slide of pond water. Using the microscope, find several organisms that you are able to identify, and collect images and/or movies of them. Do this for your various samples. You will be challenging your students to identify these organisms for themselves and to look for them on their own slides, so select and label accordingly.
3. Locate hardcopy and/or electronic references with information on the microscopic life found in pond water. An example is the "Pond Life Identification Kit " Web site from Microscopy-UK.

Procedure:

1. Have students work in pairs or small teams to prepare and label slides from each sample of pond water you collected.
2. Project an image or movie of an organism in front of the class, have the class briefly discuss what they'd look for in order to identify this organism, and then challenge your students to (a) try to locate one like it in their slides and (b) try to identify it using the available resources.
 - When pairs or teams think they've located and/or identified one of the organisms, check their find to see if you can confirm this.
3. Challenge your students with 1 to 3 other organisms.
4. Have students complete the activity.

Extension:

Have your students count how many of each identified species they have on a slide or within the field of view. They can consider the diversity of life in the pond water and how populations differ at different locations.

Assessment:

Have students submit an image, details on the organism in the image, an explanation of how the organism was identified, and any other information that seems pertinent for several identified organisms.



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Student Sheet

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1. Prepare a slide of pond water.
 - Optional: Using a toothpick, put a small ring of methyl cellulose solution on a slide. (Note that methyl cellulose solution is very viscous.)
 - Using a pipette or eyedropper, place one drop of pond water on the slide (in the ring).
 - Add a cover slip.
 - Label the slide with information about its source.
2. An image or movie of an organism will be projected in front of the class. Working with a partner, (a) try to locate one like it on your slide and (b) try to identify it using the available resources.
 - a. Search your slide for the projected organism, using the microscope's eyepieces and mini-digital screen (and/or the computer screen). *NOTE: Your slide may or may not have this organism.*
 - Whenever you find an organism that you think might be the one projected, discuss it with your partner, compare it to the projected organism, and take an image or short movie to document your find. Alert your teacher to have your find confirmed.
 - Along the way, if you see any other organisms of interest, take images and/or movies of them for use later in this activity. Include information on the sample in and the magnification at which you found the organisms.
 - b. Search the available resources for the identity of the projected organism. Consider such factors as structure (internal and external), size, color, motion, etc.
 - When you and your partner think you have identified the organism, record details about that organism and how you identified it. Alert your teacher to have your identification confirmed.
3. Repeat this for other organisms projected in front of the class and for other slides made from various water samples.

REMEMBER to practice proper safety techniques in all science laboratory activities!

4. Prepare your own “Find and/or Identify the Organism I Am Showing You” images and/or movies.
 - Start with any organisms you photographed or took movies of earlier in this activity. Use the resources to try to identify them.
 - Search for, photograph and/or make a movie of, and try to identify other organisms that are common in your samples or that you find particularly interesting.
 - Select three organism images and/or movies to use for challenging other students. This can include organisms that you have not (yet) managed to identify, as long as you share this fact.
5. Present your challenge organisms to other students, and work on their challenge organisms in turn.