



## PLANKTON INDOOR LAB TEACHER'S GUIDE

**Learning Goal:** Understand the role of plankton in the lake food web and distinguish between various types of freshwater plankton.

### **Objectives:**

- Introduce safe and effective microscope procedures.
- Practice using a microscope to examine plankton from lake water samples.
- Distinguish between zooplankton and phytoplankton.
- Identify *Daphnia*, cycloids, diatoms, algae.
- Describe the global importance of plankton for transferring energy as a base of the food web and releasing oxygen through photosynthesis.

Note: Before beginning this lesson, make sure you have collected a water sample from a local lake to bring into the classroom.

### 1. Introduce the guests in the room and today's topic:

- Ask students: "Do you know what tiny, microscopic organisms that live in the water are called?" If students struggle, a successful hint is to say that the term is also the name of a character on the SpongeBob SquarePants show.
- Then, introduce the two big groups of plankton (phytoplankton and zooplankton) by saying that there are animal and plant plankton. Point out that animals are found in zoos and "zoo" refers to animals. For phytoplankton, point out that "phyto" refers to "light" and refers to the process of photosynthesis.
- Ask students to share their ideas on where energy comes from. The sun provides energy to plants on land, but how many know that this same phenomenon occurs in the water? Ask students which of the two types of plankton are able to photosynthesize. Remind them that plants photosynthesize and are most often green, from chlorophyll. The presence of green would indicate that you are looking at a type of phytoplankton. Phytoplankton are important because globally they produce the most oxygen in the world – more than all the other plants and trees combined.
- Next, have students think about the whole lake food web. Phytoplankton use energy from the sun during photosynthesis and are the base of the lake food chain. Ask students what sort of organisms might eat phytoplankton? How would that energy be transferred to the next trophic level, or up the food chain? In general, zooplankton are the key consumers of phytoplankton (some fish and larger organisms eat phytoplankton). Zooplankton use the energy in phytoplankton to grow and survive. Many juvenile fish and smaller prey fish, like bluegill, and minnows, survive on zooplankton. Larger predator fish will eat the smaller prey fish and the energy continues up the chain. Students may also link terrestrial animals

to the food chain. An eagle, bear, and other mammals are predators of fish. This is an important transfer of energy that originated in the lake ecosystem to land ecosystems.

2. Hand out lab packets and have students refer to the pictures for identification of the common types of plankton found in the lake water sample.
  - Students will be looking for phytoplankton (algae and diatoms) and zooplankton (*Daphnia* and copepods)
  - Before looking at the sample, give students some tips. For example, if the organism is moving, it is a type of zooplankton. If it is green, it is most likely phytoplankton (although zooplankton can have phytoplankton in their stomachs). Both *Daphnia* and copepods have eyes, which would indicate they have found zooplankton. When identifying diatoms, look for geometric and symmetrical forms.
3. Next, demonstrate how to use the microscopes that are available.
  - Specifically, make sure they know how to properly care for the microscope by carrying it with two hands supporting the base.
  - Using small flashlights under the slide base helps increase clarity and brightness of the slides. Show students how to maximize the light on their slides.
  - In addition, point out there are four different settings for the magnification level. Let them know that they will not be using the oil immersion setting. Going to this setting without oil can be harmful to the microscope or could crush their slide.
  - Show them how to use the dials on the side to focus on the organisms.
  - Demonstrate how to load the slide that will contain their lake water sample.
  - Finally, show how to use the pipette to collect lake water from the larger sample. Carefully squeeze one drop onto the slide. Point out that the cover slip is what holds the water in place on the slide. Show them how to angle the cover slip on one end and then releasing the cover slip over the sample to reduce the air bubbles that form in the prepared slide.
4. While students are prepping their slides, have an instructor or volunteer set up samples on additional microscopes to allow students to rotate through the prepared microscopes and identify organisms they could not find on their own. It is especially beneficial if there are dissecting microscopes available so that you can demonstrate the differences.
5. Instruct students to record which plankton they have found. The instructors should engage with students by guiding them as they use the microscopes and identify plankton. As students correctly identify the various types, initial their lab books in the corresponding space.
6. Be sure to leave time to discuss the critical thinking question at the end of the lab, focusing on the important role plankton play in our global environment (review points in #1 above). Make sure students record these ideas in their lab packets.
7. Students should be directed to clean-up their stations before class ends. Show them how to wash and dry slides or dispose of any cracked glass slides.