

## Discover the microscopic world

### Objectives:

Become familiar with microscopes and how to use them

- Grades 1-3: Work on fine motor skills, encourage curiosity and observation
- Grade 4+: Observe and discuss a diversity of organisms, prompt questions about function and traits

### Introduction:

In this activity, you will introduce students to the use of a basic bright field microscope or a stereoscopic microscope. Younger students will learn about the diversity of organisms that can be observed around you, and will learn to make observations and ask questions.

We will demonstrate:

#### 1) Insects

#### 2) Pond Water

### 1) Observing Insects with a binocular stereoscopic microscope:

With this microscope, you can see 3D objects at low magnification. Ideal to observe whole small specimens (insects, small plants, seeds). To obtain insects for observation, look right under the first layer of soil in your garden, or from underneath leaves on the ground. Or, you can try to catch a fly or mosquito. One way to easily trap a fly or mosquito is to cut the top of a bottle off, fill the bottom of the bottle with a bit of sugar water or piece of fruit (i.e. banana), flip the top over and stick it back into the base of the bottle to form a funnel. To keep bugs still and easier to observe, place them in a plastic container and freeze them.

### Materials:

- Bugs
- Tweezers
- Petri dishes
- Microscope

### Procedure (stereoscopic microscope):

- 1) Pick up a bug with a pair of tweezers
- 2) Place it on a dish under the lens
- 3) Move the focus up and down to observe

### Discussion:

#### A. Identify the different parts of the insect:

The body of an insect is divided into three parts: head (with eyes, one pair of antennae, mandibles), thorax (with jointed legs and wings) and abdomen. It can be interesting to observe diversity of antennae shape, eyes and wings.

#### B. How many legs does an insect or a spider have?

Insects have six legs and spiders have eight legs. Spiders, as well as scorpions and ticks, are named arachnids and do not belong to the group of insects.

#### C. How many wings do insects have? Do all insects have wings?

The number of wings is variable; many insects have two pairs of wings. For instance, flies' hindwings are absent or rudimentary. For some other insects, like ants, the wings are lost in "workers" only the males and the "queens" have wings (they lose them after mating). Most insects have wings (at least at one stage of their life) however there are some exceptions (fleas, for instance).

#### D. Do you know how insects breathe?

Insects do not have a nose. Insects have openings on their abdomen (spiracles) to allow air to enter their respiratory system.

## 2) Pond Water

### Materials:

- Pond water, collected from a pond, lake, marsh - try anywhere you want!
- Microscope
- Plastic bowls
- White plastic spoons
- Magnifying glasses
- Ice cube trays (optional)
- Eyedroppers

- Microscope slides and cover slips

### Procedure:

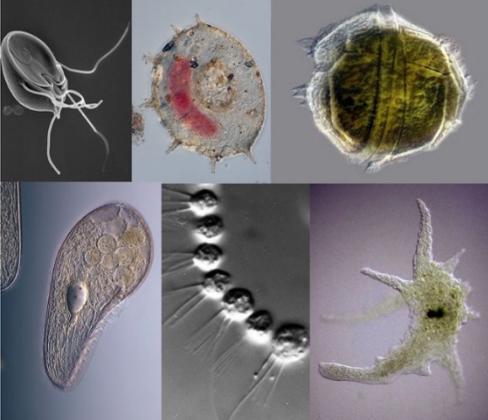
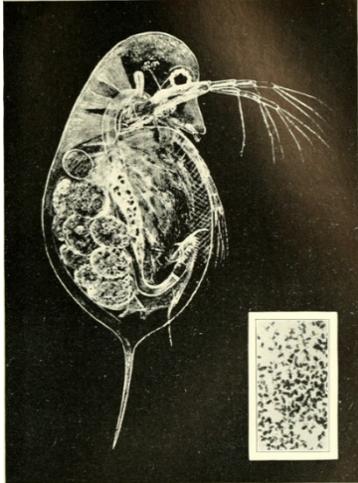
- 1) Arrange students in groups, with one larger bowl of pond water for the group. Each student should have 2-3 smaller bowls and a white plastic spoon.
- 2) Have students add a bit of pond water to one of their bowls (assist as necessary)
- 3) Begin by encouraging students to look for large bugs or invertebrates. They can use their plastic spoon to separate them out and place them in a separate bowl. If you have ice cube trays, use these to separate their findings.
- 4) In groups, or calling students up to the front of the class (dependent upon the number of microscopes available), prepare slides or assist students in making slides.
- 5) Use an eyedropper to pick up a small amount of pond water and place a drop on the slide. If there is too much liquid, use a piece of paper towel to siphon off excess.
- 6) Add a coverslip to the microscope slide.
- 7) Guide students through arranging the slide on the microscope and adjusting the focus. For very young students, it may be best to focus the specimen for them.
- 8) *Optional:* have students sketch the organisms they see, either under the magnifying glasses or under the microscope.

### Guiding Questions:

- 1) What do you see?
- 2) What is the shape of the organism?
- 3) Why do you think the organism is shaped the way it is?
- 4) What is the organism?
- 5) How did the organism move?

**Discussion:**

There is a great diversity of organisms living in pond water that one may observe. From algae to dragonfly nymphs, there's a whole world in a single drop of pond water. Don't expect your students to be able to identify everything you see, but here are a few possibilities.

<i>Protozoa</i>	<i>Rotifers</i>
<p>Single celled organisms, they may have appendages to aid in movement.</p>	<p>These tiny predators use whirling hairs to sweep food into their mouth</p>
	
<i>Flatworms</i>	<i>Daphnia</i>
<p>These invertebrates absorb oxygen and nutrients through their skin</p>	<p>Known as water fleas, these little crustaceans can be seen with the naked eye.</p>
	

**Some online guides to the organisms you might observe:**

<http://www.microscopy-uk.org.uk/index.html?http://www.microscopy-uk.org.uk/pond/index.html>

<http://www.waynesthisandthat.com/microscopic%20pond%20life.html>

**Sources:**

<http://www.greatscopes.com/act014.htm>

<https://www.microscopemaster.com/pond-water-microscope.html>

<http://www.microscopy-uk.org.uk/index.html?http://www.microscopy-uk.org.uk/pond/index.html>

[https://upload.wikimedia.org/wikipedia/commons/7/7c/Protozoa\\_collage\\_2.jpg](https://upload.wikimedia.org/wikipedia/commons/7/7c/Protozoa_collage_2.jpg)