

Lesson Plan

Assessment
Cross-curricular

Quest., observation, worksheet

Big Ideas

- Cells are the basis of life.

Learning Goals

- Observe unicellular organisms in water sample.
- Compare unicellular organisms to multicellular organism.

Specific Expectations:

- 2.1** follow established safety procedures for handling apparatus and materials and use microscopes correctly and safely
- 2.2** use a microscope correctly and safely to find and observe components of plant and animal cells
- 2.3** prepare dry- and wet-mount slides of a variety of objects for use with a microscope
- 2.5** use appropriate science and technology vocabulary, including organelle, diffusion, osmosis, cell theory, selective permeability, membrane, stage, and eyepiece, in oral and written communication
- 2.6** use a variety of forms to communicate with different audiences and for a variety of purposes
- 3.1** demonstrate an understanding of the postulates of the cell theory
- 3.5** identify unicellular organisms (e.g., amoebae) and multicellular organisms
- 3.6** describe the organization of cells into tissues, organs, and systems

Description:

In this lesson students will compare unicellular organisms to multicellular organisms. They will also observe unicellular organisms in a water sample.

Materials/Resources:

Hay Infusion Discussion Questions Worksheet

Hay Infusion Discussion Questions Answers

Hay Infusion experiment:

One 1-litre jar with lid, Dried hay, A jar of pond water, Hand lenses, Glass slides and cover slips, Eyedropper

Clean culture dishes

Microscopes

Small pieces of cotton

Safety Notes:

Unknown (potentially harmful) microorganisms may also start to grow in the hay infusion. It is important to follow basic lab hygiene rules.

Introduction

Ask students, “What are protozoa? What do they look like? Where do they live?” “Are protozoa plants, animals or something else?” Answer: unicellular eukaryotic organisms with animal like characteristics. You can use this as an opportunity to talk about how they are different from bacteria (prokaryotic, no nucleus) and different from multicellular organisms.

Explain to students you will be growing protozoa in a “hay infusion” with pond water. Unknown (potentially harmful) microorganisms may also start to grow in the hay infusion. It is important to follow basic lab hygiene rules. This website has good advice on safety with microscopy.
<http://www.microbehunter.com/safety-issues-in-microscopy/>

Action

Make a hay infusion ahead of time to be ready for the lesson. Add cut up hay to water in an open jar or container. The hay should be free of herbicides and pesticides. The water should be untreated - from a stream, pond or puddle. (If you take the students out to collect the pond water, have them make observations of the microorganisms found in the water). The container should be kept at room temperature. Initially bacteria will grow (and perhaps create an odour). The bacteria are food for the protozoa, whose populations will then increase. The protozoa populations peak in about a week.

After the protozoa have grown, give each student (or team) a clean culture dish. Open the jar, and with an eyedropper collect a sample of the water from the top. Have the students observe their water samples with a hand lens, and make observations.

Next, have each student observe the protozoa in their culture dishes through the microscopes. Place a drop of water on a clean, dry glass slide. Cover the drop with a cover glass by placing one edge down first to avoid trapping air bubbles beneath the glass. If the protozoa are moving around too much, try placing a few fibres of cotton on the slide before adding the drop of water. This should trap the protozoa. Try observing first under low power, and then gradually move to high power.

It is easier to observe microorganisms under low to medium powers in the microscope as the protozoa move very quickly and are easier to observe with a wide field of view. The field of view narrows under higher magnification.

Have each student draw the animals they see and if possible, identify how each are moving.

Have students complete the discussion questions. (See Links)

Consolidation/Extension

You can use the discussion questions as a summative assessment, if you choose. They are a jumping off point to discuss the differences between unicellular and multicellular organisms. Discuss with the students why larger, more complex multicellular organisms have tissues, organs and organ systems.

Students can dissect animal heart tissue and observe the cells under a microscope. Discuss how our cells cannot live like the unicellular protozoa. Discuss why it is important for our cells to change into all the different cells we have in our bodies. We would not survive without our heart and the rest of our circulatory system. Protozoa are so small; they do not need a circulatory system. Discuss simple animals too. Earthworms also need a circulatory system to get stuff around their bodies.

Other technology: use a laser to project the image of protozoa in a droplet of water. Fill a syringe with hay water. Suspend the syringe between two glasses. Make a droplet come out of the syringe, but do not let the droplet fall. Shine a laser through the droplet onto a screen. Make note of what is observed.