

# EXERCISE 3

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## Observing Protozoa, Algae, and Cyanobacteria

### OBJECTIVES

At the conclusion of the exercise, you should...

1. be able to prepare wet mounts of various living microorganisms.
2. observe microscopic features of protozoa, algae, cyanobacteria and bacteria.
3. recognize the diversity of microorganisms.
4. understand the basic differences between Prokaryotes and Eucaryotes.
5. understand what hay infusion is.
6. be introduced to common genera and species of Eucaryotes.
7. know what a parasite is.

### INTRODUCTION

The microbial world includes a wide variety of microorganisms. Samples taken from ponds and oceans will have many different species of protozoa, algae, plankton, diatoms, and cyanobacteria. This exercise will give you more practice using the microscope and introduce you to the diversity of the microbial world.

### MATERIALS

Cultures:

Hay infusion

*Euglena*

Plankton tow

Cyanobacteria

Pond water

Plates of bacteria (*Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*)

Supplies:

Slides and coverslips

Lens paper

Pasteur pipettes with bulbs

Prepared slides of some medically important protozoa

## PROCEDURES

### Technical Background

**Hay Infusion:** An infusion is made by soaking dried plant material in water. For example, after soaking hay in non-chlorinated water for a week, a “hay infusion” will develop, yielding a variety of microorganisms. Protozoa are typically found in water, but when they become dry, they can form cysts and go into a dormant state. These cysts can be activated by adding water. At the beginning of the infusion, bacteria will predominate. Then a variety of other microorganisms will appear; these will include saprophytic flagellates, ciliates, and amoebae that feed on the bacteria. Eventually, the carnivorous ones will appear. The appearance of each new species is related to factors such as light intensity, gases present, pH, and concentration of organic compounds. The sequence of appearance of organisms in the hay infusion is representative of a food chain.

**Succession:** Succession refers to orderly sequential changes in the composition or structure of an ecological community. Succession in a protozoan community may be demonstrated in pond water.

**Prokaryote:** A cell whose genetic material is not enclosed in a nuclear envelope and usually has a single circular DNA molecule as its chromosome. The bacteria are in this group.

**Eukaryote:** A cell having DNA inside a distinct membrane-enclosed nucleus (true nucleus) and usually other organelles. The protozoa and fungi (as well as animals and plants) are in this group.

**Protozoa:** Mostly unicellular eukaryotic microorganisms that lack cell walls.

**Parasite:** A type of organism that feeds on live organic matter, such as another organism.

**Algae:** The common name given to a heterogeneous group of plants that are capable of carrying on photosynthesis and usually live in water. Some are unicellular.

**Euglena:** A one-celled organism that is usually green in color, can generally make its own food by photosynthesis (phototrophic), and is free moving.

**Tetrahymena:** A protozoan possessing cilia for motility.

**Cyanobacteria:** Oxygen-producing prokaryotes; also called blue-green algae.

**Plankton:** Free-floating aquatic microorganisms. This group includes diatoms and dinoflagellates. Diatoms have cell walls that consist of pectin and silica.

### *Making Wet Mount Slides*

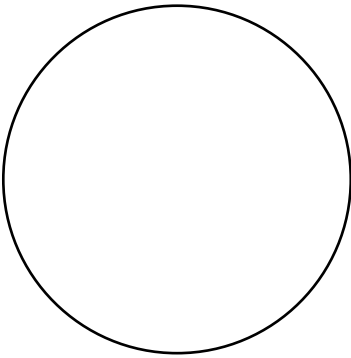
1. After viewing the videos showing some of the microorganisms that can be found in the environment, examine the various samples to try to find examples.
2. Place a drop of one of the liquid specimens on a microscope slide, cover with a coverslip, and examine with the brightfield microscope, starting with 10x and going up to 40x.
3. Use the manuals and diagrams provided, as a guide.
4. Note the means of motility (flagella, cilia, ameboid).
5. Note the difference in sizes of the bacteria and the protozoa. Protozoa can range in size from 1 mm to 70 mm or larger. Bacteria usually range from 0.5-2.0 mm.
6. Practice making wet mounts of all the samples and record the observations in the evaluation of results.



### EVALUATION OF RESULTS (EXERCISE 3: OBSERVING PROTOZOA, ALGAE, AND CYANOBACTERIA)

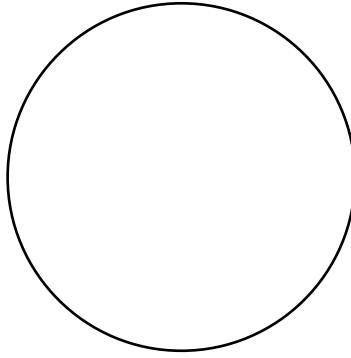
Purpose

Data



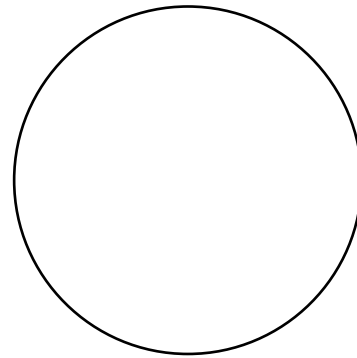
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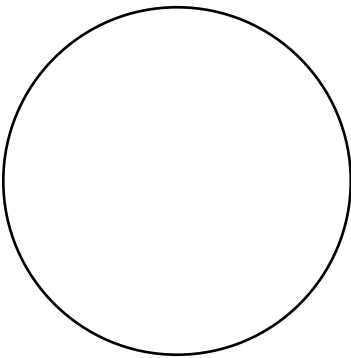
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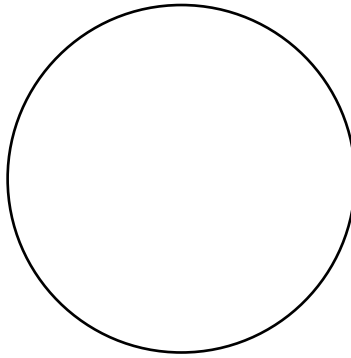
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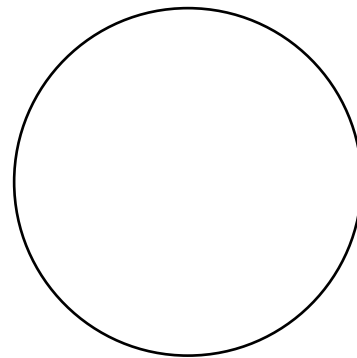
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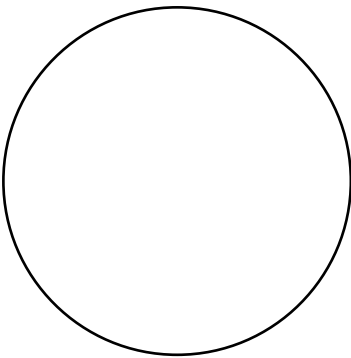
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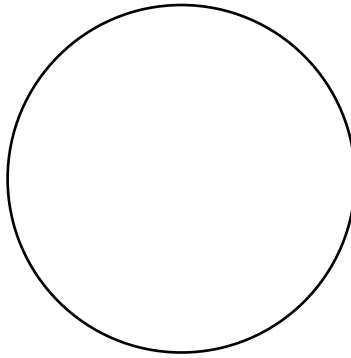
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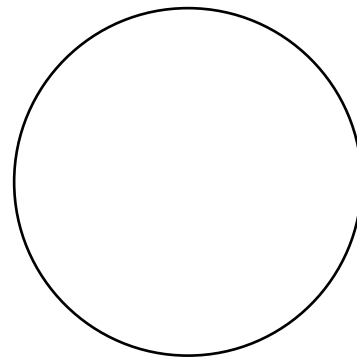
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## CONCLUSIONS, DISCUSSIONS, AND QUESTIONS

1. Explain two differences between protozoa and algae and two differences between algae and cyanobacteria.

2. Use your textbooks and the Internet to complete the table below.

Examples of human pathogens that are protozoa

Name of pathogen	Disease	Source of human infections
<i>Giardia lamblia</i>		
<i>Entamoeba histolytica</i>		
<i>Naegleria fowleri</i>		
<i>Cryptosporidium</i> species		
<i>Trichomonas vaginalis</i>		

3. Write a short paragraph in which you compare what you can see in the pond water or plankton tow with your naked eyes with what you can see through the microscope at 100x and 400x total magnification.

