OBSERVING LIVING PROTISTS: “LET’S PLAY LEEUWENHOEK”

INTRODUCTION

Today you will have the opportunity to observe cells which are actually individual organisms-- unicellular or colonized Eukaryotes. These organisms, which are members of the kingdom Protista, come in many shapes and sizes and exhibit diverse behaviors.

As a student scientist, you will practice your observational and microscope skills as you investigate the activities of these creatures. In the 17th-century, Anton van Leeuwenhoek was most known for his observation and identification of these tiny creatures that he called “animalcules” using a simple compound light microscope he built himself. This lab should give you a sense of what he witnessed in his studies.

**OBJECTIVES**

The students will be able to:

1. Observe the various Protists (Amoeba, Paramecium, Chilomonas, Stentor, Euglena, Volvox) provided and make comparisons (shape, size, color, unicellular or multicellular)
2. Identify the form and functions of each of the Protist.
3. Differentiate the movements and activity of the various Protists

Diagrams are from [www.microscope-microscope.org](http://www.microscope-microscope.org)

 Amoeba Chilomonas Stentor Volvox

 Paramecium Species Euglena

**Background Information for Observing and Identifying Protists**

**Paramecium**: Under 100x you will see elongated organisms, darting about rapidly.

*Ciliate movement*: If you can reduce the light entering the microscope and increase the magnification, you will see tiny hair-like threads completely encircling the paramecium. These are called cilia. The cilia act as tiny oars to propel the paramecium through the water.

*Eating method*: Under high power you'll see the funnel-like opening going from one end of the paramecium to its middle, covered with cilia. These cause a water current that sweeps tiny particles into its mouth. At the end of the mouth is a food vacuole. This collects food until it is a certain size and then it detaches itself from the mouth and floats inside the cell to feed the animal. Many food vacuoles can be found in a paramecium at one time.

*Defenses*: Add a drop of methylene blue or food coloring to a drop of culture. Cover with a cover slip. You'll notice that the dye has killed the paramecium, but if you look closely, you'll see long hairs called trichocysts (trick-o-sists). Scientists believe the paramecium uses these to defend itself from its enemies.

*Asexual reproduction*: When a paramecium grows large, it splits into two identical paramecia and each swims away as if nothing had happened. Under ideal conditions a paramecium can split every hour. That means after one day one paramecium can reproduce over 8 million paramecia!

**Euglena**:

*Flagellate movement*: At the back of the euglena is a hair-like whip called a flagellum. As the animal moves the flagellum back and forth it is able to swim much like a snake swims through water. Euglena can also crawl across flat surfaces like caterpillars.

*Eating method*: While most protozoa capture their food like the paramecia, euglena are different. Inside euglena are small blackish green chloroplasts. Euglena can manufacture their own food by using minerals and light much in the way a plant gets its nutrition.

**Amoeba:**

*Amoeboid movement*: Notice the amoebas seem to flow along the slide. This type of movement is called amoeboid movement (a-me-boyd); the amoeba uses pseudopodia, or temporary foot-like extensions, to move. Our white blood cells move in our bodies in the same way.

*Eating method*: The amoeba encircles its food with its body and absorbs it into a food vacuole similar to the paramecium. The amoeba takes its food from the vacuole and inedible parts are left behind.

**Stentor:**

*Stentor movement and eating method*: Stentor have a ring of prominent [cilia](http://en.wikipedia.org/wiki/Cilia) around the anterior "bell" that aid in swimming and sweep in food. It feeds like a vacuum cleaner.

**Volvox:**

*Volvox movement and eating method*: Volvox is a one-cell algae that live together in a colony. The colony is a hollow ball with 500 to 20,000 individual cells. They look like rolling green balls on the slide. Each Volvox cell have two flagella. The flagella beat together to roll the ball through the water. Volvox cell have chloroplast and make their own food by photosynthesis. They use their red eye spot to find sunlight.

**Chilomonas:**

*Chilomonas movement and eating method*: Chilomonas is a free swimming biflagellate monad. It moves with the whip of the flagellates. It does not have chloroplast but has numerous polysaccharide granules. They ingest bacteria.

**Materials:**

* microscope slides
* coverslips
* paper towels
* six clean pipettes
* 6 protist solutions (Amoeba, Paramecium, Euglena, Stentor, Volvox, Chilomonas)
* microscope

**Procedure:**

1. Prepare a clean slide and coverslip.
2. Use a clean pipette to put a live sample of paramecia onto a slide.
3. Add a drop of protist slowing solution.
4. Gently place a coverslip over top.
5. Adjust the diaphragm of the microscope to allow only a small amount of light through. This will provide more contrast since the protists have little color and are difficult to see in bright light.
6. Use low power to locate an area of paramecia activity, then switch to medium power to view more detail.
7. In table 1 on page 2 make observations about movement, eating method and any other characteristics observed.
8. In table 1, draw a labeled diagram of a single paramecium under medium power magnification. Draw in as much detail as possible as you are going to compare the different protists to each other. Be sure to label all visible parts. You may take a picture or video with your smart phone to help with your observations.
9. Repeat steps 1-8 for Euglena, Amoeba, Stentor. Chilomonas, and Volvox

**Observations:**

Table 1: The Structure Amoeba, Paramecium, Chilomonas, Stentor, Euglena, and Volvox Protists (mag \_\_\_\_x) [48 pts.]

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| --- | --- |
| Amoeba | Paramecium |
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| Chilomonas | Stentor |
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| Euglena | Volvox |
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**Analysis:**

1. Diagram and label the six protists you observed. You can reference the website for more information as you hover over the diagrams provided for you on page 1. [6]
2. List three characteristics that all of the protists had in common. [3]
3. Describe the three ways in which protists move and give an example of each. [3]
4. How does stentor differ from the other three protists you looked at? [2]
5. Even today some scientists are not sure if euglena are animals or plants. After you have studied euglena under the microscope make a table showing reasons why euglena could be considered plants or animals. [8]
6. What unique adaptation does the euglena have? How does it help it survive in changing conditions? [4]
7. Look up the kingdom, phylum, class, order and family (I will tell you the genus and species) for each of the protists studied. Which two are most closely related? How can you tell? [4]

**Conclusion:**

Write a concluding paragraph. Minimum of 4 detailed sentences.[7] **[Total \_\_\_\_\_/80pts]**