**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_**

**Microscope Exploration**

*Observing Organisms with a Microscope*

**Question**: How do microscopes help biologists explore the diversity of life?

**Overview**: In this investigation, you will use a microscope to observe representative organisms from the 4 kingdoms of Domain Eukarya and representatives of Domain Prokarya. You will sketch the specimens as you observe them and estimate their sizes.

**Introduction**: Robert Hooke built the first compound microscope in 1655. This microscope would revolutionize science forever as it opened a whole new world to explore and study. With the naked eye we cannot see fine details under a centimeter much less microscopic organisms such protists and bacteria. The advent of the microscope allowed scientists to make medical discoveries that enabled us to understand our bodies and the things that can make us sick. This would in turn save millions of lives.

Today you are going to view a variety of specimens underneath the light microscope much like early scientists did when the LM was first invented. Robert Hooke looked at a sample of cork and discovered the cell. Anton van Leeuwenhoek observed tiny living organisms in pond water for the first time. Theodore Schwann, Matthias Schleiden, and Rudolf Virchow were able to develop Cell Theory through their use of the Light Microscope.

In this lab, you will observe one type of organism from each of the four kingdoms in domain Eukarya: plants, animals, protists, and fungi. Although these organisms are all very different, on characteristic they share is that they all consist of one of more eukaryotic cell. A Eukaryotic cell contains a membrane- enclosed nucleus that separates genetic material from the rest of the cell. In contrast prokaryotic cells (of which you will vie one specimen) do not contain a membrane-enclosed nucleus.

**Part 1: Determining Size of Microscope Field of View**

1. Place a transparent metric ruler on the microscope stage so that the millimeter marks fall across the diameter of the circular opening where the light comes through.
2. Look through the scanning objective lens. Focus on the millimeter marks. Move the ruler so that one mark lines up at one side of the field of view. Measure the diameter of the field of view. Write your measurement in the space provided.
	* **Diameter of scanning objective field of view = \_\_\_\_\_\_\_\_\_\_\_ mm**
3. Calculate the diameter of the field of view for the low-power objective lens using the formula below. Write the result of your calculations in the space provided.
	* **Diameter of = (Diameter of scanning FOV) X (power of scanning objective)**

 **Low-power FOV power of low-power objective**

* **Diameter of low-power FOV = \_\_\_\_\_\_\_\_\_\_ mm**
1. Calculate the diameter of the FOV for the high-power objective lens using the formula below. Write the result of your calculation in the space below.
	* **Diameter of = (Diameter of scanning FOV) X (power of scanning objective)**

 **High-power FOV power of high-power objective**

* **Diameter of high-power FOV = \_\_\_\_\_\_\_\_\_\_ mm**

**Part B: Observing a Plant**

1. Obtain a leaf of the aquatic plant Elodea and make a wet mount for observation.
2. Measure the length of the plant with a metric ruler and record the length below:
	* **Length of leaf: \_\_\_\_\_\_\_\_ mm**
3. View the plant leaf first on scanning power to focus then switch to low –power. Sketch what you see in the space below. On the lines provided, write a description of the cells. Label your sketch with the name and the magnification.



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**C. Observing an Animal**

1. Write the name of the animal you will observe in the space below.
	* **Name of Animal: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. Choose an animal specimen from the animal slide selection.
3. Measure or estimate the length of one animal. Use the metric ruler if the animal is large enough. If not, focus on the animal at low power and estimate its size based on the diameter of the scanning power objective FOV determined in Part A. Write your measurement/ estimate in the space below:
	* **Size of Animal: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mm**
4. Use the space below to draw a sketch of the animal. Online the lines provided, write a description of the cells. Label your sketch with the name and the magnification.



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**Part D: Observing a Protist**

1. Obtain a prepared Protist slide (*Amoeba, Paramecium, Diatoms, Dinoflagellates, Algae)*
2. Focus first on scanning then switch to low-power.
3. Draw a sketch of the organism: include magnification, name and a brief description.
4. Repeat these steps for another Protist of your choice.

A. B. C.

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**Part E: Pond Water Organisms**

1. Choose a pond water sample to observe. Add 2-3 drops of the pond water to a slide making a wet mount. Make sure to get the “gunk” in your sample. This will increase the chances of finding microorganisms.
2. View the slide under the scanning power to locate protist organisms. These organisms are mobile and will be moving away from the light. Switch to higher magnification once you locate a suitable organism.
3. Use the Dichotomous key provided to identify your organism.
4. Draw your specimen in the spaces provided below, making sure to indicate magnification and the name of the organism as identified in the key next to the sketch. You will be sketching 3 organisms from the pond water.
5. Online the lines provided, write a description of the cells.
6. B.

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**Part F: Observing Fungi**

1. Write the name of the fungi you will observe in the space below.
	* **Name of Animal: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. Use a transfer pipette to draw up one drop of yeast culture to make a wet mount slide.
3. Observe the yeast cells at low and medium power. In order to estimate the size of a yeast cell, you will need to switch to high power. Focus on one individual yeast cell at high power. Estimate its size based on the diameter of the high-power field of view. Write your estimate in the space below:
	* **Size of Animal: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mm**
4. Use the space below to draw a sketch of the fungi. Online the lines provided, write a description of the cells. Label your sketch with the name and the magnification.



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**Part G: Observing a Human Cheek Cell**

1. Using a toothpick, gently scrape along the inside of your cheek.
2. Smear your sample on a glass slide adding a drop of water to make a cover slip.
3. Observe the cells on all levels of magnification.
4. Draw a sketch of your sample indicating the magnification.



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**Part G: Observing a Prokaryote**

1. Obtain a prokaryote slide.
2. Observe the cells on all levels of magnification.
3. Draw a sketch of your sample indicating the magnification.

