Prelab Information

**Purpose** Explore cells using a compound microscope.

**Time** Approximately 45 minutes

**Question** What is the effect of magnification on the visibility of cell organelles using a compound microscope?

**Hypothesis** If cells are viewed under higher magnification, then more cell organelles will be seen.

**Variables** *Independent variable:* magnification power of the microscope

*Dependent variable:* number of cell organelles seen

Amount of light is another independent variable that could be tested. If amount of light is the independent variable, magnification power must be held constant.

Safety

 Always wear safety goggles and a lab coat while performing an experiment.

 Keep behavior in the lab purposeful.

 Use caution while carrying and using a microscope so that you don’t damage it.

 Check glassware, such as microscope slides and cover slips, for cracks and chips prior to use.

 Report all accidents—no matter how big or small—to your teacher.

 Use dry hands to plug in and unplug electrical devices.

Microscope Handling

 Prevent eye strain by keeping both eyes open while looking through the microscope’s ocular.

 Always begin with the lowest power objective lens.

 Once you have adjusted the image on low power with the coarse adjustment knob do **not** adjust the coarse

knob again with higher power lenses. Do not let the objective impact the glass slide; you could break the slide and/or damage the lens in the objective.

Lab Procedure

1. Gather Materials

 Compound microscope

 Blank glass slide

 Cover slip

 Dropper

 Tap water

 Piece of paper with text

 Scissors

 Forceps

 Prepared slide of threads

 Prepared slide of cells, e.g., human cheek cells

1. Familiarize Yourself with the Microscope

As you do the steps below, record notes in the data table about placement, direction, and function of the various components of the microscope.

**a)** Find the power button, and turn on the light source.

**b)** Adjust the diaphragm, and observe any changes in the light.

**c)** Turn each focus knob, and observe which of the microscope’s parts move and how.

**d)** Lower the stage all the way, turn the nosepiece, and observe which parts move.

1. Prepare a Wet-Mount Slide

**a)** Cut out a letter *e* from a piece of paper with text on it.

**b)** Use forceps to transfer the *e* to the center of a glass slide. Be sure that the *e* is right side up.

**c)** Use the dropper to cover the *e* with a drop of water.

**d)** Carefully pick up a cover slip. Hold it at a 45-degree angle, lower the bottom edge of the cover slip to the slide, over the drop of water. When the cover slip touches the water, release the cover slip to allow it to cover both the *e* and the water drop.

1. Explore Features of the Compound Microscope with the Wet-Mount Slide

For each substep, record your observations by both drawing what you see and describing the difference in words. Take special note of relative size, orientation, resolution, contrast, position, and relative movement.

**a) Slide placement:** Use the coarse-focus knob to lower the microscope’s stage as far as it will

go. Then, turn the nosepiece until the low-power objective clicks into place. Place the slide on the stage, and secure it with the stage clips. Be sure that the *e* is right side up and centered over the light passing through the stage. Look at the *e* on the wet-mount slide with your unaided eye. Draw what you see to establish a baseline. Record your observations on the data sheet.

**b) Initial focus using coarse adjustment:** As you look through the ocular with one eye, use the coarse-focus knob to raise the stage slowly. Once it comes into focus, transition to the fine-focus knob to sharpen the image. Record your observations on the data sheet.

**c) Higher power objectives and fine adjustment:** Slowly turn the nosepiece until the next highest-power objective clicks into place. Continue to look through the ocular while slowly turning the fine-focus knob back and forth until the *e* is in sharp focus. Record your observations on the data sheet.

**IMPORTANT:** Be sure that the high-power objective does not touch the cover slip before allowing the objective to click into place. Also, do not touch the coarse-focus knob again after setting the higher power objective. Doing so can cause damage to the microscope and slide.

**d) Amount of light:** Adjust the diaphragm, allowing both more and less light to pass through the slide and observe how the view of the *e* under the microscope changes. Observe the *e* as you see it under the largest diaphragm setting. Record your observations on the data sheet.

**e) Direction:** Gently move the slide to the left, and observe how the *e* appears to move in the microscope’s field of view. Observe the *e* through the objective while moving the slide toward the left. Record your observations of what happens in the field of view on the data sheet.

**f)** Switch to low power, and remove the slide from the stage.

1. Explore Depth of Field

**a)** Make sure the microscope is set on low power, and lower the stage. Place a prepared slide of colored threads on the stage, and secure it with the stage clips.

**b)** Use the coarse-focus knob to raise the stage until part of the threads comes into focus. Keep raising the stage slowly until all three threads are out of focus again.

**c)** Now, switch to the high-power objective. The threads are at different depths of view. To see each thread’s color, adjust the fine-focus knob. View and record the color of each of the three threads in your data table.

**d)** Switch to low power, and remove the slide from the stage.

1. Examine Cell Structures

**a)** Now the moment of truth! You will examine cell structures! In your data table, record the title of the prepared slide that you are using.

**b)** Start with low power. Adjust the diaphragm and depth of field to locate as many cell structures and organelles as you can. Record in the data sheet.

**c)** Switch to high power. Adjust the diaphragm and depth of field to locate as many cell structures and organelles as you can. Record in the data sheet. **Be sure to use only the fine-focus knob while under high power!**

**d)** Switch to low power, and remove the slide from the stage.

Data

Record your data either in your lab notebook or in the space below.

**Step 2: Observations about the Microscope**

**Step 4: Observations about the Wet-Mount Slide**

**Drawing**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Unaided Eye** | **Low-Power**  **Objective** | **High-Power**  **Objective** | **Largest**  **Diaphragm** | **Moving Slide to the Left** |
|  |  |  |  |  |
|  |  |  |  |  |

**Description in Words**

**Step 5: Observations about Depth of Field**

|  |  |  |
| --- | --- | --- |
| **Top Thread Color** | **Middle Thread Color** | **Bottom Thread Color** |
|  |  |  |

**Step 6: Observations about Cell Structure**

Slide Title:

|  |  |  |
| --- | --- | --- |
| **Cell Structure/ Organelle** | **Observed under**  **Low Power?** | **Observed under**  **High Power?** |
| Cell membrane | Yes No | Yes No |
| Nucleus | Yes No | Yes No |
| Vacuoles | Yes No | Yes No |
| Ribosomes | Yes No | Yes No |