

Estimating the Size of Cells Using a Compound Light Microscope

Objectives of this activity are to:

- Learn how to use the compound light microscope.
- Learn how to make a preparation for viewing on a slide.
- Make scale drawings
- Estimate the lengths of cells seen with the microscope.

I. Determine the Total Magnification with each objective lens

Each lens (both **objectives** and **oculars**) has a particular magnifying power.

- The ocular lens has a number followed by an X.
- Each objective lens has a number of a particular color.
- These numbers are the magnifying power for that lens.
- Total magnification of the microscope is found by multiplying the power of the ocular lens by the power of the objective lens.

Use Table 1 to record your results as you calculate the total magnification obtained with each objective lens.

Table 1: Parameters of a compound light microscope used in Biology

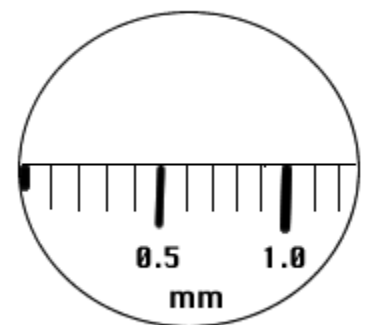
Power of Ocular Lens	Power of Objective Lens	Total Magnification	Field of View (μm) (use a stage micrometer or ruler)

II. Determine the diameter of the field of view for each objective.

Use Table 1 to record your results.

The field of view is the circular area that one sees as one looks through the microscope. To determine the diameter of the field of view, place a plastic ruler under the low power (4 x) objective. Focus on the ruler and lay it so it crosses the diameter of the field of view. Record the diameter of the field of view in millimeters in Table 1.

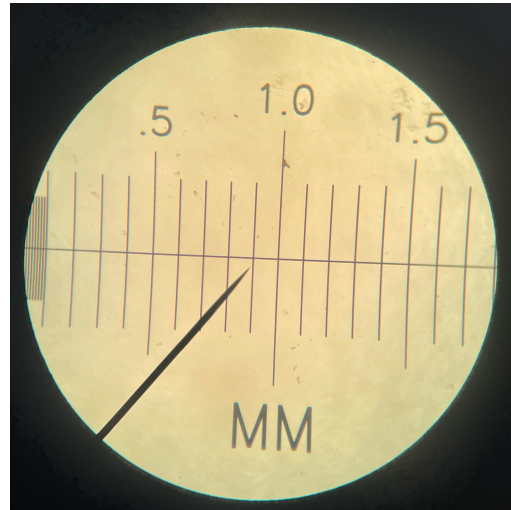
View of a metric ruler
viewed under medium power



The ruler shows the FOV
diameter of this lens.

Using a stage micrometer

A stage micrometer is used to show distances under a microscope. This is usually done in conjunction with an eyepiece micrometer, but we will just use the stage micrometer to measure the field of view at 100x and 400x. To determine the diameter of the field of view, place the slide under the low-power (4x) objective. Focus on it until you see what looks like a small ruler. Move to the medium power (10x) objective using the fine focus, and carefully move the slide until the ruler lines up with the edge of the field of view (see picture below). Record the diameter of the field of view in micrometers in Table 1. Repeat with the high power (40x) objective.



III. Estimating the Sizes of Cells

A. You will now observe various types of cells. You will use prepared slides, or you may make your own slides.

To prepare a wet mount:

- Obtain a clean glass slide.
- Place the object you wish to observe on the slide.
- Use a pipette to add a drop of water (in some cases, you may add a drop of stain instead of water).
- Now put one edge of a cover glass into the edge of the drop of water and carefully lower the cover glass into the drop of water as shown in Figure 1.
- By carefully lowering the cover glass into the drop of water, you should be able to prevent any air bubbles from being formed.

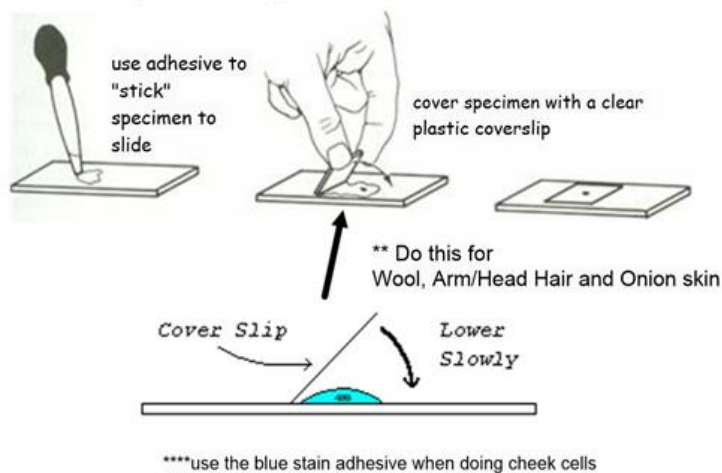


Figure 1: Preparation of a wet mount on a microscope slide

You will be looking at:

- White Onion cells
- Elodea
- Onion cells w/ iodine
- Red Onion cell
- Others (if time!)

For each slide that you observe, follow steps 1 through 4:

1. Using a pencil, draw a circle to represent the field of view. (Use a compass or the bottom of a beaker) .
- ~~2. Carefully and accurately make a scale drawing of 2 or 3 representative cells at 400X. (Remember, there are no straight lines in biology) —~~
- ~~3. Beside each drawing, neatly record the following information:~~
 - ~~a. total magnification~~
 - ~~b. the diameter of the field of view~~
 - ~~c. estimated number of cells that will stretch across the diameter of the field of view (if possible – some slides may not have regular-sized cells)~~
 - ~~d. estimated length and width of an individual cell*~~
4. Record the estimated length of each cell in [this table](#) do this for white onion cells, red onion cells, and Elodea.

*To figure the length of one cell, divide the number of cells that cross the diameter of the field of view into the diameter of the field of view.