

USING THE MICROSCOPE

Subject code: Biology 1
Learning Guide Code: 3.0
Lesson Code: 3.2 Using the Microscope



MATERIALS

To complete this module, you need the following:

1. pen and paper
2. phone/tablet/laptop
3. stable internet connection
4. coloring materials



TARGET

At the end of the module, you should be able to know how to properly use a microscope and identify its different parts along with their function.



HOOK

With the discovery of the cell and the constant development of our capability to study them further, we were able to see things we didn't imagine to exist. Microscopy paved the way to our discovery of many other phenomena. In the link below, you will be watching a talk that discusses the use of an electron microscope that will give us a glimpse into a whole other world invisible to the naked eye.



WATCH!

<https://www.youtube.com/watch?v=GR9p7gC11S4>



IGNITE

A **light microscope** is an instrument that utilizes light and magnifying lenses to examine small objects not visible to the naked eye. Examples of light microscopes include the *brightfield microscope*, the *darkfield microscope*, *phase contrast microscope* and *differential interference microscopes* which we learned from the previous module. In this module, we will examine the parts of a compound light microscope, a microscope with more than one lens therefore yielding greater magnification.

PARTS OF THE MICROSCOPE

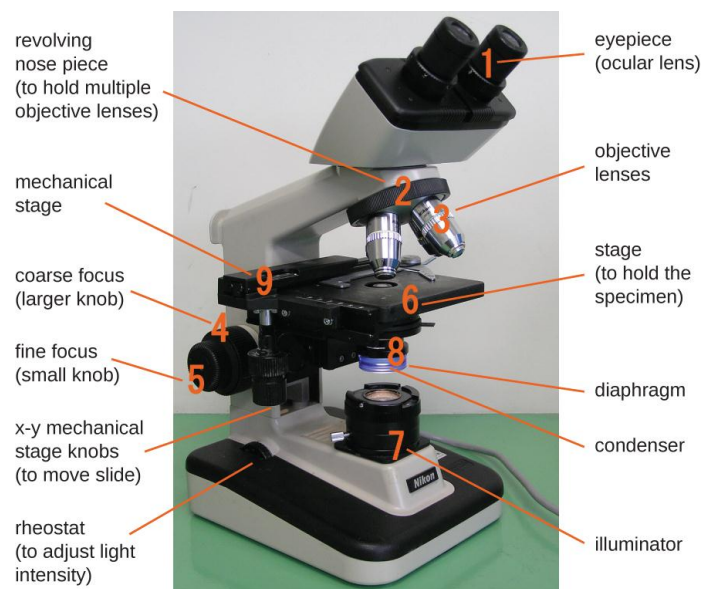


Figure 1. Parts of a compound microscope. (Instruments of Microscopy (2019).

Retrieved from: [https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_\(OpenStax\)/02%3A_How_We_See_the_Invisible_World/2.3%3A_Instruments_of_Microscopy](https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_(OpenStax)/02%3A_How_We_See_the_Invisible_World/2.3%3A_Instruments_of_Microscopy) is licensed by CC BY-NC-SA 3.0)

1. **Arm and base:** All other parts of the microscope are attached to the arm or base.
2. **Mechanical stage:** This is the platform on which the microscope slide rests and the clamp that secures the slide.
3. **Mechanical stage control knobs (x-y control knobs):** These knobs, under the stage, control the stage front to back and the slide from side to side.
4. **Lamp (illuminator):** The lamp on/off switch is usually located at the microscope's base. The lamp should be adjusted to a medium level at the start of viewing.
5. **Iris diaphragm:** This adjusts the intensity of light reaching the specimen under focus. It can be adjusted using the thin, black lever beneath the stage. It has an effect on the contrast observed in the specimen and may need to be adjusted frequently.
6. **Lens systems:** There are three lens systems utilized in our microscopes: the eyepieces (ocular), the objectives and the condenser.
 - a. **Eyepiece (ocular):** Magnification of 10X. The eyepieces are held rather loosely in the eyepiece tubes. Never remove the eyepieces from the eyepiece tubes. A rubber eye shield should be on the top of each eyepiece. The width between the eyepieces should be moved until a full circle (the viewing field) is visible with both eyes simultaneously.

- b. **Objectives:** There are four objectives attached in a revolving nosepiece: 4X (red), 10X (yellow), 40X (blue), and 100X (white, oil immersion objective).

The total magnification is calculated by multiplying the ocular magnification and the magnification of the objective in use.

- c. **Condenser:** The condenser is located directly beneath the stage. It gathers and conducts the light to the specimen. Although it can be raised and lowered with the condenser adjustment knob, the condenser should remain at its highest position.

7. **Focusing knobs:** These are located on both sides of the microscope. The larger, inner coarse adjustment knob moves the stage up and down much faster and farther than the smaller, outer fine adjustment knob. The coarse adjustment knob is used only with the low power (4X, 10X) objectives. When focusing a specimen under the 40X or 100X objective, the fine adjustment is used and never the coarse adjustment.

8. **Nosepiece:** Holds the objective lenses.



WATCH!

Go to <http://www.ncbionetwork.org/iet/microscope/> and study the different parts of a compound microscope.

USE OF THE MICROSCOPE

NOTE: When lifting the microscope, always grasp the arm of the microscope with the stronger hand and support the base with the weaker hand. Never tilt the microscope or run when carrying it.

1. Place the microscope in an upright position with the arm directed towards you. Make sure that it is at least two inches from the table.
2. Looking from the side, turn the revolving nosepiece clockwise until the LPO is in place.
3. Look through the eyepiece with one eye while keeping the other eye open.
4. Place the prepared slide on the stage in such a way that the part to be observed is centered over the hole in the stage.
5. By tuning the coarse adjustment knob, rack the LPO or the stage all the way down. Do this while looking from the side to prevent the unlikely event of breaking a slide.
6. Look into the eyepiece with one eye and slowly rack the LPO upward using the coarse adjustment knob until the specimen is visible. Obtain a clear focus by slowly turning the coarse adjustment knob clockwise or counterclockwise.
7. For greater magnification, turn the nosepiece until the HPO is in place. Take care to avoid breaking the slide in place. Use the fine adjustment knob to increase resolution.

8. After using the microscope, make sure to rack the body tube away from the stage using the coarse adjustment knob. Remove the slide and wipe the stage with a clean tissue when wet.

9. Position the clips and the mirror. Place the objective with the lowest objective in position.

10. Make sure to close the diaphragm and rack the body tube closer to the stage.



WATCH!

Go to <https://www.youtube.com/watch?v=-b3Eejf4rDQ> for a demonstration on how to properly take care of your microscope.



NAVIGATE

Go to

<http://www1.udel.edu/biology/ketcham/microscope/scope.html>

and follow the instructions in the virtual walkthrough on how to use the microscope properly. After the virtual tour, draw the different specimens after viewing them under different objectives. Draw the specimens you have observed using your pen and coloring materials

1. Letter 'e'

Specimen under Scanning Objective	Specimen Under Low Power Objective
Specimen under High Power Objective	Specimen under Oil Immersion Objective

2. Onion Root Tip

Specimen under Scanning Objective	Specimen Under Low Power Objective
Specimen under High Power Objective	Specimen under Oil Immersion Objective

3. Bacterial Capsule

Specimen under Scanning Objective	Specimen Under Low Power Objective
Specimen under High Power Objective	Specimen under Oil Immersion Objective

4. Cheek Cells

Specimen under Scanning Objective	Specimen Under Low Power Objective

Specimen under High Power Objective	Specimen under Oil Immersion Objective



KNOT

Microscopy really plays a vital role in our study of life. It is important for us to familiarize ourselves with the different parts of the microscope particularly its lens system(ocular and objective lenses) , the knobs (fine and coarse adjustment knobs) that we could use to better observe our specimen and the other parts that provide the needed quality of light (light source, condenser and diaphragm) and the parts that support the device and the sample we are to observe (base, arm, stage and stage clips).

References/Sources:

Instruments of Microscopy (2019). Retrieved from: [https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_\(OpenStax\)/02%3A_How_We_See_the_Invisible_World/2.3%3A_Instruments_of_Microscopy](https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_(OpenStax)/02%3A_How_We_See_the_Invisible_World/2.3%3A_Instruments_of_Microscopy)

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