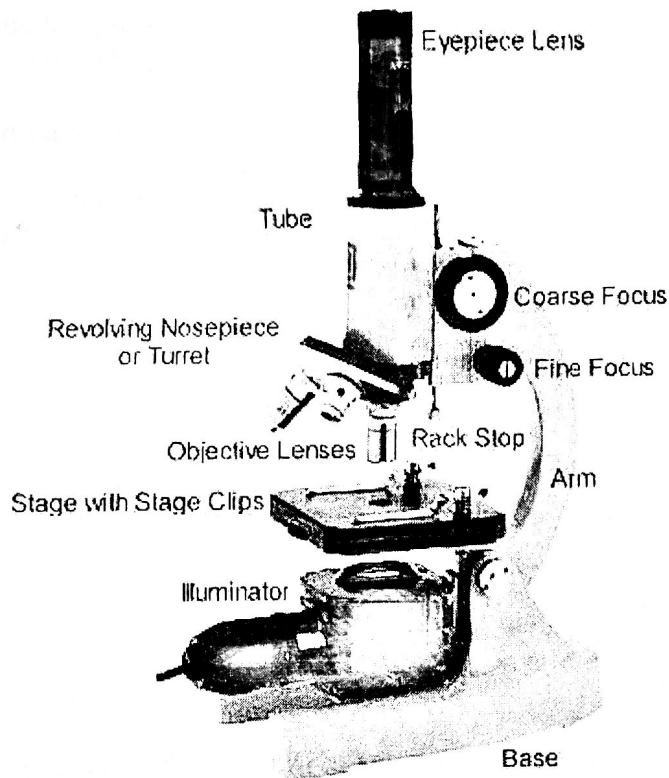


# The Microscope - Parts and Use

Name: \_\_\_\_\_

Period: \_\_\_\_\_



Historians credit the invention of the compound microscope to the Dutch spectacle maker, Zacharias Janssen, around the year 1590. The compound microscope uses lenses and light to enlarge the image and is also called an optical or light microscope (vs. an electron microscope). The simplest optical microscope is the magnifying glass and is good to about ten times (10X) magnification. The **compound** microscope has two systems of lenses for greater magnification, 1) the ocular, or eyepiece lens that one looks into and 2) the objective lens, or the lens closest to the object. Before purchasing or using a microscope, it is important to know the functions of each part.

**Eyepiece Lens:** the lens at the top that you look through. They are usually 10X or 15X power.

**Tube:** Connects the eyepiece to the objective lenses

**Arm:** Supports the tube and connects it to the base. It is used along with the base to carry the microscope

**Base:** The bottom of the microscope, used for support

**Illuminator:** A steady light source (110 volts) used in place of a mirror.

**Stage:** The flat platform where you place your slides. Stage clips hold the slides in place.

**Revolving Nosepiece or Turret:** This is the part that holds two or more objective lenses and can be rotated to easily change power.

**Objective Lenses:** Usually you will find 3 or 4 objective lenses on a microscope. They almost always consist of 4X, 10X, 40X and 100X powers. When coupled with a 10X (most common) eyepiece lens, we get total magnifications of 40X (4X times 10X), 100X, 400X and 1000X. The shortest lens is the lowest power, the longest one is the lens with the greatest power. The high power objective lenses are retractable (i.e. 40XR). This means that if they hit a slide, the end of the lens will push in (spring loaded) thereby protecting the lens and the slide.

**Rack Stop:** This is an adjustment that determines how close the objective lens can get to the slide. It is set at the factory and keeps students from cranking the high power objective lens down into the slide and breaking things.

**Diaphragm or Iris:** Many microscopes have a rotating disk under the stage. This diaphragm has different sized holes and is used to vary the intensity and size of the cone of light that is projected upward into the slide. There is no set rule regarding which setting to use for a particular power. Rather, the setting is a function of the transparency of the specimen, the degree of contrast you desire and the particular objective lens in use.

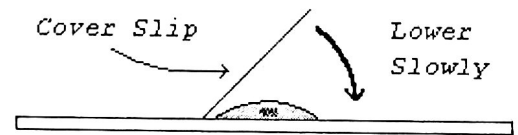
**Coarse adjustment:** This is used to focus the microscope. It is always used first, and it is used **only with the low power objective**.

**Fine adjustment:** This is used to focus the microscope. It is used with the high- power objective to bring the specimen into better focus.

**How to Focus Your Microscope:** The proper way to focus a microscope is to start with the lowest power objective lens first and while looking from the side, crank the lens down as close to the specimen as possible without touching it. Now, look through the eyepiece lens and **focus upward only** until the image is sharp. If you can't get it in focus, repeat the process again. Once the image is sharp with the low power lens, you should be able to simply click in the next power lens and do minor adjustments with the fine adjustment knob. If your microscope has a fine focus adjustment, turning it a bit should be all that's necessary. Continue with subsequent objective lenses and fine focus each time. Note: Both eyes should be open when viewing through the microscope. This prevents eye fatigue, which occurs when the non-viewing eye is kept closed. Keeping both eyes open does take some practice, but it is highly recommended. Also, you should never let your eye touch the ocular lens. If your eyelashes touch the lens you are to close. Always remove eyeglasses when viewing through a microscope. If your eyeglass lens touches the microscope it may get scratched.

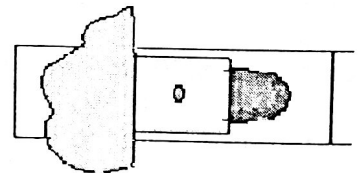
### **Making a wet-mount slide Procedure:**

- 1.-Place a clean slide on a paper towel on the lab table. **Handle slides at the ends**, not the center, to avoid getting fingerprints in the viewing area of the slide.
- 2.-Place a drop of water on the center of a clean dry slide
- 3.-Using the tweezers, place the specimen in the middle of the drop.
- 4.-While holding the cover slip upright, carefully place one edge of the cover slip next to the water. Hold the coverslip by the edges to avoid fingerprints. Set one edge against the slide and lower it until it contacts the liquid. The liquid should spread across the whole area of the coverslip. Slowly lower the upper edge of the cover slip onto the water. The objective is to minimize or eliminate air bubbles under the cover slip. You might find it helpful to use one toothpick to hold the lower edge in place, while using another to carefully lower the slip into place.
- 5.-An absorbent towel can be placed at the edge of the cover slip to draw out some of the water, further flattening the wet mount slide.
- 6.-**Never view a slide without a coverslip.** The coverslip protects the objective lens from the liquid on the slide.



### **How To Stain a Slide:**

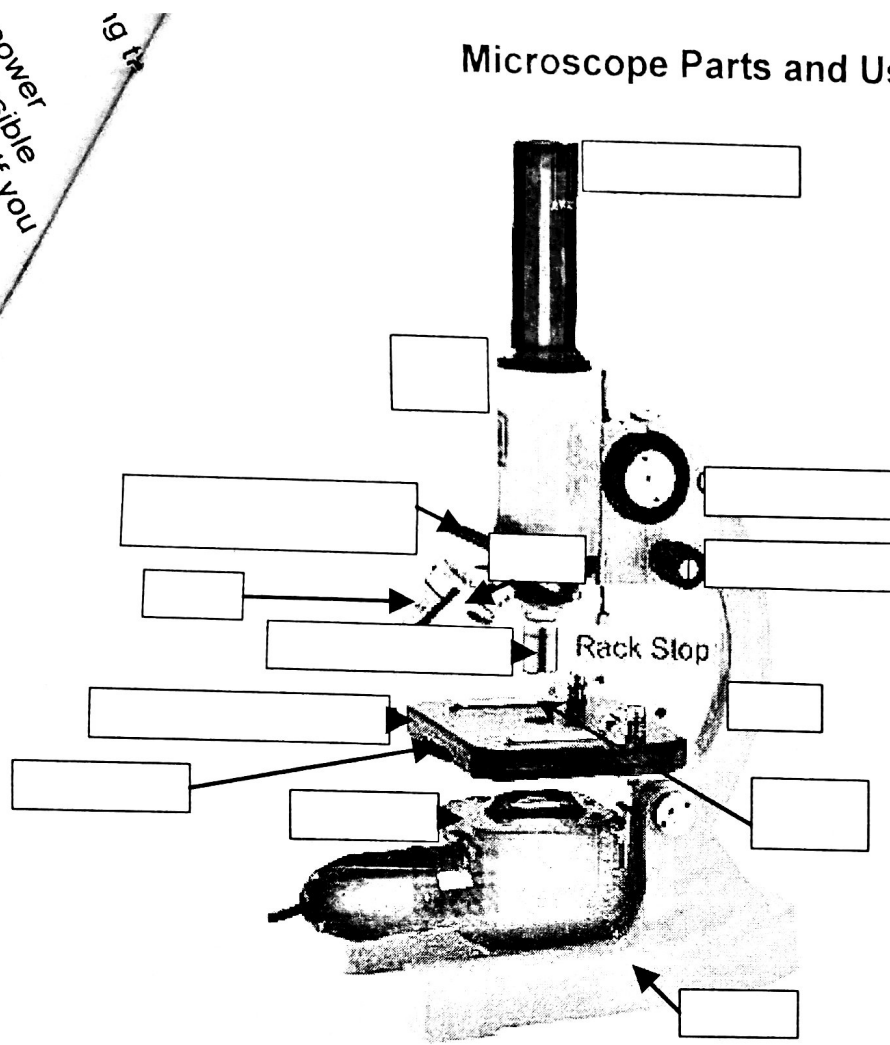
7. Place one drop of **Methylene Blue** stain on one edge of the coverslip, and the flat edge of a piece of **paper towel** on the other edge of the coverslip. The paper towel will draw the water out from under the coverslip, and the cohesion of the water will draw the stain under the coverslip.
2. As soon as the stain has **covered the area containing the specimen** you are finished. The stain does **not** need to be under the entire coverslip. If the stain does not cover the area needed, get a new piece of paper towel and add more stain until it does.
3. Be sure to **wipe off the excess stain** with a paper towel, so you don't end up staining the objective lenses.
4. You are now ready to place the slide on the microscope stage. Be sure to follow all the instructions on the previous pages as to how to use the microscope.
5. When you have completed your drawings, be sure to **wash and dry both the slide and the coverslip** and return them to the **correct places!**
6. All slides must be put away **in the proper trays!** Students **will not leave** until all materials have been put away properly. You are a **team!**
7. Remember – **You break it you buy it!!!** The microscopes you are using have a replacement cost of about \$500. (CASH ONLY – NO CHECKS) Be very careful. Keep the power cords and microscopes at least 6 inches away from the edge of the counter.



# Microscope Parts and Use Worksheet

Name: \_\_\_\_\_

Period: \_\_\_\_\_



	Microscope Part
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- 1.- Explain an important thing to remember as you turn the high- power objective into place.
- 2.- What should you always remember when you use the coarse adjustment?
- 3.- Under what conditions would you adjust the diaphragm?
- 4.- What should you always remember when handling microscope slides?
- 5.- What is the purpose of the stage clips?
- 6.- In terms of your eyes, what should you try to learn as you use the microscope?
- 7.- What are the two parts used to carry the microscope?
- 8.- What is the purpose of the coverslip?
- 9.- What is the objective lens used to locate the specimen and first focus?
- 10.- What are the chemicals called that are sometimes used to make the specimens visible?
- 11.- What should you do if the high power objective lens touches or breaks the coverslip?