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المحاضرة الثانية

Microscope

Microscope

History of Microscope

The "First" compound Microscope was in 1595. Then, in **1665** – English physicist, Robert Hooke looked at a sliver of cork through a compound microscope and noticed some "pores" or "cells" in it. In the same year, Antony van Leeuwenhoek was the first to see bacteria, red blood cells, yeast and so much more.

Microscope Vocabulary

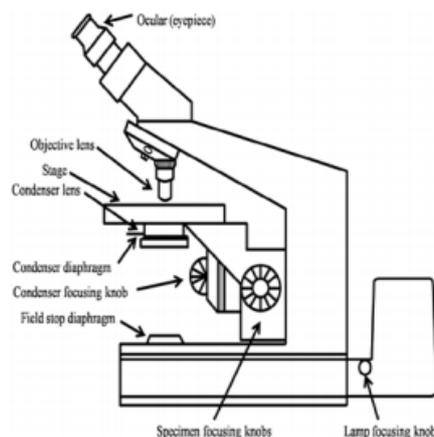
- **Micro** means "very small" and **Scope** means "to look at".
- **Magnification:** increase of an object's apparent size
- **Resolution:** power to show details clearly
- Both of these terms "Magnification and Resolution" are important and necessary to see images clearly by the microscope.

The compound light microscope:

It is the simplest form of microscopy. It has tools that are used to observe the small organisms or object and even macromolecules. It has wide variety of microscopic tools for studying the biomolecules and biological processes. This microscope is with more than one lens and its own light source. In this type of microscope, there are ocular lenses in the binocular eyepieces and objective lenses in a rotating nosepiece closer to the specimen. Although sometimes found as monocular with one ocular lens, the compound binocular microscope is more commonly used today.

How does the microscope work?

The typical diagram of a light microscope is given in the Figure below. The light is produced by a lamp (with tungsten filament) as source and light rays are focused on the specimen by the condenser. The specimen is kept on the stage and fixed by clipped present on the side. The light diffracted by the sample is then collected by the objective lens and additional magnification is achieved by the eyepiece (usually gives additional 10x magnification). Hence, if you observe a sample with 40x objective lens, microscope is actually magnifying the object by 400x (40x from objective and 10x from the eye piece, $40 \times 10 = 400x$).



Parts of Light Microscope



Eyepiece: The lens the viewer looks through to see the specimen. The eyepiece usually contains a 10X or 15X power lens.

Diopter Adjustment: Useful as a means to change focus on one eyepiece so as to correct for any difference in vision between your two eyes.

Body tube (Head): The body tube connects the eyepiece to the objective lenses.

Arm: The arm connects the body tube to the base of the microscope.

Coarse adjustment: Brings the specimen into general focus.

Fine adjustment: Used to small adjustments of focus and increase the detail of the specimen.

Nosepiece: A rotating turret that houses the objective lenses. The viewer spins the nosepiece to select different objective lenses.

Objective lenses: One of the most important parts of a compound microscope, as they are the lenses closest to the specimen. A standard microscope has three, four, or five objective lenses that range in power from 4X to 100X (4X, 10X, 40X, 100X). When focusing the microscope, be careful that the objective lens doesn't touch the slide, as it could break the slide and destroy the specimen. The oil immersion is used with the objective lens (100X) why?

Specimen or slide: The specimen is the object being examined. Most specimens are mounted on slides, flat rectangles of thin glass. The specimen is placed on the glass and a cover slip is placed over the specimen. This allows the slide to be easily inserted or removed from the microscope. It also allows the specimen to be labeled, transported, and stored without damage.

Stage: The flat platform where the slide is placed.

Stage clips: Metal clips that hold the slide in place.

Stage height adjustment (Stage Control): These knobs move the stage left and right or up and down.

Aperture: The hole in the middle of the stage that allows light from the illuminator to reach the specimen.

On/off switch: This switch on the base of the microscope turns the illuminator off and on.

Illumination: The light source for a microscope. Older microscopes used mirrors to reflect light from an external source up through the bottom of the stage; however, most microscopes now use a low-voltage bulb.

Iris diaphragm: Adjusts the amount of light that reaches the specimen.

Condenser: Gathers and focuses light from the illuminator onto the specimen being viewed.

Base: The base supports the microscope and it's where illuminator is located.

Using the Microscope

- Start on the lowest magnification
- Don't use the coarse adjustment knob on high magnification...you'll break the slide!!!
- Place slide on stage and lock clips
- Adjust light source (if it's a mirror...don't stand in front of it!)
- Use fine adjustment to focus

Caring for a Microscope

- Clean only with a soft cloth/tissue
- Make sure it's on a flat surface
- Don't bang it
- Carry it with 2 HANDS...one on the arm and the other on the base