The 2nd Lab.

The Microscope and its Components

The microscope is one of the most commonly used instruments in the Sciences Colleges and in biology laboratories.

The Light Microscope: Simple Microscope (single lens) and Compound Microscope (2 sets of lenses) there are two types of compound microscope 1) the monocular (With one eye piece) and the binocular (With two eye pieces). The compound microscope uses lenses and light to enlarge the image and is also called an optical or light microscope (vs./ an electron micros cope).

- **Parts of the Compound Microscope:**

1- **Base:** Supports the microscope.

2- **Sub stage light:** Located in the base, the light passes directly upward through the microscope.

3- **Stage:** The platform the slide rests on while being viewed. The stage has a hole in it to permit light to pass through both it and the specimen. The mechanical stage permits precise movement of the specimen.

4- **Condenser:** Concentrates the light on the specimen. The condenser has a height-adjustment knob that raises and lowers the condenser to vary light delivery. Generally, the best position for the condenser is close to the inferior surface of the stage.

5- **Iris diaphragm dial:** Dial attached to the condenser that regulates the amount of light passing through the condenser. The iris diaphragm permits the best possible contrast when viewing the specimen.

6- **Coarse adjustment knob:** Used to focus on the specimen when on 4x or 10x.

7- **Fine adjustment knob:** Used for precise focusing once coarse focusing has been completed. Use only this knob when on 40x or 100x.

8- **Head or body tube**: Supports the objective lens system, and the ocular lenses.

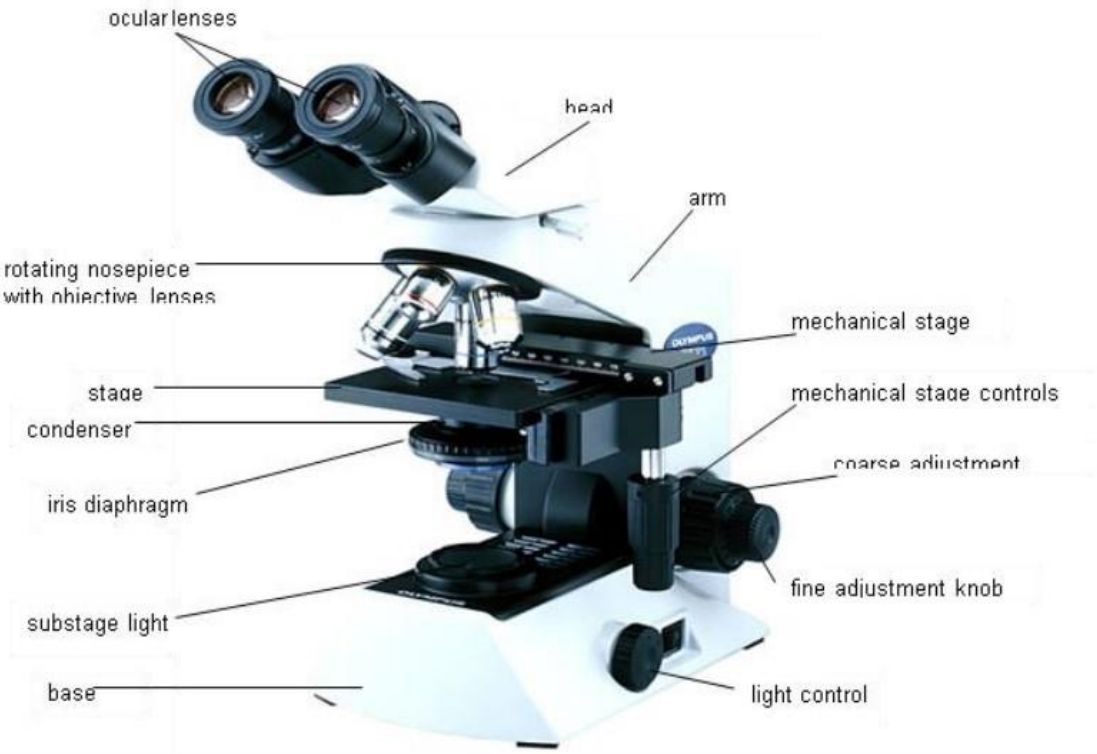
9- **Arm:** Vertical portion of the microscope connecting the base and the head.

10- **Ocular (or eyepiece):** There are two lenses at the superior end of the head, through which observations are made. An ocular lens has a magnification of 10x.

11- **Nose piece:** Has four objective lenses and permits sequential positioning of these lenses over the light beam passing through the hole in the stage. Use the nose piece to change the objective lenses.

12- **Objective lenses:** Adjustable lens system that permits the use of a scanning lens, a low-power lens, a high-power lens, or an oil immersion lens. The objective lenses have different magnifying and resolving powers.

- The shortest lens is the scanning lens, This objective, a very low power lens, magnifies the image 4 times (4x). It is used for scanning a much larger area on the slide.
- The low power lens is 10x.
- The high-power objective lens is 40x.
- The oil immersion objective lens is usually the longest of the objective lenses and has a magnifying power of 100x.



- **The working distance:**

Is the distance between the objective and the slide under study. This distance decreases with increasing magnification. It is 8–13 mm in LP, 1–3 mm in HP, and 0.5–1.5 mm in OI lenses respectively. Note that the OI lens has to be immersed in a drop of oil.

- **Magnification Power**

Magnification= Power of the ocular lens x Power of objective lens

For example: 40X (objective lens) x 10X (ocular lens) = 400X magnification

PRECAUTIONS WHILE USING THE COMPOUND MICROSCOPE

The microscope must always be handled properly. You must observe the following rules for its transport, cleaning, use, and storage:

1- Transport in an upright position with one hand on the arm and the other supporting the base. Set it down carefully at your work station. Do not drag it across the table.

2- Use only special lens paper to clean the lenses. Clean all lenses before and after use.

3- Always begin the focusing process with the 4x or 10x objective lens in position, changing to the higher-power lenses as necessary.

4- The coarse adjustment knob may be used with the 4x or 10x lens, but use only the fine adjustment with 40x or 100x.

5- Adjust lighting appropriately. Turn off the light when not in use.

6- Always use a cover slip with temporary (wet mount) preparations.

7- When you put the microscope away, remove the slide from the stage, and rotate the lowest-power objective lens into position.

8- Never remove or loosen any parts from the microscope.