

EXPERIMENT NO.: 1

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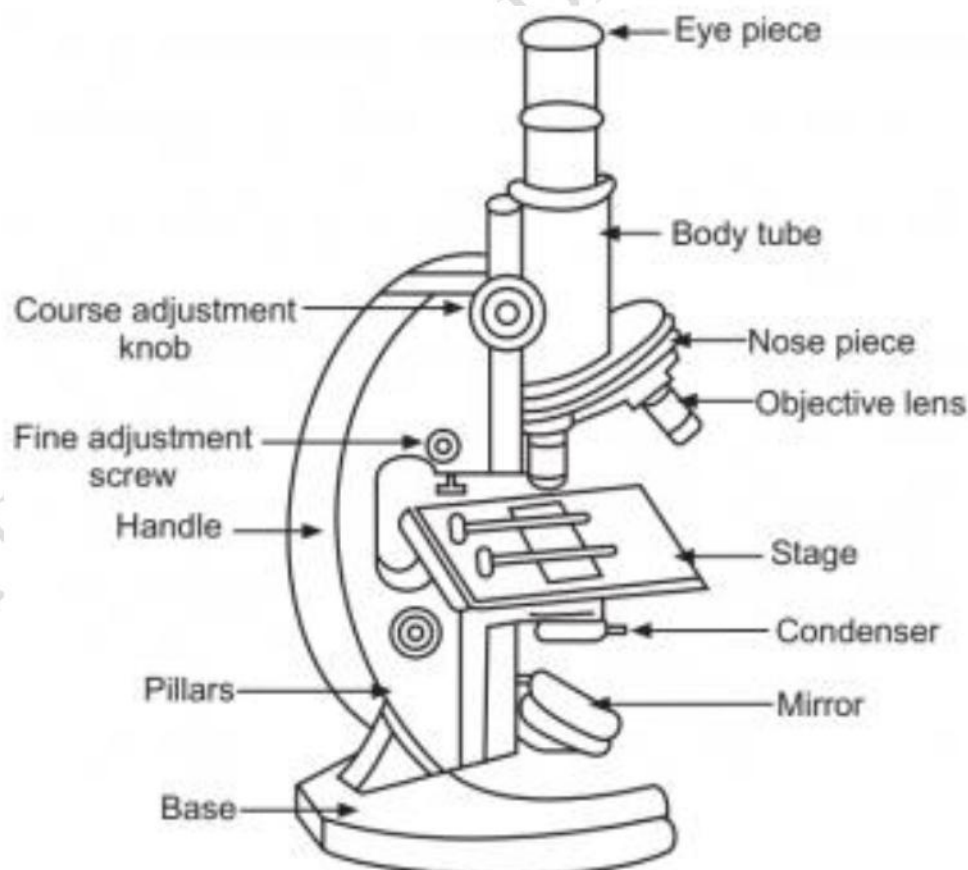
**AIM: TO STUDY THE USE AND CARE OF MICROSCOPE.**

**INTRODUCTION:**

**Types of microscope:**

1. Microscopes used in clinical practice are **light microscopes**. They are called light microscopes because they use a beam of light to view specimens.
2. A **compound light microscope** is the most common microscope used in microbiology. It consists of two lens systems (combination of lenses) to magnify the image. Each lens has a different magnifying power. A compound light microscope with a single eye-piece is called monocular; one with two eye-pieces is said to be binocular.
3. Microscopes that use a beam of electrons (instead of a beam of light) and electromagnets (instead of glass lenses) for focusing are called **electron microscopes**. These microscopes provide a higher magnification and are used for observing extremely small microorganisms such as viruses.

**PARTS OF MICROSCOPE:**



**Figure: Compound Microscope**

The main parts of the microscope are the eye-pieces, microscope tube, nosepiece, objective, mechanical stage, condenser, coarse and fine focusing knobs, and light source.

### **COMPOUND MICROSCOPE PARTS**

- A high power or compound microscope achieves higher levels of magnification than a stereo or low power microscope. It is used to view smaller specimens such as cell structures which cannot be seen at lower levels of magnification. These key microscope parts are illustrated and explained below.

#### **A. STRUCTURAL COMPONENTS**

1. **Base (foot):** It is U or horseshoe-shaped metallic structure that supports the whole microscope.
2. **Pillar:** It is a short upright part that connects to base as well as arm.
3. **Arm (Limb):** It is a curved metallic handle that connects with the arm by inclination joint. It supports stage and body tube.
4. **Inclination Joint:** It is used for tilting the microscope if required for observation in sitting position.
5. **Stage:** It is a metallic platform with a central hole fitted to the lower part of the arm. Microscopic slides held on the stage by either simple side clips or by a mechanical stage clip.
6. **Body tube:** It is meant for holding ocular and objective lenses at its two ends. The end holding ocular lens is called head while the end containing 3-4 objective lens is called nose piece. The body tube has an internal pathway for the passage of light rays which form the enlarged image or microscopic objects.
7. **Draw tube:** It is a small tube that remains fixed at the upper end of the body tube. It holds eyepiece or ocular lens.
8. **Rack and pinion:** The microscope has a rack and pinion attached either to body tube or the stage for bringing the object under focus.
9. **Adjustment screws:** There are two pairs of screws for moving the body tube in relation to stage, larger for coarse adjustment and smaller for fine adjustment. In fine adjustment the body tube or stages moves for extremely short distances. In coarse adjustment the body tube or stage can move up and distance. In coarse adjustment is meant for briefly objective lens at a proper distance from the object so as to form image of the same at the ocular end. Fine adjustment is required to obtain sharp image.
10. **Automatic Stop:** It is a small screw fitted at lower end or rack and pinion. It is meant for stopping the downward sliding of the body tube so as to prevent the damage of objective lens and the slide.

#### **B. OPTICAL COMPONENTS**

1. **Diaphragm:** It is flitted just below the stage for regulating the amount of light falling on the object. Diaphragm is of two types, disc and iris.



## D. PH 1<sup>ST</sup> YEAR: HUMAN ANATOMY AND PHYSIOLOGY – PRACTICAL

2. **Condenser:** It is attached below the diaphragm. Condenser can be moved up and down to focus light on the object.
3. **Reflector (Mirror):** It is attached just above the base. Both its surface bear mirrors, plane on one side and concave on other side. Plane side is used in strong light and concave side in weak light. Reflector directs the light on the object through the condenser and diaphragm system.
4. **Objective Lenses:** They are fitted over the nose piece. Objective lenses are of three types – low power (commonly 10X or 5X), high power (commonly 45X) and oil immersion (commonly 100X, can be more).
5. **Ocular Lens or Eyepiece:** It is lens through which image of the microscopic object is observed. It also takes part in magnification. Depending upon magnification, the eye piece is of four types-5X, 10X, 15X, and 20 X.

### USE AND CARE OF THE MICROSCOPE

- Always keep the microscope clean, dust free and covered. Clear space on the bench before getting the microscope from the cabinet
- Grasp the microscope with two hands – one on the arm and the other under the base
- When you remove the microscope from the cabinet, do it slowly and carefully
- Remove the dust cover and store it in the scope cabinet
- Verify that the MIRROR is set for minimum light. Concave mirror is used while using low power lens and the plane mirror is used while using high power or oil immersion lens. Adjust the mirror such that the maximum and even illumination is obtained.
- Lower the stage (or raise head)
- Check that the **CONDENSER** is flush with the stage and the iris diaphragm is open
- Using the knurled nose ring, rotate and click the shortest.
- Load a slide, being sure it sits flat on the stage, held by the spring clip
- While looking into the eyepieces, slowly turn the coarse knob, moving lens closer to stage. As soon as you see a hint of color, switch to the small, fine focus knob and focus the object. Close one eye at a time to compare images.
- Once the slide is perfectly focused and the image is centered on low power, use the knurled nosepiece to click the next larger lens into place. **DO NOT USE THE COARSE FOCUS KNOB** after increasing magnification. Only use the fine focus knob to focus with a higher power lens.
- If you cannot find the image when you increase the magnification, go back to 4X and start again.

**SIGNATURE OF TEACHER**