

Aim: The study of the compound microscope

REFERENCES:

- 1) Study Of Microscope, Practical Human Anatomy And Physiology, S.R.Kale et.al., 8th Edition, Dec 2002, pp.2-3
- 2) Study Of Microscope And General Techniques, Practical Human Anatomy And Physiology, Goyal et al., pp. 3-5
- 3) A Manual Of Medical Laboratory Technology, A.V.Naigaonkar et al., pp.1-11

Background: A compound microscope is an optical scientific equipment used to magnify and view smaller structures that cannot be seen with the naked eye by using two or more lenses. The compound microscope is commonly used in biological experiments. It offers both high magnification and fair resolution, enhancing the visibility of objects.

Requirement A compound microscope

Theory

Parts of Microscope:

The compound microscope has four sets of parts:

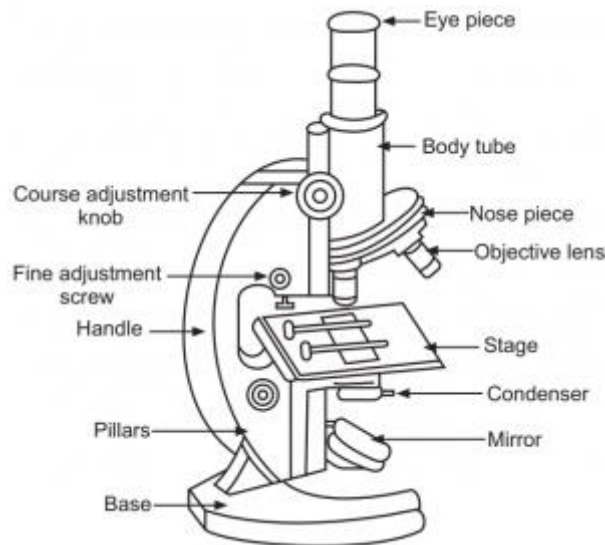
1. The stand or the support system
2. The optics or the magnification system
3. The mechanical adjustment system
4. The illumination system

1.) The support system:

This system consists of –

- **Tube:** It supports the objectives and eyepiece.
- **The arm or limb:** It is the curved metallic structure that is required to hold and move the microscope. It gives the correct height and angulation to the body tube.
- **The revolving nose piece:** It holds the objective in place while we are observing the sample. It is the objective changer.

- **Stage:** It is the flat square-shaped surface attached superiorly to the lower end of the arm on which we put our slide. It possesses a pair of spring clips that hold the slide in place.
- **The foot:** The heavy metallic bottom part supports all the other parts of the microscope. It may be oval, tripod, or horseshoe-shaped.



2.) **The optics or magnification system consists of a lens system.** The lenses of the microscope are divided into two groups

3.) **The adjustment system:** This system comprises of

- The coarse adjustment knob: It is the large knob used to adjust the position of the body tube, allowing us to bring the sample into view quickly.
- The fine adjustment knob: It is the small knob used to change the position of the body tube by slowly making small adjustments. It is used to bring the object into perfect focus.
- Condenser adjustment knob: It is the substage adjustment knob used to move the condenser up and down to increase the illumination or to reduce the illumination.
- Iris diaphragm lever: This lever is fixed on the condenser and is generally used for aperture adjustment. It is used to close and open the diaphragm to reduce or increase the intensity of light.

4.) **The illumination system:** It comprises of

- **Light source:** Electric light or daylight can serve as light sources for microscopes. Electric light is preferred for its ease of adjustment, with a common option being a 60-watt lamp 18

inches from the microscope for routine use. Some microscopes come with built-in lamps. When using daylight, it's advisable to avoid direct sunlight due to potential harm to both the microscope and the eyes. Reflected sunlight on a dull white background is recommended for optimal use.

- **Mirror:** Positioned beneath the condenser, the illuminator, adjustable in any direction, enhances light passing through the sample. It reflects light onto the object using two mirrors, one flat and the other concave. The flat mirror is employed with the condenser, while the concave mirror is used without it.

- **Condenser:** Beneath the stage, there is the presence of a condenser having a standard diameter of 39.5mm, which collects and concentrates the light that passes through the sample or brings the rays of light to a common focus on the object to be examined. There may be two or more lenses.

Instructions

1. Place Slide:

Position the slide on the stage, securing it with clips to prevent movement during observation.

2. Select Objective:

Begin with the lowest magnification (e.g., 10X) and increase gradually to higher magnifications, avoiding contact with the slide.

3. Focus:

Use the coarse adjustment for initial focusing and the fine adjustment for precision. Start at the lowest magnification and adjust focus when changing to higher magnifications.

4. Control Illumination:

Adjust light intensity using built-in controls or an external source for proper specimen visibility.

5. Move Slide:

Explore different specimen areas by smoothly moving the slide using stage controls. Handle the microscope and slides with care to prevent damage.