Microscope

- A **microscope** is an instrument to see objects too small for the naked eye.

- Microscopy is the science of investigating small objects using a microscope.

- **Microscopic**: means invisible to the eye unless aided by a microscope.

Types of microscopes:

1. Compound microscope:
- Uses light to view an image.
- It is used to view smaller specimens such as cell structures which cannot be seen at lower levels of magnification
- A compound microscope consists of structural and optical components.

STRUCTURAL COMPONENTS

The three basic structural components of a compound microscope are the head, base and arm.

- **Head/Body** houses the optical parts in the upper part of the microscope
- **Base** of the microscope supports the microscope and houses the illuminator
- **Arm** connects to the base and supports the microscope head. It is also used to carry the microscope.

When carrying a compound microscope always take care to lift it by both the arm and base, simultaneously.

OPTICAL COMPONENTS

There are two optical systems in a compound microscope: Eyepiece Lenses and Objective Lenses:

Eyepiece or Ocular is what you look through at the top of the microscope. Typically, standard eyepieces have a magnifying power of 10x.

Eyepiece tube holds the eyepieces in place above the objective lens.

Objective Lenses are the primary optical lenses on a microscope. They range from 4x-100x.

Nosepiece houses the objectives. Standard objectives include 4x, 10x, 40x and 100x.

Coarse and **Fine** Focus **knobs** are used to focus the microscope.

Stage is where the specimen to be viewed is placed.

Stage Clips are used to fix the slide on the stage.

Aperture is the hole in the stage through which the base (transmitted) light reaches the stage.

Illuminator **is** the light source for a microscope, typically located in the base of the microscope.

Condenser is used to collect and focus the light from the illuminator on to the specimen.

Iris Diaphragm controls the amount of light reaching the specimen.

Condenser Focus Knob moves the condenser up or down to control the lighting focus on the specimen.

Magnification is the process of enlarging something only in appearance, not in physical size. This enlargement is quantified by a calculated number also called "magnification".

Magnification power of light microscope = Power of eye lens X Power of objective lens.

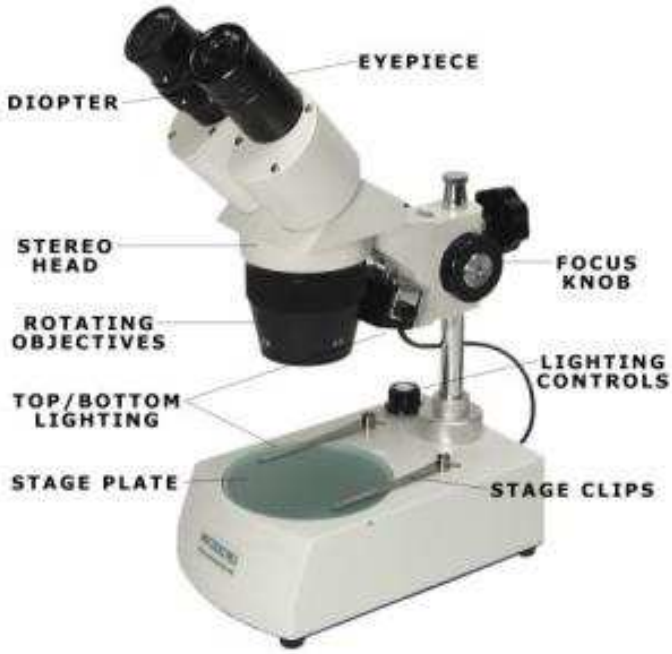
Example: at the objective lens 4X, the magnification is 10 X 4 = 40 X.


eyepiece
observation tube
neck
nosepiece
objective lens
coaxial stage controls
stage
condenser lens
course focus
iris diaphragm
light source
fine focus
base

2. Stereo-microscope:

The stereo or dissecting microscope is an optical microscope designed for low magnification observation.

- The stereo microscope is often used to study the surfaces of solid specimens or to carry out close work such as sorting, dissection, microsurgery, watch-making, small circuit board manufacture or inspection.



- Powers are 2x and 4x.

3. Electron microscopes:

Use electron beams to view an image on a screen.

Types:

1 Transmission electron microscope (TEM)

2 Scanning electron microscope (SEM)

3 Reflection electron microscopes (REM)

4 Scanning transmission electron microscope (STEM)

5 Low voltage electron microscopes (LVEM)