# Lab-2

# Microscopes

# Types of microscopes

1- Compound light Microscope

2- Electron Microscope

# 1- Compound Light Microscope

It is called compound because it depends on two types of lenses (optical and objective lenses)

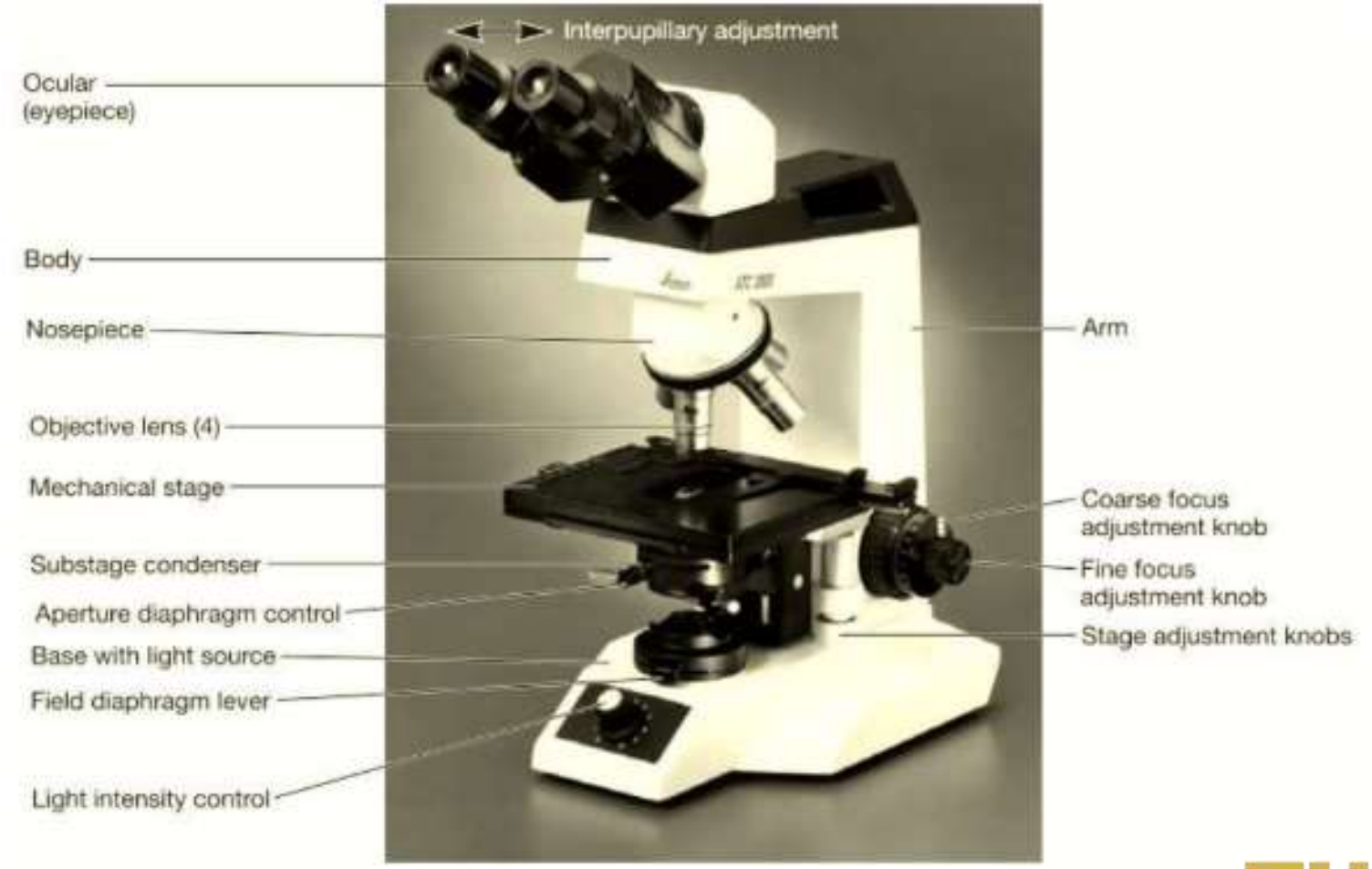
Commonly, It has two ocular lenses and four objective lenses.

These lenses are used to magnify objects.

The term light refers to the method by which light transmits to the naked eye.

It is one of the most important instrument/tool in the field of Biology.

# Parts of the Compound Light Microscope



The most important and sensitive single part in the light microscope is the objective lens.

As mentioned before there are usually four different objective lenses.

The shorter they are, the lower their magnification ability and vice versa.

It is the closest part of the microscope to the object/specimen.


Objective lenses

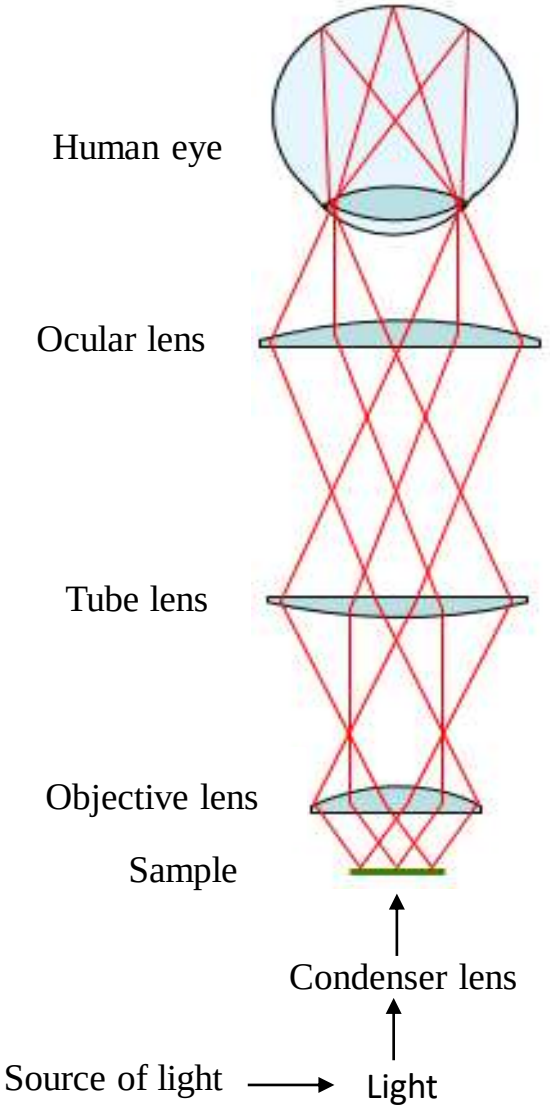
# Magnification

To calculate the total magnification power, we use the following equation:

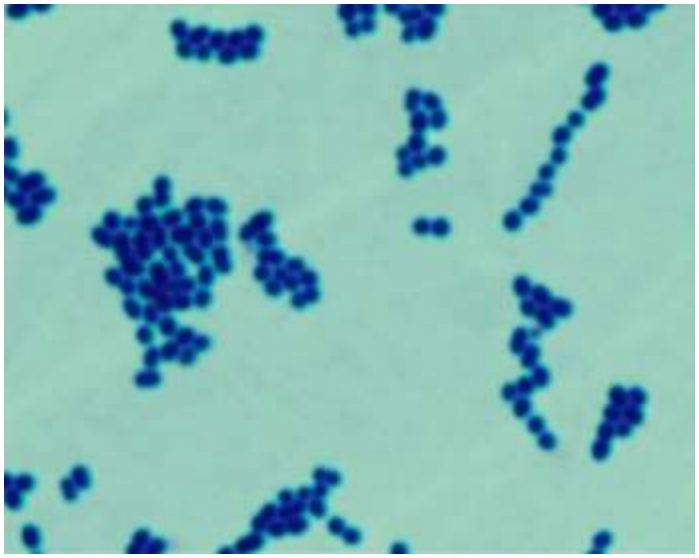
Total Magnification= ocular lens magnification X Objective lens magnification

| Property | Low power | Medium Power | High power | Oil immersion power |
|---|---|---|---|---|
| Magnification of objective lens | 4x | 10x | 40x | 100x |
| Magnification of ocular lens | 10x | 10x | 10x | 10x |
| Total magnification | 40x | 100x | 400x | 1000x |

# Principle of light microscope



# Examples of Samples under the light microscope



Bacteria

Fungi

# 2- Electron Microscope

It is called Electron because it uses a beam of electrons rather than visible light.

I has a better resolution than a light microscope.

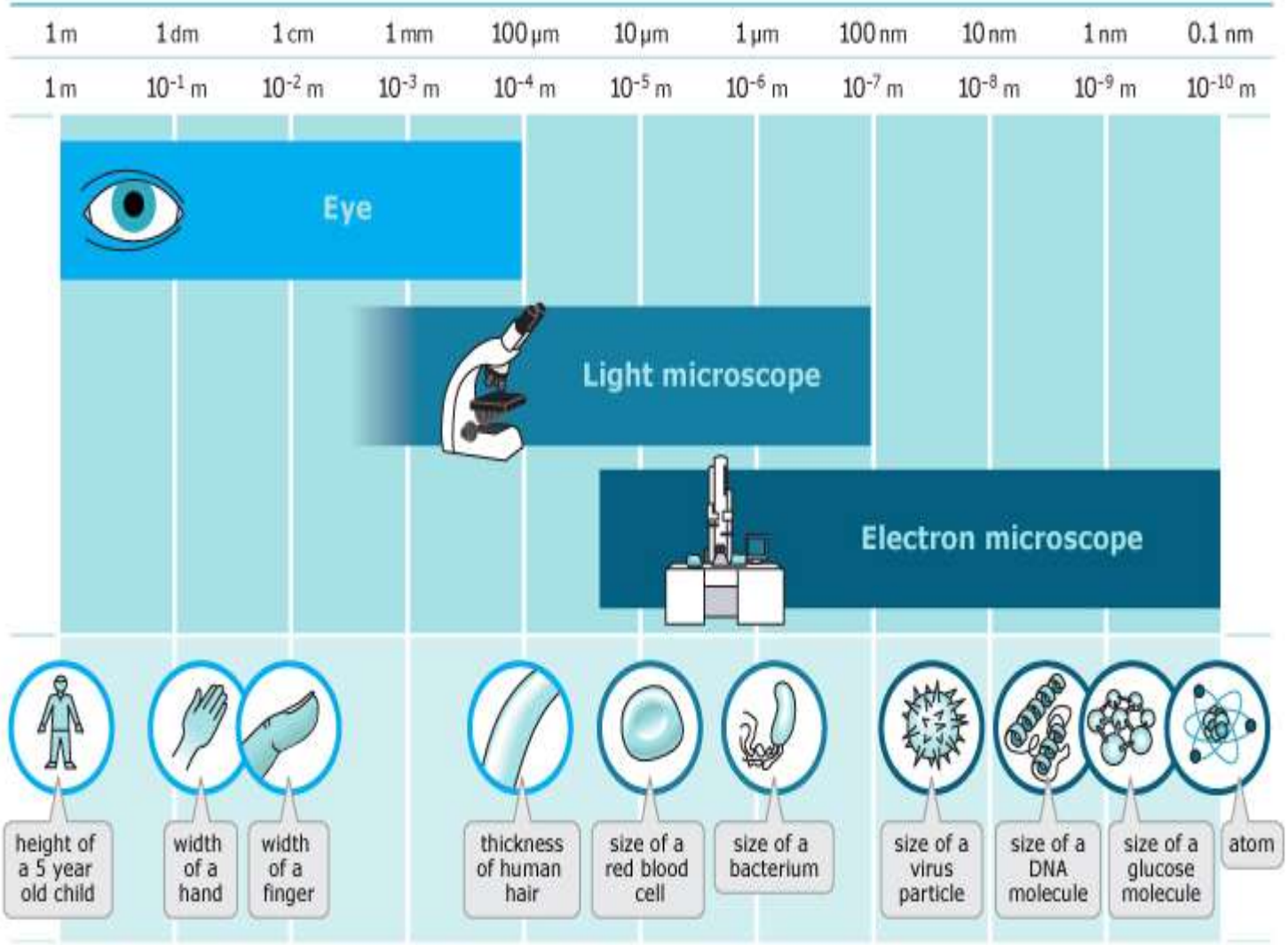
The resolution is defined as the shortest distance between two points on a specimen that can still be distinguished

There are two types of electron microscope:

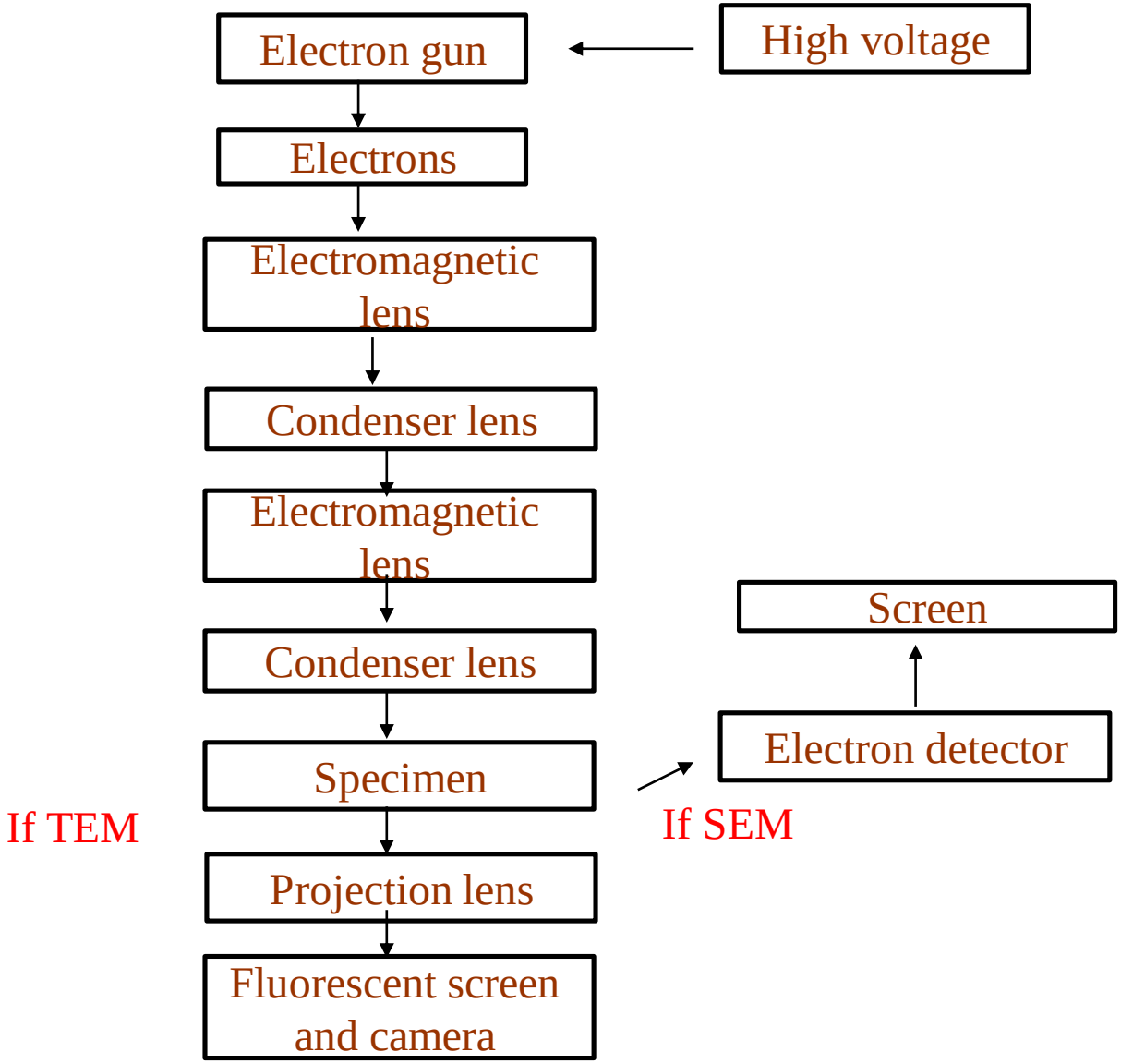
1- Transmission Electron Microscope (TEM).

2- Scanning Electron Microscope (SEM).

# Resolving power of microscopes



# Principle of electron microscope



Transmission Electron Microscope (TEM)

Scanning Electron Microscope (SEM)

Euglena under transmission microscope

Euglena under scanning microscope

# Light vs electron microscope

| characteristic | Light | Electron |
|---|---|---|
| Image produced by | Visible light | Electron beam |
| Image focused by | Glass objective lens | Electromagnetic objective lenses |
| Image viewed through | Glass ocular lens | Fluorescent screen |
| Specimen placed on | Glass slide | Copper mesh |
| Specimen may be alive | Yes | No |
| Specimen requires special treatment or stains | Not always | Yes |
| Colored images produced | Yes | No |

# Practical lesson

Prepare a slide of onion peel under light microscope .

Draw what you see.

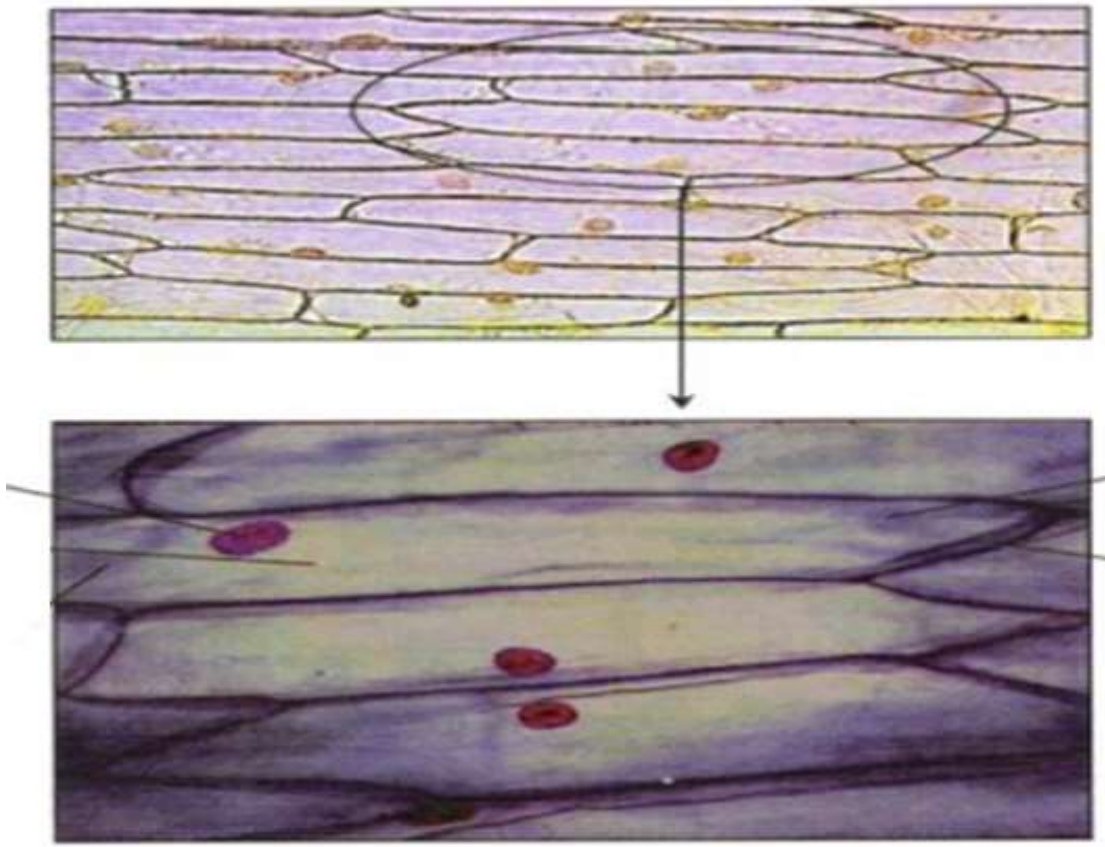
# What you need

A thin onion membrane
Microscope glass slide
Microscope cover slip
A needle
Blotting paper
Dropper
Iodine Solution
Water
Microscope

# How to do

1- Add a drop of water at the center of the microscopic slide
2- Use tweezers to pull of a thin membrane from the onion layer, lay it at the center of the microscope glass slide (the drop of water will help flatten the membrane).
3- Add a drop of iodine solution on the onion membrane.
4- Gently lay a microscope cover slip on the membrane and press it down gently using a needle to remove air bubbles.
5- Touch a blotting paper on one side of the slide to drain excess iodine/water solution.
6- Place the slide on the microscope stage under low power to observe.
7- Adjust focus for clarity to observe.

# Observation




Onion peel cells under light microscope

To learn more, type the following on YouTube:

How to use a light microscope.

How to prepare a wet mount slide.