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Microscope

Is a laboratory instrument used to magnify too small objects that are difficult or impossible to observe with the naked eye, with the help of a microscope, we can see the various organisms that we cannot see or study.

Types of microscopes :

1-Light microscope: The types of light microscope including:-

A- Bright - field microscope: It used to view stained specimens.

B- Dark - field microscopy: It used to illuminate unstained samples.

C -Ultraviolet microscope: It has quartz lenses and slides and uses ultraviolet radiation as the illumination.

D -Fluorescent microscope: It is based on the principle that fluorescent materials. E - Phase contrast microscope.

2-Electronic microscope: These types are :

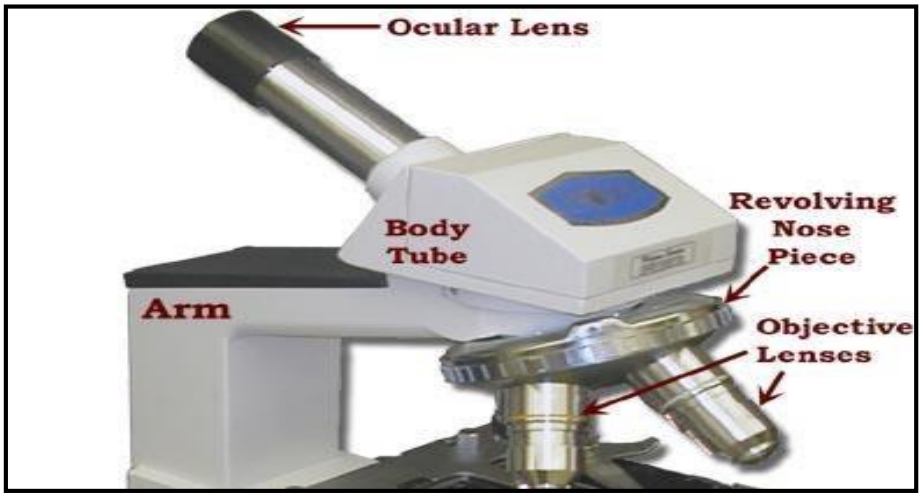
A- Scanning electron microscope (SEM).

B-Transmission electron microscope (TEM) .

Parts of Microscope:

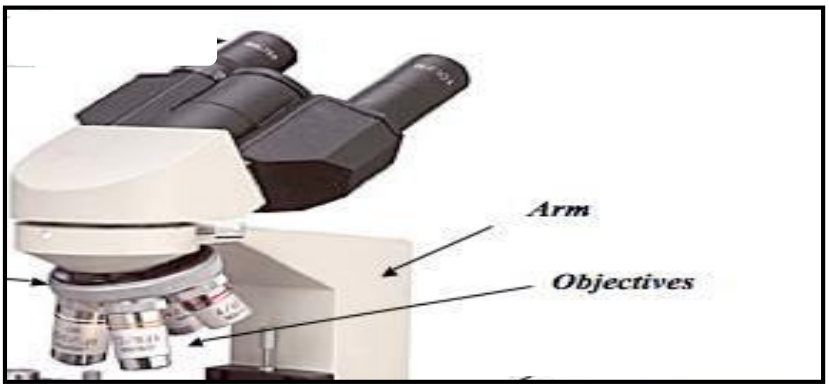
A- Frame work :

1-Body Tube: It is a hollow tube through which light travels from the objective to the ocular. It contains a prism at the base of the tube that bends the light rays so they can enter the inclined tube.

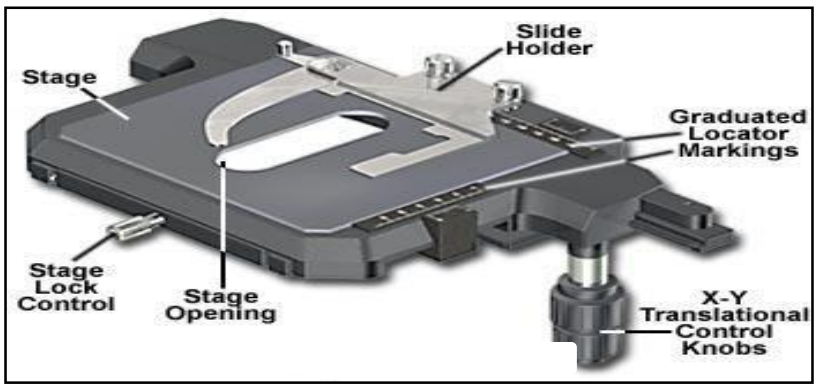


2-Revolving Nosepiece : That is the part of the microscope which holds two or more objectives to provide various magnifications in order to view the same specimen in various dimensions.

3- Arm: It connects to the base and helps carry the microscope easily.

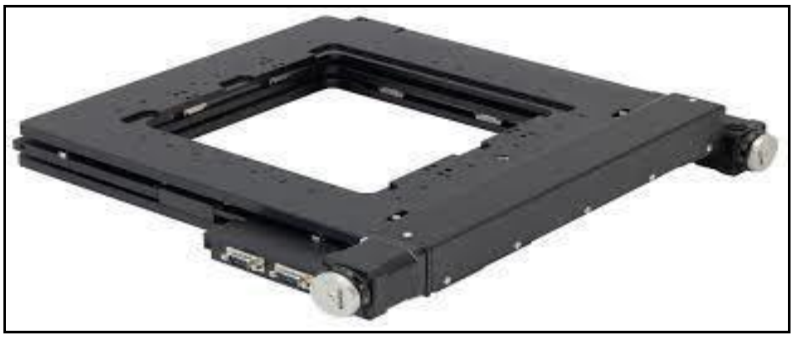


4- Stage : It is a flat surface where the slide with the specimen is placed.



5- Base: It is the bottom part of the microscope, usually made up of durable material as it supports the microscope to stand and provides stability.

6- Glass slide : It is a thin and flat piece of glass used in the microscope. The specimen is kept on the glass slide and put under the objective in order to study it.

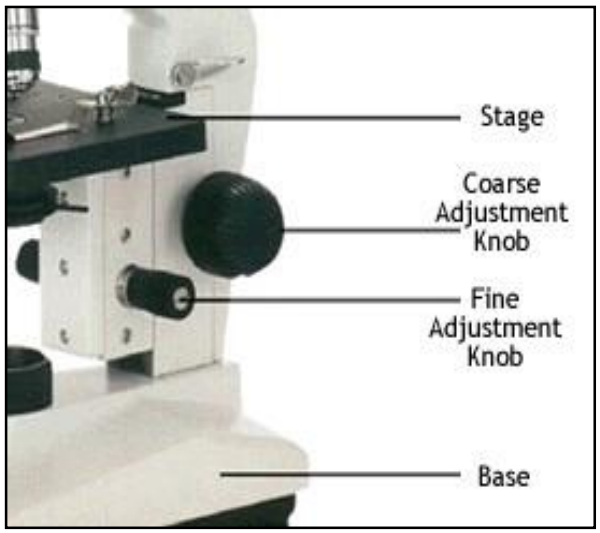


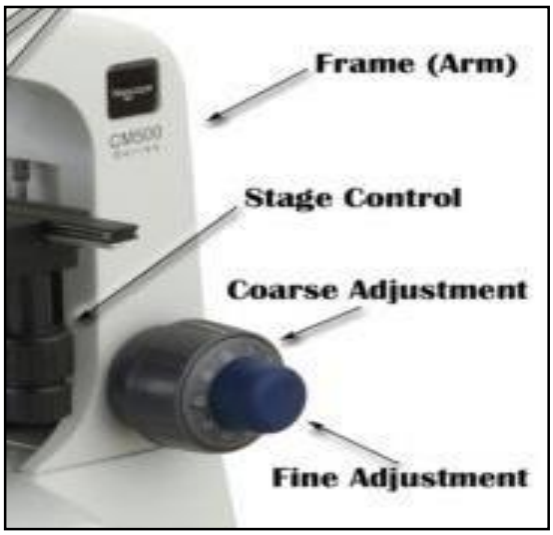
7-Power Switch: It is an electrical switch present at the bottom of the microscope in order to switch of the light source .

B – Mechanical adjustments (Focusing system):

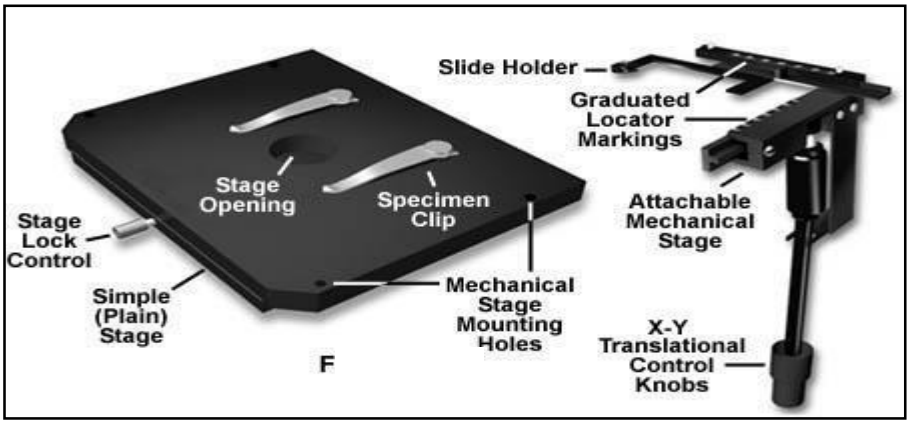
1-Coarse adjustment : It located on the arm of the microscope and used to move the stage up and down to bring the specimen into focus and show the best image possible.

2 -Fine adjustment : This knob is a sub part of the Coarse adjustment knob. It is used to bring the specimen into sharp focus.

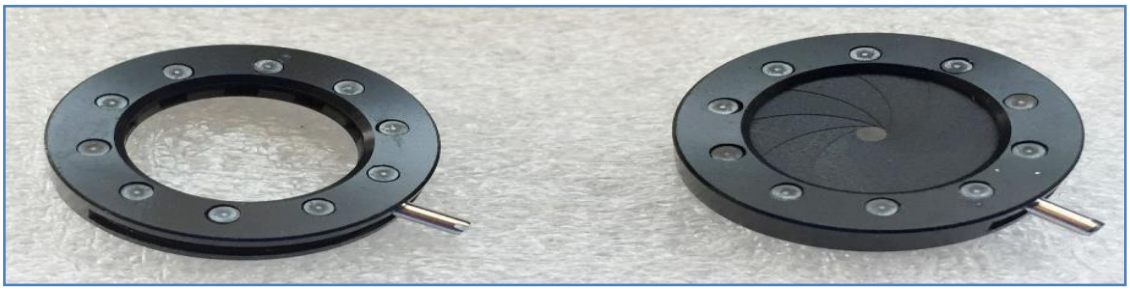




3 -Slide adjustment : It used to move the specimen back or forth to adjust the slide containing specimen in order to bring it to focus**.**



4-Condenser adjustment :The condenser is used to condense the light required for visualization. The condenser aperture is adjusted by the iris diaphragm, which is found just below the condenser.



C- Magnification system (Lenses):

1-Eyepiece (Ocular lens): is a magnifying lens, It is called an eyepiece as we need to place our eye near it in order to see the magnifying image of the sample. Eyepiece may be ***monocular*** or ***binocular*** their magnification power are 10X, 12 X.

2- Objective lens : There are four objective lenses in a standard microscope as following :

1-Scanning Objective (4X): This shortest objective is useful for getting an overview of the slide such as spinal cord, lung, digestive tract and ovary.

2-Low Power Objective (10X) .

3-High Power Objective (40X) ("high-dry" objective) : It useful for observing fine detail such as the striations in skeletal muscle, the arrangement of Haversian systems in compact bone and types of nerve cells in the retina, etc.

4-Oil Immersion Objective (100X): This longest objective is used for observing the detail of individual cells such as white blood cells. The lens *must* be used wit a specially formulated oil that creates a bridge between the tip of the objective and the cover slip. Since the refractive indices of air and this lens are different the oil immersion using to increase the refractive index to make the field clear.

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D-illumination system:

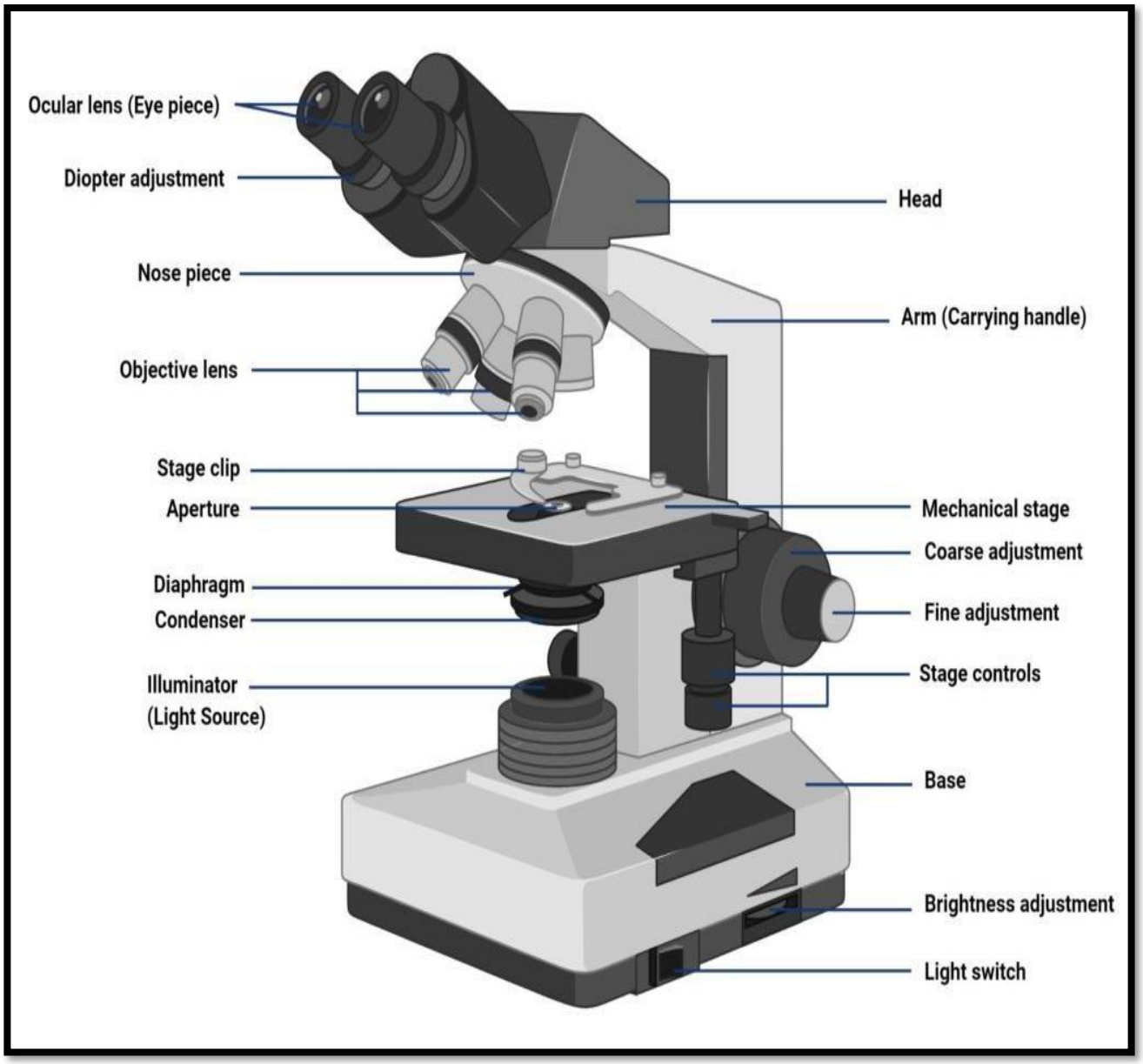
1- Condenser and iris: Condenser is a large lens with an iris diaphragm, this lens receives a beam from the light source and passes it into the objective .The iris is a mechanical device mounted underneath the condenser and controls the amount of light entering the condenser

2- Mirror: It reflects the beam of light from the light source up wards through the iris into the condenser .The mirror is used to reflect ray or electrical light .

3-Sources of illumination:

- Day light.

- Electric light.


Ocular lens (Eye piece)
Diopter adjustment
Head
Nose piece
Arm (Carrying handle)
Objective lens
Stage clip
Aperture
Mechanical stage
Coarse adjustment
Diaphragm
Condenser
Fine adjustment
Stage controls
Illuminator
(Light Source)
Base
Brightness adjustment
Light switch

Condenser of Microscope

Condenser is a large lens that used to control and concentrate light coming into the specimen from the light source of microscope.

Condenser

Cleaning of Microscope

Cleaning Solutions :

-Soap solution for cleaning of body and stage.

- Alcohol
- Lens cleaner solution } for cleaning lenses.

Cleaning Materials:

-Lint-free cotton gauze pads

-Lint-free cotton swabs

Lens paper

Cleaning of lenses (Eyepieces , Objectives lens &condenser) :

1-Turn off and unplug the microscope.

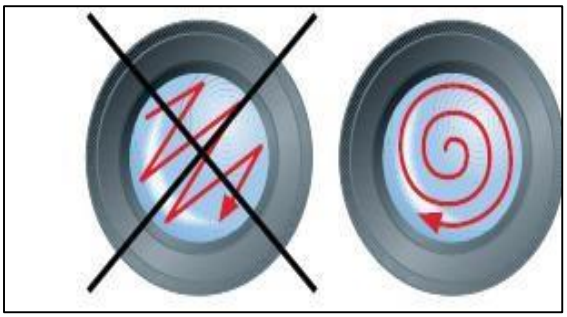
2-Remove dust before wiping lens .

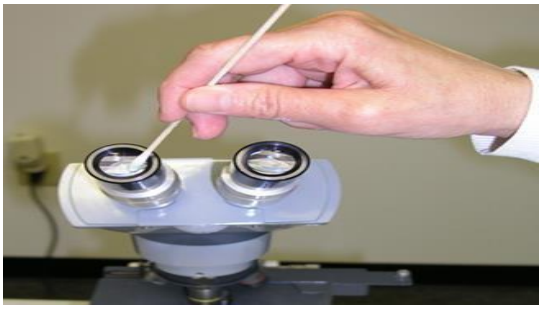
3-Clean the eyepieces with a cotton swab moistened with lens cleaning solution.

4- Wipe in a circular motion inside out.

5- Dry with lens paper.

6- Repeat cleaning and drying if required.





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Cleaning of stage or base :

1-Turn off and unplug the microscope.

2-Remove dust , dirt and oil before wiping lens.

3- Moisten the cotton pad with a mild cleaning agent.

4- Dry the stage or base.

5-Repeat cleaning and drying if required.

Maintenance of Microscope:

1-Never move microscope as doing so may cause electric shock or damage to it . 2-Allow the halogen bulbs to cool before touching. Halogen bulbs become hot and may cause burns if touched.

3- Unplug the microscope before replacing the bulb.

4-Use only the halogen or fluorescent bulb.

5-Turn off and unplug the microscope before moving.

6-Always carry the microscope with two hand.

7- Never touch the lenses with fingers.

8-When finished the scope, roll the stage down to lowest level.