

Dr. Bbosa Science

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The Science Foundation college Kiwanga-Namanve,

Uganda East Africa

Senior one to Senior six,

+256 776 802709, +256 753 802709

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Microscope

Objectives

The learners should be able to

- Explain the functioning principles of a light and electron microscope
- Prepare temporary mounts of cell and tissue slides
- Use simple stains in studying cell and tissues
- Identify different plant tissues using different laboratory stains
- Determine cell size
- Draw and label the different type of epithelial tissues.

Definition

A microscope is an instrument that focuses light.

Types of microscopes

There are two types

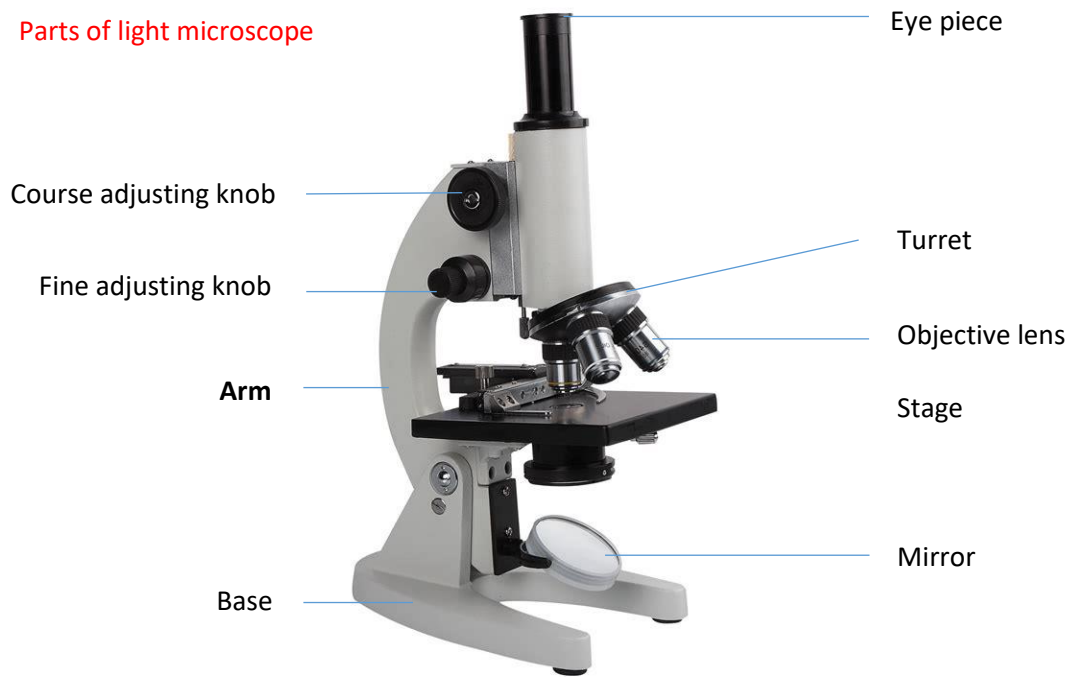
Light microscope

A beam of light through the specimen is focused by glass lenses.

Electron microscope

A beam of electron through the specimen is focused by electromagnetic field.

Parts of light microscope



Function of parts of microscope

Eye piece: magnifies the image of the specimen

Course adjusting knob: focuses the image of the specimen

Fine adjusting knob: fine tune the focus of the specimen

Turret: rotates and changes the objective lenses

Objective lenses: magnify specimens

Stage: is where the specimen is placed

Mirror: reflects light through the specimen

Preparation of specimen for microscopic observation

- A section of the specimen is to be observed must be very thin to allow light through.
- Stains may help to see parts of specimen clearly.

Comparing light and electron microscope

Light microscope	Electron microscope
Advantages	disadvantages
- cheap to purchase and operate	Very expensive to purchase and operate
- small and portable	Very large
- preparation of materials is simple, quick and cheap	- preparation of material require skill and is lengthy
Disadvantage	Advantage
- low magnification (x200)	- high magnification (x 5000)
- the depth of field is restricted	- depth of the field is bigger

$$\text{Magnification} = \frac{\text{Size of drawing}}{\text{Size of specimen}}$$

Magnification using s microscope

To determine the total magnification of an image viewed through a microscope, multiply the power of the eyepiece or ocular lens by the power of the objective lens. If the magnification power of the ocular lens is 10x and that of the objective lens is 4x, total magnification is 40x.

Resolving power of microscope

Is the ability of a microscope to distinguish fine detail.

+++Exercise

		Objective type questions	
1.	2012/1/4	The actual diameter of a cell organelle which measures 0.4mm at a magnification of x400 is A. 0.01µm B. 0.1 µm C. 1.0 µm D. 0.001 µm	
2.	2009/1/13	The resolving power of a microscope it the A. Ability of the microscope to distinguish fine detail. B. Clarity of the image formed by the microscope C. Number of times the image is magnified by the objective lens D. The power of the microscope to focus very small objects.	
3.	2004/1/3	What is the actual length of animal cell that appear 4mm long when viewed through a magnification of x400? A. 0.1 µm B. 1.6 µm C. 10 µm D. 100 µm	

4. The actual diameter of a cell organelle which measure 0.4 mm at a magnification of x400

A. $0.01\mu m$

B. $0.1\mu m$

C. $1.0\mu m$

D. $0.001\mu m$

4. The answer is C

Magnification of organelle	$= \frac{\text{diameter of organelle in microscope } (d_1)}{\text{Actual diameter of organelle } (d_0)}$		
Magnification	=	x 400	
d_1	=	0.4mm	= 400 μm
d_0	=	?	
400	=	$\frac{400}{d_0}$	
d_0	=	$\frac{400}{400} = 1\mu m$	
Note that			
1mm	=	$1 \times 10^{-3}m$	