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F.Y. B. Sc.
ZO- 123 Zoology Practical Paper

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Cell Biology

Practical No. :- 1
Aim:- Study of Microscope: Simple and Compound

- **Principle:**
- Micrscope is a laboratory instrument used to examine objects that are too small to be seen by the naked eye.
- Microscopic means being invisible to the eye unless aided by a microscope
- To what an extend a microscope can produce an enlarged image of an object is called as magnification.
- Maximumm Magnification achieved by a compound microscope is 1500x
- Resolution refers the ability of microscopes to distinguish two objects close to each other.
- Resolution power is refers the minimum distance or Power of seperation between two points

Components of microscope

- **Compound microscope**
- **Optical Components:**

- 1) Eye piece : lense at top, usually 10x or 15x
- 2) eyepiece tube : holds the eye piece lense at fixed distance
- 3) Body tube : Separates the objective and eye piece
- 4) Course focus knob : focus the specimen
- 5) Fine focus knob : bring the specimen into sharp focus
- 6) Objective lense : primary optical lense range from 4x to 100x
- 7) Stage & mounting clips : specimen to be viewed is placed
- 8) Condenser : collect and focus light
- 9) Reflector or mirror : reflects the light towards condenser

Simple microscope :

- **Components :**

- 1) objective lens
- 2) Adjustment knob : a small hollow cylindrical knob attached to the base which is used to hold the microscope
- 3) Adjustment screw : one adjustment screw used for focusing by moving the limb up and down
- 4) mirror or reflector : Concave reflecting type is used

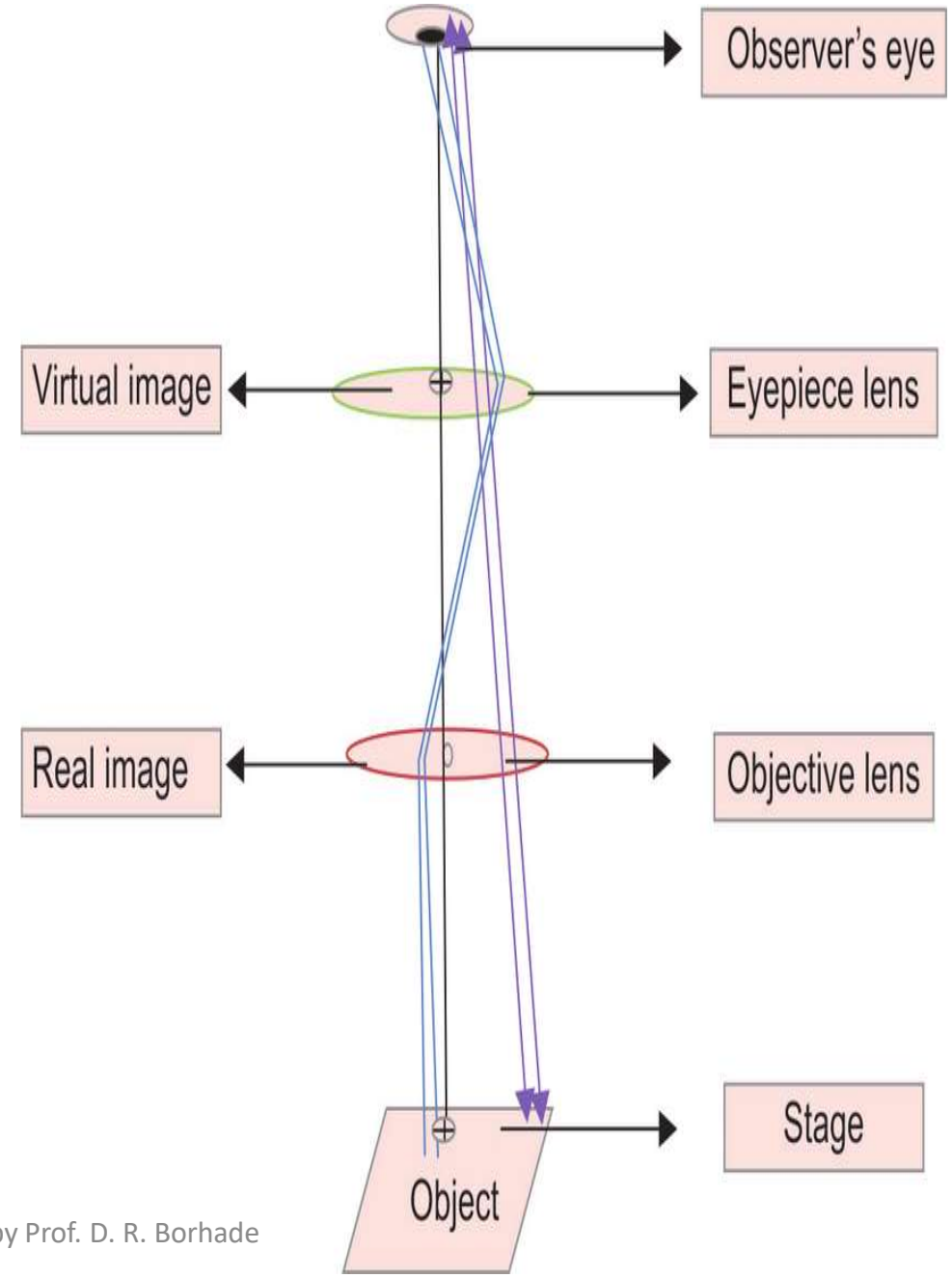
Working of Microscope :

- There are three main optical pieces in the compound light microscope.
- All threee are essential for a sharp and clear image.
- These are:
- ❍ Condenser
- ❍ Objectives
- ❍ Eye-pieces.

- The condenser illuminates the object by beam of light
- The objective forms a magnifie invertedd (upside down) image of the object.
- The eye-piece magnifies th imagee formed by the objective.
- The total magnification of the microscope is the product of the magnifying powers of the objective and the eye-piece.
- For example, if the magnifying power of the eye-piece is 10x and that of the

Objective is 100x, then the total magnification of the compound light

microscope is: 10x X 100x = 1000-fold magnification.



Practical No.:- 2
Aim:- Temporary preparation of mitotic cell division from onion root.

- **Principle:**

Mitosis is very important to life because it provides new cells for growth and replaces dead cells. Mitosis is the process in which a eukaryotic cell nucleus splits in two, followed by division of the parent cell into two daughter cells. Each cell division consists of two events: cytokinesis and karyokinesis. Karyokinesis is the process of division of the nucleus and cytokinesis is the process of division of cytoplasm. It consists of the following Phases: Prophase, metaphase, anaphase and telophase.

The meristamatic cells located in the root tips provide the most suitable material for the study of mitosis. The chromosome of monocotyledonous plants is large and more visible, therefore, onion root tips are used to study mitosis.

Requirments:

Onion root, Slide, coverslip, spirit lamp, acetocarmine stain , 1N HCl, watch glass, dropper, forcep

- **Procedure :**

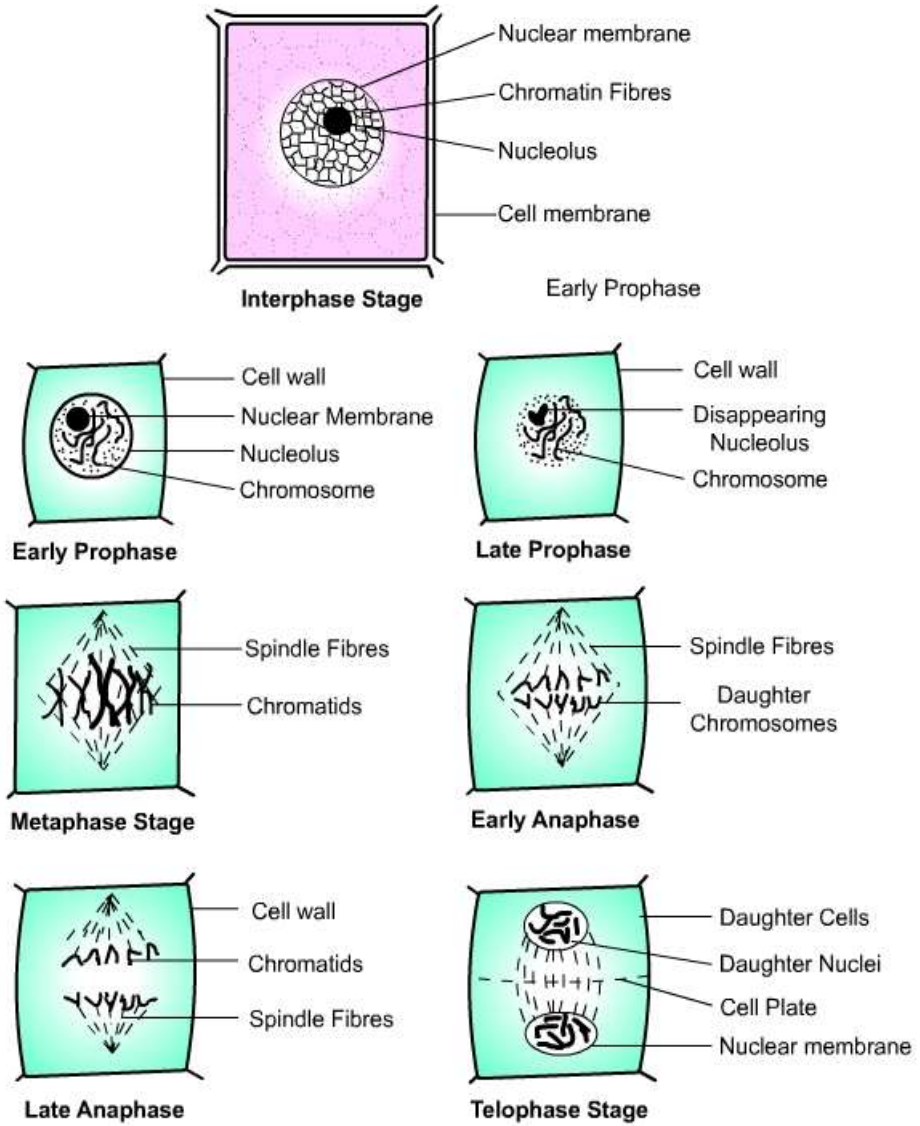
- Take onion root tip in the watch glass, add few drops of glacial acetic acid and ethenol. Wait for few minutes.
- With the help of forcep keep onion root tip on clean glass Slide
- Add a drop of HCl and Acetocarmine on the slide
- Hold the slide for some time on a spirit lamp
- Put coverslip on the slide and tease the sample with needle
- Observed the slide under the microscope for mitosis stages

- **Observations :**
- Following Stages of mitosis are observed

in prepared slide

- 1) Prophase
- 2) Metaphase
- 3) Anaphase
- 4) Telophase

- **Result:-**
- The temporary prepared slide of mitotic cell division from onion root shwos the presence of Prophase,metaphase , anaphase & telophase.



Practical No.:- 3
Aim:- Study of cell organelles by using microphographs (Any three).

- **Mitochondria:-**

- Each mitochondria in section appears as sausage or cup or bowl shaped structure lined by double membranes.
- Two membranes are separated by a 6-8 mm wide fluid filled space called peri-mitochondrial space.
- The inner membrane is projected into the central cavity as finger like outgrowths- the cristae.
- Numerous small, rounded & stalked particles – The oxysomes or F1 or ATPare are attached to the inner surface of inner membrane.
- The central cavity is filled with matrix which theoretically possesses circular DNA 55s ribosomes and respiratory enzymes.
- The main function of mitochondria is to synthesize chemical energy- ATP from glucose as substrate.
- From one molecule of glucose 38 ATP molecules (40%) are synthesized and the rest of the energy (60%) goes as heat.

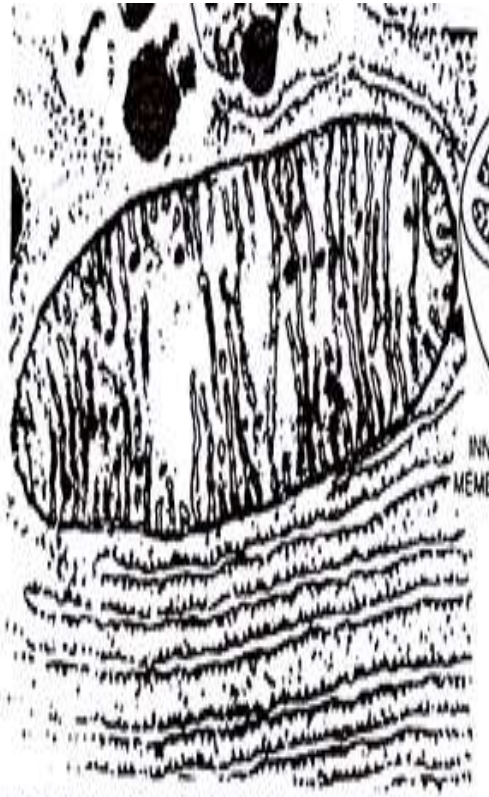


Fig. 7 ELECTRON MICROGRAPH OF MITOCHONDRIA

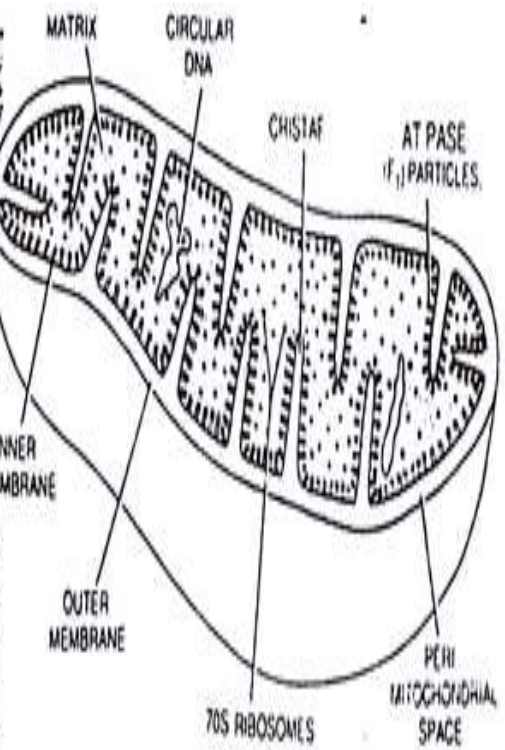


Fig. 8. HYPOTHETICAL DETAILED STRUCTURE OF A MITOCHONDRION.

2) Golgi Complex:-

- The Golgi complex, as is visible in electron microphotograph, is a stack (bundle) of hollow tubules, which in actual form are hollow flattened sacks arranged above each other. On either side certain large globular vesicles and smaller vacuoles are also visible.
- Each tubule or lamella is lined by membrane, which is theoretically similar to plasma membrane in structure and chemical composition.
- The Golgi complex is more prominent and well developed in secretory cells and absent in RBC of mammals and prokaryotic cells.
- Its main function is to glycolise the proteins which are synthesized by ribosomes i.e., It converts these inert proteins into glycoprotein's to act as hormones, enzymes and coenzymes.
- It also helps in the formation of lysosomes and acrosome of sperms.

Fig. 9 ELECTRON MICROGRAPHS OF GOLGI BODY

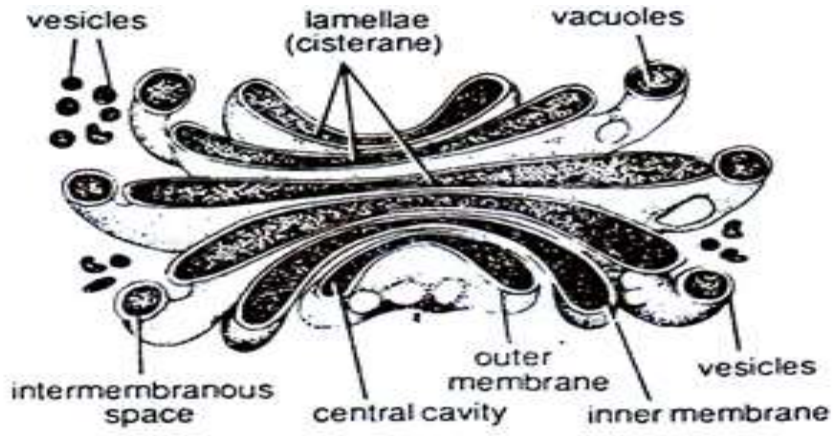


Fig. 10 GOLGI BODY THREE DIMENTIONAL AND DIAGRAMMATIC MODEL

3) Endoplasmic Reticulum

- It is made up of large number of interconnected and branched tubules, long, flattened and sac-like cisternae and hollow approximately rounded vesicles present all over in the cytoplasm forming a continuous system.
- Each tubule, cisternae or vesicle is made up of membrane, which is theoretically similar to plasma membrane in structure and chemical composition.
- Some cisternae and tubules bear small, dark, rounded and granular structures, ribosomes, along their surface. This endoplasmic reticulum is called rough or granular E.R. The endoplasmic reticulum without ribosomes is called smooth or agranular ER.
- The main function of rough endoplasmic reticulum is protein synthesis.
- The main functions of smooth endoplasmic reticulum are: Detoxification & Synthesis of lipids & cholesterol

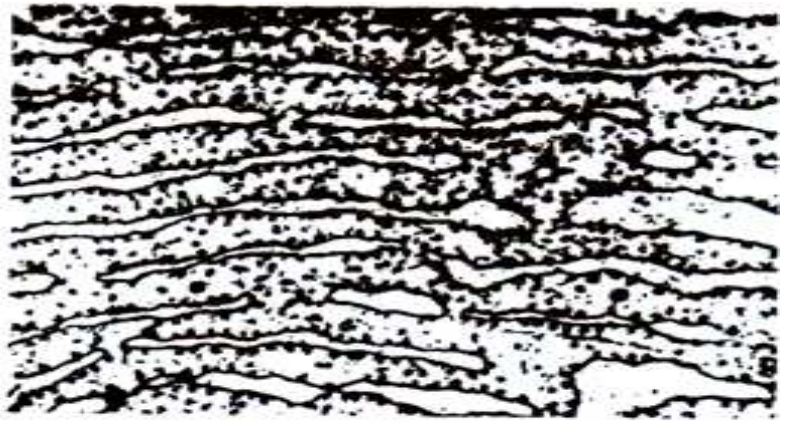


Fig. 11 ELECTROMICROGRAPH OF ROUGH ENDOPLASMIC RETICULUM.

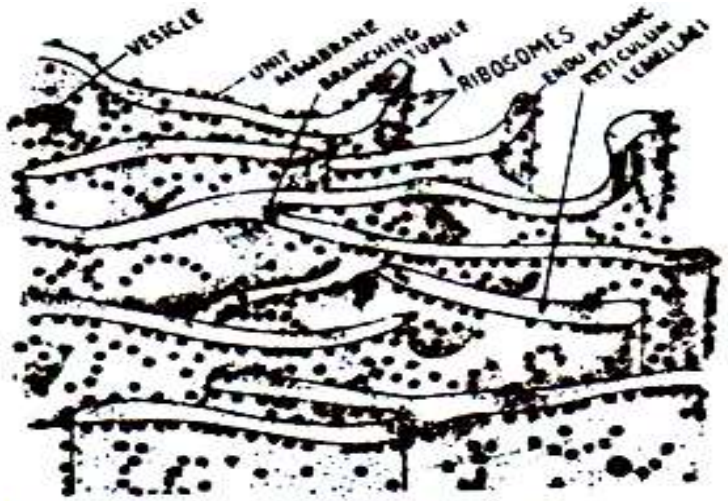


Fig. 12. DIAGRAMMATIC REPRESENTATION OF ENDOPLASMIC RETICULUM IN THREE DIMENTIONAL VIEW