

CELL THE UNIT OF LIFE

- Cell is the structural and functional unit of life
- the study of structure of cell and its organelles is called *cytology*.
- These days cytology is called as *cell biology*.
- It is the branch of biology which deals with the study of structure, biochemistry, physiology, reproduction, genetics of cell.
- Cell was discovered by Robert Hooke.

CELL THEORY

M.J Schlieden said ; the body of all plants are made up of cells

Theoder Shwann said ; the body of all animals are made up of cells

Rudolph Virschow said; new cells are formed from pre-existing cells

these three constitute the cell theory.

Prokaryotic cells

the cell without a definite nucleus is called prokaryotic cell

Mucilage:-it is a polysachride rich slimy coating of prokaryotic cell

mucilage give protection against desiccation

cell wall: it is single layered in gram positive bacteria. And two layered in gram negative bacteria.

Cell wall contain peptidoglycan, murein or mucopeptide.

Gram staining

Christian gram developed a technique of staining bacteria called gram staining. The bacteria which retain stain after the washing is called Gram positive bacteria. Gram negative bacteria, they do not retain stain after washing.

Mesosomes:- they are invaginations of palsma membrane. They help in respiration and secretion.

Ribosomes: 70S ribosomes are seen in bacteria

plasmids: they are extra chromosomal circular DNA present in bacteria

Flagella: they help in locomotion. Flagellum has three parts

1. filament
2. hook
3. basal body

some outgrowths are also seen on the body of bacteria. They are pili and fimbriae. Pili are longer the fimbriae.

Pili are elongated tubular structures. While fimbriae are bristle like.

Cell membrane

singer and nicholson proposed the structure of cell membrane as fluid mosiac model.

According to them cell membrane is made up of lipid bilayer and protein

ENDOPLASMIC RETICULUM

- two types of ER are there Rough ER and smooth ER.
- In rough ER the ribosomes are attached on the surface of ER. Protein synthesis and secretion are the functions of RER
- In smooth ER , ribosomes are absent on it. The function is lipid synthesis.

GOLGI APPARATUS

- Camillio golgi first observed them
- they consist of flat, disc shaped sacs or cisternae and they are stacked
- they are the important cite for formation of glycoproteins and glycolipids.

LYSOSOME

otherwise called as suicidal bodies.

they contain hydrolytic enzymes

VACOULES

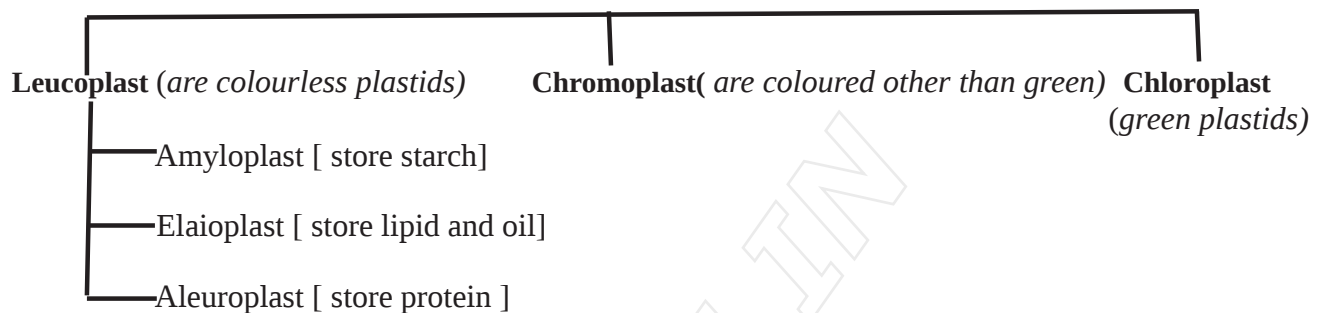
they are membrane bound space in cytoplasm
it contain water,sap etc
its membrane is called tonoplast; a single layer membrane

Mitochondria

- discovered by Kolliker
- responsible for respiration
- otherwise called powerhouses of cell; because they produce, store and supply energy
- they are double layered, outer and inner membrane
- in between outer and inner membrane a space is there, peri-mitochondrial space
- inner membrane show several infoldings called cristae
- on cristae and inner side of the inner membrane tennis racquet like structures seen called as oxysomes
- there is a fluid inside the mitochondria called *matrix*
- they are semi autonomous ;they contain DNA

PLASTIDS- classification

grouped into three



Chloroplast

- double membraneous ; outer and inner membrane
- a space in between outer and inner membrane called peri plastidal space
- fluid inside chloroplast called stroma
- membraneous structures inside it termed as lamella or thylakoids
- thylakoids seen as stack; then this stack is known as grana.
- The thylakoids of grana are grana thylakoids
- some thylakoids connect adjacent grana; termed as stroma thylakoid
- they are semiautonomous ;they contain DNA

RIBOSOME

discovered by George Pallade
has two subunits and they are attached by Mg^{++}

are composed of RNA and protein
not bounded by any membrane

CYTOSKELETON

the elaborate network of filamentous
proteinaceous structures are called cytoskeleton

CILIA AND FLAGELLA

- cilia and flagella are hair like outgrowths of cell membrane.
- Cilia are small and more in number
- while flagella are longer less in number
- both help in locomotion
- both flagellum and cilia has a central core called axoneme
- this axoneme is made up of microtubules
- microtubules are in 9+2 condition
- 9 peripheral doublet tubules and two central singlet tubules
- from peripheral to central radial spokes are seen

Centrosome

- ◆ Centrosome is an organ which contain two cylindrical centrioles
- ◆ both centrioles in a centrosome is perpendicular to each other
- ◆ centrioles are made up of nine triplet tubulins
- ◆ central part is proteinaceous
- ◆ spokes are there in between peripheral tubulins and spoke
- ◆ centrioles form the basal body of cilia ,flagella and spindle fibers

Nucleus

- Nucleus is a spherical organelle seen in cell
- it was first described by Robert Brown
- each nucleus has an envelope; it is double membraneous [outer and inner membrane]
- in between outer and inner membrane there is space called perinuclear space
- perinuclear space is the barrier for materials in cytoplasm and nucleus
- some pores are there for the nuclear envelope called nuclear pore
- nuclear pores are the passage for proteins and RNA between cytoplasm and nucleus
- nucleus is filled with a fluid called nucleoplasm
- nucleus show a spherical structure called nucleolus
- chromatin threads seen inside the nucleus. They later form chromosomes during cell division
- Chromatin contain DNA, RNA, histone proteins and non histone proteins.

Chromosome

- every chromosome has a primary constriction called centromere
- on either side of the centromere there is disc shaped structures called kinetochores

types of chromosome

1. Metacentric: in this type the centromere is seen at the centre of chromosome
2. Submetacentric: centromere is seen nearer to the centre
3. acrocentric: centromere towards apex
4. Telocentric: Centromere is terminal in position

satellite chromosome: in some chromosomes a secondary constriction is seen. This gives the appearance of a small fragment . It is the satellite.

Microbodies: the membrane bound small vesicles present in animal and plant cell is called microbodies. They contain various enzymes.