

CELL BIOLOGY

Protoplasm

Physical basis of life

Basic fundamental substance, exhibiting all the vital process of the cell

First observed by Corti (1772)

Term coined by J. Purkinje

Chemical composition of protoplasm

Major constituents - oxygen (62 %) ,carbon (20 %) hydrogen (10%), nitrogen (3%)

Trace elements - calcium, phosphate, phosphorus, chlorine, Sulphur, potassium, sodium, magnesium, iodine & iron

Ultra-structure elements /cofactors - copper, cobalt, manganese, zinc,molybdenum, boron,silicon

Compounds of protoplasm

Inorganic compounds - metals, non-metals, water, salts, electrolytes, non – electrolytes

Organic compounds - carbohydrates, lipids, proteins, vitamins, hormones, nucleotides

Cell membrane

Plasma membrane / plasma lemma

Living outer membrane of the cell

Selectively permeable membrane

Major contributions given by Nageli and Cramer (1855)

Cell Organelles

Membrane bound distinct structures found in eukaryotic cells

Nucleus

Mitochondria

Ribosome

Golgi bodies

Endoplasmic reticulum

Lysosomes

Microbodies

Vacuole

Nucleus

Directs and controls all cellular activities

Discovered by Robert Brown (1831)

Nucleus contains nuclear envelope, nucleoplasm, chromatin reticulum and nucleoplasm

Nucleolus

It's a globular in shape

It's a dense ovoid granule in the interphase nucleus of all cells

First discovered by Fontana

Main function is synthesis of Ribosomal RNA thus called as the Factory of Ribosome

It does not have a membrane

Mitochondria

Power house of a cell / chemical factory of the cell

Discovered by Albert von Kolliker in 1857 and Richard Altman in 1886

The term introduced by Benda

It's a semi-autonomous body

It's a double membraned structure, Peri mitochondrial space or outer chamber is the space between

these outer and inner membranes

Infoldings of inner membrane is called as Cristae

Inner chamber contains the mitochondrial matrix

Mitochondria is present plenty in cells of liver, brain, muscles

Function = site of ATP synthesis, cellular respiration, of glucose, amino acids and thermogenesis (heat)

production)

Ribosome

Protein factory of the cell

Seen freely scattered in the cytoplasm or associated with endoplasmic reticulum

First observed by **Emil Palad**

Term coined by **Richard Roberts**

Ribosome has **2 subunits**

Large and small subunits

Sedimentation rate of **Prokaryotic ribosome** = 70S (swedberg unit)

Sedimentation rate of **Eukaryotic ribosome** = 80S

Functions = protein synthesis

Golgi bodies

Golgi complex, Golgi apparatus, Golgi vesicles

Plant golgi bodies often described as **Dictyosomes**

Traffic police of the cell

Discovered and described by **Camillio Golgi** in **1898**, he termed as **Internal reticular apparatus**

Baker in **1951** named as **lipochondrin**

Aggregations of parallelly and concentrically arranged membrane bound vesicles

Present in glandular cells (secretory cells)

Functions = centre for sorting and processing of cell proteins & directing them to destinations

They are **absent in RBC of mammals, mature sperms, prokaryotic cells**

The flattened, slightly curved sacs arranged parallelly and concentrically to form a stack

The **convex face** of the stack is called as **cis face**

The **concave face** of the stack is called **trans face**