

Aristotle ← Biology - Life + Study

जीव विज्ञान

14

10-14

Aristotle

← Zoology
↓ Anim.

Botany → Plants
↳ Theophrastus



SAFALTA CLASS™

An Initiative by अमरउजाला

Cell: कोशिका

- A cell is the smallest (biological, structural and functional) unit of life.
- Cell (dead cell) was discovered by Robert Hook in 1665 but first living cell was discovered by Antony Van Leuwenhoek.

Que: Exception of Cell

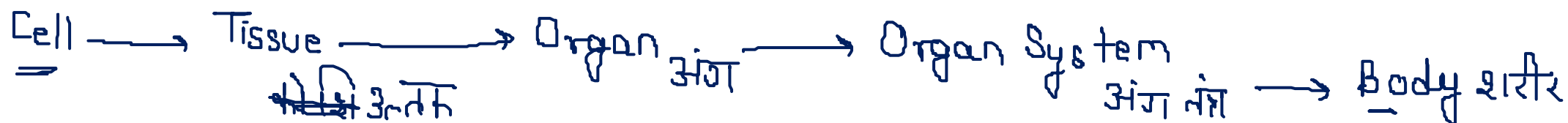
Cell Theory: कोशिका का सिद्धांत :

Virus Theory

- It was given by theodor Schwann and Matthias Jakob Schleiden

The three principles of the cell theory are as described below:

- All living organisms are composed of one or more cells.
- The cell is the basic unit of structure and organization in organisms.
- Cells arise from pre-existing cells.



* Cell / Dead : Robert Hooke
 Cell मृत को शिका

Cook - (Dead) Acellular Virus - Link b/w Living & non Living
 अणुजीवी विषाणु
 SAFALTA CLASS An Initiative by अमर उजाला

* Living cell / Bacteria :
 सजीव कोशिका जीवाणु
 Antony Van leuwenhok

* Largest cell : Ostrich egg cell

* Smallest cell : Mycoplasma (Bacteria)

* Longest cell of human : Neuron लम्बिका कोशिका

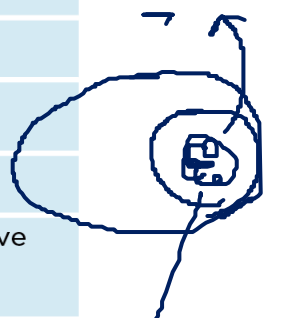
Characteristics	Eukaryotic Cells मुकेंद्रकीय	Prokaryotic Cells अमिकेंद्रकीय
Definition	Any cell that contains a clearly defined nucleus and membrane bound organelles	Any unicellular organism that does not contain a membrane bound nucleus or organelles
Examples	Animal, plant, fungi, and protist cells, Lichen, Algae	Bacteria and Archaea
Nucleus	Present (membrane bound)	Absent (nucleoid region)
Cell Size	Large (10-100 micrometers)	Small (less than a micrometer to 5 micrometers)
DNA Replication	Highly regulated with selective origins and sequences	Replicates entire genome at once
Organism Type	Usually multicellular	Unicellular
Chromosomes	More than one	One long single loop of DNA and plasmids
Ribosomes	Large	Small
Growth Rate/Generation Time	Slower	Faster
Organelles	Present	Absent
Ability to Store Hereditary Information	All eukaryotes have this ability	All prokaryotes have this ability
Cell Wall	Simple: Present in plants and fungi	Complex: Present in all prokaryotes
Plasma Membrane	Present	Present
Cytoplasm	Present	Present

Prokaryotic
 Primitive

Karyon - Nucl
 केंद्रक
 Developed

Eukar
 True

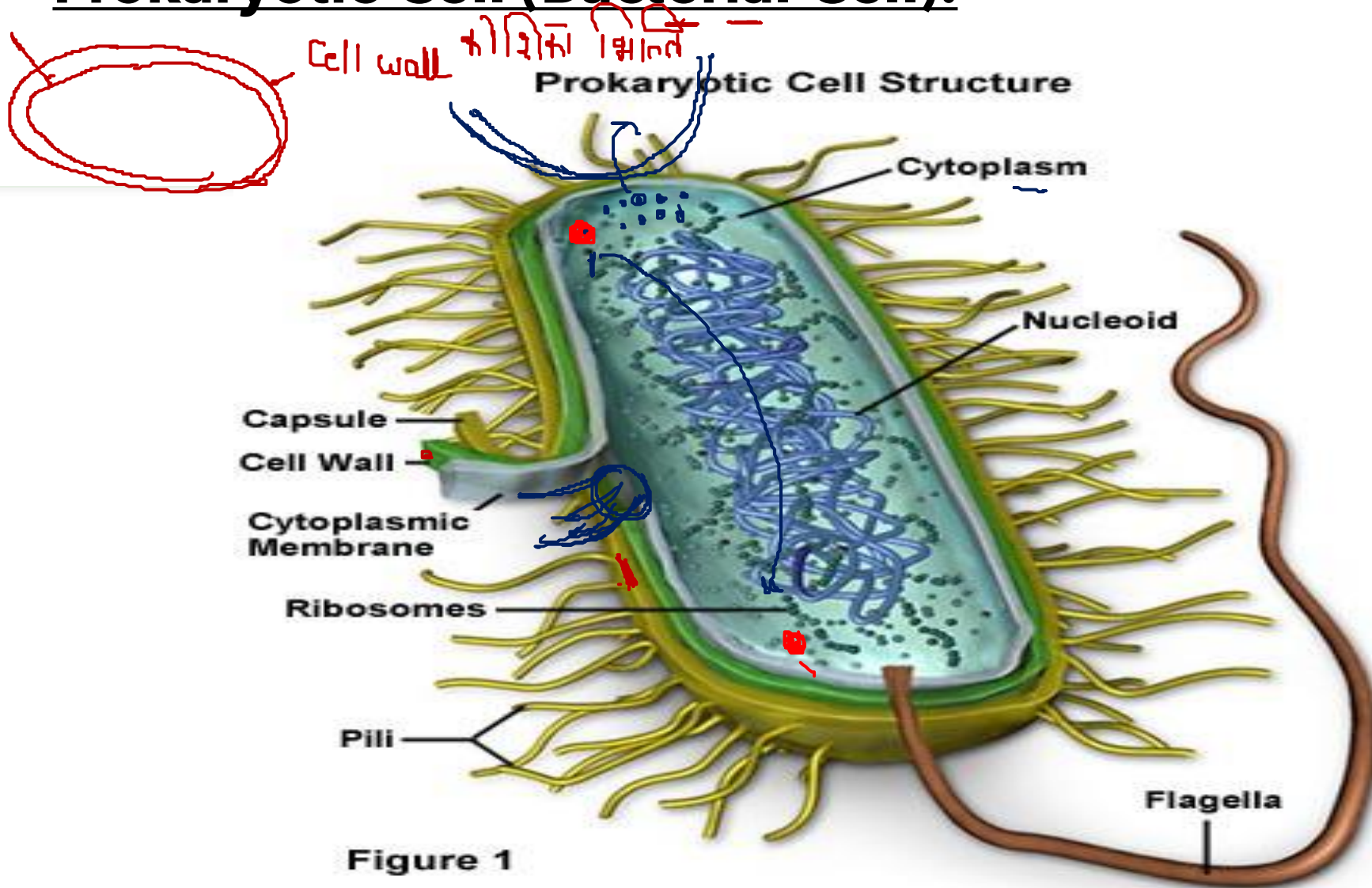
Nucleus



Nuclear Membr.
 केंद्रक झिल्ली



• Prokaryotic Cell (Bacterial Cell):



Cell Wall: कोशिका भित्ति

It is the outermost layer of plant, bacteria and fungal cell.

Composition: * पोषा जीवाणु कवक (humidity)

- Plant Cell: Cellulose (carbohydrates)
- Bacteria cell: Pectin (protein + carbohydrates)
- Fungal Cell: Chitin (carbohydrates)

Chitin
Que: Mushroom
(Fungus)

Function of Cell wall:

- Provides rigidity to cell. मजबूती
- Provides Protection to Cell. सुरक्षा → Heat
→ light

कोशिका झिल्ली

Cell Membrane/ Plasma Membrane:

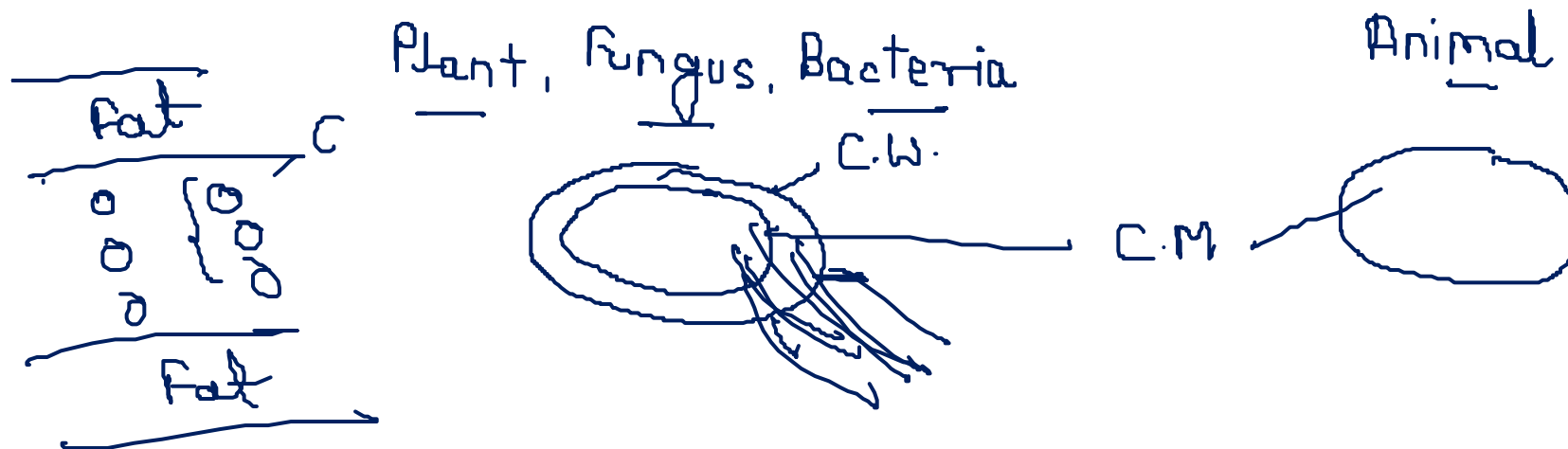
It is the outermost layer of animal cell while second most layer of plant, bacteria and fungal cell.

Lipid (fat) + Protein
↑ वसा

Composition: It is composed of "Lipoprotein" (fat + protein).

Function: Transportation of nutrients from one cell to another.

Nature: Semi permeable in nature. अर्ध पारगम्य



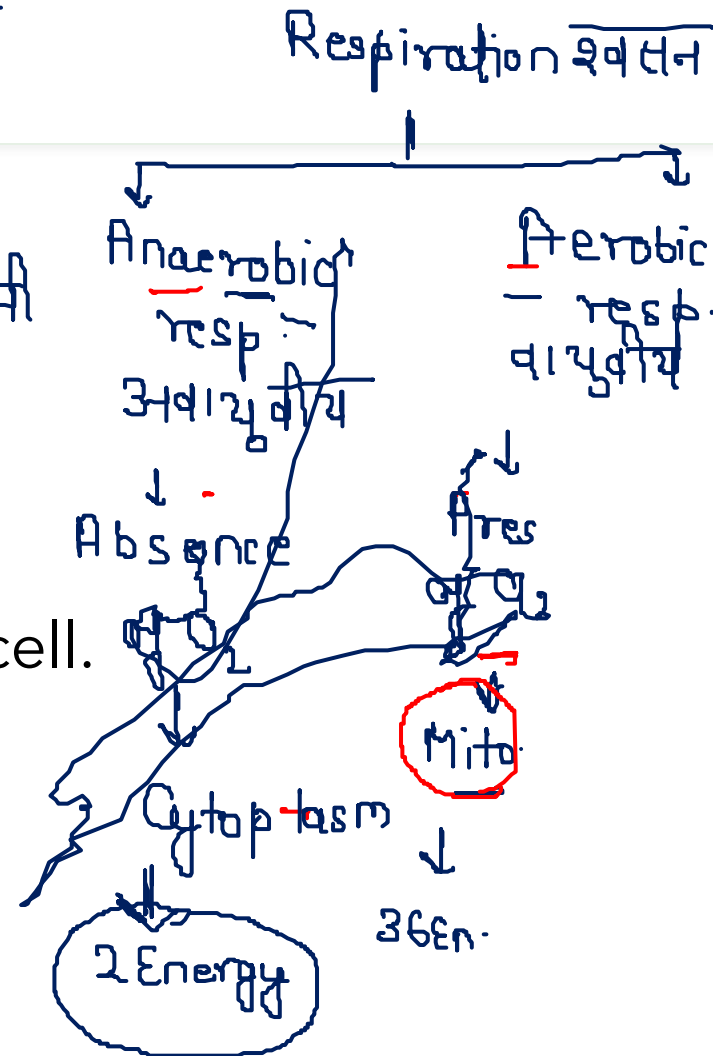
कोशिका द्रव्य

Cytoplasm: It is the liquid part of cell.

Composition: Water + salt

Function: पल + नमक

- It provides liquidity to cell. (Humidity) नमी
- Sites of anaerobic respiration
- Provides energy (2 ATP)
- Transportation of nutrients within the cell.

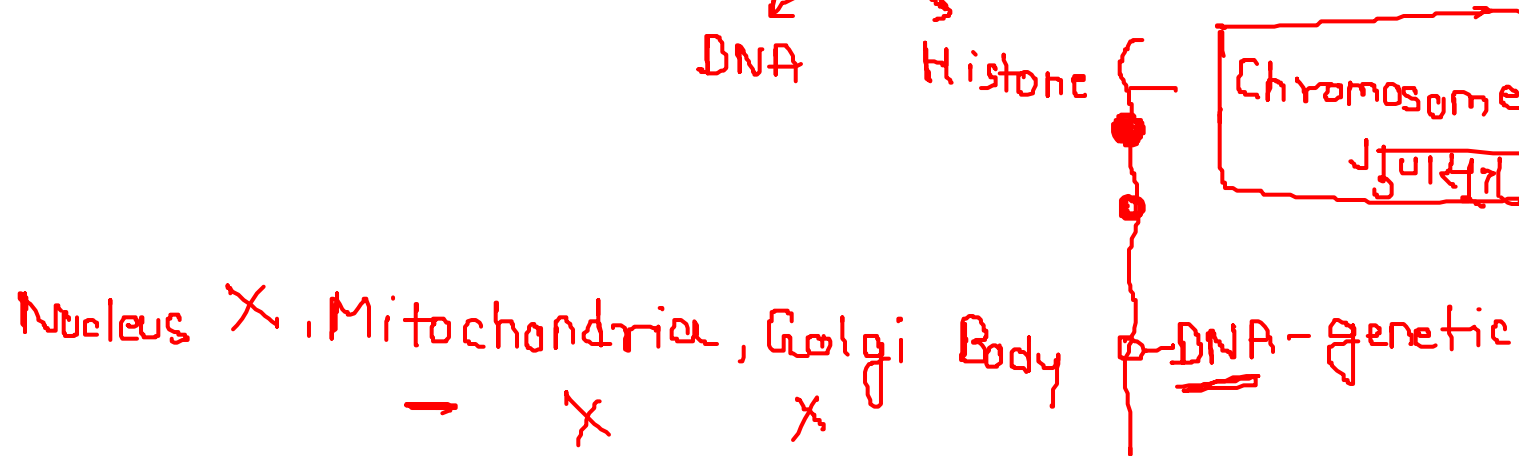


Chromosome: DNA molecule is packed in a thread like structure called Chromosome.

Composition: DNA + Histone protein *

Function: Helps in inheritance. आनुवंशिकता

Smallest unit of chromosome: Gene (discovered by Johannsen). *



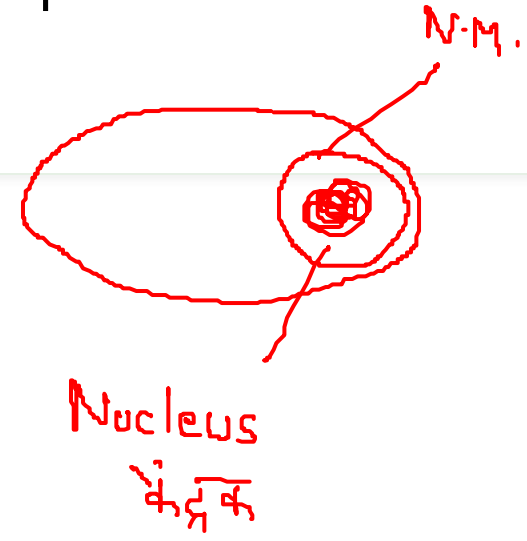
Eukaryotic Cell: It can be divided into 2 parts-

PLANT CELLS VERSUS ANIMAL CELLS

Plant cell
पादप कोशिका
Chloroplast
एरिन लवक
CW CM
Cell wall Present
Vacuoles: Large
रिक्तिका
Storage of Food & water

Animal Cell
जंतु को

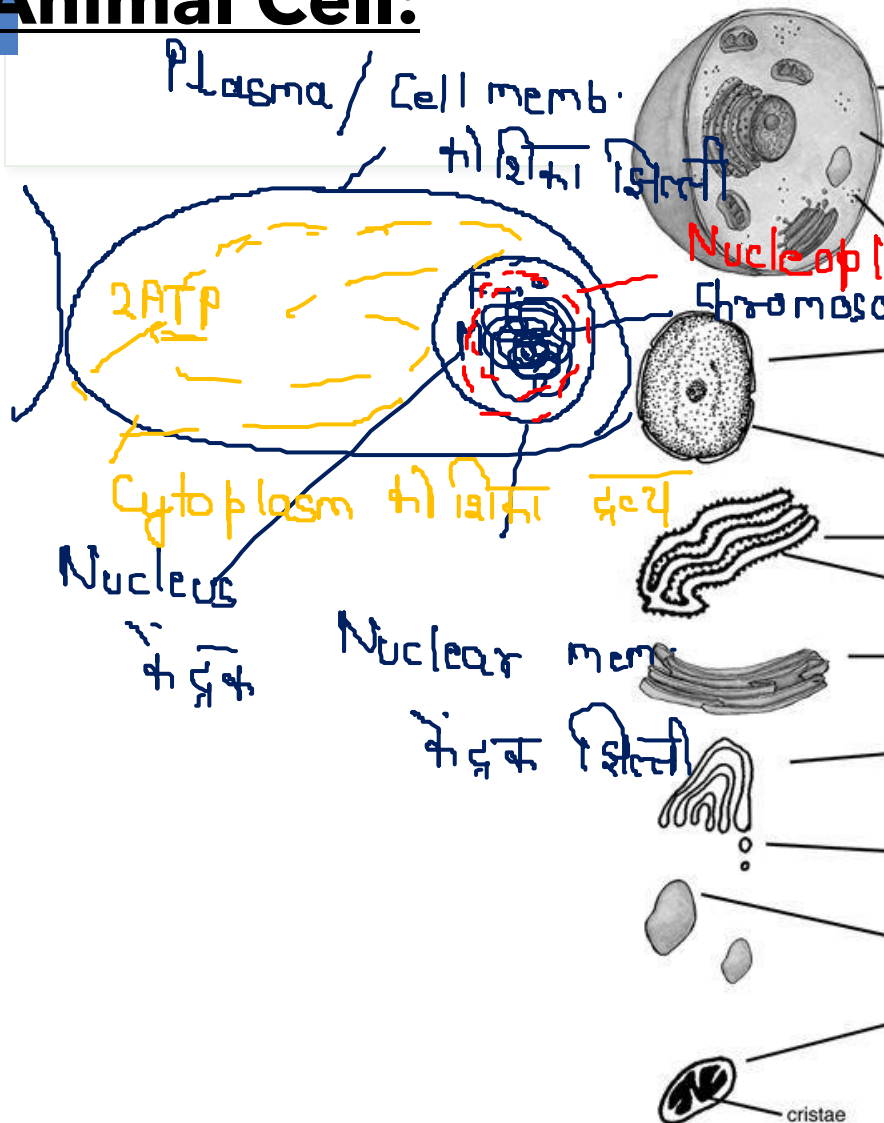
Plant cells are usually larger in size	Animal cells are smaller in size
Have a rectangular, fixed shape	Have a round, irregular shape
Composed of a cell wall made up of cellulose	Don't have a cell wall
Have one or more, comparatively very smaller vacuoles	Have one, large, central vacuole taking 90% of cell volume
Centrioles are present in lower forms of plants	Centrioles are present in all animals
Composed of chloroplast to produce their own food	Do not contain chloroplast
Don't consist of lysosomes	Consist of lysosomes
Composed of glyoxysomes	Not composed of glyoxysomes
Reserve food in the form of starch	Reserve food in the form of glycogen



• Animal Cell:

Animal Cell Organelles

1. Each cell has a protective outer layer – the **plasma membrane**. The plasma membrane lets certain things into the cell that it needs, but keeps other things out. This is called *semi-permeable*.
2. Inside the cell is a watery medium that everything floats in called **cytoplasm**. The cytoplasm contains all the working parts of the cell, the organelles.
3. Little grains floating around inside the cell are **ribosomes**, where proteins are made.
4. The **nucleus** has our **DNA** that contains all our genetic information. The DNA is found on structures in the nucleus called **chromosomes**. There are 23 pairs (46 total) of chromosomes in each nucleus of each cell.
5. The nucleus is surrounded by a **nuclear membrane**, which controls what goes in and out.
6. **Rough endoplasmic reticulum (rough ER)** is a series of folded membrane pathways spotted with ribosomes. Together the **ribosomes** and the rough ER make new proteins and new membranes that the cell needs.
7. **Smooth Endoplasmic Reticulum (smooth ER)** has no ribosomes on it and forms containers called **transport vesicles** that are used to move things around inside the cell.
8. **Golgi apparatus** are made up of saccules that package up things to be transported around the cell or that need to leave the cell, like hormones.
9. **Lysosomes** are vesicles that have digestive enzymes inside them and break down the things that the cell doesn't need. They also kill bacteria that invades the body.
10. **Vacuoles** are membrane large membranous sacs for storing things. **Vesicles** are smaller sacs.
11. **Mitochondria** have a double membrane that folds in on itself forming little finger-like projections called **cristae**. Inside is a gel-like matrix with enzymes that break down sugars to make **ATP**, which is used by the cell as energy. These very important organelles contain their own DNA and ribosomes, reproduce by division and can even produce some of their own proteins.



* Protoplasm
कोशिका द्रव्य
↓
Cyto + Nucleo

Nucleus: केंद्रक

The nucleus. The nucleus is the information Centre of the cell and is surrounded by a nuclear membrane in all eukaryotic.

- Discovered by **Robert Brown**.

Function of Nucleus:

“कौशिका का मस्तिष्क”

- It is commonly known as the Brain of the cell because it controls all the activities of the cell.
- Also known as Genetic Hub because it consists of mother and father's DNA.

आनुवंशिकता के केंद्र

Nucleoplasm: Similar to the cytoplasm of a cell, the nucleus contains nucleoplasm, also known as karyoplasm, or karyolymph or nucleus sap.

Protoplasm: The colorless material comprising the living part of a cell, including the cytoplasm, nucleus, and other organelles.

Protoplasm = Cytoplasm + Nucleoplasm

It was used in 1839 by **J. E. Purkinje** for the living fluid material of the animal embryo.

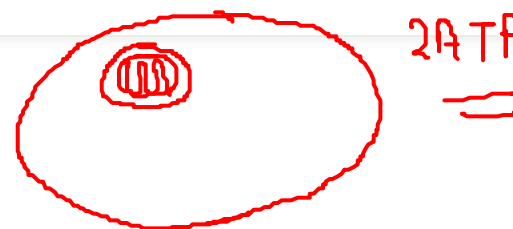
सजीव द्रव्य

Mitochondria: Mitochondria are membrane-bound cell organelles that generate most of the chemical energy needed to power the cell's biochemical reactions.

Discovered by Richard Altmann.

Function:

- Site of aerobic respiration (cellular respiration). वायुवीर्य श्वसन
- Provides maximum energy (36 ATP) needed for the functioning of the cell, hence it is known as the Power House of the Cell. → Currency of Energy ऊर्जा का मुद्रा
- Also contains Mother's DNA. Research
- Mitochondria is totally dependent upon ATP.

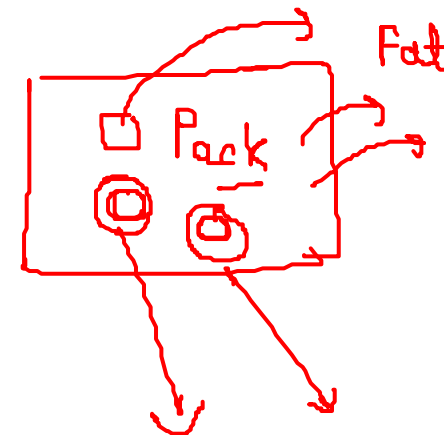


Golgi body: It is a complex of vesicles and folded membranes within the cytoplasm of most eukaryotic cells.

Discovered by Camilleo Golgi.

Function: Traffic Police of the Cell

- It is the cell's post office. A major function is the modifying, sorting and packaging of proteins for secretion.
- It is also involved in the transport of lipids around the cell.
- Helps in the creation of lysosomes.





Lysosome:

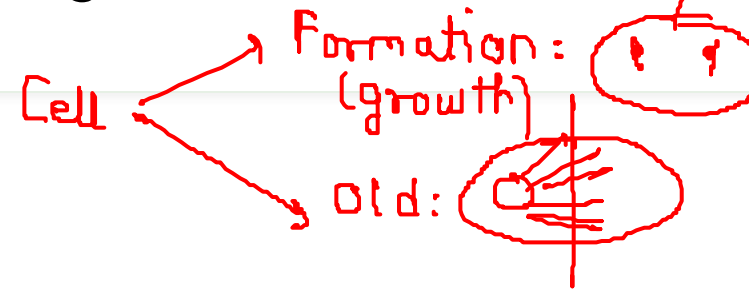
M. Imp
Suicidal Bag आत्महत्या की थैली

A lysosome is a membrane-bound cell organelle that contains digestive enzymes.

- Discovered by Christian De Duve.

Function:

- They break down excess or worn-out cell parts. They may be used to destroy invading viruses and bacteria (phagocytosis).
- Intracellular digestion that's why it is known as Suicidal Bag.
- Help in protein synthesis.
- It is a part of Golgi body.

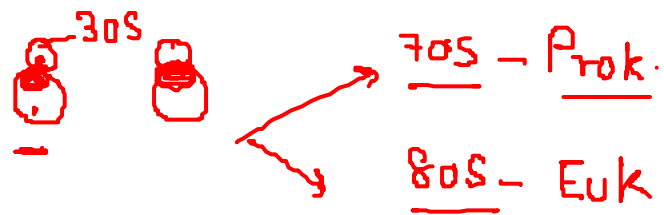


*Hydrolase Enzy.

अंतराकोशिकीय पाचन → कोशिका भक्षण

Inter Intra

Ribosome:

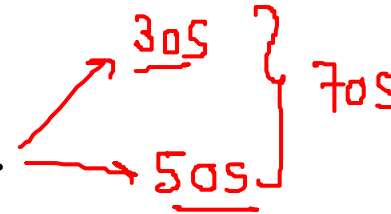


It helps in protein synthesis. प्रोटीन संश्लेषण

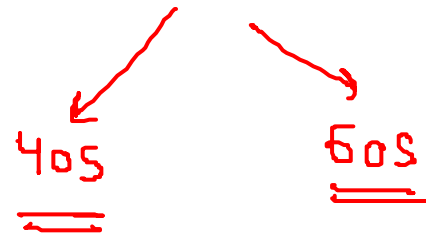
In 1949 Claude observed ribosomes and called them as microsomes. In 1955 Pallade named them as Ribosomes.

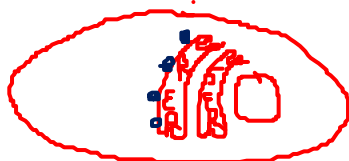
Ribosomes are usually two kinds:

1) Ribosomes of prokaryotes are 70S type.



2) Ribosomes of eukaryotes are 80S type.





Endoplasmic Reticulum: (ER)

A network of membranous tubules within the cytoplasm of a eukaryotic cell, continuous with the nuclear membrane. *Keith Porter*

There are two types of endoplasmic reticulum: rough endoplasmic reticulum (rough ER) and smooth endoplasmic reticulum (smooth ER). Both types are present in plant and animal cells.

- Rough Endoplasmic Reticulum: Their main function is produce proteins in the cells and ribosomes are attached to their surface.
- Smooth Endoplasmic Reticulum: Their main function is to produce lipids and also detoxify toxins in the body in the liver and kidney cells.

