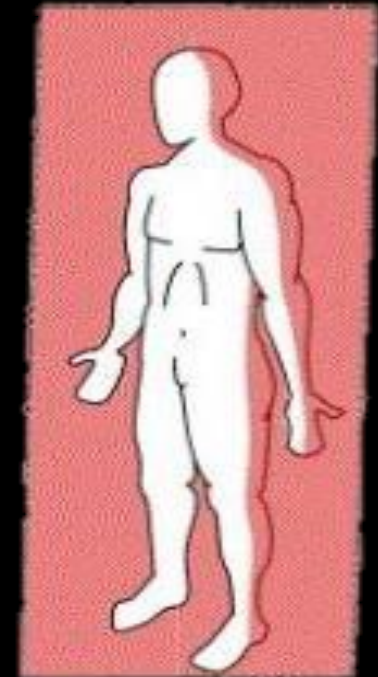




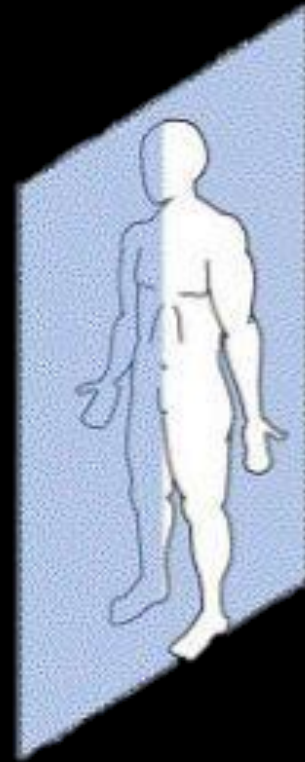
# Planes of division:

- **The frontal/coronal plane:** if the cut were made in the line with the ears and then the middle of the body you would see an anterior or ventral (front) section and posterior or dorsal (back) section.



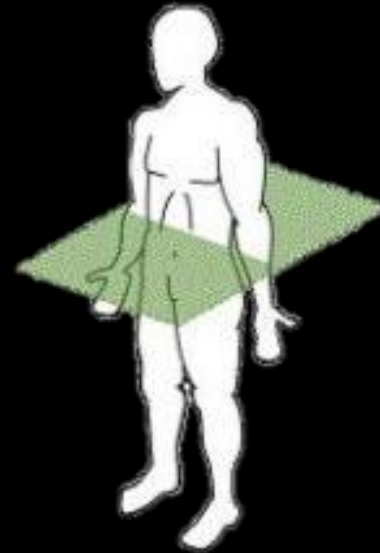
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- **The Sagittal plane:** a cut exactly down the midline of the body separating it into equal right and left half is a mid sagittal section.



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- **The Transverse plane:** if the cut were made horizontally across the other two planes it would divide the body into a superior upper part and inferior lower part also called horizontal plane.





THANK  
YOU

**D.PHARM**

**1<sup>st</sup> YEAR**

**CHAPTER-2**

**PART-1**

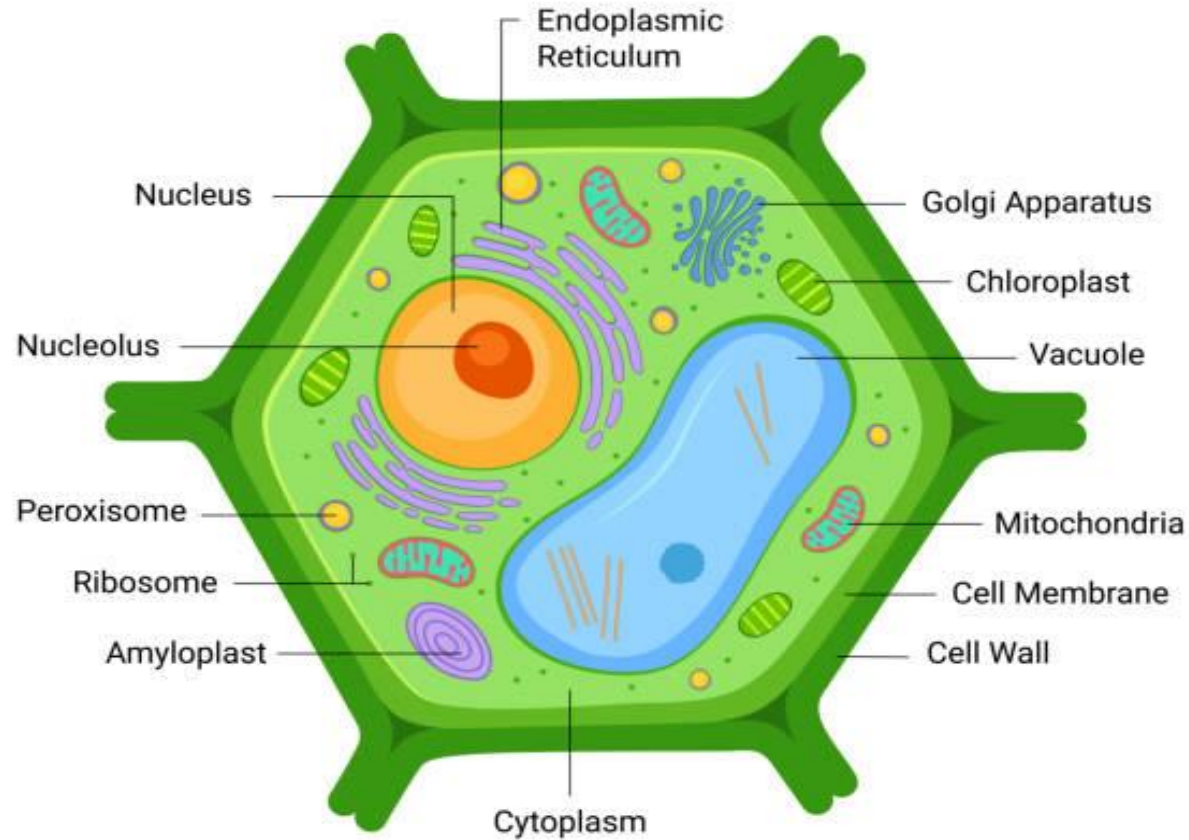
**STRUCTURE  
OF CELL**

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# CELL

- ❑ A cell can replicate itself independently.
- ❑ Robert Hooke was the first Biologist who discovered cells.
- ❑ In 1883, Robert Brown, a Scottish botanist, provided the very first insights into the cell structure.
- ❑ He was able to describe the nucleus present in the cells of orchids.

## PLANT CELL



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# CELL THEORY

- There are three main postulates of cell theory are as follows:

❖ First, cells make up all living things.

सबसे पहले, कोशिकाएं सभी जीवित चीजों का निर्माण करती हैं।

# CELL THEORY

- There are three main postulates of cell theory are as follows:

❖ Second, cells are the basic building blocks for developing tissues, organs, and fully developed living creatures.

दूसरा, कोशिकाएँ ऊतकों, अंगों और पूर्ण विकसित जीवित प्राणियों के विकास के लिए बुनियादी निर्माण खंड हैं।

# CELL THEORY

- There are three main postulates of cell theory are as follows:

❖ most crucial, aspect of the hypothesis is that cells can only develop from other cells.

परिकल्पना का सबसे महत्वपूर्ण पहलू यह है कि कोशिकाएँ केवल अन्य कोशिकाओं से ही विकसित हो सकती हैं।



## Plant Cell

## Animal Cell

### Cell Shape

Square or rectangular in shape

Irregular or round in shape

### Cell Wall

Present

Absent

### Endoplasmic Reticulum

Present

Present

### Nucleus

Present and lies on one side of the cell

Present and lies in the centre of the cell

### Lysosomes

Present but are very rare

Present

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## Golgi Apparatus

Present

Present

## Plastids

Present

Absent

## Vacuoles

Few large or a single, centrally positioned vacuole

Usually small and numerous

## Cilia

Absent

Present in most of the animal cells

## Mitochondria

Present but fewer in number

Present and are numerous



	<b>Prokaryotes</b>	<b>Eukaryotes</b>
Type of Cell	Always unicellular	Unicellular and multi-cellular
Cell size	Ranges in size from 0.2 $\mu\text{m}$ – 2.0 $\mu\text{m}$ in diameter	Size ranges from 10 $\mu\text{m}$ – 100 $\mu\text{m}$ in diameter
Cell wall	Usually present; chemically complex in nature	When present, chemically simple in nature
Nucleus	Absent. Instead, they have a nucleoid region in the cell	Present
Ribosomes	Present. Smaller in size and spherical in shape	Present. Comparatively larger in size and linear in shape

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DNA arrangement	Circular	Linear
Mitochondria	Absent	Present
Cytoplasm	Present, but cell organelles absent	Present, cell organelles present
Endoplasmic reticulum	Absent	Present
Plasmids	Present	Very rarely found in eukaryotes
Ribosome	Small ribosomes	Large ribosomes

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Lysosome	Lysosomes and centrosomes are absent	Lysosomes and centrosomes are present
Cell division	Through binary fission	Through mitosis
Flagella	The flagella are smaller in size	The flagella are larger in size
Reproduction	Asexual	Both asexual and sexual
Example	Bacteria and Archaea	Plant and Animal cell



# Cell organelles

- **Organelles without membrane:** Cell wall, Ribosomes, and Cytoskeleton.
- They are present both in the **prokaryotic cell** and the **eukaryotic cell**.
- **Single membrane-bound organelles:** Vacuole, Lysosomes Golgi Apparatus, Endoplasmic Reticulum present only in a **eukaryotic cell**.
- **Double membrane-bound organelles:** Nucleus, mitochondria and chloroplast present only in a **eukaryotic cell**.

# Plasma Membrane

- Allows only certain molecules in or out of a cell.



केवल कुछ अणुओं को ही कोशिका के अंदर या बाहर जाने की अनुमति देता है।

- Separates internal metabolic reactions from external environment.



आंतरिक चयापचय प्रतिक्रियाओं को बाहरी वातावरण से अलग करता है।

- Allows cell to excrete wastes and interact with its environment.



कोशिका को अपशिष्ट पदार्थों को बाहर निकालने और अपने पर्यावरण के साथ बातचीत करने की अनुमति देता है।

- ❖ It is made primarily of phospholipids : **Phospholipid B-Layer**

# Cell wall

- It is a rigid and stiff structure surrounding the cell membrane.



यह कोशिका झिल्ली के चारों ओर एक कठोर संरचना है।

- It provides shape and support to the cells and protects them from mechanical shocks and injuries.



यह कोशिकाओं को आकार और समर्थन प्रदान करता है और उन्हें यांत्रिक झटके और चोटों से बचाता है।

# Nucleus

- The nucleus contains the hereditary material of the cell, the DNA.



केन्द्रक में कोशिका का वंशानुगत पदार्थ, डीएनए होता है।

- It sends signals to the cells to grow, mature, divide and die.



यह कोशिकाओं को बढ़ने, परिपक्व होने, विभाजित होने और मरने के संकेत भेजता है।

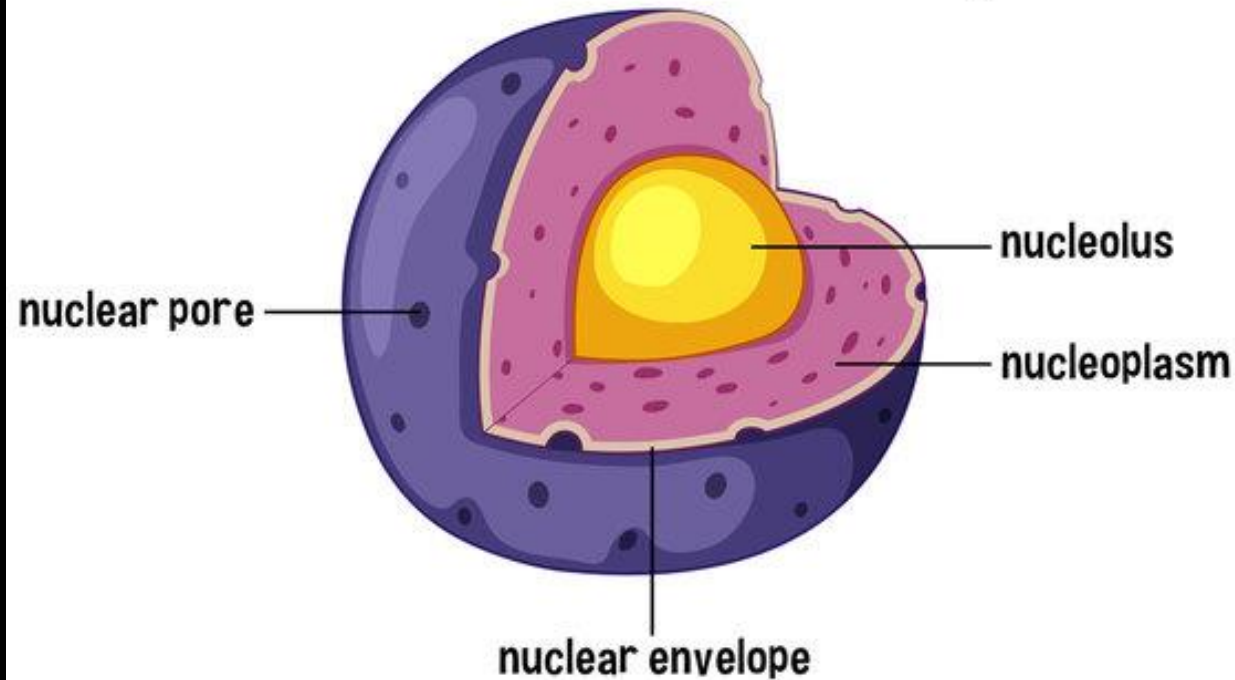
- The nucleus is surrounded by the nuclear envelope that separates the DNA from the rest of the cell.

केन्द्रक परमाणु आवरण से घिरा होता है जो डीएनए को शेष कोशिका से अलग करता है।

- The nucleus protects the DNA and is an integral component of a plant's cell structure.

केंद्रक डीएनए की रक्षा करता है और पौधे की कोशिका संरचना का एक अभिन्न अंग है।

## Cell Nucleus Anatomy



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# Mitochondria

- The mitochondrial genome is inherited maternally in several organisms.



माइटोकॉन्ड्रियल जीनोम कई जीवों में मातृ रूप से विरासत में मिला है।

- It is a **double membrane-bound, sausage-shaped** organelle, found in almost all **eukaryotic cells**.



यह एक दोहरी झिल्ली से घिरा, साँसेज के आकार का अंग है, जो लगभग सभी यूकेरियोटिक कोशिकाओं में पाया जाता है।

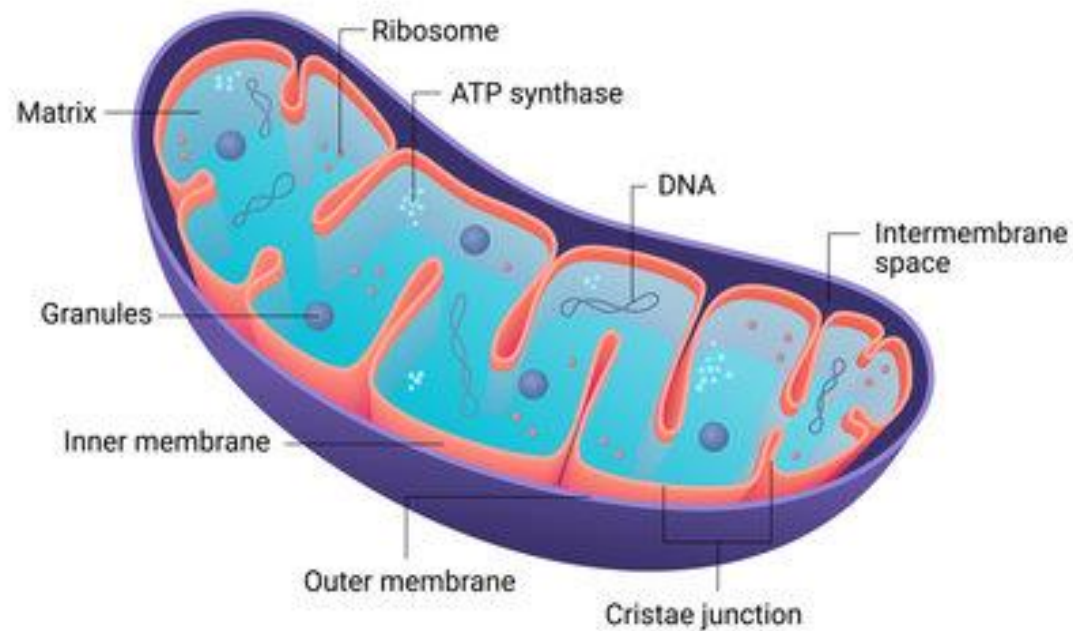


- Its size ranges from 0.5 to 1.0 micrometre in diameter.
- The membrane are made of proteins and phospholipid layers separated by the intermembrane space.
- The outer membrane covers the surface of the mitochondrion and has a large number of special proteins known as porins.



बाहरी झिल्ली माइटोकॉन्ड्रियन की सतह को कवर करती है और इसमें बड़ी संख्या में विशेष प्रोटीन होते हैं जिन्हें पोरिन कहा जाता है।

## MITOCHONDRIA



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# Ribosomes

- Small roughly spherical organelles that are responsible for building **protein**.



छोटे मोटे तौर पर गोलाकार अंगक जो प्रोटीन के निर्माण के लिए जिम्मेदार होते हैं।

- Ribosomes do not have a membrane, they are made of protein and RNA molecules.
- They are named as the 70s (**found in prokaryotes**) or 80s (**found in eukaryotes**).

# The Endoplasmic Reticulum

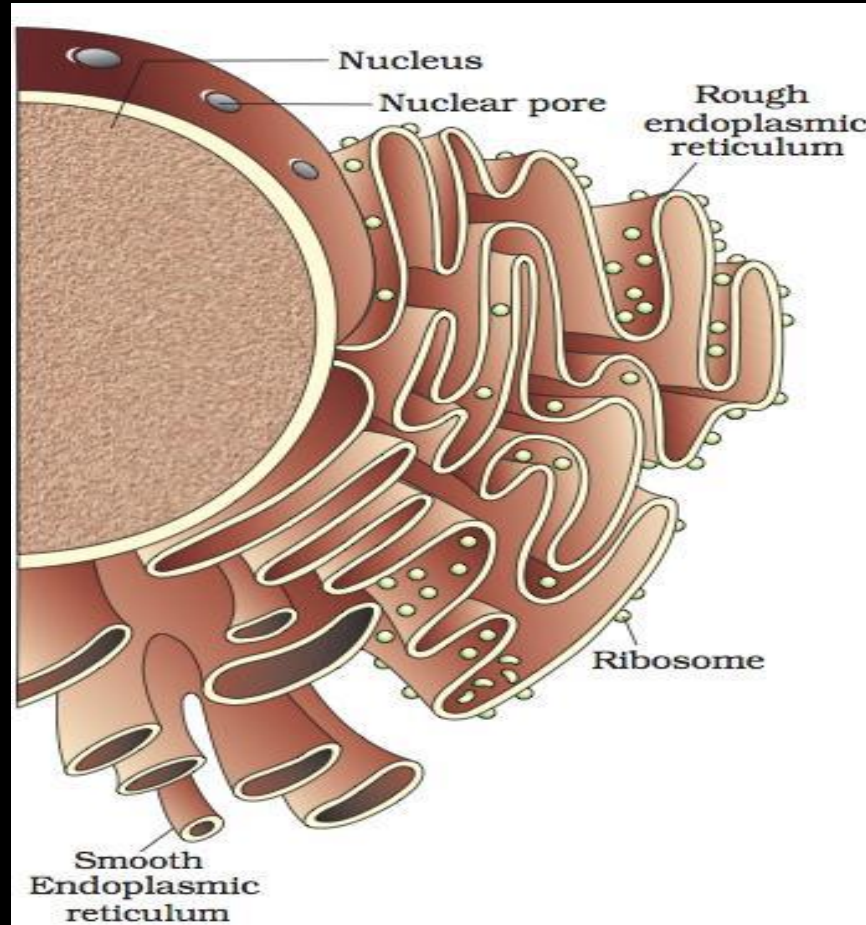
- It is a network of membranous canals filled with fluid.
- They are the transport system of the cell, involved in transporting material throughout the cell.



वे कोशिका की परिवहन प्रणाली हैं, जो संपूर्ण कोशिका में सामग्री के परिवहन में शामिल होती हैं।

<b>Rough Endoplasmic Reticulum</b>	<b>Smooth Endoplasmic Reticulum</b>
It possesses ribosomes attached to its membrane.	It does not have ribosomes on its membrane.
Formed of cisternae and a few tubules.	Formed of vesicles and tubules.
It participates in the synthesis of enzymes and proteins.	Synthesises glycogen, lipids and steroids.
It helps in the formation of lysosomes.	Gives rise to Spherosomes/ Oleosomes

It is internal and connected with the nuclear envelope.	It is peripheral and may be connected to plasmalemma.
Ribophorins are present and help ribosomes attach to ER	Devoid of Ribophorins.
It might develop from the nuclear envelope	Develops from Rough Endoplasmic Reticulum.
Provides proteins and lipids for Golgi apparatus.	Provides vesicles for cis-face of Golgi apparatus.



# Endoplasmic Reticulum

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# Golgi Apparatus

- It is a **membrane-bound organelle**, which is mainly composed of a series of flattened, stacked pouches called **cisternae**.

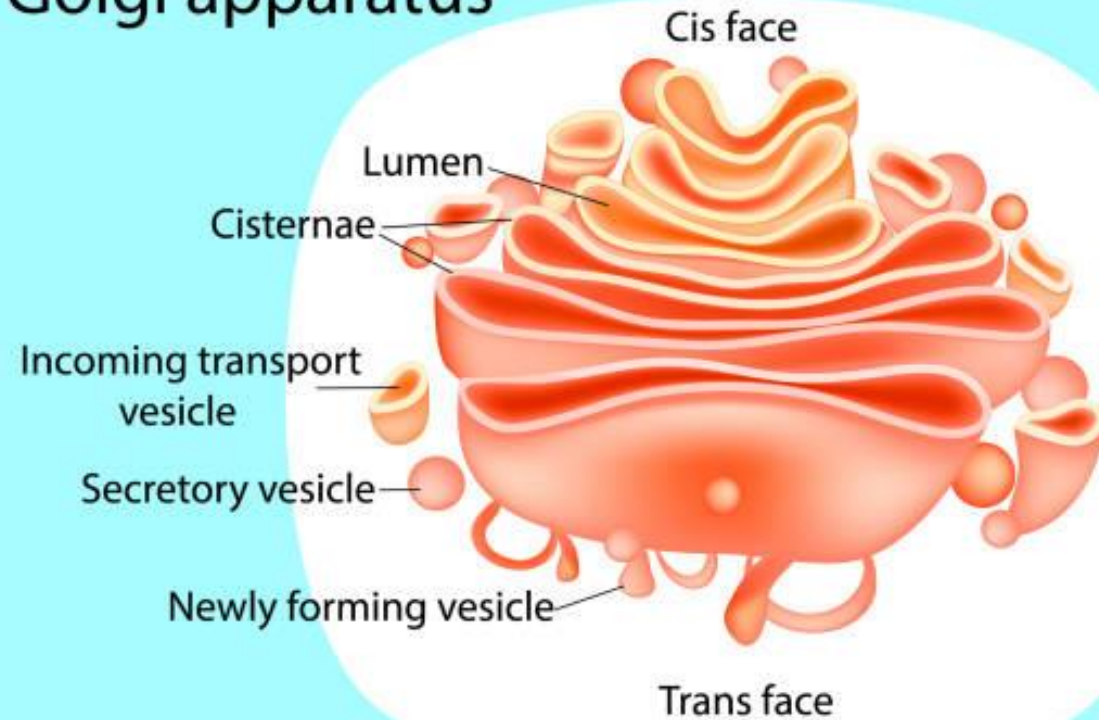
यह एक झिल्ली-बद्ध अंग है, जो मुख्य रूप से चपटी, खड़ी थैलियों की एक श्रृंखला से बना होता है जिन्हें सिस्टर्न कहा जाता है।

- This cell organelle is primarily responsible for **transporting, modifying, and packaging proteins** and lipids to targeted destinations.

यह कोशिकांग मुख्य रूप से लक्षित गंतव्यों तक प्रोटीन और लिपिड के परिवहन, संशोधन और पैकेजिंग के लिए जिम्मेदार है।



## Golgi apparatus



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# Cytoskeleton

- It is a continuous network of filamentous **proteinaceous** structures that run throughout the cytoplasm, from the nucleus to the plasma membrane.
- The primary functions include providing the shape and mechanical resistance to the cell against deformation.
- The contractile nature of the filaments helps in motility during cytokinesis.

# Vacuole



- ❑ In addition to this, it also stores and eliminate waste products.
- ❑ Compared to the animals, plant cells have **larger vacuoles**.
- ❑ Vacuoles are mostly defined as **storage bubbles** of irregular shapes which are found in cells.

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<b>Character</b>	<b>Cilia</b>	<b>Flagella</b>
Definition	Cilia are short, hair like cell organelle extending from the surface of a living cell.	Flagella are long, threadlike cell organelle present on the surface of a living cell.
Found in	It is found in Eukaryotic cell.	It is found in Prokaryotic cell as well as in eukaryotic cells.

# Plastids

## ➤ Chloroplasts:

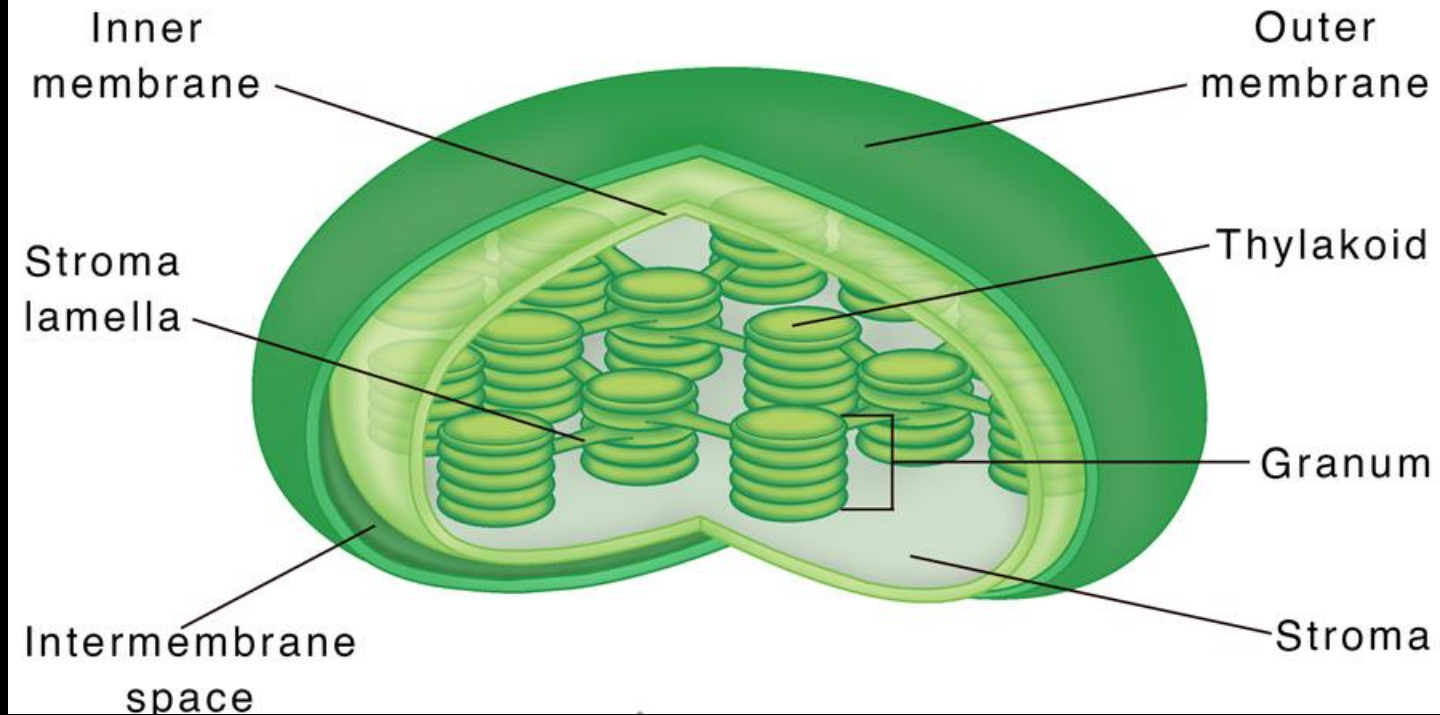
- These are double membrane-bound organelles, which usually vary in their shape – from a disc shape to spherical, discoid, oval and ribbon.



ये दोहरे झिल्ली से बंधे अंग हैं, जो आमतौर पर अपने आकार में भिन्न होते हैं - डिस्क आकार से लेकर गोलाकार, डिस्कॉइड, अंडाकार और रिबन तक।

- They are present in **mesophyll** cells of leaves.

# Chloroplast



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➤ **Chromoplasts** – The chromoplasts include fat-soluble, carotenoid pigments like **xanthophylls, carotene**, etc.



क्रोमोप्लास्ट में वसा में घुलनशील, कैरोटीनॉयड वर्णक जैसे ज़ैंथोफिल, कैरोटीन आदि शामिल होते हैं।

- They provide the plants with their characteristic color – **yellow, orange, red, etc.**

- **Leucoplasts** – Leucoplasts are **colorless plastids** which store nutrients.

<b>Amyloplast</b>	<b>Aleuroplast</b>	<b>Elaioplast</b>
Stores carbohydrates (like starch in potatoes)	Stores proteins	Stores oils and fats



# Lysosomes

- Contains enzymes that break down **proteins, nucleic acids, carbohydrates, and lipids.**



इसमें एंजाइम होते हैं जो प्रोटीन, न्यूक्लिक एसिड, कार्बोहाइड्रेट और लिपिड को तोड़ते हैं।

- Lysosomes work as the **waste discarding structures** of the cell by processing undesirable materials and degrading them.



लाइसोसोम अवांछनीय सामग्रियों को संसाधित करके और उन्हें नष्ट करके कोशिका के अपशिष्ट को हटाने वाली संरचनाओं के रूप में काम करते हैं।

- But sometimes, the digestive enzymes may end up damaging the lysosomes themselves, and this can cause the cell to die.



लेकिन कभी-कभी, पाचन एंजाइम स्वयं लाइसोसोम को नुकसान पहुंचा सकते हैं, और इससे कोशिका मर सकती है।



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