

### The Cell Theory

1. All Organisms are composed of one or more cells.
2. The cell is the basic unit of structure and organisation in organisms.
3. All cells come from preexisting cells.

### Membranes

|                         |  |
|-------------------------|--|
| Permeable Membrane:     | A membrane that lets everything through                      |
| Semipermeable Membrane: | A membrane that lets some/certain things [materials] through |
| Impermeable Membrane:   | A membrane that does not let things [materials] through      |

### Cytoplasm

- Where cellular reactions take place
- Has a thick jelly-like structure
- Allows protein respiration in the [Mitochondria]
- Where Mitosis and Meiosis occurs

### Cell Wall

- Porus to let things through
- Rigid (100x thicker than the cell membrane)
- Maintains shape and protects cells
- Attaches to other cell walls to form strong structures (plants need to be strong but don't have skeletons)

### Golgi Body

- Golgi apparatus
- Part of the cell
- Where items are collected, packed and exported
- Receives proteins from the Rough Endoplasmic Reticulum [rER]
- Modifies proteins by adding lipids or carbs or by changing shapes
- Sends proteins to damaged cell parts for recovery

### Cell Structure Of A Leaf

- The lamella is the broad flat surface of a leaf. [The large surface area allows for maximum absorption of light.] The thin lamella also allows for light to get to deeper portions of the leaves.
- Thin cells in the upper epidermis allow sunlight to reach the mesophyll
- Palisade cells are packed with Chloroplasts. Have large vacuoles or stores.
- The spongy mesophyll have large air spaces between it's cells for gaseous exchange
- Xylem vessels start a series of plant cells. At a certain point the carbohydrate lignin forms within the cell walls. Lignin is impermeable. Living contents of the cell die; The end walls between the cells break down. Continuous tubes are formed.

### Tissues

- Group of cells with a common function.
- Note: Cells (similar) to tissues to organs to organ systems to organisms

### Mitochondria

- The powerhouse of the cell
- Provides energy to all parts of the cell
- Where cellular respiration takes place [Glucose+O<sub>2</sub>=ATP+CO<sub>2</sub>] transports to other cells

### Cytoskeleton

- Skeleton of the cell
- Some cells can move using:
- Flagella: a few long whip-like structures outside the cells
- Cilia: Hundreds of short hairlike structures outside the cells

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### Nucleus

- Controls the cell
- Is the brain of the cell
- Contains DNA/Genetic Material

### Cell Membrane

- Protective outer boundary of the cell.
- Allows materials like water and oxygen, does not allow harmful materials like carbon dioxide and waste products.
- Is permeable

### Reproduction/Stem Cells

Egg cell + sperm cells = zygote (totipotent stem cells that divide and re-divide)

Zygote - Embryo (the embryo can either divide, resulting in growth, or it can differentiate to different parts of the body.

Embryonic Stem Cells: Pluripotent (can be specialised into any different type of cell)

Adult stem cells - Multipotent (they give rise to the same type of cells, like stem cells)

In Leukemia abnormal white blood cells divide and re-divide to form a mass of cell tumour which block blood vessels

Hemopoetic - Blood forming cells

### Xylem And Phloem

**Xylem:** Transports water from the roots to the leaves. Xylem has two main types of tissues. Hexagonal shapes.

**Phloem:** Transports manufactured food from the leaves to other parts of the plant. Circular shapes.

**Both:** Xylem and phloem are transport systems in vascular plants

### Smooth Endoplasmic Reticulum [sER]

Does not contain ribosomes

Does not contain proteins

Produces lipids, cholesterol, etc.

Breaks down toxic substances via detoxification

### Lysosomes

Digestive part of the cell

Has digestive enzymes

Converts carbohydrates to glucose and proteins to amino acids

### Vacuoles

Storage house of the cell

Stores water, food, minerals, nutrients and waste products

Plants have one

### Rough Endoplasmic Reticulum [rER]

Contains ribosomes

Contains proteins

Pack/enclose proteins in vesicles

Transport substances within the cell

### Ribosomes

Float in the cytoplasm

Makes proteins

### Osmosis

Diffusion of/for water

### Prokaryote & Eukaryote Cells

**Prokaryote** Pro stands for before,  
**Cells:** Karoyote stands for nucleus.  
 Oldest cell type, small and simple, lack nucleus and organelles, single-celled, single circular chromosome. Membrane bound organelles like mitochondria, endoplasmic reticulum, golgi body are absent. 70s Ribosomes. Pili present.

### Prokaryote & Eukaryote Cells (cont)

**Both:** Have DNA, have ribosomes, have cytoplasm, have a plasma membrane, brane present

**Eukaryote Cells** Eu stands for true, Karyote stands for nucleus (karyon). Evolved from prokaryotes, larger and more complex, contain nucleus and organelles, multicellular, multiple linear chromosomes

### Pits

Regions where Lignin is not deposited

### Plant Cells vs Animal Cells

**Plant Cells:** Having cell wall outside of the cell membrane, large fluid-filled vacuole. Have chloroplasts

**Animal Cells:** Have cytoplasm, have nucleus, have cell membrane, lack vacuoles or only have a few in liver cells

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Published 30th March, 2023.  
 Last updated 30th March, 2023.  
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