Department of biology

Department of biology

2025-2026

((Cell Biology))

Stage (-3-)

LEC- ((2))

Introduction to Cell Biology

By

Dr Alaa Hadi

Animal Cell and Plant Cell

- All living things are made up of cells. Animal cells and plant cells share the common components of a nucleus, cytoplasm, mitochondria and a cell membrane.
- Plant cells have three extra components, a vacuole, chloroplast and a cell wall.

Animal cells

Animals are made up of millions of cells. Animal cells have an irregular shapes and are made up of four key parts (Figure 2):

- **Nucleus** – This contains genetic material (DNA), and controls the cell's activity.
- **Cell membrane** – A flexible layer that surrounds the cell and controls the substances that enter and exit.
- **Cytoplasm** – A jelly-like substance where the chemical reactions happen.
- **Mitochondria** – This is where energy is released from the food molecules.

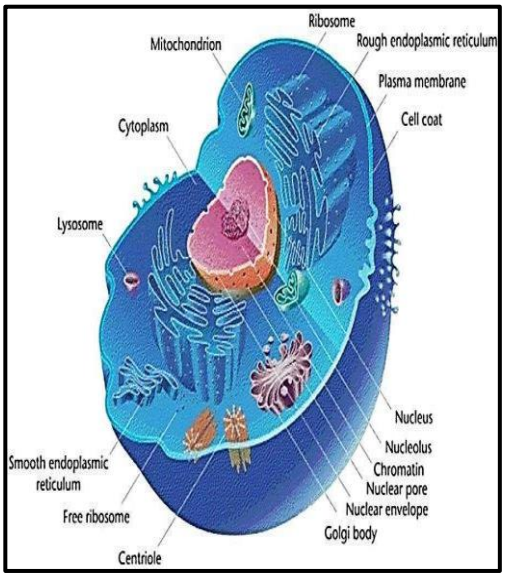

Figure 2: The animal cell

Plant cells

Plants are also made up of millions of cells. Plant cells have a nucleus, cell membrane, cytoplasm and mitochondria too, but they also contain the following structures

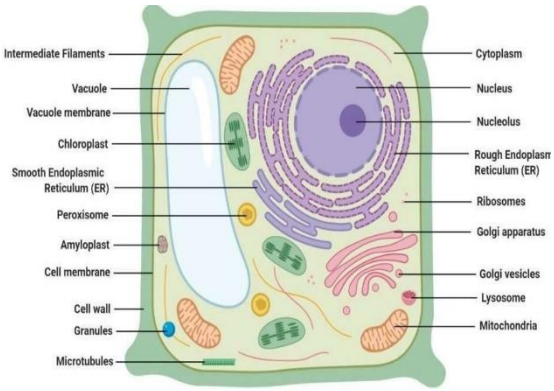

Figure 3: The plant cell

Cell wall – A hard layer outside the cell membrane, containing cellulose to provide strength to the plant.

- **Vacuole** – A space inside the cell that is used to store substances and help the cell keep its shape.

Chloroplasts – Structures that contain the green pigment **chlorophyll**,

Comparison between Animal cell and Plant cell

Characteristic	Animal cells	Plant cells
Size and Shape	Generally smaller than plant cells with their cells ranging from 10-30um in length. Shapes vary greatly from irregular shapes to round shapes.	Larger than animal cells with the cell size ranging from 10um-100um in length. Plant cells similar in shape with most cells being rectangular or cube-shaped.
Cell Wall	They lack the cell wall but possess a plasma (cell) membrane,	They have both a cell wall that is made up of cell membrane and cellulose.
Plasma membrane	Present	Present
Ribosomes	They are present and they are used for protein synthesis and genetic coding of the protein, amino acid sequences.	They are present and they are used for protein synthesis and cellular repair mechanisms.
Endoplasmic reticula	Present	Present

Lysosomes	lysosomes, contain digestive enzymes to break down cellular macromolecules.	rarely contain lysosomes as the plant vacuole and the Golgi bodies handle molecule degradation of waste cellular products.
Vacuoles	Present	Present
Nucleus	Present and it lies at the center of the cell	Present and it lies on the side of the cell
Centrioles	They are present with their major function involving the assistance of the cell division process.	They are absent in plant cells
Microfilaments and Microtubules	Present	Present.
Cilia and Filaments	Present; they allow movement of cells or part of the cell, for example, swimming of the sperm to the ova.	Absent in plants
Plastides	Absent	present; they give pigmentation color to the plants and also cilitate trapping of light energy sed for photosynthesis.

Comparison between Bacterial, Animal and Plant

	Bacterium	Animal	Plant
Type of Cell	Prokaryotic cells	Eukaryotic cells	Eukaryotic cells
Cell Wall	Present (protein-polysaccharide)	Absent	Present (cellulose)
Cell membrane	Present	Present	Present
Nucleus	Absent	Present	Present
Plasmids	Present	Absent	Absent
Plastids	Absent	Absent	Present
Mitochondria	Absent	Present	Present
Ribosomes	Present	Present	Present
Lysosomes	Absent	Present	Present but are few in numbers
Chromosomes	A single circle of naked DNA	Multiple units DNA associated with protein	Multiple units DNA associated with protein
ER	Absent	Present	Present
Centrioles	Absent	Present	Absent
Vacuoles	Absent	Absent or small	Usually a large single Vacuole in mature cell
Golgi Apparatus	Absent	Present	Present
Mode of Nutrition	Both heterotrophs and autotrophs	Heterotrophs	Autotrophs
Mode of Respiration	Both aerobic and anaerobic	Aerobic respiration	Aerobic respiration
Mode of Reproduction	Both sexual and asexual mode of reproduction.	Sexual reproduction in higher animals and asexual in lower animals.	Both sexual and asexual mode of reproduction.