

BIOL110 Lecture Summaries

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Module 1 Life, Cells and Microbiology Summarised

Cells in General

- Definition: the basic structure unit of organisms. Cells differ in complexity between organisms but have fundamental features in common.

	Plant Cell	Animal Cell	Prokaryote	Eukaryote
Nucleus	Y	Y	N	Y
Cell Wall	Y	N	Y	Depends
Endoplasmic Reticulum	Y	Y	N	Y
Plasma Membrane	Y	Y	Y	Y
Ribosomes	Y	Y	Y	Y
Golgi Apparatus	Y	Y	N	Y
Lysosome	N	Y	N	Depends
Mitochondrion	Y	Y	N	Y
Cytoskeleton	Y	Y	N	Y
Chloroplasts	Y	N	N	Depends
Vacuole	Y	N	N	Depends

Nucleus: specialised structure that is separated from the rest of the cell by the nuclear membrane. Contains chromosomes (DNA). It is the site of transcription (DNA to RNA).

Cell Wall: outer layer that maintains the cells shape and protects the cell from mechanical damage.

Endoplasmic Reticulum: network of membranous sacs and tubes; active in membrane synthesis and other synthetic and metabolic processes; Rough ER (ribosome-studded) and Smooth ER.

Plasma Membrane: membrane enclosing the cell.

Ribosomes: complexes that make proteins; free in cytosol or bound to rough ER or nuclear envelope.

Golgi Apparatus: organelle active in synthesis, modification, sorting, and secretion of cell products.

Lysosome: digestive organelle where macromolecules are hydrolysed.

Mitochondrion: organelle where cellular respiration occurs and most adenine triphosphate (ATP) is generated. **Mitochondrial Membranes:** grow independently of other organelles. Double membrane, inner membrane folds (cristae). Circular DNA and bacterial ribosomes.

Cytoskeleton: reinforces the cells shape; functions in cell movement; components are made of protein. Includes: microfilaments, microtubules, intermediate filaments (animal only) and microvilli (animal only). Protein fibres and filaments which control cell shape, guide movement of structures within the cell.

Chloroplasts: photosynthetic organelle; converts energy of sunlight to chemical energy stored in sugar molecules. **Chloroplast Membranes:** double outer membrane. Third membrane system (thylakoid) has folds arranged into stacks (grana). Usually larger than mitochondria.

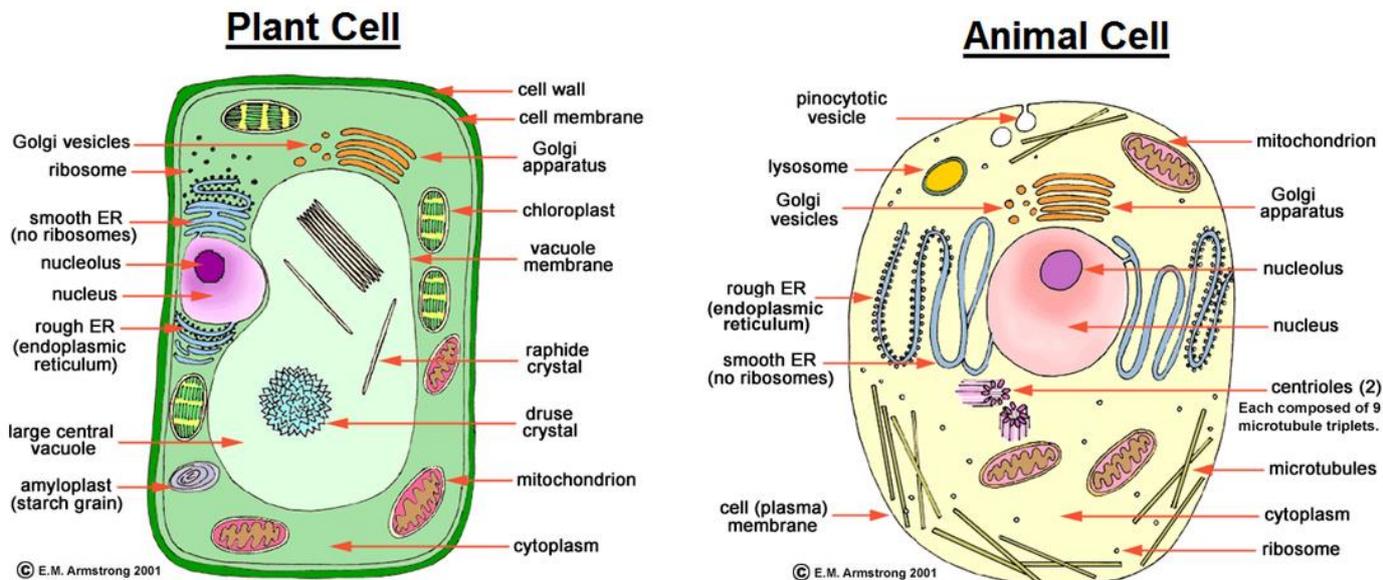
Vacuole: prominent organelle in older plant cells; functions include storage, breakdown of waste products, and hydrolysis of macromolecules; enlargement of the vacuole is a major mechanism of plant growth.

Chromosomes: linear DNA molecules complexed with proteins, usually several to many in each cell.

Endomembrane System: consists of the nuclear envelope, endoplasmic reticulum, Golgi apparatus, lysosomes, vesicle and vacuoles, and plasma membrane.

Eukaryote Cells

- Definition: a hybrid of at least two different organisms. A type of cell with a membrane-enclosed nucleus and membrane-enclosed organelles.
- Eukaryotes include protists, plants, fungi and animals.
- Cell Division: mitosis and meiosis.



Protists

- Definition: eukaryotes that are not multicellular plants, animals or fungi. They are mostly unicellular. Such as, algae, amoebae, ciliates and slime moulds. Has nucleus and usually flagella, chloroplasts and potentially cell wall or internal support.
- Mostly live in aquatic environments, or in soils, or as parasites in other organisms.
- They move using flagella or cilia. Amoebas and slime moulds have pseudopodia (false feet).
- Reproduction can be asexual, sexual or both. The cells may be diploid, haploid, dikaryotic (2 haploid nuclei per cell) or alternate between haploid and diploid generations.
- Autotrophic plant-like (algae). Heterotrophic animal-like (protozoa). Oomycetes fungus-like-absorptive (water moulds).
- Parasites: malaria (*plasmodium sp.*) have complex life-cycle, reproduce sexually in mosquito digestive tract and asexual reproduction in the human liver and blood cells.
Giardia and *Cryptosporidium* are resistant cysts in water supplies, active stages in human and animal guts which are spread through faecal contamination.