

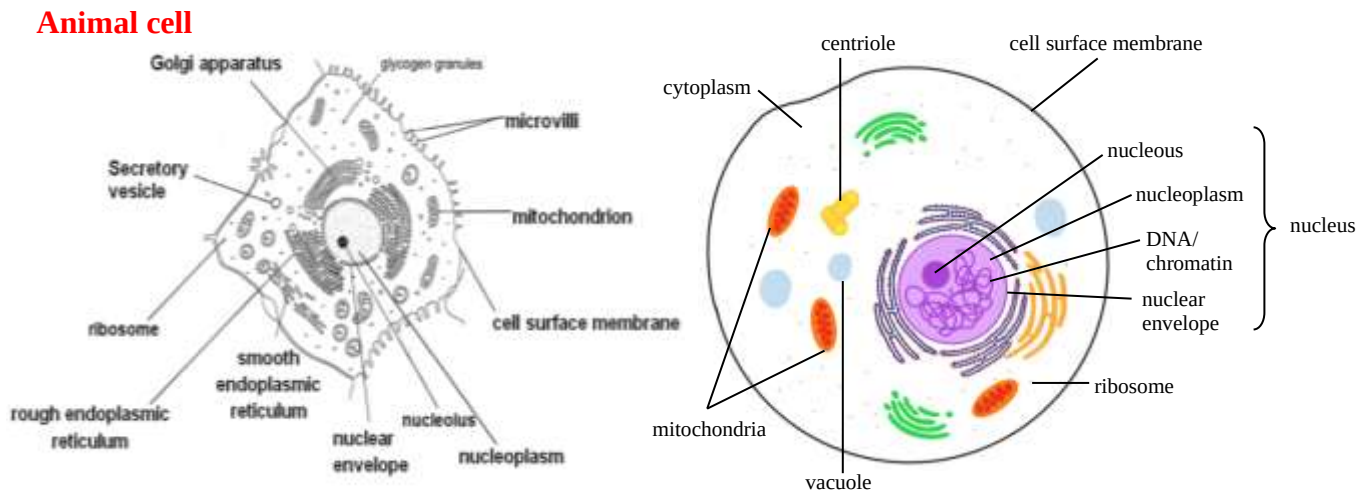
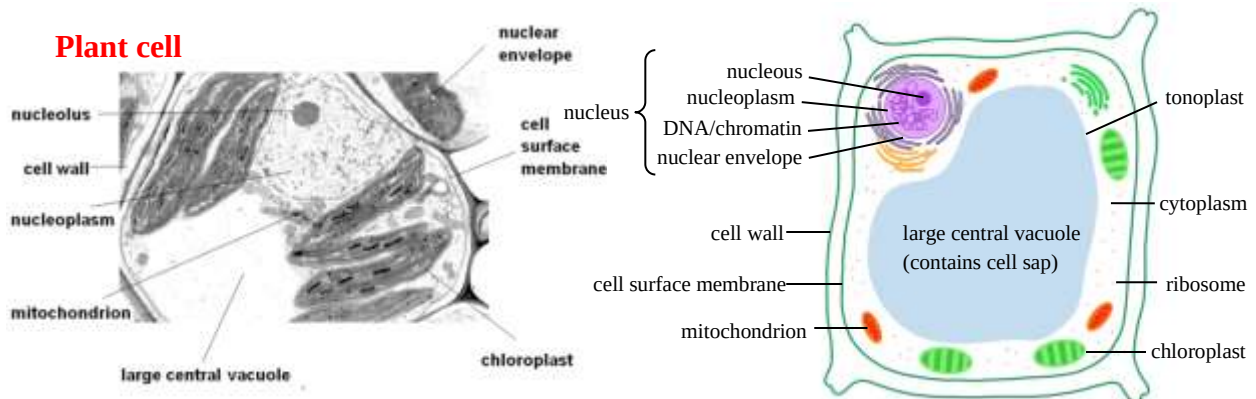
CELL STRUCTURE AND ORGANISATION

1. Organelle /Cell structure

Organelle	Structure	Function	Remarks
Visible under light microscope (1000x, view living specimens in natural colour) & electron microscope			
Chloroplast 	- Contains chlorophyll, starch grains, circular DNA and fluid. - Found in plant, oval shape	- Trap sunlight, convert light energy to chemical during photosynthesis	- Absent in root hair cell, xylem, upper and lower epidermis of leaf
Cell surface membrane 	- Partially permeable - Contain protein & fat - Can be destroyed by heat/pH → become fully permeable	- Control substances entering and leaving the cell	- No osmosis or active transport if it is destroyed
Cell wall	- Full permeable (linked to osmosis qn) - Made of cellulose to provide structural support.	- Provide turgor pressure when placed in high water potential - Maintain shape of cell	- Cellulose helps to prevent constipation
Cytoplasm	- Jelly-like substance	- A site for chemical reactions	- Xylem has no protoplasm
Vacuole 	- Plant: Large central vacuole - Animal: Many, small, temporary vacuoles	- Plant: contains cell sap enclosed by tonoplast - Animal: Store water and food substance	- cell sap = water + sugar, mineral salts, amino acids metabolic waste.
Nucleus (singular) Nucleoli (plural) 	- Consists of nucleous, nucleoplasm, nuclear envelope, nuclear pore, DNA/chromatin + RNA - Largest organelle	- Contains genetic information, involves cell division and protein synthesis, control cell activities.	- Red blood cells do not have nucleus → short life span, cannot reproduce.
Visible under electron microscope only. (200 000x, view dead specimen in black & white colour).			
Mitochondrion (singular) Mitochondria (plural) 	- Has ribosomes, fluid, circular DNA & RNA - Highly folded inner membrane to ↑SA: VR	- Contains enzyme that release energy through aerobic respiration using oxygen and glucose	- Active transport - Found in muscle/liver
Ribosome 	- Attached to rough endoplasmic reticulum or lies freely in cytoplasm	- Protein synthesis	- Active protein synthesis

Chloroplast (Chloroplasts)	Mitochondrion (Mitochondria)
Converts light energy into chemical energy (glucose)	Converts chemical energy (glucose) into another form of energy (ATP)
Uses carbon dioxide	Uses oxygen and glucose
Produce glucose	Produces carbon dioxide
Both carry out biochemical reactions and contains DNA	

2. Plant cell VS animal cell

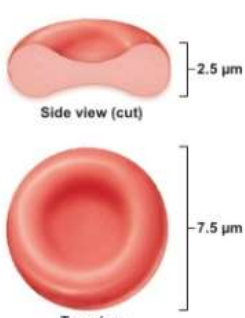
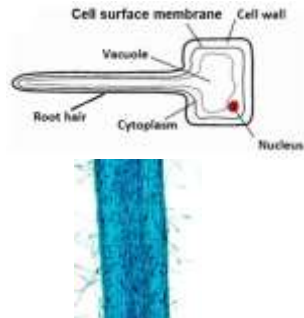
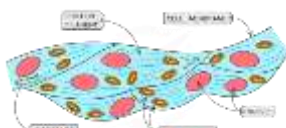


Plant cell	Animal cell
Presence of cell wall and centriole	Absent of cell wall and centriole
Presence of chloroplast (for most plant cells)	Absence of chloroplast
Presence of (usually one) large central vacuole, Lesser cytoplasm	Presence of many, temporarily tiny vacuoles. More cytoplasm

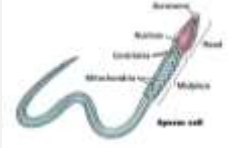
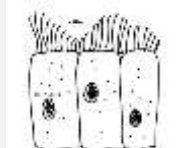
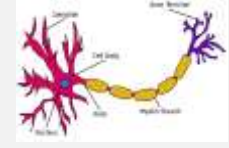
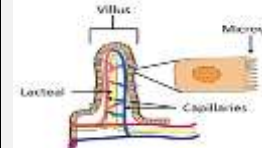
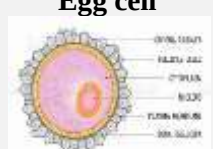
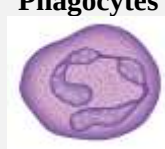
Note: - **Protoplasm** = living component of the cell, consists of cytoplasm, nucleus, cell surface membrane and nutrients.
 - Centriole: for cell division

3. Specialised cell

Differentiation is a process where cells change in shape and form and are adapted to acquire special features to perform its specific function.

Cell	Adaptation to function
 Side view (cut) 2.5 µm Top view 7.5 µm	<u>Function:</u> - To transport oxygen around body by allowing oxygen bind reversibly with haemoglobin. <u>Structure for adaptation:</u> - Contains haemoglobin which bind reversibly to oxygen to form oxyhaemoglobin (bright red colour) - Circular, biconcave disc shape to ↑SA: VR for diffusion - No nucleus to pack in more haemoglobin - Elastic to form bell-shaped to squeeze through tiny blood capillaries.
	<u>Function:</u> - Absorb water and mineral salts into the roots, anchor plant to soil <u>Structure for adaptation:</u> - Long and narrow cellular extension / long and narrow protruded root hair to ↑SA: VR for diffusion and osmosis. - No chloroplast present as it is underground and does not receive sunlight. * Tonoplast prevents leakage of cell sap → low water potential in root hair cell. little water
	<u>Function:</u> - To contact and relax to cause movement in the body. <u>Structure for adaption:</u> - Has many mitochondria to release energy for muscle contraction.

Common specialised cell and its (general) structure to function

Sperm cell  Mitochondria to release energy for flagellum to swim to the egg	Ciliated cell  Cilia to sweep dust and mucus away	Neurone/ nerve cell  Long axon to transmit information	Intestinal villus  Microvilli to ↑SA: VR for absorption of digested food.
Egg cell  Cytoplasm contains food reserve for zygote	Guard cell  Chloroplast for photosynthesis	Phagocytes  Lobed nucleus for the cell to move through tiny gaps.	Liver cell  Has a lot ribosomes & mitochondria.