

O-Level Biology

Notes

Dr. Sadia Khalid

Visiting Teacher AT

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SPIRIT ACADEMY

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CELL STRUCTURE AND ORGANISATION

Content:

- Plant and Animal cell
- Specialized cells, tissues and organs

Learning outcomes:

Students should be able to:

- ❖ Identify plant and animal cell
- ❖ Compare visible differences between plant and animal cells.
- ❖ Identify following parts of a cell:
 - Cell wall
 - Cell membrane
 - Cytoplasm
 - Nucleus
 - Chloroplast
 - Sap vacuole
- ❖ State function of cell membrane in controlling movement of substances into and out of the cell.
- ❖ State in simple terms, relationship between structure and function of the following:
 - Red blood cells
 - Xylem vessels
 - Root hair cells
- ❖ Define cells, tissues, organs and organ system along with examples.

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Cell:

It is the basic unit of life i.e. the structural and functional unit of an organism.

Depending upon number of cells, organisms can be classified as:

(1) Unicellular Organisms (simplest organisms):

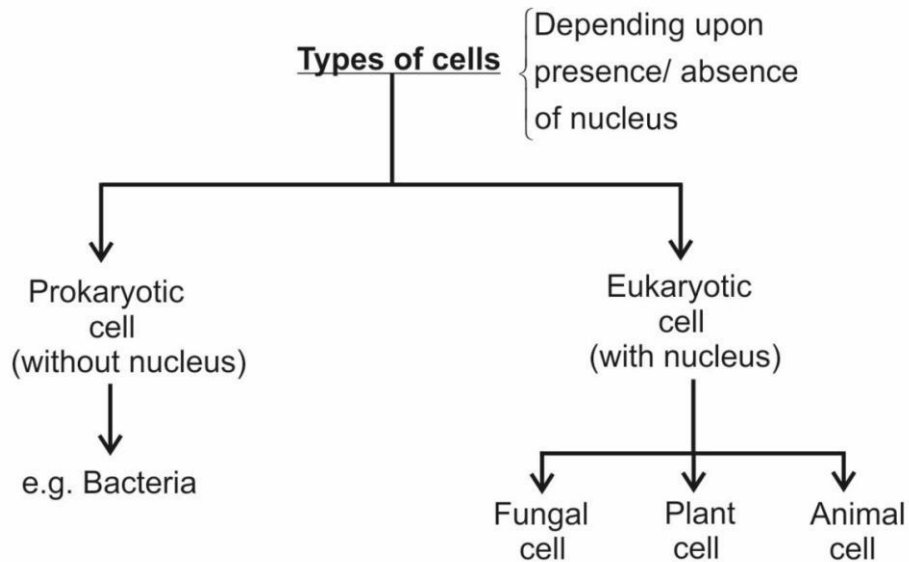
Made up of one cell e.g. Bacteria, Yeast (fungus) etc.

(2) Multicellular organisms:

Made up of more than two or many cells. Most of the organisms are multicellular e.g. Mushroom (fungus), Humans etc.

Cell Theory:

- ❖ All organisms are made up of cell.
- ❖ It is the basic unit of all organisms i.e. their smallest part which can live independently.
- ❖ New cells are formed from previously existing cells.



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Differences between prokaryotes and eukaryotes

	<u>Prokaryotes</u>	<u>Eukaryotes</u>
❖ <u>Size</u>	Smaller	Bigger
❖ <u>Cell wall</u>	Their cell wall is made up of Murein (a peptidoglycane),	Their cell wall is made up of chitin (in fungus) and cellulose(in plants)
❖ <u>Cytoplasm</u>	Contains very few organelles e.g. ribosomes.	Contains many organelles are found e.g. ribosomes, vacuole, mitochondria, chloroplast etc.
❖ <u>DNA</u>	<ul style="list-style-type: none"> • Their DNA is circular/ring shaped. • Suspended in the cytoplasm. • It is naked i.e. is not surrounded by membrane/nuclear envelop. e.g. Bacteria	<ul style="list-style-type: none"> • Their DNA is not circular • Found in the nucleus. • It is separated from cytoplasm by nuclear membrane/ nuclear envelop e.g. Fungi, Plant cell, Animal cell

Note:

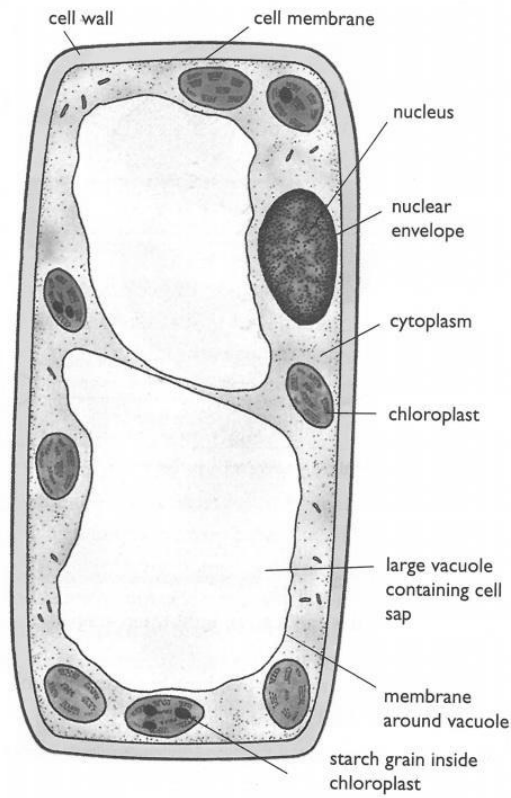
Ribosome of prokaryotes is smaller than eukaryotes.

Peptidoglycane (a polysaccharide with amino acid)

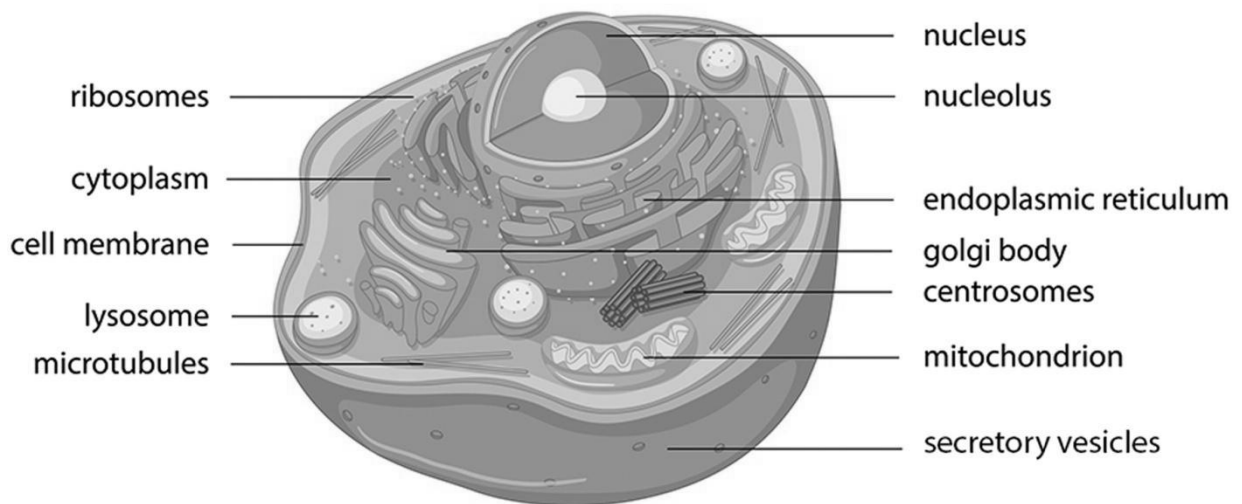
Chitin (a nitrogen containing polysaccharide)

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Diagram of eukaryotic cell



Plant cell



Animal cell

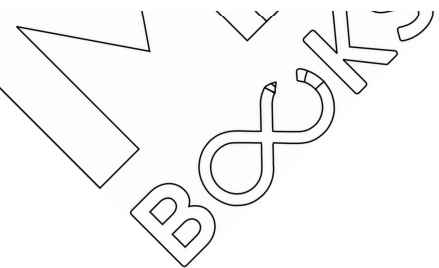
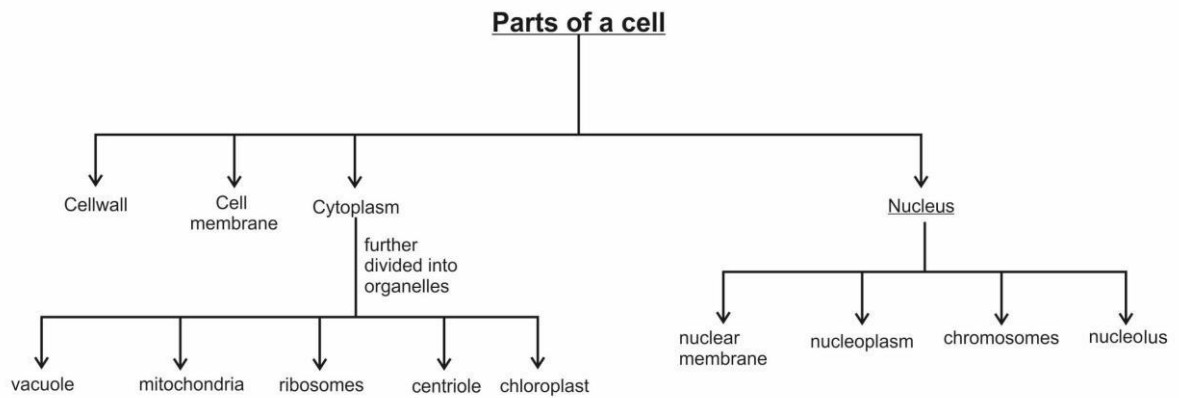
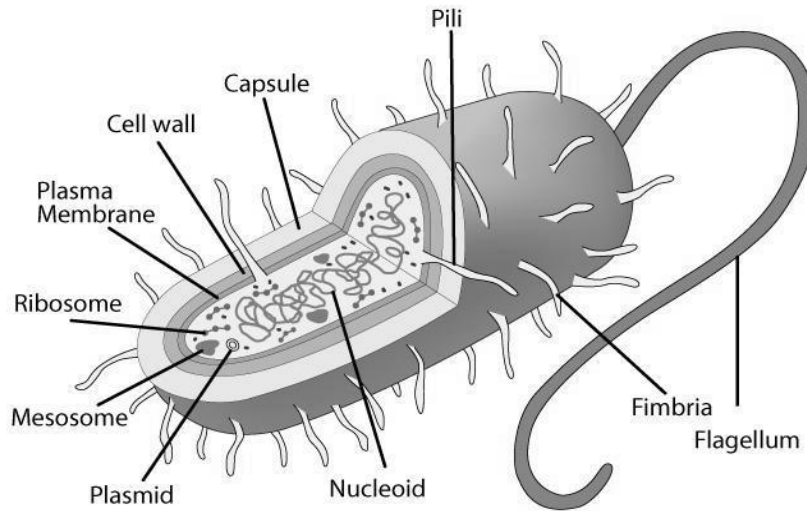


Diagram of prokaryotic cell



Protoplasm

All the cell parts excluding cell wall are protoplasm .This is also called living parts of a cell.

Protoplasm

Cell membrane + cytoplasm with organelles + nucleus

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Parts of a cell**Table**

	Parts	Description	Where found	Functions
Animal and plant cells	Cell membrane	<ul style="list-style-type: none"> Partially permeable membrane which form boundary around cytoplasm Made up of protein and lipid. It is flexible and living part 	Around the cytoplasm. Outermost boundary of animal cell and inner to cell wall in plants	<ul style="list-style-type: none"> It is partially permeable membrane. It controls movement of substances into or out of the cells Prevents cell contents from escaping
	Cytoplasm	Jelly like substance present between cell membrane and nuclear membrane it contains particles and organelles. Each organelle is bounded by a partially permeable membrane and thus separated from each other (known as compartmentalisation.)	Between cell membrane and nuclear membrane.	<ul style="list-style-type: none"> All cellular chemical reactions take place here contain cell organelles e.g. sap vacuole, ribosome, chloroplast, centriole etc.
	Ribosomes	Bounded by partially permeable membrane	Cytoplasm	Protein synthesis
	Mitochondria	Bounded by partially permeable membrane	Cytoplasm	Formation of energy in form of ATP as a result of cellular respiration
	Parts	Description	Where found	Functions
Plant cells only.	Cell wall	Tough, dead layer made up of cellulose. It surrounds cell membrane in plant cells.	Outermost boundary of plant cell.	<ul style="list-style-type: none"> Maintains shape of plant cell. Maintains turgidity by preventing it from bursting. Freely permeable (allows H₂O (water) & salts to pass through)
	Sap vacuole	Fluid filled space surrounded by a membrane called tonoplast (partially permeable)	In plant cells only there is one, large and central sap vacuole.	It contains salts and sugars which help keep plant cells firm.
	Chloroplast	It contains a green pigment	In the	It traps sunlight

		(chlorophyll). For chlorophyll formation magnesium ions and nitrate ions are required.	cytoplasm of some plant cells e.g. palisade & spongy mesophyll cells and guard cells.	and converts it into chemical energy to make glucose in photosynthesis.
Animal cell only	Centriole	Found in pairs	In cytoplasm just above nucleus.	Have role in cell division.

Similarities and difference between plant and animal cells

	<u>Animal cell</u>	<u>Plant cell</u>
<u>Similarities</u>	<ul style="list-style-type: none"> • Cell membrane is found in both. • Cytoplasm is found in both. • Nucleus is found in both. • Mitochondria are found in both. • Ribosomes are found in both. 	
<u>Differences</u>	<ul style="list-style-type: none"> • No sap vacuole. • No cell wall. • No chloroplast. • No starch granules. • Smaller in size. • Centrioles present 	<ul style="list-style-type: none"> • Contain sap vacuole. • Bounded by cell wall. • Contain chloroplast • May store starch granules. • Bigger in size. • No centriole.

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