

Organisation and Maintenance of the Organism

Eukaryotic cells→ Have a nucleus and membrane enclosed organelles

Prokaryotic cells→ Unicellular; no nucleus or membrane enclosed organelles

- All cells have cell membrane, cytoplasm, genetic material.
- Most cells have nucleus, mitochondria
- Only plant cells have cell walls, plastids (chloroplast) and large vacuoles.

Cytoplasm

- Semisolid matrix in which organelles are suspended
- Liquid part is 90% water with dissolved salts and sugars
- Suspended in the cytoplasm are lipids and proteins
- Proteins are used for building up cell structures; some are enzymes.

Cell membrane

- Also known as plasma membrane
- It contains (surrounds) the cytoplasm and maintains the structure of the cell
- It is *semipermeable*- allows water, food and oxygen to enter and waste products to leave
- Semipermeability implies that the cytoplasm maintains the chemical reactions of the cell.

Nucleus

- Rounded structure enclosed in a double membrane
- Regulatory centre- It controls the type and quantity of enzymes produced, regulates chemical reactions, thus determining the function of the cell.
- Contains genetic material, ie. DNA and chromosomes
- It is responsible for cell division

Mitochondria

- Rod shaped, elongated with double membrane
- Inner membrane has several folds
- Function: cellular respiration
- Aerobic respiration produces energy (ATP) from food substances (powerhouse of the cell)
- Most numerous in regions of rapid chemical activity, eg: muscles.

Endoplasmic reticulum

- Network of flattened cavities surrounded by a membrane.
- Stretches from nuclear membrane to cell membrane
- Rough endoplasmic reticulum has ribosomes which are the site of protein synthesis
- Function of RER- producing, storing, and transporting proteins
- ER also gives shape to the cell and is required for transport.

PLANT CELLS:

Cell wall

- Made of cellulose and other compounds
- It is completely permeable
- It is a protective layer that gives shape and rigidity to the cell, preventing it from bursting

Vacuole

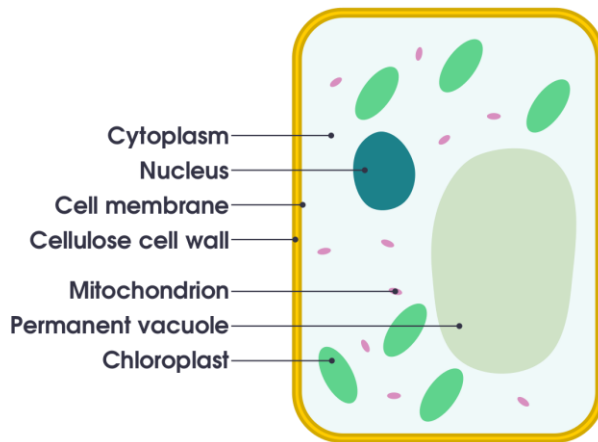
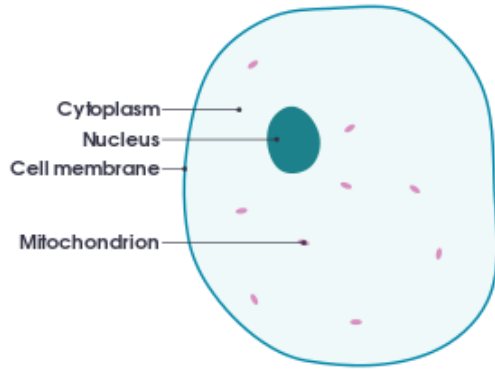
- Large fluid filled space.
- Contains cell sap- watery solution of sugars, salts, and sometimes pigments.
- Takes up most of the space in the cell, pushing the cytoplasm and organelles to the cell wall.
- Turgor pressure- outward pressure exerted by the vacuole on the cell membrane and cell wall that makes the cell firm.

Organisation and Maintenance of the Organism

Plastids

- Storage of pigments or starch
- Chloroplast- stores green pigment chlorophyll which traps sunlight for photosynthesis

Cell diagrams: note- don't shade diagrams



Specialised cells:

- Do one particular job
- Develop a distinct shape and specific chemical reactions are carried out
- Specialisation of cells to carry out specific functions (division of labour)

Ciliated cells

- Lining of nose and trachea
- Have tiny cytoplasmic hair-like structures (cilia)
- Creates a stream of mucus to carry foreign particles away from the lungs

Root hair cells

- Has thin and long hair-like projection
- Larger surface area for absorption of water and minerals

Xylem vessels

- Lignin is deposited on cell wall for strength
- End walls, cytoplasm, and organelles are degenerated once the cell matures
- Forms a long, continuous, hollow tube for unidirectional transport of water and minerals

Palisade mesophyll

- Found underneath the upper epidermis
- Contains several chloroplasts for photosynthesis

Nerve cells/ Neurons

- Function: conducting electrical impulses
- Very long to connect distant parts of the body to the central nervous system

Red blood cell

- Disc shaped/ biconcave
- No nucleus
- Contains haemoglobin

Sperm cell

- Male sex cell
- Oval shaped front containing nucleus
- Tip (acrosome) contains enzymes to degenerate egg membrane
- Mid-piece has mitochondria to provide energy for movement
- Has a tail (flagella) for movement

Egg cell/ Ovum

- Female sex cell
- Larger than sperm cell
- Spherical shape
- Cytoplasm containing yolk droplets with proteins and fat

Organisation and Maintenance of the Organism

Levels of organisation:

Organelles- intracellular structures that carry out specific functions in the cell



Cell- basic structural and functional unit of life



Tissues- group of cells with similar structures, working together to perform a shared function



Organs- structure made up of a group of tissues which carries out a specific function



Organ system- A group of organs with related functions, working together to perform a body function.

Image source:

- https://upload.wikimedia.org/wikipedia/commons/thumb/4/40/Simple_diagram_of_animal_cell_%28en%29.svg/300px-Simple_diagram_of_animal_cell_%28en%29.svg.png
 - https://upload.wikimedia.org/wikipedia/commons/thumb/5/5b/Simple_diagram_of_plant_cell_%28en%29.svg/300px-Simple_diagram_of_plant_cell_%28en%29.svg.png
-