

THE STRUCTURES OF

THE CELL

BY: KAYLEE CRAWFORD, BAILEY WALKER AND PAUL VOLLAND



THE NUCLEUS

- The largest cell organelle, 10-20 μm
- Contains DNA and regulates cell activities, produces mRNA and tRNA
- Parts:
- Nuclear Envelope: Double membrane that surrounds nucleus, outer membrane controls entry, exit, and rxns in cell
- Nuclear Pores: Around 3000 40-100 nm in diameter, regulate passage into nucleus
- Chromatin: Composed of DNA, when cell divides it becomes chromosomes
- Nucleolus: Manufactures and assembles ribosomal RNA

MITOCHONDRIA

- 1-7 μm in length, often sausage shaped
- Surrounded by 2 membranes - inner - form cristae that contain enzymes involved in aerobic respiration, and project into the interior solution called the matrix -outer-contains a transport protein called porin and allows easy access of small water soluble molecules
- Cristae have a large surface area for oxidative phosphorylation which results in synthesis of ATP
- The matrix contains protein, lipids, 70s ribosomes, and small pieces of DNA, involved in krebs cycle
- Intermembrane space - selective barrier
- Function: aerobic respiration (oxidative phosphorylation and krebs cycle) and synthesis of ATP molecules

GOLGI BODY

- Stack of membranes make up flattened sacs or cisternae
- Adds carbs to proteins to form glycoproteins
- Produces secretory enzymes
- Secretes carbohydrates
- Transports, modifies and stores lipids
- Forms primary lysosomes

CELL SURFACE MEMBRANE

- Controls movement of substances
- Partially permeable - some substances can only cross on one occasion
- Helps form cell tissues
- Boundary between the cell cytoplasm and the environment
- Pn plant and animal cells. In animal cells, membrane folds to form microvilli to provide larger surface for absorbing substances
- 7-10nm in diameter

LARGE PERMANENT VACUOLE

- Only in plant cells
- Surrounded by tonoplast which contains cell sap
- Stores water, ions, sugars, and pigments
- Pushes chloroplast to the edge of the cell and gives turgidity

CHLOROPLASTS

- Only in plant cells
- Flat discs, 3-10 μm in diameter, 1 μm thick
- Parts:
- Envelope: Double Membrane, entry and exit of substances
- Stroma: Gelatinous matrix, contains enzymes for photosynthesis, contains small piece of DNA, 70s ribosomes, and oil droplets
- Grana: Looks like stack of coins, 50/chloroplast, 100 stacked flattened sacks (thylakoids) each, attached to chlorophyll molecules, produce ATP

ENDOPLASMIC RETICULUM

- Smooth ER don't have ribosomes on surface and store/transport lipids and steroids such as cholesterol, typically more tubular
- Rough ER have ribosomes on their surface and synthesize proteins, are a pathway for transport of materials
- Pathway for transport (rough)
- Forms transport vesicles which are small membrane bound sacs for transportation

RIBOSOMES

- Spherical and found in cells
- 80s found in prokaryotic
- 70s found in prokaryotic and the mitochondria and chloroplasts of eukaryotic cells
- 1 small sub unit and 1 large which contain ribosomal DNA and protein
- make up 25% of the dry mass of a cell

LYSOSOMES

- Single membrane formed when vesicles are produced by the golgi body
- Destroy foreign material
- Digest worn out organelles
- Breaks down dead cells
- Some release hydrolytic enzymes

CELL WALL

- Provides mechanical strength, prevents cell from bursting
- Strength for whole plant
- Allows movement of water through plant
- Contain a number of polysaccharides such as cellulose hemicellulose and pectin

CENTRIOLES AND MICROTUBULES

- In animal cells, algae and fungi
- Cylinder, 0.5 μm in length, 0.2 μm in diameter
- Nine sets of three microtubules
- Microtubules form spindle fibres during nuclear division
- Convert to basal bodies, organize Microtubules to form cilia and flagella
- Responsible for the movement and positioning of organelles
- Involved in movement of cell