THE STRUCTURES OF THE CELL

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THE NUCLUS
- The largest cell organelle, 10-20 um
- Contains DNA and regulates cell activities, produces rRNA and tRNA
- Parts:
  - Nuclear Envelope: Double membrane that surrounds nucleus, outer membrane controls entry, exit, and ions in cell
  - Nuclear Pores: Around 5000-40,000 nm in diameter, regulate passage into nucleus
- Chromatin: Composed of DNA, when cell divides it becomes chromosomes
- Nucleolus: Manufactures and assembles ribosomal RNA

1-7um 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

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

CHLOROPLASTS
- Only in plant cells
- Flat discs, 3-10um in diameter, 1 um 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
- I small subunit and 1 large which contain ribosomal DNA and protein
- Make up 25% of the dry mass of a cell

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

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
- Pro plant and animal cells: In animal cells, membrane folds to form microvilli to provide larger surface for absorbing substances
- 7-10um in diameter

CENTRIOLES AND MICROBEBES
- In animal cells (sage and fungi
- Cylinder, 0.5 um in length, 0.2 um 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

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