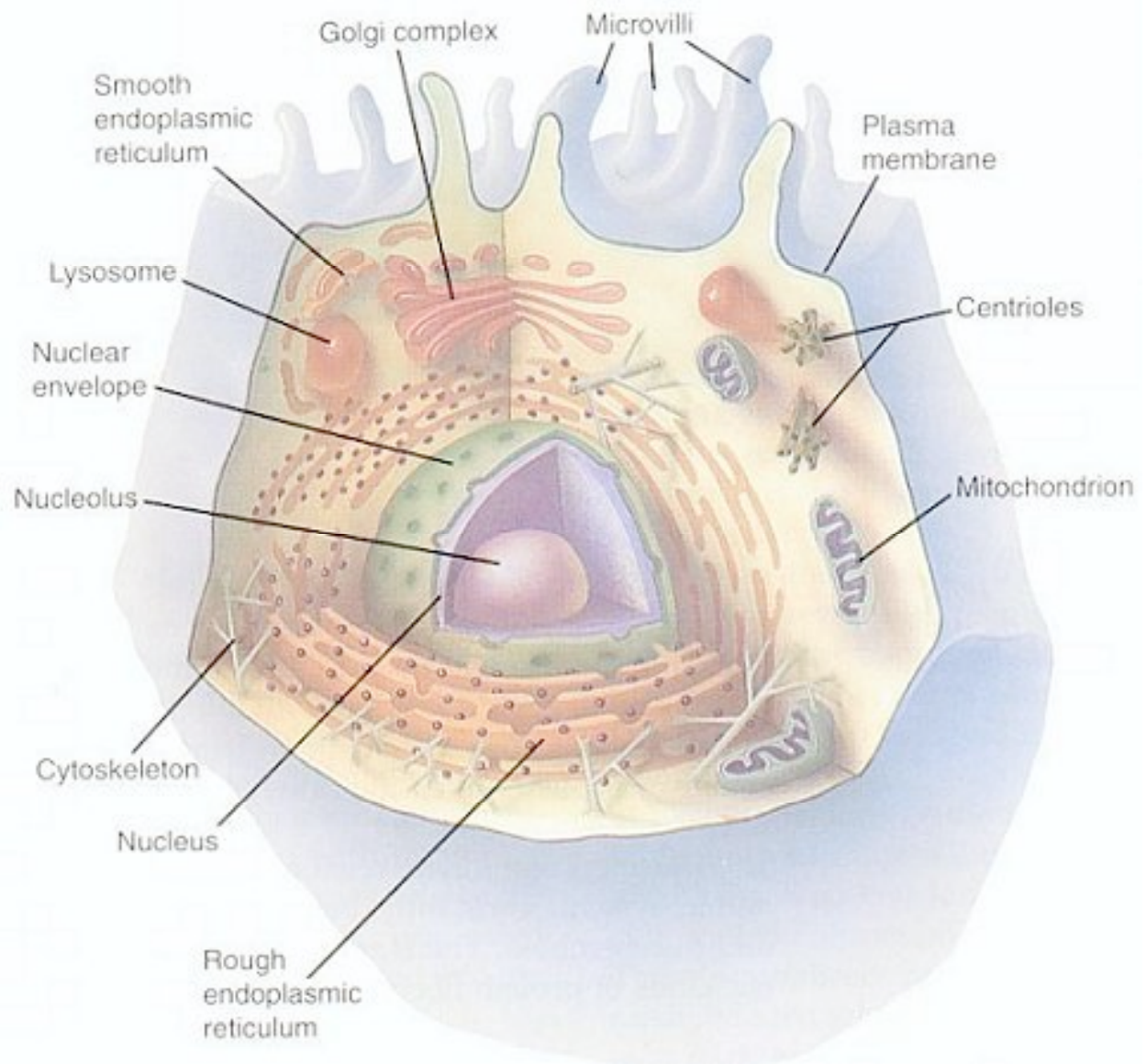


Chapter 4 – Organization of the Cell

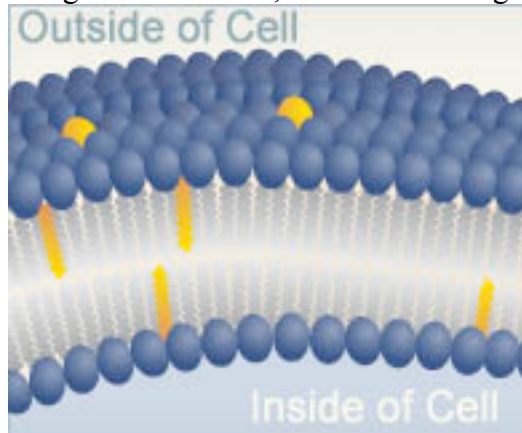
- Cell – basic unit of life
 - Small
 - Self-sufficient
 - Self-replicating
- Cell Theory – organisms are composed of cells and all cells come from the division of other cells
- Cells have:
 - Plasma membrane – Outer layer of cell
 - Selective barrier
 - DNA
 - Genetic information
 - Organelles
 - Specialized internal structures that carry out specific functions
- Prokaryotic cells
 - Bacteria, etc.
 - Plasma membrane
 - Little/no internal structure
 - Nuclear area (vs. nucleus)
 - Ribosomes
 - Cell wall
- Eukaryotic cells
 - Everything else
 - Nucleus
 - Cytoplasm (gooey cream filling)
 - Liquid component: cytosol
 - Plant cells
 - Have cell walls, plastids, and vacuoles
 - No centrioles
 - Nucleus (big blob in the middle)
 - Nuclear envelope – double membrane w/ nuclear pores
 - DNA + protein = chromatin
 - Condensed chromatin = chromosomes
 - Endoplasmic Reticulum (ER) (Squiggly foldy thing all over cell)
 - Folded internal membrane
 - Rough ER is ER + ribosomes, manufactures proteins
 - Smooth ER synthesizes lipids and detoxifying enzymes
 - Golgi complex (looks like ER, but with more closed loops)
 - Stacks of flattened sacs called cisternae
 - Processes, sorts, and modifies proteins made by the ER
 - Adds carbs and lipids to proteins, and ships them to the plasma membrane
 - Manufactures lysosomes
 - Lysosomes – sacs filled with enzymes that break down materials (cell itself, other cells, etc.)
 - Vacuoles – Plant only! Store water and/or food

- Mitochondria
 - Aerobic respiration
 - Double-membraned
 - Inner membrane is folded, forming cristae
 - Matrix – inside of cristae
 - Contain own DNA
 - Apoptosis (programmed cell death)
- Chloroplasts – Plant only!
 - Photosynthesis
 - Fluid space is the stroma
 - Grana – stacks of thylakoids
 - Chlorophyll – GREEN!
- Cytoskeleton – Internal framework. Provides support
 - Microtubules – hollow cylinders of tubulin
 - Cilia and flagella – $9 + 2$, used for movement (swimming) (Think sperm)
 - Microfilaments/Actin Filaments – Made of actin. Important for movement
 - Intermediate filaments – Strengthen the cytoskeleton and stabilize cell shape



Chapter 5 – Biological Membranes

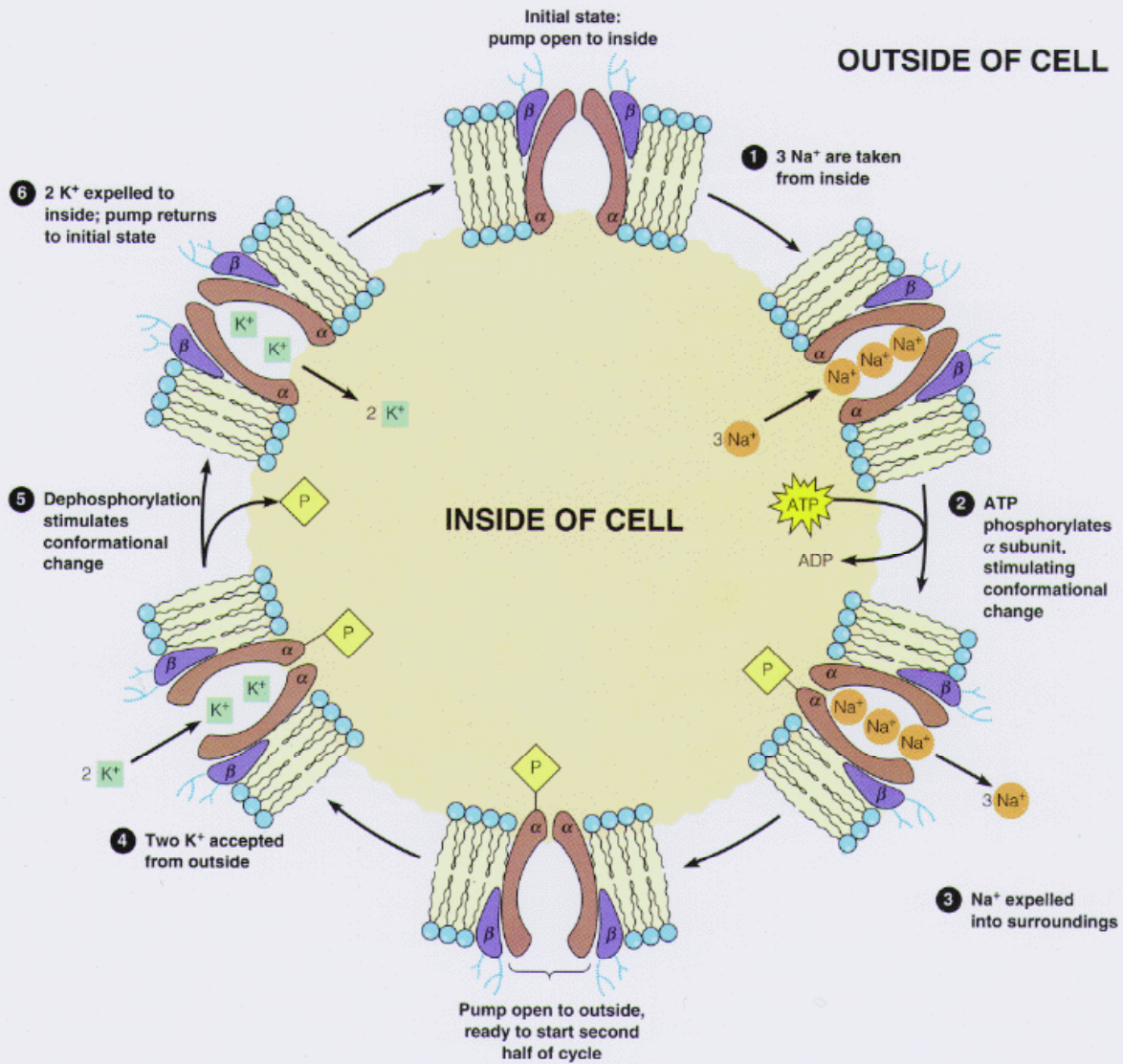
- Membranes
 - Regulate the passage of materials
 - Receive info that permits the cell to react to its environment
 - Allow specific communication with other cells
 - Participate in and serve as surfaces for biochemical reactions
- Fluid mosaic model – fluid phospholipids bilayer, with many imbedded proteins
 - Phospholipid molecules are amphipathic
 - Hydrophobic (hate water) on one side
 - Hydrophilic (like water) on the other
 - Molecules can move around the membrane
 - Integral membrane proteins – One side outside the membrane, one side in
 - Transmembrane proteins – Go all the way through (like a tunnel)
 - Peripheral membrane proteins – Only on the surface
 - Proteins, lipids, and carbs are asymmetric between the layers, so both sides are different
 - Membrane proteins can transport materials, act as enzymes or receptors, recognize other cells, and link cells together



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- Selective permeability
 - Diffusion – the net movement of a substance down it's concentration gradient (higher concentration to lower)
 - Dialysis – Diffusion of a solute across a selectively permeable membrane
 - Osmosis – Diffusion of water
 - Osmotic pressure – Determined by the concentration of solutes
 - Too high, and cells can burst
 - Isotonic solution – Has an equal solute concentration to another fluid
 - Hypertonic solution – Has a greater solute concentration than the cell, causing it to lose water
 - Causes plants to undergo plasmolysis, where the cell membrane separates from the cell wall
 - Hypotonic solution – Has a lower solute concentration than the cell, causing water to enter the cell and make it swell
 - Turgor pressure – Pressure of the water in vacuoles against the cell wall
 - Carrier-mediated transport

- Membrane proteins move ions across a membrane
- Facilitated diffusion – Uses the energy of the concentration gradient, and can't work against it
- Carrier-mediated active transport – Uses metabolic energy to move ions or molecules against a gradient
 - Sodium-potassium pump

Figure 10.25 Schematic model of the sodium-potassium pump in operation



- Cotransport – ATP-powered pump transports solute and indirectly allows other solutes to move due to change in concentration gradient
- Exocytosis – Cell ejects garbage by fusing a vesicle with the plasma membrane
- Endocytosis – Cell takes in food/etc. by engulfing it with the plasma membrane, enclosing it in a vesicle/vacuole, and then releasing it in the cell
 - Phagocytosis – Hot cell-on-cell action
 - Pinocytosis – Cell takes in fluid by forming vesicles around droplets using microvilli
 - Receptor-mediated endocytosis

