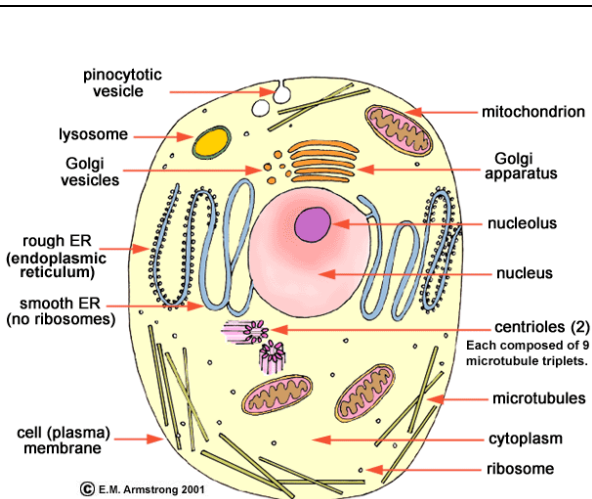
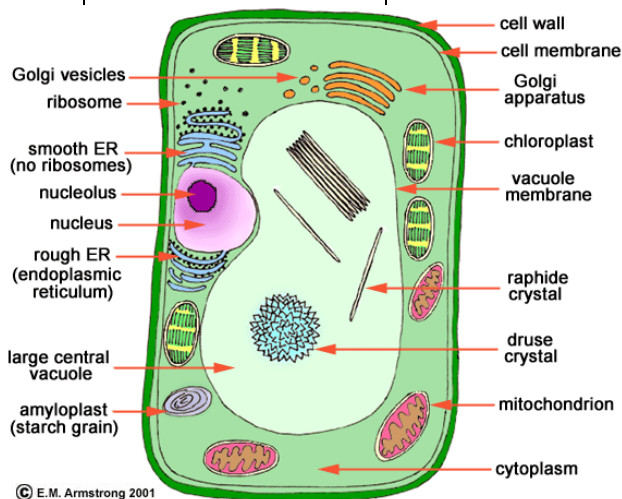


Objective 2 Cells

Investigate and identify cellular processes including homeostasis, permeability, energy production, transportation of molecules, disposal of wastes, function of cellular parts, and synthesis of new molecules

Cell Parts and Functions

Cell Structure	Structure's Function
Cell Membrane	Encloses cell and controls what enters and leaves the cell
Cytoplasm	Surrounds organelles; transports some materials
Endoplasmic reticulum	Transports, and stores some substances, throughout the cell
Ribosome	Builds proteins; (protein synthesis)
Lysosome	Breaks down nutrients and foreign substances
Nucleus	Control center; regulates metabolic activities, is surrounded by a double-layered membrane.
Chromosomes	Genetic material The DNA with proteins form chromosomes. Chromosomes are usually broken down into chromatin.
Nuclear Membrane	Encloses nucleus and controls what enters and leaves the nucleus
Nucleolus	Contains RNA; sends mRNA to ribosome with protein blueprints
Golgi apparatus	Secretes and stores secretions for transport out of the cell
Chloroplast	Manufactures food in green plants; photosynthesis
Cell wall	Protective out barrier of plant cells
Centrosomes	Aids in mitosis in animal cells
Vacuole	Stores food, water, wastes and building materials
Mitochondria	Powerhouse of cell; cellular respiration



Prokaryotic and Eukaryotic Cells:

Prokaryotic	Eukaryotic
1. No nuclear membrane (nucleoid region)	1. Definite membrane bound nucleus
2. No membrane bound organelles	2. Contains membrane bound organelles
3. Found only in the kingdoms Eubacteria and Archabacteria	3. Found in Kingdoms: Animal, Plant, Fungi, and Protista
4. Size 0.1 um - 10 um.	4. 10 um-100 um.

Cell Size: is governed by several factors:

DNA must be available to produce the enzymes and proteins needed for proper functioning. The second restriction is the surface area to volume ratio. As the cell increases in size the volume increased geometrically while the surface area increase arithmetically

4 Types of Cellular Transport:

Diffusion	Osmosis
Facilitated diffusion	Active transport

Transport is essential for life → Cells must import and export materials in order to maintain life-sustaining activities. Two types of transport move materials across the plasma membrane: passive transport and active transport. Examples of both types of transport will be discussed and then applied to the cell and its functions

PASSIVE TRANSPORT: DIFFUSION AND OSMOSIS

Passive transport does not require an expenditure of metabolic energy, and materials flow *down* the concentration gradient.

Examples of passive transport are diffusion, osmosis, and facilitated diffusion.

Diffusion is the movement of substances with the concentration gradient. Osmosis and facilitated diffusion are kinds of diffusion. When someone wears cologne or perfume, the aromatic molecules are initially concentrated on that person's skin. As the constant, random motion of the perfume molecules spreads them throughout the room, the aroma disperses. Even when the molecules reach equilibrium, spread evenly in the room, they will continue to move randomly.

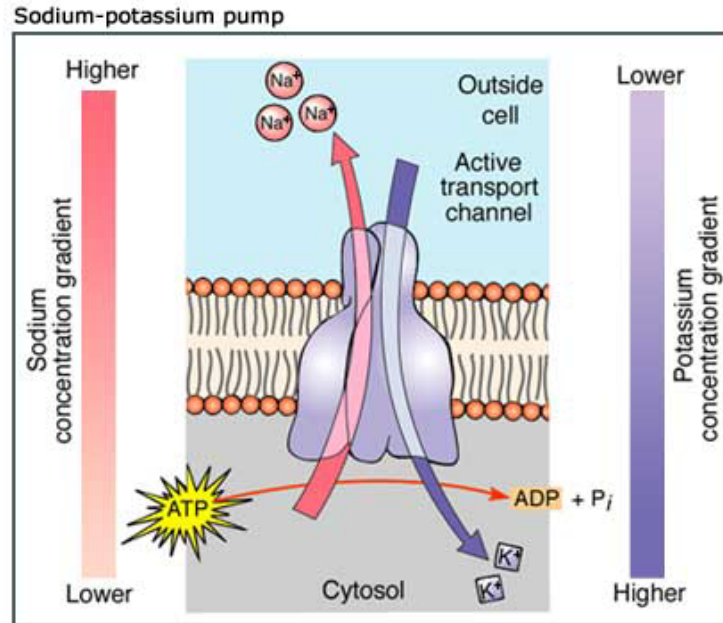
Osmosis is the movement of water through a semipermeable membrane. Water moves from an area of higher concentration to an area of lower concentration, that is, toward the area where there is more solute, and thus less water. The area of less solute is called the hypotonic solution, and the area of more solute is called the hypertonic solution. If a semipermeable membrane separates the hypotonic solution from the hypertonic solution, water will move across the membrane from the hypotonic to the hypertonic solution. No metabolic energy is involved.

Facilitated diffusion is the diffusion of a substance across a membrane. It is "facilitated" because a transport protein in the membrane enhances the transport of the substance across the membrane.

ACTIVE TRANSPORT

Active transport *uses energy* (in the form of ATP), and materials flow *against* the concentration gradient.

Carrier-mediated active transport systems use energy and membrane proteins to "pump" certain substances *against* a concentration gradient. This causes the substance to accumulate on one side of the plasma membrane. An example of this type of active transport is the sodium-potassium pump (Figure 5-15), which consists of a membrane protein that uses ATP to pump Na⁺ (sodium) out of the cell and K⁺ (potassium) into the cell. These unbalanced accumulations of Na⁺ and K⁺ are needed for proper nerve functioning.



SUMMARY

the two types of transport, active and passive, are distinguished by the use of metabolic energy and the direction of flow of materials. Passive transport does *not* expend metabolic energy, and the flow of materials is *down* the concentration gradient. With passive transport, materials move to reach equilibrium. Active transport uses metabolic energy, and material flow is *against* the concentration gradient. Materials accumulate on one side of a membrane with active transport.

Cellular Respiration

Energy Review:

- Cells require a constant source of energy to carry out their life functions.
- The main source of energy for most living systems is the sun.
- Photosynthetic organisms capture sunlight and transform it into a useable source of energy via the chemical bonds in the organic compounds it produces.
- Cells use some of this chemical bond energy to make **ATP**, the energy source for cellular work.
- Much of this energy is released as unusable heat.

Catabolism: Chemical pathways that break down materials and release energy.

- The catabolic process of respiration transfers the energy stored in food molecules to ATP.
- Organisms use ATP molecules to capture and release small amounts of energy to fuel various bodily functions.
- The molecule contains the nitrogenous base adenine connected to three molecules of phosphorous.
- When ATP releases the terminal (end) phosphate, energy is released while forming a new compound ADP. ADP can be refitted with another phosphate to form ATP again.
- In order for the most efficient production of ATP to occur the cell must transfer this energy from the chemical bonds of the organic compounds to the ATP molecule with minimal loss.

THE CELL CYCLE

