

The Cell

Learning Outcome B1

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- Analyze the functional inter-relationship of cell structures

Student Achievement Indicators

- Describe the following cell structures and their functions:
 - ✓ Cell membrane
 - ✓ Cell wall
 - ✓ Chloroplast
 - ✓ Cytoskeleton
 - ✓ Cytoplasm
 - ✓ Golgi bodies
 - ✓ Lysosomes
 - ✓ Mitochondria – including cristae and matrix
 - ✓ Nucleus – including nuclear pore, nucleolus, chromatin, nuclear envelope and chromosomes
 - ✓ Smooth and rough endoplasmic reticulum
 - ✓ Ribosomes
 - ✓ Vacuoles
 - ✓ Vesicles

Student Achievement Indicators

- State a balanced chemical equation for cellular respiration
- Describe how the following organelles function to compartmentalize the cell and move material through it:
 - ✓ Rough and smooth endoplasmic reticulum
 - ✓ Vesicles
 - ✓ Golgi bodies
 - ✓ Cell membrane
- Identify cell structures depicted in diagrams and electron micrographs

How do we define “Living”?

- The following characteristics are used to define living things:

1. Living things are organized

- Specialized for specific functions
- Have various levels → organs/tissues/cells
- Cells are the smallest structural unit of life
- Cells are made up of molecules such as proteins, carbohydrates and fats

How do we define “Living”?

2. Living things need food or energy from the environment

- Animals obtain materials and energy when they eat food
- Plants use CO_2 , water and solar energy to make their food, through the process of photosynthesis
- Nutrient molecules can be broken down into parts and products through a series of chemical reactions. Some of these molecules will be broken down completely to provide energy for these chemical reactions.
- Metabolism* – is all the chemical reactions that happen within cells

How do we define "Living"?

3. Living things keep a steady internal environment despite changes in the external environment.

- *Example* – blood pressure, body temperature
- *Homeostasis* – helps maintain a constant internal environment despite changes in the external environment

How do we define "Living"?

4. Living things respond to stimuli, both internal and external.

- An organism's behavior may be dictated by how it responds to its external environment
- *Example* – movement towards light

How do we define "Living"?

5. Living things reproduce offspring, and offspring generally resemble parents.

- *Asexual* – organisms divides, so offspring have the same genes as parents (identical)
- *Sexual* – each parent contributes half of the genes (variation)

How do we define "Living"?

6. Living things grow and develop

- Changes occur during the lifecycle
- Different stages from fertilization to death
- *Growth* – increase in size and number of cells
- *Development* – stages that occur between fertilization and death.

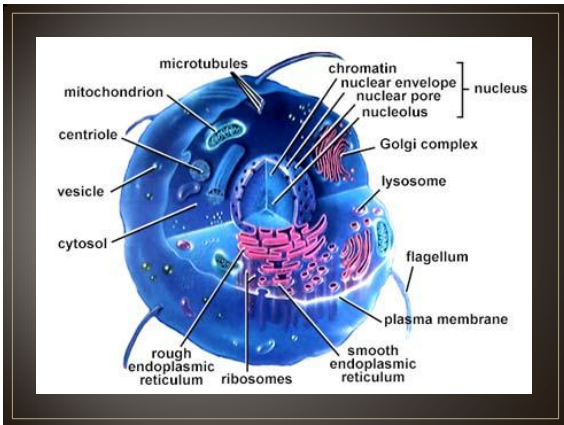
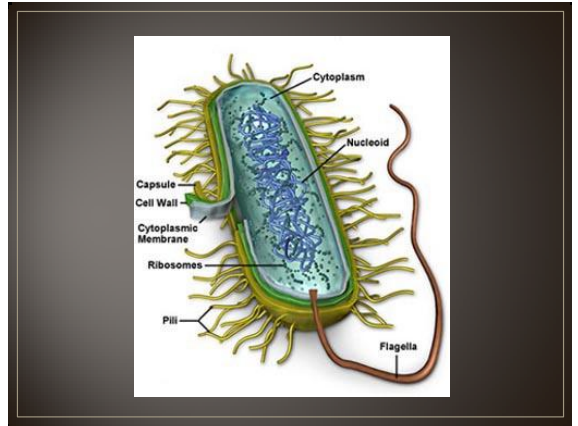
How do we define "Living"?

7. Living things adapt to different environments and conditions.

- May adapt to become suited to a particular way of life

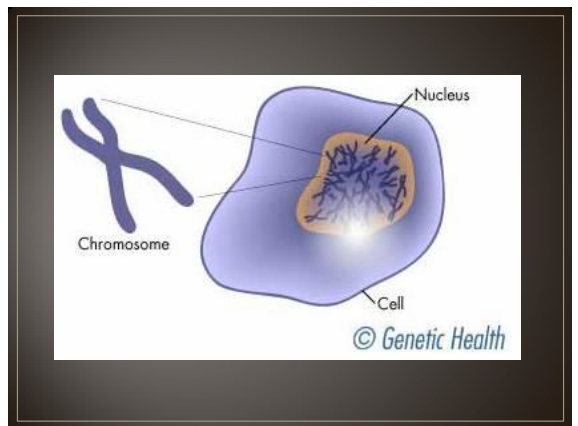
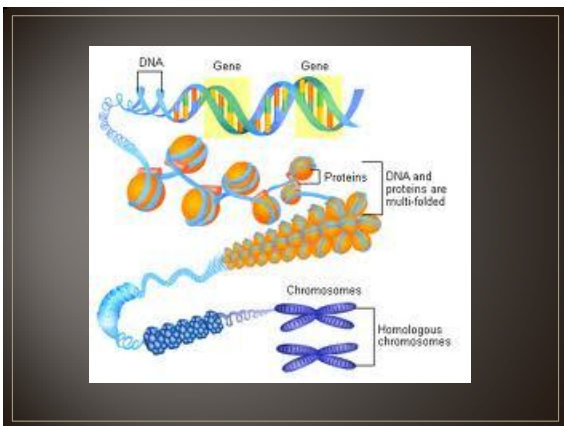
The Cell

- There are two types of cells:
 1. Prokaryotic – no nucleus or membrane-bound organelles
 - *Example* – bacteria
 2. Eukaryotic – has a nucleus and membrane-bound organelles
 - *Example* – mammals



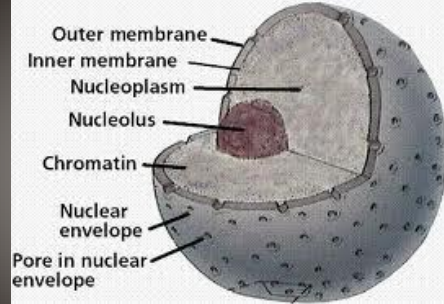
Chromosomes

- Location in Cell
 - Nucleus
- Function
 - Contains genetic information that regulates cell function
 - Contains DNA and protein



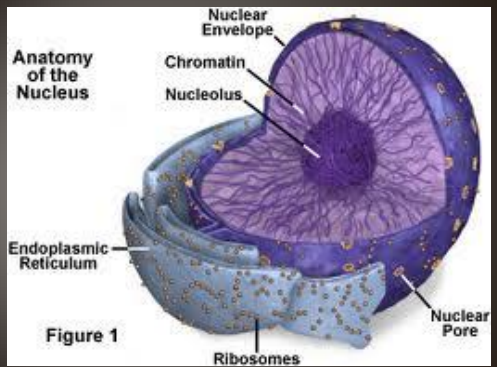
Nucleolus

- Location in Cell
 - Nucleus
- Function
 - Makes a chemical messenger, called mRNA.
 - Carries the genetic information from the nucleus to ribosomes



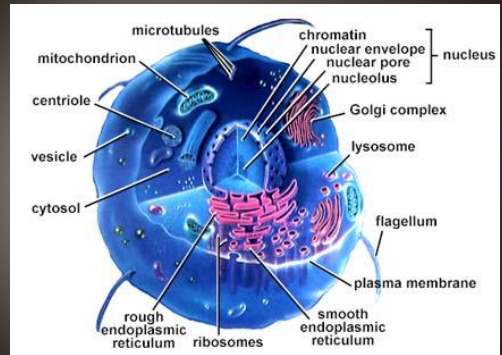
Nuclear Membrane (Envelope)

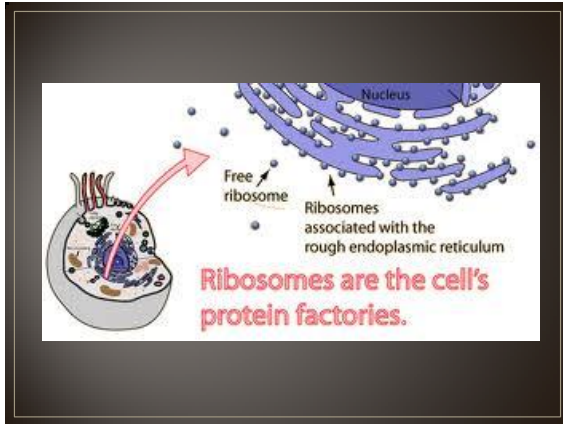
- Location in Cell
 - Nucleus
- Function
 - Separates the genetic information from the cytoplasm.
 - Functions as a barrier



Ribosomes

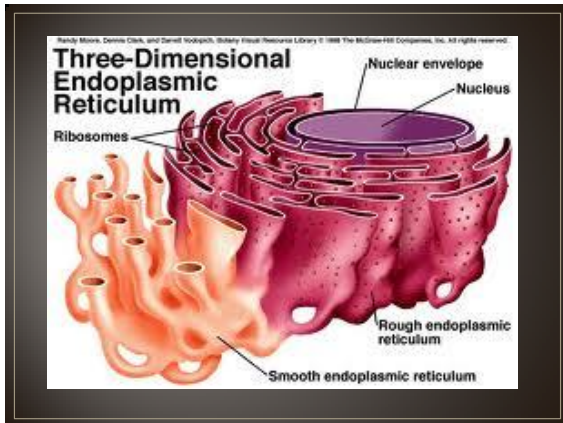
- Location in Cell
 - Cytoplasm
- Function
 - Site of protein synthesis
 - Receives information from the nucleus to order the joining of amino acids into proteins.





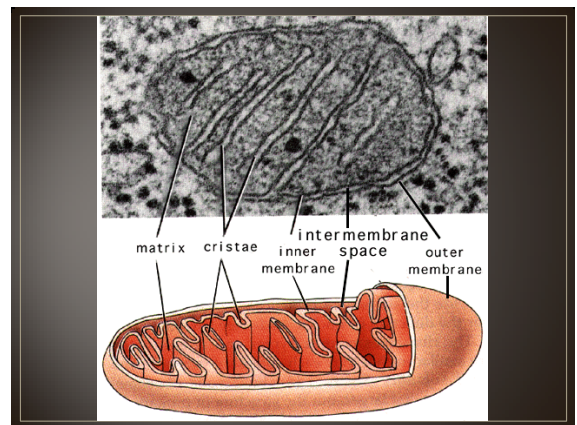
Endoplasmic Reticulum

- Location in Cell
 - Cytoplasm
- Function
 - Transports various large molecules that are synthesized within the cytoplasm
 - Rough endoplasmic reticulum contains ribosomes that synthesize proteins.
 - While the smooth endoplasmic reticulum does not contain ribosomes.

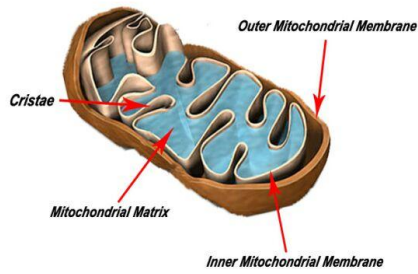


Mitochondria

- Location in Cell
 - Cytoplasm
- Function
 - Converts energy
 - Is involved in aerobic cellular respiration
 - Formula for cellular respiration



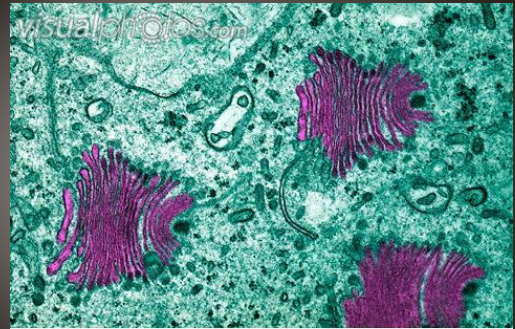
The Mitochondrion



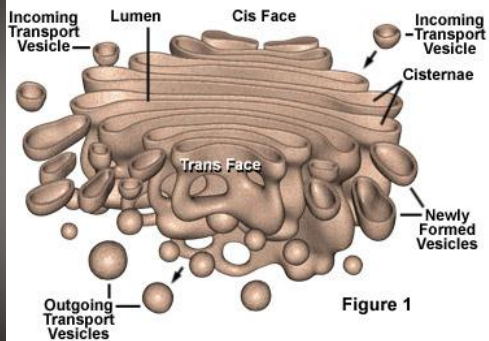
Golgi Body (Apparatus)

- Location in Cell
 - Cytoplasm
- Function
 - Processes, packages and secretes various proteins.
 - Releases fluids through cell membrane by exocytosis.

Golgi Body

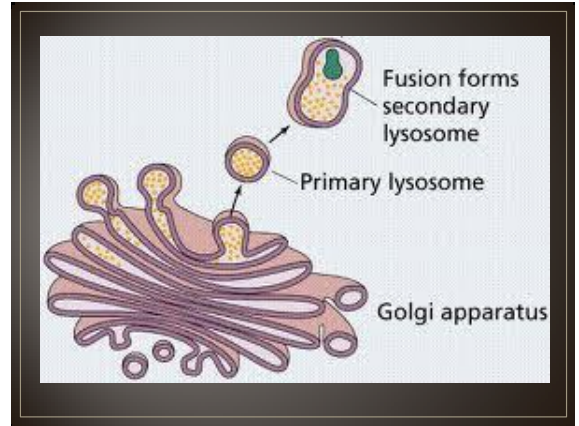
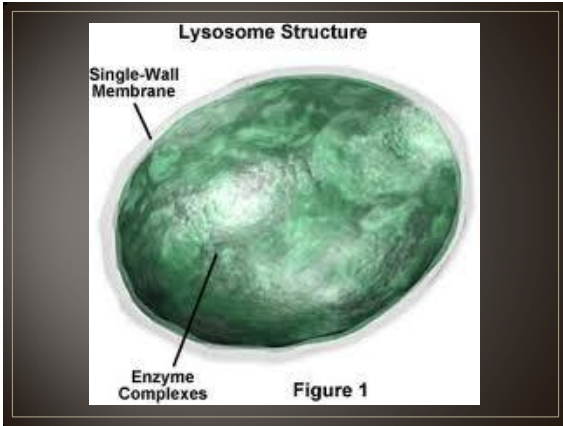


The Golgi Apparatus



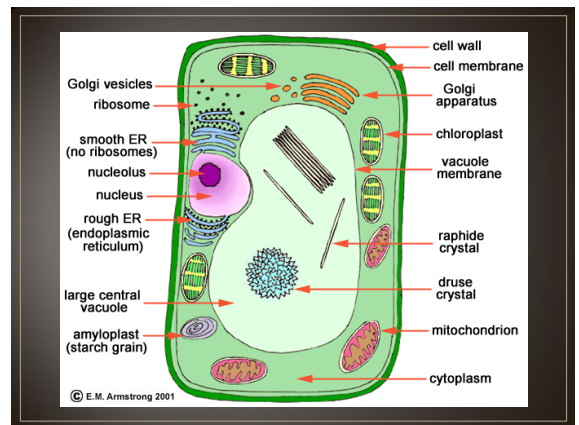
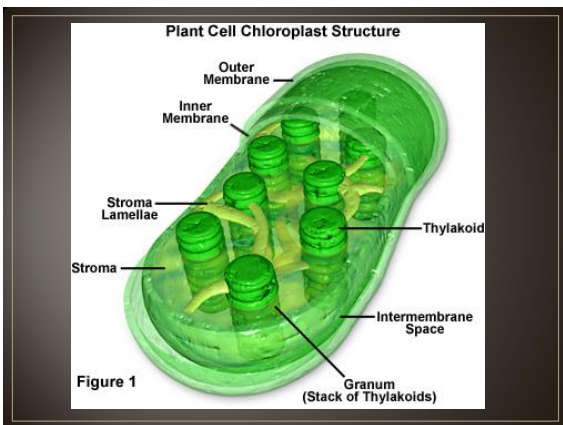
Lysosome

- Location in Cell
 - Cytoplasm
- Function
 - Contains enzymes that digest things taken into the cell.
 - Is capable of destroying the cell



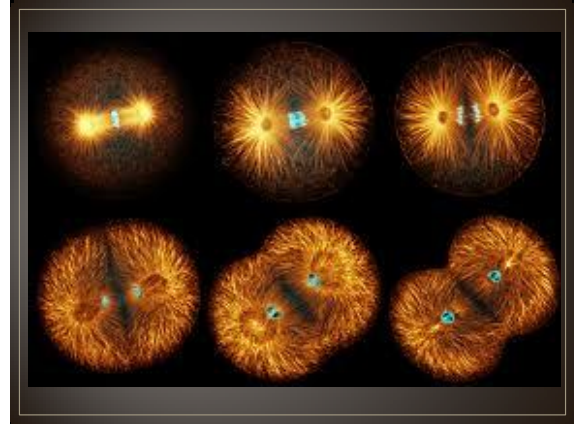
Chloroplasts

- Location in cell
- Cytoplasm
- Function
- Specializes in photosynthesis in plant cells



Microfilaments

- Location in cell
 - Cytoskeleton
- Function
 - Provides shape and movement for cells.
 - Are found in muscle cells



Microtubules

- Location in cell
 - Cytoskeleton
- Function
 - Are cylinders of protein found in cytoplasm, cilia and flagella
 - Help maintain shape and act as a track along which cell organelles can move.

