

### III. Studying Life (1.3)

#### A. Characteristics of Living Things

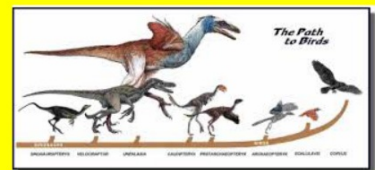
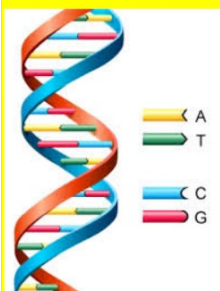
1. Living Things are Made Up of One or More Cells :
  - a. a cell is the smallest unit considered fully alive
    - \* cells do all of the things that living things do
2. Living Things are Based on a Universal Genetic Code
  - a. all organisms store complex info they need to live, grow and reproduce in a genetic code.
  - b. the genetic code is written in an molecule called **DNA**
  - c. this info is copied and passed from parent to offspring
3. Living Things Obtain and Use Materials and Energy
  - a. all organisms need to take in materials which allow them to grow, develop, live and reproduce
  - b. **Metabolism**: all of the chemical reactions that break down and build substances and structures in the body
4. Living Things Grow and Develop
  - a. living things use nutrients to **grow** in size by adding new cells
  - b. living things **develop** or change throughout their life
5. Living Things Reproduce
  - a. **Reproduce**: make new organisms of the same species
  - b. **sexual reproduction**: two cells, sperm and egg, unite to form the new organism
  - c. **asexual reproduction**: a single organism produces offspring identical to itself

#### 6. Living Things Respond to Their Environment

- a. organisms can detect and respond to stimuli
- b. **Stimulus**: a change or condition in the internal or external environment
- c. **Homeostasis**: the ability to maintain a stable internal environment
  - ex. maintaining proper body temperature

#### 7. Organisms Change Over Time or Evolve

- a. all life on the planet today is linked to a common origin 3.5 billion years ago

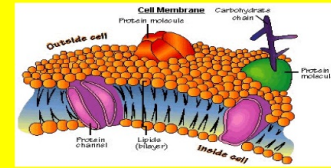


## IV. Characteristics of All Cells (7.1)

### A. Cell Boundary

#### 1. Plasma Membrane (Cell Membrane)

- forms the outside layer of the cell
- separates the cell from its surrounding environment
- regulates the exchange of material into and out of the cell



### B. Inside Every Cell

#### 1. Cytoplasm: gel-like material inside the cell composed of water, and dissolved and suspended molecules and particles

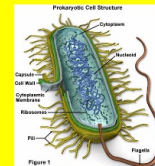
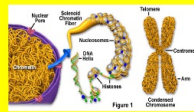
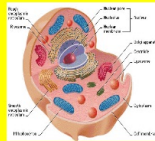
- cytoplasm provides support and protection for the cell

#### 2. DNA: Deoxyribonucleic acid, stores genetic information and allows the cell to pass this information on to future generations.

- genes**: small pieces of DNA that contain information on building proteins
- genes are copied onto RNA and brought to ribosomes

#### 3. Ribosomes: made up of proteins and rRNA, decode genes and build proteins

- proteins**: molecules that build the structure of an organism and carry out important functions



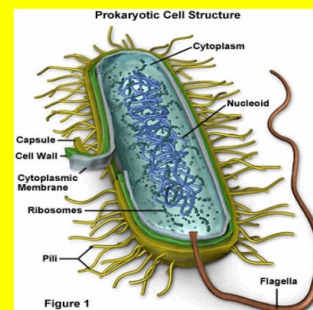
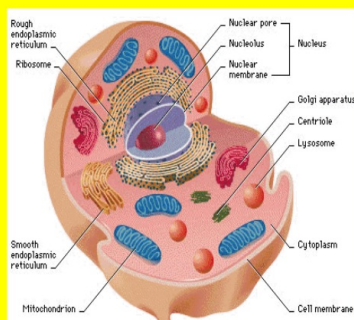
## V. Two Categories of Cells: Prokaryotes and Eukaryotes (7.1-7.2)

### 1. Prokaryotic Cells: no nucleus or membrane-bound organelles

- DNA is located in cytoplasm
- all unicellular bacteria (Eubacteria and Archaeobacteria)
- oldest type of cell (3.5 billion years)
- smallest type of cell (1-10 micrometers)

### 2. Eukaryotic Cells: have a nucleus and many membrane-bound organelles

- larger and more complex than prokaryotic (10-100 micrometers)
  - \*has a **cytoskeleton** (protein scaffold) that helps to support the structure
- nucleus holds DNA and many organelles perform specialized jobs
- all animal, plant, fungus and protists; about 1.5 billion years old
- can be unicellular or multicellular organisms



## VI. Organells of the Eukaryotic Cell

**A. Organelle:** membrane-bound structure that performs a specific job within the cell

### B. The Organells:

1. **Nucleus:** contains the cell's genetic information (DNA)
  - a. DNA has two forms: chromatin (functioning DNA) is in the form of long, thin strands and chromosomes (packaged DNA) is in the form of tightly coiled and condensed chromatin (only found in dividing cells)
2. **Mitochondria:** the "powerhouses" of the cell; convert food (sugar or fat) and oxygen into usable energy (ATP).
3. **Ribosomes:** decode genes and manufacture proteins
  - a. found in the cytoplasm and attached to the Rough Endoplasmic Reticulum
4. **Rough ER:** a series of membrane tubes with ribosomes; manufacture proteins and packages them into membrane sacs called **vesicles**.
  - a. vesicles carry the proteins to the Golgi Bodies
5. **Golgi Bodies** (Golgi Apparatus): stacks of flat membranes that receive protein vesicles from the RER.
  - a. the proteins are sorted, processed and packaged into another vesicle so it can be sent to its final destination
6. **Lysosomes:** special vesicles with digestive enzymes that breakdown food or other large molecules within the cell

7. **Smooth ER:** series of membrane tubes with no ribosomes that makes phospholipids for the plasma membrane and detoxifies harmful substances
8. **Vacuole:** large vesicle that stores food, nutrients and water

## VI. Plant Cells

A. Organells found in Plant cells that are not found in Animal Cells

1. **Chloroplasts:** capture sunlight energy, water and CO<sub>2</sub> and make sugar and oxygen (Photosynthesis)
  - a. contain the green pigment chlorophyll
2. **Cell Wall:** rigid structure made of cellulose (carbohydrate) that surrounds the plasma membrane. Provides support.
3. **Large Central Vacuole:** stores water and applies pressure to the cell wall which allows the plant to stand upright

END Lesson 1

