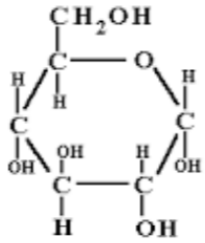
1st 9 weeks test review – Pre-AP Biology

*Please study and understand the concepts listed below. The 9 weeks test will require you to APPLY the knowledge that you have learned over the past unit. Study your NOTES and assignments from class. Your JOURNALS are due the day of this test! Make sure it is complete and you answered your "I can . . . " statements.

BIOMOLECULES:

Carbohydrates – contain C, H, O

Carbohydrates are the most common organic molecule because they make up most plant matter. They are made from carbon, hydrogen and oxygen. Their monomer is a single sugar called a monosaccharide. When two monosaccharides, or sugars, combine, they form a polymer called a disaccharide (di= two). When more than two monosaccharides join together, a polysaccharide (poly= many) is formed.

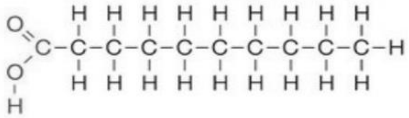


Glucose

There are three classes of carbohydrate polysaccharides. The first is starch. Starch is a carbohydrate used in food storage in plants. Potatoes, pasta and rice are rich in starch. Starches are very valuable to us because they **provide a quick form of energy** for our body. The second is glycogen. Glycogen is used for food storage in animals. The third is cellulose. Cellulose is used for **structural support** in plants (stems, leaves).

Lipids – contain C, H, O

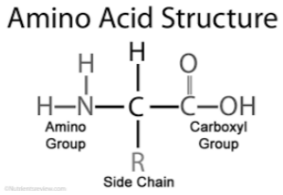
Lipids are a class of organic molecules which includes fats and oils. They function as **long-term storage of energy** in the body, **insulation** (fat = warmth), **protects** organs and is a major structure that **makes up the cell membrane**.



Proteins – contain C, H, O, N

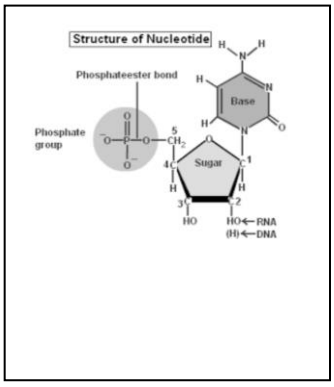
Proteins are organic molecules that **form muscles, transport oxygen in blood** (hemoglobin), and act as **hormones and enzymes**. Most importantly, proteins determine how our bodies look and function. Their building block (monomer) is the amino acid. Proteins are made of amino acids combined in a long chain. When groups of amino acids are joined together, a protein is formed.

There are more than 20 different kinds of amino acids. The only difference among the amino acids is the "R" group. The "R" represents a group of elements that is attached to this point. The sequence and shapes of the "R" groups control the shape and function of the protein.



Nucleic Acids – contain C, H, O, N, P

The fourth class of organic molecules is the nucleic acids. This class involves the **genetic materials**, DNA and RNA. DNA is the **blueprint of life** because it contains instructions on how to make proteins in the body. Each individual's DNA is unique, which means that each individual has a unique set of proteins. That is why each of us looks and behaves differently. **All living things from bacteria to blue whales share the exact same components of DNA!** The only difference is the order the monomers are put in. The different orders of the monomers code for all the different living organisms. RNA is a copy of DNA that can leave the nucleus to make a protein.



LEVELS OF ORGANIZATION

Biological Levels of Organization

- **ATOM** (Protons, neutrons, electrons) --- smallest part of an element
- **MOLECULE** --- Smallest part of a compound with unique properties
- **MACROMOLECULE** (Carbohydrates, lipids, proteins, nucleic acids) --- polymers of biological molecules
- **CELL ---** smallest unit of any living thing (nerve cell, lung cell, etc) --- **LIFE BEGINS!**
- **TISSUE ---** group of similar cells performing a job or function
- **ORGAN** --- group of tissues, organized into brain, heart, lungs, stomach, etc.
- **SYSTEM** --- Organs working together (circulatory, digestive, etc.)
- **ORGANISM** --- Individual living thing (person, dog, plant, etc.)

- **POPULATION** --- group of one kind of organism (species) in an area that can interbreed & make fertile offspring --- (cardinals at the bird feeder)
- **COMMUNITY ---** Several populations of organisms in an area --- (animals in the zoo)
- **ECOSYSTEM** --- All the living (biotic) and nonliving (abiotic) parts of an environment --- (Tropical rain forest, grassland, etc.)
- **BIOME** --- Large areas of the world with similar climates and organisms
- **BIOSPHERE** --- All the living and nonliving things on Earth

Level of Organization	Explanation	Example
 Atomic Level	Atoms are defined as the smallest unit of an element that still maintains the property of that element.	Carbon, Hydrogen, Oxygen
 Molecular Level	Atoms combine to form molecules which can have entirely different properties than the atoms they contain.	Water, DNA, Carbohydrates
 Cellular Level	Cells are the smallest unit of life. Cells are enclosed by a membrane or cell wall and in multicellular organisms often perform specific functions.	Muscle cell, Skin cell, Neuron
 Tissue Level	Tissues are groups of cells with similar functions	Muscle, Epithelial, Connective
 Organ Level	Organs are two or more types of tissues that work together to complete a specific task.	Heart, Liver, Stomach
 Organ System Level	An organ system is group of organs that carries out more generalized set of functions.	Digestive System, Circulatory System
 Organismal Level	An organism has several organ systems that function together.	Human

CELLS

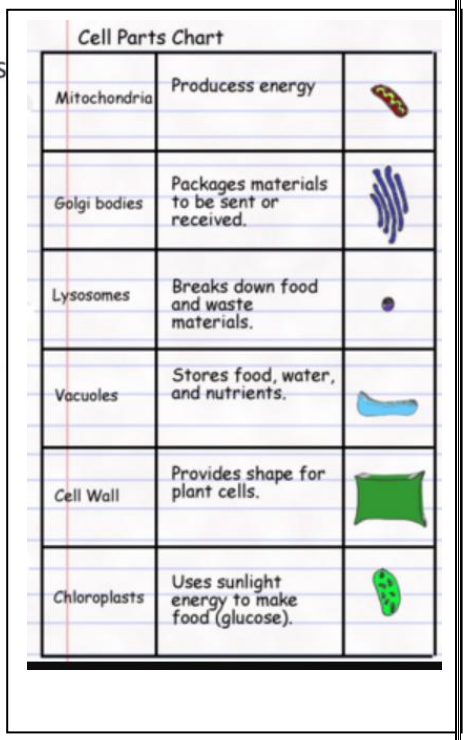
A cell is like a factory. It is built according to the way it works and it has a major product, proteins. Each cell holds many smaller structures inside, most bound by membranes, called organelles. An organelle is one of several structures with specialized functions. They are suspended in the cytoplasm of a eukaryotic cell. There are some differences among eukaryotic cells as to which organelles they contain, but all eukaryotic cells contain the following organelles.

Cells consist of a cell membrane. The cell membrane regulates the transportation of molecules in and out of the cells. It plays a major role in maintaining homeostasis for the cell. The cell membrane is often called the plasma membrane, because it is the boundary of the cytoplasm (the cell fluid). Other organelles are found in the cytoplasm. The Nucleus is a very important structure that controls all the activities of the cell. It stores DNA, which has the instructions for how to run all cell functions, like making proteins. Ribosomes build proteins. These can be attached to the rough endoplasmic reticulum (ER) and also found floating inside the cytoplasm. The ribosome does not have a membrane and is one of the only non-membrane bound organelles found in a cell. The ribosome is one organelle also found in a prokaryote cell.

Cell Parts Chart

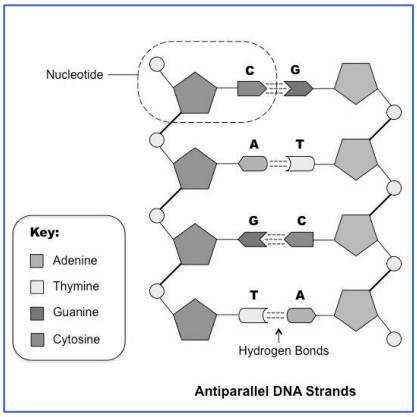
Name	What does it do?	Picture
Nucleus	Directs all the activities of the cell	
Cell Membrane	Protects the cell and allows nutrients to come into the cell.	
Cytoplasm	The gel-like fluid that holds the organelles.	
Ribosomes	Produces proteins that helps the cell grow.	
Endoplasmic Reticulum	Passages that transports materials.	

The Endoplasmic Reticulum (ER) transports proteins that are built by the ribosomes. The Golgi apparatus, is an organelle that modifies, sorts, packages and distributes proteins that are received from the ER. The Golgi apparatus also prepares materials that are exported outside the cell. The packages prepared by the Golgi apparatus are called vesicles. The most important vesicles are lysosomes. Lysosomes are enzyme filled membrane packages that are capable of digesting food, virus, bacteria, etc. Basically they keep the cell clean of waste products and old, decaying organelles.



The mitochondria are another important organelle inside the cell. This does not have any role in protein production other than producing energy for the cell. This is responsible for energy production and cell respiration. Mitochondria has its own DNA and its own dedicated set of ribosomes within it. So it is thought to have once been its own prokaryotic cell.

Plant cells differ from animal cells in structure. They have organelles that do not exist in animal cells. The cell wall is a rigid structure made of cellulose that supports a plant cell. It surrounds the cell membrane. It does not provide any protection other than keeping the cell from collapsing. Plant cells also contain chloroplasts. These organelles use radiant (or light) energy to make glucose, which provides energy for the cell. So plant cells have two organelles that provide energy, the mitochondria and chloroplasts. There is a very large storage sac for water and salt in plant cells called a vacuole which allows the plant to go without water for a period of time.

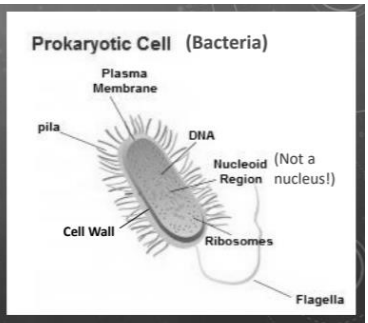


DNA

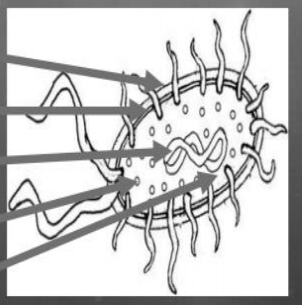
DNA is a double helix shaped molecule made of nucleotide chains. Each nucleotide contains a phosphate group, deoxyribose sugar and a nitrogenous base – A, T, C or G. The two strands making the double helix are held together at the nucleotide bases where they pair A-T or C-G. Hydrogen bonds are between the two bases, holding the strands together. The code for making proteins that build our traits is found in the sequence of the nitrogenous bases. DNA components are the same in all living species. The difference is the sequence of the bases. Different species from bacteria to animals have different traits, therefore, different base sequences. DNA is found in the nuclei of every cell in eukaryotic organisms and in the cytoplasm of the cell of prokaryotic organisms.

PROKARYOTIC CELLS

- Unicellular
- Circular DNA
- Ribosomes
- Cell membrane
- Cell Wall
- NO membrane bound organelles
- All are bacteria

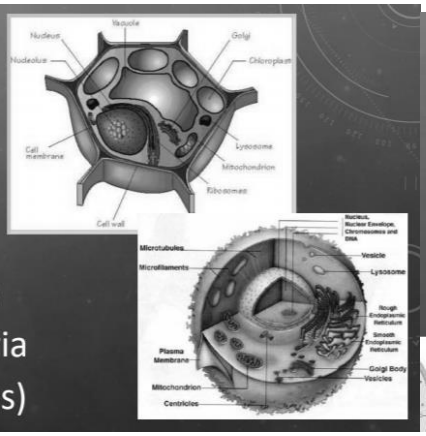


- Cell Wall
- Cell Membrane
- DNA
- Ribosomes
- Cytoplasm

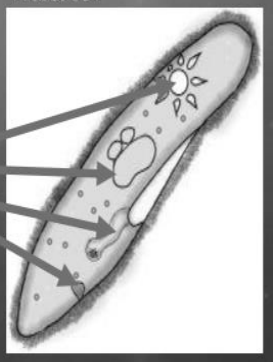


EUKARYOTIC CELLS

- Unicellular **and** Multicellular
- Linear DNA in a nucleus
- Ribosomes
- Cell membrane
- Cell Wall
- Membrane bound organelles
- All living things except bacteria (plant, animal, fungus, protists)

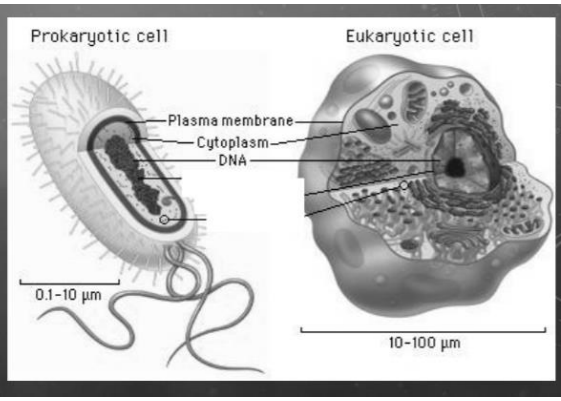


- Nucleus and other organelles

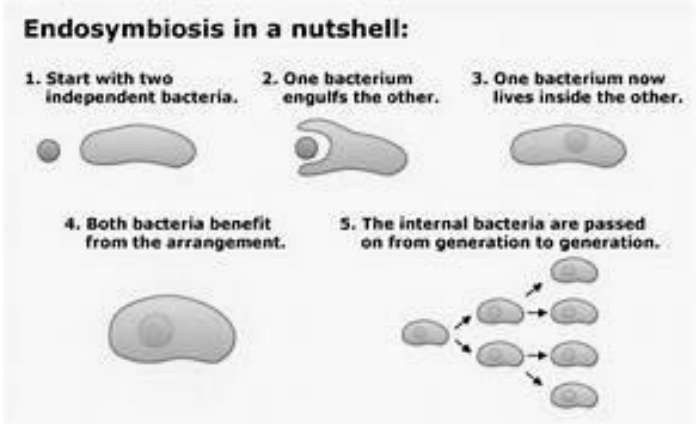


WHAT CHARACTERISTICS DO THEY SHARE?

- Unicellular
- DNA
- Ribosomes
- Cell membrane
- Cell Wall



ENDOSYMBIOTIC THEORY:



The mitochondrion and the chloroplast are both organelles that were once free-living cells. They were prokaryotes that ended up inside of other cells (host cells). They may have joined the other cell by being eaten (a process called phagocytosis), or perhaps they were parasites of that host cell.