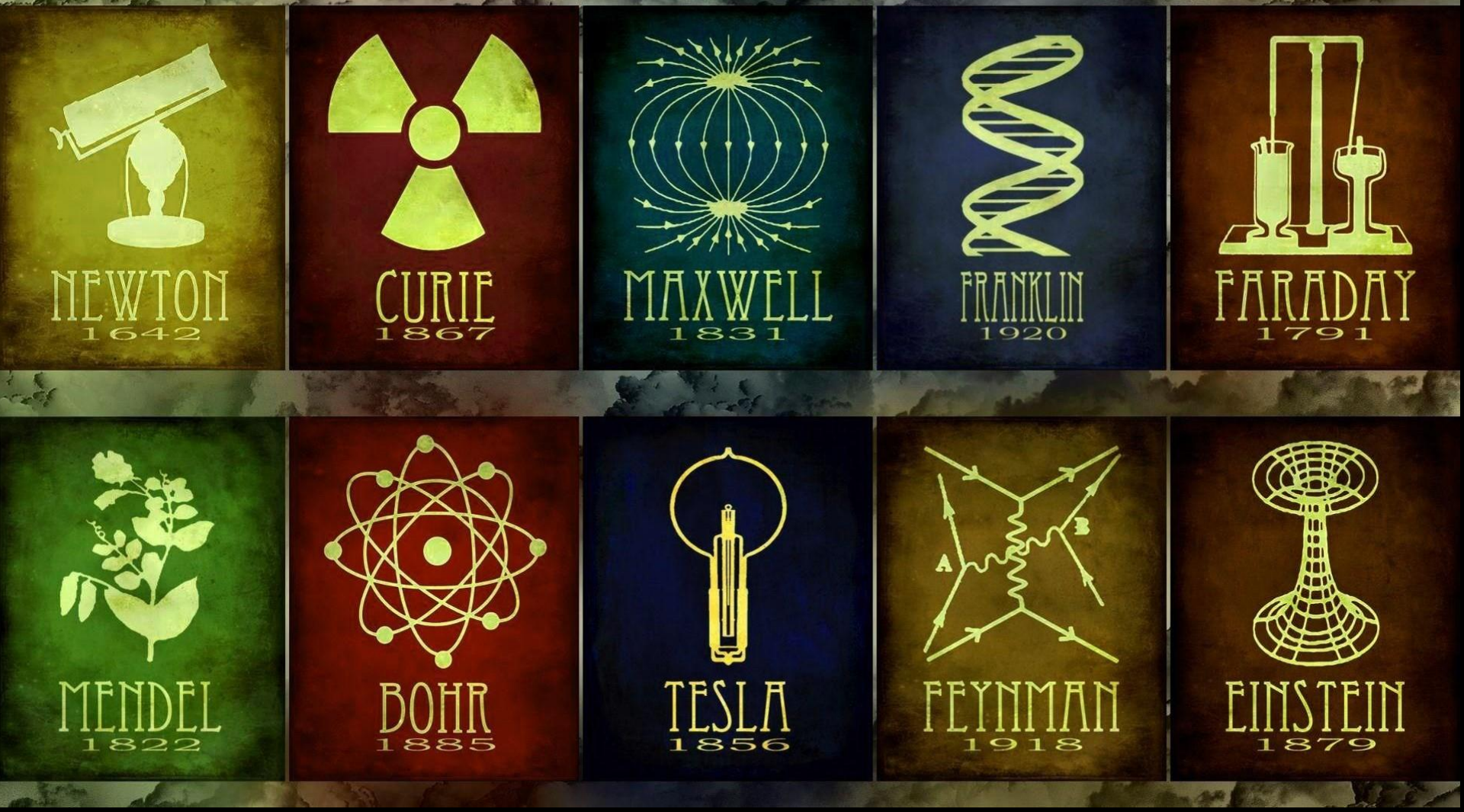

NEWTON
1642
CURIE
1867
MAXWELL
1831
FRANKLIN
1920
FARADAY
1791
MENDEL
1822
BOHR
1885
TESLA
1856
A
B
FEYNMAN
1918
EINSTEIN
1879

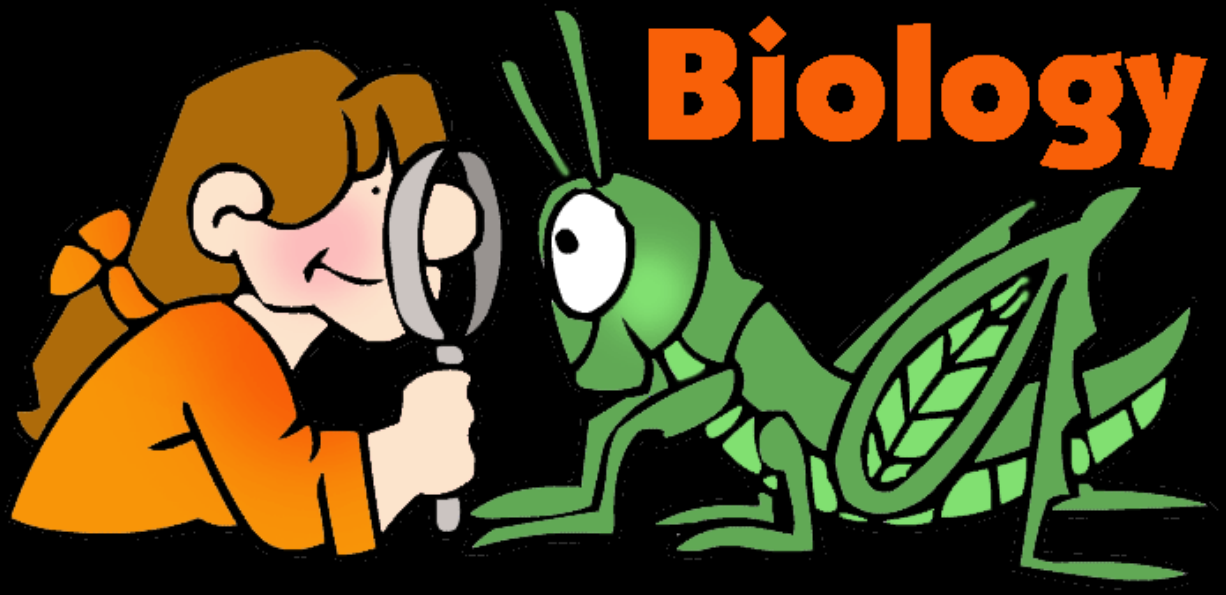
Unit 1

What does BIOLOGY mean?

Biology is the study of life.

The prefix *Bio* means "life"

The suffix -o*logy* means "study of"

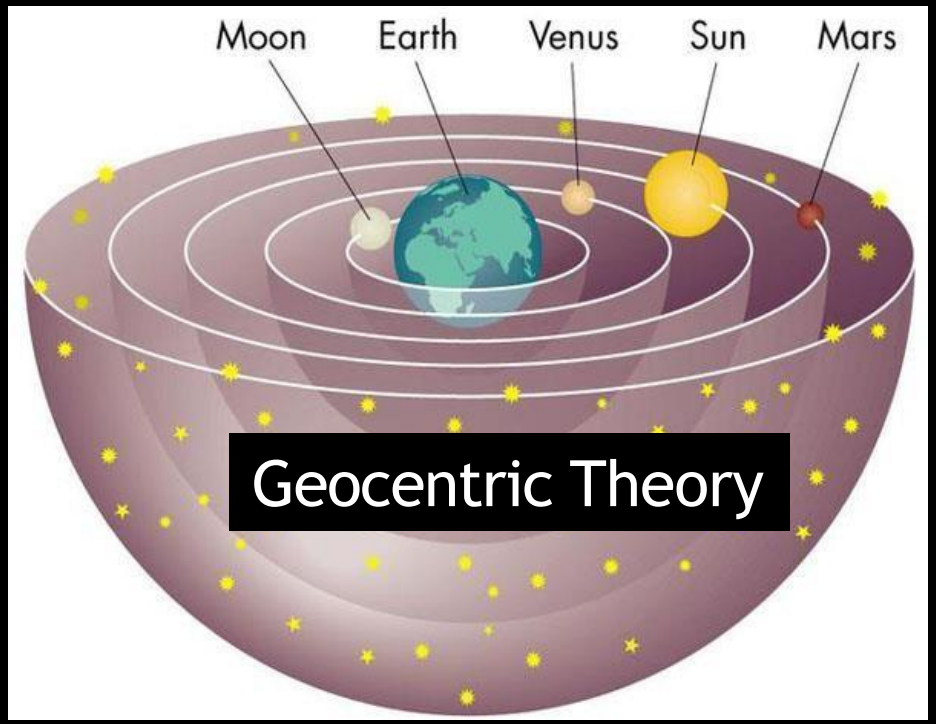


Goals of Science

- Provide testable explanations about events in the natural world
- Use data to explain patterns in nature
- Make predictions about natural events
- Science is continually changing based on advancements in technology and new evidences discovered

Scientific Theory: A tested, highly reliable scientific explanation of the natural world based on repeated observations, and a well-supported hypothesis

Theories are subject to revision and correction upon new scientific data



Setting up a Scientific Experiment

1. Problem – Based on observation
   What do you want to better understand?

2. Hypothesis – Proposed scientific explanation from observation(s)
What are you going to test?

-Always written as. . . IF (something happens)
THEN (something else happens) Cause & Effect

Example: If homework is not turned in on time, then late points will be taken off the assignment.

- 3. Background – What prior information will help you do the experiment?

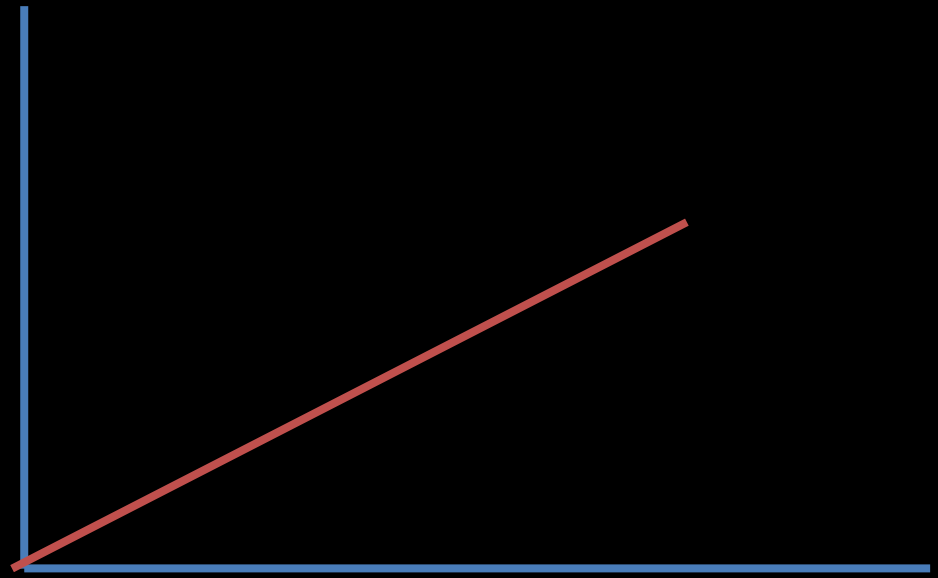
Setting up a Scientific Experiment

4. Procedure – What steps will you take to perform the experiment? What materials do you need?
   - Independent variable – changed by the researcher
   - Dependent variable – measured, collected as data
   - Control variable(s) – remains the same, compare to testing groups

Setting up a Scientific Experiment

5. Observations/Data Collection
   What happened during the experiment?
6. Results/Conclusion – What does your data mean? What conclusions can you draw from this information? What did you learn about your original problem?
   - Remember, science is collaborative!
   - Repeated, highly tested, reliable results help form a theory!

When graphing variables…

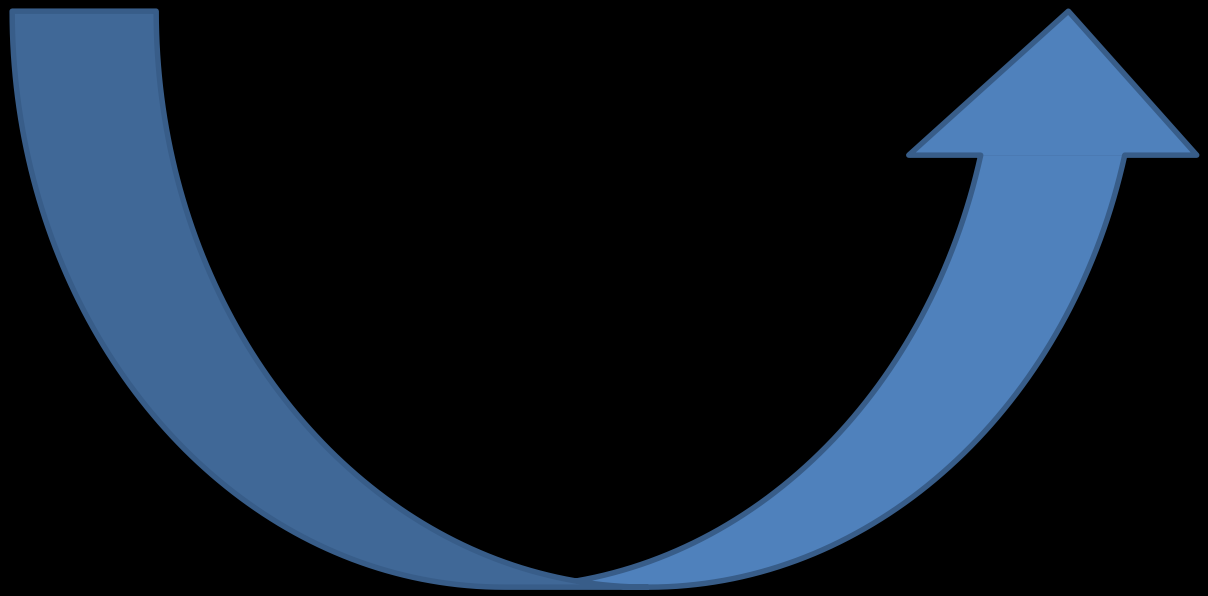


Dependent
Responding
Y-axis
(What you
MEASURE)

Manipulative
Independent
X-axis
(What you
CHANGED)

Levels of Organization

- Small
- Large

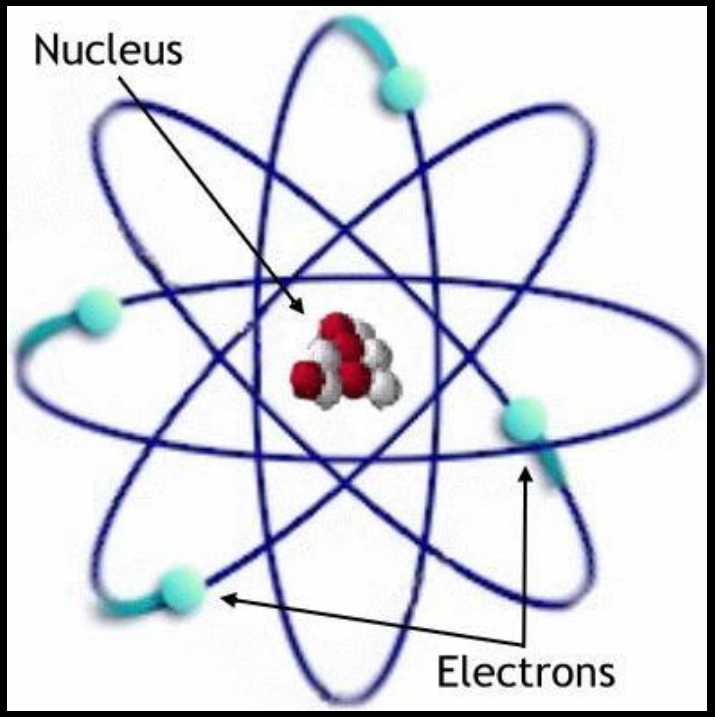


Levels of Organization

- Letter = **W**
- Word = **Letters** join to make a **Word**
- Sentence= **Words** join to make a a **Sentence.**
- Paragraph= 2 or more **Sentences** make up a **Paragraph**.
- Essay= 2 or more **Paragraphs** make up an **Essay.**
- Book= collection of essays
- Library= collection of books

ATOMS

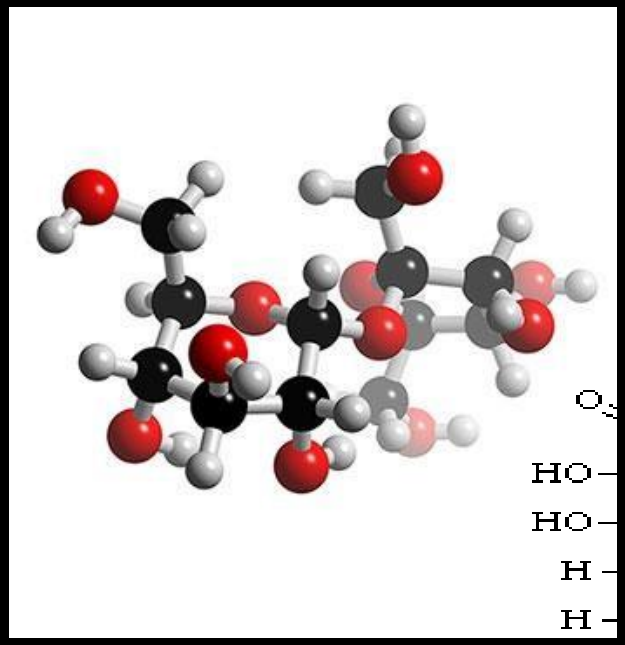
1. An atom is the smallest particle of a substance Ex. Carbon, Hydrogen

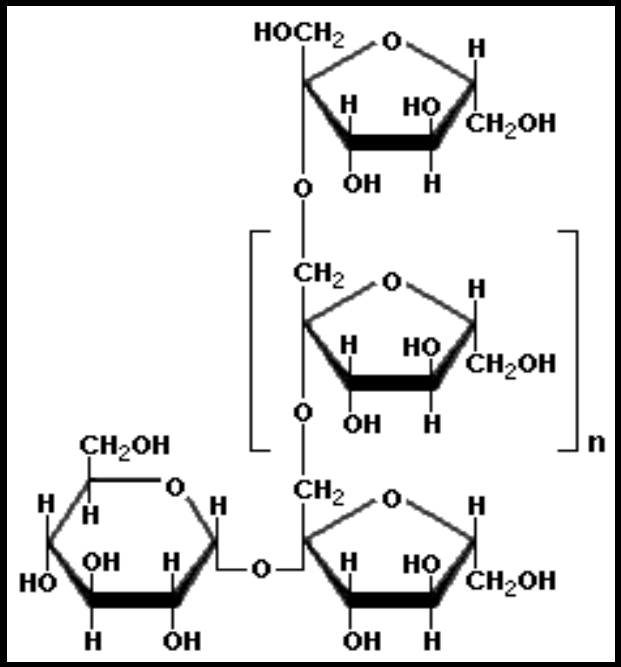


MOLECULES

2. **Molecules are made when atoms bond together**

Ex. Proteins and Nucleic Acids

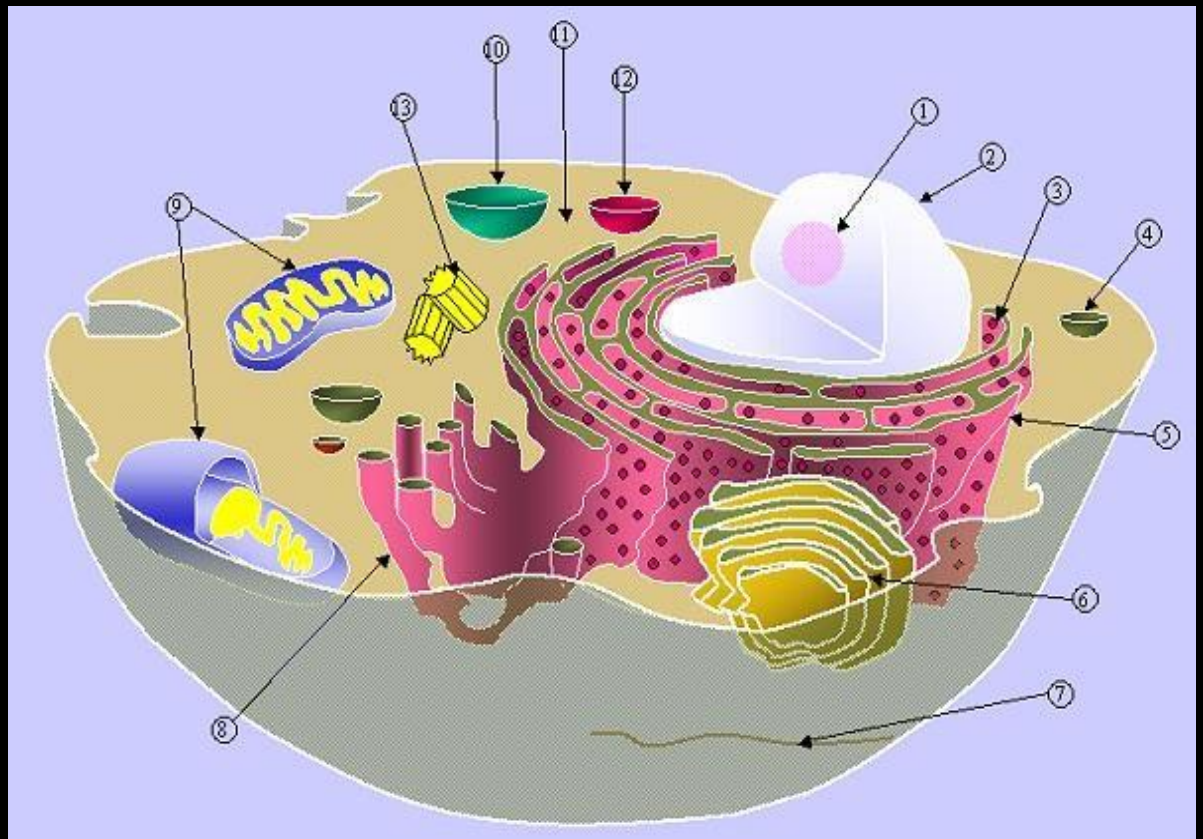




ORGANELLES

3. An organelle is found INSIDE of **cells**; performs a specific **function**

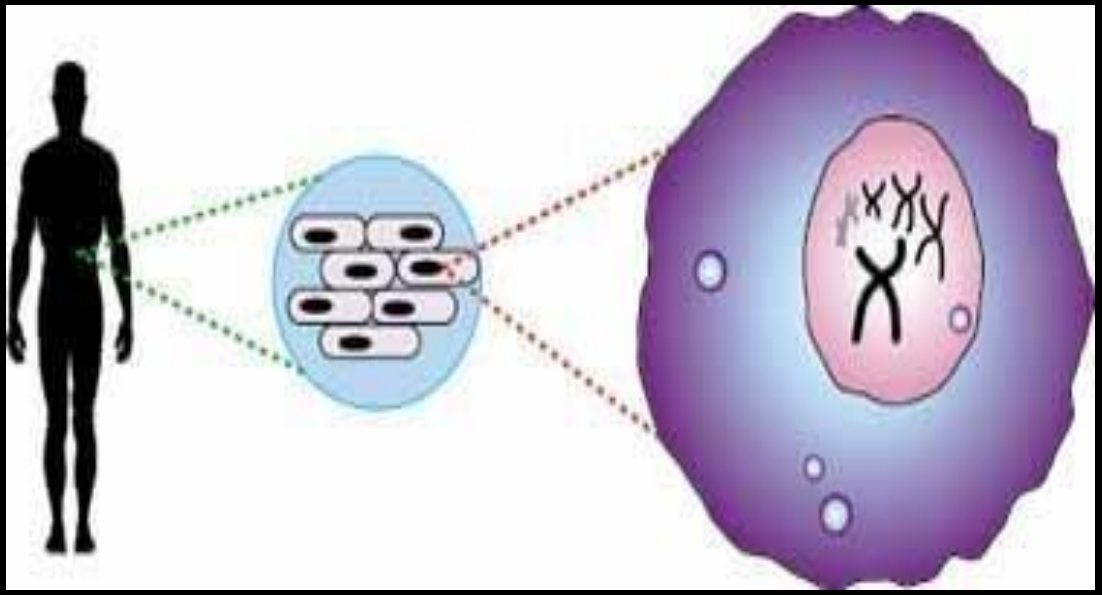
Ex. Nucleus, mitochondria, chloroplast

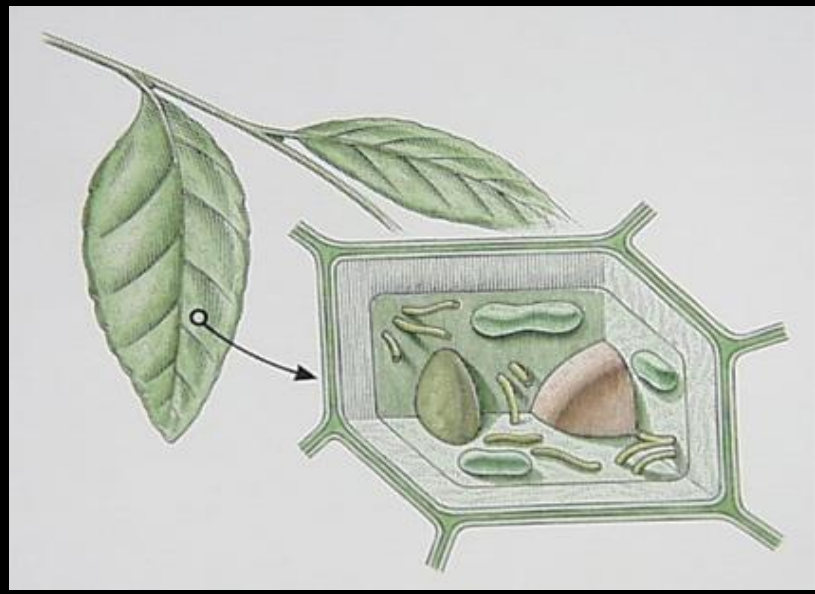


CELLS

4. Organelles join together to form cells.

The cell is the smallest unit of living matter



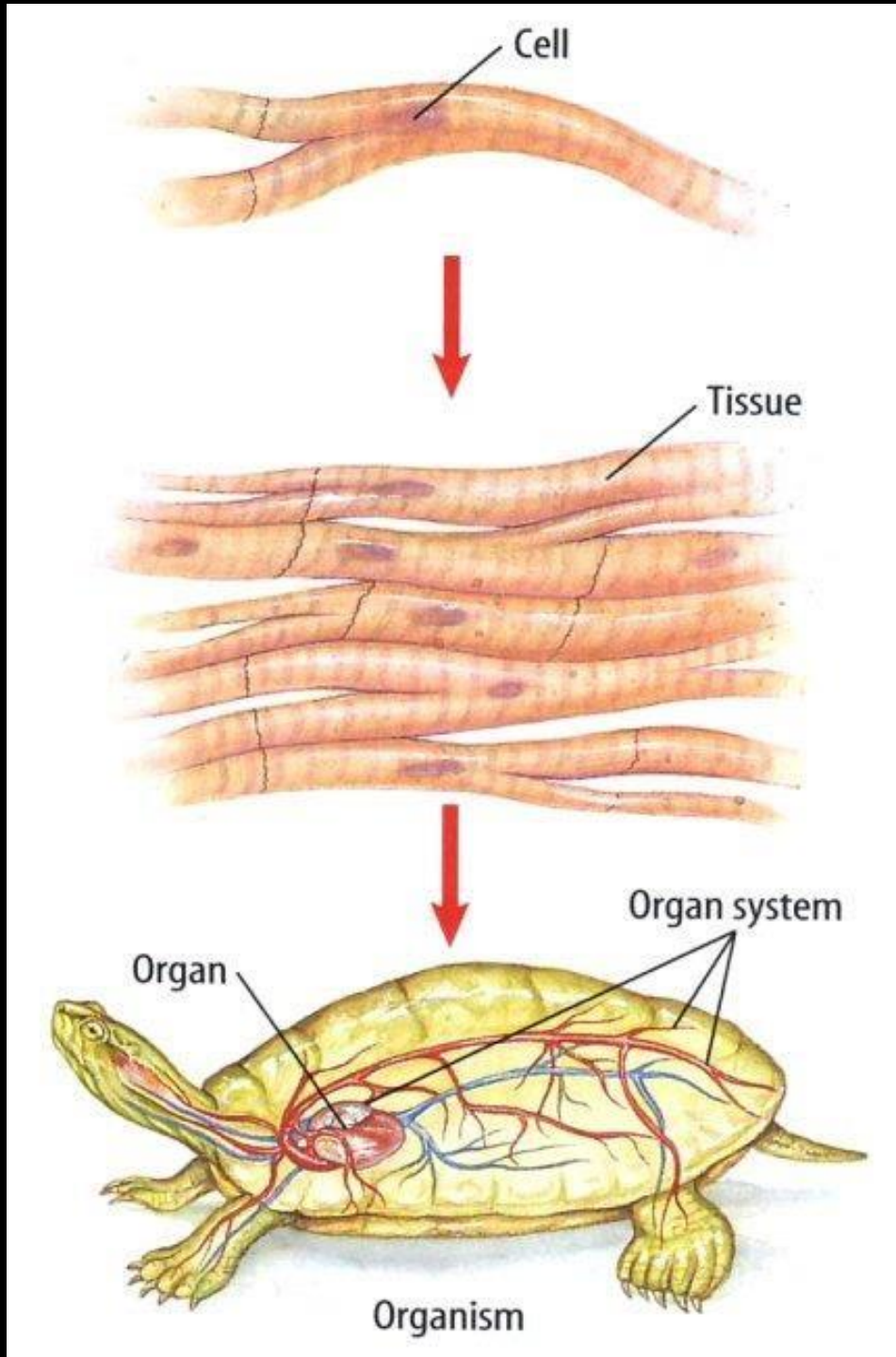


TISSUES

5. Tissues form when cells join

Tissues are a group of cells working together to perform a similar function

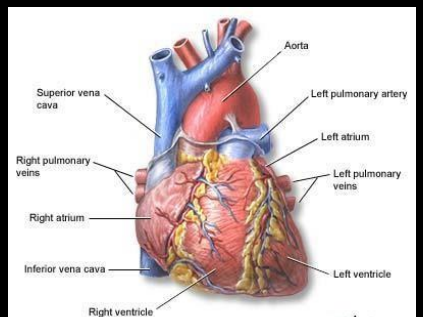
Ex. cardiac tissue, epithelial tissue

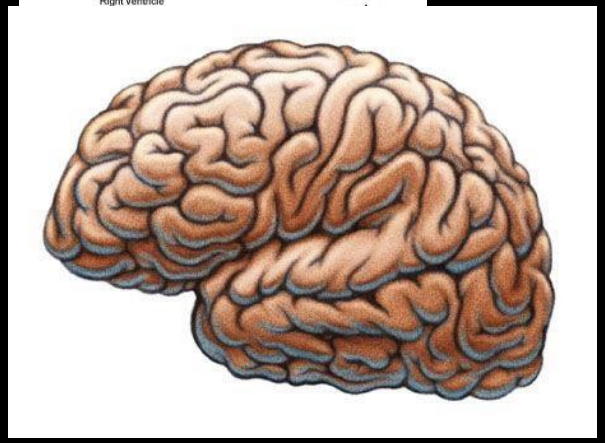


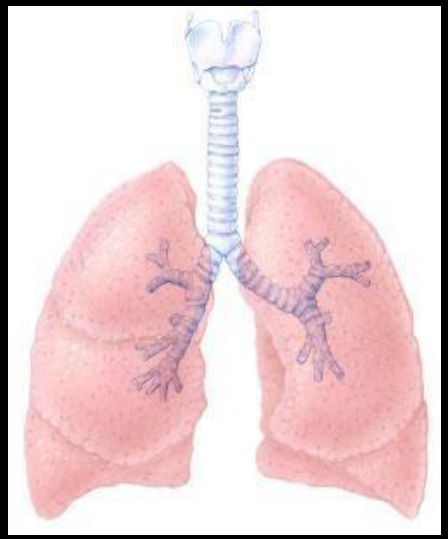
ORGANS

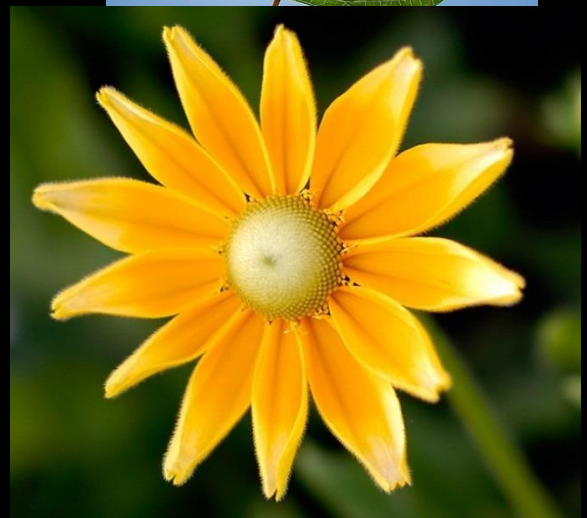
6. **ORGANS are formed when similar tissues join together**

An organ is a group of tissues working together Ex. Brain, Lungs, Leaves









ORGAN SYSTEMS

7. Organ systems are groups of organs working together to ensure the body keeps functioning

Examples: root system, reproductive system

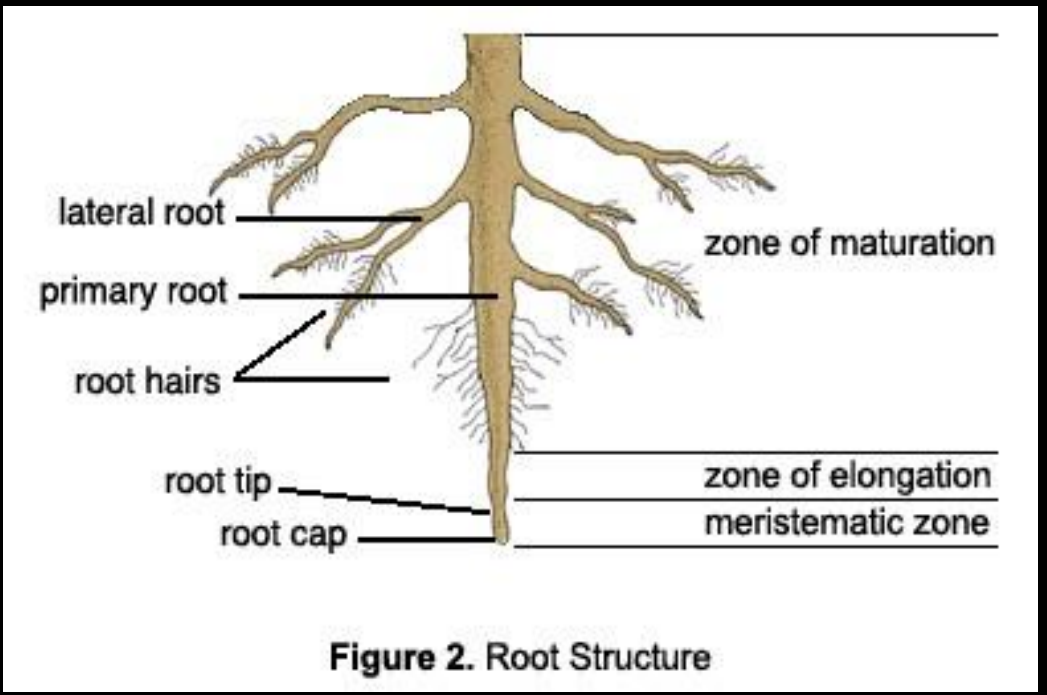
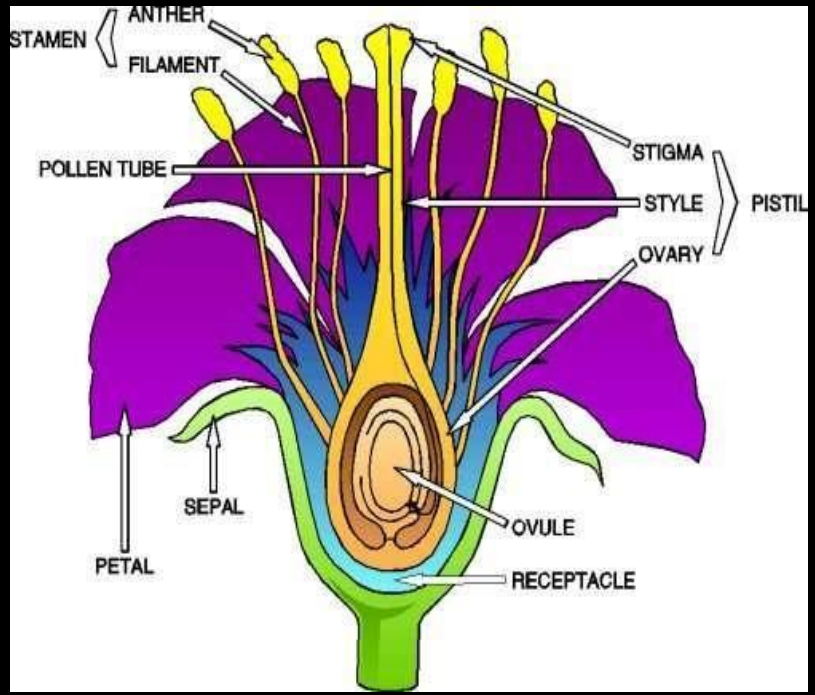


Figure 2. Root Structure

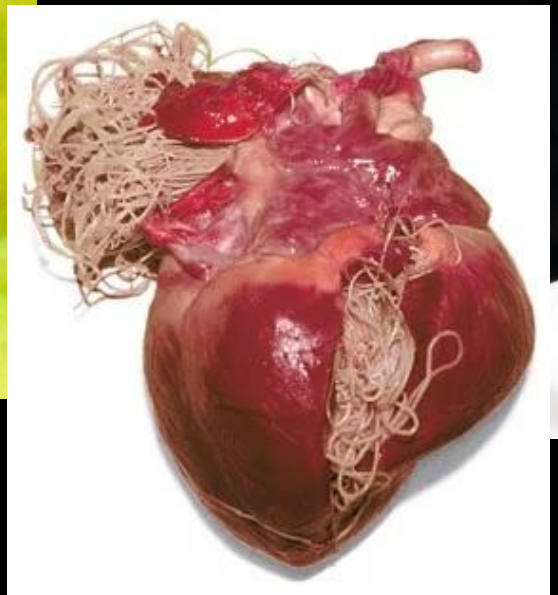


ORGANISMS

8. Organisms are made from organ systems

An organism is an individual life composed of one or more cells

*Some organisms are *pathogenic* (Cause harm or disease)



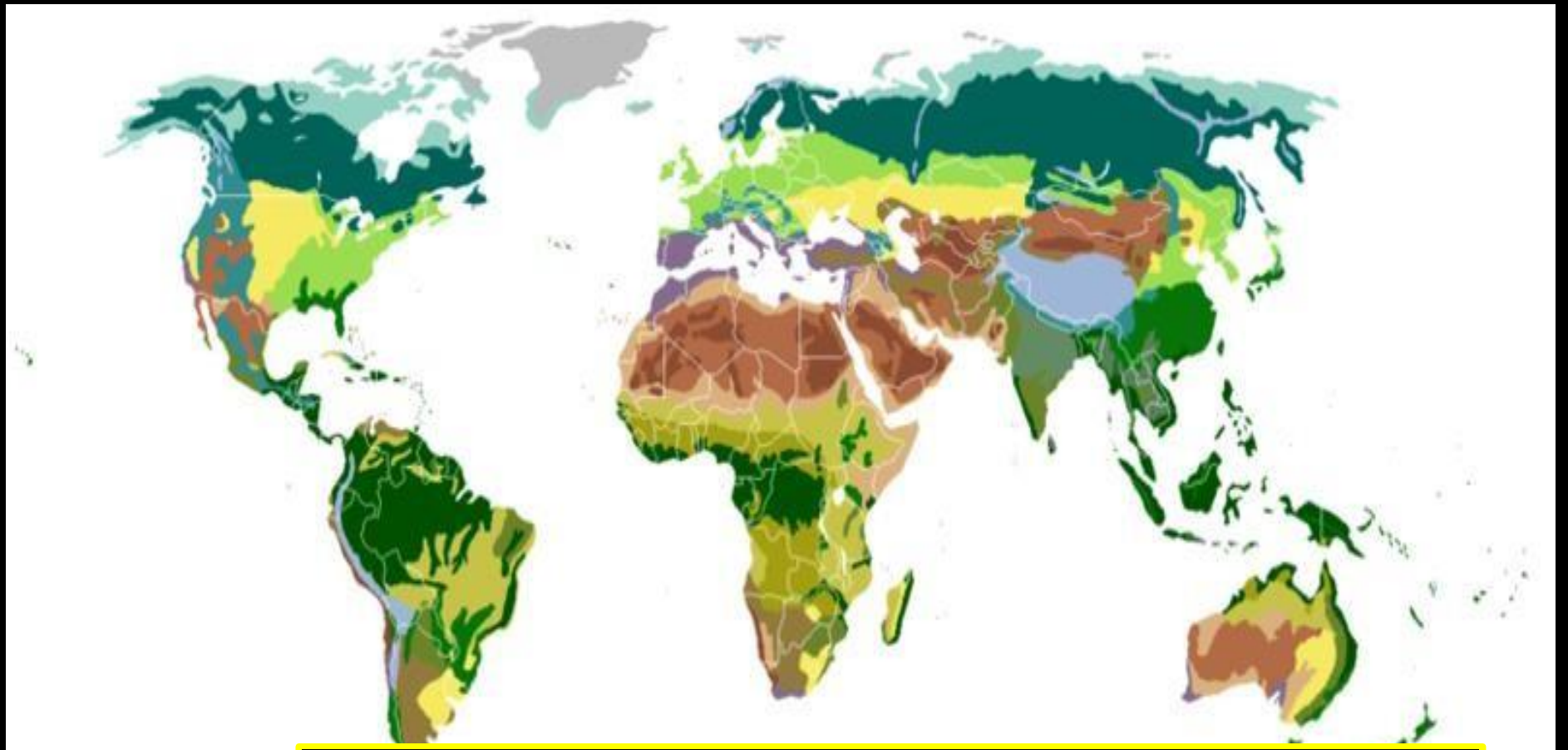
9. Population: Groups of individuals of the same species that interbreed and live in the same place at the same time.

10. Community:
collection of different populations of species that live in a defined area

11. Ecosystem:

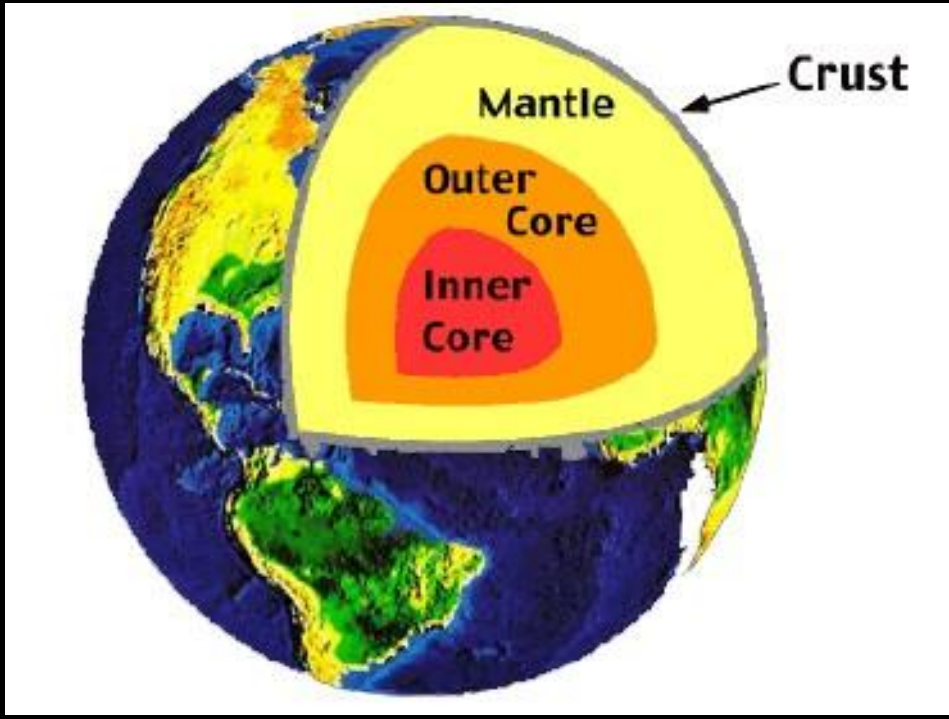
All the biotic (living) factors together in their abiotic (non-living) environment

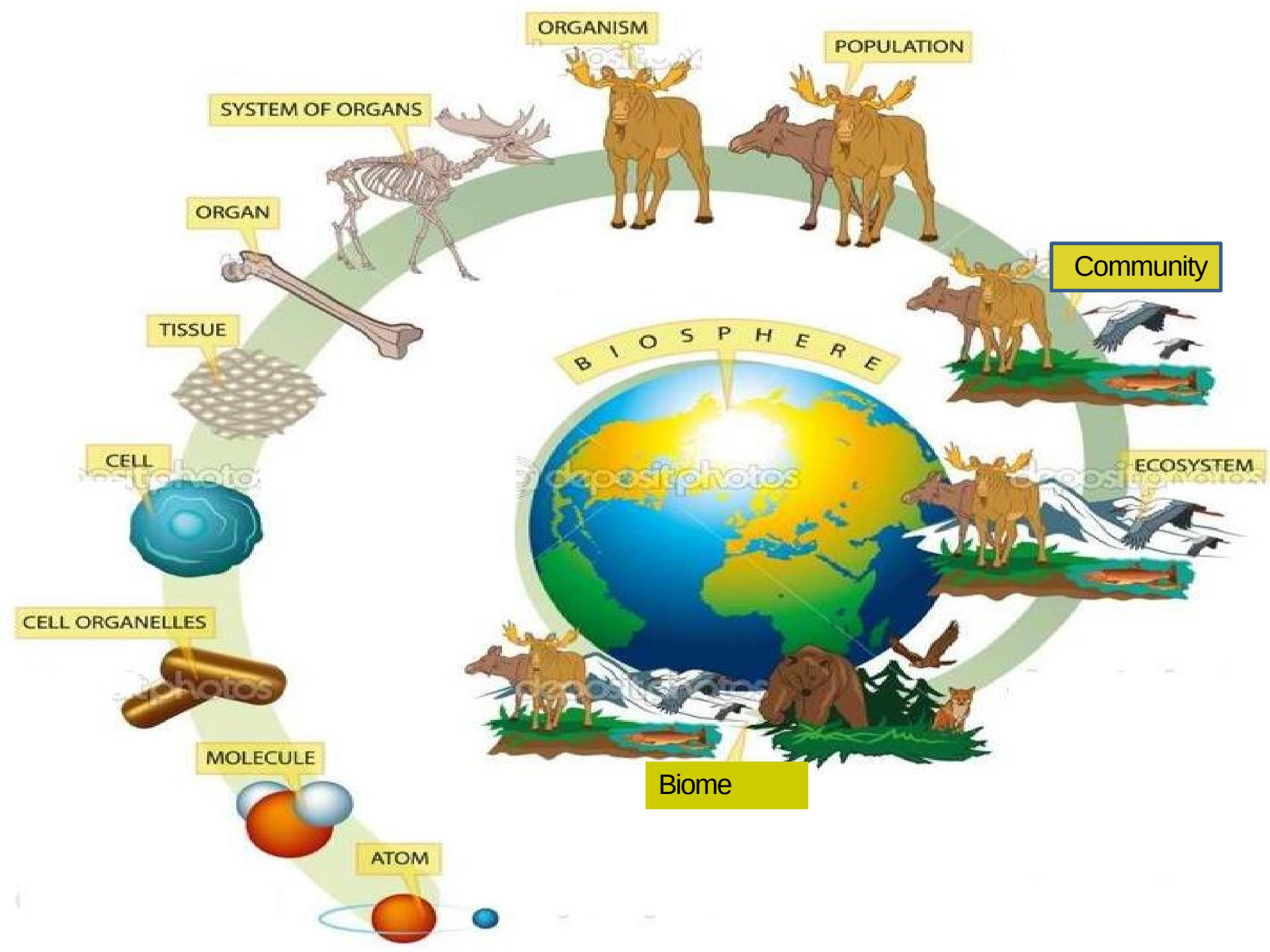
12. Biome: Group of ecosystems that share similar climates and typical organisms



The average year-after-year conditions of temperature and precipitation in a particular region.

13. Biosphere:
part of the Earth in which life exists including land, water, and air or atmosphere




ORGANISM
POPULATION
SYSTEM OF ORGANS
ORGAN
TISSUE
CELL
CELL ORGANELLES
MOLECULE
ATOM
BIOSPHERE
Community
ECOSYSTEM
Biome

7 Characteristics of Life

MR. ROUGH

When life is tough, just remember…

MR. ROUGH!

7 Characteristics of Life

M: Metabolism (Energy Usage)

a. Autotrophic – makes OWN energy to use *photosynthesis

b. Heterotrophic –

must CONSUME energy from other organisms

c. Decomposers –

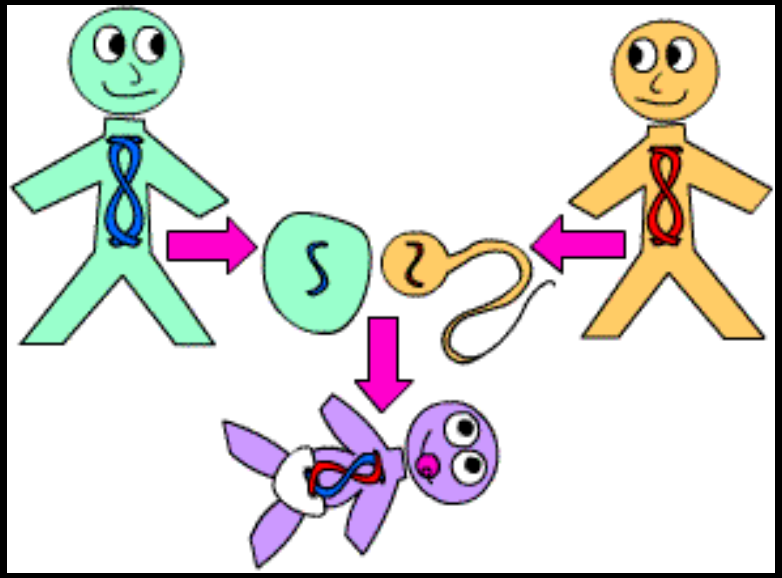
obtains energy from dead organic remains of organisms

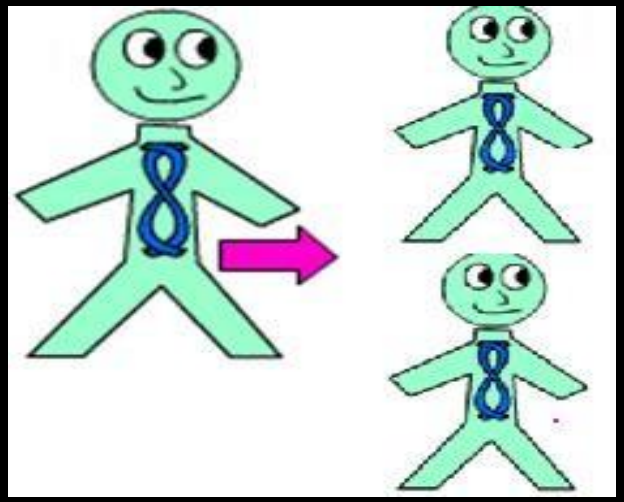
7 Characteristics of Life

R: Reproduction

a. Sexual reproduction - cells from different parents unite to form a new cell

b. Asexual reproduction = single parent





7 Characteristics of Life

R: Respond to Environment

a. Organisms detect stimuli from the environment; a stimulus is a signal to which an organism responds (temp, light, smell)

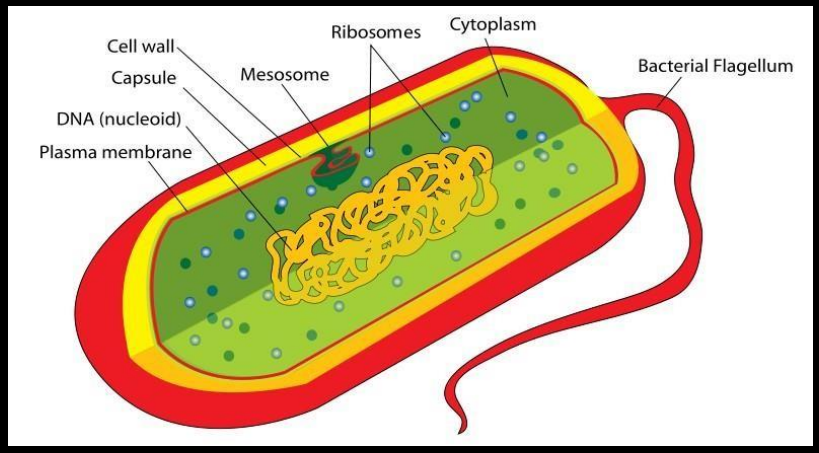
ex: migration due to change in weather

7 Characteristics of Life

O: Organized of Cells

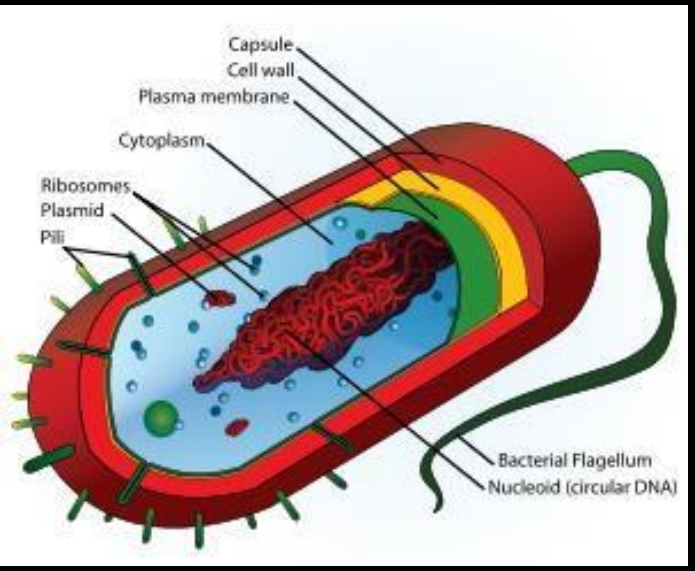
a. Unicellular – one SINGLE cell

b. Multicellular – MANY cells; can have SPECIALIZATION of cells to perform a different function.

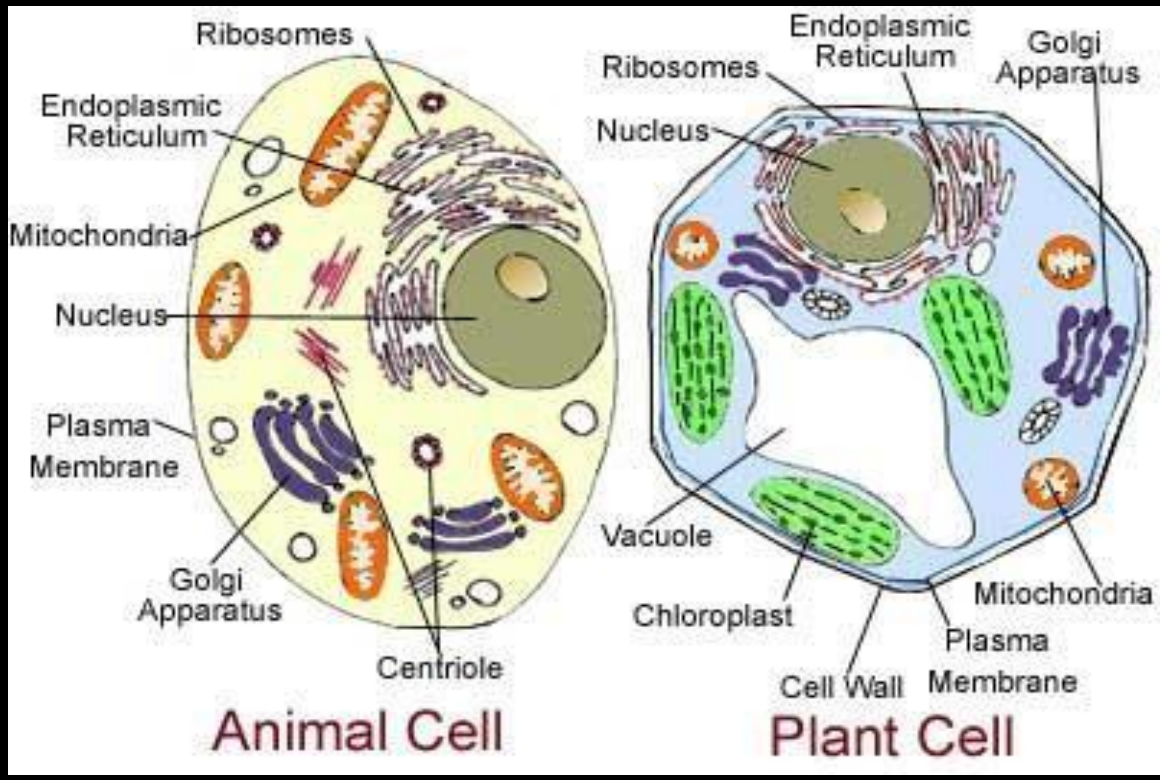


Types of cells

1. Prokaryote (Bacteria)



2. Eukaryote

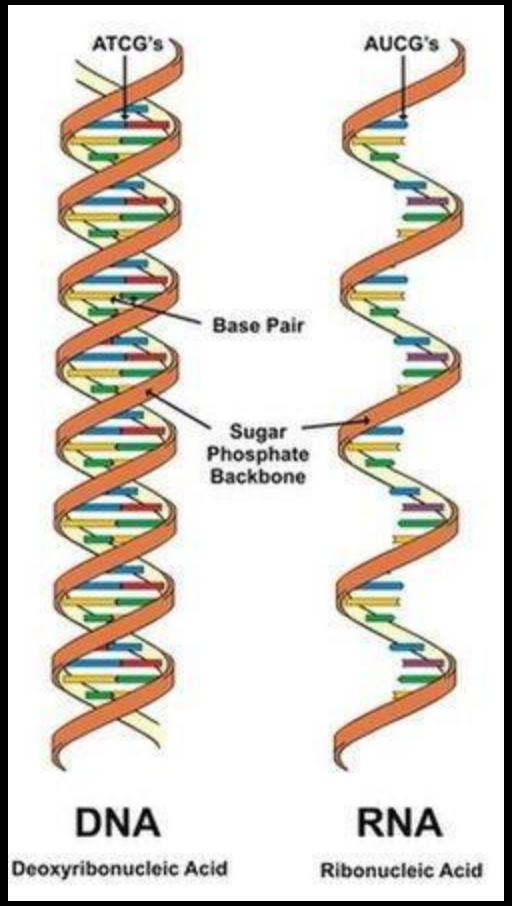


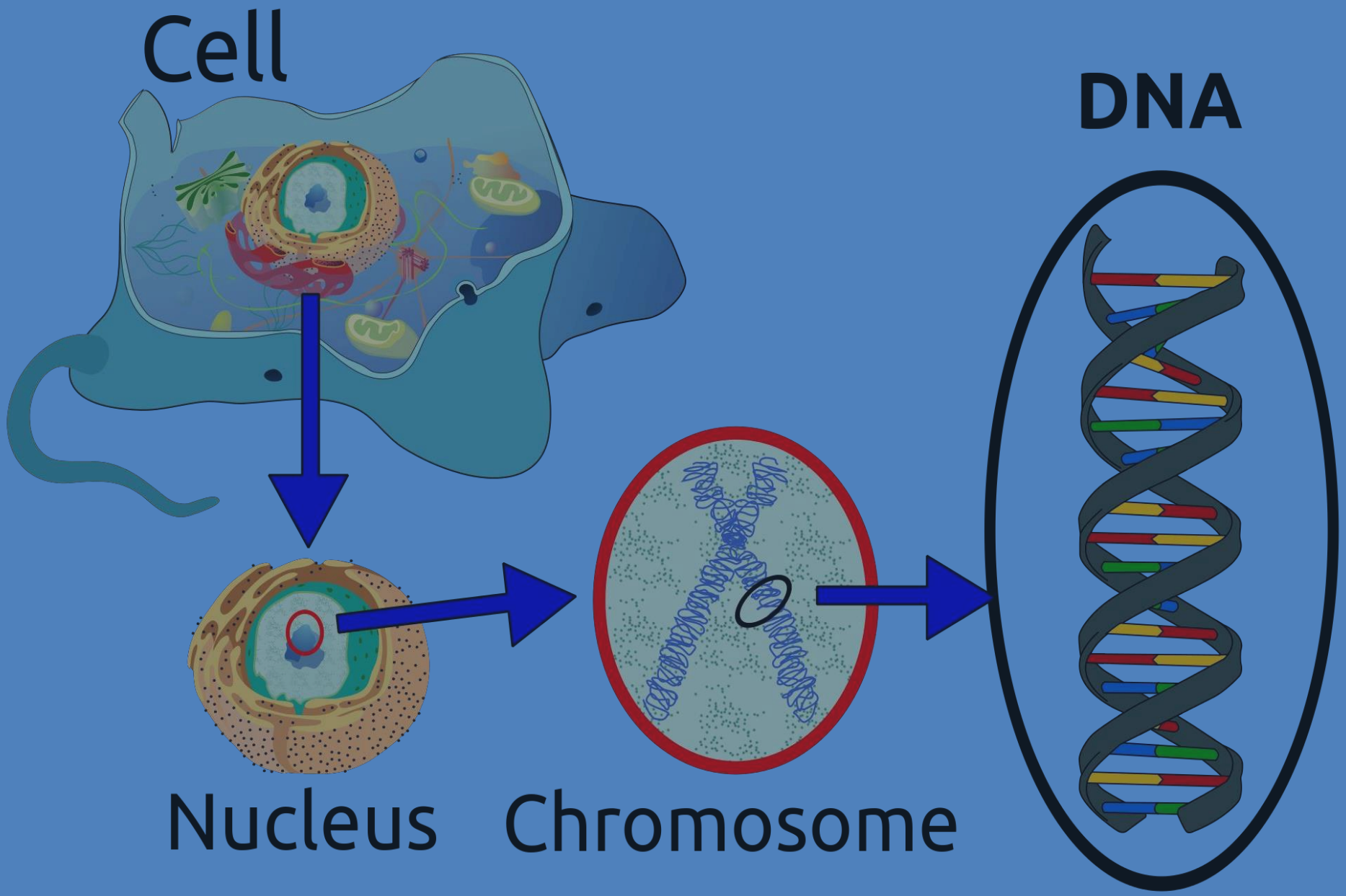
7 Characteristics of Life

U: Universal Genetic Code

a. All living things are based on a UNIVERSAL GENETIC CODE

b. DNA (deoxyribonucleic acid) or RNA (ribonucleic acid) ; heredity information passed from parent to offspring



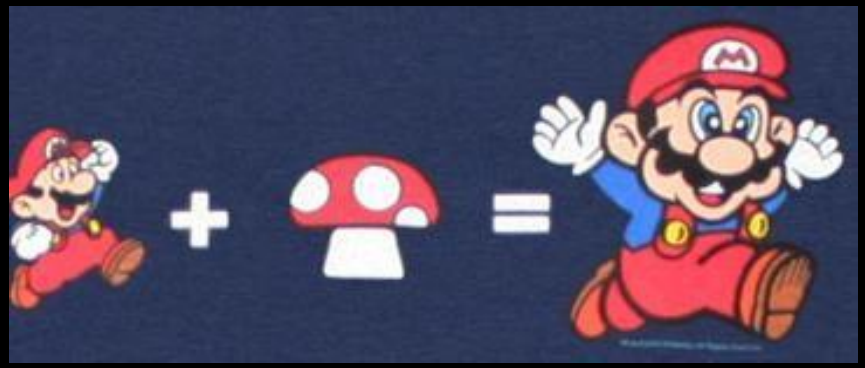

Cell
DNA
Nucleus
Chromosome

7 Characteristics of Life

G: Grow and Develop/Evolve

a. Unicellular grows in size/mass

b. Multicellular changes through differentiation, a change in shape and size



7 Characteristics of Life

H: HOMEOSTASIS

1. Living things maintain a stable internal balance through homeostasis.

Example: Keeping the body constant.

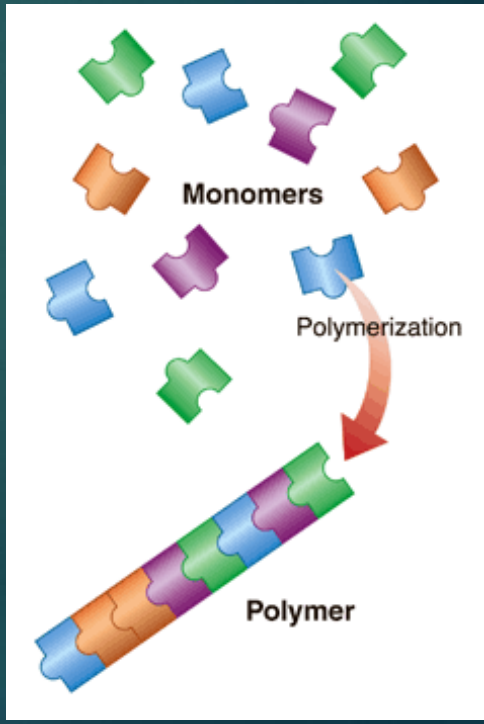
ex: 98.6 degrees F

ex. sweating vs. shivering

Domain:	Archea	Bacteria	Eukaryota			
Kingdom:	Archaebacteria 	Eubacteria 	Protista 	Plantae 	Fungi 	Animalia 
Prokaryote Eukaryote?	Prokaryote	Prokaryote	Eukaryote	Eukaryote	Eukaryote	Eukaryote
Unicellular Multi?	Unicellular	Unicellular	MOST unicellular *can be multicellular*	Multicellular	MOST multicellular *can be unicellular*	Multicellular
Autotroph Hetero or Chemoauto?	All three	All three	Auto/Hetero	Autotroph	Heterotroph	Heterotroph
Cell Wall?	Present No Peptidoglycan	Present Peptidoglycan	Absent Or Present	Present Cellulose	Present Chitin	Absent NONE!!!
Asexual, Sexual, or both?	Asexual	Asexual	Both	Both	Both	Sexual
Examples of Organisms:	Thermofiles Halophiles Methanogens	E-Coli Salmonella	Algae Amoebas	Trees Flowers	Mushroom Yeast Mold	Mammals Amphibians

Biomolecules…. also called Macromolecules
ALL are ORGANIC = Having CARBON

- Formed by a process called *polymerization*, in which large compounds are built by joining smaller compounds.
- The small compounds are called monomers, which join together to form polymers.
- 4 groups of biomolecules:
  - **Carbs, Lipids, Proteins, Nucleic Acids**



Your body accesses biomolecules for energy in THIS order:

1.) Carbs

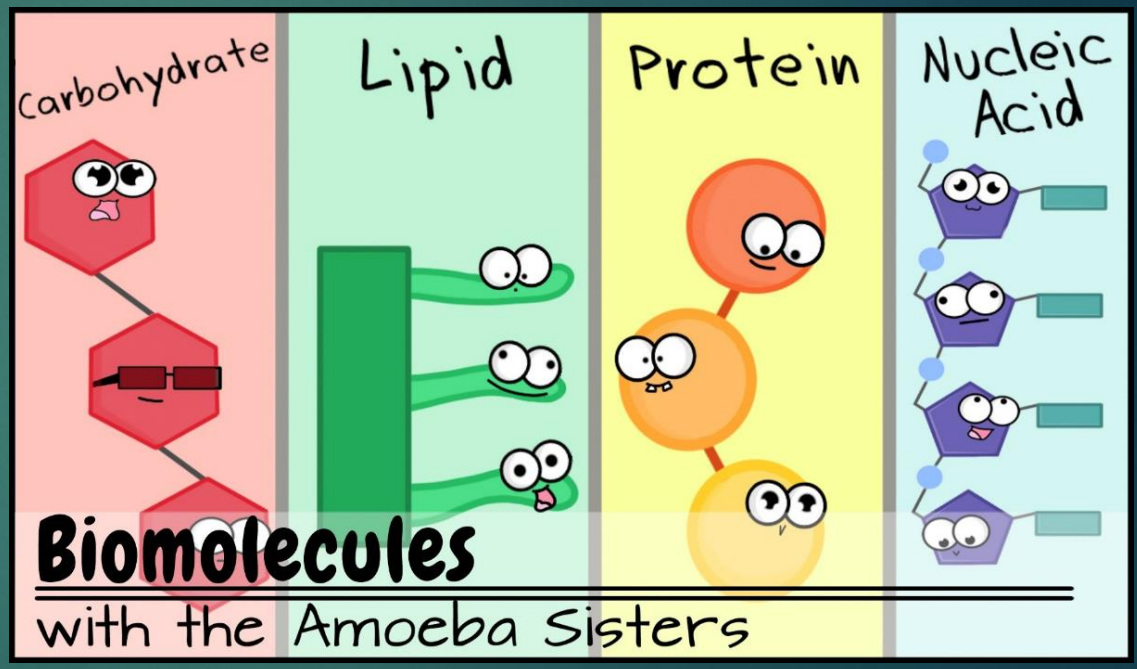
2.) Lipids

3.) Proteins

4.) Nucleic Acids

…are NEVER used to obtain energy.

*Also, most complex!



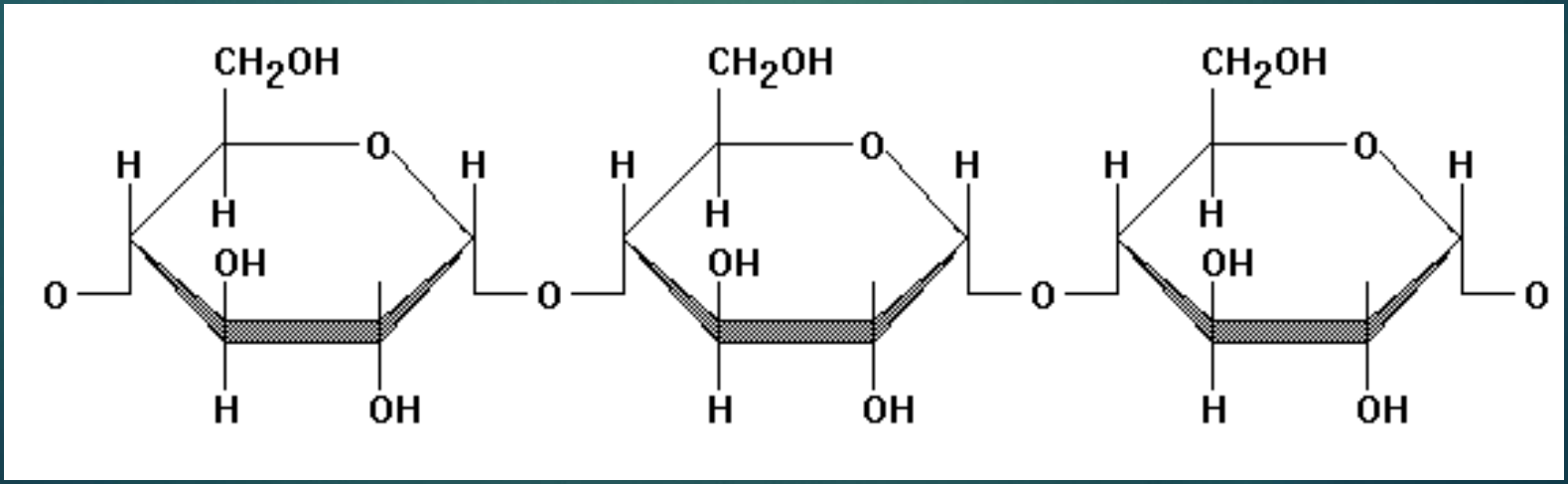
Carbohydrates

- **Elements:** Carbon, Hydrogen, and Oxygen
- **Monomer:** Monosaccharides
- **Function:**
  - Quick Energy
  - Plants: stored energy (glucose)
- **Energy:** 4 cals/1 g
- **Examples:** Glucose, Sucrose, Cellulose, Starch, Glycogen (stored in muscles)

- Joining monosaccharides (monomers) together forms large macromolecules call polysaccharides (polymers)

  (Remember *polymerization*?)

*****Glycogen: form of sugar that is stored in liver and muscles**

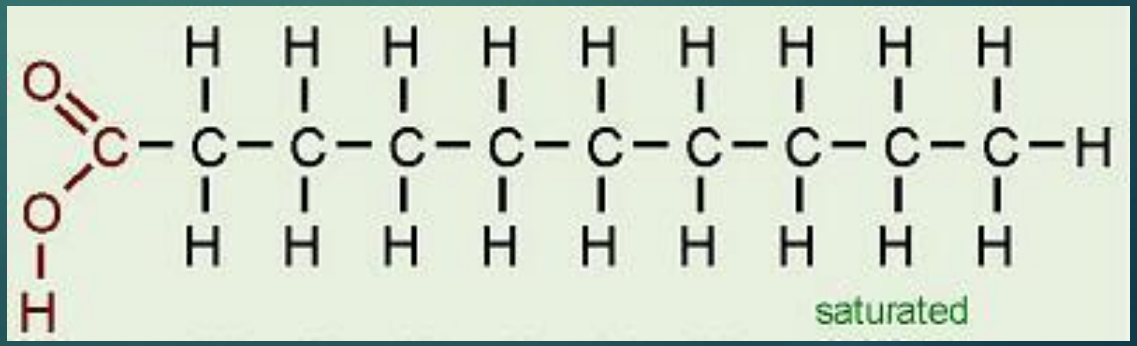



STOP
Eating Carbs right NOW!!!

Lipids

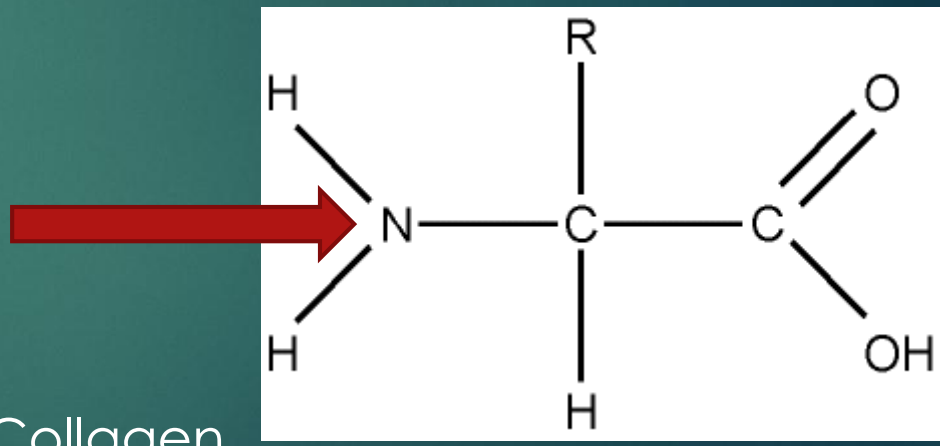
- **Elements:** Carbon, Hydrogen, and Oxygen
- **Monomers:** Glycerol and Fatty Acids.
- **Function:**
  - store energy
  - biological membranes
  - waterproof coverings
- **Energy:** 9 cals/ 1 g
- **Examples:** fat, oil, wax

L I N E



Proteins

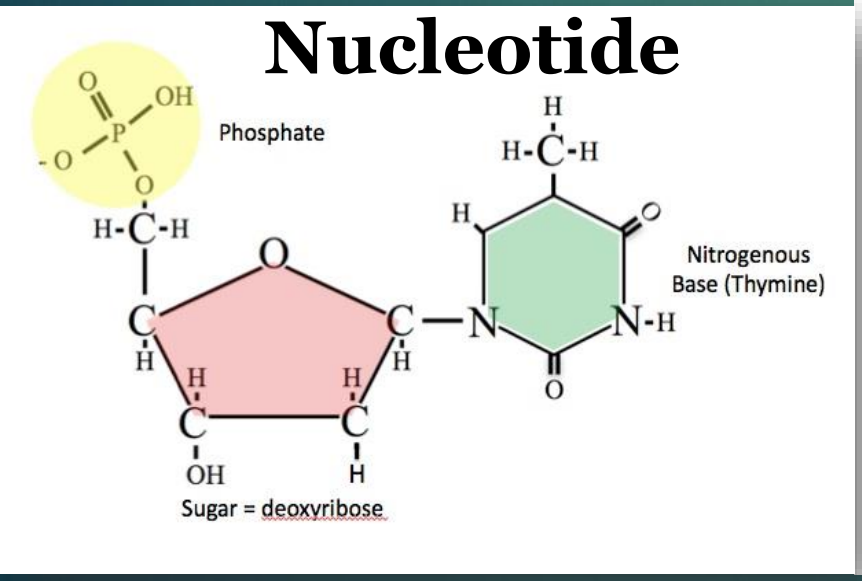
- **Elements:** Carbon, Hydrogen, Oxygen, and Nitrogen
- **Monomer:** Amino acids
  - joined together by **peptide bonds** to form proteins (polymers)
- **Function:**
  - regulate reactions (enzymes) and cell processes,
  - form bones and muscles
  - repair and build tissues
  - transport substances
  - fights disease
- **Energy:** 4 cals/ 1 gram
- **Examples:** Keratin, Hemoglobin, Collagen

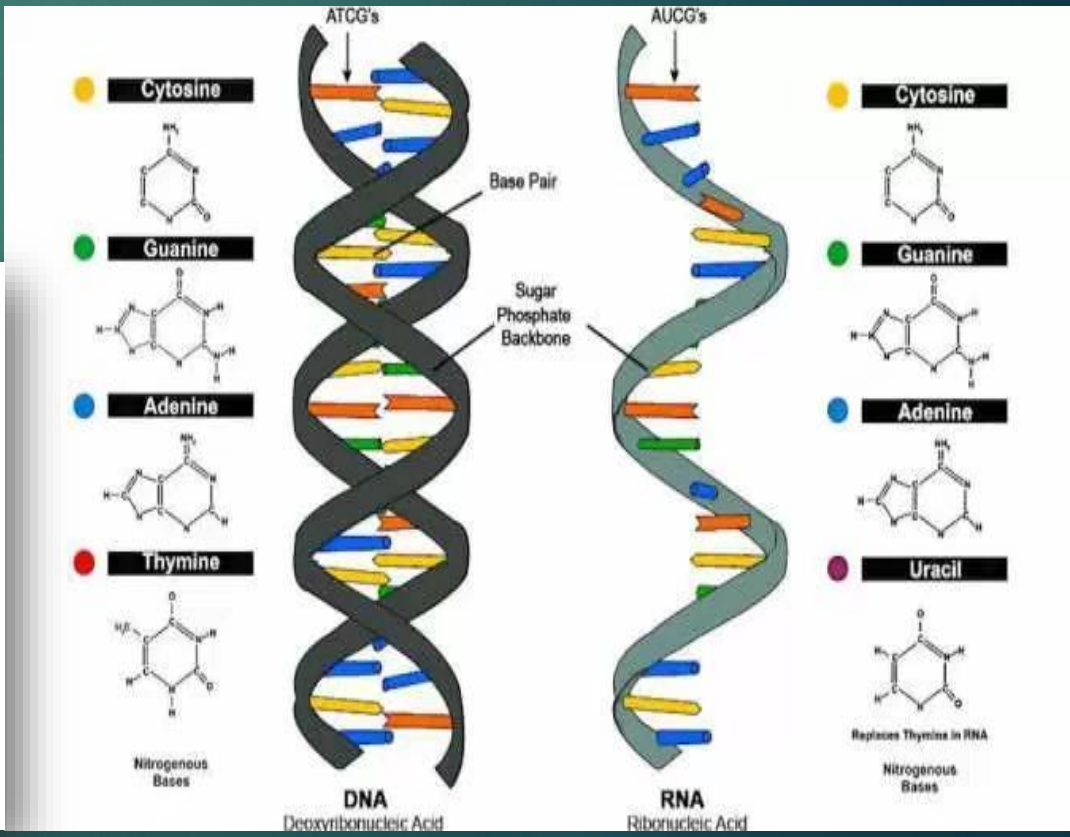


Hint: Protein has an 'N' just like 'N'itrogen!

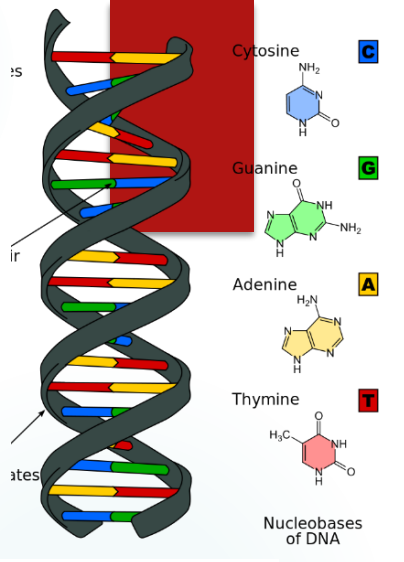
Nucleic Acids

- **Elements:** Carbon, Hydrogen, Oxygen, Nitrogen, and Phosphorus
- **Monomer:** Nucleotides (monomer)
- **Function:** Used to store and transmit heredity or genetic information
- **Energy:** 0 cals/ 0 gram
- **Examples:** DNA, RNA

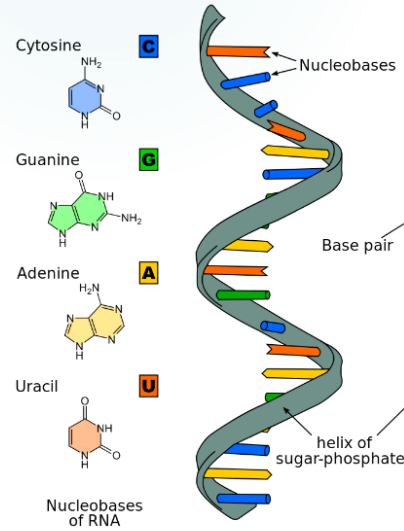




	DNA	RNA
Structure	2 strands	1 strand
Sugar	Deoxyribose	Ribose
Bases	Adenine (A) Thymine (T) Cytosine (C) Guanine (G)	Adenine (A) Uracil (U) Cytosine (C) Guanine (G)
Base Pair Rule	A – **T** C – G	A – **U** C – G
Location in cells	Nucleus (Eukaryotes only) Cytoplasm (Prokaryotes only)	Nucleus and Cytoplasm



DNA



RNA