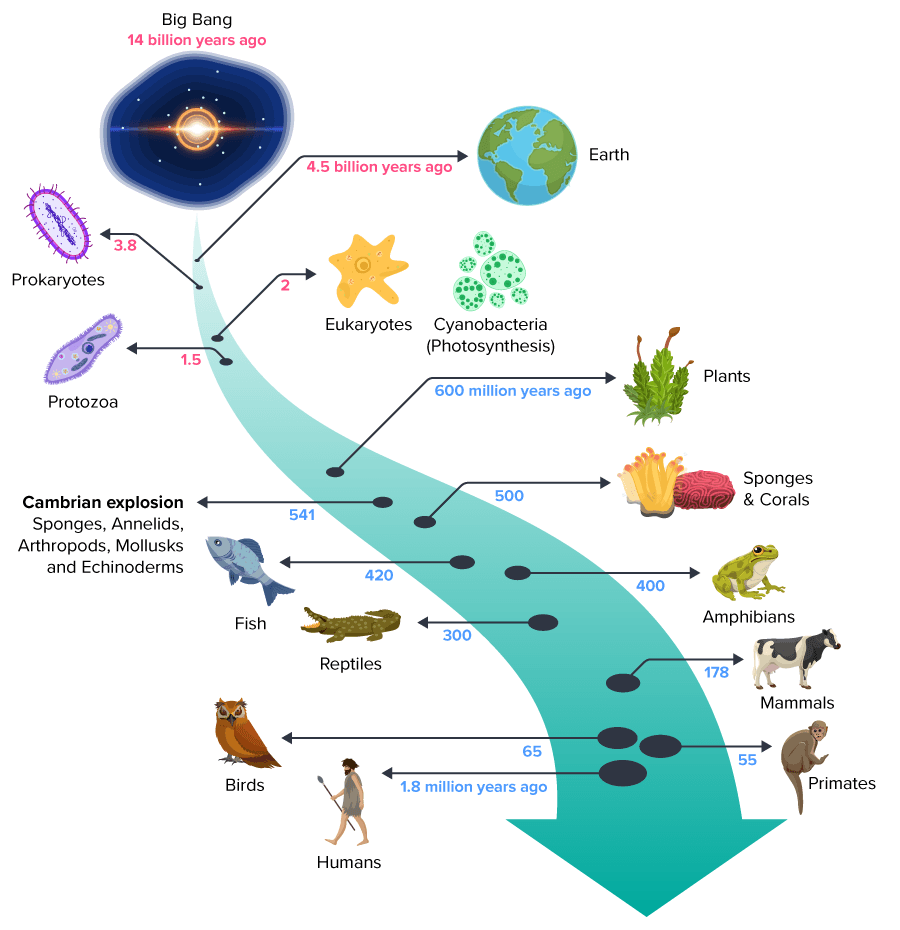
**Introduction to Biology – The Study of Life**

**Date: Biological Specimen:**

**By the end of the lesson you should be able to:**

* Describe the 8 characteristics of life
* Describe how life is organized

**Life on Earth**

* Life arose more than \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* First organisms (living things) were \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Only life on Earth for millions of years
* Organisms changed over time (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* New organisms arose from older kinds
* Today there are millions of species that inhabit almost every region of Earth today

**Characteristics of Life**

* **Biology** is the scientific study of life.
* What defines life? Most biologists look for a set of general characteristics.

**All life …**

1) … is made up of at least one or more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2) … must obtain and use materials and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3) … \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and develops

4) … \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ itself

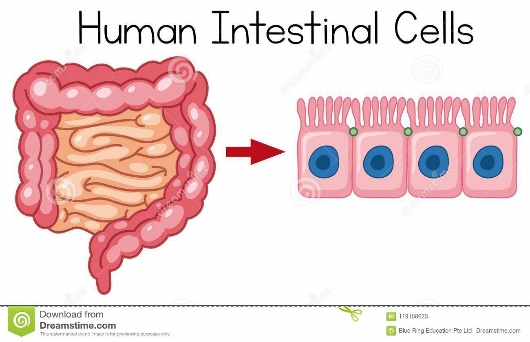
5) … \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to its environment

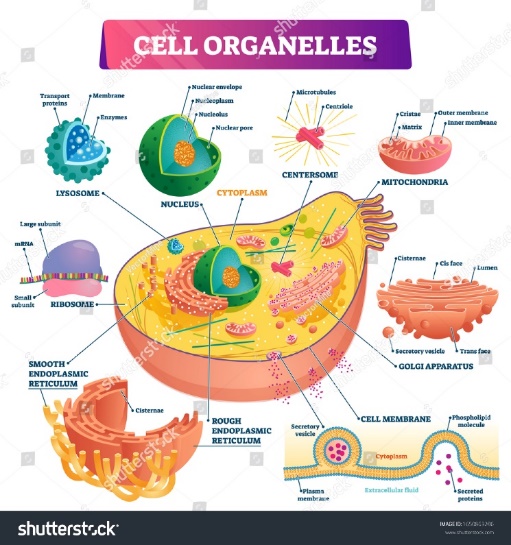
6) … \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - evolves - to survive in its environment

****7) … maintains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (stable internal environments)

8) … is based on a universal \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

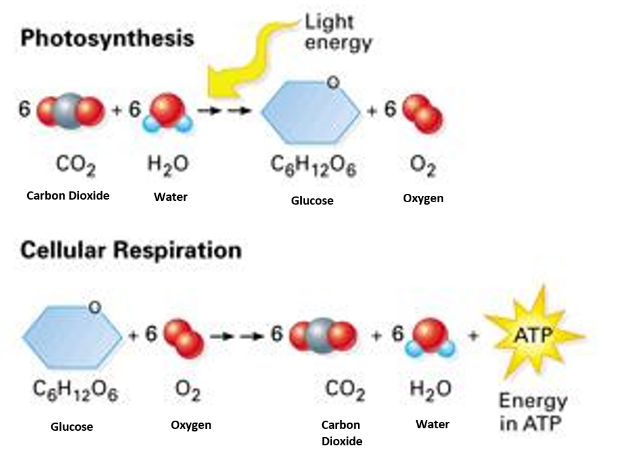
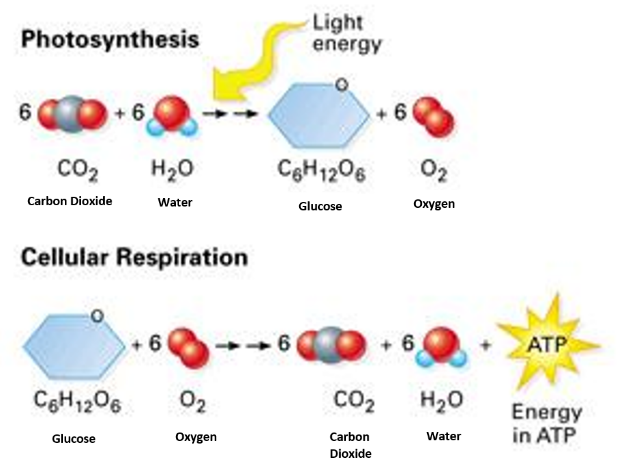
**1) Life is Made Up of at Least One Cell**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are the basic unit of life
* All organisms are made of and develop from cells
* Some composed of only a single cell (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) which is usually \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (eg. bacteria, amoeba, algae, paramecium)
* Most organisms are composed of many cells (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* Cells are different (undergo \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* Cells are small and highly organized
* There is a close relationship between cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



* Cells contain specialized structures (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) that carry out the cell’s life processes
* Many different kinds of cells exist
* All cells surrounded by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Contain a set of instructions called DNA (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

**2) Life Must Obtain and Use Materials and Energy (Metabolism)**

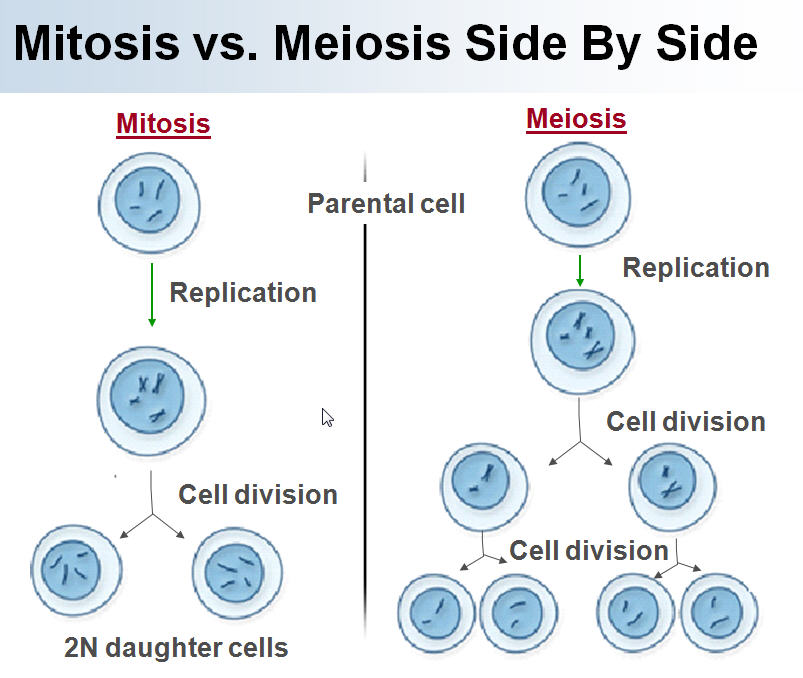
* Living things need energy to power cellular processes and materials to build new cells, grow and reproduce
*  Set of chemical reactions that convert “food” into energy is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - *Sum of all chemical processes*
* Almost all energy comes from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (directly or indirectly)
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the process by which some organisms capture the energy from the sun (solar) and transform it into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that can be used by living things
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the process by which all organisms break down glucose (sugar) to produce the high energy molecule \_\_\_\_\_\_\_\_\_\_ (cellular energy) that can be used by the organism.

 **Autotrophs**

* + Organisms that make their own food are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – use solar energy (photosynthesis) to get energy
  + Convert H2O and CO2 into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – use different chemical processes to get energy

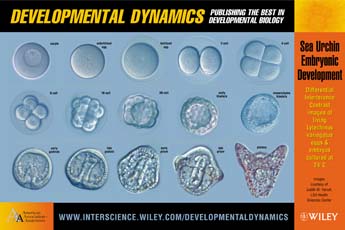
**Heterotrophs**

* + Organisms that must take in food to meet their energy needs are called \_\_\_\_\_\_\_\_\_\_\_\_\_
  + Consume autotrophs (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_), other heterotrophs (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) or both (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) for their energy needs
  + Complex chemicals are broken down and reassembled into chemicals and structures needed by organisms

**3) Life Grows and Develops**

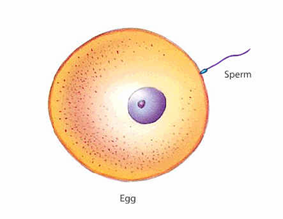
**Growth**

* Growth is an increase in biomass that occurs as the result of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Cell division is the formation of two cells from a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* New cells enlarge as they mature
* When a cell grows to a size where its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ isn’t big enough for its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the cell divides

**Development**

* The process by which an adult organism arise is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Repeated cell divisions and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Organisms grow and develop along a specific sequence based on the instructions present in their genetic code (DNA).

**4) Life Reproduces Itself**

* All species have the ability to reproduce
* Not essential to survival of individual but is essential for continuation of a species

**Sexual Reproduction**

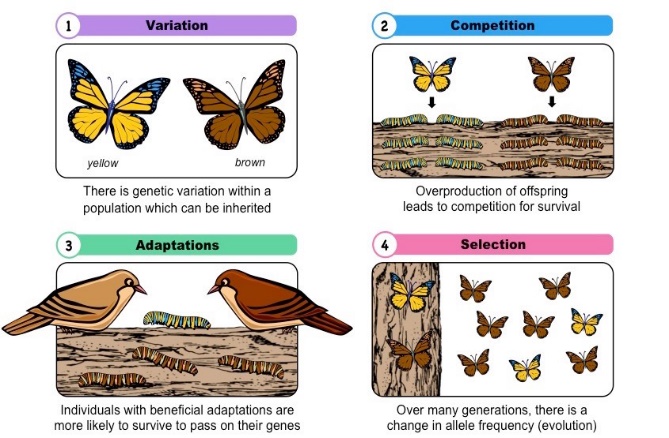
* + Hereditary information from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the same species are combined
  + Egg and sperm 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (fertilized egg)
  + Zygote contains hereditary information from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Asexual Reproduction**

* + Hereditary information from \_\_\_\_\_\_\_\_\_\_, usually unicellular, organism that divides
  + Resulting cells contain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ information
  + Genetic information from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Populations of organisms adapt to their environment over time through the process of evolution

**5) Life Responds to its Environment**

* Livings things have the ability to respond to changes in their environment called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Detect and respond to changes in light, heat, sound, chemicals and mechanical contact
* Coordinates its responses

**6) Life Adapts Over Time - Evolves - to Survive in its Environment**

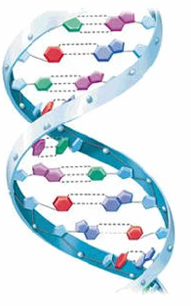
* Populations of organisms adapt to their environment over time through the process of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are selected for and passed on to offspring. These are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Driven by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or “survival of the fittest”

**7) Life Maintains Homeostasis (Stable Internal Environments)**

* Living organisms must maintain a specific range of internal conditions in spite of the outside changes. This balance is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*Cells function best when these are in balance

* **Homeo** = same, steady **Stasis** = state
* Examples: - Water balance inside and outside of cell, Human body temperature

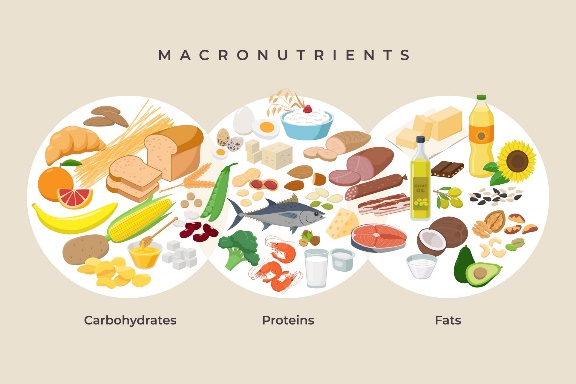
**8) Life is Based on a Universal Genetic Code**

**DNA**

* Genetic Information in all cells
* Deoxyribonucleic Acid
* DNA contains instructions for traits \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Make the structures and complex chemicals necessary for life \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* DNA in every body cell (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) is exactly alike

**Organization of Life**

* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the part of Earth that supports life.
* An \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a specific area within the biosphere with a common set of physical characteristics. - Climate, soil, landforms, etc.
* The biological \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is made of all populations living and interacting in one ecosystem.
* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_includes all members of a species that live in the same community.
* An \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is an individual living thing.
* Organisms are made of organ systems and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, structures with a specific vital function.
* Each organ is made of a collection of \_\_\_\_\_\_\_\_\_\_\_\_\_, which are groups of cells with similar structure and functions.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the smallest unit of an organism that still demonstrates all the basic characteristics of life.



**What is Life Made From?**

* You are what you eat! This will be our next topic!

**Can You …**

* … describe the 8 characteristics of life?
* … describe how life is organized?