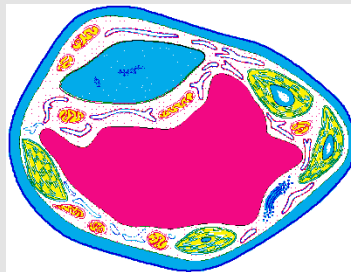
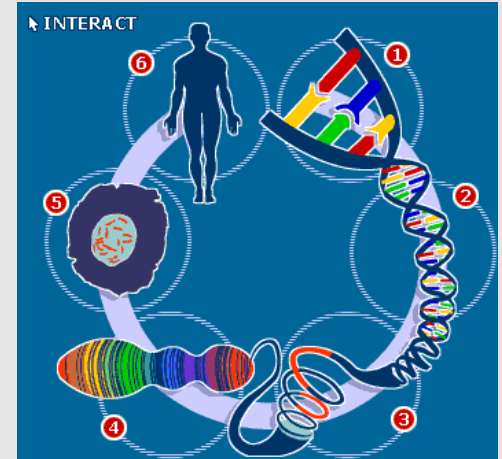


Biology 1 Review



Characteristics of Living Things

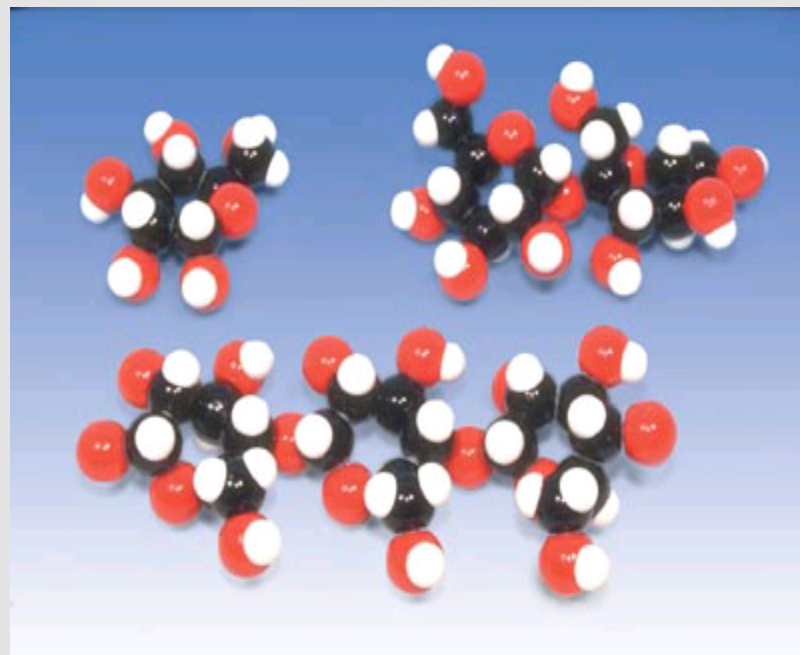
- Living things are made of cells.
- Living things reproduce.
- Living things are based on a universal genetic code based on DNA.
- Living things grow and develop.
- Living things obtain and use materials and energy.
- Living things respond to their environment
- Living things can maintain a stable internal environment (homeostasis).
- Living things change over time-they evolve.



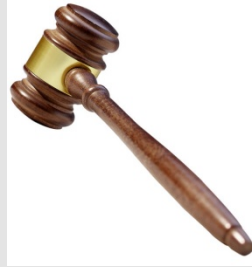
Chemistry of Life

- Living things generally require water for the chemical reactions that take place in their cells.
- Carbon-based molecules make up the majority of compounds in living things.

Organic chemistry is the study of carbon compounds



Cell Theory (1850' s)



- All living things are made of one or more cells.
- The cell is the basic unit of organization of all living things.
- All cells come from pre-existing cells.

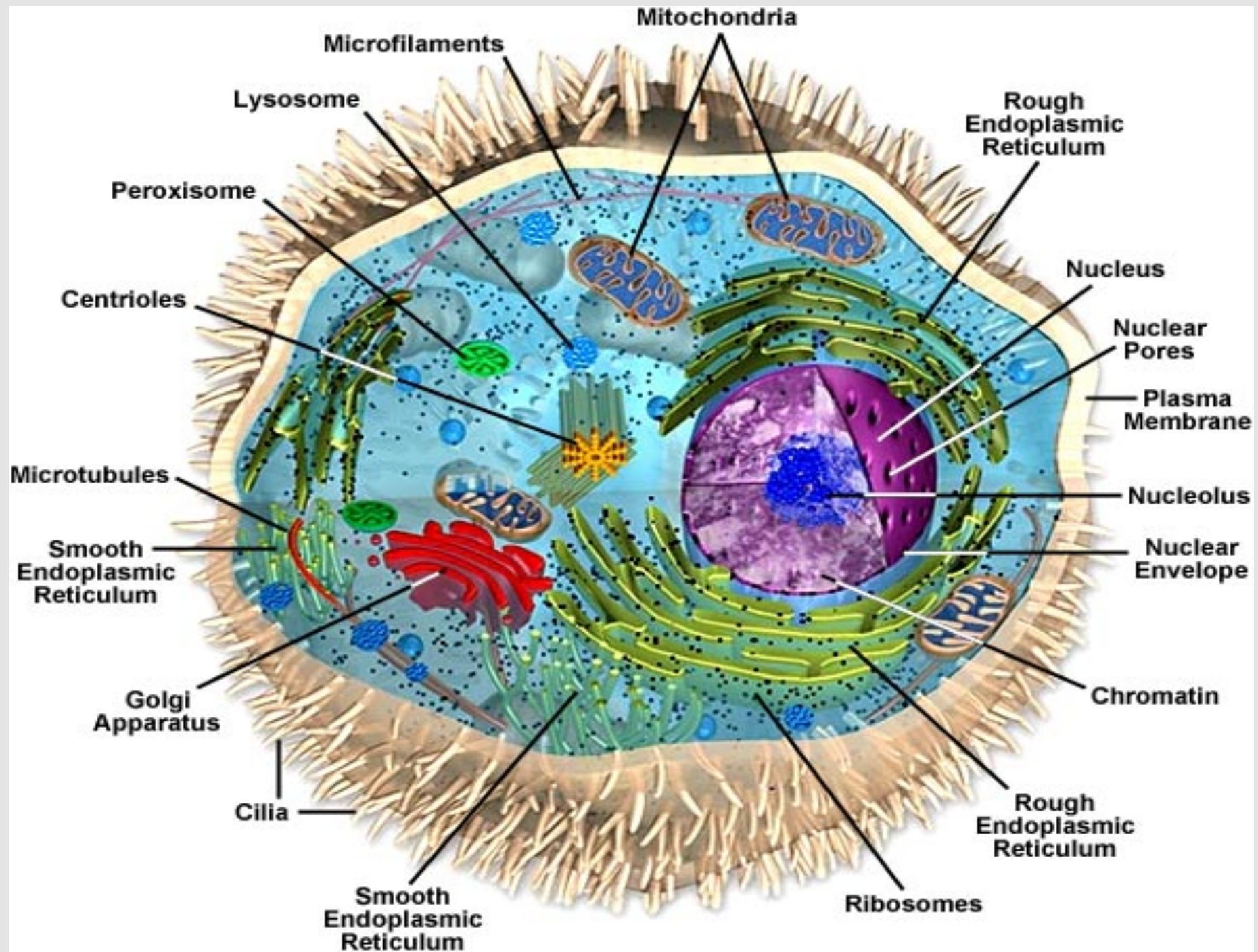
Two Types of Cells

Eukaryotic Cells

- Make up plants, animals, fungi and protists
- Have membrane-bound organelles
- Organelles include nucleus, mitochondria, lysosomes, ribosomes, etc.

Prokaryotic Cells

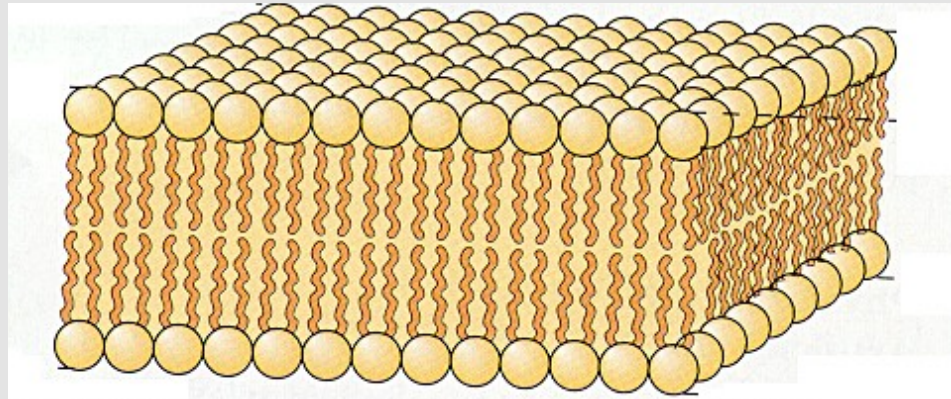
- Make up Archaea and Bacteria
- DO NOT contain internal membrane-bound organelles.
- Genetic material is a circular chromosome.
- Have extra DNA in a plasmid.



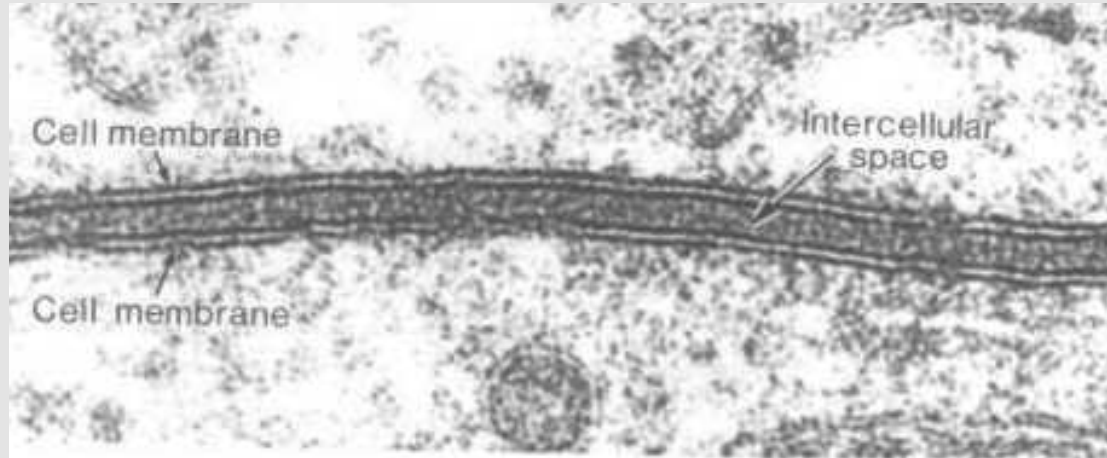
Construction of the Cell Membrane

- Phospholipid bilayer: two layers of phospholipids positioned tail to tail.

Fluid mosaic model



What does this really look like?



The nonpolar tails (middle layer) help keep unwanted materials out of the cell.

The polar heads on the outside, allow the cell to mingle with most “body” fluids which are water soluble.

Two Types of Transport

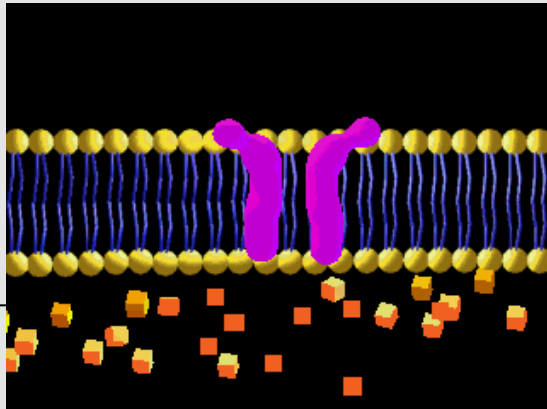
Passive Transport

Uses no energy

Simple Diffusion

Facilitated Diffusion

Osmosis



Active Transport

Uses energy

Ion Pump

Endocytosis

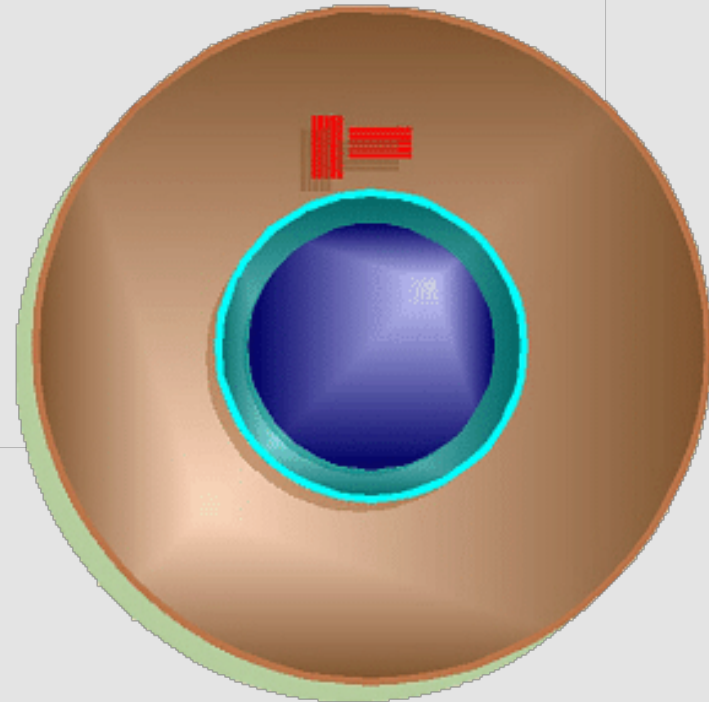
(Phagocytosis)

Exocytosis

The Cell Cycle...

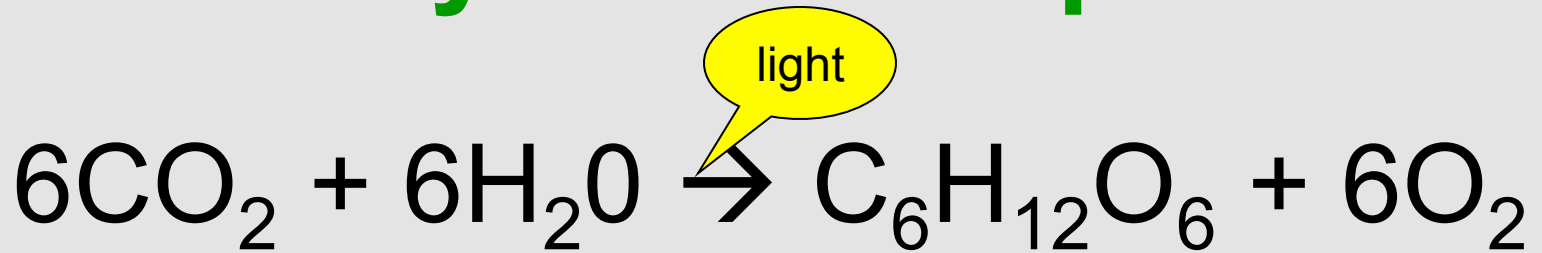
Interphase and Mitosis

Interphase
Prophase
Metaphase
Anaphase
Telophase
Cytokinesis

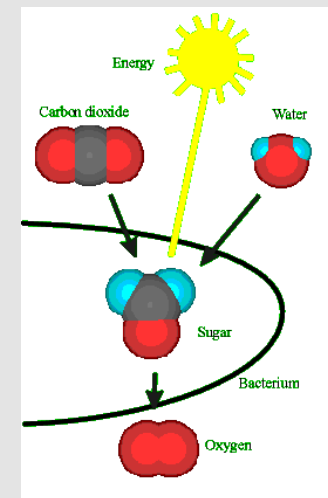
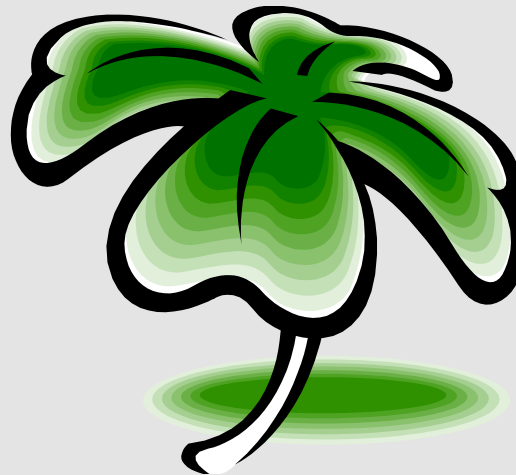
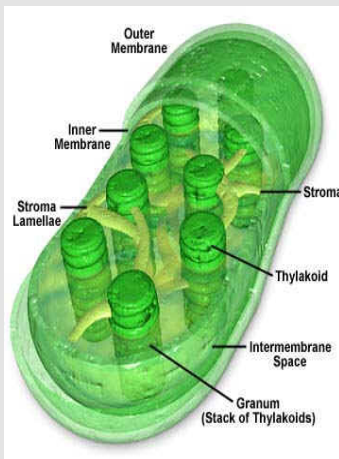


Individual cells divide making 2 cells both genetically identical to the original.

Photosynthesis Equation

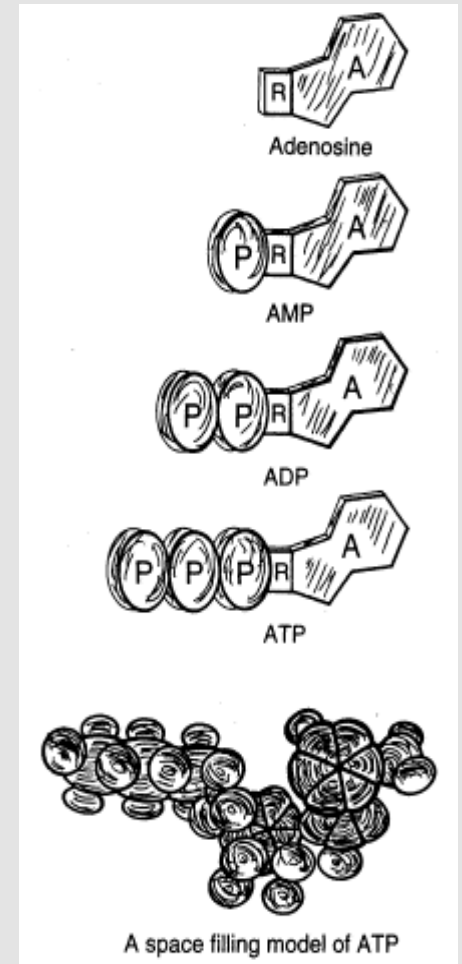


6 molecules of carbon dioxide and 6 molecules of water react in the presence of light to produce 1 molecule of sugar and 6 molecules of oxygen.

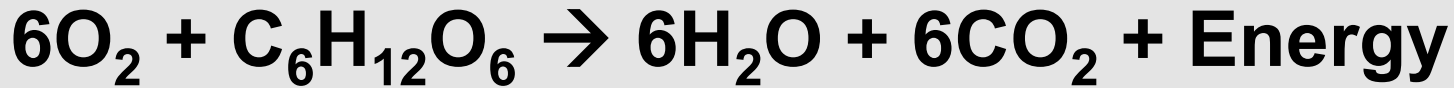


Cells Use Energy in the form of ATP

- ATP → Adenosine Triphosphate
- As long as phosphate (PO_4) molecules are available in the cytoplasm, the cell can make energy.
- PO_4 binds to specific sites on proteins to release their energy.
- ATP > ADP > AMP
- $1\text{ATP} = 12\text{kcal (C)} = 12000\text{cal (c)}$



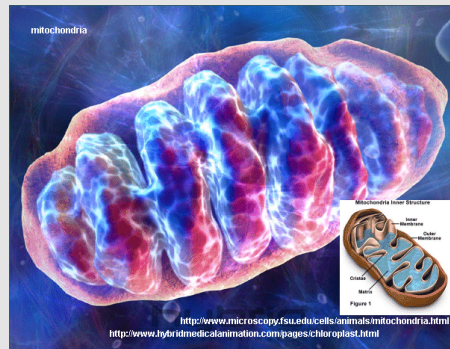
Cellular Respiration Formula



36 molecules of ATP

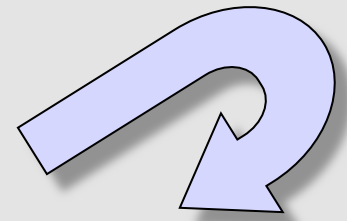
6 molecules of oxygen and 1 molecule sugar react to produce 6 molecules of water, 6 molecules of carbon dioxide and 36 molecules of ATP.

Happens
in the
mitochondria





Fermentation...



the other way to break down sugar

Lactic Acid Fermentation:

Lactic Acid builds up in overworked muscle cells causing a burning pain.



Alcoholic Fermentation:

Yeasts and some bacteria can break down sugar to produce ethanol (alcohol), carbon dioxide and energy.



What Mendel Learned



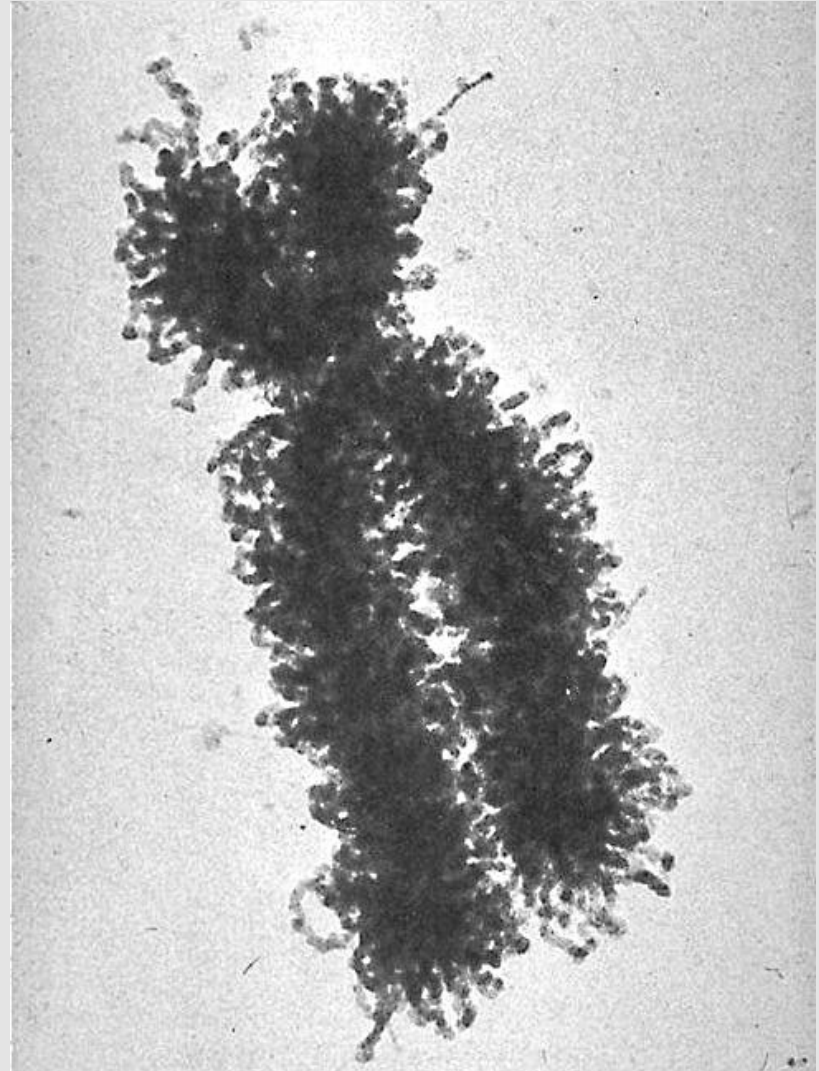
- Genetics: the study of heredity
- Heredity: the study of how traits are passed from parent to offspring.
- Traits: Physical characteristics of an organism
- Alleles: alternative forms of a gene that may appear at the same point on a chromosome

- Dominant: the stronger, overriding gene (allele), if present will show (T)
- Recessive: the hidden, weaker, gene (allele), will show if dominant is not present (t)

- Genotype: The 2 gene combination of an organism (TT, Tt, tt)
- Phenotype: how the 2 gene combination physically appears (tall, short)

- Homozygous: having 2 of the same genes for a trait (TT, tt) Purebred
- Heterozygous: having 2 different genes for a trait (Tt) Carrier, Hybrid

Chromosomes are Tightly Coiled DNA



Sperm Cell
23 chromosomes
(haploid n)

Why Meiosis?



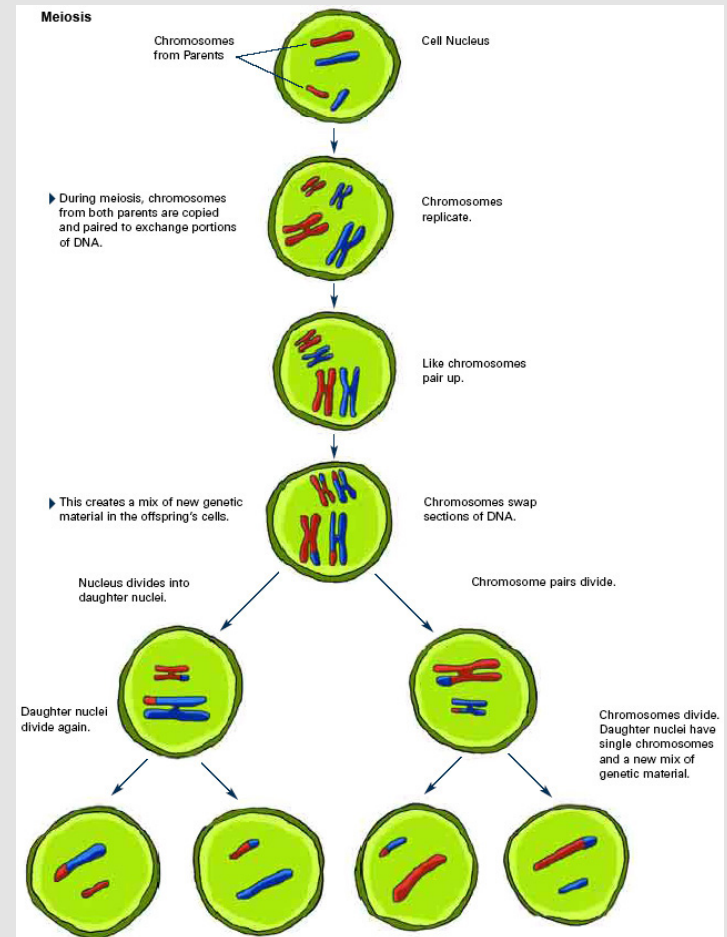
Baby
46 chromosomes
(diploid $2n$)



Egg Cell
23 chromosomes
(haploid n)

Meiosis

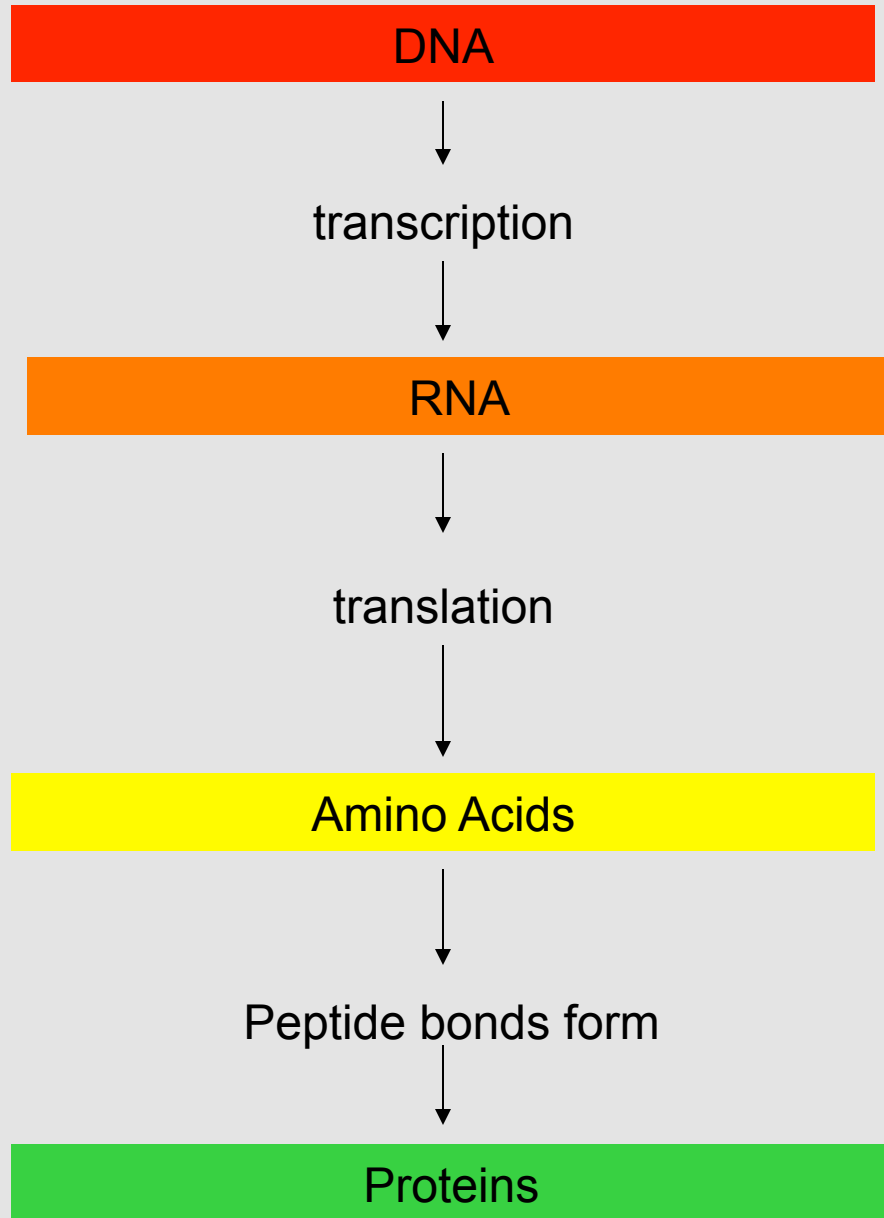
- Meiosis is how **gametes** are made.
- It reduces the **diploid** number of chromosomes to **haploid**.
- Human sex cells have 23 chromosomes.
- **Crossing over**, which occurs during **Prophase 1**, is when homologous chromosomes exchange genes. This produces genetic variety.
- Meiosis in males (**spermatogenesis**) produces 4 haploid sperm cells.
- Meiosis in females (**oogenesis**) produces 1 **ovum (egg)** and 3 **polar bodies** which die.



Deoxyribonucleic Acid (DNA)

Ribonucleic Acid (RNA)

- DNA is the cell's instructions for making proteins.
- RNA is like a working copy of a single gene.
- RNA is different from DNA.
 - 1) RNA is single stranded; DNA is double-stranded.
 - 2) In RNA the sugar is ribose; DNA has deoxyribose.
 - 3) RNA has Uracil; DNA has Thymine.
 - 4) 3 types of RNA: messengerRNA, transferRNA, and ribosomalRNA.



A strand of DNA reads:

ATG GAA CAA TTG TGA

What would the complementary strand read?

TAC CTT GTT AAC ACT

Using the complementary strand as a template, what RNA strand would result?

AUG GAA CAA UUG UGA

Which Amino Acids would result from these codons?

Methionine—Glutamic Acid—Glutamine—Leucine—STOP

	U	C	A	G	
U	Phenylalanine	Serine	Tyrosine	Cysteine	U
	Phenylalanine	Serine	Tyrosine	Cysteine	C
	Leucine	Serine	Stop	Stop	A
	Leucine	Serine	Stop	Tryptophan	G
C	Leucine	Proline	Histidine	Arginine	U
	Leucine	Proline	Histidine	Arginine	C
	Leucine	Proline	Glutamine	Arginine	A
	Leucine	Proline	Glutamine	Arginine	G
A	Isoleucine	Threonine	Asparagine	Serine	U
	Isoleucine	Threonine	Asparagine	Serine	C
	Isoleucine	Threonine	Lysine	Arginine	A
	Methionine	Threonine	Lysine	Arginine	G
G	Valine	Alanine	Aspartic acid	Glycine	U
	Valine	Alanine	Aspartic acid	Glycine	C
	Valine	Alanine	Glutamic acid	Glycine	A
	Valine	Alanine	Glutamic acid	Glycine	G

Examples of Proteins

- Insulin: breaks down blood glucose
- Hemoglobin: carries oxygen in blood cells.
- Saliva (Amylase): begins digestive process in mouth
- Hormones: chemicals in the body direct cell activities (estrogen, testosterone, growth, etc.)
- Collagen: connects muscles to bones



Genetic Engineering

Since **ALL living things use DNA** as their genetic material, it is possible to introduce DNA from one species into another:

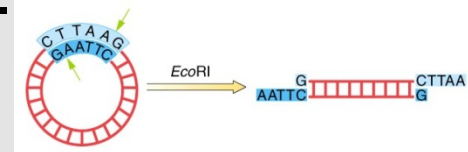
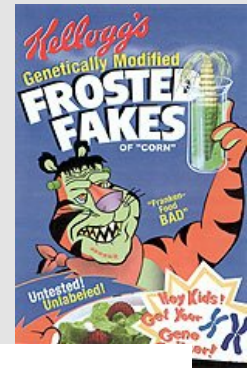


Selective Breeding: Crossing good specimens of the same species to produce desired results. Purebred animals.

Hybridization: Crossing similar species. Results somewhat unpredictable. Offspring is usually infertile.



Recombinant DNA: In a laboratory, a specific DNA segment is cut from one organism then inserted into bacteria to carry into the new organism to be incorporated into its cells.



EVOLUTION is the process of biological change that causes organisms to differ from their ancestors.

Mutations: Random mutations cause living things of the same species to differ, some mutations are beneficial.

Natural Variation: Living things of the same species naturally differ, and some differences are advantageous, or attractive to the opposite sex and tend to become more common over time.



Traits that favor **survival** and **reproduction** are carried on at a greater rate than other traits.

Ecology is the study of how living things live together

Biotic Factors are biological influences on the organisms within an ecosystem.

Abiotic Factors are physical, non-living factors that shape an ecosystem.

Predation: predator/prey

Symbiosis: “living together”

Mutualism: both species benefit

Commensalism: one species benefits and the other is neither helped nor harmed

Parasitism: one species benefits and the other is harmed

