DNA Structure and Replication

- DNA is the basis of genetics, and a macromolecule (nucleic acid)
- All living things have DNA --> but viruses do not have DNA, just RNA
- Made up of nucleotides (monomers)
 - Phosphate group
 - Sugar (deoxyribose)
 - Nitrogenous bases --> A, T, C, G
- DNA is a double stranded molecule, thus it is very stable
 - Thought of as a ladder --> double helix
 - Phosphates and sugars form a backbone rail
 - Complementary bases form the rungs
 - Complementary base pairing
 - A always pairs with T
 - G always pairs with G
- Hydrogen bonds hold the DNA strands together
 - Individually weak, but collectively very strong
- Discovery of DNA
 - James Watson and Francis Crick in 1953 discovered the double helix
 - Used the work of Rosalind Franklin and Maurice Wilkins
- DNA, Chromosomes, and Genomes
 - In eukaryotic cells, DNA in nucleus; in prokaryotic cells, DNA in cytoplasm
 - DNA packaged in chromosomes
 - DNA wrapped tightly around proteins
 - Individuals of the same species usuall make an equal number of chromosomes
 - A genome a vrganism's complete set of DNA
 - Not all genomes TP. Poly in size
- DNA Replication (Semi-Conservative)
 - \circ $\,$ Begins with one molecule of DNA $\,$
 - Split the hydrogen bonds in order to separate (unzip) the two strands
 - Add complementary bases
 - In the end, you get two DNA molecules identical to the original
 - The old strand is the template
 - Use of enzymes to break the H bonds and add nucleotides
- Mutations
 - DNA polymerase proofreads the new strands as it adds new nucleotides
 - Caused by errors in DNA replication, UV radiation, chemicals, etc