

Macromolecules of Biology

Main Macromolecules

- Carbohydrates
- Lipids
- Protein
- Nucleic Acids

Introduction

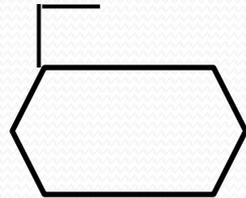
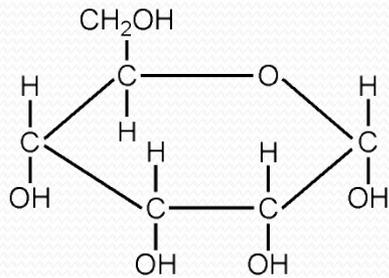
- Monomers are the individual units that are used to make polymers. (mono – one)
- Polymers are large molecules formed from the joining of monomers. (poly – many)

Carbohydrate

- Monomer is glucose.
- Used for short term energy.
- Polymer –
 - Animals – Glycogen. Usually stored in the liver and large muscles.
 - Plants –
 - Starch for energy
 - Cellulose for support (“plant bones”)

Carbohydrate cont'd.

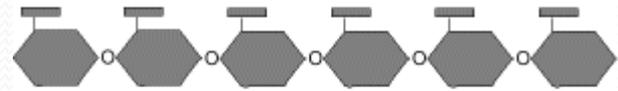
Monomer



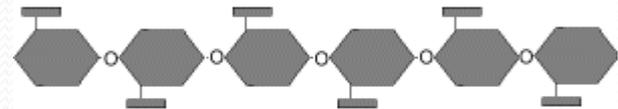
Glucose

Polymer

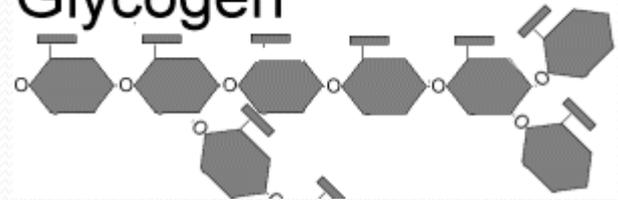
Starch



Cellulose



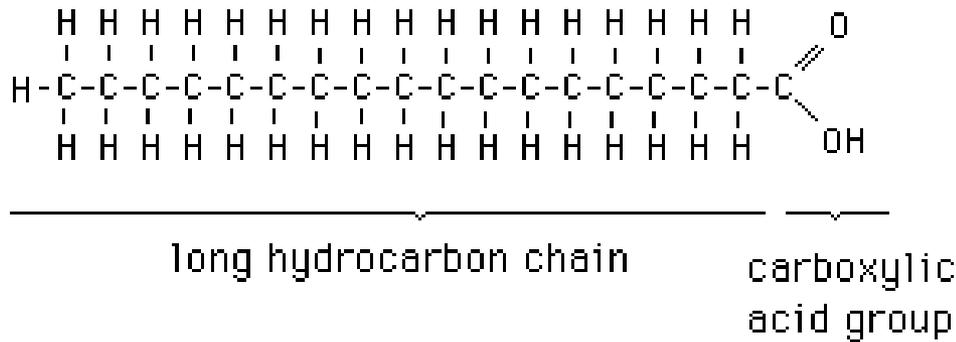
Glycogen



Lipids

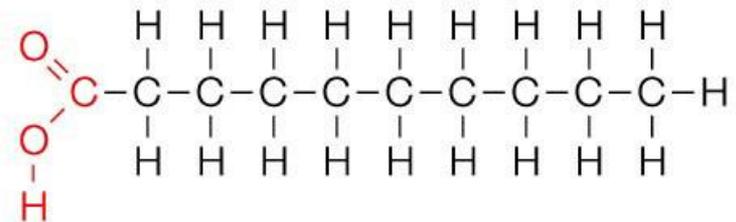
- Monomers are fatty acids.
- Polymers are fatty acids attached to a glycerol.
- Fats, waxes, fat-soluble vitamins are examples of lipids.
- Main biological functions:
 - Long term energy storage and protection.
 - Components of cell structures (i.e., cell membrane)
 - Signaling molecules.

Lipid monomers

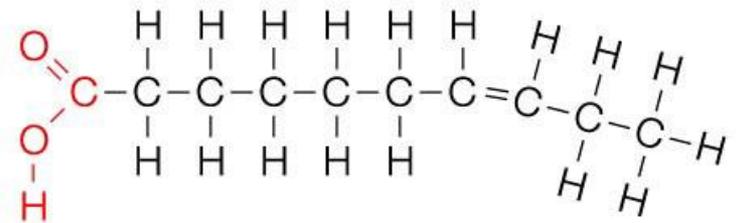


Essential features of a fatty acid

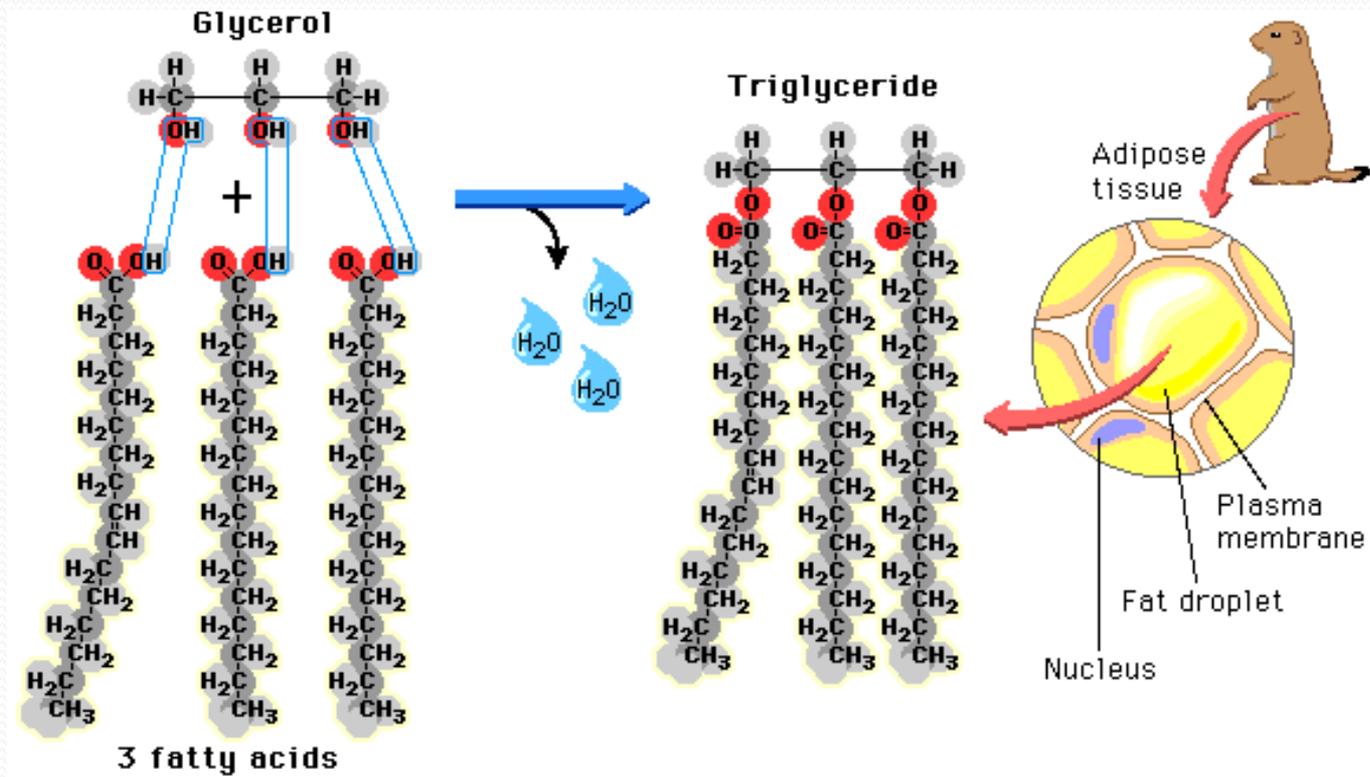
Saturated



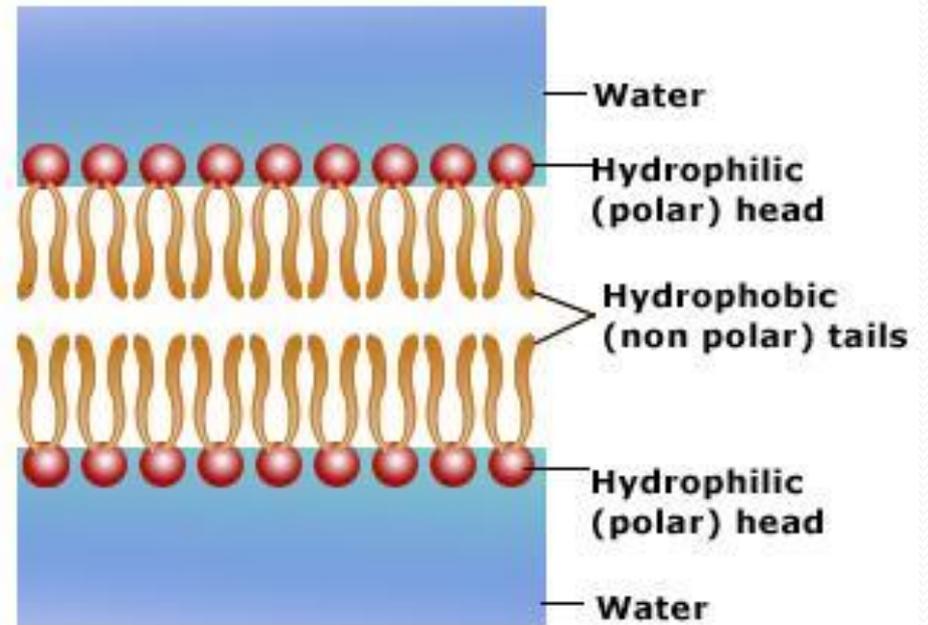
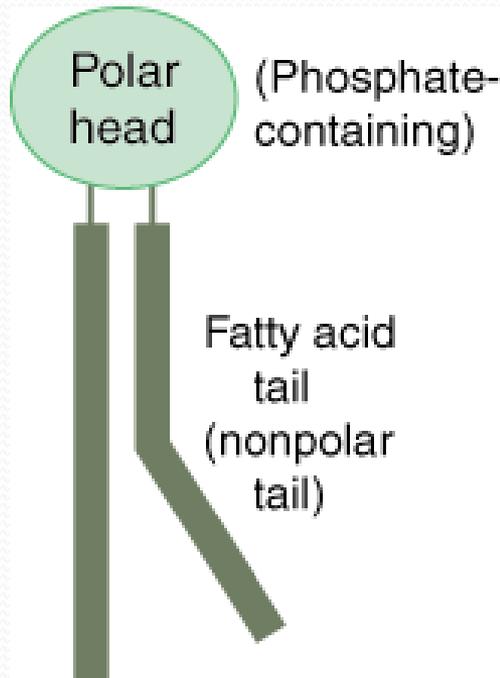
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Lipid polymers



Lipid polymers cont'd.



Cell Membrane

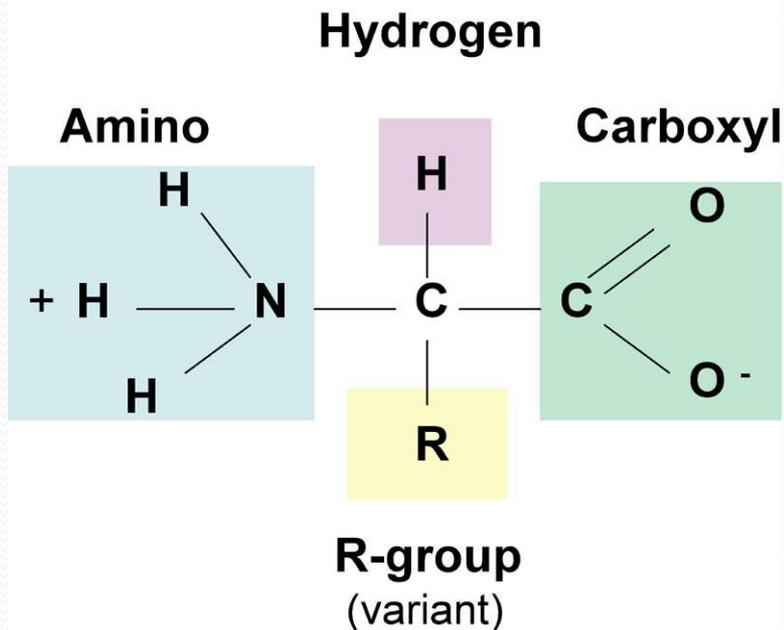
Proteins

- Monomers are amino acids.
 - Free amino acids can be neurotransmitters or intermediates in metabolic processes.
- Polymers can be called peptides or proteins.
- Biological functions of proteins include:
 - Movement and structure (muscles and cell structures)
 - ENZYMES!!
- The arrangement of amino acids in a protein determine its shape and therefore its function.

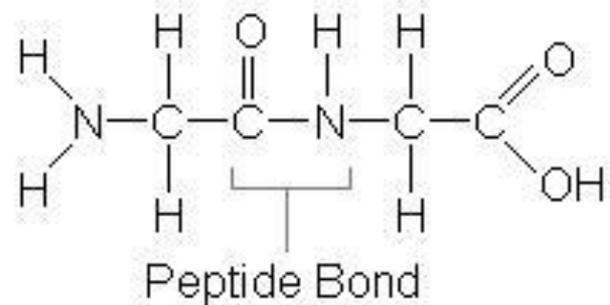
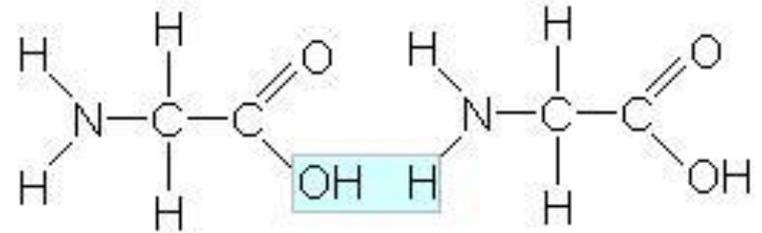
Proteins

Monomer

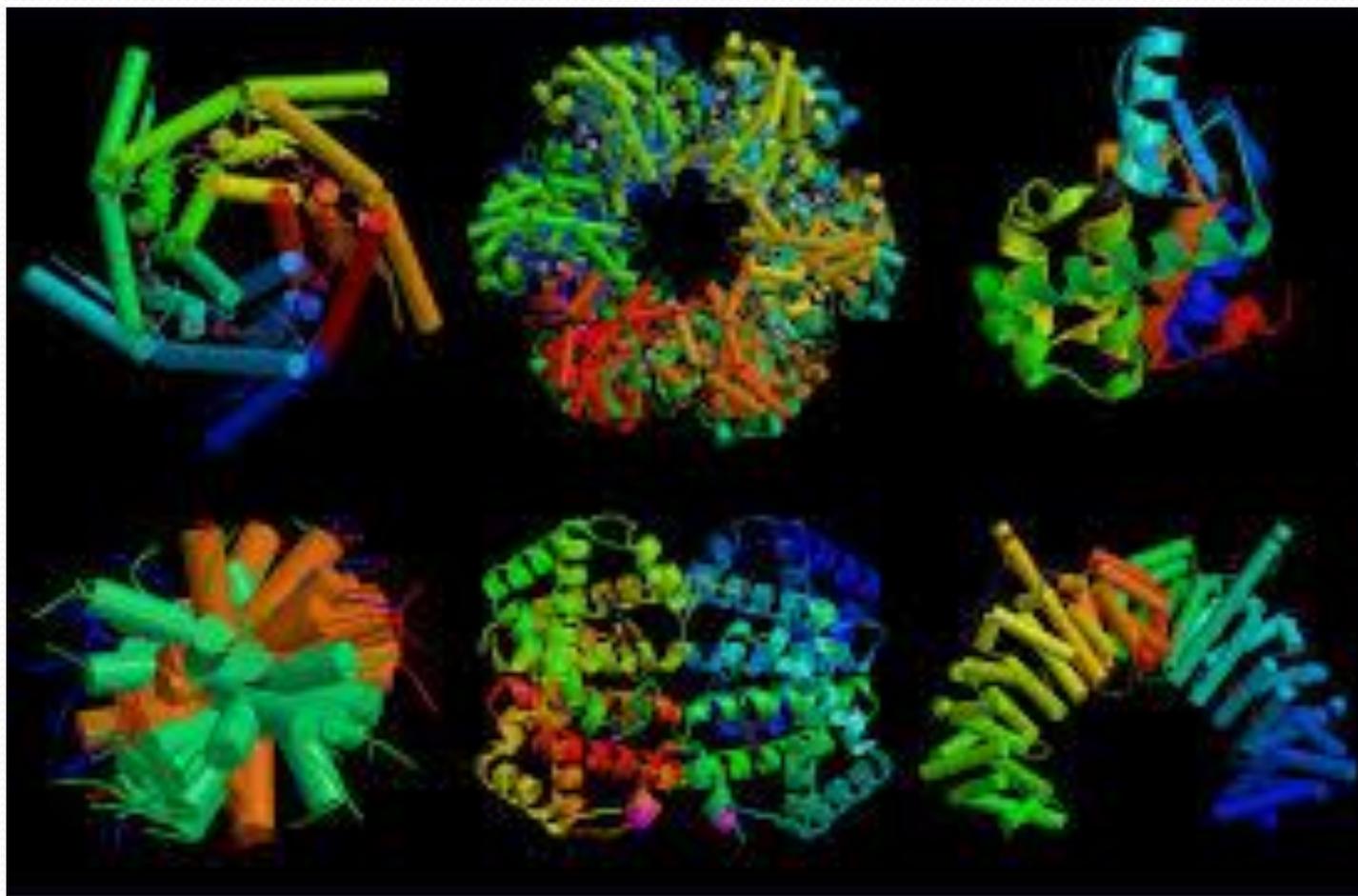
Amino Acid Structure



Polymer

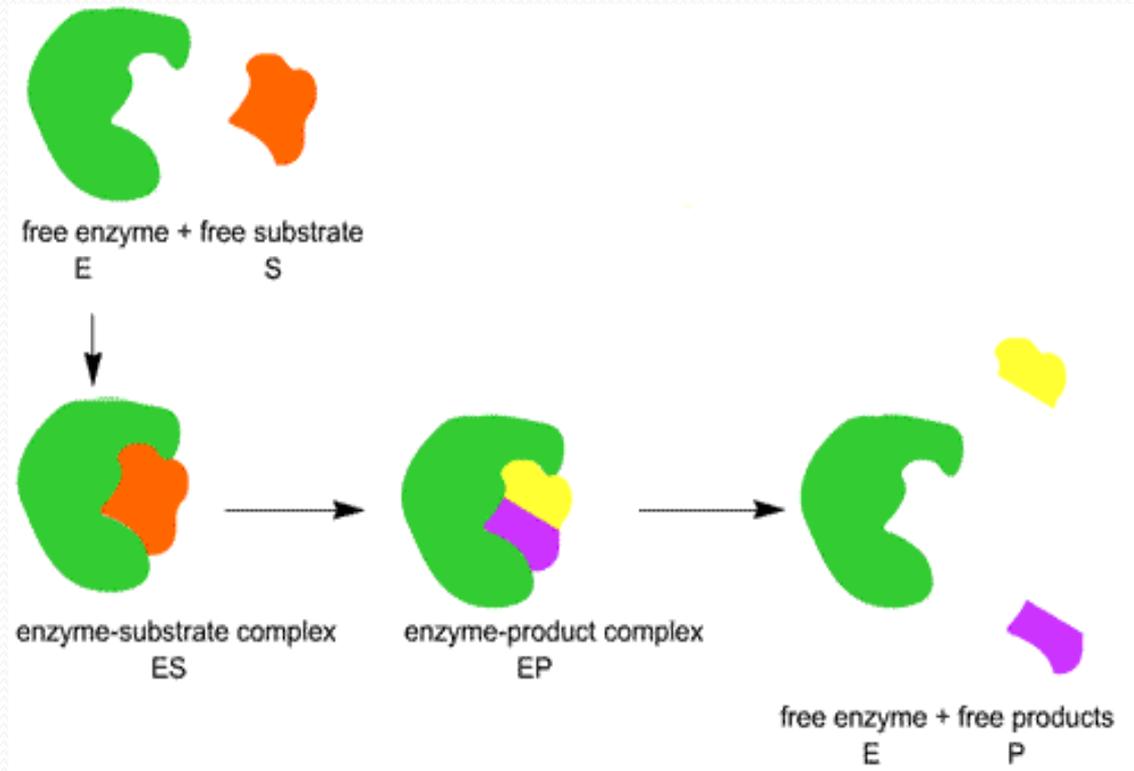


A molecule of water is removed from two glycine amino acids to form a peptide bond.



Enzymes

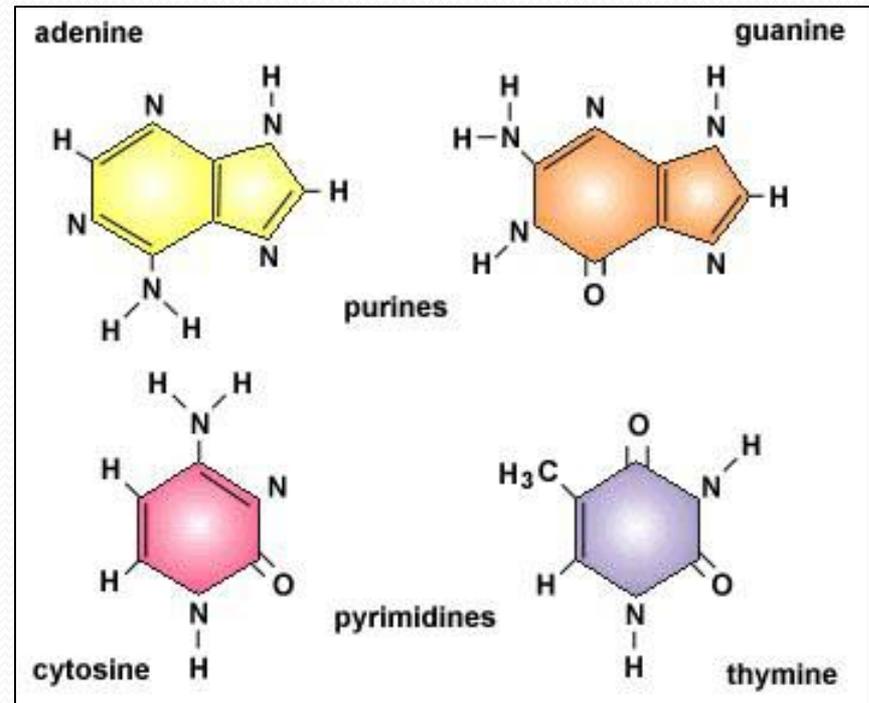
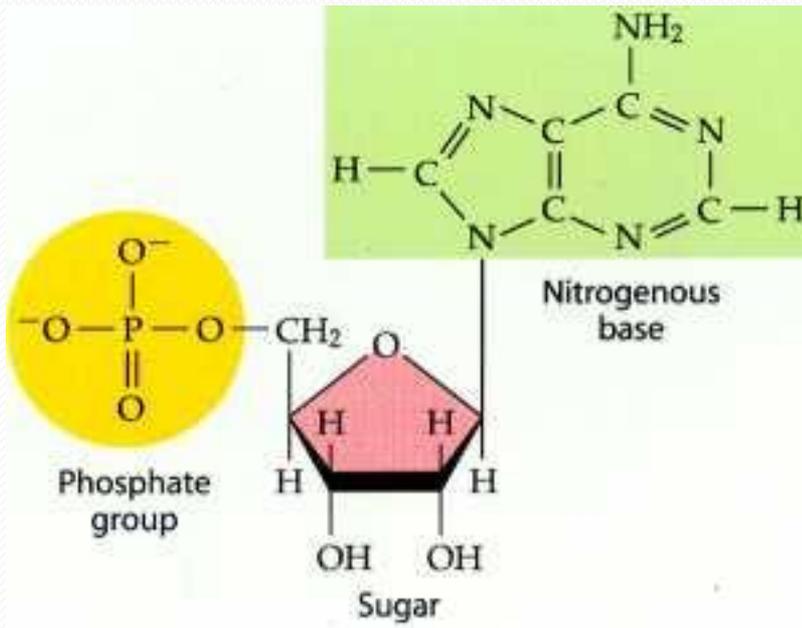
- Catalysts are molecules that can increase the rate of a chemical reaction.
- Enzymes are biological catalysts to increase the rate of chemical reactions within an organism.
- Without enzymes many biological reactions would take too long to be useful in maintaining life.
- Negative genetic mutations often affect enzyme structure and therefore many essential biological reactions are impacted.



Nucleic Acids

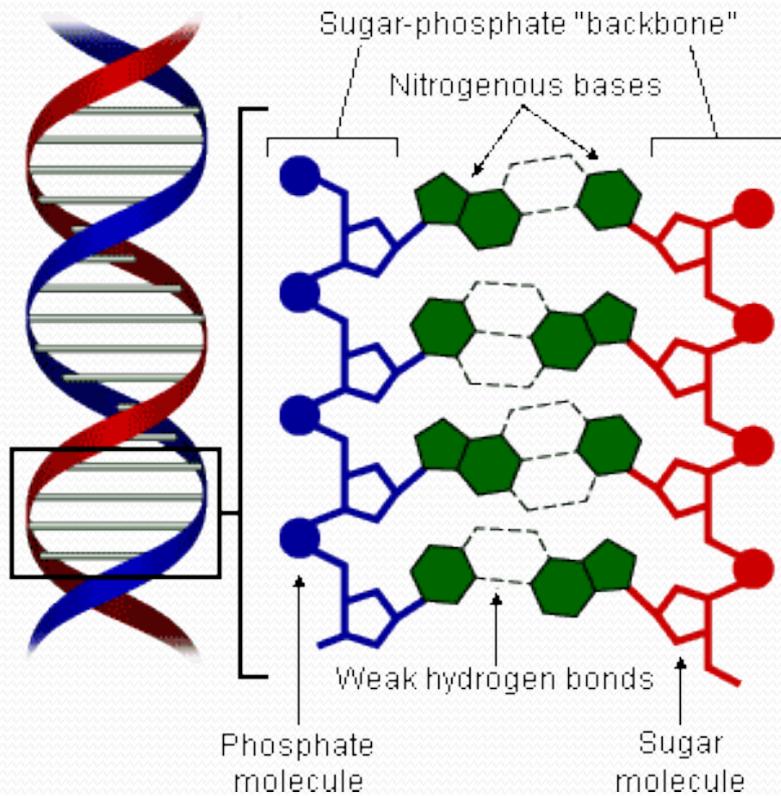
- Monomers are called nucleotides.
- Nucleic Acids is the name for the polymers of nucleotides.
- DNA and RNA are examples of nucleic acids
- The functions of nucleic acids are:
 - Storage and transmission of genetic information.AND
 - Use of that information to direct protein synthesis.

Nucleotides



Nucleic Acid Polymers

DNA



RNA

