AP Biology
Notes: Proteins

Types of proteins:
1. Structural functions in support, ex. collagen and keratin
2. Storage food source, ex. ovalbumin and casein
3. Transport moves other substances, ex. hemoglobin
4. Hormonal activates, ex. insulin
5. Contractile movement, ex. actin and myosin
6. Antibodies defense, ex. IgE, IgA, and IgG
7. Enzymes- aid in chemical reactions, ex. amylase and proteases.

Protein Structure

Amino Acids: Most amino acids consist of an asymmetrical carbon(chiral) bonded to an amine group, hydrogen, R group, and a carboxyl group.

There are 20 different amino acids. Each amino acid has an optical isomer. The left amino acid (L-form) is the functional isomer. The D-amino acid only rarely function. Proteins are formed by bonding amino acids together. The bond formed is called a peptide bond.

Protein conformation: refers to the three dimensional shape of a protein molecule. This shape is important to its function. If the conformation is changed, even slightly, the the function of the protein changes.

Levels of Protein structure:
1. Primary: refers to the unique sequence of amino acids in the protein. All proteins have a special sequence of amino acids, this sequence is derived from the cell's DNA.

2. Secondary: the coiling or bending of the polypeptide into sheets is referred to the proteins secondary structure. alpha helix or a beta pleated sheet are the basic forms of this level. They can exist separately or jointly in a protein.

Alpha Helix: In an alpha helix, the polypeptide backbone coils around an imaginary helix axis in clockwise direction.

Beta sheet: The polypeptide backbone is nearly fully extended. The R-groups are alternately pointed above and then below the extended backbone.

3. Tertiary: The folding back of a molecule upon itself and held together by disulfide bridges and hydrogen bonds. This adds to the proteins stability.

4. Quaternary: Complex structure formed by the interaction of 2 or more polypeptide chains.

Chaperone proteins are intracellular proteins which guide the folding of proteins, preventing incorrect molecular interactions. They do NOT appear as components of the final structures. Chaperones are widespread, and chaperone defects are believed to be the etiology of some diseases.