Guided Reading Questions

Chapter 3
The Molecules of Life

(intro) What is lactose intolerance? What enzyme is in short supply for people with lactose intolerance? What is the prevalence of lactose intolerance among Americans of African, Asian, and European ancestries?

(3.1) Define organic compounds. What type of bonds do carbon atoms form? How many bonds does each carbon atom form? Define hydrocarbon, carbon skeleton and isomer. Are hydrocarbons polar or nonpolar?

(3.2) Define functional groups and hydrophilic. What is the structure of the following functional groups – hydroxyl, carbonyl, carboxyl and amino? What are carboxylic acids and amines? What is phosphate and how is it abbreviated?

(3.3) What are the four groups of large biological molecules? Define macromolecule. What are monomers and polymers and how are they related?. What is the key to the diversity of macromolecules? What type of reaction links and what type of reaction separates monomers? In which reaction is water a reactant and in which is it a product?

(3.4) What is the monomer of carbohydrates? What is the general molecular formula of monosaccharides? What are the two common functional groups of carbohydrates? What is the suffix for a sugar? What are the two forms of glucose? In Figure 3.4C, how are the carbons represented in the abbreviated structure?

(3.5) What is a disaccharide made of? What type of reaction makes a disaccharide? What monosaccharides make up maltose and sucrose?

(3.6) Why does something taste sweet? What are five sweet sugars that we consume? Why do some sweeteners also taste bitter?

(3.7) Define polysaccharide. What is starch a polysaccharide of? How does glycogen differ from starch? What are the functions of starch, glycogen and cellulose? Can humans, cows or microorganisms digest cellulose?

(3.8) What are the two main elements in lipids? Define hydrophobic. What is a fat made of? What are the functional groups of glycerol and fatty acids? What is the function of fat? What type of reaction links a fatty acid with a glycerol molecule? What is a triglyceride made of? Define saturated and unsaturated fatty acids. How are some margarines produced? Are most plants fat saturated or unsaturated? Are most animal fats saturated or unsaturated?

(3.9) How do phospholipids differ from fats? What are waxes and steroids? What are some of the functions of phospholipids, waxes, and steroids?

(3.10) Define anabolic steroids. How do they affect the human body?

(3.11) Define protein. What is the monomeric unit of proteins? Define enzyme. What are some of the other functions of protein?

(3.12) What provides proteins with their diversity? What are the functional groups of amino acids? What group determines the specific properties of amino acids? What type of bond links two amino acids? What type of reaction links two amino acids? Define polypeptide. What creates the large diversity of proteins?

(3.13) Note that a protein's shape determines its function. Define denaturation. What

environmental conditions cause proteins to denature?

(3.14) What is the primary structure of a protein? What is the secondary structure of a protein? What are alpha helices and pleated sheets? What type of bond maintains the secondary structure? Which part of the amino acids form the hydrogen bonds? What is the tertiary structure of a protein? What are the two three-dimensional shapes of a protein? Which part of the amino acid is involved in the tertiary structure? Which types of amino acids are generally found on the inside of a protein? What types of bonds maintain the tertiary structure? What is the quaternary structure of a protein? Do the polypeptides in a protein need to be identical?

(3.15) In what areas did Linus Pauling earn his two Nobel prizes?

(3.16) What are the two types of nucleic acids? Define genes. What part of protein structure do genes determine? What is the monomeric unit of nucleic acids? What are the three parts of a nucleotide? What are the four nitrogenous bases of DNA and of RNA? What type of reaction joins two nucleotides? What two parts of a nucleotide are joined in this reaction? How do the nitrogenous bases pair in DNA? What type of bond holds the two strands of DNA together?