**Chapter 3, part 2, Concepts 3.2 to 3.5: Biochemistry**

***Big Picture Questions***

This second part of chapter 3 focuses on the four families of molecules that make up living things. These are the very same molecules that make up your body, and which you encounter as the food you eat. Before you read, think about what you already know about this topic, and answer the following questions

1. Think about the foods you eat.
   1. Which foods have  lots of carbohydrate? Fat? Protein?
   2. What makes a fat a fat? A carbohydrate a carbohydrate? A protein a protein?
   3. Some fats are solid, like butter. Others, like oil, are liquid. What makes a solid fat different from a liquid fat?
2. Some carbohydrates, like sugar, have a lot of energy (usually measured in calories). Other foods, like lettuce, have hardly any food energy. Why?
3. Genes (the information you inherited from your parents through their sperm and egg cells) are made of a type of molecule called a nucleic acid. How can these molecules store information?
4. Read the Chapter Review at the end of the chapter. Because we covered the entire chapter, please read all of the concept reviews, and spend a moment thinking about the review questions.

***Concept 3.2: Macromolecules are polymers, built from monomers***

1. Define polymer and monomer.
2. Explain how cells synthesize and break down macromolecules (condensation synthesis vs. hydrolysis)
3. There are only about 50 monomers that make up most of life’s polymers. Yet polymers are astonishingly diverse. What’s a good analogy for this? How does this analogy fall short? How is this related to the theme of unity and diversity?

***Concept 3.3: Carbohydrates***

1. What are carbohydrates?
2. Describe the key traits (basic structure and function) of
   1. Monosaccharides (simple sugars)
   2. Disaccharides
   3. Polysaccharides
3. For the following, be able to describe what *type* of carbohydrate, and its overall function: glucose, fructose, sucrose, lactose, starch, glycogen, cellulose, chitin)
4. Why can we use starch as an energy source, but not cellulose?

***Concept 3.4: Lipids***

1. Describe the unifying characteristics of lipids: what makes a lipid a lipid?
2. Describe the structure, properties, and biological importance of fats (AKA triglyceride or triacylglyceride)
3. In terms of properties and chemistry, compare and contrast saturated and unsaturated fatty acids.
4. What’s a *hydrogenated* fat?
5. What’s the connection between saturated fats (especially trans fats) and heart disease?
6. What are the functions of fats in animals?
7. What are phospholipids? Why are they important in cells?
8. What are steroids? What is cholesterol, and what is good and bad about it?

***Concept 3.5: Proteins***

1. Using the text in the 1st paragraph of this section, and figure 3.17, list some of the functions of proteins.
2. What are enzymes, and why are they important?
3. What’s the relationship between a *polypeptide* and a *protein*?
4. Describe the structure of a generalized amino acid, and explain how peptide bonds form (figure 5.17)
5. Using figure 3.18, list the types of side chains in amino acids, and when presented with a specific amino acid,  be able to identify which type of side chain it has (non-polar, polar, acidic, basic). **DO NOT** try to memorize the structural formulas of specific amino acids.
6. Why is the shape of a protein so important?
7. Use figure 3.22 to explain the four levels of protein structure. Briefly describe the kinds of molecular interactions that bring about
   1. Primary structure
   2. Secondary structure
   3. Tertiary structure
   4. Quaternary structure
8. Using 3.23, explain the symptoms and molecular cause of sickle cell anemia (for symptoms, look up the disease in the index or on the Web).
9. Describe denaturation and explain how it happens.

***Concepts 3.6 and 3.7: Nucleic Acids and Genomics***

NOTE: Read, but don’t take notes on these sections. We’ll handle them in detail later in the course.

***Conclusion/Synthesis***

1. Note that the chapter review diagram (p. 70) has already been set up as a study sheet, which you can use for practice. For each macromolecule family, you should be able to describe the main function (1st column), the components (2nd column), list some examples (3rd column), and describe the function of each example (4th column)

**After Reading**

***Interact***

1. Do the interactive exercises connected with this chapter on [sciencemusicvideos.com](https://www.sciencemusicvideos.com/ap-biology/module-6-menu-biochemistry/)

***Master the content***

1. You have 3 options: Cornell Notes, flashcards on your [qwizcards](https://qwizcards.com/) webpage or [qwizcards.com/wizard](http://qwizcards.com/wizard), or physical flashcards. Always spend time reviewing previous flashcards or Cornell notes.