Chapter 4 WHAT MAKES LIVING MATTER "LIVING?"

OVERVIEW: "Life" can be defined from different philosophical perspectives. Living matter becomes more unique as one progresses "upward" in the hierarchy of levels of organization, but can it be fully distinguished from artificial intelligence by naturalistic science alone? To understand basic life processes, one must have a basic knowledge of the elements and molecules of life.

STRATEGY: Chapter 4 is a bit different in that it introduces "basic chemistry for biology" but also provides some greater detail that you will find more meaningful later. Therefore, your plan should be to understand the basic concepts (see VOCABULARY below) and otherwise, try to gain an overview of the "atoms and molecules of life." Appendix A is intended to assist those who have little chemistry background. Don't panic over chemistry! We will not be requiring great depth of knowledge of chemistry; only enough to understanding basic life processes.

VOCABULARY:

atom	ionic bond	carbohydrate	mechanism
covalent bond	organic molecule	lipid	vitalism
molecule	inorganic molecule	protein	reductionism
		nucleic acid	naturalism

LEARNING GOALS: the following statements represent learning goals which, when attained will suggest mastery of the vocabulary and move you toward structural literacy:

1. List at least 15 elements common in living cells using the "C HOPKINS Ca Fe" memory aid.

2. Define chemical bond and distinguish ionic bonds from covalent bonds. What are molecules?

3. List four classes of molecules of life, list two roles of each; and, be able to distinguish each group if given a chemical structure diagram.

4. Sketch a typical cell and label cell membrane, nucleus, and cytoplasm. Then indicate one location in cells for each of the four classes of molecules of life.

5. State three requirements for metabolism and illustrate using the example of photosynthesis; and, of a zygote being nurtured within the mother.

6. In what senses can a "bionic human" be considered living? Can a bionic human ever attain salvation? Why or why not? Would a human with increasing numbers of artificial organs cease to be human? Explain the importance of worldview and presuppositions in this discussion.

LECTURE-STUDY OUTLINE :

AIM: Address the question "What is Life"? from two perspectives: biological and philosophical

I. Two biological approaches:

A. Is "life" living because of its unique chemical composition?

1. ATOMIC COMPOSITION – Atom = _____
   a. Elements of life? – 96% consist of _____
   b. ...the rest (4%) = _____
   c. Do living organisms have UNIQUE elements? ____ Same as the D_____ of the Earth.

2. MOLECULAR COMPOSITION – Molecule = _____

   a. Predictable # of bonds per element = C ___, N ___, O ___, H ___

Molecule Type	Examples	Ratio of Atoms	Functions
Carbohydrates			
Lipids			
Proteins			
Nucleic Acids			

3. CELLULAR COMPOSITION -- Basic cell structure: Membranes, cytoplasm, organelles

B. Is "life" living because of its unique organization and function – Four "Basic Life Functions"

1. Metabolism = all chemical reactions in cells
2. Reproduction: each species after its kind
3. Responsiveness to stimuli in environment
4. Homeostasis = maintenance of steady state amid environmental fluctuations

II.. Philosophical approach: How is life different from a bionic "machine?"

A. ANSWER -- Becomes a philosophical question --> How we define life

B. Worldview Presuppositions:

1. Theistic Creationism

2. Atheistic Naturalism

C. REDUCTIONISM = _____

> How do reductionism become a deceiving influence in the understanding of life?