

ENVS 10 Sect 06
Fall 2008
Midterm I Study Guide

For all questions, be sure to use proper terminology!

- Evolution by the Mechanism of Natural Selection (Lecture 1/Chp 1)
 - Name and describe the two fundamental observations Darwin made to come to his hypothesis of natural selection.
 - Explain the significance of the two fundamental observations that led Darwin to posit his hypothesis of natural selection – what was his inescapable conclusion?

- Two Approaches to Science (lecture 2/Chp 1)
 - Discovery and Hypothesis-Driven – compare and contrast; give an example of each; what types of reasoning are used with each.

- Scientific Method (Lecture 2/Chp 1)
 - Draw the diagram of the scientific method and describe each step
 - Be able to apply scientific method to hypothetical situation
 - What is a null hypothesis?
 - What is a controlled experiment?
 - What do you do when your hypothesis is supported/not supported?

- Advancement of Scientific Knowledge (Lecture 2/Chp 1)
 - Explain two ways in which scientific knowledge advances
 - Answers: Sharing of Knowledge (research and publications, conferences, internet); funding of more research; unbiased, ethical, and robust research; defensible and repeatable study design

- Ivory-billed woodpecker (Lecture 2, Case Study 1, Class discussion 1)
 - Describe the actions that are believed to have driven the woodpecker to extinction (or brink of extinction).
 - Are you convinced by the evidence provided in the case study? Be prepared to defend your answer using the scientific method and evidence from the case study.
 - In the case study discussed in class, what is the major conflict between Brad and Mary in terms of the scientific process?
 - Answer: Brad focused on supporting evidence whereas Mary focused on rejection of alternative hypotheses. By testing (and rejecting) more and more alternatives, the surviving hypothesis becomes more and more convincing. To make this extra effort is what Mary (and the scientific community) calls “good science”. This case is unusual because hypothesis can be proven if one has a live bird in hand and can positively identify it. In this case, researchers did not have live bird but used video as evidence.

Mary objects by pointing out that even though this may look like an Ivory-billed, we can not be sure that it is until we have tested and rejected all alternative explanations (e.g., that it is a Pileated woodpecker).

- Elements of Life (Lecture 3, Chp 2)
 - Atoms: Name and define the three most important subatomic particles?, how are they arranged in an atom?, what would make atoms react with other atoms (think electrons), which features make an atom chemically reactive versus chemically unreactive?
 - Chemical Bonds: describe the three types of chemical bonds, under what situations would the different bonds be formed, be prepared to see atoms and predict which type of bond would form and explain why
 - Chemical Reactions do not create or destroy matter, simply rearrange it
 - What are chemical equations? What are the reactants and products?
- Water and Life (Lecture 3/Chp 2)
 - The polarity of water molecules and hydrogen bonding that results explains most of water's life supporting properties: cohesion, solvent, ice floating, temperature moderation. Explain how the unique properties of water result from the fact that water is a polar molecule and how are these properties significant for life?
 - Describe how acid precipitation forms? How far-ranging are the effects of acid precipitation?
- Organic Chemistry (Lecture 3/Chp 3)
 - What are organic compounds?
 - What are the two unique properties of an organic compound?
Answer: carbon skeleton that gives compound unique 3 dimensional shape and functional group
 - Functional Groups: define, what do they do?, why are they reactive? What are the major functional groups and which macromolecules are they associated with? Be able to identify a functional group based on its structural formula.
 - Macromolecules: Be able to name, and describe the four macromolecules, what are their functions, what are their functional groups? Be prepared to identify a macromolecule by its molecular structure.
 - Carbohydrates: What are carbohydrates, what are their main functional group(s), what is the function of carbohydrates in plants and animals? Polysaccharides: what are polysaccharides, what are polysaccharides used for and how (and in what form) are they used (and stored) in plants and animals?
 - Lipids: what are lipids and what is their function, what is the main functional group of a lipid?
 - Proteins: What is a protein? What are proteins made of? What are the functional groups of proteins? What is the structure of an

amino acid? Describe the two qualities (3D structure and language) of proteins that determine the protein function? What makes these two qualities? Provide examples of the consequences when either of these qualities is compromised.

- Nucleic Acids: What is the function of nucleic acids, what are the two types of nucleic acids and what are their functions? What are nucleic acids made from? List the three parts of a nucleotide – which are consistent and which is variable?

- Cell Evolution (Lecture 4/Chp 15 & pg 32)
 - Explain the two theories on the origin of life. What is the prevailing theory? How did Earth's early environmental conditions facilitate life? How did Miller and Urey's work support this hypothesis?
 - Contrast eukaryotes and prokaryotes. What is one specific difference in their internal structure? What is the link between prokaryotes and eukaryotes and why? How did multicellularity likely evolve?
 - What is the significance of the nucleus to the eukaryotic cell?
 - What is the function of ribosomes? Where are they found?
 - What is the function of ER (smooth and rough), Golgi apparatus, lysosomes, chloroplasts, and mitochondria?
 - How does DNA control protein synthesis?
 - If you were to follow a protein in the cell from start to finish, which organelles and which order would they create, receive, and pass the protein?

- Cellular Respiration and Photosynthesis (Lecture 5/Chps 5,6,7)
 - What is ATP (structure, function, site of production)? How does ATP store energy? How does ATP release energy?
 - Cellular Respiration and Photosynthesis: Be prepared to define, describe the function, site(s) of cellular respiration/photosynthesis. Explain how the process of cellular respiration (and photosynthesis) proceeds (major stages) using proper terminology. Be prepared to identify the chemical equations of cellular respiration and photosynthesis.
 - Global warming – explain global warming in terms of photosynthesis and Carbon dioxide.