

**Bio. 3302: Introduction to Evolution, Spring 2014**  
**Study Guide, Lecture 19ab**  
**Big Bang Theory, Origin of Life and the Precambrian**

**Important Terms and Concepts**

Abiotic  
Aerobic respiration  
Age of Universe  
Age of Earth  
Amino acids  
Anaerobic respiration  
Archean Era  
Archaea (Archaeobacteria)  
Bacteria (Eubacteria)  
Banded Iron  
Big Bang Theory  
Chemical Evolution  
Chondrite Meteor  
Copernicus  
Cosmic Background Radiation  
Cosmology  
Creation Myth  
Domain  
Early Atmosphere  
Ediacaran  
Endosymbiosis  
Eukarya  
Eukaryotes  
Expanding Universe  
Expansion  
Grypania  
Hadean Era  
Horizontal Gene Transfer  
Hubble  
Inflation  
LUCA  
Microspheres  
Miller Experiments (Urey-Miller)  
Monomers  
Nucleic acids  
Oparin  
Origin of the Moon  
Oxygen Onset (Catastrophe)  
Panspermia  
Paradigm  
Pasteur

Polymerization  
Precambrian  
Primordial Soup  
Proteinoids  
Proterozoic Era  
Proto-cells  
Redshift  
RNA World  
Redi Experiments  
Ribozyme  
Singularity  
Spontaneous Generation  
Stromatolite  
Transcription  
Translation  
Warm Little Pond  
Woese, Carl

### **Discussion Questions**

1. Describe the main points of the Big Bang Theory. What is the evidence for it? What was Hubble's evidence for an expanding universe?
2. When is life thought to have originated on earth? What and how old are the earliest fossils? The oldest rocks?
3. Discuss the idea of spontaneous generation. What experiments "proved" that it does not occur? Yet, did spontaneous generation occur on the early earth? How?
4. What is the theory of Panspermia? Why have scientists not generally accepted it? What is the reason we cannot discount it entirely?
5. What are the basic problems that must be solved before we can fully understand the origin of life? What are the major developments which must have occurred to make a simple living cell?
6. How was the earth's early atmosphere formed? How was it different from today, and why was this important to the origin of life?
7. Discuss the Miller experiments. How was the system set up? What were the results?
8. What is a possible mechanism that could form membranous droplets with a lipid bilayer?
9. What is the present day relationship between DNA, RNA, and proteins
10. Discuss the possibility that the first replicating molecule was RNA? Why does it seem likely that RNA preceded DNA?

11. What is the evidence for the rise of oxygen production in the Precambrian? How did early cellular life cope with the buildup of oxygen in the atmosphere?
12. What are some major differences between prokaryotes and eukaryotes? How might they have arisen?
13. How do you define life? Is it possible to provide a definition of life that covers all organisms? Is it necessary to do so?
14. What are the main ingredients needed for life to arise on Earth? Describe their functions. How might they have arisen from simpler molecules?