

**URI CMB 190  
Issues in Biotechnology  
Lesson 3: Study Guide**

Name \_\_\_\_\_ Date \_\_\_\_\_

- 1. Difference occurs in the sequence of long chain molecules and becomes information in biological organisms. 'Life' assembles itself into chains:  
(A) of RNA  
(B) all of the answers are correct  
(C) of DNA  
(D) of protein  
(E) none of these answers are correct**
  
- 2. Which of the following foods is not a significant source of complex carbohydrates?  
(A) fresh fruit  
(B) rice  
(C) pasta  
(D) oatmeal  
(E) all of the above are significant sources of complex carbohydrates**
  
- 3. The order that best represents size from the smallest to the largest biological entities is:  
(A) all answers are correct  
(B) Ribosomes-Mitochondria-Nuclei-Cells-Tissues  
(C) Organelles-Tissues-Organs-Organism-Species  
(D) Atoms-Molecules-Chain Molecules-Molecular- Structures-Organelles-Cells  
(E) Cells-Tissues-Organs-Individual**
  
- 4. The major contributions to the discovery of the DNA double helix structure over fifty years ago, although not all were recognized by the Nobel prize Committee were made by:  
(A) Darwin and Mendel  
(B) Miller and Lamarck  
(C) Watson and Crick  
(D) Watson and Hoagland  
(E) Watson, Crick, Wilkins, and Franklin**

5. Which of the following nucleotide bases are present in equal amounts in DNA?

- (A) adenine and cytosine
- (B) thymine and guanine
- (C) adenine and guanine
- (D) thymine and cytosine
- (E) adenine and thymine

6. All of the following are features of RNA except:

- (A) a sugar-phosphate-sugar-phosphate backbone
- (B) a coiled double-stranded structure
- (C) a different type of sugar than is found in DNA
- (D) an ability to direct protein production
- (E) a different type of base than is found in DNA

7. An example of chain molecules would be?

- (A) cells
- (B) oxygen molecules
- (C) proteins
- (D) mitochondria
- (E) aspirin

8. Prokaryotic cells:

- (A) are complex creature and usually do not live in diverse and extreme environments
- (B) lack a membrane bound nucleus like most bacteria
- (C) have membrane bound organelles that originated from bacteria
- (D) are animal type cells with diverse biochemical compartments
- (E) only live in extreme environment without oxygen

9. The endosymbiont hypothesis:

- (A) has been shown to be false by modern molecular biology
- (B) has been outlawed in Kansas
- (C) is key evidence in favor of Intelligent Design
- (D) explains the origins of chloroplasts and mitochondria
- (E) was first described by James Watson and Francis Crick

**10. Eukaryotic cells:**

- (A) are just a theory**
- (B) include the bacteria and viruses and are not considered as life forms**
- (C) contain various membrane bound compartments, such as chloroplasts, mitochondria and nuclei**
- (D) are the most primitive type of cell originating 3.2 billion years ago**
- (E) only live in extreme environments without oxygen**

**11. When individual cells divide they first make a copy of all the information they carry in their DNA and every cell in an organism usually contains a nearly exact copy of all of the DNA that codes for that organism. However, 'life' creates with mistakes. Every so often cellular mechanisms make errors during the copy process. A mutation:**

- (A) occurs only in bacterial DNA**
- (B) is never random**
- (C) is always a negative change for the organism**
- (D) is a random change in DNA sequence**
- (E) none of these answers are correct**

**12. When we muse about the question "What is Life?- What impresses us at first glance, is its diversity. But we also are interested in its unity. What feature seems to be shared by all living organisms on this planet?**

- (A) they all move**
- (B) they all contain information that is stored in chain molecules**
- (C) they never change but remain exactly the same from on generation to the next**
- (D) they all require air**
- (E) none of these answers are correct**

**13 The double helix structure of DNA that is created by a sequence of bases was a clue to how one molecule of DNA could be replicated into two exact copies. DNA replication results in the same copy of DNA in each cell and:**

- (A) occurs spontaneously**
- (B) occurs only in prokaryotes**
- (C) occurs only during embryogenesis**
- (D) occurs before every cell divides**
- (E) never occurs after a cell has divided**

14. Which of the following is *not* a characteristic of all living organisms?

- (A) capable of genetic information (RNA and/or DNA) replication
- (B) has either DNA or RNA as an information basis
- (C) complex yet organized
- (D) chemical energy storage and utilization
- (E) relies only on non-organic material

15. Which in the following list includes all others in the list?

- (A) polysaccharide
- (B) carbohydrate
- (C) monosaccharide
- (D) disaccharide
- (E) carbon

16. A polar molecule:

- (A) is slightly negative at one end and slightly positive at the other end
- (B) has an extra electron, giving it a positive charge
- (C) has an extra electron giving it a negative charge
- (D) has covalent bonds
- (E) is comprised of a single atom

17. Proteins are an essential component of a healthy diet for humans (and other animals). Their most common purpose is to serve as:

- (A) raw material for growth
- (B) fuel for running the body
- (C) organic precursors for enzyme construction
- (D) long-term energy storage
- (E) inorganic precursors for enzyme construction

18. When asked by a reporter what they had discovered, Francis Crick famously replied:

- (A) The New World
- (B) The Higgs Boson
- (C) The Secret of Life
- (D) Silly Putty
- (E) A New Planet with Life

**19. The Flow of Information of life on earth usually occurs from:**

- (A) the Sun**
- (B) DNA to RNA to Protein**
- (C) amino acids to complex carbohydrates**
- (D) gas to liquid to solid**
- (E) primarily viruses**

**20. The RNA World describes**

- (A) the possibility of life on other planets where RNA not DNA is the informational molecule**
- (B) the hypothesis that the informational basis of life on earth was RNA**
- (C) a ecosystem on earth that is dominated by RNA not DNA**
- (D) the scenario of a recent science fiction movie where alien life forms dominate earth because they are based on RNA**
- (E) All of the answers are correct.**

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**22. Ribozymes were discovered by Altman and Cech in the 1980s to have catalytic properties. However, most enzymes are usually:**

- (A) proteins**
- (B) carbohydrates**
- (C) helpful bacteria**
- (D) Only available in health food stores**
- (E) none of these answers are correct**