

## Biology 2020

### Study questions for Lectures 1 and 2, Spring 2004

1. What are the structural differences between animal and plant cells?
2. What are the resolutions of light microscope and electron microscopes? Why is the resolution of an electron microscope better than that of a light microscope?
3. Briefly describe the cellular functions of the following organelles: a) SER and RER, b) Golgi apparatus, c) mitochondria, d) ribosomes e) nucleoli
4. What were the major components of the atmosphere of Earth four billion years ago? What is the "Miller-Urey" experiment and what does it show?
5. What are the three domains that are used by biologists to classify cells?
6. List the features of viruses that distinguish them from cells..
7. True or false:
  - a) A transmission electron microscope can show details like ribosomes attached to the endoplasmic reticulum
  - b) I would use a transmission electron microscope to examine the surface topology of a cell
  - c) Prokaryotes have a true nucleus
  - d) Organelles are generally membrane-bound.
8. Finish the sentence
  - a) Chloroplasts evolved when a respiring eukaryote ingested a -----
  - b) RNA-based enzymes are called as -----
  - c) The domain prokaryotes consists of eubacteria and -----
  - d) The osmolarity of the cytoplasm and the turgor pressure in the plant cell are controlled by ion channels present in the ----- membrane
  - e) Microfilaments, microtubules and intermediate filaments together form the -----
10. You can imagine the cell interior as a matrix of cytoplasm into which the different organelles are dispersed. What do you think regulates the spatial arrangement of the organelles in the cytoplasm and prevents them from getting mixed up?
11. Mitochondria contain their own genetic material, reproduce by dividing into two and are thought to be derived from bacteria engulfed by some ancestor of a present day eukaryotic cell. Do you think that mitochondria would be able to survive as an independent organism today if you took it out of an eukaryotic cell? Why or why not?
12. Outline the main principles on which immunofluorescence microscopy works. What is the advantage of this technique over other light microscopic techniques?

13. What fundamental processes occur in the following organelles: mitochondria, ribosomes, and chloroplasts? What is the function of each of the following: plasma membrane, cell wall, and extracellular matrix?

14. Which came first in the evolution of life: RNA or DNA? What is the evidence?