

**Microbiology 2730  
Study Guide #4  
Winter Semester 2008  
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## **LABORATORY SECTION**

### **THE ACID FAST STAIN**

**Textbook reference for this set of questions is chapter 3  
You should also read the introductory material presented in your laboratory manual.**

1. As was pointed out in class, there are relatively few genera of bacteria, which are acid fast positive in nature. What genus did you work with in the laboratory that is characterized by being acid fast positive?
2. Cite 1 species found in the above-mentioned genus, which is capable of causing human disease.
3. If an acid-fast stain is successfully run on an acid fast positive bacterium, what color will it appear? Acid fast negative bacteria appear what color at the conclusion of the acid-fast procedure as carried out in our laboratory?
4. What is the major characteristic of the acid-fast bacteria that is responsible for the staining result obtained?
5. Some people contend that as many a \_\_\_ of the people on the earth may be infected with *M. tuberculosis*. How does this bacterium rate in terms of bacteria which are known to kill people?

### **THE ENDOSPORE STAIN**

**Textbook reference for this set of questions is chapter 3  
You should also read the introductory material presented in your laboratory manual.**

1. What are the 2 major genera of bacteria capable of forming endospores?
2. Cite 4 characteristics of endospores that make them quite different from the vegetative form of the bacterium.

3. Under most circumstances, you would expect a vegetative cell to form how many endospores?
4. You must certainly take into account the possible presence of endospores if you were attempting to sterilize a material. Why is this so?
5. You should be able to describe the following structures after the successful application of the endospores staining procedure used in you laboratory.
  - a. Vegetative cells
  - b. Free spores
  - c. Spores within a “sporangium”
6. What is meant by the term, vegetative cell, in the context of spore forming bacteria?
7. What would be the single best reference book to look at, to determine if *Bacillus subtilis* has subterminal spores

## LECTURE SECTION

**The textbook reference for this question is chapter 2**

**Shown below is a diagrammatic sketch of the now famous Watson and Crick view of the DNA molecule. You should be able to name the parts of the molecule indicated with an (\*)**

**The textbook reference for this set of questions is chapter 3**

1. You were introduced to 4 individuals or groups of individuals in connection with the early history of the so-called cell theory or concept. What were the major contributions of the following individuals to the place of the cell in modern biology?

- a. R. Hooke
  - b. M. Schleiden and T Schwann
  - c. R. Virchow
  - d. A. Leeuwenhoek
2. Cells can be used in one of 4 ways to construct living organisms. What are these ways? Cite an example of a living organism that exhibits each of the above-mentioned approaches.
3. Cells are considered to exhibit 2 major architectural styles. What are they?
4. What is the hallmark characteristic, which identifies the eukaryotic cell from the prokaryotic cell?
5. Chapter 3 of your textbook indicates that there are many differences between prokaryotic and eukaryotic cells. You should be able to cite 3 **structural differences** between these cell types.
6. To illustrate the importance to the medical field of locating differences between eukaryotic and prokaryotic cells, I cited the example of the antibiotic, penicillin.
- a. This antibiotic affects the ability of the bacterial cell to produce what molecule?
  - b. Bacterial cells which can not produce the above-mentioned molecule will usually die. Why is that?
  - c. In theory, penicillin should be rather harmless to us, humans. Note: It can cause side effects and in some cases lead to serious allergic reactions.
7. Materials must constantly enter and leave cells. There are 2 basic types of cellular transport. What are their names? What is the major difference between these processes?
8. In both the prokaryotic and eukaryotic cell, the cellular structure that is primarily responsible for regulating the enter and exit of materials from the cell is its \_\_\_\_.
9. The above-mentioned structure has as its backbone or core, a double layer of \_\_\_\_ molecules. Within this bimolecular layer are embedded an array of different kinds of \_\_\_\_ molecules, which have a variety of functions. This overall structure is normally referred to as the \_\_\_\_ model.
10. The underlying process of passive transport is \_\_\_\_\_. This process can be defined as the spontaneous movement of materials from a region of \_\_\_\_ concentration to a region of \_\_\_\_ concentration.
11. Active transport systems involve the expenditure of \_\_\_\_ on the part of the cell to move materials across its plasma membrane.

12. When cellular processes require the utilization of energy, the molecule, which usually is involved in providing this energy, is \_\_\_ (spell it out) and whose acronym is \_\_\_\_. These molecules are produced via the so-called \_\_\_\_\_ processes of the cell.
13. Active transport systems can assume several major forms. There are those systems, which rely on carrier molecules to move selected molecules across the plasma membrane of the cell. These carriers are normally \_\_\_ in nature.
14. Another major active transport system is that known as vesicular transport. This approach makes use of membranous sacks to move materials into or out of cell's cytoplasmic area. The best known and most spectacular of these approaches is that referred to as phagocytosis.
- a. You should be able to describe this process.
  - b. What protozoan, viewed in the laboratory uses this process to ingest its food?
  - c. Phagocytosis (followed by microbial destruction) forms a major component of our bodies defense system against microbial invasion. (See page 378)
    1. What are the 8 steps of this process outlined in your textbook?
    2. Microbes that have been taken up by phagocytes are then destroyed by several different processes. You should be able to cite 3 such methods or processes.