

**Microbiology 2400
Study Guide #2
Winter Semester 2008
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LABORATORY SECTION

Textbook reference for this set of questions is chapter 3

You also read the introductory material presented in your laboratory manual

1. You were introduced to the concept of depth of field in relation to the various objectives of your microscope. If your microscope were to have a depth of field of 1 millimeter when the scanning power objective was being utilized, what would this tell you about your microscope?
2. What happens to the depth of field of the optical system of your microscope as you change objectives moving from the scanning objective to the oil immersion objective?
3. A student can focus his specimen sharply when using 40X, 100X and 400X level of magnification. The student complains that when he switches from 400X level of magnification to 1000X, he can not seem to find his specimen. What is the most likely explanation for this difficulty?

THE SIMPLE STAIN

Textbook reference for this set of questions is chapter 3

You also read the introductory material presented in your laboratory manual

1. What is the major purpose behind conducting a “simple stain” on a smear of bacteria?
2. The procedure known as a simple stain, involves what action being carried out on a smear of bacteria?

3. Biological stains can be classified as being basic, acidic, or neutral. Define each of these stain types based on the nature of their chromophore group. What is a chromophore group?
4. In conducting the simple stain, you “heat fixed” your smear before conducting the actual staining procedure. What is the major reason for carrying out the heat-fixing step?
5. Why should you start flaming a loop from the back to the front, as opposed to the opposite direction? What does the flaming procedure accomplish?
6. What are the 3 major cell shapes that bacterial cells usually assume?
7. Chains of cocci are referred to as a ___ cell arrangement.
8. Irregular clusters of cocci (grape like) are referred to as a ___ cell arrangement.
9. A group of cocci, arranged to form a packet or cube of 8 cells is referred to as a ___ cell arrangement.

THE GRAM STAIN

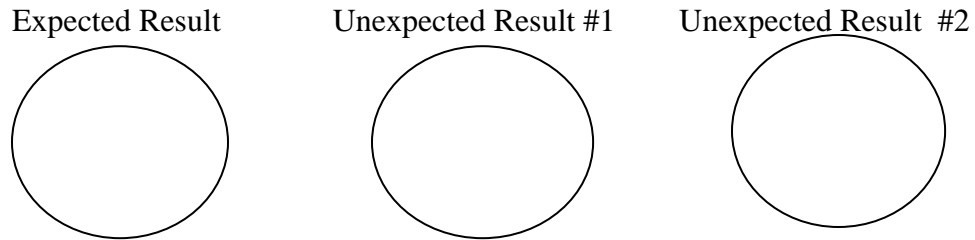
Textbook reference for this set of questions is chapter 3

You also read the introductory material presented in your laboratory manual

1. The Gram stain is considered to be an example of a differential stain. What does this imply?
2. In the case of the Gram stain, you should be able to identify the following reagents:
 - a. The Primary Stain
 - b. The Mordant
 - c. The Decolorizing agent
 - d. The Counter stain
3. If a Gram stain is correctly carried out, a Gram (+) bacterium will appear ___ in color, while a Gram (-) bacterium, will appear ___ in color.
4. For best results, the Gram stain should be conducted, only on “young” cultures. Why?

5. Given the indicated normal Gram stain, explain the “unexpected” results shown below. Note: The bacteria in all fields are of the same species.

* = Purple in color o = Pink in color



6. Table 4.1 on page 88 of your textbook lists numerous differences between Gram (+) and (-) bacteria. You should be able to cite 3 of these differences.

LABORATORY CALCULATIONS

Here is the “recipe” for the construction of the Gram’s Iodine solution that you used in carrying out the Gram Stain. This information comes from the eighth edition of Microbiological Applications by Benson. Dissolve 2.0 gm of potassium iodide in 300 ml of distilled water and then add 1.0 gm of iodine crystals. The question is, how would you make 3.5 liters of this reagent. Note, I have not lectured on this, just see what you can do yourself. If you have questions, please feel free to ask.

LECTURE SECTION

Chapter 1

1. L. Pasteur, probably more than anyone brought to the attention of the world, the benefits derived from an understanding of, the microbial world. 3 distinct areas of study were mentioned in class. These were alcoholic fermentation, spontaneous generation, and the germ theory of disease.

- a. In regard to Pasteur, you were introduced the work that he did for a certain Mr. Bigo. What was this gentleman's business? What "problem" put him into contact with Pasteur? What, in the end, was Pasteur's solution to Bigo's "problem"? Because of this work, it can argued that Pasteur can be considered to be one of the founders of what area of microbiology?
 - b. You were also introduced to Pasteur's work concerning the idea of spontaneous generation of microorganisms. (1) What is meant by the term spontaneous generation? (2) You should be able to sketch, the now famous flasks that Pasteur used in this work. (3) Where did Pasteur expect the microbes to collect in an undisturbed flask? (4) Why did Pasteur leave his flasks open? (5) What was Pasteur's conclusion concerning the validity of spontaneous generation as it applied to microorganisms? (6) The debate over the validity of spontaneous generation goes back well before the time of Pasteur. Your textbook introduces you to the work of Francesco Redi. This individual disproved the idea of the spontaneous generation of _____. You should be able to describe his experimental work.
 - c. In connection with Pasteur, you were introduced to studies that were done at the instigation of a Mr. Dumas. What prompted the request to Pasteur by Dumas? What was the general conclusion concerning this "problem" that was eventually reached by Pasteur? It was noted in that this work of Pasteur was one of the pioneering pieces of work that lent early support to the developing ____ theory of disease.
2. L. Pasteur was not formally trained as a Microbiologist, since at the time he went to school; this branch of science really didn't exist. What was the area of science that Pasteur was trained in?
 3. You should be able to describe Koch's Postulates. What does the application of these postulates allow an individual to do? If you need more information concerning Koch's postulates than was provided in lecture, consult the index of your textbook.
 4. In the course of studying what disease did Koch develop his now famous postulates?
 5. As was pointed out in class, Koch was the first individual to definitely show that a microorganism caused a specific, human disease. What was the disease studied?

6. Why, is the period of time between approximately 1857 and the early 1900s, referred to by many historians as the “Golden Age of Microbiology”?

7. Your textbook spends some time discussing the work of Edward Jenner, Paul Ehrlich, and Alexander Fleming.

Edward Jenner:

- a. What major human illness is this individual study?
- b. What did this individual develop in regard to the above named illness?

Paul Ehrlich:

- a. This individual is associated with the development of the idea of the “magic bullet”. Describe this concept.
- b. Professor Ehrlich actually developed such an agent for use against what disease?

Alexander Fleming:

- a. This individual is usually credited with the discovery of a group of antimicrobial agents, that in today’s world, we call by what name?
- b. Specifically, Fleming is the discoverer of what well- known antimicrobial agent?
- c. The above mentioned agent is produced by what major microbial group (Algae, Protozoans, Fungi, etc.)?
- d. You should be able to describe the now famous observation of Fleming that led to the discovery of the above- mentioned antimicrobial.

8. Some time was spent discussing the taxonomic category known as the **DOMAIN**. The idea of the domain has grown out the work of ____, which was begun, in the early 1970s.

9 The initial work of the above-mentioned individual was centered on studies involving nitrogenous base sequences found in some of the ____ molecules found in the ____ (name of organelle) in both prokaryotic and eukaryotic cells.

10. The above mentioned work led to the conclusion that the entire world of living organisms could be subdivided into ____ (a number) of major groups or domains. What are the names of these domains?

11. The Domain is initially subdivided into smaller subdivisions known as _____.

12. The scientific name of the bacterium that is the causative agent of bubonic plague is *Yersinia pestis*. To what genus does this bacterium belong?

13. In the case of bacterial organisms, most have only been given a standard scientific name. One of the few exceptions to this is *Mycobacterium leprae* (the causative agent of leprosy) which is also known as Hansen's bacillus. Names such as Hansen's bacillus or dog are referred to as _____ names.
14. These questions involve the CDC. You can go to the CDC website or use the materials presented in your textbook.
 - a. What is the full name of this agency?
 - b. It is a branch of what Federal agency?
 - c. It is based in what city?