

**Microbiology 2730
Study Guide #5
Winter Semester 2008
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LABORATORY SECTION

THE COMPOUND MICROSCOPE

1. A last question concerning your microscope. Beyond turning the light of your microscope on and off, there are 3 additional steps that you can take to adjust the light that enters into your microscope. What are those 3 approaches?

THE GRAM STAIN

The following questions should have been inserted into the set of questions dealing with the Gram Stain that appeared on Study guide #3

1. The Gram reaction is tied to the nature of what part of the bacterial cell?
2. The bacterial cell wall provides what type of protection from the environment?
3. The world of bacterial cell walls was subdivided into 3 types. That of the Gram ____, the Gram ____, and what I called _____. The chemical nature of the Gram ____ can be described as being thick and homogenous in nature while that of the Gram ____ is constructed from several layers and is chemically heterogenous.
4. In terms of specific chemicals, your attention was called to the peptidoglycan which is the found in both the Gram positive and negatives and is the principle component that gives the wall its ____.
5. Your attention was also drawn to the LPS component of the wall of the Gram _____. This is a chemical substance which is found in the so-called _____ of these cells and which can function as a ____ in our body if it gets loose.
6. To illustrate the importance of understanding the cell wall chemistry of bacteria, you were introduced to penicillin. The original form of this antibiotic was much more effective against Gram ____ bacteria than Gram _____. Why?

7. Some time was spent in discussing the cell walls of the “others”. You were introduced to a group known as the Mycoplasmas. These bacteria ___ cell walls all together. They are of importance to the medical microbiologist. Several of their characteristics make them somewhat difficult to culture for patient specimens. You should be able to cite 2 such characteristics.
8. At the same time that a mentioned the Mycoplasmas, I also introduced you the “L-form”. What are these kinds of bacteria
9. When taking samples from the culture tubes in the laboratory as you prepare your stains such as the Gram stain, you utilize a procedure known as sterile technique. You should be able to describe this process in a stepwise fashion.

THE FUNGI—CONTINUED

1. You had the opportunity to view a prepared slide of *Candida albicans*. This microbe belongs to a group of fungi that are commonly called ____.
2. It was pointed out in class, that this microbe exhibits a dimorphic growth pattern. This really means that the microbe can exist in a _____ like state or one in which a _____ type growth can be observed.
3. While many healthy humans carry around this organism as part of the normal group of microbes which inhabit the body (the normal flora), it can on occasion “get out of control” and cause problems. If this occurs in the oral cavity a condition known as _____ can occur (see page 749). According to statistics provided by some, infection of the _____ of the body has sent about 50% of all college women to the MDs for treatment (see page 657 for information about this condition).
4. What the two principle situations which lead to this type of infection in the adult humans. Note: newborns can get into difficulty because they do not have a well established normal flora.

MICROMETRY

See the introductory materials in your laboratory manual and class notes

1. The principle reason that one would have to determine the size of a bacterial cell lies in the area of ____.
2. You should be able to determine the size of the bacterial cell shown below.

THE NEGATIVE STAIN

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

1. This staining technique has its prime use in determining what characteristics of the bacterial cell?
2. What “step” has been eliminated from this staining procedure that was done in the other procedures that you have conducted in the laboratory? Why is the elimination of this step important considering the use that this procedure is put to?
3. The negative staining procedure can be replaced by the use of what type of microscope?

LECTURE SECTION

Chapter 4

1. You were introduced to several different mechanisms that bacterial cells make use of to reproduce. The first of these methods was that known as binary fission. In discussing this approach to reproduction, I noted that 3 major events have to occur in order for binary fission to achieve its goals. What were those events?
2. While the above-mentioned process is really quite complex, it can be completed in remarkably quickly. It was noted in class, that *E. coli* has the ability to divide once every ___ minutes under the right set of circumstances.
3. You were introduced to the genus, *Streptomyces* to illustrate another method of bacterial reproduction. This method of reproduction involves the production of what are known as ____. You should be able to describe the production of the previously mentioned structures with the use of a labeled diagram. Generally speaking, members of the genus, *Streptomyces* are ___ bacteria. Members of this genus have been widely studied because of their ability to produce ___ for man’s use.
4. You were also introduced to a group of bacteria known as the Chlamydia. While these bacteria actually do use the process of binary fission to reproduce, they do have a rather different “life cycle”. What are the names of the two stages in the life cycle? Which of the stages is infective for man? Which of the stages does undergo binary fission?
5. The Chlamydia gain access to our body by several means. What means were noted in class? These organisms are single most important of the ___ transmitted disease organisms and also a major cause of ___ in man.

6. During my comments on the Chlamydia, I mentioned the idea of a “silent infection”. What does this term, generally refer to? It was noted that a (high or low) percentage of STD infections that are caused by chlamydia in man are of this nature.
7. You should be able to sketch and label a typical bacterial growth curve. This includes labeling the axis to the graph.
8. When producing a growth curve, the numbers of bacteria present are plotted as the ___ of their numbers.
9. You were introduced to several ways to determine bacterial numbers. You should be able to briefly describe how the following number determination methods achieve their ends:
- a. Standard Plate Count. **You, will need to wait until this is covered in LAB.**
 - b. Direct Count
 - c. Turbidimetric Measures. **You will need to wait until this is covered in LAB.**
 - d. MPN. **You will need to wait until this is covered in LAB.**
10. What were the two major reasons cited for the existence of the LAG phase of the growth curve? Under what two circumstances (When) would you expect to encounter a LAG phase if you were cultivating or growing bacteria in culture?
11. The LOG phase of the growth curve is marked by the ___ growth rate of the bacterium.
12. Show by means of a labeled graph, how you would calculate the generation time of a bacterium.
13. If you had a bacterial species, which doubled every 30 minutes, and you started with 10 bacteria, how many would you have at the end of a 4-hour growth time? You should be able to use the following formula for this problem:
- $$X_t = 2^{kt} (X_0)$$
14. The stationary phase is indicated by a ___ rate that is equal to the ___ rate for the culture.
15. The stationary phase is usually triggered by a “limiting factor”. What, in general, are limiting factors? In the case of bacterial cultures, three potential classes of limiting factors were noted. What were they?

16. The death phase of a culture is marked by a situation where ____ of cells is greater than _____. Cite 2 factors that have the potential to cause cell death.
17. What are the two general methods employed to cultivate microorganisms?
Which method have you employed in the laboratory?
18. What is a chemostat? Which of the above methods of cultivation is it used in?