Preface

To the Student

Welcome to microbiology. As with any subject, you'll find some parts more interesting than others. But you will encounter few subjects in college that touch on daily living in so many ways. You'll find out things quite certain to interest you: how you become immune to diseases, how penicillin works, why oranges get moldy, and other "facts of life." On the other hand, now and then you may feel like the little girl thanking her aunt for a book on penguins. "Thank you very much," she wrote, "for the book on penguins. It told me a lot about penguins, even more than I wanted to know."

The Importance of Tutoring Yourself

I teach microbiology regularly to students required to take it for nursing, pharmacy, home economics, agriculture, civil engineering, and a number of other fields, including mortuary science. Not long ago, a mortuary science student attempted the course and failed miserably. In none of three exams did he reach a score of 50%. At the end of the following term he told me, woefully, that he had just repeated the course and had missed a grade of C by two points. To transfer the credit to the school of mortuary science he needed at least a C.

It happens that our school has a policy of providing tutors for those who need them. I turned his case over to a bacteriology graduate student who tutored in his spare time. On the first exam this formerly hapless undergraduate scored a 92 . . . and never looked back. Had three terms of exposure to my lectures finally enlightened him? Probably not; the tutor reported that in preparing for the first exam, the student denied having ever heard of the procaryotic cell.

What, then, made the difference? The tutor did, of course. But a tutor can't really put anything into your head that you can't put there all by

yourself. What the tutor does is force you to think about the material instead of just staring at it. The tutor exposes your areas of ignorance, but instead of letting it go at that, forces you to pave over these areas with information.

You can do the same thing the tutor does—tutor yourself. The suggestions that follow and the use of this study guide will help you.

Lectures and Note Taking

Instructors vary in their approaches to microbiology courses. Some give lectures that largely paraphrase the text, and exams are based mainly on the text. Others scarcely use the book at all in their lectures and base the exams solely on the lectures; successful students must be careful note takers. (I have even heard of some cases in which there seems to be no apparent relationship between the information available to the student and the exams. These cases, of course, can only be left to the chaplain.)

It is important to take notes in an organized fashion such as this:

Staining of Bacteria
  Gram Stain
    Insert all material about Gram staining. Take down all terms likely to be associated with Gram staining.

  Acid-Fast Stain
    Insert all material about the acid-fast stain. Take down all terms likely to be associated with acid-fast staining.

If you look back at notes like this, you can see that you were hearing about the staining of bacteria and that there were basically two types of bacterial stains discussed. Note that you also clearly kept the information about the Gram stain separate from information about the acid-fast stain. Never let your notes run together so that one topic merges with another. On objective tests this failure to separate discussions can be fatal. Make sure you have definitions straight. Never leave your notes or your mind a blank on something as obvious as the definition of a term.

Studying

I always invite students with grade problems in the course to come see me. I ask them to bring their notes and a copy of the offending exam, corrected from a key. Very often certain patterns show up. One is that the notes have no "study marks"; that is, no underlining or circling. Another is that the student often misses a cluster of questions pertaining to one group of topics, for example, the characteristics of different antibiotics. In other words, the student has encountered a list of antibiotics and failed to differentiate one from another. This is why it is important to organize information by general headings and a system of indentation as I have described. I also notice occasionally that a term, such as the word *autotroph*, stands alone in the notes without definition or explanation. Surely the student could have filled in such an omission by consulting the book

or the instructor. In my presentation of the material, I am not trying to keep things secret, nor, presumably, is your instructor.

My recommendations are these: First, *organize your notes* so that it is obvious where a discussion of a topic, such as the disease diphtheria, starts, and where it ends. The most obvious way of doing this is to underline the main topic and inset all the information about that topic. (If you have trouble writing rapidly enough, or you have trouble with English as a language, ask the instructor if you can record the lectures.)

Second, *never confuse staring at a page with studying a page*. As you read, do your eyes ever travel down half a page while your mind fails to take in a single word written on it? A person has a limited capability for concentration, and by staying up all night before an exam, he or she is likely to exceed it. Do your studying in short bursts within the limits of your full attention span; start early. In order to ensure concentration, go through the notes or the text with a pencil or highlighting marker. Look deliberately at the material, and try to think like the person who goes through it to create an exam. You will find that your mind and the instructor's mind will often travel the same path. If the topic is penicillin, for example, mark the important facts: that it is produced by a mold, that its mode of action affects cell wall synthesis, that it has a β-lactam ring in its structure, that it affects mainly gram-positive bacteria, and so on. When you have done this, you have actually *thought* about the material instead of just staring at it. This method will also teach you how to take notes. You'll begin to recognize material that is likely to be on an exam and get it down, leaving to casual memory the instructor's anecdote about his memories of childhood chickenpox.

Study Guide Contents

This study guide provides a summary of each chapter that contains the important terms and concepts likely to be on examinations. This chapter summary is usually organized by the headings used in the text. Important terms are printed in boldface and defined, and important figures and tables from the text are included. Following each chapter synopsis is a sample exam, which is an extensive self-testing section containing matching questions and fill-in-the-blanks. An answer key is provided. (You may wish to supplement these questions with the Study Questions at the end of each chapter in the textbook.) Obviously, not all questions can be anticipated, and a good instructor will usually introduce material other than that found in the text. But going through these sample exams will work as a self-tutoring device to direct attention to any areas of ignorance.

If you are going to improve your time in running the mile or the amount of weights you can lift, you must do more than read a book on techniques. You must apply them to build up your endurance or your muscles. The same applies to study habits. A guide cannot do your work for you; it can only serve as a tutor. You must do the work yourself.