

PREFACE

MICROBIOLOGY EXPERIMENTS

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Part Two: The Other Microbial World

To the Student

A microbiology laboratory is valuable because it actually gives you a chance to see and study microorganisms firsthand. In addition, it provides you with the opportunity to learn the special techniques used to study and identify these organisms. The ability to make observations, record data, and analyze results is useful throughout life.

It is very important to read the scheduled exercises before coming to class so that class time can be used efficiently. It is helpful to ask yourself the purpose of each step as you are reading and carrying out the steps of the experiment. Sometimes it will be necessary to read an exercise several times before it makes sense.

Conducting experiments in microbiology laboratories is particularly gratifying because the results can be seen in a day or two (as opposed, for instance, to plant genetics laboratories, which can take months). Opening the incubator door to see how your cultures grew and the results of the experiment is a pleasurable moment. We hope you enjoy your experience with microorganisms as well as acquire laboratory and critical thinking skills that will be valuable in the future.

To the Instructor

The manual includes a wide range of exercises—some more difficult and time-consuming than others. Usually more than one exercise can be done in a 2-hr laboratory period. In these classes, students can actually see the applications of the principles they have learned in the lectures and text. We have tried to integrate the manual with the text *Nester's Microbiology: A Human Perspective*, Ninth Edition, by Denise Anderson et al.

The exercises were chosen to give students an opportunity to learn new techniques and to expose them to a variety of experiences and observations. We did not assume that the school or department

has a large budget; thus, exercises were written to use as little expensive media and equipment as possible. The manual contains more exercises than can be done in one course so that instructors will have an opportunity to select the appropriate exercises for their particular students and class.

- An online Instructor's Manual is available from the publisher.
 - It lists equipment, cultures, media, and reagents needed for each exercise and has extensive information for storing cultures and making media.
- The Notes to the Instructor section gives suggestions for preparing and presenting the laboratory sessions.
- There are questions that can be used to supplement those in the student manual.
- **We highly recommend that the instructors utilize the Instructor's Manual.** Contact your local McGraw-Hill representative for the URL and password for this site.
- Revisions in the Ninth Edition include the following:
 - New exercises:
 - Ex. 18 Enzymes and Hydrolysis Reactions, which bridge the Gram-positive (Ex. 16 and 17) and Gram-negative (Ex. 19 and 20) exercises
 - Ex. 21 Chromagars and All-in-One Tests, which now includes the EnteroPluri-Test and API20E tests
 - Ex. 26 Protists: Algae, Protozoa, Slime and Water Molds, were split out from Parasites
 - Changes to exercises:
 - The majority of figures were updated, with many re-drawn to make procedures easier to follow.
 - Numerous Figures and Tables were added throughout.

- Numerous Lab Report tables were updated to guide students in recording lab results.
- Definitions of words match the accompanying Nester textbook.
- Culturing Gram-positive and Gram-negative microbes were moved up to exercises 16–21.
- Charts to describe and separate bacterial genera by shape and test result were added to exercises 16 and 17.
- A Beta-lactamase test (Nitrocefin slide) was added to exercise 16.
- A NaCl (Salt) test was added to exercise 17.
- Some hydrolysis tests were separated from gram positive and gram negative exercises into exercise 18 Enzymes and Hydrolysis Reactions.
- Lipase, Gelatinase, and DNase hydrolysis tests were added to exercise 18.
- The nitrate test, ornithine decarboxylase (ODC), and lysine decarboxylase (LDC) tests were added to exercises 19 and 20.
- Enteropluri-Test and API20E tests were added to exercise 21.
- A Chromagar was added to exercise 21.
- Microbial Genetics exercises were moved back to exercises 22–24.
- Fungi, Protists, Parasites, and Viruses were moved back to exercises 25–28.
- Fungi in exercise 25 were edited and now have labeled photos.
- Slime molds were moved under Protists in exercise 26.
- Exercise 32 was rewritten to make the PCR experiment easier to follow.
- The ELISA was moved behind exercise 35 Microarray.
- Lines were added to several tables in the results sections.
- Many textbooks figures were added.
- An additional 18 color plates and many new figures were added to enhance student learning.
- Student objectives that meet suggested American Society for Microbiology

(ASM) curriculum guidelines are designated by superscripted numbers.

- If a student has a special interest in microbiology and would like to do independent work, three projects are available online:
 - Methylophils
 - The UV-Resistant *Deinococcus*
 - Hydrocarbon-Degrading Bacteria

We hope these changes are helpful and that the manual contributes to the students' understanding of microbiology. We also hope both students and instructors enjoy their experience with a very interesting group of organisms.

Acknowledgments

We would like to thank Denise Anderson, Sarah Salm, and Deborah Allen for their text *Nester's Microbiology: A Human Perspective*. This text was the source of much of the basic conceptual material and figures for our laboratory manual.

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