

LABORATORY INSTRUCTIONS

in

MICROBIOLOGY

by

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SECOND EDITION

ST. LOUIS

THE C. V. MOSBY COMPANY

1958

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1954

Printed in the
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PREFACE TO SECOND EDITION

Continued rapid advances in the field of microbiology necessitate changes in any laboratory manual used for teaching. As a part of this revision, therefore, descriptions of certain new techniques, equipment, and media have been included. Where feasible, such descriptions have been incorporated in the appropriate exercises. Other additions include (1) a new exercise on The Microbial Deterioration of Matériel, (2) two line drawings illustrating basic techniques, (3) additional questions designed to emphasize the fundamental principles embodied in each exercise, (4) additional references to three of the more commonly used texts in addition to references to the companion textbook, Microbiology,* and (5) a simple, illustrated key designed to aid in the identification of genera of some of the common molds.

Other changes involve (1) corrections of inadvertent errors found in the first edition, (2) deletion or combination of a few exercises which failed to produce the desired teaching results, and (3) correction of the genus and species names of bacteria to agree with the seventh edition of Bergey's Manual of Determinative Bacteriology.

* Gebhardt, Louis P., and Anderson, Dean A.: Microbiology, St. Louis, The C. V. Mosby Co.

PREFACE TO FIRST EDITION

This manual embodies a large number of experiments, many of which have been used repeatedly by the authors in their laboratories. While designed as a companion to Microbiology by Gebhardt and Anderson, it can be used very successfully with other texts. It has been prepared with the following objectives in mind:

1. To provide relatively simple experiments which will demonstrate basic microbiological principles and at the same time require only a minimum of equipment, materials, and effort.

2. To maintain student interest at as high a level as possible by making extensive use of microorganisms and materials which are around us rather than relying entirely on pure cultures and sterile media supplied by the instructor.

3. To include those exercises which will provide the student with some experience in performing the basic microbiological techniques so that on completion of the course he will have acquired many of the fundamental laboratory skills peculiar to microbiology or at least have an understanding of the techniques involved.

4. To emphasize practical applications along with theoretical concepts, since it is felt that the experiments which have some bearing on everyday life will be of greatest value to the type of student likely to enroll in a course in elementary microbiology.

5. To provide many more experiments than can be performed in the time allotted, in order to permit the teacher to select the exercises most suited to his or her purposes. Many of these exercises are applicable either as student experiments or as class demonstrations.

6. To acquaint students (who may subsequently become teachers of biological science) with experiments which are simple enough to permit their use at the high school level for demonstrating microbiological principles.

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D. A. A.

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GENERAL INSTRUCTIONS

TO BE READ CAREFULLY BEFORE BEGINNING THE EXPERIMENT

The experiments which will follow represent an excursion into a world of unseen living forms. Because of this element of invisibility, microbiology differs from the other sciences in terms of the laboratory techniques which must be employed. With microorganisms constantly about us, procedures must be followed which will enable us to grow the organisms we desire without having our experiments ruined by foreign microbes.

If these experiments are performed intelligently and understandingly you will find yourself conversant with most of the basic techniques developed by Pasteur, Koch, and their contemporaries. In addition, you may learn to use a number of techniques unknown to them. Also, these experiments, simple though they may be, will enable you to visualize many of the basic principles of microbiology, most of which have a direct application in your everyday life.

In order for an experiment to yield full value it is imperative that you understand what you are doing before you begin it.

The following suggestions are offered as an aid:

1. Read directions carefully and understandingly BEFORE beginning the experiment. Do not rely on what your neighbor tells you. He may be wrong. Know what you intend to do and why. If you are not sure, ask the instructor.
2. Plan your work in advance.
3. Keep careful notes and make accurate drawings. Answer the questions at the end of the experiment completely and thoughtfully.
4. Learn to use the microscope correctly. Time spent in mastering this procedure will pay dividends throughout the course.
5. Remember that microbiology requires special techniques or skills comparable to those of the surgeon and that there is a right and a wrong way to carry on these various procedures. The right way brings success; the wrong way, contaminated cultures. Practice "dry runs" of the techniques a few times before actually attempting to carry them out.

While the microorganisms you use in the laboratory will be mostly harmless forms, a few, such as some common pus-formers, may have some disease-producing power. Therefore, it is desirable that you treat all of your cultures as if they were pathogenic. Through the use of careful techniques, better experimental results will be obtained because contaminations will be largely eliminated. The following simple laboratory rules should be observed:

1. Always wear a laboratory coat or apron. This (a) protects your outer clothing from chance contamination, (b) prevents your outer clothes, soiled with dust, etc., from introducing contaminants into your cultures, and (c) protects your clothing from being splashed with stains used daily in the laboratory.