

R. P. MacFATE

INTRODUCTION *to*  
THE  
CLINICAL  
LABORATORY



SECOND

# INTRODUCTION *to* THE CLINICAL LABORATORY

*by*

ROBERT P. MACFATE, Ch.E., M.S., Ph.D.

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SECOND EDITION



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## Preface to Second Edition

THIS IS NOT a book of methods. It is a presentation of fundamental laboratory data and procedures, designed to assist the beginner in the Clinical Laboratory as well as the experienced laboratory technologist. Some material has been added with the hope that it may lighten the burden of the Laboratory Director when questions arise concerning the construction of the Clinical Laboratory, equipment, certain procedures, laboratory animals and the health of the laboratory staff. The further purposes of this book are detailed in the preface to the first edition, which follows directly.

Acknowledgment is here made for the many suggestions from friends which have resulted in additions to and changes in this book. It is hoped that the added material will increase its usefulness.

The chapter on Construction of the Clinical Laboratory has been rewritten to give further details on the planning and furnishing of the rooms for the various disciplines. Check lists of the equipment required for specific laboratories are included.

The list of Equipment used in the Clinical Laboratory has been revised. Concise descriptions, recommended specifications and important information have been included.

The chapter on Physical Procedures has been revised to include all purely physical processes. Detailed discussions of microscopy, the nature of light, the spectroscope, colorimetry and photometry, the polarimeter, the refractometer, radioactivity and sterilization have been added.

The chapters on Chemical and Microbiological Procedures have been thoroughly revised.

A speaking acquaintance with other disciplines is desirable. To this end, a few exercises are presented for the novice to perform other than the actual tests. Since this is not a book of methods, it is suggested that the beginner in the Clinical Laboratory read this text and then do the

various tests performed as routine in the laboratory, using specimens left over from the daily work. Later reference to this book may assist in solving some of the problems that will arise.

Dr. Oscar Kanner, Chief, Laboratory and Radioisotope Services, Veterans Administration Hospital, Oteen, N. C., has kindly contributed a portion of the chapter on Statistical Methods in the Clinical Laboratory. The proper concept of populations and the differentiation of sample parameters from population parameters must be clearly understood.

The chapter on Animals used in the Clinical Laboratory has been revised and important information added.

The chapter on Health, Safety and First Aid has been revised to point specifically to situations that may arise in the Clinical Laboratory. Health and accident records are proposed. Not all Clinical Laboratories are located in hospitals, but private laboratories usually are situated near physicians' offices. First aid procedures, therefore, are presented which will permit care of the injured worker until a physician arrives.

The safe handling of chemicals, biologic specimens and equipment is reviewed, with specific suggestions concerning the prevention of fires, explosions and electrical accidents.

I wish to thank again the publisher's staff for their assistance and many fine suggestions in the preparation of this book.

ROBERT P. MACFATE

*June, 1965*

## Preface to First Edition

BEGINNERS in medical technology are overwhelmed by the vast amount of material to be absorbed. Where can they find a moderate approach to the field? Where can they review important material, not only of the basic sciences they have studied but of those they have not studied that have application in medical technology? Where can they readily find the answer to many technical problems which arise every day in the Clinical Laboratory?

The training of medical technologists is a serious problem that has been recognized by the American Society of Clinical Pathologists, the American Society of Medical Technologists and related organizations, including their various committees such as the National Committee for Careers in Medical Technology.

Educational programs in medical technology are directed mainly toward improvement in methodology and instrumentation. Little attention is devoted to such fundamental procedures as titrations, photometry and weighing. This information can be accumulated, laboriously and piecemeal, from many sources. Those not acquainted with a particular field have difficulty in reviewing basic information with which they should be familiar.

The author, drawing on his experiences in the Clinical Laboratory over more than 30 years, started several years ago to accumulate data on the problems which arose daily and caused greatest concern to the less experienced medical technologist. This manual is the result.

This is not a book of methods. Comparatively few procedures are given in detail, and these only when they are fundamental to the particular branch of Clinical Laboratory work under discussion. The book has five purposes:

1. To serve as an introduction to the Clinical Laboratory.
2. To present, for the medical technologist and nursing staff, pro-

cedures for the collection of specimens to be delivered to the Clinical Laboratory for examination.

3. To review the important laboratory manipulations, such as titrations, weighing and bacteriologic transfer.

4. To review briefly the various branches of Clinical Laboratory endeavor.

5. To present detailed explanations of procedures and equipment used in the Clinical Laboratory, not included in most books on methodology and which often present problems to the inexperienced technologist.

To provide an introduction to the Clinical Laboratory, some basic plans and suggestions for equipment are presented. The ordering, receipt and storage of supplies are detailed. Glassware is discussed and general laboratory equipment reviewed.

The collection of specimens for examination is discussed early in the manual for ease of frequent reference by the laboratory and nursing staffs.

General laboratory manipulations are presented in chapters on physical, chemical, microbiologic, serologic, hematologic and similar procedures. Animal care is included, and a section on safety and first aid.

This manual is intended to provide a brief review, directing attention to items of extreme importance to the beginner in the laboratory. Obviously it is not a substitute for the orderly study of a particular subject.

The author is indebted to his colleagues for their assistance and suggestions. Thanks are due the publisher for permission to use illustrations and other material from S. A. Levinson and R. P. MacFate, *Clinical Laboratory Diagnosis* (5th ed.; Philadelphia: Lea & Febiger, 1956). Use has been made of incomplete notes compiled by Dr. Charles P. Carter and made available through Year Book Medical Publishers, whose cooperation in the preparation of this manual is gratefully acknowledged.

ROBERT P. MACFATE

January, 1961



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