LABORATORY METHODS OF THE UNITED STATES ARMY

FIFTH EDITION

Edited by

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ILLUSTRATED WITH 103 ENGRAVINGS AND 8 COLOR PLATES

APPROVED BY THE SURGEON GENERAL OF THE UNITED STATES ARMY

LEA & FEBIGER
PHILADELPHIA

Reprinted
December, 1944
April, 1946
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PRINTED IN U. S. A.

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GEORGE M. STERNBERG
(1838-1915)

Pioneer American bacteriologist, who was Surgeon General of the United States Army during the last decade of the nineteenth century, and to the host of laboratory workers who, inspired by his zeal for scientific research, have since made such rich contributions to the prevention of disease among American troops and to the health and welfare of mankind.

PREFACE TO THE FIFTH EDITION

THE present edition of "Laboratory Methods of the United States Army," like the first one, has been prepared to meet a war-time need for a manual describing practical methods for use in the medical and sanitary laboratories of the Army. The first edition which bore the title, "Medical War Manual No. 6; Laboratory Methods of the United States Army," was written during World War I by officers on duty in the Office of The Surgeon General of the Army. It served as a valuable reference for the large numbers of officers and technicians who entered the Army and assumed responsibility for its enormously expanded laboratory services during the period from 1917 to 1919. Since that time, the manual has passed through three editions and has been enlarged at each appearances

The recent mobilization and the present war again necessitated an expansion of the Army's diagnostic and sanitary laboratory services and created an unusual need for reference books dealing with laboratory technic. Consequently the remaining copies of the fourth edition of Laboratory Method, of the U. S. Army were soon absorbed and during 1941, plans were made to publish a fifth edition. The completion of this new edition has been somewhat delayed because of the increased duties and responsibilities which the war has imposed on the authors. However, the book has been revised throughout in order to bring it up to date and many sections have been completely rewritten.

The editors desire to express their appreciation to all of the many individuals who have assisted in the preparation of this book, including those who contributed to the earlier editions. Special thanks are due for advice or assistance rendered by the following individuals: In the Office of The Surgeon General: Brig. General R. A. Kelser, U. S. Army, Director, Veterinary Division; Lieut. Colonel Elliott S. Robinson, M.C., Director of the Laboratories Division, Preventive Medicine Service, and members of his staff including Major A. James French, M.C. and Captain Arthur Stull Sn.C.; Colonel Karl R. Lundeberg, M.C., Assistant Chief, Preventive Medicine Service, and Major Oliver R. McCoy, M.C., Director of Tropical Disease Control Division; Major Douglass W. Walker, M.C., Executive Assistant, Preventive Medicine Service, and Major Leon H. Warren, Research and Development Division; also to Colonel George R. Callender, M.C., Director of the Army Medical School and to members of his staff; to Dr. Lewis H. Weed, Chairman of the Division of Medical Sciences, National Research Council and members of various advisory committees dealing with the laboratory sciences; to Dr. William Mansfield Clark, Professor of Physiological Chemis-

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Manual of Laboratory Methods

INTRODUCTION

By Elliott S. Robinson

Laboratory organization and procedure in the Army do not differ fundamentally from those in civil life, but such elements as the size of the Army, the number and variety of hospitals, and the necessity for functioning in both fixed and mobile installations in all parts of the world give rise to situations not commonly encountered in civilian institutions. The following paragraphs are designed to outline functions of Army laboratories of various types.

A basic concept which, though obvious, is frequently forgotten, is the impossibility of providing complete laboratory service at all Army posts. This does not preclude providing as much laboratory service as is required under ordinary conditions at each post, which may be supplemented in case of need.

Army laboratories frequently combine the functions of diagnostic (hospital) laboratories with those ordinarily performed in civil life by city, county, or state health department laboratories. This is in line with the dual rôle of Army medical officers as physicians and as health officers.

In the zone of the interior, each medical dispensary and station hospital maintains a laboratory commensurate in scope with its size, needs, and geographic location. In the smaller units, the duties of chief of laboratory service are carried by a medical officer on a part-time basis, but in hospitals of 100 or more beds the service is usually sufficiently heavy to require his full time. The range of the examinations carried out in the smallest units is limited to routine blood counts and the simpler and more frequently required tests of other kinds. In the larger station hospitals, the equipment is more varied, more personnel are available and usually the personnel have had greater training and experience so that the more complicated tests may be performed. This is indicated in the Tables 1 and 2, taken from S. G. O. Circular Letter No. 73, July 22, 1941, Subject: The provision of adequate laboratory service in military hospitals. As a rule, the general hospitals are equipped even more generously, for they are more frequently confronted with difficult diagnostic problems.

Each Service Command is also provided with one or more Service Command Laboratories. These are used primarily as health laboratories. One of their functions is to examine specimens from hospitals which are not themselves equipped to carry out the tests required. Because of difficulties and delays in transmission of specimens and reports it is not always easy to fulfill this function, and therefore authority is granted to send specimens to the nearest appropriately equipped laboratory. When

this is necessary, arrangements satisfactory to all concerned should be made in advance, if possible.

For the examination of pathological specimens, certain hospitals have been designated as "histo-pathologic centres." In the continental United States there are 19 of these, each of which examines and reports upon the pathological specimens submitted to it by the hospitals in its area.

TABLE 1.—TYPES OF LABORATORY WORK TO BE DONE NORMALLY IN THE ARMY DIAGNOSTIC LABORATORIES

		Bed size of station hospital					
	Dispensaries	25–99	100–249	250–749	750–999	1000–2000	General hospitals
Clinical pathology and parasitology:							
Routine hematology, urinalysis, gastric analysis, and feces examination for parasites and ova	x	x	x	x	x	x	x
Collection of specimens:							
To be forwarded to larger laboratories for examination	x	x	x	x	x		
Bacteriology:							
Limited bacteriology, smears, throat cultures, wound or abscess cultures, blood cultures, cultures of fluids from serous cavities	x	x	x				
Complete bacteriology:							
Including water and milk	..	..	..	x	x	x	x
Chemistry:							
Blood and urine chemistry	..	..	x	x	x	x	x
Toxicology and sanitary chemistry, food chemistry	..	..	..	..	x	x	x
Serology:							
Precipitation tests for syphilis	..	..	x	x	x	x	x
Wassermanns	..	..	..	..	..	x	x
Colloidal gold	..	..	..	..	..	x	x
Pathology:							
Gross	..	x	x	x	x	x	x
Microscopic	..	..	..	..	..	x	x

TABLE 2.—GUIDE FOR ASSIGNMENT OF COMMISSIONED PERSONNEL TO THE "LABORATORY SERVICES" AT ARMY HOSPITALS AND DISPENSARIES IN THE ZONE OF INTERIOR

		Bed size of station hospital							Bed size of general hospital		
Commissioned personnel	Dispensaries*	25–99*	100–249	250–499	500–999	1000	1500	2000	500	1000	2000
Chief of laboratory service (Must be a physician of the Medical Corps with general laboratory training and experience)	...	..	1	1	1	1	1	1	1	1	1
Clinical pathologist and parasitologist† (Medical or Sanitary Corps)	...	..	..	..	..	..	..	1	..	..	
Pathologist (Medical Corps)	...	..	..	..	..	1	1	1	1	1	1
Bacteriologist (Medical or Sanitary Corps)	...	..	..	1	1	1	1	1	1	1	1
Serologist (Medical or Sanitary Corps)	...	..	..	..	..	..	1	1	..	..	1
Biochemist (Medical or Sanitary Corps)	...	..	..	..	1	1	1	1	..	1	1
Total full-time officers	0	0	1	2	3	4	5	6	3	4	6

* A medical officer, on a part-time basis, should be in charge of the laboratory in dispensaries and small hospitals with less than 150 beds.

† In hospitals of less than 1000 beds these duties will be performed by the chief of the laboratory service, or the bacteriologist.

The Army Medical School and the Army Medical Museum in their respective fields are fully equipped to carry out, directly or through other agencies, tests beyond the scope of other Army laboratories. The Army