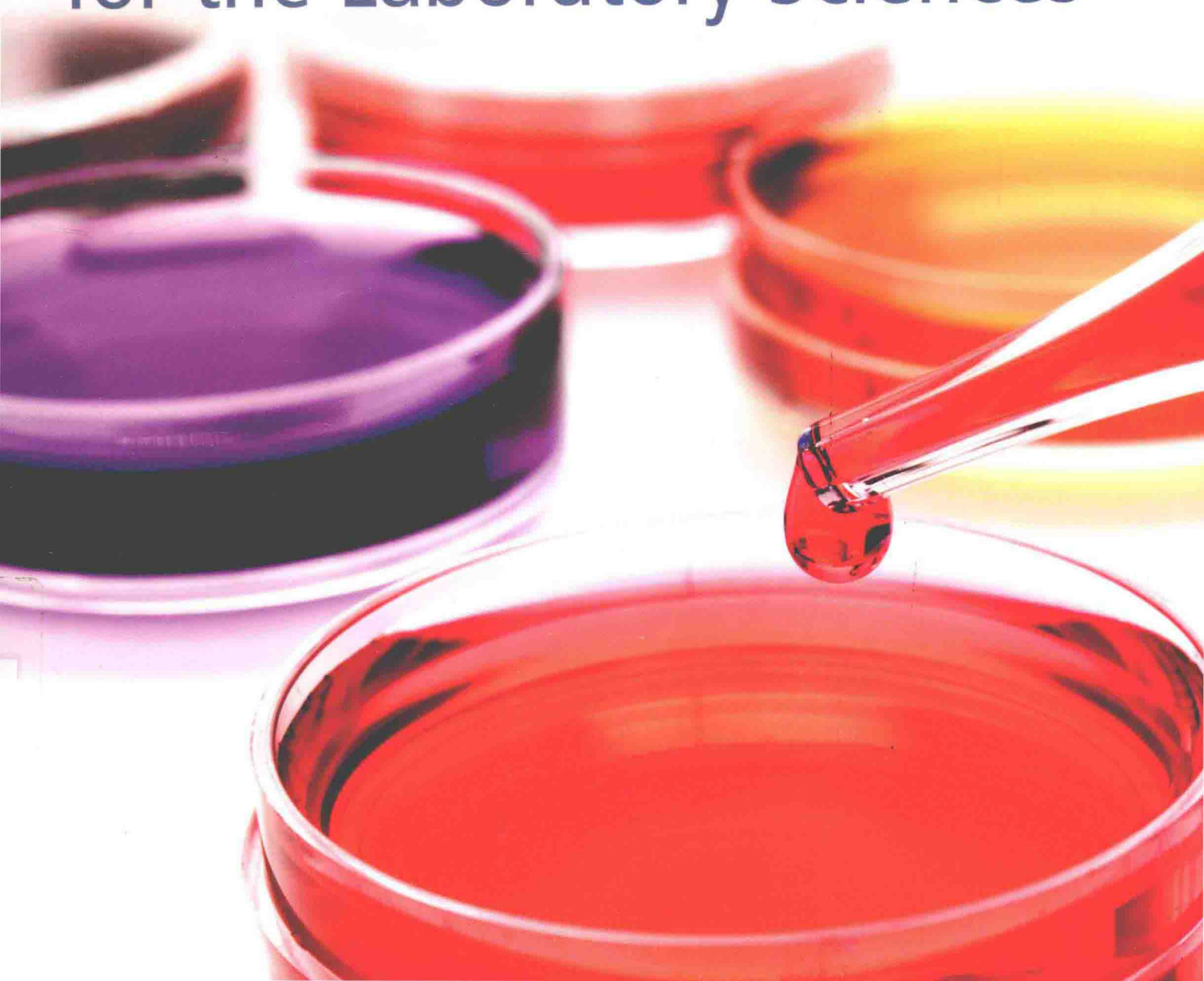


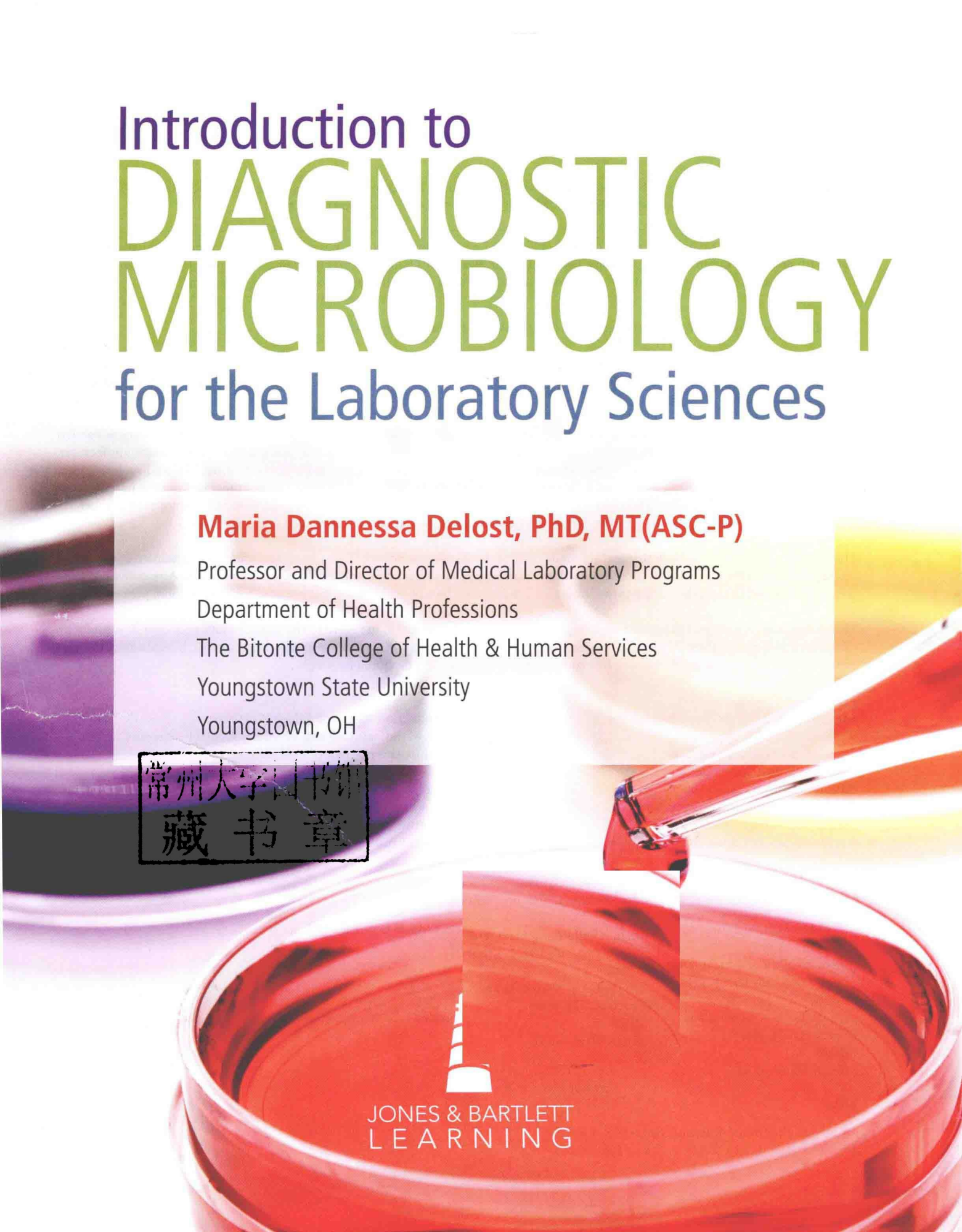
Maria Dannessa Delost

Introduction to

DIAGNOSTIC MICROBIOLOGY

for the Laboratory Sciences



The background of the cover features a close-up, slightly blurred image of laboratory glassware. In the foreground, a large petri dish filled with a red agar medium is visible. Above it, a glass dropper is shown dispensing a drop of red liquid into the dish. To the left, another petri dish with a purple agar medium is partially visible. The overall lighting is bright, creating a clean and professional scientific aesthetic.

Introduction to DIAGNOSTIC MICROBIOLOGY for the Laboratory Sciences

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Dedication

*To the memory of my Dads, Amil M. Dannessa
and George Delost, Jr., who served their country
in World War II as members of our Greatest
Generation and who taught me the values of
hard work, loyalty, and honesty*

Preface

Introduction to Diagnostic Microbiology for the Laboratory Sciences provides a concise study of clinically significant microorganisms for the medical laboratory science student and the laboratory professional. This text is on the recommended reading list to prepare for the ASCP MLT (American Society for Clinical Pathology, Medical Laboratory Technician) exam. Although comprehensive textbooks for diagnostic microbiology abound, this text is unique in its focus on what is most essential for the beginning student. The concept of this text was originally suggested by my medical laboratory technology students who were frustrated by the length and depth of other microbiology textbooks. Students became discouraged with the vast amount of information included in these texts, which serve as excellent learning resources but were inappropriate for the beginning student.

This text provides an overview of diagnostic microbiology that is relevant and essential to medical laboratory students and entry level medical laboratory technicians. Chapters 1 through 6 begin by providing an overview of the infectious process, including disease transmission and host immunity. The importance of specimen collection is emphasized with both general and specific requirements, instilling in the student the importance of pre-analytical factors in specimen management and quality laboratory testing. The goal is to provide a thorough yet succinct discussion of isolation media, as well as the basics of preliminary testing in the microbiology laboratory.

Essential manual methods are addressed both in theory and method so the student can understand, practice, and apply each laboratory procedure. The chapters mesh didactic theory with laboratory testing and interpretation, creating an orderly and complete presentation. Additional testing methods, such as serology, immunoassay, antibiotic susceptibility testing, and molecular diagnostics are also presented with pertinent applications. Current modes of antibiotic resistance and the required testing are included

which introduce the student to the increased attention required in antibiotic testing, as well as the identification of resistance patterns. The expanded information on molecular diagnostics provides the student with the essential framework and examples of the expanding use of molecular technologies in the microbiology laboratory. The text also introduces the student to current automation in the microbiology laboratory, including contemporary instrumentation used in microbial identification, antibiotic susceptibility testing, and blood culture technologies.

Chapters 7 through 18 address medically important bacteria, including their isolation, identification, and treatment. Each chapter focuses on major divisions of bacteria, including gram-positive cocci, gram-negative cocci, gram-negative bacilli, gram-positive bacilli, mycobacterium, anaerobes, spirochetes, chlamydia, and rickettsia. Each chapter includes concise information on the isolation, identification, and clinical relevance of those microorganisms that a microbiologist may encounter in the clinical setting. These chapters also include news pieces that describe a timely concern related to a specific microorganism and its associated public health concern. Examples include antibiotic resistance in *Staphylococcus aureus*, meningococcal disease, listeriosis, Lyme Disease, and legionellosis. These items attempt to instill in the student the relevance of clinical microbiology in their everyday life by relating contemporary events to the lessons presented in the chapter.

Chapters 19 through 21 provide an orderly presentation of clinical virology, mycology, and parasitology that can be realistically covered in an introductory course. These topics are often overwhelming in both quantity and depth of information in most microbiology texts, leading to frustration in many students. These important topics are summarized in a format that encourages the student to review and apply central concepts in each discipline. Chapter 19,

Introduction to Virology summarizes viral replication, classification of DNA and RNA viruses, and the isolation and identification of medically important viruses. This chapter also summarizes and describes significant viral infections and the role of the laboratory in the diagnosis of viral infections. Chapter 20, Introduction to Medical Mycology discusses the classification of mycoses, specimen collection, and fungal culture media. Clear identification schemes utilizing both macroscopic colonial appearance and microscopic characteristics as well as biochemical methods for medically important fungi are included. Superficial, subcutaneous, systemic, and opportunistic mycoses are addressed. This chapter includes images that are vital in the correct identification of the fungi. Chapter 21, Introduction to Medical Parasitology provides an organized classification outline of medically relevant parasites and infections. Specimen collection requirements unique to parasitology are described as well as concentration methods and stains. The chapter is divided into units which discuss protozoans such as the amebae, sporozoans and hemoflagellates, nematodes, cestodes, and trematodes. Extensive, clearly drawn life cycles with images of the infectious stage and diagnostic stage are included for clinically relevant parasites.

The final chapter, Chapter 22, Clinical Specimens, ties the components of the text together by summarizing the medically important pathogens typically found in clinical specimens with identification schemes. Complete work-ups of microorganisms from major clinical sites are included with flowcharts and suggested laboratory protocols. Students are able to apply the didactic and laboratory concepts presented throughout the text to evaluate clinical specimens and develop appropriate testing schemes to correctly identify pathogens and differentiate these from normal flora.

The goal of the text is to provide the medical laboratory student with the information and skills necessary for entry into the medical laboratory profession. The information is organized into a format that facilitates learning through the use of integrated text,

charts, figures, and laboratory exercises. This format also provides a quick reference to the most frequently utilized manual procedures and most commonly referred topics in clinical microbiology.

Key Features

Introduction to Diagnostic Microbiology for the Laboratory Sciences includes learning objectives, laboratory exercises, news features, and review questions. Both didactic and psychomotor skills are presented and reinforced in each chapter.

- **Learning Objectives**—Clearly outlines for the reader the desired outcomes of the chapter, focuses reading, and provides a basis to gauge learning.
- **Laboratory Exercises**—Engages the reader by having them apply what they learned in a lab activity, record their results, and push their analysis further with critical thinking questions.
- **News Feature**—Highlights current issues that face the contemporary medical laboratory technician, grounding the information in a real-world context.
- **Review Questions**—Provides a way to apply what has been learned in the chapter and also provides practice for preparation for the Medical Lab Technician (MLT) certification examination.

Many reference texts in clinical microbiology are available with complex descriptions and highly detailed methods which can intimidate the beginning student. The purpose of *Introduction to Diagnostic Microbiology for the Laboratory Sciences* is to provide a condensed and practical approach for students and novice microbiologists. A mastery of the material and procedures in this text will provide students with a strong background for pursuing higher levels in clinical microbiology. Additionally, the text is an excellent resource to prepare for the ASCP certification examination. It further serves as a valuable review for laboratory professionals who are returning to the microbiology field after an absence. The concise format provides a quick and thorough review mechanism for students and laboratory professionals who may need a refresher course in diagnostic microbiology.

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Special thanks to my husband, Raymond, and my sons, Gregory and Michael, and my entire family for their encouragement and support during this project. Also, thank you to all of my medical laboratory students at Youngstown State University from whom I have learned so much during my thirty years of teaching.

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