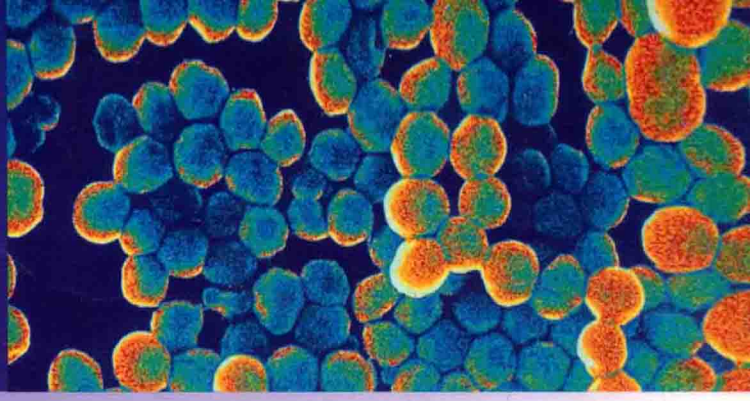

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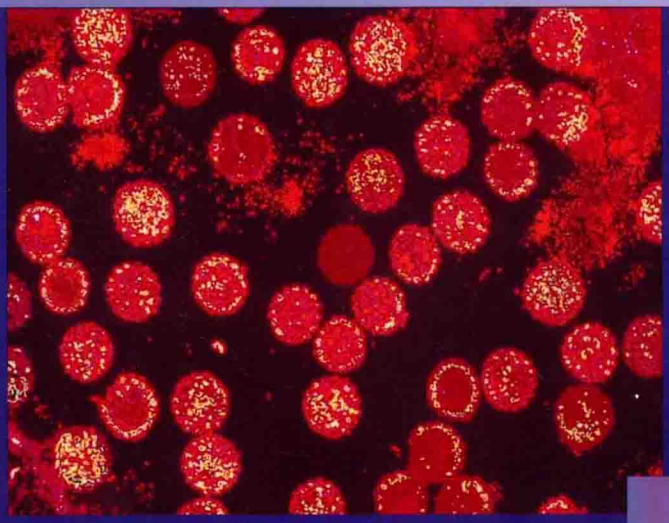

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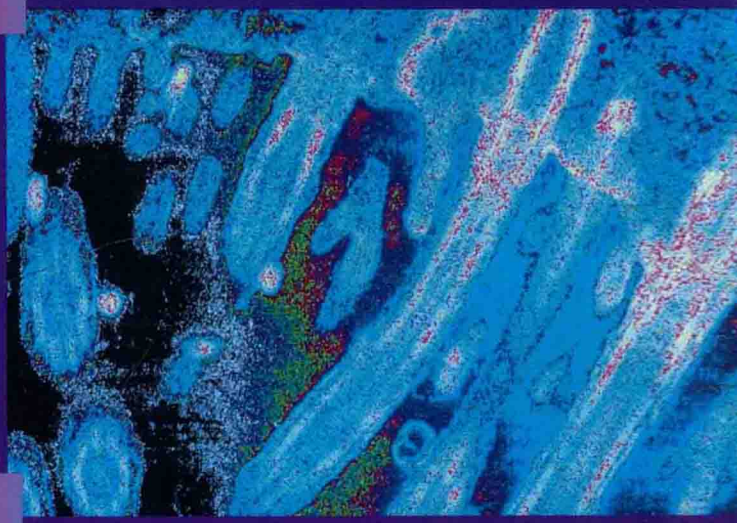

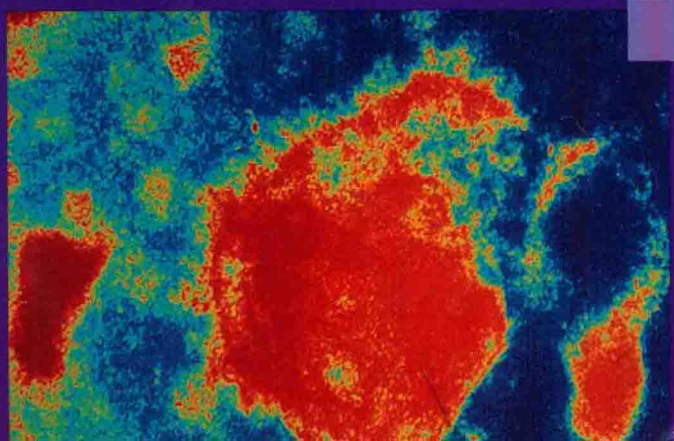

Microbial Disease

Third Edition

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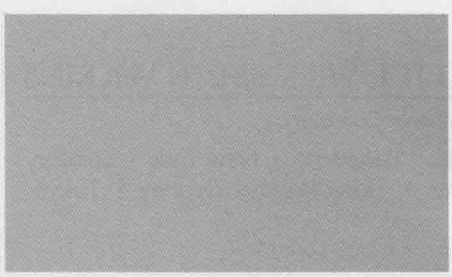

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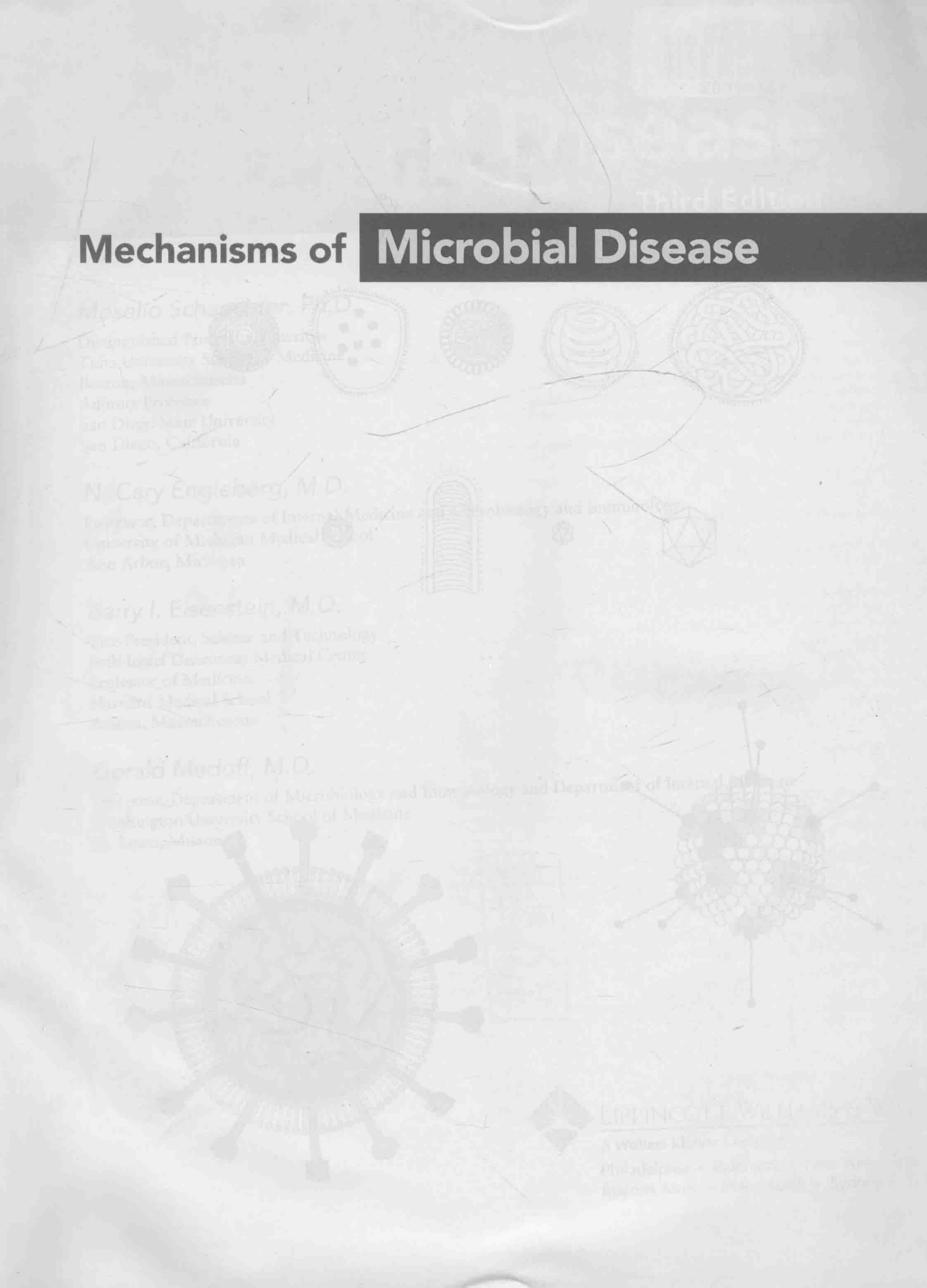

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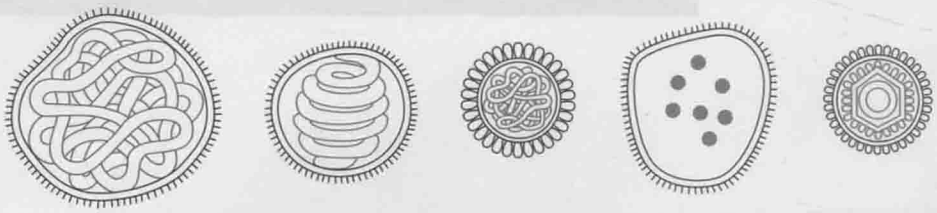

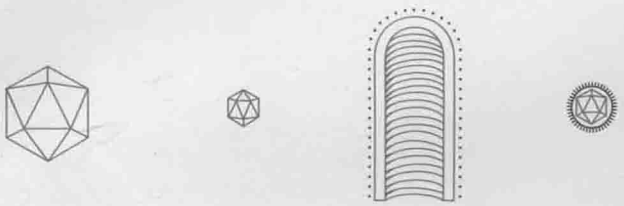

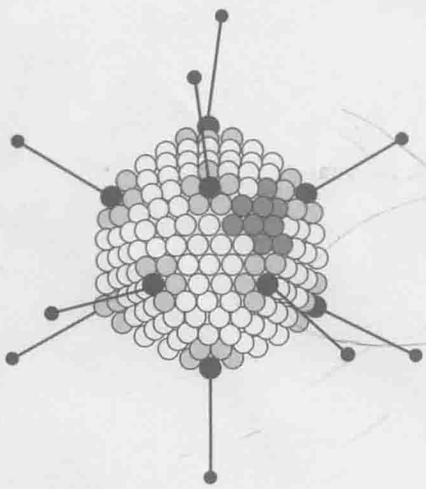

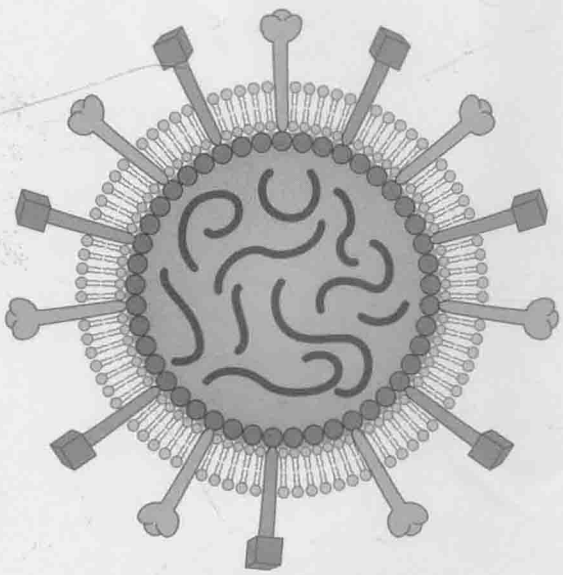

To Edith, Suzy, Joyce, Judy, and the memory of Barbara

Preface

The previous edition of this book has been well received by faculty members and especially by students. Particularly well liked has been our notion of presenting the material in a pathobiological framework and in the context of clinical cases. This format seems to lend itself to an active form of studying and to be easily adaptable to problem-based learning.

This edition reflects many of the rapid changes that have taken place in medical microbiology and infectious diseases. Several new chapters have been added, others have been dropped. Although we have tried to update all the material, we must acknowledge that information in this field is acquired at such dazzling speed that it risks becoming outdated before the ink dries. The format of this edition has also been changed and most of the illustrations are new.

This textbook is intended to be used in courses on medical microbiology and infectious diseases for medical students and other health professionals, graduate students, and advanced undergraduates. In medical schools the topic is often divided between two courses: one on microbiology and another on infectious diseases (frequently embedded within a pathophysiology course). Our intent is to bridge the contents of these two courses by discussing first the major infectious agents as biological models (Parts I and II), then presenting ways in which the major systems of the body are affected by infectious diseases (Part III). Since the purpose of this book is to develop a conceptual framework, it highlights certain infectious agents and diseases and does not attempt to present the material in exhaustive fashion.

In many of the chapters on individual infectious agents you will find sections called "Paradigms." Here we discuss certain general principles that are best illustrated with the agents described in that chapter, but which can be applied to others as well.

Following the chapters on each group of infectious agents (bacteria, viruses, fungi, and animal parasites), you will find review charts. Filling in the blank spaces should help you outline the scope of the material, organize your store of information, and prepare yourself for examinations. Only the most common agents of human infectious diseases are listed, with reference to relevant chapters in this book.

Moselio Schaechter
N. Cary Engleberg
Barry Eisenstein
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Contents

SECTION

I

Principles

CHAPTER 1

Establishment of Infectious Diseases

MOSELIO SCHAECHTER
BARRY I. EISENSTEIN

As a student and as a physician you confront a large number of facts about infectious agents and the diseases they cause. How will you manage this large amount of material? Given the magnitude of the task, memorizing bits of information would be difficult and unproductive.

Fortunately, it is possible to develop a conceptual framework on which to hang a multitude of facts. This framework consists of two generalizations that are based on the features that characterize all forms of parasitism:

1. In all infectious diseases, the following events take place :
   Encounter: The agent meets the host.
   Entry: The agent enters the host.
   Spread: The agent spreads from the site of entry.
   Multiplication: The agent multiplies in the host.
   Damage: The agent, the host response, or both cause tissue damage.
   Outcome: The agent or the host wins out, or they learn to coexist.
2. Each of these steps requires the breach of host defenses. The manner in which each parasite combats host defenses distinguishes one parasite from another.

ENCOUNTER

Most of us first encounter microorganisms at birth. Microbiologically speaking, we lead a sterile existence while in our mother's womb. The fetus is well shielded from the microorganisms in the uterine environment by the fetal membranes. Second, the mother is not a likely source of microorganisms for the fetus. The mother's blood carries infectious agents only sporadically and in small numbers. In addition, the placenta is a formidable barrier to the transmission of microorganisms to the fetus. However, such transmission is possible, and some diseases are transmitted to the fetus through the placenta. Examples of these so-called congenital infections are **rubella** (German measles) and **syphilis**, or those caused by **human immunodeficiency virus** (HIV) or **cytomegalovirus** (CMV).

First Encounters

The first encounter with environmental microorganisms usually takes place at birth. During parturition the newborn comes in contact with microorganisms present in the mother's vaginal canal and on her skin. Thus, the newborn faces the challenge of living in the intimate company with a bewildering number of microorganisms. The mother, however, does not send the newborn into the world totally unprotected. Through her circulation she endows the fetus with a vast repertoire of specific antibodies. Some immunological protection is also provided by the mother's milk (colostrum), which also contains maternal antibodies. However, these acquired defenses soon wane and the child must cope on its own. The microbial challenge is renewed time and again as all of us come in contact with new organisms throughout our lives. Most of these organisms rapidly disappear from the body, whereas others are adroit colonizers and become part of the normal flora. A few will cause disease.

Endogenous vs. Exogenous Encounters

Microbial diseases are contracted in two general ways, exogenously and endogenously.