

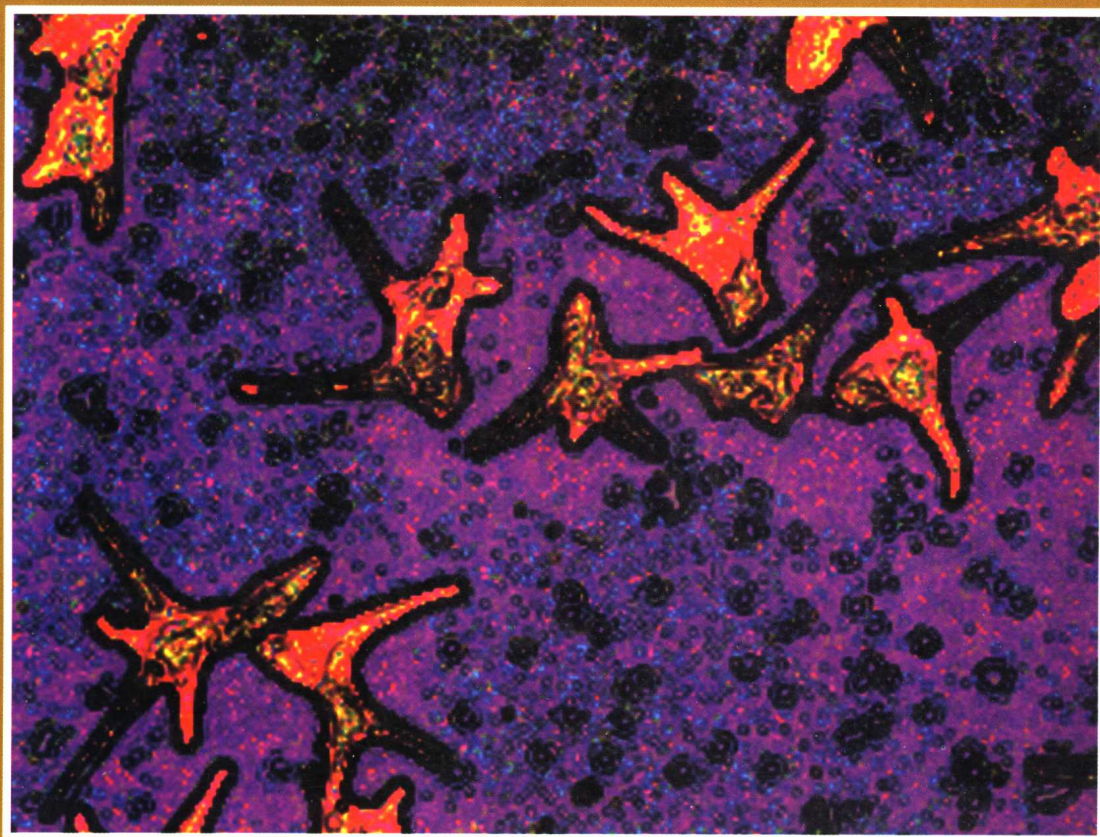
国外生命科学优秀教材

INTRODUCTION TO MICROBIOLOGY

# 微生物学导论 (第二版)

(影印版)

John L. Ingraham  
Catherine A. Ingraham



科学出版社



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## Introduction to Microbiology

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John L. Ingraham Catherine A. Ingraham

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北 京

## 内 容 简 介

本书全面地概述了基础微生物学和应用微生物学的内容, 涉及医学、环境、农业、工业等方面。全书共包括四部分: 微生物学基本原理、微生物分类、微生物与人类的关系、微生物的应用及在地球生态中的作用。在第一版的基础上增加了一些最新科学研究进展, 拓展了实验内容, 改变了一些微生物代谢过程和遗传的描述。书中内容详尽, 图文并茂, 是一本很好的微生物学教材, 可以使你的微生物学习变得更加容易。

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*We dedicate this book to*

**Tom V., Marge, Tom I., Anna, Lisa, and Dana,  
who indulged us for eight years.**

## PREFACE

**M**icrobiology has something for everyone. Because microorganisms are so abundant and widespread, their impacts on us and our environment are numerous and profound. Because some of them are so easy to cultivate and manipulate, their study has led to some of the most important discoveries in basic biology. Because they are so biochemically versatile, their use has spawned new industries and expanded agricultural productivity. Because only such a small fraction of them has been discovered (some say less than 1 percent), the field of microbiology continues to expand and reveal new terrain. In spite of the wealth of information that makes up the subject, microbiology is still a young, rapidly expanding science driven by the real and pressing needs of our time. So whatever your particular interest—health, the environment, basic science, business, agriculture, or microorganisms themselves—you'll undoubtedly gain new insight during your upcoming exploration of the microbial world.

We hope you'll find this book to be a helpful, congenial guide and the trip to be interesting and rewarding. We'll visit all aspects of microbiology—basic and applied, including medical, environmental, agricultural, and industrial. One primary emphasis is medical: two entire parts (Parts III and IV) of the book deal with microbial diseases. These follow a consideration of the basic science of microbiology (Part I) and a survey of the various kinds of microorganisms (Part II). Finally, we examine the way humans use microorganisms and the essential roles they play in Earth's ecology (Part V).

### Second Edition

In this second edition, we maintained the approach and attitude of the first, including emphasis on the why of metabolism and genetics as well as the what and reliance on actual case studies to relate medical microbiology to the lives of people and to provide an organizing framework for its myriad facts. However, there are changes. Some of these reflect the scientific progress that has occurred since publication of the first edition. To name just one example of progress, great advances have been made in the treatment of AIDS and in the under-

standing of its causative agent, human immunodeficiency virus. We've also expanded the number of case studies. We've altered the presentation of metabolism and genetics to make these important topics more readily accessible. We've also added a CD-ROM and cross-referenced it to the text, added a new class of questions, and reorganized the boxes.

### Student-Support Features

The book contains a number of features designed to assist your learning and organize your study.


**Learning Goals.** Each chapter begins with a succinct list of Learning Goals to help you focus on its overall aims.

**Boldface Terms.** Certain terms are highlighted in boldface type the first time they occur. We consider them important and suspect they might be new to you. They are defined in the context in which they occur, and those that might not be adequately defined in a dictionary are included in the Glossary at the back of the book.

**Boxes.** We've included three kinds of boxes—Case Studies, Sharper Focus, and Larger Field.

- ◆ Case Studies explore real clinical cases (most from Catherine Ingraham's medical practice). We hope these stories will help you remember the details of the text material more easily. These Case Studies occur throughout the text. Those at the beginning of each disease chapter play a critical role: they set the stage for much that follows in the chapter. You'll probably want to refer back to these from time to time as you progress through the material that follows.
- ◆ Sharper Focus boxes examine a chapter topic in more detail. Just as you can see greater level of detail by focusing a microscope, these boxes (which appear in every chapter) reveal more information about interesting chapter topics.
- ◆ Larger Field boxes connect text material to our world. Just as you can expand a microscope's field to see more background around an organism, these boxes expand a chapter topic to its larger context—environmental aspects, history, news events, etc. They emphasize the connections of microbiology

to all facets of our lives—beyond the medical aspects explored in the Case Studies.

 **CD Connection.** In most chapters there are one or more “CD Connections” marked by a CD-ROM icon and carrying directions to particular sites on the CD-ROM as well as a brief account of what the site shows. For the most part the designated sites are film loops that quickly convey information that might be difficult to grasp from words alone. For example, one shows how the many flagella on certain bacterial cells coalesce into a single structure that propels the cell through its liquid environment. One look explains it all.

**Suggested Readings.** Each chapter contains suggested readings. To save space these references to books and scientific journals have been pruned to include only the most helpful and informative sources of information, most of which will lead you to more highly specialized information.

**Chapter Summaries.** You’ll find some summaries within chapters that reiterate in a different way material that you might find difficult to grasp in a single reading. In addition, each chapter ends with a somewhat detailed summary. These are provided to help you recall and organize the material you read in the chapter.

**Questions.** We’ve included three kinds of questions at the end of each chapter—review, correlation and essay.

- ❶ Review Questions are just that. They’re not designed to make you think, only to recall and to reassure yourself that you’ve assimilated the material contained in the chapter.
- ❷ Correlation Questions are meant to offer a greater challenge. They ask you to collate different pieces of information and compare them or apply them to a new problem. A correct answer to these questions should assure you that you have gained a thorough understanding of the material. Congratulations are in order.
- ❸ Essay Questions ask you to deal with larger portions of a subject and add your own opinions.

## ADDITIONAL LEARNING AIDS

### Study Guide

This helpful manual contains chapter outlines, key terms, a new feature called “Study Tips,” study exercises of various question types, multiple-choice questions, discussion questions, and an answer key. (ISBN: 0-534-55225-0).


## InfoTrac® College Edition

Available exclusively from Brooks/Cole, this online library offers you unlimited access to more than 700 publications—at any time of the day. With *InfoTrac*, you can search for complete articles from periodicals including *Science*, *Discover*, *Annual Review of Microbiology*, and *Bioscience*. The password-protected site is updated daily, and a 4-month subscription is offered free to students who purchase new texts. An online student guide correlates each chapter in this text to InfoTrac articles. (ISBN: 0-534-55224-2).

## Virtual Molecular Biology Lab CD/Web Site

Explore the world of molecular biology with a fun, accessible, and uniquely powerful CD-ROM. This virtual laboratory environment allows you to make the connection between the lab and the classroom by performing virtual experiments and correlating the experiments to concepts presented in the classroom. The virtual environment allows you to “use” equipment to conduct ten of the most common molecular techniques, giving you a sense of being in a live lab to either augment or replace live lab time. Concept and textbook correlations presented throughout the experiments reinforce the relationship between scientific concepts and how science is conducted. Manipulate live data from GenBank to perform cutting edge research!

## Electronic Companion to Accompany *Beginning Microbiology*, from Cogito Learning Media, Inc.

This interactive CD-ROM, authored by John Ingraham, includes a comprehensive tutorial, quizzes, and exercises about microbiology. This CD-ROM allows you to study the details of microbiology and to visualize the complex processes you learn about in the course. “CD Connections” in the textbook  guide you to the CD-ROM for further study.

## How to Classify Microorganisms

Classifying microorganisms has always been a moving target. Classification schemes become obsolete as rapidly as significant new information becomes available, and the rate of generating new information continues to accelerate. Large amounts of new classification-relevant information have become available since the first edition

was published, which is reflected in this edition's consideration of classification and nomenclature. However, at this very moment massive amounts of new information are pouring out from the many microbial equivalents of the human genome project that's being followed so closely by the press. Undoubtedly, this new information will change our ideas about microbial classification, perhaps slightly, perhaps profoundly. It is too soon for us to

know exactly how. The words of the most famous microbiologist of all, Louis Pasteur (1822–1895), which seemed appropriate at the time of the first edition, are even more relevant now: "*Messieurs, c'est les microbes qui auront le dernier mot.*" ("The microbes have the last word.") We'll have to wait to see what they tell us.

*John Ingraham*  
*Catherine Ingraham*

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## ABOUT THE AUTHORS

Drawing on their combined strengths, this father-daughter author team (John Ingraham, Ph.D. and Catherine Ingraham [Vigran] M.D.) hones the authority, clarity, and currency of *Introduction to Microbiology* with this revision.

John is a past president of the American Society for Microbiology (1993), a Guggenheim fellow, regularly consults for drug and biotech companies, has authored several scholarly books on microbiology, has published more than 100 scholarly papers in journals, and has taught introduction to microbiology many, many times.

Catherine is a board-certified pediatrician with the Permanente Medical Group, Inc. in Rancho Cordova, California. She received a great many honors during her studies and medical training, including being named the

Outstanding Student in Obstetrics and Gynecology from University of California-Davis during her last year there.

Each author brings a unique perspective and expertise to the text.

John's background shows in the solid coverage of the fundamentals and of the newest research. His depth of understanding for the field makes it possible for him to synthesize information for student readers—giving them “the big picture” of processes as well as the detail of how those processes work.

The compelling case studies throughout the text come from Catherine's practice. Her physician's sensibility grounds the text with examples and applications that will help students in their careers.

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# BRIEF CONTENTS

## I

---

### **Principles of Microbiology 1**

- 1 The Science of Microbiology 2
- 2 Basic Chemistry 24
- 3 Methods of Studying Microorganisms 54
- 4 Prokaryotic and Eukaryotic Cells 86
- 5 Metabolism of Microorganisms 118
- 6 The Genetics of Microorganisms 150
- 7 Recombinant DNA Technology 190
- 8 The Growth of Microorganisms 210
- 9 Controlling Microorganisms 234

## II

---

### **The Microorganisms 250**

- 10 Classification 252
- 11 The Prokaryotes 272
- 12 Eukaryotic Microorganisms, Helminths, and Arthropod Vectors 300
- 13 The Viruses 330

## III

---

### **Principles of Human-Microbe Interaction 360**

- 14 Microorganisms and Human Health 362
- 15 Microorganisms and Human Disease 384
- 16 The Body's Three Lines of Defense Against Infection 412
- 17 The Immune System: Specific Defenses of the Body's Interior 438
- 18 Immunologic Disorders 466
- 19 Diagnostic Immunology 490

- 20 Preventing Disease 506
- 21 Pharmacology 530

## IV

---

### **Human Diseases Caused by Microorganisms 562**

- 22 Infections of the Respiratory System 568
- 23 Infections of the Digestive System 598
- 24 Infections of the Genitourinary System 634
- 25 Infections of the Nervous System 666
- 26 Infections of the Body's Surfaces 688
- 27 Systemic Infections 718

## V

---

### **Benefits and Uses of Microorganisms 754**

- 28 Microorganisms and the Environment 756
- 29 Microbial Biotechnology 784

- Appendix I Metric Measurements and Conversions A-1
- Appendix II Some Word Roots Used in Microbiology A-3
- Appendix III Pronunciation of Scientific Names A-7
- Appendix IV Biochemical Pathways A-9
- Glossary G-1
- Credits C-1
- Index I-1

# CONTENTS

## I

### Principles of Microbiology 1

#### 1

#### The Science of Microbiology 2

*The Case of James Greenlees* 3

#### The Unseen World and Our World 4

Microbes and Disease 4

*Childbed Fever* 5

Microbes and Life Today 5

Careers in Microbiology 6

#### The Scope of Microbiology 7

Bacteria 8

Archaea 8

Algae 9

Fungi 10

Protozoa 11

Viruses 11

Helminths 11

#### A Brief History of Microbiology 12

Leeuwenhoek's Animalcules 12

Hooke and the Cell Theory 12

Spontaneous Generation 14

The Germ Theory of Disease 15

Koch's Postulates 15

*Frau Hesse's Pantry* 16

Immunity 16

Public Hygiene 17

#### Microbiology Today 17

Chemotherapy 17

Immunology 17

Virology 18

Genetic Engineering 18

The Future 18

Summary 19

Review Questions 21

Essay Questions 22

Suggested Readings 22

## 2

### Basic Chemistry 24

*The Chemical Soup of Life* 25

#### The Basic Building Blocks 26

Atoms 26

Elements 27

*Radioactive Tracers* 28

Molecules 29

#### Chemical Bonds and Reactions 30

Covalent Bonds 30

Ionic Bonds 31

Hydrogen Bonds 32

Chemical Reactions 33

#### Water 34

Special Properties of Water 35

Water as a Solvent 35

Hydrogen and Hydroxide Ions 36

#### Organic Molecules 38

Carbon 38

Functional Groups 39

#### Macromolecules 39

Proteins 40

*A Tantalizing Question* 42

Nucleic Acids 43

*Peptidoglycan: Molecular Boilerplate* 45

Polysaccharides 45

Lipids 47

*Bread in the Desert* 48

*A Useful Polysaccharide* 48

**Summary 49**

**Review Questions 51**

**Correlation Questions 52**

**Essay Questions 53**

**Suggested Readings 53**

## 3

### **Methods of Studying Microorganisms 54**

*Just by Looking 55*

**Viewing Microorganisms 56**

Properties of Light 56

*Measuring Microorganisms 58*

Microscopy 58

The Compound Light Microscope 61

Wet Mounts 62

Stains 62

*First, Do a Gram Stain 65*

Light Microscopy: Other Ways to Achieve

Contrast 66

Electron Microscopy 68

Uses of Microscopy 71

**Culturing Microorganisms 71**

Obtaining a Pure Culture 71

*The Importance of Being Pure 74*

Growing a Pure Culture 76

*And They Grew Happily Ever After 79*

Preserving Cultures 81

**Microorganisms That Cannot Be Cultivated in the Laboratory 81**

**Summary 82**

**Review Questions 84**

**Correlation Questions 85**

**Essay Questions 85**

**Suggested Readings 85**

## 4

### **Prokaryotic and Eukaryotic Cells 86**

*A Matched Team 87*

**Structure and Function 88**

**The Prokaryotic Cell 88**

Structure of the Bacterial Cell 89

*The Capsule is the Clue 91*

*Be Prepared 92*

*No One Knows for Sure, but a Long Time 100*

Structure of the Archaeon Cell 102

**The Eukaryotic Cell 102**

Structure 102

**Passage of Molecules**

**Across Cell Membranes 108**

*Endosymbiosis: Something Old, Something New 109*

Simple Diffusion 110

Osmosis 111

Facilitated Diffusion 111

Active Transport 112

Group Translocation 112

Engulfment 113

**Summary 113**

**Review Questions 115**

**Correlation Questions 116**

**Essay Questions 117**

**Suggested Readings 117**

## 5

### **Metabolism of Microorganisms 118**

*Introducing Escherichia Coli 119*

**Metabolism: an Overview 120**

**Aerobic Metabolism 122**

Bringing Nutrients into the Cell 122

Catabolism 124

Reducing Reductionism 128

Biosynthesis 132

Polymerization 133

Not Just Proteins Anymore 135

Assembly 136

**Anaerobic Metabolism 136**

Anaerobic Respiration 136

*The Nose Knows 137*

Fermentation 138

**Nutritional Classes of Microorganisms 139**

Formation of Precursor Metabolites by

Autotrophs 139

Formation of ATP and Reducing Power by

Photoautotrophs 140

Formation of ATP and Power by

Chemoautotrophs 141

**Regulation of Metabolism 143**

Purpose 143

Types 144

**Summary 145****Review Questions 148****Correlation Questions 149****Essay Questions 149****Suggested Readings 149**

---

**6**

---

**The Genetics of Microorganisms 150***Serendipity and Science 151***Structure and Function of Genetic Material 152**

The Structure of DNA 152

Reactions of DNA 154

Replication of DNA 155

Gene Expression: Transcription 158

Gene Expression: Translation 160

**Regulation of Gene Expression 163**

Regulation of Transcription 164

*Jannine Zeig 164*

Regulation of Translation 166

Global Regulation 168

Two-Component Regulatory Systems 168

**Changes in a Cell's Genetic Information 169**

The Genome 169

*Pasteur Revisited 170*

Mutations 171

*Death by Mutation 172*

Selecting and Identifying Mutants 175

Uses of Mutant Strains 176

Genetic Exchange among Bacteria 178

*Genetics of Antibiotic Resistance 182*

Genetic Exchange among Eukaryotic

Microorganisms 183

Population Dynamics 184

**Summary 184****Review Questions 187****Correlation Questions 188****Essay Questions 188****Suggested Readings 189**

---

**7**

---

**Recombinant DNA Technology 190***The Whole Story 191***Recombinant DNA Technology 192****Gene Cloning 192***Cohen, Boyer and Corned Beef 193*

Obtaining DNA 194

*Cloning Dinosaurs 194*

Splicing Genes into a Cloning Vector 195

Putting Recombinant DNA into a Host Cell 199

Finding the Right Gene 200

**Hosts for Recombinant DNA 202****Applications of Recombinant DNA Technology 202**

Producing DNA 203

Making Proteins 204

Amplifying Genes 204

*Tree Testimony 205*

Engineering Organisms 205

*Fighting TB—New Hope 207***Summary 207****Review Questions 208****Correlation Questions 209****Essay Questions 209****Suggested Readings 209**

---

**8**

---

**The Growth of Microorganisms 210***A Walking Chemostat 211***Populations 212****The Way Microorganisms Grow 212**

Doubling Time and Growth Rate 212

Exponential Growth 212

Phases of Growth 214

Continuous Cultures of Microorganisms 215

Growth of a Colony 215

**What Microorganisms Need to Grow 216**

Nutrition 216

*Selenium: Nutrient or Poison? 219*

The Nonnutrient Environment 219

*Fighting Off a Chill 221*

*The Record Temperature* 222

*Why Does Champagne Come in a Heavy Bottle?* 223

### **Measuring Microbial Growth 224**

Measuring the Mass of Cells in a Population 224

Counting the Number of Cells in a Population 224

Measuring Metabolic Activity 229

### **Summary 230**

### **Review Questions 232**

### **Correlation Questions 232**

### **Essay Questions 233**

### **Suggested Readings 233**

## **9**

### **Controlling Microorganisms 234**

*A Tough Bug* 235

#### **The Way Microorganisms Die 236**

Some Useful Terms 236

Death Rate 236

Sterilization 237

#### **Physical Controls on Microorganisms 237**

Heat 237

Cold 239

Radiation 239

Filtration 240

Drying 240

Osmotic Strength 240

#### **Chemical Controls on Microorganisms 240**

Selecting a Germicide 241

Testing Germicides 241

Classes of Germicides 241

#### **Preserving Food 244**

Temperature 244

Canning 245

Pasteurization 245

pH 245

Water 245

Chemicals 246

### **Summary 246**

### **Review Questions 248**

### **Correlation Questions 248**

### **Essay Questions 248**

### **Suggested Readings 249**

## **II**

### **THE MICROORGANISMS 250**

## **10**

### **Classification 252**

*We're All Kin* 253

#### **Principles of Biological Classification 254**

Scientific Nomenclature 255

*No Job Too Big* 255

Artificial and Natural Systems of Classification 255

The Fossil Record 256

The Concept of Species 256

*Looks Can Be Deceiving* 258

#### **Microorganisms and**

#### **Higher Levels of Classification 258**

#### **Methods of Microbial Classification 260**

Numerical Taxonomy 260

Traditional Characters Used to Classify Bacteria 260

*Kits Come to the Micro Lab* 261

Comparing Genomes 262

*Good Question* 264

*Escherichia coli's Family Tree* 268

Characters Used to Classify Viruses 268

Dichotomous Keys 268

### **Summary 269**

### **Review Questions 270**

### **Correlation Questions 271**

### **Essay Questions 271**

### **Suggested Readings 271**

## **11**

### **The Prokaryotes 272**

*An Exception Proves the Rule* 273

#### **Prokaryotic Taxonomy 274**

#### **The Bergey's Manual Scheme of Bacterial Taxonomy 274**

The Spirochetes (Section 1) 276

Aerobic/Microaerophilic, Motile, Helical/Vibroid

Gram-Negative Bacteria (Section 2) 276

Gram-Negative Aerobic Rods and Cocci

(Section 4) 280



Facultatively Anaerobic Rods (Section 5) 281  
 Anaerobic Gram-Negative Straight, Curved and Helical Rods (Section 6) 283  
 Dissimilatory Sulfate- and Sulfur-Reducing Bacteria (Section 7) 284  
 Anaerobic Gram-Negative Cocci (Section 8) 285  
 The Rickettsias and Chlamydias (Section 9) 285  
 The Mycoplasmas (Section 10) 285  
*Enter Staphylococcus aureus* 287  
 The Gram-Positive Cocci (Section 12) 287  
 Endospore-Forming Gram-Positive Rods and Cocci (Section 13) 288  
 Regular Nonsporing, Gram-Positive Rods (Section 14) 289  
 Irregular Nonsporing, Gram-Positive Rods (Section 15) 289  
 The Mycobacteria and Nocardioforms (Sections 16 and 17) 290  
 Anoxygenic Phototrophic Bacteria (Section 18) 290  
 Oxygenic Photosynthetic Bacteria (Section 19) 291  
 Aerobic Chemolithotrophic Bacteria and Associated Organisms (Section 20) 291  
 Budding and/or Appendaged Bacteria (Section 21) 292  
 Sheathed Bacteria (Section 22) 293  
 Nonphotosynthetic, Nonfruiting Gliding Bacteria (Section 23) 293  
 Gliding Fruiting Bacteria (Section 24) 294  
 Archaeobacteria (Section 25) 294  
*Can Bacteria Grow Anywhere? What about Mars?* 295  
 Actinomycetes with Multilocular Sporangia (Section 27) 297  
*Streptomyces* and Related Genera (Section 29) 297

**Summary 297**

**Review Questions 298**

**Correlation Questions 299**

**Essay Questions 299**

**Suggested Readings 299**

## 12

### **Eukaryotic Microorganisms, Helminths, and Arthropod Vectors 300**

*Parasitology: A Can of Worms?* 301

**Eukaryotic Microorganisms 302**

Fungi 302

*Gerald Fink* 310

Algae 311

*St. Anthony's Fire* 312

Lichens 315

Protozoa 316

*Not Gone and Not Forgotten* 318

The Slime Molds 319

**Helminths 320**

Flatworms 320

Roundworms 323

**Arthropod Vectors 323**

The Organisms 324

Arthropods and Human Health 324

*One Disease, One Bacterium, Three Ticks* 324

**Summary 326**

**Review Questions 327**

**Correlation Questions 328**

**Essay Questions 328**

**Suggested Readings 328**

## 13

### **The Viruses 330**

*New Alliances with Old Enemies* 331

**The Ultimate Parasites 332**

The Discovery of Viruses 332

Are Viruses Alive? 333

**Classification of Viruses 333**

Host Range 333

Size 334

Structure 334

Life Cycle 335

Taxonomy 336

**Bacteriophages 336**

Phage Counts and Phage Growth 336

*Werner Arber* 340

Replication Pathways 340

*How Safe Is Safe?* 343

**Animal Viruses 343**

Cell Cultures 343

Replication 345

Latency 349

Animal Viruses of Special Interest 349

*Good Timing* 354

**Plant Viruses 354**

Growth, Replication, and Control 354

Tobacco Mosaic Virus 355

**Viruses of Eukaryotic Microorganisms 355**

**Infectious Agents That Are Simpler Than Viruses 355**

Viroids 355

Prions 356

**The Origin of Viruses 356**

**Summary 357**

**Review Questions 358**

**Correlation Questions 359**

**Essay Questions 359**

**Suggested Readings 359**

# III

## PRINCIPLES OF HUMAN-MICROBE INTERACTION 360

### 14

### Microorganisms and Human Health 362

*A Baby Enters the World of Microorganisms 363*

*Gonococcal Blindness 364*

**Normal Biota 364**

Resident Biota 364

Transient Biota 364

Opportunists 364

*Torch 366*

Changing Biota 366

**Symbioses 367**

Commensalism 367

Mutualism 367

Parasitism 367

**Factors That Determine**

**The Normal Biota 368**

Living Tissues as an Environment for

Microorganisms 368

Microbial Adaptations to Life on Body Surfaces 370

**Sites of Normal Biota 370**

The Skin 371

The Conjunctiva 373

The Nasal Cavity and Nasopharynx 373

The Mouth 374

The Intestinal Tract 376

The Vagina 376

*Once a Hydrogen Producer, Always a Hydrogen Producer 377*  
The Urethra 378

**Is the Normal Biota**

**Helpful or Harmful? 378**

Conflicting Theories 378

Harmful Effects 378

Beneficial Effects 378

Loss of Normal Biota 378

A Spectrum of Disease-Causing Abilities 379

**Summary 379**

**Review Questions 381**

**Correlation Questions 382**

**Essay Questions 382**

**Suggested Readings 383**

### 15

### Microorganisms and Human Disease 384

*The Infection of Baby Girl B 385*

**The Seven Capabilities of a Pathogen 386**

**One: Maintaining a Reservoir 386**

Human Reservoirs 386

Animal Reservoirs 386

*Koch's Postulates 388*

Environmental Reservoirs 389

**Two: Getting to and Entering a Host 390**

Portals of entry 390

Modes of Transmission 392

**Three: Adhering to a Body Surface 395**

**Four: Invading the Body 395**

**Five: Evading the Body's Defenses 396**

Evading Phagocytosis 397

Evading the Immune System 398

*Critical Cues 399*

Obtaining Iron 399

**Six: Multiplying in the Host 399**

*No Harm, No Foul 400*

Toxins 400

Other Toxic Proteins 403

Damage Caused by Host Responses 404

Viral Pathogenesis 404

*Another Golden Age? 405*

**Seven: Leaving the Body 406**

Summary 407

Review Questions 409

Correlation Questions 410

Essay Questions 410

Suggested Readings 410

## 16

### Defending the Body's Interior: Nonspecific Defenses 412

*T. L.'s Close Call: Part One 413*

**The Body's Three Lines of Defense Against Infection 414**

*Fever 415*

**Inflammation 416**

Inflammatory Mediators 416

Inflammatory Stimuli 416

Effects of Inflammatory Mediators 418

Acute Inflammation 418

Inflammatory Repair 419

*Blood: A Complex Body Tissue 420*

**Leukocytes 420**

The Phagocytic Family 423

Phagocytosis 425

*When Phagocytes Don't Work 426*

*Complement out of Control 427*

**Complement 428**

Complement Cascades 428

The Classical Pathway 428

The Alternate Pathway 431

The Terminal Pathway 431

**Interferon 432**

Summary 433

Review Questions 435

Correlation Questions 436

Essay Questions 436

Suggested Readings 437

## 17

### The Immune System: Specific Defenses of the Body's Interior 438

*T. L.'s Close Call: Part Two 439*

**Cells and Organs of the Immune System 440**

Lymphocytes 441

Organs of the Immune System 441

**Immune Reaction: an Overview 443**

Immune Recognition 444

Immune Activation 444

Immune Response 444

*Runaway Antibodies 445*

**B Cells 445**

Antigen Recognition 445

B-Cell Activation 446

B-Cell Response 448

*The Indispensable Macrophage 453*

*Anti-Immune Trickery: Various Strategies 454*

**T Cells 456**

Antigen Recognition 456

T-Cell Activation 457

T-Cell Response 457

**Non-B Non-T Cells 458**

**Immune Tolerance 459**

**Types of Immunity 460**

**The Role of the Immune  
System in T. L.'s Recovery 460**

Immune Recognition 460

Immune Activation 461

Immune Response 461

Summary 461

Review Questions 463

Correlation Questions 464

Essay Questions 465

Suggested Readings 465

## 18

### Immunologic Disorders 466

*"It's Nothing—Just a Bee Sting" 467*

**Immune System Malfunctions 468**

**Hypersensitivity 468**

Type I: Anaphylactic Hypersensitivity (Allergy) 468

Type II: Cytotoxic Hypersensitivity 472

*Blood Transfusion 475*

Type III: Immune-Complex Hypersensitivity 476

Type IV: Cell-Mediated (Delayed)

Hypersensitivity 477