

Contents

Preface vii

Introduction xi

Color Plates (after page xvi)

- I Staining
- II Biotechnology
- III Microbial Metabolism
- IV Eukaryotes
- V Plate Cultures
- VI Environmental Microbiology
- VII Pathology
- VIII Medical Microbiology
- IX Immunology
- X Growth
- XI Bioremediation
- XII Plate Culture for Enterics
- XIII Phototrophic Microorganisms
- XIV Unknown Identification: A Photo Quiz

Part One

Microscopy 1

- 1 Use and Care of the Microscope 3
- 2 Examination of Living Microorganisms 13

Part Two

Staining Methods 23

- 3 Preparation of Smears and Simple Staining 25
- 4 Negative Staining 31
- 5 Gram Staining 35
- 6 Acid-Fast Staining 41
- 7 Structural Stains (Endospore, Capsule, and Flagella) 47
- 8 Morphologic Unknown 57

Part Three

Cultivation of Bacteria 65

- 9 Microbes in the Environment 67
- 10 Transfer of Bacteria: Aseptic Technique 75
- 11 Isolation of Bacteria by Dilution Techniques 85
- 12 Special Media for Isolating Bacteria 93

Part Four	Microbial Metabolism 97
	13 Carbohydrate Catabolism 99
	14 Fermentation 105
	15 Protein Catabolism, Part 1 113
	16 Protein Catabolism, Part 2 119
	17 Respiration 125
	18 Rapid Identification Methods 129
Part Five	Microbial Growth 139
	19 Oxygen and the Growth of Bacteria 141
	20 Determination of a Bacterial Growth Curve: The Role of Temperature 149
	21 Biofilms 157
Part Six	Control of Microbial Growth 165
	22 Physical Methods of Control: Heat 167
	23 Physical Methods of Control: Ultraviolet Radiation 175
	24 Chemical Methods of Control: Disinfectants and Antiseptics 181
	25 Chemical Methods of Control: Antimicrobial Drugs 185
	26 Effectiveness of Hand Scrubbing 193
Part Seven	Microbial Genetics 197
	27 Regulation of Gene Expression 199
	28 Isolation of Bacterial Mutants 207
	29 Transformation of Bacteria 213
	30 DNA Fingerprinting 217
	31 Genetic Engineering 223
	32 Ames Test for Detecting Possible Chemical Carcinogens 233
Part Eight	The Microbial World 239
	33 Unknown Identification and Bergey's Manual 241
	34 Fungi: Yeasts 247
	35 Fungi: Molds 253
	36 Phototrophs: Algae and Cyanobacteria 263
	37 Protozoa 269
Part Nine	Viruses 275
	38 Isolation and Titration of Bacteriophages 277
	39 Plant Viruses 285
Part Ten	Interaction of Microbe and Host 289
	40 Epidemiology 291
	41 Koch's Postulates 299

Preface

Part Eleven

Immunology 305

- 42 Innate Immunity 307
- 43 Blood Group Determination: Slide Agglutination 315
- 44 Agglutination Reactions: Microtiter Agglutination 321
- 45 ELISA Technique 325

Part Twelve

Microorganisms and Disease 331

- 46 Bacteria of the Skin 333
- 47 Bacteria of the Respiratory Tract 337
- 48 Bacteria of the Mouth 341
- 49 Bacteria of the Gastrointestinal Tract 347
- 50 Bacteria of the Urogenital Tract 355
- 51 Identification of an Unknown from a Clinical Sample 361

Part Thirteen

Microbiology and the Environment 365

- 52 Microbes in Water: Multiple-Tube Technique 367
- 53 Microbes in Water: Membrane Filter Technique 375
- 54 Microbes in Food: Contamination 381
- 55 Microbes Used in the Production of Foods 387
- 56 Microbes in Soil: The Nitrogen and Sulfur Cycles 391
- 57 Microbes in Soil: Bioremediation 403

Appendices 409

- A Pipetting 411
- B Dilution Techniques and Calculations 415
- C Use of the Spectrophotometer 419
- D Graphing 421
- E Use of the Dissecting Microscope 423
- F Use of the Membrane Filter 425
- G Electrophoresis 427
- H Keys to Bacteria 429

Art and Photography Credits 437

Index 439