

Contents

VOLUME 1

I Basic Principles in the Diagnosis and Management of Infectious Diseases

A Microbial Pathogenesis

- 1 A Molecular Perspective of Microbial Pathogenicity 1
David A. Relman and Stanley Falkow

- 2 The Human Microbiome of Local Body Sites and Their Unique Biology 11
Kjersti Aagaard, Ruth Ann Luna, and James Versalovic

- 3 Prebiotics, Probiotics, and Synbiotics 19
Lea Ann Chen and Cynthia L. Sears

B Host Defense Mechanisms

- 4 Innate (General or Nonspecific) Host Defense Mechanisms 26
Carl W. Dieffenbach and Edmund C. Tramont

- 5 Adaptive Immunity: Antibodies and Immunodeficiencies 34
Holly H. Birdsall

- 6 Cell-Mediated Defense against Infection 50
Tobias M. Hohl

- 7 Mucosal Immunity 70
Peter B. Ernst

- 8 Granulocytic Phagocytes 78
Frank R. DeLeo and William M. Nauseef

- 9 Complement and Deficiencies 93
Peter Densen and Sanjay Ram

- 10 Human Genetics and Infection 116
Stephen J. Chapman and Adrian V. S. Hill

- 11 Nutrition, Immunity, and Infection 125
Caryn Gee Morse and Kevin P. High

- 12 Evaluation of the Patient with Suspected Immunodeficiency 134
Steven M. Holland and John I. Gallin

C Epidemiology of Infectious Disease

- 13 Epidemiologic Principles 146
Michael T. Osterholm and Craig W. Hedberg

- 14 Emerging and Reemerging Infectious Disease Threats 158
Rima Khabbaz, Beth P. Bell, Anne Schuchat, Stephen M. Ostroff, Robin Moseley, Alexandra Levitt, and James M. Hughes

- 15 Bioterrorism: An Overview 178
Luciana L. Borio, Donald A. Henderson, and Noreen A. Hynes

D Clinical Microbiology

- 16 The Clinician and the Microbiology Laboratory 191
Patrick R. Murray

E Anti-infective Therapy

- 17 Principles of Anti-infective Therapy 224
George M. Eliopoulos and Robert C. Moellering, Jr.

- 18 Molecular Mechanisms of Antibiotic Resistance in Bacteria 235
Steven M. Opal and Aurora Pop-Vicas

- 19 Pharmacokinetics and Pharmacodynamics of Anti-infective Agents 252
Manjunath P. Pai, Mackenzie L. Cottrell, Angela D. M. Kashuba, and Joseph S. Bertino, Jr.

- 20 Penicillins and β -Lactamase Inhibitors 263
Yohei Doi and Henry F. Chambers

- 21 Cephalosporins 278
William A. Craig and David R. Andes

- 22 Other β -Lactam Antibiotics 293
Yohei Doi and Henry F. Chambers

- 23 Antibiotic Allergy 298
Merin Elizabeth Kuruvilla and David A. Khan

- 24 Fusidic Acid 304
Jason Trubiano and M. Lindsay Grayson

- 25 Aminoglycosides 310
James E. Leggett

- 26 Tetracyclines, Glycylcyclines, and Chloramphenicol 322
Matthew Moffa and Itzhak Brook

- 27 Rifamycins 339
Melanie Jane Maslow and Cynthia Portal-Celhay

- 28 Metronidazole 350
Jerod L. Nagel and David M. Aronoff

- 29 Macrolides, Clindamycin, and Ketolides 358
Sumathi Sivapalasingam and Neal H. Steigbigel

- 30 Glycopeptides (Vancomycin and Teicoplanin), Streptogramins (Quinupristin-Dalfopristin), Lipopeptides (Daptomycin), and Lipoglycopeptides (Telavancin) 377
Barbara E. Murray, Cesar A. Arias, and Esteban C. Nannini

- 31 Polymyxins (Polymyxin B and Colistin) 401
Keith S. Kaye, Jason M. Pogue, and Donald Kaye

- 32 Linezolid and Other Oxazolidinones** 406
Heather L. Cox and Gerald R. Donowitz
- 33 Sulfonamides and Trimethoprim** 410
Stephen H. Zinner and Kenneth H. Mayer
- 34 Quinolones** 419
David C. Hooper and Jacob Strahilevitz
- 35 Unique Antibacterial Agents** 440
Gerard R. Barber and Amar Safdar
- 36 Urinary Tract Agents: Nitrofurantoin, Fosfomycin, and Methenamine** 447
James M. Horton
- 37 Topical Antibacterials** 452
Judith A. O'Donnell, Steven P. Gelone, and Amar Safdar
- 38 Antimycobacterial Agents** 463
Richard J. Wallace, Jr., Julie V. Philley, and David E. Griffith
- 39 Drugs Active against Fungi, *Pneumocystis*, and Microsporidia** 479
John H. Rex and David A. Stevens
- 40 Antimalarial Drugs** 495
James S. McCarthy and Richard N. Price
- 41 Drugs for Protozoal Infections Other Than Malaria** 510
James S. McCarthy, Glenn W. Wortmann, and Louis V. Kirchhoff
- 42 Drugs for Helminths** 519
James S. McCarthy and Thomas A. Moore
- 43 Antiviral Agents: General Principles** 528
Raphael Dolin
- 44 Antiviral Drugs for Influenza and Other Respiratory Virus Infections** 531
Fred Y. Aoki
- 45 Antivirals against Herpes Viruses** 546
Fred Y. Aoki
- 46 Antiviral Drugs against Hepatitis Viruses** 563
Jules L. Dienstag
- 47 Miscellaneous Antiviral Agents (Interferons, Imiquimod, Pleconaril)** 576
Raphael Dolin
- 48 Immunomodulators** 581
Andrea V. Page and W. Conrad Liles
- 49 Hyperbaric Oxygen** 591
Juan Carlos Sarria and Norbert J. Roberts, Jr.
- 50 Complementary and Alternative Medicines for Infectious Diseases** 597
Jonathan Berman
- 51 Antimicrobial Stewardship** 605
Conan MacDougall
- 52 Designing and Interpreting Clinical Studies in Infectious Diseases** 612
John H. Powers III

- 53 Outpatient Parenteral Antimicrobial Therapy** 625
Kevin Hsueh and Jeffrey Bruce Greene
- 54 Tables of Anti-infective Agent Pharmacology** 631
Manjunath P. Pai and Joseph S. Bertino, Jr.

II Major Clinical Syndromes

A Fever

- 55 Temperature Regulation and the Pathogenesis of Fever** 708
Mohammad M. Sajadi and Philip A. Mackowiak
- 56 Fever of Unknown Origin** 721
William F. Wright and Philip A. Mackowiak
- 57 The Acutely Ill Patient with Fever and Rash** 732
David J. Weber, Myron S. Cohen, and William A. Rutala

B Upper Respiratory Tract Infections

- 58 The Common Cold** 748
Ronald B. Turner
- 59 Pharyngitis** 753
Anthony R. Flores and Mary T. Caserta
- 60 Acute Laryngitis** 760
Mary T. Caserta
- 61 Croup in Children (Acute Laryngotracheobronchitis)** 762
John Bower and John T. McBride
- 62 Otitis Externa, Otitis Media, and Mastoiditis** 767
Jerome O. Klein
- 63 Sinusitis** 774
Gregory P. DeMuri and Ellen R. Wald
- 64 Epiglottitis** 785
Jennifer L. Nayak and Geoffrey A. Weinberg
- 65 Infections of the Oral Cavity, Neck, and Head** 789
Anthony W. Chow

C Pleuropulmonary and Bronchial Infections

- 66 Acute Bronchitis** 806
Edward E. Walsh
- 67 Acute Exacerbations of Chronic Obstructive Pulmonary Disease** 810
Leopoldo N. Segal, Michael D. Weiden, and Harold W. Horowitz
- 68 Bronchiolitis** 818
John Bower and John T. McBride
- 69 Acute Pneumonia** 823
Richard T. Ellison III and Gerald R. Donowitz
- 70 Pleural Effusion and Empyema** 847
Edward J. Septimus

- 71 Bacterial Lung Abscess** 855
Bennett Lorber
- 72 Chronic Pneumonia** 860
Peter G. Pappas
- 73 Cystic Fibrosis** 874
Ahmet Uluer and Francisco M. Marty
- D Urinary Tract Infections**
- 74 Urinary Tract Infections** 886
Jack D. Sobel and Donald Kaye
- E Sepsis**
- 75 Sepsis, Severe Sepsis, and Septic Shock** 914
Robert S. Munford and Anthony F. Suffredini
- F Intra-abdominal Infections**
- 76 Peritonitis and Intraperitoneal Abscesses** 935
Matthew E. Levison and Larry M. Bush
- 77 Infections of the Liver and Biliary System (Liver Abscess, Cholangitis, Cholecystitis)** 960
Costi D. Sifri and Lawrence C. Madoff
- 78 Pancreatic Infection** 969
Miriam Baron Barshak
- 79 Splenic Abscess** 979
Lawrence C. Madoff
- 80 Appendicitis** 982
Costi D. Sifri and Lawrence C. Madoff
- 81 Diverticulitis and Typhlitis** 986
Costi D. Sifri and Lawrence C. Madoff
- G Cardiovascular Infections**
- 82 Endocarditis and Intravascular Infections** 990
Vance G. Fowler, Jr., W. Michael Scheld, and Arnold S. Bayer
- 83 Prosthetic Valve Endocarditis** 1029
Raj Palraj, Bettina M. Knoll, Larry M. Baddour, and Walter R. Wilson
- 84 Infections of Nonvalvular Cardiovascular Devices** 1041
M. Rizwan Sohail, Walter R. Wilson, and Larry M. Baddour
- 85 Prophylaxis of Infective Endocarditis** 1057
David T. Durack
- 86 Myocarditis and Pericarditis** 1066
Kirk U. Knowlton, Anna Narezkina, Maria C. Savoia, and Michael N. Oxman
- 87 Mediastinitis** 1080
Trevor C. Van Schooneveld and Mark E. Rupp
- H Central Nervous System Infections**
- 88 Approach to the Patient with Central Nervous System Infection** 1091
Allan R. Tunkel
- 89 Acute Meningitis** 1097
Allan R. Tunkel, Diederik van de Beek, and W. Michael Scheld
- 90 Chronic Meningitis** 1138
John E. Bennett
- 91 Encephalitis** 1144
J. David Beckham and Kenneth L. Tyler
- 92 Brain Abscess** 1164
Allan R. Tunkel
- 93 Subdural Empyema, Epidural Abscess, and Suppurative Intracranial Thrombophlebitis** 1177
Allan R. Tunkel
- 94 Cerebrospinal Fluid Shunt and Drain Infections** 1186
Adarsh Bhimraj, James M. Drake, and Allan R. Tunkel
- I Skin and Soft Tissue Infections**
- 95 Cellulitis, Necrotizing Fasciitis, and Subcutaneous Tissue Infections** 1194
Mark S. Pasternack and Morton N. Swartz
- 96 Myositis and Myonecrosis** 1216
Mark S. Pasternack and Morton N. Swartz
- 97 Lymphadenitis and Lymphangitis** 1226
Mark S. Pasternack and Morton N. Swartz
- J Gastrointestinal Infections and Food Poisoning**
- 98 Syndromes of Enteric Infection** 1238
Regina C. LaRocque and Stephen B. Calderwood
- 99 Esophagitis** 1248
Paul S. Graman
- 100 Nausea, Vomiting, and Noninflammatory Diarrhea** 1253
David A. Bobak and Richard L. Guerrant
- 101 Bacterial Inflammatory Enteritides** 1263
Aldo A. M. Lima, Cirle A. Warren, and Richard L. Guerrant
- 102 Enteric Fever and Other Causes of Fever and Abdominal Symptoms** 1270
Jason B. Harris and Edward T. Ryan
- 103 Foodborne Disease** 1283
Rajal K. Mody and Patricia M. Griffin
- 104 Tropical Sprue: Enteropathy** 1297
Christine A. Wanke
- K Bone and Joint Infections**
- 105 Infectious Arthritis of Native Joints** 1302
Christopher A. Ohl and Derek Forster
- 106 Osteomyelitis** 1318
Elie F. Berbari, James M. Steckelberg, and Douglas R. Osmon

- 107 Orthopedic Implant–Associated Infections** 1328
Werner Zimmerli and Parham Sendi
- L Diseases of the Reproductive Organs and Sexually Transmitted Diseases**
- 108 Genital Skin and Mucous Membrane Lesions** 1341
Michael H. Augenbraun
- 109 Urethritis** 1349
Michael H. Augenbraun and William M. McCormack
- 110 Vulvovaginitis and Cervicitis** 1358
William M. McCormack and Michael H. Augenbraun
- 111 Infections of the Female Pelvis** 1372
David E. Soper
- 112 Prostatitis, Epididymitis, and Orchitis** 1381
Catherine C. McGowan and John Krieger
- M Eye Infections**
- 113 Introduction to Eye Infections** 1388
Marlene L. Durand
- 114 Microbial Conjunctivitis** 1392
Scott D. Barnes, Nalin M. Kumar, Deborah Pavan-Langston, and Dimitri T. Azar
- 115 Microbial Keratitis** 1402
Scott D. Barnes, Joelle Hallak, Deborah Pavan-Langston, and Dimitri T. Azar
- 116 Endophthalmitis** 1415
Marlene L. Durand
- 117 Infectious Causes of Uveitis** 1423
Marlene L. Durand
- 118 Periocular Infections** 1432
Marlene L. Durand
- N Hepatitis**
- 119 Viral Hepatitis** 1439
Jules L. Dienstag and Andrew S. Delemos
- O Acquired Immunodeficiency Syndrome**
- 120 Global Perspectives on Human Immunodeficiency Virus Infection and Acquired Immunodeficiency Syndrome** 1469
Peter Piot and Helena Legido-Quigley
- 121 Epidemiology and Prevention of Acquired Immunodeficiency Syndrome and Human Immunodeficiency Virus Infection** 1483
Carlos del Rio and James W. Curran
- 122 Diagnosis of Human Immunodeficiency Virus Infection** 1503
Francesco R. Simonetti, Robin Dewar, and Frank Maldarelli
- 123 The Immunology of Human Immunodeficiency Virus Infection** 1526
Susan Moir, Mark Connors, and Anthony S. Fauci
- 124 General Clinical Manifestations of Human Immunodeficiency Virus Infection (Including Acute Retroviral Syndrome and Oral, Cutaneous, Renal, Ocular, Metabolic, and Cardiac Diseases)** 1541
Timothy R. Sterling and Richard E. Chaisson
- 125 Pulmonary Manifestations of Human Immunodeficiency Virus Infection** 1558
Paul E. Sax and Kevin L. Ard
- 126 Gastrointestinal, Hepatobiliary, and Pancreatic Manifestations of Human Immunodeficiency Virus Infection** 1567
Charles Haines and Mark S. Sulkowski
- 127 Neurologic Diseases Caused by Human Immunodeficiency Virus Type 1 and Opportunistic Infections** 1574
Omar K. Siddiqi and Igor J. Koralnik
- 128 Human Immunodeficiency Virus Infection in Women** 1590
Susan E. Cohn and Rebecca A. Clark
- 129 Pediatric Human Immunodeficiency Virus Infection** 1616
Geoffrey A. Weinberg and George K. Siberry
- 130 Antiretroviral Therapy for Human Immunodeficiency Virus Infection** 1622
Athe M. N. Tsibris and Martin S. Hirsch
- 131 Management of Opportunistic Infections Associated with Human Immunodeficiency Virus Infection** 1642
Henry Masur
- 132 Vaccines for Human Immunodeficiency Virus Type 1 Infection** 1666
Dan H. Barouch, Lindsey R. Baden, and Raphael Dolin
- P Miscellaneous Syndromes**
- 133 Chronic Fatigue Syndrome** 1674
N. Cary Engleberg
- VOLUME 2**
- III Infectious Diseases and Their Etiologic Agents**
- A Viral Diseases**
- 134 Biology of Viruses and Viral Diseases** 1681
James D. Chappell and Terence S. Dermody
- i. DNA Viruses • a. Poxviridae**
- 135 Orthopoxviruses: Vaccinia (Smallpox Vaccine), Variola (Smallpox), Monkeypox, and Cowpox** 1694
Brett W. Petersen and Inger K. Damon

- 136 Other Poxviruses That Infect Humans: Parapoxviruses (Including Orf Virus), Molluscum Contagiosum, and Yatapoxviruses 1703**
Brett W. Petersen and Inger K. Damon
- b. Herpesviridae**
- 137 Introduction to Herpesviridae 1707**
Jeffrey I. Cohen
- 138 Herpes Simplex Virus 1713**
Joshua T. Schiffer and Lawrence Corey
- 139 Chickenpox and Herpes Zoster (Varicella-Zoster Virus) 1731**
Richard J. Whitley
- 140 Cytomegalovirus (CMV) 1738**
Clyde S. Crumpacker II
- 141 Epstein-Barr Virus (Infectious Mononucleosis, Epstein-Barr Virus–Associated Malignant Diseases, and Other Diseases) 1754**
Eric C. Johannsen and Kenneth M. Kaye
- 142 Human Herpesvirus Types 6 and 7 (Exanthem Subitum) 1772**
Jeffrey I. Cohen
- 143 Kaposi's Sarcoma–Associated Herpesvirus (Human Herpesvirus 8) 1777**
Kenneth M. Kaye
- 144 Herpes B Virus 1783**
Jeffrey I. Cohen
- c. Adenoviridae**
- 145 Adenoviruses 1787**
Elizabeth G. Rhee and Dan H. Barouch
- d. Papillomaviridae**
- 146 Papillomaviruses 1794**
William Bonnez
- 147 JC, BK, and Other Polyomaviruses: Progressive Multifocal Leukoencephalopathy (PML) 1807**
C. Sabrina Tan and Igor J. Koralnik
- e. Hepadnaviridae**
- 148 Hepatitis B Virus and Hepatitis Delta Virus 1815**
Chloe Lynne Thio and Claudia Hawkins
- f. Parvoviridae**
- 149 Human Parvoviruses, Including Parvovirus B19V and Human Bocaparvoviruses 1840**
Kevin E. Brown
- ii. RNA Viruses • a. Reoviridae**
- 150 Orthoreoviruses and Orbiviruses 1848**
Roberta L. DeBiasi and Kenneth L. Tyler
- 151 Coltiviruses and Seadornaviruses 1851**
Roberta L. DeBiasi and Kenneth L. Tyler
- 152 Rotaviruses 1854**
Philip R. Dormitzer
- b. Togaviridae**
- 153 Alphaviruses 1865**
Lewis Markoff
- 154 Rubella Virus (German Measles) 1875**
Anne A. Gershon
- c. Flaviviridae**
- 155 Flaviviruses (Dengue, Yellow Fever, Japanese Encephalitis, West Nile Encephalitis, St. Louis Encephalitis, Tick-Borne Encephalitis, Kyasanur Forest Disease, Alkhurma Hemorrhagic Fever, Zika) 1881**
Stephen J. Thomas, Timothy P. Endy, Alan L. Rothman, and Alan D. Barrett
- 156 Hepatitis C 1904**
Stuart C. Ray and David L. Thomas
- d. Coronaviridae**
- 157 Coronaviruses, Including Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) 1928**
Kenneth McIntosh and Stanley Perlman
- e. Paramyxoviridae**
- 158 Parainfluenza Viruses 1937**
Michael G. Ison
- 159 Mumps Virus 1942**
Nathan Litman and Stephen G. Baum
- 160 Respiratory Syncytial Virus (RSV) 1948**
Edward E. Walsh and Caroline Breese Hall
- 161 Human Metapneumovirus 1961**
Ann R. Falsey
- 162 Measles Virus (Rubeola) 1967**
Anne A. Gershon
- 163 Zoonotic Paramyxoviruses: Nipah, Hendra, and Menangle 1974**
Anna R. Thorner and Raphael Dolin
- f. Rhabdoviridae**
- 164 Vesicular Stomatitis Virus and Related Vesiculoviruses 1981**
Steven M. Fine
- 165 Rabies (Rhabdoviruses) 1984**
Kamaljit Singh, Charles E. Rupprecht, and Thomas P. Bleck
- g. Filoviridae**
- 166 Marburg and Ebola Hemorrhagic Fevers (Filoviruses) 1995**
Thomas W. Geisbert

h. Orthomyxoviridae

- 167 Influenza (Including Avian Influenza and Swine Influenza)** 2000
John J. Treanor

i. Bunyaviridae

- 168 California Encephalitis, Hantavirus Pulmonary Syndrome, and Bunyavirus Hemorrhagic Fevers** 2025
Dennis A. Bente

j. Arenaviridae

- 169 Lymphocytic Choriomeningitis, Lassa Fever, and the South American Hemorrhagic Fevers (Arenaviruses)** 2031
Alexey Seregin, Nadezhda Yun, and Slobodan Paessler

k. Retroviridae

- 170 Human T-Lymphotropic Virus (HTLV)** 2038
Edward L. Murphy and Roberta L. Bruhn
- 171 Human Immunodeficiency Viruses** 2054
Marvin S. Reitz, Jr., and Robert C. Gallo

l. Picornaviridae

- 172 Introduction to the Human Enteroviruses and Parechoviruses** 2066
José R. Romero and John F. Modlin
- 173 Poliovirus** 2073
José R. Romero and John F. Modlin
- 174 Coxsackieviruses, Echoviruses, and Numbered Enteroviruses** 2080
José R. Romero and John F. Modlin
- 175 Human Parechoviruses** 2091
José R. Romero and John F. Modlin
- 176 Hepatitis A Virus** 2095
Francisco Averhoff, Yury Khudyakov, and Beth P. Bell
- 177 Rhinovirus** 2113
Ronald B. Turner

iii. Caliciviridae and Other Gastrointestinal Viruses

- 178 Noroviruses and Sapoviruses (Caliciviruses)** 2122
Raphael Dolin and John J. Treanor
- 179 Astroviruses and Picobirnaviruses** 2128
Raphael Dolin and John J. Treanor

iv. Unclassified Viruses

- 180 Hepatitis E Virus** 2131
Stephen R. Walsh

B Prion Diseases

- 181 Prions and Prion Diseases of the Central Nervous System (Transmissible Neurodegenerative Diseases)** 2142
Patrick J. Bosque and Kenneth L. Tyler

C Chlamydial Diseases

- 182 *Chlamydia trachomatis* (Trachoma, Genital Infections, Perinatal Infections, and Lymphogranuloma Venereum)** 2154
Byron E. Batteiger and Ming Tan
- 183 Psittacosis (Due to *Chlamydia psittaci*)** 2171
David Schlossberg
- 184 *Chlamydia pneumoniae*** 2174
Margaret R. Hammerschlag, Stephan A. Kohlhoff, and Charlotte A. Gaydos

D Mycoplasma Diseases

- 185 *Mycoplasma pneumoniae* and Atypical Pneumonia** 2183
Robert S. Holzman and Michael S. Simberkoff
- 186 Genital Mycoplasmas: *Mycoplasma genitalium*, *Mycoplasma hominis*, and *Ureaplasma Species*** 2190
David H. Martin

E Rickettsioses, Ehrlichioses, and Anaplasmosis

- 187 Introduction to Rickettsioses, Ehrlichioses, and Anaplasmosis** 2194
Didier Raoult
- 188 *Rickettsia rickettsii* and Other Spotted Fever Group Rickettsiae (Rocky Mountain Spotted Fever and Other Spotted Fevers)** 2198
David H. Walker and Lucas S. Blanton
- 189 *Rickettsia akari* (Rickettsialpox)** 2206
Didier Raoult
- 190 *Coxiella burnetii* (Q Fever)** 2208
Thomas J. Marrie and Didier Raoult
- 191 *Rickettsia prowazekii* (Epidemic or Louse-Borne Typhus)** 2217
Lucas S. Blanton and David H. Walker
- 192 *Rickettsia typhi* (Murine Typhus)** 2221
Lucas S. Blanton, J. Stephen Dumler, and David H. Walker
- 193 *Orientia tsutsugamushi* (Scrub Typhus)** 2225
Didier Raoult
- 194 *Ehrlichia chaffeensis* (Human Monocytotropic Ehrlichiosis), *Anaplasma phagocytophilum* (Human Granulocytotropic Anaplasmosis), and Other Anaplasmataceae** 2227
J. Stephen Dumler and David H. Walker

F Bacterial Diseases

- 195 Introduction to Bacteria and Bacterial Diseases** 2234
Jennifer A. Philips and Martin J. Blaser

i. Gram-Positive Cocci

- 196 *Staphylococcus aureus* (Including Staphylococcal Toxic Shock Syndrome)** 2237
Yok-Ai Que and Philippe Moreillon
- 197 *Staphylococcus epidermidis* and Other Coagulase-Negative Staphylococci** 2272
Mark E. Rupp and Paul D. Fey
- 198 Classification of Streptococci** 2283
Kathryn L. Ruoff and Alan L. Bisno
- 199 *Streptococcus pyogenes*** 2285
Amy E. Bryant and Dennis L. Stevens
- 200 Nonsuppurative Poststreptococcal Sequelae: Rheumatic Fever and Glomerulonephritis** 2300
Stanford T. Shulman and Alan L. Bisno
- 201 *Streptococcus pneumoniae*** 2310
Edward N. Janoff and Daniel M. Musher
- 202 *Enterococcus Species, Streptococcus gallolyticus Group, and Leuconostoc Species*** 2328
Cesar A. Arias and Barbara E. Murray
- 203 *Streptococcus agalactiae* (Group B Streptococcus)** 2340
Morven S. Edwards and Carol J. Baker
- 204 Viridans Streptococci, Nutritionally Variant Streptococci, Groups C and G Streptococci, and Other Related Organisms** 2349
Scott W. Sinner and Allan R. Tunkel
- 205 *Streptococcus anginosus* Group** 2362
Cathy A. Petti and Charles W. Stratton IV

ii. Gram-Positive Bacilli

- 206 *Corynebacterium diphtheriae* (Diphtheria)** 2366
Rob Roy MacGregor
- 207 Other Coryneform Bacteria and Rhodococci** 2373
Rose Kim and Annette C. Reboli
- 208 *Listeria monocytogenes*** 2383
Bennett Lorber
- 209 *Bacillus anthracis* (Anthrax)** 2391
Gregory J. Martin and Arthur M. Friedlander
- 210 *Bacillus Species* and Related Genera Other Than *Bacillus anthracis*** 2410
Thomas Fekete
- 211 *Erysipelothrix rhusiopathiae*** 2415
Annette C. Reboli
- 212 Whipple's Disease** 2418
Thomas Marth and Thomas Schneider

iii. Gram-Negative Cocci

- 213 *Neisseria meningitidis*** 2425
David S. Stephens and Michael A. Apicella
- 214 *Neisseria gonorrhoeae* (Gonorrhea)** 2446
Jeanne M. Marrazzo and Michael A. Apicella
- 215 *Moraxella catarrhalis, Kingella*, and Other Gram-Negative Cocci** 2463
Timothy F. Murphy

iv. Gram-Negative Bacilli

- 216 *Vibrio cholerae*** 2471
Matthew K. Waldor and Edward T. Ryan
- 217 Other Pathogenic Vibrios** 2480
Marguerite A. Neill and Charles C. J. Carpenter
- 218 *Campylobacter jejuni* and Related Species** 2485
Ban Mishu Allos, Nicole M. Iovine, and Martin J. Blaser
- 219 *Helicobacter pylori* and Other Gastric Helicobacter Species** 2494
Timothy L. Cover and Martin J. Blaser
- 220 Enterobacteriaceae** 2503
Michael S. Donnenberg
- 221 *Pseudomonas aeruginosa* and Other *Pseudomonas* Species** 2518
Erika D'Agata
- 222 *Stenotrophomonas maltophilia* and *Burkholderia cepacia*** 2532
Amar Safdar
- 223 *Burkholderia pseudomallei* and *Burkholderia mallei*: Melioidosis and Glanders** 2541
Bart J. Currie
- 224 *Acinetobacter Species*** 2552
Michael Phillips
- 225 *Salmonella Species*** 2559
David A. Pegues and Samuel I. Miller
- 226 *Bacillary Dysentery: Shigella* and Enteroinvasive *Escherichia coli*** 2569
Herbert L. DuPont
- 227 *Haemophilus Species*, Including *H. influenzae* and *H. ducreyi* (Chancroid)** 2575
Timothy F. Murphy
- 228 *Brucellosis (Brucella Species)*** 2584
H. Cem Gul and Hakan Erdem
- 229 *Francisella tularensis* (Tularemia)** 2590
Robert L. Penn
- 230 *Pasteurella Species*** 2603
John J. Zurlo
- 231 *Yersinia Species* (Including Plague)** 2607
Paul S. Mead
- 232 *Bordetella pertussis*** 2619
Valerie Waters and Scott A. Halperin

- 233 Rat-Bite Fever: *Streptobacillus moniliformis* and *Spirillum minus*** 2629
Ronald G. Washburn
- 234 Legionnaires' Disease and Pontiac Fever** 2633
Paul H. Edelstein and Craig R. Roy
- 235 Capnocytophaga** 2645
J. Michael Janda
- 236 Bartonella, Including Cat-Scratch Disease** 2649
Tejal N. Gandhi, Leonard N. Slater, David F. Welch, and Jane E. Koehler
- 237 Klebsiella granulomatis (Donovanosis, Granuloma Inguinale)** 2664
Ronald C. Ballard
- 238 Other Gram-Negative and Gram-Variable Bacilli** 2667
James P. Steinberg and Eileen M. Burd

v. Spirochetes

- 239 Syphilis (*Treponema pallidum*)** 2684
Justin D. Radolf, Edmund C. Tramont, and Juan C. Salazar
- 240 Endemic Treponematoses** 2710
Edward W. Hook III
- 241 Leptospira Species (Leptospirosis)** 2714
David A. Haake and Paul N. Levett
- 242 Relapsing Fever Caused by *Borrelia* Species** 2721
James M. Horton
- 243 Lyme Disease (Lyme Borreliosis) Due to *Borrelia burgdorferi*** 2725
Allen C. Steere

vi. Anaerobic Bacteria

- 244 Anaerobic Infections: General Concepts** 2736
Ronit Cohen-Poradosu and Dennis L. Kasper
- 245 *Clostridium difficile* Infection** 2744
Dale N. Gerdling and Vincent B. Young
- 246 Tetanus (*Clostridium tetani*)** 2757
Aimee Hodowanec and Thomas P. Bleck
- 247 Botulism (*Clostridium botulinum*)** 2763
Aimee Hodowanec and Thomas P. Bleck
- 248 Gas Gangrene and Other *Clostridium*-Associated Diseases** 2768
Andrew B. Onderdonk and Wendy S. Garrett
- 249 Bacteroides, Prevotella, Porphyromonas, and *Fusobacterium* Species (and Other Medically Important Anaerobic Gram-Negative Bacilli)** 2773
Wendy S. Garrett and Andrew B. Onderdonk
- 250 Anaerobic Cocci and Anaerobic Gram-Positive Nonsporulating Bacilli** 2781
Eija Könönen

vii. Mycobacterial Diseases

- 251 *Mycobacterium tuberculosis*** 2787
Daniel W. Fitzgerald, Timothy R. Sterling, and David W. Haas
- 252 *Mycobacterium leprae* (Leprosy)** 2819
Cybèle A. Renault and Joel D. Ernst
- 253 *Mycobacterium avium* Complex** 2832
Fred M. Gordin and C. Robert Horsburgh, Jr.
- 254 Infections Caused by Nontuberculous Mycobacteria Other than *Mycobacterium avium* Complex** 2844
Barbara A. Brown-Elliott and Richard J. Wallace, Jr.

viii. Higher Bacterial Diseases

- 255 *Nocardia* Species** 2853
Tania C. Sorrell, David H. Mitchell, Jonathan R. Iredell, and Sharon C-A. Chen
- 256 Agents of Actinomycosis** 2864
Thomas A. Russo

G Mycoses

- 257 Introduction to Mycoses** 2874
John E. Bennett
- 258 *Candida* Species** 2879
John E. Edwards, Jr.
- 259 *Aspergillus* Species** 2895
Thomas F. Patterson
- 260 Agents of Mucormycosis and Entomophthoramycosis** 2909
Dimitrios P. Kontoyiannis and Russell E. Lewis
- 261 *Sporothrix schenckii*** 2920
John H. Rex and Pablo C. Okhuysen
- 262 Agents of Chromoblastomycosis** 2925
Duane R. Hospenthal
- 263 Agents of Mycetoma** 2929
Duane R. Hospenthal
- 264 Cryptococcosis (*Cryptococcus neoformans* and *Cryptococcus gattii*)** 2934
John R. Perfect
- 265 *Histoplasma capsulatum* (Histoplasmosis)** 2949
George S. Deepe, Jr.
- 266 Blastomycosis** 2963
Robert W. Bradsher, Jr.
- 267 Coccidioidomycosis (*Coccidioides* Species)** 2974
John N. Galgiani
- 268 Dermatophytosis (Ringworm) and Other Superficial Mycoses** 2985
Roderick J. Hay
- 269 Paracoccidioidomycosis** 2995
Angela Restrepo, Angela María Tobón, and Luz Elena Cano

- 270 Uncommon Fungi and Related Species** 3003
Duane R. Hespenthal
- 271 *Pneumocystis* Species** 3016
Peter D. Walzer, A. George Smulian, and Robert F. Miller
- 272 Microsporidiosis** 3031
Louis M. Weiss
- H Protozoal Diseases**
- 273 Introduction to Protozoal Diseases** 3045
Poonum S. Korpe, Jonathan I. Ravdin, and William A. Petri, Jr.
- 274 *Entamoeba* Species, Including Amebic Colitis and Liver Abscess** 3047
William A. Petri, Jr., and Rashidul Haque
- 275 Free-Living Amebae** 3059
Anita A. Koshy, Brian G. Blackburn, and Upinder Singh
- 276 Malaria (*Plasmodium* Species)** 3070
Rick M. Fairhurst and Thomas E. Wellem
- 277 *Leishmania* Species: Visceral (Kala-Azar), Cutaneous, and Mucosal Leishmaniasis** 3091
Alan J. Magill
- 278 *Trypanosoma* Species (American Trypanosomiasis, Chagas' Disease): Biology of Trypanosomes** 3108
Louis V. Kirchhoff
- 279 Agents of African Trypanosomiasis (Sleeping Sickness)** 3116
Louis V. Kirchhoff
- 280 *Toxoplasma gondii*** 3122
José G. Montoya, John C. Boothroyd, and Joseph A. Kovacs
- 281 *Giardia lamblia*** 3154
David R. Hill and Theodore E. Nash
- 282 *Trichomonas vaginalis*** 3161
Jane R. Schwebke
- 283 *Babesia* Species** 3165
Jeffrey A. Gelfand and Edouard G. Vannier
- 284 Cryptosporidiosis (*Cryptosporidium* Species)** 3173
A. Clinton White, Jr.
- 285 *Cyclospora cayetanensis*, *Cystoisospora (Isospora) belli*, *Sarcocystis* Species, *Balantidium coli*, and *Blastocystis* Species** 3184
Kathryn N. Suh, Phyllis Kozarsky, and Jay S. Keystone
- I Diseases Due to Toxic Algae**
- 286 Human Illness Associated with Harmful Algal Blooms** 3192
J. Glenn Morris, Jr.
- J Diseases Due to Helminths**
- 287 Introduction to Helminth Infections** 3196
James H. Maguire
- 288 Intestinal Nematodes (Roundworms)** 3199
James H. Maguire
- 289 Tissue Nematodes (Trichinellosis, Dracunculiasis, Filariasis, Loiasis, and Onchocerciasis)** 3208
James W. Kazura
- 290 Trematodes (Schistosomes and Liver, Intestinal, and Lung Flukes)** 3216
James H. Maguire
- 291 Tapeworms (Cestodes)** 3227
Charles H. King and Jessica K. Fairley
- 292 Visceral Larva Migrans and Other Uncommon Helminth Infections** 3237
Theodore E. Nash
- K Ectoparasitic Diseases**
- 293 Introduction to Ectoparasitic Diseases** 3243
James H. Diaz
- 294 Lice (Pediculosis)** 3246
James H. Diaz
- 295 Scabies** 3250
James H. Diaz
- 296 Myiasis and Tungiasis** 3255
James H. Diaz
- 297 Mites, Including Chiggers** 3260
James H. Diaz
- 298 Ticks, Including Tick Paralysis** 3266
James H. Diaz
- L Diseases of Unknown Etiology**
- 299 Kawasaki Disease** 3280
Jane C. Burns
- IV Special Problems**
- A Nosocomial Infections**
- 300 Infection Prevention in the Health Care Setting** 3286
Michael B. Edmond and Richard P. Wenzel
- 301 Disinfection, Sterilization, and Control of Hospital Waste** 3294
William A. Rutala and David J. Weber
- 302 Infections Caused by Percutaneous Intravascular Devices** 3310
Susan E. Beekmann and David K. Henderson
- 303 Nosocomial Pneumonia** 3325
Michael Klompas
- 304 Nosocomial Urinary Tract Infections** 3334
Thomas M. Hooton
- 305 Health Care–Acquired Hepatitis** 3347
Kent A. Sepkowitz
- 306 Transfusion- and Transplantation-Transmitted Infections** 3351
Matthew J. Kuehnert and Sridhar V. Basavaraju

- 307 Human Immunodeficiency Virus in Health Care Settings 3361**
David K. Henderson
- 308 Nosocomial Herpesvirus Infections 3376**
Tara N. Palmore and David K. Henderson
- B Infections in Special Hosts**
- 309 Infections in the Immunocompromised Host: General Principles 3384**
J. Peter Donnelly, Nicole M. A. Blijlevens, and Walter J. F. M. van der Velden
- 310 Prophylaxis and Empirical Therapy of Infection in Cancer Patients 3395**
Elio Castagnola, Małgorzata Mikulska, and Claudio Viscoli
- 311 Risk Factors and Approaches to Infections in Transplant Recipients 3414**
J. Stephen Dummer and Lora D. Thomas
- 312 Infections in Recipients of Hematopoietic Stem Cell Transplants 3425**
Jo-Anne H. Young and Daniel J. Weisdorf
- 313 Infections in Solid-Organ Transplant Recipients 3440**
Nina Singh and Ajit P. Limaye
- 314 Infections in Patients with Spinal Cord Injury 3453**
Rabih O. Darouiche
- 315 Infections in the Elderly 3459**
Kent B. Crossley and Phillip K. Peterson
- 316 Infections in Asplenic Patients 3466**
Janet R. Gilsdorf
- 317 Infections in Injection Drug Users 3475**
Donald P. Levine and Patricia D. Brown
- 318 Surgical Site Infections and Antimicrobial Prophylaxis 3492**
Thomas R. Talbot
- C Surgical- and Trauma-Related Infections**
- 319 Burns 3505**
Clinton K. Murray
- 320 Bites 3510**
Ellie J. C. Goldstein and Fredrick M. Abrahamian
- D Immunization**
- 321 Immunization 3516**
Andrew T. Kroger, Larry K. Pickering, Melinda Wharton, Alison Mawle, Alan R. Hinman, and Walter A. Orenstein
- E Zoonoses**
- 322 Zoonoses 3554**
W. Ian Lipkin
- F Protection of Travelers**
- 323 Protection of Travelers 3559**
David O. Freedman
- 324 Infections in Returning Travelers 3568**
David O. Freedman