

Foreword	x
Preface	xii
List of Contributors	xiii

## SECTION I: Principles and General Considerations

1 Principles of Parasitism: Host–Parasite Interactions	1
<i>Juan P. Olano, Peter F. Weller, Richard L. Guerrant, David H. Walker</i>	
2 The Perfect Storm: Climate, Ecosystems and Infectious Diseases	8
<i>Fernando J. Torres-Vélez, Corrie Brown</i>	
3 Epidemiology and Biostatistics	11
<i>Edward T. Ryan, Megan Murray</i>	
4 Social and Cultural Factors in Tropical Medicine: Reframing Our Understanding of Disease	17
<i>Rebecca Dillingham, David A. Walton, Paul E. Farmer</i>	
5 Nutrition and Micronutrients in Tropical Infectious Diseases	23
<i>Margaret Kosek, Robert E. Black</i>	
6 Host Genetics and Susceptibility to Infection	32
<i>Graham S. Cooke, Michael Levin, Robert J. Wilkinson, Geoffrey Pasvol</i>	
7 Disease Eradication and Control	40
<i>David L. Heymann</i>	
8 Vector Biology	45
<i>José M.C. Ribeiro, Jesus G. Valenzuela</i>	
9 Immunology, Host Defense, Immunodeficiencies, and Vaccines	52
<i>Lisa A. Spencer, Anne Nicholson-Weller</i>	
10 Vaccines in the Tropics	63
<i>Alan D.T. Barrett</i>	
11 Tropical Infectious Diseases and Malignancy	71
<i>Catherine de Martel, Silvia Franceschi, Julie Parsonnet</i>	
12 Chemotherapy of Parasitic Diseases	76
<i>Richard D. Pearson, Peter F. Weller, Richard L. Guerrant</i>	

13 Chemotherapy of Bacterial, Fungal, and Viral Diseases	95
<i>Thomas L. Holland, Nathan M. Thielman, Richard D. Pearson</i>	
14 Global Surveillance for Emerging Infectious Diseases	105
<i>Ray R. Arthur, James W. LeDuc, James M. Hughes</i>	

## SECTION II: Pathogens

### Part A: Bacterial and Mycobacterial Infections

15 Enteric <i>Escherichia coli</i> Infections	110
<i>Theodore S. Steiner, Nathan M. Thielman, Richard L. Guerrant</i>	
16 Typhoid and Paratyphoid (Enteric) Fever	121
<i>Myron M. Levine, Milagritos D. Tapia, Anita K.M. Zaidi</i>	
17 Nontyphoidal Salmonellosis	128
<i>Christopher C. Moore, Patrick Banura, David A. Pegues, Samuel I. Miller</i>	
18 Shigellosis	137
<i>Gerald T. Keusch, Mohammed A. Salam, Dennis J. Kopeccko</i>	
19 <i>Campylobacter</i> Infections	145
<i>Ban Mishu Allos, Albert J. Lastovica</i>	
20 Cholera Infections	150
<i>Myron M. Levine, Debasish Saha, A.S.G. Faruque, Samba O. Sow</i>	
21 “Noncholera” <i>Vibrio</i> Infections	157
<i>J. Glenn Morris, Jr, G. Balakrish Nair</i>	
22 Enteric <i>Clostridium</i> Infections	162
<i>Cirle A. Warren</i>	
23 <i>Helicobacter pylori</i> Infections	167
<i>Barry J. Marshall, Robert H. Gilman</i>	
24 Meningococcal Disease	174
<i>Alexandre Leite de Souza, Diederik van de Beek, W. Michael Scheld</i>	
25 Gonococcal and Other Neisserial Infections	184
<i>Joseph A. Duncan, Lillian B. Brown, Peter A. Leone</i>	

- 26 *Haemophilus ducreyi* Infections 191  
*Allan R. Ronald*
- 27 *Haemophilus influenzae* 193  
*Mark C. Steinhoff, Thomas Cherian, Elizabeth P. Schlaudecker*
- 28 Donovanosis 196  
*Nigel O'Farrell*
- 29 Pneumococcal Infections 199  
*Keith P. Klugman, Charles Feldman*
- 30 Group A Streptococcal and Staphylococcal Infections 203  
*Dennis L. Stevens, Amy E. Bryant*
- 31 Pertussis 212  
*Joshua C. Eby, Erik L. Hewlett*
- 32 Legionellosis 215  
*Thomas J. Marrie, Paul S. Hoffman*
- 33 Melioidosis 219  
*Sharon J. Peacock, David A.B. Dance*
- 34 Diphtheria 223  
*Anna Kabanova, Rino Rappuoli*
- 35 Tuberculosis and Atypical Mycobacterial Infections 228  
*Edward C. Jones-Lopez, Jerrold J. Ellner*
- 36 *Mycobacterium ulcerans* Infection (Buruli Ulcer) 248  
*Wayne M. Meyers, Douglas S. Walsh, Françoise Portaels*
- 37 Leprosy 253  
*Douglas S. Walsh, Wayne M. Meyers*
- 38 Anthrax 261  
*G. Raghurama Rao, David H. Walker*
- 39 Bartonellosis 265  
*Christoph Dehio, Ciro Maguiña, David H. Walker*
- 40 Brucellosis 271  
*Eduardo Gotuzzo, Georgios Pappas*
- 41 Plague 276  
*Paul S. Mead*
- 42 Tetanus 284  
*Barnett R. Nathan, Thomas P. Bleck*
- Part B: Spirochetal Infections**
- 43 Treponemal Infections 289  
*Joseph D. Tucker, Arlene C. Seña, P. Frederick Sparling, Xiang-Sheng Chen, Myron S. Cohen*
- 44 Relapsing Fever and Other *Borrelia* Diseases 295  
*Alan G. Barbour*
- 45 Leptospirosis 303  
*Wun-Ju Shieh, Charles Edwards, Paul N. Levett, Sherif R. Zaki*
- Part C: Chlamydial Infections**
- 46 Trachoma 308  
*Chandler R. Dawson, Julius Schachter*
- 47 *Chlamydia trachomatis* Infections of the Genital Tract (Including Lymphogranuloma Venereum) 314  
*David Mabey, Rosanna W. Peeling*
- 48 Psittacosis 320  
*Thomas J. Marrie*
- Part D: Rickettsial and Ehrlichial Infections**
- 49 Spotted Fever Group Rickettsioses 323  
*Daniel J. Sexton, David H. Walker*
- 50 Typhus Group Rickettsioses 329  
*David H. Walker, Didier Raoult*
- 51 Scrub Typhus 334  
*Ik-Sang Kim, David H. Walker*
- 52 Ehrlichioses and Anaplasmosis 339  
*J. Stephen Dumler*
- 53 Q Fever 344  
*Thomas J. Marrie*
- Part E: Viral Infections**
- 54 Measles 347  
*Jon K. Andrus, Ciro A. De Quadros, Carlos Castillo-Solorzano*
- 55 Hendra and Nipah Viral Infections 352  
*Thomas G. Ksiazek, K.B. Chua, Paul A. Rota, Pierre E. Rollin*
- 56 Human Herpesvirus Infections 355  
*S. David Hudnall, Lawrence R. Stanberry, Paul D. Griffiths*
- 57 Smallpox and Related Orthopoxviral Infections 369  
*Peter B. Jahrling*
- 58 Respiratory Viral Infections 378  
*José Luiz Proença-Módena, Gustavo Olszanski Acrani, Cynthia B. Snider, Eurico Arruda*
- 59 Severe Acute Respiratory Syndrome (SARS) 392  
*Mei-Shang Ho*
- 60 Enterovirus Infections, Including Poliomyelitis 398  
*Mark A. Pallansch*
- 61 Rotavirus Infections 406  
*Juana Angel, Manuel A. Franco, Harry B. Greenberg*
- 62 Calicivirus Infections 411  
*Gagandeep Kang, Mary K. Estes, Robert L. Atmar*
- 63 Astroviruses, Enteric Adenoviruses, and Other Gastroenteritis Viral Infections 416  
*Roger I. Glass, Joseph S. Bresee*

- 64 Enteric Viral Hepatitis A and E 420  
*Shahid Jameel, Rakesh Aggarwal*
- 65 Viral Hepatitis C 427  
*Miriam J. Alter*
- 66 Hepatitis B and Deltavirus Infections 433  
*Ding-Shinn Chen, Pei-Jer Chen*
- 67 Overview of Viral Hemorrhagic Fevers 441  
*C.J. Peters, Sherif R. Zaki*
- 68 Arenavirus Infections 449  
*Delia A. Enría, James N. Mills, Dan Bausch, Wun-Ju Shieh, C.J. Peters*
- 69 Rift Valley Fever 462  
*C.J. Peters, Shinji Makino, J.C. Morrill*
- 70 Crimean-Congo Hemorrhagic Fever 466  
*Onder Ergonul, Michael R. Holbrook*
- 71 Hantavirus Infections 470  
*Charles F. Fulhorst, Frederick T. Koster, Delia A. Enría, C.J. Peters*
- 72 Sandfly Fever, Oropouche Fever, and Other Bunyavirus Infections 481  
*Robert B. Tesh, Pedro F.C. Vasconcelos*
- 73 Filovirus Infections 483  
*Victoria Wahl-Jensen, C.J. Peters, Peter B. Jahrling, Heinz Feldmann, Jens H. Kuhn*
- 74 Yellow Fever 492  
*J. Erin Staples, Thomas P. Monath*
- 75 Dengue and Dengue Hemorrhagic Fever 504  
*Eng Eong Ooi, Duane J. Gubler*
- 76 Japanese Encephalitis, West Nile, and Other Flavivirus Infections 511  
*Robert B. Tesh, Tom Solomon*
- 77 Tick-borne Encephalitis and Omsk Hemorrhagic Fever 515  
*Christian W. Mandl, Michael R. Holbrook*
- 78 Alphavirus Infections 519  
*Scott C. Weaver, David W. Smith*
- 79 Rabies 525  
*Thomas P. Bleck*
- 80 Human Papillomavirus Infections 532  
*William Bonnez, Gerhard Lindeque*
- Part F: Retroviral Infections**
- 81 Human Retroviral Infections in the Tropics 541  
*Steven J. Reynolds, Pascal O. Bessong, Thomas C. Quinn*
- Part G: Fungal Infections**
- 82 Dermatophytosis 559  
*Michael B. Smith, Michael R. McGinnis*
- 83 Mycetoma 565  
*Ahmed Hassan Fahal*
- 84 Chromoblastomycosis and Phaeohyphomycosis 569  
*Tadahiko Matsumoto, Chester R. Cooper, Paul J. Szanislo*
- 85 Histoplasmosis, Blastomycosis, Coccidioidomycosis, and Cryptococcosis 573  
*Gregory M. Anstead, Tihana Bicanic, Eduardo Arathoon, John R. Graybill*
- 86 Paracoccidioidomycosis 582  
*Ricardo Negroni, Gregory M. Anstead, John R. Graybill*
- 87 Penicilliosis Marneffeii 586  
*Khuanchai Supparatpinyo, Gregory M. Anstead, John R. Graybill*
- 88 Mucocutaneous and Deeply Invasive Candidiasis 589  
*Shmuel Shoham, Marcio Nucci, Thomas J. Walsh*
- 89 Mucormycosis 597  
*Thomas J. Walsh, Emmanuel Roilides, John H. Rex, Michael R. McGinnis*
- 90 Entomophthoromycosis, Lobomycosis, Rhinosporidiosis, and Sporotrichosis 603  
*Duane R. Hospenthal*
- 91 Pneumocystosis 608  
*Peter D. Walzer, A. George Smulian, Robert F. Miller*
- Part H: Protozoan Infections**
- 92 Enteric Amebiasis 614  
*Kristine M. Peterson, Upinder Singh, William A. Petri, Jr*
- 93 Intestinal Flagellate and Ciliate Infections 623  
*David R. Hill, Theodore E. Nash*
- 94 Cryptosporidiosis 633  
*Aldo A.M. Lima, Amidou Samie, Richard L. Guerrant*
- 95 Cyclospora, Isospora, and Sarcocystis Infections 641  
*Ynés R. Ortega, Jean W. Pape*
- 96 Malaria 646  
*Stephen L. Hoffman, Carlos C. (Kent) Campbell, Nicholas J. White*
- 97 Babesiosis 676  
*Sam R. Telford III, Peter F. Weller, James H. Maguire*
- 98 African Trypanosomiasis (Sleeping Sickness) 682  
*Jacques Pépin, John E. Donelson*
- 99 American Trypanosomiasis (Chagas Disease) 689  
*Louis V. Kirchhoff*

- 100 Leishmaniasis 696  
*Selma M.B. Jeronimo, Anastacio de Queiroz Sousa, Richard D. Pearson*
- 101 Pathogenic and Opportunistic Free-Living Amebae: *Acanthamoeba* spp., *Balamuthia mandrillaris*, *Naegleria fowleri*, and *Sappinia pedata* 707  
*Govinda S. Visvesvara, Sharon L. Roy, James H. Maguire*
- 102 Microsporidiosis 714  
*Louis M. Weiss, David A. Schwartz*
- 103 Toxoplasmosis 722  
*Joseph D. Schwartzman, James H. Maguire*
- Part I: Nematode Infections**
- 104 Lymphatic Filariasis 729  
*Thomas B. Nutman, James W. Kazura*
- 105 Loiasis and *Mansonella* Infections 735  
*Amy D. Klion, Thomas B. Nutman*
- 106 Onchocerciasis 741  
*Achim M. Hoerauf*
- 107 Zoonotic Filariasis 750  
*Mark L. Eberhard*
- 108 Dracunculiasis 759  
*Ernesto Ruiz-Tiben, Donald R. Hopkins*
- 109 Toxocariasis and Larva Migrans Syndromes 763  
*James S. McCarthy, Thomas A. Moore*
- 110 Trichinellosis 768  
*Fabrizio Bruschi, K. Darwin Murrell*
- 111 Angiostrongyliasis 774  
*John H. Cross<sup>†</sup>, Kao-Pin Hwang*
- 112 Other Tissue Nematode Infections 778  
*Yezid Gutierrez*
- 113 Enterobiasis 788  
*Thomas A. Moore, James S. McCarthy*
- 114 Trichuriasis 791  
*Nilanthi R. de Silva, Edward S. Cooper*
- 115 Ascariasis 794  
*David J. Diemert*
- 116 Hookworm Infections 799  
*Peter J. Hotez*
- 117 Strongyloidiasis 805  
*Afzal A. Siddiqui, Robert M. Genta, Ismael Maguilnik, Steven L. Berk*
- Part J: Cestode Infections**
- 118 Introduction to Tapeworm Infections 813  
*Herbert B. Tanowitz, Murray Wittner, A. Clinton White, Jr*
- 119 Cysticercosis 815  
*Hector H. Garcia, Christina M. Coyle, A. Clinton White, Jr*
- 120 Echinococcosis 824  
*Peter M. Schantz, Peter Kern, Enrico Brunetti*
- 121 *Taenia* and Other Tapeworm Infections 839  
*Murray Wittner, A. Clinton White, Jr, Herbert B. Tanowitz*
- Part K: Trematode Infections**
- 122 Schistosomiasis 848  
*Charles H. King*
- 123 Liver, Lung, and Intestinal Fluke Infections 854  
*Siddhartha Mahanty, J. Dick Maclean<sup>†</sup>, John H. Cross<sup>†</sup>*
- Part L: Ectoparasitic Infections**
- 124 Arthropods, Tongue Worms, Leeches, and Arthropod-borne Diseases 868  
*Jerome Goddard*
- SECTION III: Practice: Approach to the Patient in the Tropics**
- 125 Distinguishing Tropical Infectious Diseases from Bioterrorism 879  
*Juan P. Olano, C.J. Peters, David H. Walker*
- 126 Health Advice for International Travel 887  
*Jay S. Keystone, Robert Steffen, Phyllis E. Kozarsky*
- 127 Migrant, Immigrant, and Refugee Health 902  
*Luis S. Ortega, Rachel B. Eidex, Martin S. Cetron*
- 128 Infectious Diseases in Modern Military Forces 910  
*Alan J. Magill, Bonnie L. Smoak, Truman W. Sharp*
- 129 Gastrointestinal Symptoms 916  
*Luis M. Valdez, Eduardo Gotuzzo, Nathan M. Thielman, Herbert L. DuPont*
- 130 Fever and Systemic Symptoms 925  
*Mary E. Wilson, Andrea K. Boggild*
- 131 Eosinophilia 939  
*Mary E. Wilson, Peter F. Weller*
- 132 Cutaneous Lesions 950  
*Steven D. Mawhorter, David L. Longworth*
- 133 Hepatobiliary Disease 975  
*Mohammad S. Khuroo, Mehnaaz S. Khuroo*
- 134 Approach to the Patient in the Tropics with Pulmonary Disease 982  
*Gregory J. Martin*
- 135 Ocular Disease 991  
*Edward T. Ryan, Marlene Durand*

**136 Neurologic Disease 1017**

*Tom Solomon, Mustapha A. Danesi, Frank J. Bia,  
Thomas P. Bleck*

**137 Approach to the Patient in the Tropics  
with Anemia 1024**

*Saad H. Abdalla, Geoffrey Pasvol*

**138 Sexually Transmitted and Urinary Tract  
Infections 1033**

*Arlene C. Seña, Allan R. Ronald, Kimberley K. Fox,  
Myron S. Cohen*

**139 Approach to the Patient with HIV and  
Coinfecting Tropical Infectious  
Diseases 1046**

*Christopher L. Karp, Siddhartha Mahanty*

**140 Delusional Parasitosis 1066**

*Kathryn N. Suh, Jay S. Keystone*

**141 Tropical Infectious Disease Concerns  
in Pregnancy 1072**

*Raul E. Isturiz, Eduardo Gotuzzo*

*Index 1082*