

Mandell, Douglas, and Bennett's  
PRINCIPLES AND PRACTICE OF  
**INFECTIOUS  
DISEASES**

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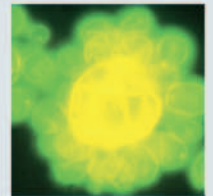
Mandell, Douglas, and Bennett's  
PRINCIPLES AND PRACTICE OF  
**INFECTIOUS  
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Volume 1

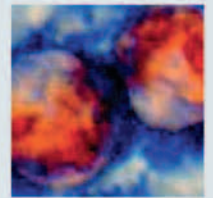
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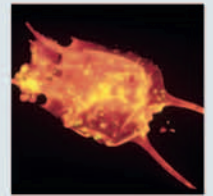
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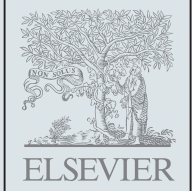


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Cystic Fibrosis

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Infections in the Immunocompromised Host: General Principles

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Enterobacteriaceae

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Linezolid and Other Oxazolidinones; Acute Pneumonia

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Rotaviruses

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Cerebrospinal Fluid Shunt Infections

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*Rickettsia typhi* (Murine Typhus); *Ehrlichia chaffeensis* (Human Monocytotropic Ehrlichiosis), *Anaplasma phagocytophilum* (Human Granulocytotropic Anaplasmosis), and Other Anaplasmataceae

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Risk Factors and Approaches to Infections in Transplant Recipients; Infections in Solid Organ Transplant Recipients

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*Shigella* Species (Bacillary Dysentery)

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Fever of Unknown Origin; Prevention of Infective Endocarditis

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Endophthalmitis; Infectious Causes of Uveitis; Periocular Infections

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*Legionella*

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Organization for Infection Control; Isolation

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*Candida* Species

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*Streptococcus agalactiae* (Group B Streptococcus)

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Principles of Anti-infective Therapy

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Chronic Fatigue Syndrome

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*Mycobacterium leprae*

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*Plasmodium* Species (Malaria)

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Cestodes (Tapeworms)

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A Molecular Perspective of Microbial Pathogenicity

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Human Metapneumovirus

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The Immunology of Human Immunodeficiency Virus Infection

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Hepatitis A Virus

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*Bacillus* Species and Related Genera Other than *Bacillus anthracis*

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*Staphylococcus epidermidis* and Other Coagulase-Negative Staphylococci

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Anaerobic Cocci

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Antimicrobial Stewardship

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*Mycobacterium tuberculosis*

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Protection of Travelers; Infections in Returning Travelers

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*Bacillus anthracis* (Anthrax); Anthrax as an Agent of Bioterrorism

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*Coccidioides* Species

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Evaluation of the Patient with Suspected Immunodeficiency

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Human Immunodeficiency Viruses

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Gas Gangrene and Other *Clostridium*-Associated Diseases; *Bacteroides*, *Prevotella*, *Porphyromonas*, and *Fusobacterium* Species (and Other Medically Important Anaerobic Gram-Negative Bacilli)

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*Babesia* Species

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Topical Antibacterials

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Rubella Virus (German Measles); Measles Virus (Rubeola)

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Cell-Mediated Defense against Infection

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*Stenotrophomonas maltophilia* and *Burkholderia cepacia* Complex

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Diagnosis of Human Immunodeficiency Virus Infection

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Bites

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*Vibrio cholerae*

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Esophagitis

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*Capnocytophaga*

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Foodborne Disease

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Antimycobacterial Agents

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Principles and Syndromes of Enteric Infection; Nausea, Vomiting, and Noninflammatory Diarrhea; Inflammatory Enteritides; Enteric Fever and Other Causes of Abdominal Symptoms with Fever

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*Leptospira* Species (Leptospirosis)

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*Mycobacterium tuberculosis*

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*Bordetella pertussis*

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*Chlamydophila (Chlamydia) pneumoniae*

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*Neisseria gonorrhoeae*

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*Entamoeba* Species, Including Amebiasis

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*Acinetobacter* Species

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Dermatophytosis and Other Superficial Mycoses

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Antiviral Drugs (Other than Antiretrovirals)

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Epidemiologic Principles

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Hospital Preparedness for Emerging and Highly Contagious Infectious Diseases: Getting Ready for the Next Epidemic or Pandemic; Infections Caused by Percutaneous Intravascular Devices; Human Immunodeficiency Virus in Health Care Settings; Nosocomial Herpesvirus Infections

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Bioterrorism: An Overview

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Epiglottitis

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Toxins

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*Giardia lamblia*

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Antiretroviral Therapy for Human Immunodeficiency Virus Infection

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*Francisella tularensis* (Tularemia) as an Agent of Bioterrorism

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Evaluation of the Patient with Suspected Immunodeficiency

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Endemic Treponematoses

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Quinolones; Urinary Tract Agents: Nitrofurantoin and Methenamine

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Nosocomial Urinary Tract Infections

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*Mycobacterium avium* Complex

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*Nocardia* Species

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*Capnocytophaga*

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Anaerobic Infections: General Concepts

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Otitis Externa, Otitis Media, and Mastoiditis

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Zoonoses

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*Toxoplasma gondii*

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Immunomodulators

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Mumps Virus

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Infections in Asplenic Patients

**Rob Roy MacGregor, MD**

Professor of Medicine, Division of Infectious Diseases, University of Pennsylvania School of Medicine; Attending Physician, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania  
*Corynebacterium diphtheriae*

**Philip A. Mackowiak, MD, MBA**

Professor and Vice Chairman, Department of Medicine, University of Maryland School of Medicine; Chief, Medical Care Clinical Center, Veterans Affairs Maryland Health Care System, Baltimore, Maryland  
Temperature Regulation and the Pathogenesis of Fever; Fever of Unknown Origin

**Lawrence C. Madoff, MD**

Professor of Medicine, University of Massachusetts Medical School; Director, Division of Epidemiology and Immunization, Massachusetts Department of Public Health and University of Massachusetts Memorial Medical Center, Division of Infectious Disease and Immunology, Worcester, Massachusetts  
Infections of the Liver and Biliary System; Pancreatic Infection; Splenic Abscess; Appendicitis; Diverticulitis and Typhlitis

**Alan J. Magill, MD**

Associate Professor of Preventive Medicine and Biometrics and Associate Professor of Medicine, Uniformed Services University of the Health Sciences F. Edward Hébert School of Medicine, Bethesda; Director, Division of Experimental Therapeutic, Walter Reed Army Institute of Research, Silver Spring, Maryland  
*Leishmania* Species: Visceral (Kala-Azar), Cutaneous, and Mucosal Leishmaniasis

**James H. Maguire, MD, MPH**

Professor of Medicine, Harvard Medical School; Senior Physician, Division of Infectious Disease, Brigham and Women's Hospital, Boston, Massachusetts  
Introduction to Helminth Infections; Intestinal Nematodes (Roundworms); Trematodes (Schistosomes and Other Flukes)

**Frank Maldarelli, MD, PhD**

Staff Clinician, Host-Virus Interaction Branch, and Head, In Vivo Biology Group, HIV Drug Resistance Program, National Cancer Institute, National Institutes of Health, Bethesda, Maryland  
Diagnosis of Human Immunodeficiency Virus Infection

**Lionel A. Mandell, MD**

Professor of Medicine, McMaster University Faculty of Health Sciences; Attending Physician, Hamilton Health Sciences, Hamilton, Ontario, Canada  
Fusidic Acid; Novel Antibiotics

**Barbara J. Mann, PhD**

Associate Professor of Medicine and Microbiology, University of Virginia School of Medicine, Charlottesville, Virginia  
Microbial Adherence

**Lewis Markoff, MD**

Chief, Laboratory of Vector-Borne Virus Diseases, Office of Vaccines, Center for Biologics Evaluation and Research, U.S. Food and Drug Administration, Bethesda, Maryland  
Alphaviruses

**Jeanne M. Marrazzo, MD, MPH**

Associate Professor of Medicine, Division of Allergy and Infectious Diseases, University of Washington School of Medicine, Seattle, Washington  
*Neisseria gonorrhoeae*

**Thomas J. Marrie, MD**

Dean, Dalhousie University Faculty of Medicine, Halifax, Nova Scotia, Canada  
*Coxiella burnetii* (Q Fever)

**Thomas Marth, MD**

Chief, Division of Internal Medicine, Krankenhaus Maria Hilf, Daun, Germany  
Whipple's Disease

**Gregory J. Martin, MD**

Associate Professor of Medicine and Associate Professor of Preventive Medicine, Uniformed Services University of the Health Sciences F. Edward Hébert School of Medicine; Attending Physician, National Naval Medical Center, Bethesda, Maryland  
*Bacillus anthracis* (Anthrax); Anthrax as an Agent of Bioterrorism

**Georg Maschmeyer, MD, PhD**

Academic Clinical Instructor, Charité University of Medicine, Berlin; Director, Department of Hematology and Oncology, Klinikum Ernst von Bergmann, Potsdam, Germany  
*Stenotrophomonas maltophilia* and *Burkholderia cepacia* Complex

**Henry Masur, MD**

Chief, Critical Care Medicine Department, Clinical Center, National Institutes of Health, Bethesda, Maryland  
Management of Opportunistic Infections Associated with Human Immunodeficiency Virus Infection

**Alison Mawle, PhD**

Associate Director for Laboratory Science, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia  
Immunization

**Kenneth H. Mayer, MD**

Professor of Medicine and Community Health and Director, Brown University AIDS Program, Warren Alpert Medical School of Brown University; Attending Physician, Miriam Hospital, Providence, Rhode Island  
Sulfonamides and Trimethoprim

**John T. McBride, MD**

Professor of Pediatrics, Northeastern Ohio Universities Colleges of Medicine and Pharmacy, Rootstown; Vice Chair, Department of Pediatrics, Akron Children's Hospital, Akron, Ohio  
Acute Laryngotracheobronchitis (Croup); Bronchiolitis

**William M. McCormack, MD**

Distinguished Teaching Professor of Medicine and of Obstetrics and Gynecology, State University of New York Downstate Medical Center College of Medicine; Chief, Infectious Diseases Division, State University of New York Downstate Medical Center, Brooklyn, New York  
Urethritis; Vulvovaginitis and Cervicitis

**Kenneth McIntosh, MD**

Professor of Pediatrics, Harvard Medical School; Professor, Department of Immunology and Infectious Diseases, Harvard School of Public Health; Emeritus Chief, Division of Infectious Diseases, Children's Hospital Boston, Boston, Massachusetts  
Coronaviruses, Including Severe Acute Respiratory Syndrome (SARS)—Associated Coronavirus



**Paul S. Mead, MD, MPH**

Chief, Epidemiology and Surveillance Activity, Bacterial Disease Branch, National Center for Zoonotic, Vector-Borne, and Enteric Diseases, Centers for Disease Control and Prevention, Fort Collins, Colorado

*Yersinia* Species, Including Plague

**Daniel K. Meyer, MD**

Assistant Professor of Medicine, University of Medicine and Dentistry of New Jersey—Robert Wood Johnson Medical School; Program Director, Division of Infectious Diseases, Cooper University Hospital, Camden, New Jersey

Other Coryneform Bacteria and Rhodococci

**Burt R. Meyers, MD**

Clinical Professor, Department of Medicine/Infectious Diseases, Mount Sinai School of Medicine, New York; Attending Physician, New York Medical College, Valhalla, New York

Tetracyclines and Chloramphenicol; Metronidazole

**Mark A. Miller, MD**

Associate Professor, McGill University Faculty of Medicine; Staff Physician, Jewish General Hospital, Montreal, Quebec, Canada

Prebiotics, Probiotics, and Synbiotics

**Samuel I. Miller, MD**

Professor, Department of Immunology, University of Washington School of Medicine, Seattle, Washington

*Salmonella* Species, Including *Salmonella* Typhi

**David H. Mitchell, MB BS**

Clinical Senior Lecturer, Department of Infectious Diseases, University of Sydney Faculty of Medicine, Sydney; Senior Staff Specialist, Centre for Infectious Diseases and Microbiology, Westmead Hospital, Westmead, New South Wales, Australia

*Nocardia* Species

**John F. Modlin, MD**

Chair, Department of Pediatrics, Dartmouth-Hitchcock Medical Center; Infectious Disease and International Health, Children's Hospital at Dartmouth, Lebanon, New Hampshire

Introduction to the Enteroviruses and Parechoviruses; Poliovirus; Coxsackieviruses, Echoviruses, Newer Enteroviruses, and Parechoviruses

**Robert C. Moellering, Jr., MD**

Shields Warren-Mallinckrodt Professor of Medical Research, Harvard Medical School; Staff Physician, Division of Infectious Diseases, Beth Israel Deaconess Medical Center, Boston, Massachusetts

Principles of Anti-infective Therapy

**Susan Moir, PhD**

Staff Scientist, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland

The Immunology of Human Immunodeficiency Virus Infection

**Joel M. Montgomery, PhD**

Epidemiologist, Influenza Division, Centers for Disease Control and Prevention, Atlanta, Georgia

Outbreak Investigation

**José G. Montoya, MD**

Associate Professor of Medicine, Division of Infectious Diseases and Geographic Medicine, Stanford University School of Medicine; Attending Physician, Stanford University Medical Center; Director, Toxoplasma Serology Laboratory, Palo Alto Medical Foundation, Stanford, California

*Toxoplasma gondii*

**Thomas A. Moore, MD**

Clinical Professor, Department of Medicine, University of Kansas School of Medicine—Wichita Campus, Wichita, Kansas

Agents Active against Parasites and *Pneumocystis*

**Philippe Moreillon, MD, PhD**

Professor and Vice-Rector for Research, and Director of the Department of Fundamental Microbiology, University of Lausanne, Lausanne, Switzerland

*Staphylococcus aureus* (Including Staphylococcal Toxic Shock)

**Dean S. Morrell, MD**

Clinical Associate Professor, University of North Carolina at Chapel Hill School of Medicine; Director of Residency Training Program, Pediatric Dermatology, University of North Carolina Health Care, Chapel Hill, North Carolina

The Acutely Ill Patient with Fever and Rash

**J. Glenn Morris, Jr., MD, MPHTM**

Professor of Medicine, Division of Infectious Diseases, University of Florida College of Medicine; Director, University of Florida Emerging Pathogens Institute, Gainesville, Florida

Human Illness Associated with Harmful Algal Blooms

**Caryn Gee Morse, MD, MPH**

Assistant Clinical Investigator, Laboratory of Immunoregulation, Clinical Research Section, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland

Nutrition, Immunity, and Infection

**Robin Moseley, MAT**

Associate Director for Program Integration, National Center for Preparedness, Detection, and Control of Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia

Emerging and Reemerging Infectious Disease Threats

**Robert R. Muder, MD**

Professor of Medicine, University of Pittsburgh School of Medicine; Chief, Infectious Disease Section, Veterans Affairs Pittsburgh Healthcare System, Pittsburgh, Pennsylvania

Other *Legionella* Species

**Robert S. Munford, MD**

Senior Clinician, Laboratory of Clinical Infectious Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland

Sepsis, Severe Sepsis, and Septic Shock

**Edward L. Murphy, MD, MPH**

Professor, Departments of Laboratory Medicine and Epidemiology/Biostatistics, University of California, San Francisco, School of Medicine; Senior Investigator, Blood Systems Research Institute, San Francisco, California

Human T-Cell Lymphotropic Virus Types I and II

**Timothy F. Murphy, MD**

University of Buffalo Distinguished Professor, Departments of Medicine and Microbiology, and Chief, Infectious Diseases, State University of New York at Buffalo School of Medicine and Biomedical Sciences, Buffalo, New York

*Moraxella catarrhalis*, *Kingella*, and Other Gram-Negative Cocci; *Haemophilus* Species (Including *H. influenzae* and Chancroid)

**Barbara E. Murray, MD**

J. Ralph Meadows Professor of Medicine and Director, Division of Infectious Diseases, University of Texas Medical School at Houston, Houston, Texas

Glycopeptides (Vancomycin and Teicoplanin), Streptogramins (Quinupristin-Dalfopristin), and Lipopeptides (Daptomycin); *Enterococcus* Species, *Streptococcus bovis* Group, and *Leuconostoc* Species

**Clinton K. Murray, MD**

Associate Professor, Uniformed Services University of the Health Sciences, Bethesda, Maryland; Clinical Associate Professor, University of Texas Health Science Center at San Antonio; Program Director, Infectious Disease Fellowships, San Antonio Uniformed Services Health Education Consortium, San Antonio, Texas  
Burns

**Patrick R. Murray, PhD**

Chief, Microbiology Service, Clinical Center, National Institutes of Health, Bethesda, Maryland  
The Clinician and the Microbiology Laboratory

**Daniel M. Musher, MD**

Professor of Medicine, Baylor College of Medicine; Chief, Infectious Disease, Michael E. DeBakey Veterans Affairs Medical Center, Houston, Texas  
*Streptococcus pneumoniae*

**Esteban C. Nannini, MD**

Assistant Professor, Division of Infectious Diseases, Facultad de Ciencias Médicas, Universidad Nacional de Rosario; Attending Physician, Sanatorio Parque, Rosario, Argentina  
Glycopeptides (Vancomycin and Teicoplanin), Streptogramins (Quinupristin-Dalfopristin), and Lipopeptides (Daptomycin)

**Theodore E. Nash, MD**

Head, Gastrointestinal Parasites Section, Laboratory of Parasitic Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland  
*Giardia lamblia*; Visceral Larva Migrans and Other Unusual Helminth Infections

**William M. Nauseef, MD**

Professor of Medicine and of Microbiology, Department of Medicine, University of Iowa Carver College of Medicine; Attending Physician, Iowa City Veterans Affairs Medical Center, Iowa City, Iowa  
Granulocytic Phagocytes

**Marguerite A. Neill, MD**

Associate Professor of Medicine, Warren Alpert Medical School of Brown University, Providence; Attending Physician, Division of Infectious Disease, Memorial Hospital of Rhode Island, Pawtucket, Rhode Island  
Other Pathogenic Vibrios

**Judith A. O'Donnell, MD**

Professor of Clinical Medicine, Division of Infectious Diseases, University of Pennsylvania School of Medicine; Hospital Epidemiologist and Director, Department of Infection Prevention and Control, Penn Presbyterian Medical Center, Philadelphia, Pennsylvania  
Topical Antibacterials

**Christopher A. Ohl, MD**

Associate Professor of Medicine, Wake Forest University School of Medicine; Medical Director, Center for Antimicrobial Utilization, Stewardship, and Epidemiology, Wake Forest University Baptist Medical Center, Winston-Salem, North Carolina  
Infectious Arthritis of Native Joints

**Pablo C. Okhuysen, MD**

Professor of Medicine, Division of Infectious Diseases, University of Texas Medical School at Houston; Medical Staff, Memorial Hermann Hospital-Texas Medical Center; Medical Staff, Lyndon B. Johnson General Hospital, Houston, Texas  
*Sporothrix schenckii*

**Andrew B. Onderdonk, PhD**

Professor of Pathology, Harvard Medical School; Director, Clinical Microbiology, Brigham and Women's Hospital, Boston, Massachusetts  
Gas Gangrene and Other *Clostridium*-Associated Diseases; *Bacteroides*, *Prevotella*, *Porphyromonas*, and *Fusobacterium* Species (and Other Medically Important Anaerobic Gram-Negative Bacilli)

**Steven M. Opal, MD**

Professor of Medicine, Warren Alpert Medical School of Brown University, Providence; Chief, Division of Infectious Diseases, Memorial Hospital of Rhode Island, Pawtucket, Rhode Island  
Molecular Mechanisms of Antibiotic Resistance in Bacteria

**Walter A. Orenstein, MD**

Deputy Director for Vaccine-Preventable Diseases, Integrated Health Solutions Development, Global Health Program, Bill and Melinda Gates Foundation, Seattle, Washington  
Immunization

**Douglas R. Osman, MD, MPH**

Associate Professor, Division of Infectious Diseases, Mayo Clinic College of Medicine; Consultant, Mayo Clinic, Rochester, Minnesota  
Osteomyelitis

**Michael T. Osterholm, PhD, MPH**

Professor, Division of Environmental Health Sciences, University of Minnesota School of Public Health; Adjunct Professor, University of Minnesota Medical School, Minneapolis, Minnesota  
Epidemiologic Principles

**Stephen M. Ostroff, MD**

Director, Bureau of Epidemiology, and Acting Physician General, Pennsylvania Department of Health, Harrisburg, Pennsylvania  
Emerging and Reemerging Infectious Disease Threats

**Michael N. Oxman, MD**

Professor of Medicine and Pathology, University of California, San Diego, School of Medicine, La Jolla; Staff Physician (Infectious Diseases), Veterans Affairs San Diego Healthcare System, San Diego, California  
Myocarditis and Pericarditis

**Andrea V. Page, MD**

Clinician-Scientist Training Program, Department of Medicine, University of Toronto Faculty of Medicine; Clinical Associate, Divisions of Internal Medicine and Infectious Diseases, University Health Network, Toronto, Ontario, Canada  
Immunomodulators

**Tara N. Palmore, MD**

Deputy Hospital Epidemiologist, Clinical Center, National Institutes of Health, Bethesda, Maryland  
Nosocomial Herpesvirus Infections

**Eric G. Pamer, MD**

Professor of Medicine, Weill Cornell Medical College; Chief, Infectious Diseases, Memorial Hospital, Memorial Sloan-Kettering Cancer Center, New York, New York  
Cell-Mediated Defense against Infection

**Peter G. Pappas, MD**

Professor of Medicine and Tinsley Harrison Clinical Scholar, University of Alabama at Birmingham School of Medicine, Birmingham, Alabama  
Chronic Pneumonia

**Mark S. Pasternack, MD**

Associate Professor of Pediatrics, Harvard Medical School; Chief, Pediatric Infectious Disease Unit, Massachusetts General Hospital, Boston, Massachusetts  
Cellulitis, Necrotizing Fasciitis, and Subcutaneous Tissue Infections; Myositis and Myonecrosis; Lymphadenitis and Lymphangitis

**Thomas F. Patterson, MD**

Chief, Division of Infectious Diseases; Professor of Medicine; and Director, San Antonio Center for Medical Mycology, University of Texas Health Science Center at San Antonio; Attending Physician, South Texas Veterans Health Care System, San Antonio, Texas  
*Aspergillus* Species

**Deborah Pavan-Langston, MD**

Professor of Ophthalmology, Harvard Medical School; Attending Physician, Massachusetts Eye and Ear Infirmary, Boston, Massachusetts  
Microbial Conjunctivitis; Microbial Keratitis

**David A. Pegues, MD**

Professor of Clinical Medicine, David Geffen School of Medicine at UCLA; Hospital Epidemiologist and Attending Physician, Ronald Reagan UCLA Medical Center, Los Angeles, California  
*Salmonella* Species, Including *Salmonella* Typhi

**Robert L. Penn, MD**

Professor of Medicine, Louisiana State University Health Sciences Center in Shreveport School of Medicine; Chief, Section of Infectious Diseases, Louisiana State Health Sciences Center—University Hospital, Shreveport, Louisiana  
*Francisella tularensis* (Tularemia); *Francisella tularensis* (Tularemia) as an Agent of Bioterrorism

**John R. Perfect, MD**

Professor of Medicine, Duke University School of Medicine and Duke University Medical Center, Durham, North Carolina  
*Cryptococcus neoformans*

**Stanley Perlman, MD, PhD**

Professor of Microbiology and Pediatrics, University of Iowa Carver College of Medicine, Iowa City, Iowa  
Coronaviruses, Including Severe Acute Respiratory Syndrome (SARS)—Associated Coronavirus

**C. J. Peters, MD**

Professor, Department of Microbiology and Immunology; Professor, Department of Pathology; and John Sealy Distinguished University Chair in Tropical and Emerging Virology, University of Texas Medical Branch, Galveston; Adjunct Graduate Faculty, Texas A&M University, College Station, Texas  
Marburg and Ebola Virus Hemorrhagic Fevers; California Encephalitis, Hantavirus Pulmonary Syndrome, and Bunyavirid Hemorrhagic Fevers; Lymphocytic Choriomeningitis Virus, Lassa Virus, and the South American Hemorrhagic Fevers; Viral Hemorrhagic Fevers as Agents of Bioterrorism

**Phillip K. Peterson, MD**

Professor of Medicine; Director, Division of Infectious Diseases and International Medicine; and Co-Director, Center for Infectious Diseases and Microbiology Translational Research, University of Minnesota Medical School, Minneapolis, Minnesota  
Infections in the Elderly

**William A. Petri, Jr., MD, PhD**

Wade Hampton Frost Professor of Epidemiology; Professor of Medicine, Microbiology, and Pathology; and Chief, Division of Infectious Diseases and International Health, University of Virginia School of Medicine; Attending Physician, University of Virginia Health System, Charlottesville, Virginia  
Microbial Adherence; Introduction to Protozoal Diseases; *Entamoeba* Species, Including Amebiasis

**Cathy A. Petti, MD**

Associate Professor of Pathology and Medicine, University of Utah School of Medicine, Salt Lake City, Utah  
*Streptococcus anginosus* Group

**Larry K. Pickering, MD**

Professor of Pediatrics, Emory University School of Medicine; Executive Secretary, Advisory Committee on Immunization Practices (ACIP), and Senior Adviser to the Director, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia  
Immunization

**Gerald B. Pier, PhD**

Professor of Medicine (Microbiology and Molecular Genetics), Harvard Medical School; Microbiologist, Brigham and Women's Hospital, Boston, Massachusetts  
*Pseudomonas aeruginosa*

**Satish K. Pillai, MD**

Instructor in Medicine, Harvard Medical School; Staff Physician, Division of Infectious Diseases, Beth Israel Deaconess Medical Center, Boston, Massachusetts  
Principles of Anti-infective Therapy

**Peter Piot, MD, PhD**

Professor of Global Health and Director, Institute for Global Health, Imperial College London, London, United Kingdom  
Global Perspectives on Human Immunodeficiency Virus Infection and Acquired Immunodeficiency Syndrome

**Susan F. Plaeger, PhD**

Director, Basic Sciences Program, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland  
Innate (General or Nonspecific) Host Defense Mechanisms

**Ronald E. Polk, PharmD**

Professor of Pharmacy and Medicine, Virginia Commonwealth University School of Pharmacy, Richmond, Virginia  
Antimicrobial Stewardship

**Aurora Pop-Vicas, MD**

Assistant Professor of Medicine, Warren Alpert Medical School of Brown University, Providence; Infectious Disease Physician, Memorial Hospital of Rhode Island, Pawtucket, Rhode Island  
Molecular Mechanisms of Antibiotic Resistance in Bacteria

**John H. Powers, MD**

Assistant Clinical Professor of Medicine, George Washington University School of Medicine, Washington, DC; Assistant Clinical Professor of Medicine, University of Maryland School of Medicine, Baltimore; Senior Medical Scientist, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland  
Interpreting the Results of Clinical Trials of Antimicrobial Agents

**Antonello Punturieri, MD, PhD**

Program Director, Division of Lung Diseases, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland

Chronic Obstructive Pulmonary Disease and Acute Exacerbations

**Yok-ai Que, MD, PhD**

Instructor and Researcher, University of Lausanne School of Medicine; Attending Physician, Department of Critical Care Medicine, Centre Hospitalier Universitaire Vaudois Lausanne, Lausanne, Switzerland

*Staphylococcus aureus* (Including Staphylococcal Toxic Shock)

**Ronald P. Rabinowitz, MD**

Assistant Professor of Medicine, Division of Infectious Diseases, University of Maryland School of Medicine; Attending Physician, R. Adams Cowley Shock Trauma Center, Baltimore, Maryland

Hyperbaric Oxygen

**Sherwin Rabizadeh, MD, MBA**

Instructor, David Geffen School of Medicine at UCLA; Staff Physician, Department of Pediatrics, Cedars-Sinai Medical Center, Los Angeles, California

Prebiotics, Probiotics, and Synbiotics

**Reuben Ramphal, MD**

Professor of Medicine, Division of Infectious Diseases, University of Florida College of Medicine, Gainesville, Florida

*Pseudomonas aeruginosa*

**Didier Raoult, MD, PhD**

Professor and President, Marseille School of Medicine; Director, Clinical Microbiology Laboratory for the University Hospitals; Founder, WHO Collaborative Center; President, Université de la Méditerranée in Marseille, Marseille, France

Introduction to Rickettsioses, Ehrlichioses, and Anaplasmosis; *Rickettsia akari* (Rickettsialpox); *Coxiella burnetii* (Q Fever); *Rickettsia prowazekii* (Epidemic or Louse-Borne Typhus); *Orientia tsutsugamushi* (Scrub Typhus)

**Jonathan I. Ravdin, MD**

Dean and Executive Vice President, Medical College of Wisconsin, Milwaukee, Wisconsin

Introduction to Protozoal Diseases

**Stuart C. Ray, MD**

Associate Professor of Medicine, Johns Hopkins University School of Medicine, Baltimore, Maryland

Hepatitis C

**Annette C. Reboli, MD**

Professor of Medicine, University of Medicine and Dentistry of New Jersey—Robert Wood Johnson Medical School; Deputy Chief of Medicine for Administration, Head of Infectious Diseases Division, and Hospital Epidemiologist, Cooper University Hospital, Camden, New Jersey

Other Coryneform Bacteria and Rhodococci; *Erysipelothrix rhusiopathiae*

**Pavani Reddy, MD**

Assistant Professor, Division of Infectious Diseases, Northwestern University Feinberg School of Medicine; Director of Antimicrobial Stewardship, Northwestern Memorial Hospital, Chicago, Illinois

*Clostridium tetani* (Tetanus); *Clostridium botulinum* (Botulism); Botulinum Toxin as a Biological Weapon

**Richard C. Reichman, MD**

Emeritus Professor of Medicine, University of Rochester School of Medicine and Dentistry; Attending Physician, University of Rochester Medical Center, Rochester, New York

Papillomaviruses

**Marvin S. Reitz, Jr., PhD**

Professor, Institute of Human Virology and Department of Medicine, University of Maryland School of Medicine, Baltimore, Maryland

Human Immunodeficiency Viruses

**David A. Relman, MD**

Professor of Medicine and Professor of Microbiology and Immunology, Stanford University School of Medicine, Stanford; Chief, Infectious Diseases, Veterans Affairs Palo Alto Health Care System, Palo Alto, California

A Molecular Perspective of Microbial Pathogenicity

**Cybèle A. Renault, MD, DTM&H**

Clinical Assistant Professor, Department of Internal Medicine, Division of Infectious Diseases, Stanford University School of Medicine, Stanford; Attending Physician, Veterans Affairs Palo Alto Health Care System, Palo Alto, California

*Mycobacterium leprae*

**Angela Restrepo, PhD**

Senior Researcher and Scientific Director, Corporación para Investigaciones Biológicas, Medellín, Colombia

*Paracoccidioides brasiliensis*

**John H. Rex, MD**

Adjunct Professor of Medicine, University of Texas Medical School at Houston, Houston, Texas; Infection Clinical Vice President, AstraZeneca Pharmaceuticals, Macclesfield, United Kingdom

Systemic Antifungal Agents; *Sporothrix schenckii*

**Herbert Y. Reynolds, MD**

Emeritus Professor of Medicine, Penn State University College of Medicine, Milton S. Hershey Medical Center, Hershey, Pennsylvania; Adjunct Professor of Medicine, Uniformed Services University of the Health Sciences F. Edward Hébert School of Medicine; Medical Officer, Division of Lung Diseases, National Heart, Lung and Blood Institute, National Institutes of Health, Bethesda, Maryland

Chronic Obstructive Pulmonary Disease and Acute Exacerbations

**Elizabeth G. Rhee, MD**

Fellow, Department of Medicine, Harvard Medical School; Division of Viral Pathogenesis, Department of Medicine, Beth Israel Deaconess Medical Center; Attending Physician, Division of Infectious Diseases, Department of Medicine, Brigham and Women's Hospital, Boston, Massachusetts

Adenoviruses

**Kyu Y. Rhee, MD, PhD**

Assistant Professor of Medicine, Microbiology, and Immunology and William Randolph Hearst Foundation Clinical Scholar in Microbiology and Infectious Diseases, Weill Cornell Medical College; Assistant Attending Physician, New York—Presbyterian Hospital and Weill Cornell Medical Center, New York, New York

*Borrelia* Species (Relapsing Fever)

**Lisa D. Rotz, MD**

Director, Division of Bioterrorism Preparedness and Response, National Center for Preparedness, Detection, and Control of Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia

Smallpox as an Agent of Bioterrorism

**Kathryn L. Ruoff, PhD**

Associate Professor, Dartmouth Medical School, Hanover; Associate Director, Clinical Microbiology Laboratory, Dartmouth-Hitchcock Medical Center, Lebanon, New Hampshire  
Classification of Streptococci

**Mark E. Rupp, MD**

Professor, Department of Internal Medicine, Division of Infectious Diseases, University of Nebraska Medical Center College of Medicine; Director, Department of Healthcare Epidemiology, Nebraska Medical Center, Omaha, Nebraska  
Mediastinitis; *Staphylococcus epidermidis* and Other Coagulase-Negative Staphylococci

**Charles E. Rupprecht, VMD, PhD**

Section Lead, Rabies, Centers for Disease Control and Prevention, Atlanta, Georgia  
Rhabdoviruses

**Thomas A. Russo, MD**

Professor of Medicine and Microbiology, Division of Infectious Diseases, State University of New York at Buffalo School of Medicine and Biomedical Sciences; Staff Physician, Veterans Affairs Western New York Health Care System, Buffalo, New York  
Agents of Actinomycosis

**William A. Rutala, PhD, MPH**

Professor of Medicine and Director, Statewide Program in Infection Control and Epidemiology, University of North Carolina at Chapel Hill School of Medicine; Director, Hospital Epidemiology, Occupational Health and Safety Program, University of North Carolina Health Care System, Chapel Hill, North Carolina  
The Acutely Ill Patient with Fever and Rash; Disinfection, Sterilization, and Control of Hospital Waste

**Mirella Salvatore, MD**

Assistant Professor, Department of Public Health, and Assistant Professor, Department of Medicine/Infectious Diseases, Weill Cornell Medical College; Assistant Attending Physician, New York–Presbyterian Hospital, New York, New York  
Tetracyclines and Chloramphenicol; Metronidazole

**Frank T. Saulsbury**

Professor, Department of Pediatrics, Division of Immunology and Rheumatology, University of Virginia School of Medicine, Charlottesville, Virginia  
Kawasaki Syndrome

**Maria C. Savoia, MD**

Vice Dean for Medical Education and Professor of Medicine, University of California, San Diego, School of Medicine, La Jolla, California  
Myocarditis and Pericarditis

**Paul E. Sax, MD**

Associate Professor of Medicine, Harvard Medical School; Clinical Director, Division of Infectious Diseases and Human Immunodeficiency Virus Program, Brigham and Women's Hospital, Boston, Massachusetts  
Pulmonary Manifestations of Human Immunodeficiency Virus Infection

**W. Michael Scheld, MD**

Gerald L. Mandell–Bayer Professor of Infectious Diseases and Professor of Medicine, University of Virginia School of Medicine; Clinical Professor of Neurosurgery and Director, Pfizer Initiative in International Health, University of Virginia Health System, Charlottesville, Virginia  
Endocarditis and Intravascular Infections; Acute Meningitis

**Joshua T. Schiffer, MD, MS**

Senior Fellow, University of Washington School of Medicine and Fred Hutchinson Cancer Research Center, Seattle, Washington  
Herpes Simplex Virus

**David Schlossberg, MD**

Professor of Medicine, Temple University School of Medicine; Adjunct Professor of Medicine, University of Pennsylvania School of Medicine; Medical Director, Tuberculosis Control Program, Philadelphia Department of Public Health, Philadelphia, Pennsylvania  
*Chlamydomonas (Chlamydia) psittaci* (Psittacosis)

**Thomas Schneider, MD, PhD**

Professor of Infectious Diseases, Charité University Hospital, Benjamin Franklin Campus, Berlin, Germany  
Whipple's Disease

**Jane R. Schwebke, MD**

Professor of Medicine, University of Alabama at Birmingham School of Medicine, Birmingham, Alabama  
*Trichomonas vaginalis*

**Cynthia L. Sears, MD**

Professor of Medicine, Divisions of Infectious Diseases and Gastroenterology, Johns Hopkins University School of Medicine, Baltimore, Maryland  
Prebiotics, Probiotics, and Synbiotics

**Carlos Seas, MD**

Associate Professor of Medicine and Principal Investigator, Alexander von Humboldt Tropical Medicine Institute, Cayetano Heredia University; Attending Physician, National Hospital Cayetano Heredia, Lima, Peru  
*Vibrio cholerae*

**Kent A. Sepkowitz, MD**

Professor of Medicine, Weill Cornell Medical College; Vice-Chairman of Medicine and Director, Hospital Infection Control, Memorial Sloan-Kettering Cancer Center, New York, New York  
Nosocomial Hepatitis and Other Transfusion- and Transplantation-Transmitted Infections

**Edward J. Septimus, MD**

Affiliate Professor and Distinguished Senior Fellow, School of Public Policy, George Mason University, Fairfax, Virginia; Medical Director, Infection Prevention, HCA Healthcare System, Nashville, Tennessee  
Pleural Effusion and Empyema

**George K. Siberry, MD, MPH**

Medical Officer, Pediatric, Adolescent, and Maternal Acquired Immunodeficiency Syndrome Branch, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, Bethesda, Maryland  
Pediatric Human Immunodeficiency Virus Infection

**Costi D. Sifri, MD**

Assistant Professor of Medicine, Division of Infectious Diseases and International Health, University of Virginia School of Medicine; Attending Physician, Department of Medicine, University of Virginia Health System, Charlottesville, Virginia  
Infections of the Liver and Biliary System; Appendicitis; Diverticulitis and Typhlitis

**Nina Singh, MD**

Associate Professor of Medicine, University of Pittsburgh School of Medicine; Chief, Transplant Infectious Diseases, Veterans Affairs Pittsburgh Healthcare System, Pittsburgh, Pennsylvania  
Infections in Solid Organ Transplant Recipients

**Upinder Singh, MD**

Assistant Professor, Department of Internal Medicine, Division of Infectious Diseases, Stanford University School of Medicine, Stanford, California  
Free-Living Amebas

**Scott W. Sinner, MD**

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# PREFACE TO THE FIRST EDITION

**I**nfectious diseases traverse the usual boundaries established by medical specialists. All organ systems may be involved, and all physicians caring for patients may have to deal with infected patients. The format of this book was chosen with the intent that it would contain the necessary information to aid the practitioner in the understanding, diagnosis, and treatment of infectious diseases. Thus, internists, family or general practitioners, pediatricians, surgeons, obstetrician-gynecologists, urologists, residents and fellows in training, medical students, hospital infection control personnel, and clinical microbiologists should find the book a valuable reference.

In planning this book, the editors considered several different patterns of organization. The system adopted allows the reader to approach an infected patient three different ways: (a) by major clinical syndrome, (b) by specific etiologic organisms, and (c) by host characteristics for patients who are compromised.

*Principles and Practice of Infectious Diseases* consists of four major parts. The book may be perused as whole, or individual chapters may be examined when the reader is concerned with a specific problem. Part I covers the basic principles necessary for a clear understanding of the concepts of diagnosis and management of infectious disease. Chapters dealing with microbial virulence factors, host defense mechanisms, the epidemiology of infectious diseases, and the clinician and microbiology laboratory are included. In addition, there is a comprehensive discussion of anti-infective chemotherapy.

Part II considers major clinical syndromes. The syndromes are described, followed by a discussion of the potential etiologic agents, evaluation of differential diagnostic possibilities, and an outline of presumptive therapy. All major infectious diseases are discussed in this part of the book.

Part III describes all important pathogenic microbes for man and the diseases they cause. The pathogen is classified and described, the epidemiology is discussed, clinical manifestations are listed, and specific information on therapy and prevention is presented. The most comprehensive discussion of a disease entity can be found by reading about both the etiologic agent and the clinical syndrome. Thus, a comprehensive treatment of pneumococcal pneumonia could be found in reading the appropriate sections of the chapters on acute pneumonia and *Streptococcus pneumoniae*. We attempted to make the chapters dealing with etiologic agents and those dealing with syndromes complete. Therefore some repetition was unavoidable.

The final section, Part IV, covers special problems in infectious diseases including nosocomial infections, infections in impaired hosts, immunizations, and protection of travelers.

The editors are grateful to our expert contributors. These physicians are the world's leaders in their fields, and they diligently prepared carefully written, well-referenced "state of the art" chapters. Our secretaries were skillful and meticulous in their attention to the complexities of assembling *Principles and Practice of Infectious Diseases*. John de Carville, executive editor of John Wiley & Sons, encouraged, cajoled, and advised us from the formative steps all the way through to completion. Lastly, and perhaps most important, we are grateful to our wives and children for putting up with interminable editorial work and meetings.

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# PREFACE TO THE SEVENTH EDITION

**I**t is interesting to compare the first edition with the new, seventh edition of *Principles and Practice of Infectious Diseases*. Since 1979, when the first edition was published, there have been scores of new antimicrobial agents and newly recognized diseases and pathogens, such as Legionnaires' disease, Lyme disease, Kaposi's sarcoma, human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS), multidrug-resistant tuberculosis, *Clostridium difficile* colitis, progressive multifocal leukoencephalopathy, severe acute respiratory syndrome (SARS), and the new H1N1 flu, to mention just a few. A comparison with the sixth edition, published in 2004, reveals a further increase in our knowledge of newly recognized diseases, microbes, and therapeutic agents. The developments in basic sciences have been astounding, with advances in genomics leading to rapid diagnoses and breakthrough therapies.

*Principles and Practice of Infectious Diseases* differs from other sources of information, such as many web-based resources, in that it is carefully edited and the content put into perspective by infectious diseases experts. The new edition combines the knowledge and experience of the world's authorities with the careful review of all chapters by all three editors.

This edition has been planned and designed for physicians (infectious diseases specialists, internists, family practitioners, travel medicine specialists, HIV/AIDS researchers), pharmacologists, public health experts, microbiologists, and basic scientists. Readers consulting the volumes can quickly find key clinical information to help in

diagnosing and treating their patients. The text contains up-to-date information and includes numerous 2009 references. New chapters have been added, and all other chapters have been revised extensively, with tables, figures, and references updated.

Among the 330 chapters is excellent coverage of such topics as microbial pathogenesis, infections in cancer patients, emerging infections, new antimicrobial agents, antibiotic resistance, travel medicine, vaccines, infections related to exotic pets, and important aspects of agents of bioterrorism.

The online version of the book contains fully searchable text on the dedicated Expert Consult website. It will also allow us to present new developments in the field and advances in therapy via regular content updates. The website contains other added-value features such as a downloadable image library and drug database.

We could not have edited this book without the assistance and stoic patience of our wives, Judy Mandell, Shirley Bennett, and Kelly Dolin, who endured the many long hours their husbands spent at home, uncommunicative, laboring over yet another edition of this treatise. Our thanks also go to Janet Morgan for her invaluable assistance to Dr. Dolin.

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