Nigel A. Cunliffe, BSc (Hons), MB ChB, PhD. MRCP, FRCPath, DTM&H

Professor Department of Clinical Infection, Microbiology & Immunology Institute of Infection and Global Health University of Liverpool Liverpool, UK

Bart J. Currie, MB BS, FRACP, FAFPHM. DTM&H

Professor in Medicine and Head of Infectious Diseases Department of Infectious Diseases Royal Darwin Hospital and Menzies School of Health Darwin, Northern Territory, Australia

Marian J. Currie, PhD

Academic Unit of Internal Medicine Australian National University Medical School Canberra, Australia

David A. B. Dance, MB ChB, MSc. FRCPath Clinical Research Microbiologist

Microbiology Laboratory, Mahosot Hospital Vientiane, Lao Centre for Tropical Medicine University of Oxford Honorary Consultant Microbiologist Public Health England and Oxford University Hospitals NHS Oxford, UK

Lao Oxford Mahosot Hospital Wellcome Trust Research Unit

Nicholas P. J. Day, MA, BM BCh, DM, FRCP, FMedSci

Professor of Tropical Medicine University of Oxford Oxford, UK Director, Mahidol-Oxford Tropical Medicine Research Unit Faculty of Tropical Medicine Mahidol University Bangkok, Thailand

Kevin DeCock, MD

Director Center for Global Health Centers for Disease Control and Prevention Atlanta, GA, USA

Jacqueline Deen, MD, MSc

Researcher Global Health Division Menzies School of Health Research Casuarina, Northern Territory, Australia

Sarah R Doffman, MB ChB, FRCP

Consultant in Respiratory and General (Internal) Medicine Brighton and Sussex University Hospitals NHS Trust Brighton, UK

Arjen Dondorp, MD, PhD

Infectious Diseases and Intensive Care Physician Professor of Tropical Medicine University of Oxford Visiting Professor of Clinical Tropical Medicine Deputy Director, Mahidol-Oxford Tropical Medicine Research Unit Faculty of Tropical Medicine Mahidol University Bangkok, Thailand

H. Rogier van Doorn, MD, PhD

Clinical Virologist Centre for Tropical Medicine Oxford University Clinical Research Unit Ho Chi Minh City, Vietnam

Martin W. Dünser, MD, PD, DESA, EDIC

Head Intensivist Department of Anesthesiology, Perioperative Medicine and General Intensive Care Salzburg General Hospital and Paracelsus Private Medical University Salzburg, Austria

Edward M. Eitzen, Jr., MD, MPH

Adjunct Associate Professor Department of Military and Emergency Medicine Uniformed Services University of the Health Sciences Bethesda, MD Senior Partner Biodefense and Public Health Programs Martin, Blanck and Associates, Alexandria, VA, USA

Delia A. Enria, MD, MPH

Instituto Nacional de Enfermedades Virales Humanas Pergamino: Argentina

Jeremy Farrar, FRCP, FMedAcSci, DPhil, OBE

Professor of Tropical Medicine University of Oxford Oxford, ÚK Director Oxford University Clinical Research Unit Wellcome Trust Major Overseas Programme South East Asia Infectious Disease Clinical Research Network Hospital for Tropical Diseases Ho Chi Minh City, Vietnam

Christina Faust, MS, MSc

PhD Candidate Ecology and Evolutionary Biology Princeton University Princeton, NJ, USA

Nicholas A. Feasey, BSc, MSc, MB BS, MRCP, FRCPath, DTM&H

Clinical Research Fellow Department of Gastroenterology Institute of Translational Medicine University of Liverpool Liverpool, UK

Abebaw Fekadu, MD, PhD, MRCPsych

Department of Psychiatry School of Medicine Addis Ababa University Addis Ababa, Ethiopia

Günther Fink, PhD

Assistant Professor of International Health Reonomics Harvard School of Public Health, Department of Global Health and Population Boston, MA, USA

Peter U. Fischer, PhD

Research Associate Professor of Medicine Infectious Diseases Division Department of Internal Medicine Washington University School of Medicine St. Louis, MO, USA

Carlos Franco-Paredes, MD, MPH

Staff Physician Infectious Diseases Phoebe Putney Memorial Hospital Albany, GA, USA Clinical Assistant Professor Hospital Infantil de Mexico Federico Gomez Mexico City, Mexico

Neil French, MB ChB, PhD, FRCP

Professor of Infectious Diseases & Global Health Institute of Infection & Global Health University of Liverpool Honorary Consultant Physician Tropical & Infectious Disease Royal Liverpool University Hospital Liverpool, UK

Hector H. Garcia, MD, PhD

Director, Center for Global Health - Tumbes Universidad Peruana Cavetano Heredia Head, Cysticercosis Unit Instituto Nacional de Ciencias Neurologicas Lima, Peru

Roger I. Glass, MD, PhD

Director Fogarty International Center National Institutes of Health Bethesda, MD, USA

Melita A. Gordon, BM MCh, MA, MRCP, DTM&H, MD

Reader in Gastroenterology Department of Gastroenterology Institute of Translational Medicine University of Liverpool Honorary Consultant Gastroenterologist Royal Liverpool University Hospital Liverpool, UK

Stephen B. Gordon, MA, MD, FRCP, FRCPE DTM&H

Head, Department of Clinical Sciences Professor of Respiratory Medicine Liverpool School of Tropical Medicine Pembroke Place Liverpool, UK

Bruno Gottstein, PhD

Professor of Medical and Veterinary Parasitology Institute of Parasitology University of Bern Bern, Switzerland

Stephen M. Graham, MB BS, FRACP, DTCH, PhD

Professor of International Child Health Department of Paediatrics University of Melbourne Melbourne, Victoria, Australia

Andy Haines, MD, FRCP, FRCGP, FFPH, **FMedSci**

Professor of Public Health and Primary Care London School of Hygiene and Tropical Medicine London, UK

Roy A. Hall, BSc. PhD

Professor of Virology Australian Infectious Diseases Research Centre School of Chemistry & Molecular Biosciences University of Queensland Brisbane, Oueensland, Australia

Charlotte Hanlon, BM BChir, MA, MRCPsvch. PhD

Associate Professor Department of Psychiatry School of Medicine College of Health Sciences Addis Ababa University Addis Ababa, Ethiopia

The late C. Anthony Hart, MB BS, BSc, PhD, FRCPCH. PRCPath

Formerly Professor of Medical Microbiology Department of Medical Microbiology University of Liverpool Medical School Liverpool, UK

Melissa R. Haswell, MSc, PhD

Associate Professor Muru Marri Indigenous Health Unit School of Public Health and Community Medicine University of New South Wales Sydney, New South Wales, Australia

Sophie Hawkesworth, BSc, MSc, PhD

Research Fellow MRC International Nutrition Group London School of Hygiene and Tropical Medicine London, UK

Preface to the First Edition ix Preface to the Twenty-Third Edition xi Contributors xiii

1 History of Tropical Medicine, and Medicine in the Tropics 1 GORDON C. COOK

SECTION I Public Health & Economics

- 2 Global Health 9 ANDY HAINES, ANITA BERLIN
- 3 Global Health Governance and Tropical Diseases 16
 TILL BÄRNIGHAUSEN, DAVID E. BLOOM, SALAL HUMAIR
- 4 The Economic Case for Devoting Public Resources to Health 23 DAVID E. BLOOM, GÜNTHER FINK

SECTION 2 Health Research and Ethics

5 Ethics and Tropical Diseases: Some Global Considerations 31 SUSAN BULL, MICHAEL PARKER

SECTION 3 Epidemiology

6 Issues and Challenges of Public-Health Research in Developing Countries 40 JACQUELINE DEEN, LORENZ VON SEIDLEIN, JOHN D. CLEMENS

SECTION 4 Clinical Assessment

- 7 Emergency and Intensive Care Medicine in Resource-Poor Settings 49 ARJEN M. DONDORP, MARTIN W. DÜNSER, MARCUS J. SCHULTZ
- 8 Ultrasound in Tropical Medicine 60 ENRICO BRUNETTI

SECTION 5 Viral Infections

- 9 HIV Epidemiology in the Tropics 68 PHILIP J. PETERS, BARBARA J. MARSTON, KEVIN M. DE COCK
- 10 Clinical Features and Management of HIV/AIDS 79
 ROBIN WOOD
- 11 HIV/AIDS in Children 97 STEPHEN M. GRAHAM, MARK COTTON
- 12 HIV/AIDS Prevention 100 STEVEN J. REYNOLDS, THOMAS C. QUINN
- 13 Viral Hepatitis 112 M. ESTÉE TÖRÖK
- 14 Arbovirus Infections 129
 PAUL R. YOUNG, LISA F. P. NG, ROY A. HALL, DAVID W. SMITH,
 CHERYL A. JOHANSEN
- 15 Dengue 162 SOPHIE YACOUB, JEREMY FARRAR
- 16 Viral Haemorrhagic Fevers 171 LUCILLE BLUMBERG, DELIA ENRIA, DANIEL G. BAUSCH
- 17 Rabies 195 MARY J. WARRELL
- 18 Rotavirus and Other Viral Diarrhoea 207 NIGEL A. CUNLIFFE, ROGER I. GLASS, OSAMU NAKAGOMI
- 19 Respiratory Viruses and Atypical Bacteria 215 PAUL S. McNAMARA, H. ROGIER VAN DOORN
- 20 Viral Exanthems 225
- 21 Virus Infections of the Nervous System 242 TOM SOLOMON

SECTION 6 Bacterial Infections

22 Tropical Rickettsial Infections 273 DANIEL H. PARIS, NICHOLAS P. J. DAY

- 23 Sexually Transmitted Infections (Excluding HIV) 292

 JOHN RICHENS, PHILIPPE MAYAUD, DAVID C. W. MABEY
- 24 Bacterial Enteropathogens 319 GAGANDEEP KANG, C. ANTHONY HART, PAUL SHEARS
- 25 Salmonella Infections 337 NICHOLAS A. FEASEY, MELITA A. GORDON
- 26 Pneumococcal Disease 349
- 27 Bacterial Meningitis 361
 MATTHUS C. BROUWER, DIEDERIK VAN DE BEEK
- 28 Brucellosis 371 NICK J. BEECHING, M. MONIR MADKOUR
- 29 Noma, Actinomycosis and Nocardia 379 M. LEILA SROUR, VANESSA WONG, SARAH WYLLIE
- 30 Bartonellosis, Cat-scratch Disease, Trench Fever, Human Ehrlichiosis 385 EMMANOUIL ANGELAKIS, DIDIER RAOULT
- 31 Anthrax 395
- 32 Tetanus 399 c. LOUISE THWAITES, LAM MINH YEN
- 33 Plague 404 MINOARISOA RAJERISON, MAHERISOA RATSITORAHINA, VOAHANGY ANDRIANAIVOARIMANANA
- 34 Melioidosis 410 DAVID A. B. DANCE
- 35 Diphtheria 416
 TRAN TINH HIEN, NICHOLAS J. WHITE
- 36 Endemic Treponematosis Including Yaws and Other Spirochaetes 421 JUAN C. SALAZAR, NICHOLAS J. BENNETT
- 37 Leptospirosis 433 wirongrong chierakul

SECTION 7 Fungal Infections

- 38 Fungal Infections 441 RODERICK J. HAY
- 39 Pneumocystis jirovecii Infection 459 ROBERT F. MILLER, SARAH R. DOFFMAN

SECTION **8** Mycobacterial Infections

- 40 Tuberculosis 468
- 41 Leprosy 506 STEPHEN L. WALKER, STEPHEN G. WITHINGTON, DIANA N. J. LOCKWOOD
- 42 Mycobacterium ulcerans Disease 519
 THOMAS JUNGHANSS, ROCH CHRISTIAN JOHNSON, GERD PLUSCHKE

SECTION 9 Protozoan Infections

- 43 Malaria 532 NICHOLAS J. WHITE
- 44 Babesiosis 601
- 45 Human African Trypanosomiasis 606 CHRISTIAN BURRI, FRANÇOIS CHAPPUIS, RETO BRUN
- 46 American Trypanosomiasis: Chagas Disease 622 CARLOS FRANCO-PAREDES
- 47 Leishmaniasis 631
 MARLEEN BÖELAERT, SHYAM SUNDAR
- 48 Toxoplasmosis 652
 MELBA MUÑOZ-ROLDAN, MARKUS M. HEIMESAAT, OLIVER LIESENFELD
- 49 Intestinal Protozoa 664
- 50 Pathogenic and Opportunistic Free-Living Amoebae: Agents of Human and Animal Disease 683 GOVINDA S, VISVESVARA
- 51 Trichomonas vaginalis 692 PATRICIA KISSINGER

SECTION 10 Helminthic Infections

52 Schistosomiasis 698 AMAYA L BUSTINDUY, CHARLES H. KING

- 53 Food-borne Trematodes 726
 PAIBOON SITHTIIHAWORN, BANCHOB SRIPA, SASITHORN KAEWKES, YUKIFUMI NAWA, MELISSA R. HASWELL
- 54 The Filariases 737

 PAUL E. SIMONSEN, PETER U. FISCHER, ACHIM HOERAUF, GARY I WEII

- 55 Soil-transmitted Helminths (Geohelminths) 766 SIMON J. BROOKER, DONALD A. P. BUNDY
- 56 Echinococcosis 795 Marija stojkovic, bruno gottstein, thomas junghanss
- 57 Other Cestode Infections: Intestinal Cestodes, Cysticercosis, Other Larval Cestode Infections 820 GUY BALLY, HECTOR H. GARCIA

SECTION **1** Ectoparasites

- 58 Scabies 833
 BART J. CURRIE, JAMES S. MCCARTHY
- 59 Louse Infestation 839 MARIAN J. CURRIE, FRANCIS J. BOWDEN, JAMES S. McCARTHY
- 60 Other Ectoparasites: Leeches, Myiasis and Sand Fleas 843
 KOSTAY, MUMCUOGLU

SECTION I Non-communicable Diseases in the Tropics

- 61 Non-communicable Diseases: Equity, Action and Targets 848
 SANDEEP P. KISHORE, K. SRINATH REDDY
- 62 Cardiovascular and Vascular Disease in the Tropics Including Stroke, Hypertension and Ischaemic Heart Disease 854 NIGEL UNWIN, T. ALAFIA SAMUELS, ANGELA M. C. ROSE, ANSELM J. M. HENNIS
- 63 Diabetes in the Tropics 873 AYESHA A. MOTALA, FRASER J. PIRIE
- 64 Cancer in the Tropics 879 ROBERT NEWTON, KATIE WAKEHAM, FREDDIE BRAY
- 65 Haematological Diseases in the Tropics 894

 JECKO THACHIL, SHIRLEY OWUSU-OFORI, IMELDA BATES
- 66 Renal Disease in the Tropics 933 RAJ THURAISINGHAM, DWOMOA ADU
- 67 Ophthalmology in the Tropics and Sub-tropics 952 NICHOLAS A.V. BEARE, ANDREW BASTAWROUS
- 68 Dermatological Problems 995 FRANCISCO VEGA-LOPEZ, SARA RITCHIE

- 69 Musculoskeletal Disorders 1027
- 70 Respiratory Problems in the Tropics 1038 STEPHEN B. GORDON, KEVIN J. MORTIMER, REFILOE MASEKELA
- 71 Tropical Neurology 1047
 JEANNINE M. HECKMANN, AHMED I. BHIGJEE
- 72 Psychiatry 1061 CHARLOTTE HANLON, ABEBAW FEKADU
- 73 Tropical Oral Health 1073 RAMAN BEDI, CRISPIAN SCULLY

SECTION B Environmental Disorders

- 74 Environmental Stress 1084 BUDDHA BASNYAT, JENNIFER O'HEA, KEN ZAFREN
- 75 Venomous and Poisonous Animals 1096
- 76 Plant Poisons and Traditional Medicines 1128 JEFFREY K. ARONSON

SECTION 14 Nutrition

- 77 Nutrition-associated Disease 1151 STEPHEN ABRAMS, BERNARD J. BRABIN, JOHN B. S. COULTER
- 78 Obesity in the Tropics 1168 SOPHIE HAWKESWORTH, ANDREW M. PRENTICE

SECTION 15 Maternal/Child Health

- 79 Obstetrics in the Tropics 1177
 ROSE MCGREADY, GLEN D. LIDDELL MOLA, MARCUS A. J. RIJKEN,
 FRANCOIS H. NOSTEN, THEONEST MUTABINGWA
- 80 Paediatrics in the Tropics 1197 ZULFIQAR A. BHUTTA

Appendices

- A1 Clinical Laboratory Diagnosis 1215
 JANET ROBINSON
- A2 Parasitic Protozoa 1238 HONORINE WARD, SITARA S. R. AJJAMPUR

- A3 Medical Helminthology 1250 MALCOLM K. JONES, JAMES S. MCCARTHY VAUGHAN R. SOUTHGATE, RODNEY A. BRAY
- A4 Medical Acarology and Entomology 1258 GRAHAM B. WHITE, CHRISTINA FAUST
- A5 Sources of Information in Tropical Medicine 1273 TRUDIE LANG, LAURA MERSON

Index 1283

PREFACE TO THE FIRST EDITION

A manual on the diseases of warm climates, of handy size, and yet giving adequate information, has long been a want; for the exigencies of travel and tropical life are, as a rule, incompatible with big volumes and large libraries. This is the reason for the present work.

While it is hoped that the book may prove of practical service, it makes no pretension to being anything more than an introduction to the important department of medicine of which it treats; in no sense is it put forward as a complete treatise, or as being in this respect comparable to the more elaborate works by Davidson, Schebe, Rho, Laveran, Corre, Roux, and other systematic writers in the same field. The author avails himself of this opportunity to acknowledge the valuable assistance he has received, in revising the text, from Dr. L. Westerna Sambon and Mr David Rees, MRCP LRCP lately Senior House

Surgeon, Seamen's Hospital, Albert Docks, London.

He would also acknowledge his great obligation to Mr Richard Muir, Pathological Laboratory, Edinburgh University, for his care and skill in preparing the illustrations.

> Patrick Manson April 1898