Allergy and Allergic Diseases
To our wives: Rosemary, Lee, Hélène and Barbara
Allergy and Allergic Diseases

Editor-in-Chief

A. Barry Kay MD, PhD, FRCP, DSc, FRSE, FMedSci
Emeritus Professor of Allergy and Clinical Immunology, National Heart and Lung Institute, London, UK

Editors

Allen P. Kaplan MD
The National Allergy, Asthma, and Urticaria Centers of Charleston; Professor, Department of Medicine
Medical University of South Carolina, Charleston, South Carolina, USA

Jean Bousquet MD, PhD
CHU Montpellier, Service des Maladies Respiratoires, Hôpital Arnaud de Villeneuve, Montpellier, France

Patrick G. Holt DSc, FRCPath, FAA
Head, Division of Cell Biology, TVW Telethon Institute for Child Health Research, West Perth, Western Australia, Australia

SECOND EDITION

FOREWORD BY K. FRANK AUSTEN, MD

In two volumes
Volume 1

WILEY-BLACKWELL
A John Wiley and Sons, Ltd., Publication
## Contents

List of Contributors, ix
Foreword, xvii
Preface, xviii

### VOLUME 1

**The Scientific Basis of Allergy**

**Part 1 Immunology of the Allergic Response**

1. Allergy and Hypersensitivity: History and Concepts, 3  
   A. Barry Kay

2. Development of Allergy and Atopy, 23  
   Catherine Thornton and Patrick G. Holt

3. T Cells and Cytokines in Asthma and Allergic Inflammation, 48  
   Chris Corrigan

4. Regulatory T Cells and Other Tolerogenic Mechanisms in Allergy and Asthma, 83  
   Catherine Hawrylowicz and Cezmi A. Akdis

5. IgE and IgE Receptors, 103  
   Brian J. Sutton, Andrew J. Beavil, Rebecca L. Beavil and James Hunt

6. Immunoglobulin Gene Organization and Expression and Regulation of IgE, 119  
   Hannah J. Gould and David J. Fear

7. Environmental Factors in IgE Production, 141  
   Anne Tsicopoulos, Catherine Duez and Andrew Saxon

8. Antigen-presenting Dendritic Cells and Macrophages, 166  
   Bart N. Lambrecht and Hamida Hammad

9. Innate Immunity in Allergic Disease, 187  
   Ian Sabroe

10. Signal Transduction in Allergic and Inflammatory Cells, 203  
    Rafeul Alam

**Part 2 Inflammatory Cells and Mediators**

11. Mast Cells: Biological Properties and Role in Health and Allergic Diseases, 217  
    Peter Bradding and Glenn Cruse

12. Eosinophils: Biological Properties and Role in Health and Disease, 258  
    Simon P. Hogan, Helene F. Rosenberg, Redwan Moqbel, Simon Phipps, Paul S. Foster, Paige Lacy, A. Barry Kay and Marc E. Rothenberg

13. Neutrophils: Biological Properties and Role in Health and Allergic Diseases, 295  
    Alison M. Condliffe, Andrew S. Cowburn and Edwin R. Chilvers

14. Basophils: Biological Properties and Role in Allergic Diseases, 320  
    Gianni Marone, Giuseppe Spadaro and Arturo Genovese

15. Leukocyte Adhesion in Allergic Inflammation, 337  
    Michelle J. Muessel and Andrew J. Wardlaw

16. Airway Epithelium, 366  
    Pedro C. Avila and Robert P. Schleimer

17. Airway Vascularity in Asthma, 398  
    John W. Wilson

18. Fibroblasts and the Extracellular Matrix, 412  
    Lynne A. Murray, William G. Glass, Anuk M. Das and Geoffrey J. Laurent

19. Immune Complexes and Complement: Their Role in Host Defense and in Disease, 436  
    Michael M. Frank and C. Garren Hester

20. Bradykinin Pathways and Allergic Disease, 451  
    Allen P. Kaplan

21. Chemokines, 471  
    James E. Pease and Timothy J. Williams

22. Neurotrophins, 494  
    Wolfgang A. Nockher, Sanchaita Sonar and Harald Renz

23. Neuropeptides, 511  
    David A. Groneberg and Axel Fischer
Contents

24 Late-phase Allergic Reactions in Humans, 524
   Yee-Ean Ong and A. Barry Kay

Part 3 Pharmacology

25 Antihistamines, 551
   F. Estelle R. Simons and Keith J. Simons

26 Lipid Mediators: Leukotrienes, Prostanoids, Lipoxins, and Platelet-activating Factor, 566
   Sophie P. Farooque, Jonathan P. Arm and Tak H. Lee

27 Theophylline and Isoenzyme-selective Phosphodiesterase Inhibitors, 634
   Mark A. Giembycz

28 Adrenergic Agonists and Antagonists, 668
   Tony R. Bai

29 Cholinergic Antagonists, 683
   Nicholas J. Gross

30 Antileukotriene Agents, 694
   Graeme P. Currie and Brian J. Lipworth

31 Glucocorticosteroids, 715
   Peter J. Barnes

32 Immunomodulating Drugs, 732
   Iain A.M. MacPhee

Part 4 Physiology

33 Physiologic Aspects of Asthma, 749
   Philip W. Ind and Neil B. Pride

34 Aerosol Delivery Systems, 768
   Thomas G. O’Riordan and Gerald C. Smaldone

35 Bronchial Hyperresponsiveness, 783
   Guy F. Joes

36 Exercise-induced Bronchoconstriction: Animal Models, 794
   Arthur N. Freed and Sandra D. Anderson

37 Exercise-induced Bronchoconstriction: Human Models, 808
   Arthur N. Freed and Sandra D. Anderson

38 Sensory and Autonomic Nervous System in Asthma and Rhinitis, 823
   Bradley J. Undem and Kevin Kwong

39 Mucus and Mucociliary Clearance in Asthma and Allergic Rhinitis, 840
   Duncan F. Rogers

40 Biology of Vascular Permeability, 857
   Peter Clark

41 Airway Smooth Muscle, 874
   Stuart J. Hirst

Part 5 Allergens

42 Biochemistry of Allergens and Recombinant Allergens, 895
   Rudolf Valenta

43 Host Responses to Allergens, 913
   Wayne R. Thomas and Belinda J. Hales

44 Allergen Extracts and Standardization, 928
   Ronald van Ree

45 Grass, Tree, and Weed Pollen, 942
   Jean Emberlin

46 Fungi as Allergens, 963

47 Dust Mites and Asthma, 984
   Thomas A.E. Platts-Mills and Judith A. Woodfolk

48 Animal Allergens, 997
   Adrian Custovic and Angela Simpson

49 Airborne Allergens and Irritants in the Workplace, 1017
   Xaver Bauer

50 Allergens from Stinging Insects: Ants, Bees, and Vespids, 1123
   Te Piao King and Rafael I. Monsalve

51 Cockroach Allergens, Environmental Exposure, and Asthma, 1131
   Martin D. Chapman and Anna Pomés

52 Food Allergens, 1146
   Ricki M. Helm and A. Wesley Burks

53 Latex Allergy, 1164
   Robyn E. O’Hehir, Michael F. Sutherland, Alexander C. Drew and Jennifer M. Rolland

Part 6 Animal Models of Asthma

54 Primate Models of Allergic Asthma, 1187
   Charles G. Plopper, Suzette M. Smiley-Jewell, Lisa A. Miller, Michelle V. Fanucchi, Michael J. Evans, Alan R. Buckpitt, Mark V. Avdalovic, Laurel J. Gershwin, Jesse P. Joad, Radhika Kajekar, Shawnessy D. Larson, Kent E. Pinkerton, Laura S. Van Winkle, Edward S. Schelegle, Emily M. Pieczarka, Reen Wu and Dallas M. Hyde

55 Airway Remodeling in Small Animal Models, 1202
   Clare M. Lloyd
Contents

85 Extrinsic Allergic Alveolitis/Hypersensitivity Pneumonitis, 1757
Michael C. Zacharisen and Jordan N. Fink

86 Pulmonary Eosinophilia, 1779
Jean-François Cordier and Vincent Cottin

87 Hypereosinophilic Syndromes, 1802
Hans-Uwe Simon

Part 12 Allergy and the Skin

88 Atopic Dermatitis, 1813
Julia D. Proelss and Thomas Bieber

89 Contact Dermatitis, 1831
David I. Orton and Carolyn M. Willis

90 Urticaria and Angioedema, 1853
Allen P. Kaplan

91 Mastocytosis, 1878
Nataliya M. Kushnir-Sukhov, Dean D. Metcalfe and Jamie A. Robyn

Part 13 Anaphylaxis and Allergy to Food and Drugs

92 Anaphylaxis, 1897
M. Rosario Caballero, Stephen J. Lane and Tak H. Lee

93 Food Allergy and Eosinophilic Gastroenteropathies, 1921
Scott H. Sicherer and Hugh A. Sampson

94 Drug Hypersensitivity, 1943
Werner J. Pichler

95 Hypersensitivity to Aspirin and other NSAIDs, 1966
Andrzej Szczeklik, Ewa Niżankowska- Możilnicka and Marek Sanak

96 Insect Sting Allergy, 1980
Ulrich R. Müller

Part 14 Prevention of Allergic Disease

97 Prevention of Allergic Disease, 1997
Susan L. Prescott and Bengt Björkstén

98 Prevalence of Atopic Disorders in a Developing World: Pitfalls and Opportunities, 2020
Maria Yazdanbakhsh, Taniawati Supali and Laura C. Rodrigues

Index

Companion CD-ROM

A companion CD-ROM is included at the end of Volume 2 with:
- the complete text of both volumes
- a full text search function
- over 300 of the text figures in full colour
List of Contributors

Cezmi A. Akdis
Swiss Institute of Allergy and Asthma Research (SIAF)
Davos, Switzerland

Rafeul Alam
Professor & Head
Division of Allergy & Immunology
National Jewish Medical and Research Center;
University of Colorado Health Sciences Center
Denver, Colorado, USA

Sandra D. Anderson
Principal Hospital Scientist
Department of Respiratory Medicine & Sleep Medicine
Royal Prince Alfred Hospital
Camperdown
Melbourne, New South Wales, Australia

Jonathan P. Arm
Harvard Medical School;
Brigham and Women’s Hospital
Boston, Massachusetts, USA

Mark V. Avdalovic
California National Primate Center and Schools of Veterinary Medicine and Medicine
University of California
Davis, California, USA

Pedro C. Avila
Northwestern University Feinberg School of Medicine
Department of Medicine
Division of Allergy-Immunology
Chicago, Illinois, USA

Claus Bachert
Chief of Clinics
Head, Upper Airway Research Laboratory
University Hospital Ghent
Ghent, Belgium

Sanjeev Bagga
Institute of Environment and Health
Cranfield University
Cranfield, UK

Tony R. Bai
Professor of Medicine ABC
Head, Respiratory Division
University of British Columbia;
James Hogg iCAPTURE Center
St. Paul’s Hospital
Vancouver, British Columbia, Canada

Peter J. Barnes
Head of Respiratory Medicine
Airway Disease Section
National Heart and Lung Institute
Imperial College London
London, UK

Xaver Baur
Head of the Zentralinstitut für Arbeitsmedizin und Maritime Medizin;
Chair in Occupational Medicine
University Medical Center
Hamburg-Eppendorf, Germany

Andrew J. Beavil
Senior Lecturer in Asthma
King’s College London
MRC & Asthma UK Centre in Allergic Mechanisms of Asthma
The Randall Division of Cells & Molecular Biophysics
London, UK

Rebecca L. Beavil
Postdoctoral Research Fellow
King’s College London
MRC & Asthma UK Centre in Allergic Mechanisms of Asthma
The Randall Division of Cell & Molecular Biophysics
London, UK

Thomas Bieber
Professor and Chair
Department of Dermatology & Allergy
University of Bonn
Bonn, Germany

Bengt Björkstén
The National Institute of Environmental Medicine/IMM

Division of Physiology
Karolinska Institutet
Stockholm, Sweden

Jean Bousquet
CHU Montpellier
Service des Maladies Respiratoires
Hôpital Arnaud de Villeneuve
Montpellier, France

Peter Bradding
Professor of Respiratory Medicine
University of Leicester
Glenfield Hospital
Leicester, UK

Alan R. Buckpitt
California National Primate Center and Schools of Veterinary Medicine and Medicine
University of California
Davis, California, USA

A. Wesley Burks
Professor and Chief
Pediatric Allergy and Immunology
Duke University Medical Center
Durham, North Carolina, USA

Peter Burney
Professor of Respiratory Epidemiology and Public Health
National Heart and Lung Institute
Imperial College of Science, Technology and Medicine
London, UK

M. Rosario Caballero
King’s College London;
Guy’s Hospital
London, UK

Virginia L. Calder
Department of Clinical Ophthalmology
Institute of Ophthalmology
University College London
London, UK
List of Contributors

**G. Walter Canonica**
Full Professor and Director of Allergy & Respiratory Diseases Clinic
Department of Internal Medicine
University of Genoa
Genoa, Italy

**Gaetano Caramori**
Centro di Ricerca su Asma e BPCO
University of Ferrara
Ferrara, Italy

**Martin D. Chapman**
INDOOR Biotechnologies Inc.
Charlottesville, Virginia, USA

**Edwin R. Chilvers**
Department of Medicine
University of Cambridge School of Clinical Medicine
Addenbrooke’s Hospital
Cambridge, UK

**Peter Clark**
Leukocyte Biology Section
National Heart and Lung Institute
Imperial College London
London, UK

**Alison M. Condliffe**
Respiratory Medicine Unit
Department of Medicine
University of Cambridge School of Clinical Medicine
Addenbrooke’s and Papworth Hospital
Cambridge, UK

**Andrew S. Cowburn**
Respiratory Medicine Unit
Department of Medicine
University of Cambridge School of Clinical Medicine
Addenbrooke’s and Papworth Hospital
Cambridge, UK

**Glenn Cruse**
Postgraduate Research Student
Institute for Lung Health
University of Leicester Medical School
Department of Infection, Immunity and Inflammation
Division of Respiratory Medicine
Glenfield Hospital
Leicester, UK

**Paul Cullinan**
Consultant Physician
Department of Occupational and Environmental Medicine
Royal Brompton Hospital
London, UK

**Graeme P. Currie**
Department of Respiratory Medicine
Aberdeen Royal Infirmary
Aberdeen
Scotland, UK

**Adnan Custovic**
University of Manchester
North West Lung Centre
Wythenshawe Hospital
Manchester, UK

**Gennaro D’Amato**
Director
Division of Respiratory and Allergic Diseases
Department of Respiratory Diseases
High Speciality Hospital “A. Cardarelli”
Napoli, Italy

**Anuk M. Das**
Immunobiology
Centnor
Radnor, Pennsylvania, USA

**W. Edward Davis**
Ochsner Clinic Foundation
Department of Allergy
New Orleans, Louisiana, USA

**Pascal Demoly**
Head, Allergy Department
University Hospital of Montpellier and Hôpital Arnaud de Villeneuve
Montpellier, France

**Alexander C. Drew**
Department of Allergy, Immunology and Respiratory Medicine
Alfred Hospital
Melbourne, Victoria, Australia

**Catherine Duez**
Chargée de Recherche Inserm
Institut Pasteur de Lille
Lille, France

**Stephen R. Durham**
Head, Section of Allergy and Clinical Immunology
National Heart and Lung Institute
Faculty of Medicine
Imperial College London
London, UK

**Jean Emberlin**
Director
National Pollen and Aerobiology Research Unit
Institute of Health
University of Worcester
Worcester, UK

**Ed Erin**
National Heart and Lung Institute
Clinical Studies Unit
Royal Brompton Hospital
London, UK

**Michael J. Evans**
California National Primate Research Center and Schools of Veterinary Medicine and Medicine
University of California
Davis, California, USA

**Leonardo M. Fabbri**
Full Professor of Respiratory Medicine
University of Modena and Reggio Emilia
Modena, Italy

**Michelle V. Fanucchi**
California National Primate Research Center and Schools of Veterinary Medicine and Medicine
University of California
Davis, California, USA

**Sophie P. Farooque**
MRC & Asthma UK Centre in Allergic Mechanisms of Asthma
King’s College London
Guy’s Hospital
London, UK
List of Contributors

David J. Fear  
Division of Allergy, Asthma and Lung Biology  
King’s College London  
London, UK

Jordan N. Fink  
Medical College of Wisconsin  
Departments of Pediatrics and Medicine  
Milwaukee, Wisconsin, USA

Axel Fischer  
Otto-Heubner-Centre  
Pneumology and Immunology  
Charité School of Medicine  
Free University Berlin and Humboldt-University Berlin  
Berlin, Germany

Wytseke Fokkens  
Department of Otorhinolaryngology  
Head and Neck Surgery  
Academic Medical Center  
Amsterdam, The Netherlands

Susan Foley  
Meakins-Christie Laboratories  
McGill University  
Montreal, Quebec, Canada

Paul S. Foster  
Centre for Asthma and Respiratory Diseases  
School of Biomedical Sciences  
University of Newcastle  
Newcastle, New South Wales, Australia

Howard Fox  
Novartis Horsham Research Centre  
Horsham  
West Sussex, UK

Francesca Franco  
Section of Respiratory Disease  
Department of Oncology, Hematology and Respiratory Disease  
University of Modena and Reggio Emilia  
Modena, Italy

Michael M. Frank  
Samuel L. Katz Professor of Pediatrics, Medicine and Immunology  
Duke University Medical Center  
Durham, North Carolina, USA

Arturo Genovese  
Professor of Medicine  
Division of Clinical Immunology and Allergy  
University of Naples Federico II  
Naples, Italy

Laurel J. Gershwin  
California National Primate Research Center and Schools of Veterinary Medicine and Medicine  
University of California Davis, California, USA

Mark A. Giembycz  
Department of Pharmacology & Therapeutics  
Institute of Infection, Immunity and Inflammation  
Faculty of Medicine  
University of Calgary  
Calgary, Alberta, Canada

William G. Glass  
Immunology  
Centocor  
Radnor, Pennsylvania, USA

Hannah J. Gould  
Professor  
Randall Division of Cell & Molecular Biophysics  
Division of Allergy, Asthma and Lung Biology  
King’s College London  
London, UK

David A. Groneberg  
Department of Respiratory Medicine  
Hannover Medical School  
Hannover, Germany

Nicholas J. Gross  
Pulmonary and Critical Care Division  
Hines VA Hospital  
Hines, Illinois, USA

Avinash Gurbaxani  
Moorfields Eye Hospital  
London, UK

Belinda J. Hales  
Senior Research Officer  
University of Western Australia Centre for Child Health Research  
Telethon Institute for Child Health Research Subiaco, Western Australia, Australia

Qutayba Hamid  
Meakins-Christie Laboratories  
McGill University  
Montreal, Quebec, Canada

Hamida Hammad  
Postdoctoral Fellow  
University of Ghent Laboratory of Immunoregulation  
Ghent, Belgium

Trevor T. Hansel  
Medical Director  
National Heart & Lung Institute Clinical Studies Unit  
Imperial College  
Royal Brompton Hospital  
London, UK

Paul Harrison  
Institute of Environment and Health  
Cranfield University  
Cranfield, UK

Cathryn C. Hassett  
MRC & Asthma UK Centre in Allergic Mechanisms of Asthma  
King’s College London  
London, UK

Ricki M. Helm  
Project Team Manager  
Research Support Center  
Office of the Vice Chancellor for Academic Affairs and Research Administration  
Little Rock, Arkansas, USA

C. Garren Hester  
Laboratory Research Analyst II  
Duke University Medical Center  
Durham, North Carolina, USA

Stuart J. Hirst  
MRC & Asthma UK Centre in Allergic Mechanisms of Asthma  
King’s College London  
London, UK

Simon P. Hogan  
Division of Allergy and Immunology  
Department of Pediatrics  
Cincinnati Children’s Hospital Medical Center University of Cincinnati College of Medicine  
Cincinnati, Ohio, USA

Stephen T. Holgate  
Allergy & Inflammation Research  
Division of Infection, Inflammation & Repair  
School of Medicine  
Southampton General Hospital  
Southampton, UK
List of Contributors

Patrick G. Holt  
Head  
Division of Cell Biology  
TVW Telethon Institute for Child Health Research  
West Perth, Western Australia, Australia

W. Elliott Horner  
Principal Consultant  
Air Quality Sciences Inc.  
Marietta, Georgia, USA

Peter H. Howarth  
Reader in Medicine & Hon. Consultant Physician  
Southampton General Hospital  
Southampton, UK

Marc Humbert  
Professor of Respiratory Medicine  
Université Paris-Sud II  
Service de Pneumologie Respiratoire  
Hôpital Antoine-Béclère  
Clamart, France

James Hunt  
Postdoctoral Researcher  
Randall Division of Cell & Molecular Biophysics;  
Division of Asthma, Allergy & Lung Biology  
King’s College London  
London, UK

Wouter Huvenne  
Upper Respiratory Laboratory  
ENT-Department  
University Hospital Ghent  
Ghent, Belgium

Dallas M. Hyde  
California National Primate Research Center and  
Schools of Veterinary Medicine and Medicine  
University of California  
Davis, California, USA

Philip W. Ind  
Consultant Physician  
Clinical Head of Department  
Hammersmith Hospital;  
Hon. Senior Lecturer  
National Heart & Lung Institute at Hammersmith  
London, UK

Debbie L. Jarvis  
Senior Lecturer in Public Health  
Respiratory Epidemiology and Public Health Group  
National Heart and Lung Institute  
Imperial College London  
London, UK

Peter K. Jeffery  
Emeritus Professor of Lung Pathology  
Senior Research Investigator  
Honorary Consultant  
Imperial College London

Royal Brompton Hospital  
London, UK

Jesse P. Joad  
California National Primate Research Center and  
Schools of Veterinary Medicine and Medicine  
University of California  
Davis, California, USA

Guy F. Joos  
Department of Respiratory Medicine  
Ghent University Hospital  
Ghent, Belgium

Radhika Kajekar  
California National Primate Research Center and  
Schools of Veterinary Medicine and Medicine  
University of California  
Davis, California, USA

Michael A. Kaliner  
Medical Director  
Institute for Asthma & Allergy  
Wheaton, Maryland, USA

Allen P. Kaplan  
The National Allergy, Asthma, and Urticaria  
Centers of Charleston;  
Professor, Department of Medicine  
Medical University of South Carolina  
Charleston, South Carolina, USA

A. Barry Kay  
Emeritus Professor of Allergy and Clinical  
Immunology  
National Heart and Lung Institute  
Imperial College London  
London, UK

Te Piao King  
Professor Emeritus  
Rockefeller University  
New York, New York, USA

Jörg Kleine-Tebbe  
Allergy & Asthma Center  
Westend  
Berlin, Germany

Onn Min Kon  
National Heart and Lung Institute  
Clinical Studies Unit  
Royal Brompton Hospital  
London, UK

Nataliya M. Kushnir-Sukhov  
Laboratory of Allergic Diseases  
National Institute of Allergy and Infectious  
Diseases  
National Institutes of Health  
Bethesda, Maryland, USA

Kevin Kwong  
Johns Hopkins University  
Johns Hopkins School of Medicine  
Johns Hopkins Asthma and Allergy Center  
Baltimore, Maryland, USA

John Lacey  
Deceased

Paige Lacy  
Division of Pulmonary Medicine  
Department of Medicine  
University of Alberta  
Edmonton, Alberta, Canada

Bart N. Lambrecht  
Professor of Pulmonary Medicine  
Laboratory of Immunoregulation & Mucosal  
Immunology  
University Hospital Ghent  
Ghent, Belgium

Stephen J. Lane  
Consultant Respiratory Physician & Allergist  
Adelaide & Meath Hospital  
Tallaght  
Dublin, Ireland

Mark Larché  
Professor of Medicine, Canada Research Chair  
Clinical Immunology & Allergy  
Department of Medicine  
McMaster University  
Hamilton, Ontario, Canada

Shawnessy D. Larson  
California National Primate Research Center and  
Schools of Veterinary Medicine and Medicine  
University of California  
Davis, California, USA

Geoffrey J. Laurent  
Director  
Centre for Respiratory Research  
Department of Medicine  
Rayne Institute  
University College London  
London, UK

Tak H. Lee  
Professor  
King’s College London;  
Director  
MRC & Asthma UK Centre in Allergic  
Mechanisms of Asthma  
Guy’s Hospital  
London, UK

Samuel B. Lehrer  
Professor of Medicine  
Tulane University School of Medicine  
Department of Medicine
List of Contributors

Section of Clinical Immunology, Allergy and Rheumatology
New Orleans, Louisiana, USA

Estelle Levetin
The University of Tulsa
Department of Biological Science
Tulsa, Oklahoma, USA

Susan Lightman
Professor of Clinical Ophthalmology
Moorfields Eye Hospital
London, UK

Brian J. Lipworth
Asthma & Allergy Research Group
Ninewells Hospital and Medical School
Dundee, Scotland, UK

Clare M. Lloyd
Leukocyte Biology Section
National Heart and Lung Institute
Faculty of Medicine
Imperial College London
London, UK

Iain A.M. MacPhee
Senior Lecturer in Renal Medicine
St. George’s, University of London
London, UK

Piero Maestrelli
Professor of Occupational Medicine
Department of Environmental Medicine and Public Health
University of Padova
Padova, Italy

Hans-Jørgen Malling
Allergy Clinic
National University Hospital
Copenhagen, Denmark

Gianni Marone
Division of Clinical Immunology and Allergy
Center for Basic and Clinical Immunology Research (CISI)
University of Naples Federico II
School of Medicine
Naples, Italy

Dean D. Metcalfe
Laboratory of Allergic Diseases
National Institute of Allergy and Infectious Diseases
National Institutes of Health
Bethesda, Maryland, USA

Lisa A. Miller
California National Primate Research Center and
Schools of Veterinary Medicine and Medicine

University of California
Davis, California, USA

Miriam F. Moffatt
Reader in Human Genetics
Molecular Genetics Group
National Heart and Lung Institute
Imperial College London
London, UK

Rafael I. Monsalve
Group Leader
Allergy Chemistry and Biotechnology Department
Research and Development ALK-ABELLÓ
Madrid, Spain

Redwan Moqbel
Division of Pulmonary Medicine
Departments of Medicine and Medical Microbiology and Immunology
University of Alberta
Edmonton, Alberta, Canada

Ulrich R. Müller
Allergy Division
Medical Department
Spital Bern Ziegler
Bern, Switzerland

Michelle J. Muessel
Research Associate
Glenfield Hospital
Department of Respiratory Medicine
Leicester, UK

Lynne A. Murray
Manager of Pharmacology
Promedior Inc
Malvern, Pennsylvania, USA

Anthony J. Newman Taylor
Head, National Heart and Lung Institute
Faculty of Medicine
Imperial College London
London, UK

Ewa Niązankowska-Mogilnicka
Department of Medicine
Jagiellonian University School of Medicine
Kraków, Poland

Wolfgang A. Nockher
Department of Clinical Chemistry and Molecular Diagnostics
Medical Faculty
Philips-Universität Marburg
Marburg, Germany

Yee-Ean Ong
Consultant Physician and Honorary Senior Lecturer

St George’s Hospital
London, UK

Robyn E. O’Hehir
Professor and Director
Department of Allergy, Immunology and Respiratory Medicine
Alfred Hospital and Monash University
Melbourne, Victoria, Australia

Thomas G. O’Riordan
Associate Professor of Clinical Medicine and Public Health
Department of Medicine
State University of New York at Stony Brook
Stony Brook, New York, USA

David I. Orton
Consultant Dermatologist
Environmental & Contact Dermatitis Unit
Department of Dermatology and Allergy
Amersham Hospital
Amersham, UK

Reinhard Pabst
Head, Functional & Applied Anatomy
Medical School of Hannover
Hannover, Germany

Giovanni Passalacqua
Research Professor
Allergy and Respiratory Diseases
Department of Internal Medicine
University of Genoa
Genoa, Italy

Ian D. Pavord
Institute for Lung Health
Department of Respiratory Medicine and Thoracic Surgery
Glenfield Hospital
Leicester, UK

James E. Pease
Leukocyte Biology Section
National Heart and Lung Institute
Faculty of Medicine
Imperial College London
London, UK

Simon Phipps
Centre for Asthma and Respiratory Diseases
School of Biomedical Sciences
University of Newcastle
Newcastle, New South Wales, Australia

Werner J. Pichler
Division of Allergology
Clinic for Rheumatology and Clinical Immunology/Allergology,
University of Bern
Bern, Switzerland

.. ..
List of Contributors

Emily M. Pieczarka
California National Primate Research Center and Schools of Veterinary Medicine and Medicine
University of California
Davis, California, USA

Kent E. Pinkerton
California National Primate Research Center and Schools of Veterinary Medicine and Medicine
University of California
Davis, California, USA

Anais Pipet
Exploration des allergies
Hôpital Arnaud de Villeneuve
University Hospital of Montpellier
Montpellier, France

Thomas A.E. Platts-Mills
Professor Emeritus Asthma and Allergic Diseases Center
University of Virginia Health System
Charlottesville, Virginia, USA

Charles G. Plopper
Professor Emeritus, California National Primate Research Center and Schools of Veterinary Medicine and Medicine
University of California
Davis, California, USA

Anna Pomés
INDOOR Biotechnologies Inc.
Charlottesville, Virginia, USA

Stéphanie Pouvels-Frys
Department of Pneumology and Immunology
University Hospital
Lille, France

Susan L. Prescott
School of Paediatrics and Child Health
Princess Margaret Hospital
Perth, Western Australia, Australia

Neil B. Pride
Emeritus Professor of Respiratory Medicine and Senior Research Investigator
National Heart and Lung Institute
Imperial College
London, UK

Julia D. Proelss
Senior House Officer
Department of Dermatology and Allergy
University of Bonn
Bonn, Germany

Harald Renz
Professor and Chairman
Department of Clinical Chemistry
Philips University Marburg
Marburg, Germany

Jamie A. Robyn
Laboratory of Allergic Diseases
National Institute of Allergy and Infectious Diseases
National Institutes of Health
Bethesda, Maryland, USA

Laura C. Rodrigues
Infectious Disease Epidemiology Unit
London School of Hygiene and Tropical Medicine
London, UK

Duncan F. Rogers
Thoracic Medicine
National Heart & Lung Institute
Imperial College London
London, UK

Jennifer M. Rolland
Associate Professor and Deputy Head
Department of Immunology
Monash University
Melbourne, Victoria, Australia

Helene F. Rosenberg
Laboratory of Allergic Diseases
National Institute of Allergy and Infectious Diseases
National Institutes of Health
Bethesda, Maryland, USA

Marc E. Rothenberg
Division of Allergy and Immunology
Department of Pediatrics
Cincinnati Children’s Hospital Medical Center
University of Cincinnati College of Medicine
Cincinnati, Ohio, USA

Ian Sabroe
Academic Unit of Respiratory Medicine
School of Medicine and Biological Sciences
University of Sheffield
Royal Hallamshire Hospital
Sheffield, UK

Hugh A. Sampson
Professor of Pediatrics and Immunobiology
Dean for Translational Biomedical Sciences
Chief of Pediatric Allergy and Immunology
Mount Sinai School of Medicine
New York, New York, USA

Marek Sanak
Department of Medicine
Jagiellonian University School of Medicine
Kraków, Poland

Andrew Saxon
Professor of Medicine
UCLA School of Medicine
Los Angeles, California, USA

Edward S. Schelegle
California National Primate Research Center and Schools of Veterinary Medicine and Medicine
University of California
Davis, California, USA

Robert P. Schleimer
Northwestern University Feinberg School of Medicine
Department of Medicine
Division of Allergy-Immunology
Chicago, Illinois, USA

Seif O. Shaheen
Clinical Senior Lecturer in Epidemiology, and Asthma UK Senior Research Fellow
Respiratory Epidemiology & Public Health Group
National Heart and Lung Institute
Imperial College London
London, UK

Dominick E. Shaw
Specialist Registrar
Department of Respiratory Medicine
Nottingham City Hospital
Nottingham, UK

Scott H. Sicherer
Associate Professor of Pediatrics
The Elliott and Roslyn Jaffe Food Allergy Institute
Division of Allergy and Immunology
Department of Pediatrics
Mount Sinai, School of Medicine
New York, New York, USA

Hans-Uwe Simon
Department of Pharmacology
University of Bern
Bern, Switzerland

F. Estelle R. Simons
Department of Pediatrics & Child Health
Department of Immunology
Faculty of Medicine
University of Manitoba
Winnipeg, Manitoba, Canada

Keith J. Simons
Faculty of Pharmacy
Department of Pediatrics & Child Health
Faculty of Medicine
University of Manitoba
Winnipeg, Manitoba, Canada

Angela Simpson
Senior Lecturer
Respiratory Research Group
Education and Research Centre
University Hospital of South Manchester NHS Foundation Trust
Manchester, UK
Rebecca Slack  
Institute of Environment and Health  
Cranfield University  
Cranfield, UK

Gerald C. Smaldone  
Chief, Pulmonary, Critical Care and Sleep Medicine  
Department of Medicine  
State University of New York at Stony Brook  
Stony Brook, New York, USA

Suzette M. Smiley-Jewel  
California National Primate Research Center and Schools of Veterinary Medicine and Medicine  
University of California  
Davis, California, USA

Sanchaita Sonar  
Department of Clinical Chemistry and Molecular Diagnostics  
Medical Faculty  
Philips-Universität Marburg  
Marburg, Germany

Giuseppe Spadaro  
Associate Professor of Medicine  
Division of Clinical Immunology and Allergy  
University of Naples Federico II  
Naples, Italy

Steven O. Stapel  
Head, Department of Allergy Diagnostics  
Sanquin Diagnostic Services  
Amsterdam, The Netherlands

Taniawati Supali  
Department of Parasitology  
University of Indonesia  
Jakarta, Indonesia

Michael F. Sutherland  
Department of Allergy, Immunology and Respiratory Medicine  
Alfred Hospital and Monash University  
Melbourne, Victoria, Australia

Brian J. Sutton  
Professor of Molecular Biophysics  
Randall Division of Cell & Molecular Biophysics; Division of Asthma, Allergy & Lung Biology  
King’s College London  
London, UK

Andrzej Szczeklik  
Professor and Chairman  
Department of Medicine  
Jagiellonian University School of Medicine  
Kraków, Poland

Wayne R. Thomas  
University of Western Australia Centre for Child Health Research  
Telethon Institute for Child Health Research  
Subiaco, Western Australia, Australia

Catherine Thornton  
Senior Lecturer in Newborn Immunity  
Institute of Life Science  
School of Medicine  
Swansea University  
Swansea, UK

Stephen J. Till  
Clinician Scientist Fellow (The Health Foundation)  
Allergy and Clinical Immunology  
Imperial College London  
London, UK

Isabelle Tillie-Leblond  
Department of Pneumology and Immunology  
University Hospital  
Lille, France

André-Bernard Tonnel  
Department of Pneumology and Immunology  
A. Calmette Hospital  
Lille, France

Anne Tsicopoulos  
Directeur de Recherche Inserm  
Institut Pasteur de Lille  
Lille, France

Bradley J. Undem  
Johns Hopkins University  
Johns Hopkins School of Medicine  
Johns Hopkins Asthma and Allergy Center  
Baltimore, Maryland, USA

Rudolf Valenta  
Christian Doppler Laboratory for Allergy Research  
Division of Immunopathology  
Department of Pathophysiology  
Center for Physiology and Pathophysiology  
Medical University of Vienna  
Vienna General Hospital  
Vienna, Austria

Paul Van Cauwenberge  
Upper Respiratory Laboratory  
Department of Otorhinolaryngology  
Ghent University and Ghent University Hospital  
Ghent, Belgium

Ronald van Ree  
Head, Allergy Research  
Department of Experimental Immunology  
Academic Medical Center  
University of Amsterdam  
Amsterdam, The Netherlands

Laura S. Van Winkle  
California National Primate Research Center and Schools of Veterinary Medicine and Medicine  
University of California  
Davis, California, USA

Ulrich Wahn  
Professor and Director  
Department of Pediatric Pneumology and Immunology  
Charité-University Medicine  
Berlin, Germany

Andrew J. Wardlaw  
Institute for Lung Health  
Department of Respiratory Medicine  
Glenfield Hospital  
Leicester, UK

John O. Warner  
Department of Paediatrics  
Division of Medicine  
Imperial College London  
London, UK

Laurianne G. Wild  
Ochsner Clinic Foundation  
Department of Allergy  
New Orleans, Louisiana, USA

Timothy J. Williams  
Leukocyte Biology Section  
National Heart and Lung Institute  
Faculty of Medicine  
Imperial College London  
London, UK

Carolyn M. Willis  
Research Director  
Department of Dermatology  
Amersham Hospital  
Amersham, UK

Saffron A.G. Willis-Owen  
Postdoctoral Research Associate  
National Heart and Lung Institute  
Imperial College London  
London, UK

John W. Wilson  
Department of Allergy, Immunology and Respiratory Medicine  
Alfred Hospital and Monash University  
Melbourne, Victoria, Australia

Judith A. Woodfolk  
Associate Professor  
Asthma and Allergic Diseases Center  
University of Virginia Health System  
Charlottesville, Virginia, USA