Rook's Textbook of Dermatology

EDITED BY

Tony Burns

MB, BS, FRCP, FRCP(Edin) Emeritus Consultant Dermatologist, Leicester Royal Infirmary, Leicester

Stephen Breathnach

MA, MB, BChir, MD, PhD, FRCP Consultant Dermatologist and Senior Lecturer, St John's Institute of Dermatology, St Thomas' Hospital, London, and Consultant Dermatologist, Epsom & St Helier University Hospitals NHS Trust, Epsom, Surrey

Neil Cox

BSc, MB, ChB, FRCP(Lond & Edin) Consultant Dermatologist, Department of Dermatology, Cumberland Infirmary, Carlisle

Christopher Griffiths

BSc, MD, FRCP, FRCPath Professor of Dermatology and Consultant Dermatologist, The Dermatology Centre, University of Manchester, Hope Hospital, Salford, Manchester

IN FOUR VOLUMES VOLUME 1

SEVENTH EDITION

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Rook's Textbook of Dermatology



The Editors. From l to r, Tony Burns, Stephen Breathnach, Christopher Griffiths and Neil Cox standing in front of a portrait of Arthur Rook, the father of the *Textbook of Dermatology*.

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EDITED BY

Tony Burns

MB, BS, FRCP, FRCP(Edin) Emeritus Consultant Dermatologist, Leicester Royal Infirmary, Leicester

Stephen Breathnach

MA, MB, BChir, MD, PhD, FRCP Consultant Dermatologist and Senior Lecturer, St John's Institute of Dermatology, St Thomas' Hospital, London, and Consultant Dermatologist, Epsom & St Helier University Hospitals NHS Trust, Epsom, Surrey

Neil Cox

BSc, MB, ChB, FRCP(Lond & Edin) Consultant Dermatologist, Department of Dermatology, Cumberland Infirmary, Carlisle

Christopher Griffiths

BSc, MD, FRCP, FRCPath Professor of Dermatology and Consultant Dermatologist, The Dermatology Centre, University of Manchester, Hope Hospital, Salford, Manchester

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Contributors

ADRIAANS, Beverley M.

MD, FRCP

Consultant Dermatologist, Department of Dermatology, Gloucestershire Royal Hospital, Great Western Road, Gloucester

GL1 3NN

Co-author of

Chapter 27: Bacterial Infections

ANSTEY, Alexander V.

MB, BS, FRCP

Consultant Dermatologist, Royal Gwent Hospital, Cardiff Road, Newport NP20 2UB, and Honorary Senior Lecturer, Academic Department of Dermatology, University of Wales College of Medicine, Heath Park, Cardiff CF14 4XN *Co-author of*

Chapter 39: Disorders of Skin Colour

ARCHER, Clive B.

BSc, MB, BS, MD, PhD(Lond), FRCP(Lond & Edin) Consultant Dermatologist and Clinical Senior Lecturer, Bristol Dermatology Centre, Bristol Royal Infirmary, Marlborough Street, Bristol BS2 8HW Author of

Chapter 4: Functions of the Skin

Co-author of

Chapter 60: The Skin and the Nervous System

ATHERTON, David J.

MA, MB, BChir, FRCP

Consultant in Paediatric Dermatology, Department of Dermatology, Great Ormond Street Hospital for Children, Great Ormond Street, London WC1N 3JH

Co-author of

Chapter 14: The Neonate Chapter 15: Naevi and other Developmental Defects

BARAN, Robert

MD

Head of Nail Disease Centre, Le Grand Palais, 42 rue des Serbes, 06400 Cannes, France

Co-author of

Chapter 62: Disorders of Nails

BARHAM, Kelly L.

MD

Resident Physician, Department of Dermatology, Wake Forest University School of Medicine, Medical Center Boulevard, Winston-Salem, NC 27157-1071, USA

Co-author of

Chapter 49: Vasculitis and Neutrophilic Vascular Reactions

BARKER, Jonathan N.W.N.

BSc, MD, FRCP, FRCPath

Professor of Clinical Dermatology, St John's Institute of Dermatology, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH

Co-author of

Chapter 35: Psoriasis

BARLOW, Richard J.

MD, FRCP

Consultant Dermatologist and Senior Lecturer, Dermatological Surgery and Laser Unit, St John's Institute of Dermatology, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH *Co-author of*

Chapter 77: Physical and Laser Therapies

BECK, Michael H.

MB, ChB, FRCP

Consultant Dermatologist and Director of Contact Dermatitis Investigation Unit, Dermatology Centre, University of Manchester, Hope Hospital, Stott Lane, Salford, Manchester M6 8HD

Co-author of

Chapter 19: Contact Dermatitis: Irritant Chapter 20: Contact Dermatitis: Allergic

BERTH-JONES, John

FRCP

Consultant Dermatologist, University Hospitals Coventry and Warwickshire NHS Trust, Department of Dermatology, Walsgrave Hospital, Clifford Bridge Road, Coventry CV2 2DX, and Coventry and George Eliot Hospital NHS Trust, Nuneaton

Author of

Chapter 44: Rosacea, Perioral Dermatitis and Similar Dermatoses, Flushing and Flushing Syndromes

Chapter 75: Topical Therapy

Co-author of

Chapter 17: Eczema, Lichenification, Prurigo and Erythroderma

BLACK, Martin M.

MD, FRCP, FRCPath

Consultant Dermatologist, St John's Institute of Dermatology, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH

Co-author of

Chapter 42: Lichen Planus and Lichenoid Disorders Chapter 55: Subcutaneous Fat

BLEEHEN, Stanley S.

MA, MB, BChir, FRCP

Emeritus Professor of Dermatology, University of Sheffield, Sheffield, and Honorary Consultant Dermatologist, St John's

x Contributors

Institute of Dermatology, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH

Co-author of

Chapter 39: Disorders of Skin Colour

BREATHNACH, Stephen M.

MA, MB, BChir, MD, PhD, FRCP

Consultant Dermatologist and Senior Lecturer, St John's Institute of Dermatology, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH, and Consultant Dermatologist, Epsom and St Helier University NHS Trust, Dorking Road, Epsom, Surrey KT18 7EG

Editor

- Author of
 - Chapter 73: Drug Reactions

Chapter 74: Erythema Multiforme, Stevens–Johnson Syndrome and Toxic Epidermal Necrolysis

Co-author of

Chapter 11: Wound Healing

Chapter 42: Lichen Planus and Lichenoid Disorders

Chapter 57: Metabolic and Nutritional Disorders

Chapter 72: Systemic Therapy

BUNKER, Christopher B.

MA, MD, FRCP

Consultant Dermatologist, Chelsea & Westminster Hospital, Fulham Road, London SW10 9NH, and the Royal Marsden Hospital, Fulham Road, London SW3 6JJ, London, and Honorary Senior Lecturer, Imperial College School of Medicine, London *Co-author of*

Chapter 26: AIDS and the Skin

Chapter 68: The Genital, Perianal and Umbilical Regions

BURD, D. Andrew R.

MD, FRCSEd, FHKAM

Chief of Division of Plastic and Reconstructive Surgery, Department of Surgery, Chinese University of Hong Kong, Prince of Wales Hospital, Shatin, Hong Kong

Co-author of

Chapter 22: Mechanical and Thermal Injury

BURGE, Susan M.

BSc, DM, FRCP

Consultant Dermatologist, Department of Dermatology, Churchill Hospital, Old Road, Headington, Oxford OX3 7LJ

Co-author of

Chapter 40: Genetic Blistering Diseases Chapter 41: Immunobullous Diseases

BURNAND, Kevin G.

MB, BS, FRCS, MS

Professor of Vascular Surgery, Head of Academic Department of Surgery, UMDS, St Thomas' Campus, Lambeth Palace Road, London SE1 7EH

Co-author of

Chapter 50: Diseases of the Veins and Arteries: Leg Ulcers

BURNS, David Anthony

MB, BS, FRCP, FRCP(Edin)

Emeritus Consultant Dermatologist, Leicester Royal Infirmary, Leicester LE1 5WW

Editor

Author of

Chapter 2: Comparative Dermatology

Chapter 33: Diseases Caused by Arthropods and Other Noxious

Animals Chapter 67: The Breast *Co-author of* Chapter 1: Introduction and Historical Bibliography

Chapter 57: Metabolic and Nutritional Disorders

BURROWS, Nigel P.

MD, FRCP

Consultant Dermatologist and Associate Lecturer, Department of Dermatology, Addenbrooke's Hospital, Hills Road, Cambridge CB2 2QQ

Co-author of

Chapter 46: Disorders of Connective Tissue

CALONJE, Eduardo

MD, DipRCPath

Director of Diagnostic Dermatopathology, and Consultant and Honorary Senior Lecturer in Dermatology, St John's Institute of Dermatology, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH

Co-author of

Chapter 7: Histopathology of the Skin: General Principles Chapter 37: Tumours of the Skin Appendages Chapter 53: Soft-Tissue Tumours and Tumour-like Conditions

CAMP, Richard D.R.

PhD, FRCP

Professor of Dermatology, Department of Infection, Immunity and Inflammation, Maurice Shock Medical Sciences Building,

University of Leicester, University Road, Leicester LE1 9HN Co-author of

Chapter 35: Psoriasis

CANT, Andrew J.

BSc, MRCP, MD, FRCP, FRCPCH

Consultant in Paediatric Immunology and Infectious Diseases, and Honorary Clinical Senior Lecturer in Child Health, Newcastle General Hospital, Westgate Road, Newcastle upon Tyne NE4 6BE *Co-author of*

Chapter 14: The Neonate

CERIO, Rino

BSc, MB, BS, FRCP, FRCP(Edin), FRCPath

Consultant Dermatologist and Reader in Dermatopathology, Department of Dermatology and Institute of Pathology (QMUL), Bart's and Royal London Medical Schools, Whitechapel Road, London E1 1BB

Co-author of

Chapter 7: Histopathology of the Skin: General Principles

CHALMERS, Robert J.G.

MB, FRCP

Consultant Dermatologist, University of Manchester, Dermatology Centre, Hope Hospital, Stott Lane, Salford, Manchester, M6 8HD Co-author

Chapter 72: Systemic Therapy

CHU, Anthony C. FRCP

Senior Lecturer/Honorary Consultant Dermatologist, Imperial College, Hammersmith Campus, Hammersmith Hospital, Du Cane Road, London W12 0HS

Author of

Chapter 52: Histiocytoses

CHURCH, Martin K.

MPharm, PhD, DSc

Professor of Immunopharmacology, Allergy and Inflammation Research, Southampton General Hospital, Tremona Road, Southampton SO16 6YD

Co-author

Chapter 9: Inflammation

COTTERILL, John A.

BSc, MD, FRCP

Formerly Consultant Dermatologist, Department of Dermatology, Leeds General Infirmary, Leeds

Co-author Chapter 61: Psychocutaneous Disorders Chapter 71: General Aspects of Treatment

COULSON, Ian H.

BSc, MB, BS, FRCP

Consultant Dermatologist, Dermatology Unit, Burnley General Hospital, Casterton Avenue, Burnley, Lancashire BB10 2PQ Author of

Chapter 45: Disorders of Sweat Glands *Co-author*

Chapter 5: Diagnosis of Skin Disease

COX, Neil H.

BSc, MB, ChB, FRCP(Lond & Edin)

Consultant Dermatologist, Department of Dermatology, Cumberland Infirmary, Carlisle CA2 7HY

Editor

Co-author of

Chapter 1: Introduction and Historical Bibliography

Chapter 5: Diagnosis of Skin Disease

Chapter 48: Purpura and Microvascular Occlusion

Chapter 49: Vasculitis and Neutrophilic Vascular Reactions Chapter 59: Systemic Disease and the Skin

CUNLIFFE, William J.

MD, FRCP

Professor of Dermatology, Department of Dermatology, Leeds General Infirmary, Great George Street, Leeds LS1 3EX

Co-author

Chapter 43: Disorders of the Sebaceous Glands Chapter 55: Subcutaneous Fat

DART, John K.G.

MA, DM, FRCS, FRCOphth

Consultant Ophthalmologist, Corneal External Disease and Cataract Services, Moorfields Eye Hospital, City Road, London EC1V 2PD *Co-author*

Chapter 64: The Skin and the Eyes

DAWBER, Rodney P.R.

MA, FRCP

Consultant Dermatologist, Department of Dermatology, Churchill Hospital, Old Road, Headington, Oxford OX27LJ

Co-author

Chapter 62: Disorders of Nails

de BERKER, David A.R.

BA, MRCP

Consultant Dermatologist and Clinical Senior Lecturer, Bristol Dermatology Centre, Bristol Royal Infirmary, Marlborough Street, Bristol BS2 8HW Co-author

Chapter 62: Disorders of Nails Chapter 63: Disorders of Hair

DOWD, Pauline M.

BSc, MD, FRCP

Professor of Dermatology, Department of Dermatology, The Middlesex Hospital, Tottenham Street, London W1T 4NJ *Author of*

Chapter 23: Reactions to Cold

EADY, Robin A.J.

DSc, FRCP, FMedSci

Emeritus Professor of Experimental Dermatopathology, Division of Skin Sciences, Guy's, King's and St Thomas' School of Medicine, King's College London, and Honorary Consultant Dermatologist, St John's Institute of Dermatology, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH

Co-author of

Chapter 3: Anatomy and Organization of Human Skin Chapter 13: Prenatal Diagnosis of Genetic Skin Disease Chapter 40: Genetic Blistering Diseases

EEDY, David J.

MD, FRCP

Consultant Dermatologist, Department of Dermatology, Craigavon Area Hospital Group Trust, 68 Lurgan Road, Portadown, Co. Armagh, Northern Ireland BT63 5QQ

Co-author of

Chapter 60: The Skin and the Nervous System

ENGLISH, John S.C.

MB, BS, FRCP

Consultant Dermatologist, Department of Dermatology, Queen's Medical Centre, University Hospital, Clifton Boulevard, Nottingham NG7 2UH

Co-author of

Chapter 21: Occupational Dermatoses

FERGUSON, James

Consultant Dermatologist, Photobiology Unit, Department of Dermatology, Ninewells Hospital and Medical School, Dundee DD1 9SY

Co-author of

Chapter 24: Cutaneous Photobiology

FINE, Jo-David

MD, MPH, FACP

Professor of Medicine, University of Kentucky College of Medicine, and Dermatology Associates of Kentucky, PSC, 250 Fountain Court, Lexington, KY 40509, USA

Court, Lexington, KY 40509, US Co-author of

Chapter 40: Genetic Blistering Diseases

FINLAY, Andrew Y.

FRCP(Lond & Glasg)

Professor of Dermatology and Honorary Consultant Dermatologist, Department of Dermatology, University of Wales College of Medicine, Heath Park, Cardiff CF14 4XN

Co-author of

Chapter 71: General Aspects of Treatment

MD, FRCP

xii Contributors

FRIEDMANN, Peter S.

MD, FRCP, FMedSci

Professor of Dermatology, Dermatopharmacology Unit, Southampton General Hospital, Tremona Road, Southampton SO16 6YD

Co-author of

Chapter 18: Atopic Dermatitis

GAWKRODGER, David J.

MD, FRCP, FRCPE

Consultant Dermatologist and Honorary Senior Clinical Lecturer, Department of Dermatology, Royal Hallamshire Hospital, Glossop Road, Sheffield S10 2JF Author of

Chapter 58: Sarcoidosis

Chapter 69: Racial Influences on Skin Disease

GENNERY, Andrew R.

MD, MRCP, MRCPCH, DCH, DipMedSci

Watson Clinical Senior Lecturer/Honorary Consultant in Paediatric Immunology and Bone Marrow Transplantation, Newcastle General Hospital, Westgate Road, Newcastle upon Tyne NE4 6BE

Co-author of Chapter 14: The Neonate

GOODFIELD, Mark J.D.

MD, FRCP

Consultant Dermatologist, Department of Dermatology, Leeds General Infirmary, Great George Street, Leeds LS1 3EX *Co-author of*

Chapter 56: The 'Connective Tissue Diseases'

GOTCH, Frances

PhD, FRCPath

Professor of Immunology, Head of Department, Department of Immunology, Imperial College School of Medicine, Chelsea & Westminster Campus, Fulham Road, London SW10 9NH *Co-author of*

Chapter 26: AIDS and the Skin

GRAHAM, Robert M.

MB, FRCP

Consultant Dermatologist, Department of Dermatology, James Paget Healthcare NHS Trust, Lowestoft Road, Gorleston, Great Yarmouth, Norfolk NR31 6LA

Co-author of

Chapter 59: Systemic Disease and the Skin

GRAHAM-BROWN, Robin A.C.

BSc, MB, BS, FRCP

Consultant and Honorary Senior Lecturer in Dermatology, Department of Dermatology, Leicester Royal Infirmary, Leicester LE1 5WW

Author of

Chapter 70: The Ages of Man and their Dermatoses

GRATTAN, Beth

MD

Resident Physician, Department of Dermatology, Medical University of South Carolina, Charleston, SC 29425, Carolina,

USA

Co-author of

Chapter 49: Vasculitis and Neutrophilic Vascular Reactions

GRATTAN, Clive E.H.

MA, MD, FRCP

Consultant Dermatologist, Department of Dermatology, Norfolk and Norwich University Hospital, Colney, Norfolk NR4 7UZ *Co-author of*

Chapter 47: Urticaria and Mastocytosis

GREAVES, Malcolm W.

MD, PhD, FRCP

Professor of Dermatology, Department of Dermatology, Singapore General Hospital, Outram Road, Singapore 169608

Author of Chapter 16: Pruritus

GRIFFITHS, Christopher E.M.

BSc, MD, FRCP, FRCPath

Professor of Dermatology and Consultant Dermatologist, The Dermatology Centre, University of Manchester, Irving Building, Hope Hospital, Salford, Manchester M6 8HD

Editor

Co-author of

- Chapter 9: Inflammation Chapter 35: Psoriasis
- Chapter 72: Systemic Therapy

HARPER, John I.

MD, FRCP, FRCPCH

Professor of Paediatric Dermatology, Great Ormond Street Hospital for Children, Great Ormond Street, London WC1N 3JH

Co-author of

Chapter 12: Genetics and Genodermatoses

HAWK, John L.M.

BSc, MD, FRACP, FRCP

Consultant Dermatologist and Head, Department of Environmental Dermatology, St John's Institute of Dermatology, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH

Co-author of

Chapter 24: Cutaneous Photobiology

HAY, Roderick J.

DM, FRCP, FRCPath

Dean, Faculty of Medicine and Health Sciences, Queen's University Belfast, Whitla Medical Building, 97 Lisburn Road, Belfast BT9 7BL

Co-author of

Chapter 27: Bacterial Infections Chapter 31: Mycology Chapter 32: Parasitic Worms and Protozoa Chapter 72: Systemic Therapy

HOLDEN, Colin A.

BSc, MD, FRCP

Consultant Dermatologist, Epsom and St Helier University Hospitals NHS Trust, St Helier Hospital, Wrythe Lane, Carshalton, Surrey SM5 1AA

Co-author of

Chapter 17: Eczema, Lichenification, Prurigo and Erythroderma Chapter 18: Atopic Dermatitis

JONES, Stephen K.

BMedSci, BM, BS, MD, FRCP(Lond & Edin)

Consultant Dermatologist, Department of Dermatology, Clatterbridge Hospital, Bebington, Wirral CH63 4JY *Co-author of* Chapter 56: The 'Connective Tissue Diseases'

JORIZZO, Joseph L.

MD

Professor and Former (Founding) Chair, Department of

Dermatology, Wake Forest University School of Medicine, Medical Centre Boulevard, Winston-Salem, NC 27157-1071, USA *Co-author of*

Chapter 49: Vasculitis and Neutrophilic Vascular Reactions

JUDGE, Mary R.

MD, FRCP, DCH

Consultant Dermatologist, Department of Dermatology, Royal Bolton Hospital, Minerva Road, Farnworth, Bolton BL4 0JR, and Consultant Paediatric Dermatologist, Dermatology Centre, Hope Hospital, Stott Lane, Salford, Manchester M6 8HD

Co-author of

Chapter 34: Disorders of Keratinization

KELLY, Charles G.

MSc, FRCP, FRCR

Consultant Clinical Oncologist, Northern Centre for Cancer Treatment, Newcastle General Hospital, Westgate Road, Newcastle upon Tyne NE4 6BE

Co-author of

Chapter 76: Radiotherapy and Reactions to Ionizing Radiation

KENNEDY, Cameron T.C.

MA, MB, BChir, FRCP

Consultant Dermatologist and Clinical Senior Lecturer, Bristol Dermatology Centre, Bristol Royal Infirmary, Marlborough Street, Bristol BS2 8HW Author of

Chapter 65: The External Ear

Co-author of

Chapter 22: Mechanical and Thermal Injury

KERDEL-VEGAS, Francisco

CBE, MD, MSc, DSc, FACP

Former Professor of Dermatology, Universidad Central de Venezuela, Caracas, and Fellow of the National Academy of Medicine and the Academy of Sciences of Venezuela, Central University of Venezuela, Apartado 60391, Caracas 1060-A, Venezuela

Co-author of

Chapter 30: The Treponematoses

KINGHORN, George R.

MB, ChB, MD, FRCP

Clinical Director, Department of Genitourinary Medicine, Royal Hallamshire Hospital, Glossop Road, Sheffield S10 2JF

Co-author of

Chapter 30: The Treponematoses

KOBZA BLACK, Anne

MD, FRCP

Consultant Dermatologist, St John's Institute of Dermatology, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH *Co-author of*

Chapter 47: Urticaria and Mastocytosis

LAWRENCE, Clifford M.

MD, FRCP

Consultant Dermatologist, Department of Dermatology, Royal Victoria Infirmary, Queen Victoria Road, Newcastle upon Tyne NE1 4LP

Co-author of

Chapter 77: Physical and Laser Therapies Chapter 78: Dermatological Surgery

LEONARD, Jonathan N.

BSc, MD, FRCP

Consultant Dermatologist, Department of Dermatology, St Mary's Hospital, Praed Street, London W2 1NY

Co-author of

Chapter 64: The Skin and the Eyes

LOCKWOOD, Diana N.J.

MD, FRCP

Consultant Physician and Leprologist, The Hospital for Tropical Diseases, Capper Street, London WC1E 6AU

Author of

Chapter 29: Leprosy

LOVELL, Christopher R.

MD, FRCP

Department of Dermatology, Royal United Hospital, Coombe Park, Bath BA1 3NG

Co-author of

Chapter 46: Disorders of Connective Tissue

LUGER, Thomas A.

MD

Professor and Chairman, Department of Dermatology, University of Münster, Von-Esmarch-Strasse 58, D-48149 Münster, Germany *Co-author of*

Chapter 9: Inflammation

MACKIE, Rona M.

CBE, FRSE, MD, DSc, FRCP, FRCPath

Senior Research Fellow, Public Health and Health Policy, University of Glasgow, 1 Lilybank Gardens, Glasgow G12 8RZ

Author of

- Chapter 38: Disorders of the Cutaneous Melanocyte *Co-author of*
- Chapter 36: Non-Melanoma Skin Cancer and Other Epidermal Skin Tumours

Chapter 37: Tumours of the Skin Appendages

Chapter 53: Soft-Tissue Tumours and Tumour-like Conditions Chapter 54: Cutaneous Lymphomas and Lymphocytic Infiltrates

McGRATH, John A.

MD, FRCP

Professor of Molecular Dermatology, St John's Institute of Dermatology, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH

Co-author of

Chapter 3: Anatomy and Organization of Human Skin Chapter 11: Wound Healing

Chapter 13: Prenatal Diagnosis of Genetic Skin Disease

McLEAN, W.H. Irwin

PhD, DSc

Wellcome Trust Senior Research Fellow and Professor of Human Genetics, Human Genetics Unit, Division of Pathology and Neuroscience, Ninewells Hospital and Medical School, University of Dundee, Dundee DD1 9SY

xiv Contributors

Co-author of Chapter 34: Disorders of Keratinization

MESSENGER, Andrew G.

MD, FRCP

Consultant Dermatologist, Department of Dermatology, Royal Hallamshire Hospital, Glossop Road, Sheffield S10 2JF *Co-author of*

Chapter 63: Disorders of Hair

MILLARD, Leslie G.

MD, FRCP(Lond & Edin)

Consultant in Dermatology and Cutaneous Surgery, Department of Dermatology and Dermatological Surgery, Queen's Medical Centre, University Hospital NHS Trust, Clifton Boulevard, Nottingham NG7 2UH

Co-author of

Chapter 61: Psychocutaneous Disorders

MOORE, Mary K.

MA, PhD

Lecturer, Mycology Department, St John's Institute of Dermatology, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH

Co-author of

Chapter 31: Mycology

MORTIMER, Peter S.

MD, FRCP

Professor of Dermatological Medicine, Dermatology Unit, St George's Hospital Medical School, Cranmer Terrace, London SW17 0RE

Author of

Chapter 51: Disorders of Lymphatic Vessels

Co-author of

Chapter 50: Diseases of the Veins and Arteries: Leg Ulcers

MORTON, Robert S. [Deceased]

MBE, MD, FRCP(Edin), DHMSA

Formerly Honorary Lecturer in History of Medicine, University of Sheffield *Co-author of*

Chapter 30: The Treponematoses

MOSS, Celia

DM, FRCP, MRCPCH

Consultant Dermatologist, Department of Dermatology, Birmingham Children's Hospital, Steelhouse Lane, Birmingham B4 6NL

Co-author of

Chapter 15: Naevi and other Developmental Defects

MUNRO, Colin S.

MD, FRCP(Glasg)

Consultant Dermatologist and Professor, Department of Dermatology, South Glasgow University Hospitals NHS Trust, Govan Road, Glasgow G51 4TF

Co-author of

Chapter 34: Disorders of Keratinization

NEILL, Sallie M.

FRCP

Consultant Dermatologist, St John's Dermatology Unit, Guy's and St Thomas' NHS Trust, Lambeth Palace Road, London, SE1 7EH, Chelsea and Westminster NHS Trust, Fulham Road, London SW10 9NH and Ashford & St Peter's NHS Trust, Guildford Road, Chertsey, Surrey KT16 0PZ

Co-author of

Chapter 68: The Genital, Perianal and Umbilical Regions

PIETTE, Warren W.

MD

Professor and Vice-Chair, Department of Dermatology, University of Iowa Roy J. and Lucille A. Carver College of Medicine, University of Iowa Hospitals and Clinics, 200 Hawkins Drive, Iowa City, IA 52242-1090, USA

Co-author of

Chapter 48: Purpura and Microvascular Occlusion

POPE, F. Michael

MD, FRCP(Lond, Edin & Glasg)

Consultant Dermatologist, West Middlesex University Hospital, Twickenham Road, Isleworth, Middlesex TW7 6AF, and the Chelsea & Westminster Hospital, Fulham Road, London SW10 9NH, Professor of Medical Genetics and Honorary Consultant Clinical Geneticist, Institute of Medical Genetics, University of Wales College of Medicine and University Hospital of Wales, Heath Park, Cardiff CF14 4XN

Co-author of

Chapter 3: Anatomy and Organization of Human Skin

QUINN, Anthony G.

BMSc, MB, ChB, PhD, FRCP

Director/Senior Principal Scientist, Experimental Medicine, AstraZeneca R&D Charnwood, Bakewell Road, Loughborough, Leicestershire LE11 5RH

Co-author of

Chapter 36: Non-Melanoma Skin Cancer and Other Epidermal Skin Tumours

REES, Jonathan L.

BMedSci, MB, BS, FRCP, FMedSci

Grant Chair of Dermatology, Department of Dermatology, The University of Edinburgh, Lauriston Building, Lauriston Place, Edinburgh EH3 9HA

Author of

Chapter 8: Molecular Biology

ROOK, Graham A.W.

BA, MB, BChir, MD

Professor of Medical Microbiology, Department of Medical Microbiology, Windeyer Institute of Medical Sciences, Royal Free and University College Medical School, 46 Cleveland Street, London W1T 4JF

Co-author of

Chapter 28: Mycobacterial Infections

SARKANY, Robert P.E.

BSc, MRCP, MD

Consultant Dermatologist, Department of Dermatology, St George's Hospital, Blackshaw Road, London SW17 0QT

Co-author of

Chapter 57: Metabolic and Nutritional Disorders

SCHWARZ, Thomas

MD

Professor of Dermatology, Department of Dermatology, University of Münster, Von-Esmarch-Strasse 58, D-48149 Münster, Germany *Co-author of*

Chapter 10: Clinical Immunology, Allergy and Photoimmunology

SCULLY, Crispian

CBE, MD, PhD, MDS, MRCS, FDSRCS, FDSRCPS, FFDRCSI, FDSRCSE, FRCPath, FMedSci

President of the European Association of Oral Medicine, and Dean and Director of Studies and Research, Eastman Dental Institute for Oral Health Care Sciences, and International Centres for Excellence in Dentistry, University College London, 256 Gray's Inn Road, London WC1X 8LD

Author of

Chapter 66: The Oral Cavity and Lips

SEYMOUR, Carol A.

MA(Oxon), MA(Cantab), PhD, FRCPath, FRCP

Emeritus Professor of Clinical Biochemistry and Metabolic

Medicine, St George's Hospital Medical School, Blackshaw Road, London SW17 0QT

Co-author of

Chapter 57: Metabolic and Nutritional Disorders

SIMPSON, Nicholas B.

MD, FRCP(Lond & Glasg)

Consultant Dermatologist, Department of Dermatology, Royal Victoria Infirmary, Queen Victoria Road, Newcastle upon Tyne NE1 4LP

Co-author of

Chapter 43: Disorders of the Sebaceous Glands

SINCLAIR, Rodney D.

MB, BS, FACD

Senior Lecturer and Consultant Dermatologist, Skin and Cancer Foundation and St Vincent's Hospital Melbourne, Department of Dermatology, 41 Victoria Parade, Fitzroy, Victoria 3065, Australia *Co-author of*

Chapter 63: Disorders of Hair

SPICKETT, Gavin P.

MA, DPhil, FRCPath, FRCP(Lond)

- Consultant Clinical Immunologist, Regional Department of Immunology, Royal Victoria Infirmary, Queen Victoria Road,
- Newcastle upon Tyne NE1 4LP

Co-author of

Chapter 10: Clinical Immunology, Allergy and Photoimmunology

SPITTLE, Margaret F.

MSc, FRCP, FRCR, AKC

Consultant Clinical Oncologist, Meyerstein Institute of Oncology, The Middlesex Hospital, Mortimer Street, London W1N 8AA

Co-author of

Chapter 76: Radiotherapy and Reactions to Ionizing Radiation

STEINHOFF, Martin

MD, PhD

Associate Professor, Department of Dermatology and Boltzmann Institute for Immunobiology of the Skin, University of Münster, Von-Esmarch-Strasse 58, D-48149 Münster, Germany

Co-author of

Chapter 9: Inflammation

STERLING, Jane C.

MB, BChir, MA, FRCP, PhD

Honorary Consultant Dermatologist, Department of Dermatology, Addenbrooke's Hospital, Hills Road, Cambridge CB2 2QQ

Author of

Chapter 25: Virus Infections

TELFER, Nicholas R.

FRCP

Consultant Dermatological Surgeon, Dermatology Centre, University of Manchester, Irving Building, Hope Hospital, Stott Lane, Salford, Manchester M6 8HD

Co-author of

Chapter 78: Dermatological Surgery

TREMBATH, Richard C.

BSc, MB, BS, FRCP, FMedSci

Professor of Medical Genetics, Division of Medical Genetics, Adrian

Building, University of Leicester, Leicester LE1 7RH

Co-author of

Chapter 12: Genetics and Genodermatoses

VEALE, Douglas J.

MD, FRCPI, FRCP(Lond)

Consultant Dermatologist, Department of Rheumatology, St Vincent's University Hospital, Elm Park, Dublin 4, Republic of

Ireland

Co-author of

Chapter 56: The 'Connective Tissue Diseases'

VEGA-LÓPEZ, Francisco

MD, MSc, PhD

Consultant Dermatologist and Honorary Senior Lecturer, University College London Hospitals NHS Trust, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, and Former Chair and Professor of Dermatology, National University (UNAM) and National Medical Centre (IMSS), Mexico City, Mexico

Co-author of

Chapter 32: Parasitic Worms and Protozoa

VENNING, Vanessa A.

MA, DM(Oxon), FRCP

Consultant Dermatologist, Department of Dermatology, Churchill Hospital, Old Road, Headington, Oxford OX3 7LJ

Co-author of

Chapter 41: Immunobullous Diseases

WALKER, Neil P.J.

BSc, MB, FRCP

Honorary Consultant Dermatologist, Department of Dermatology, Churchill Hospital, Old Road, Headington, Oxford OX3 7LJ

Co-author of

Chapter 77: Physical and Laser Therapies Chapter 78: Dermatological Surgery

WEISMANN, Kaare

MD, PhD

Consultant Dermatologist and Professor of Dermatology, Clinic of Dermatology, Hørsholm Hospital, DK-2970 Hørsholm, Denmark *Co-author of*

Chapter 57: Metabolic and Nutritional Disorders

WHITTAKER, Sean J.

MD, FRCP

Head of Service for St John's Institute of Dermatology, Guy's and St Thomas' Hospitals NHS Trust, Lambeth Palace Road, London SE1 7EH, and Head of Skin Cancer Unit, Division of Skin Sciences, King's College London, London, UK

Co-author of

Chapter 54: Cutaneous Lymphomas and Lymphocytic Infiltrates

xvi Contributors

WILKINSON, S. Mark

MD, FRCP

Consultant Dermatologist, Department of Dermatology, Leeds General Infirmary, Great George Street, Leeds LS1 3EX

Co-author of

Chapter 19: Contact Dermatitis: Irritant

Chapter 20: Contact Dermatitis: Allergic

WILLIAMS, Hywel C.

BSc, MB, BS, FRCP, MSc, PhD

Professor of Dermato-epidemiology, Department of Dermatology, Queen's Medical Centre, Clifton Boulevard, Nottingham NG7 2UH

Author of

Chapter 6: Epidemiology of Skin Disease

WOJNAROWSKA, Fenella

MSc, DM(Oxon), FRCP(UK)

Professor of Dermatology, Department of Dermatology, Churchill Hospital, Old Road, Headington, Oxford OX3 7LJ Co-author of Chapter 41: Immunobullous Diseases

YATES, Victoria M.

MB, ChB, FRCP

Consultant Dermatologist, Department of Dermatology, Royal Bolton Hospital, Minerva Road, Farnworth, Bolton BL4 0JR, and University Department of Dermatology, Hope Hospital, Stott Lane, Salford, Manchester M6 8HD

Co-author of

Chapter 28: Mycobacterial Infections

YOUNG, Antony R.

PhD

Deputy Head, St John's Institute of Dermatology, Guy's, King's and St Thomas' School of Medicine, King's College London,

University of London, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH

Co-author of

Chapter 24: Cutaneous Photobiology

Preface to the Seventh Edition

Over thirty years have passed since the first edition of *Textbook of Dermatology* was published under the leadership of Arthur Rook, Darrell Wilkinson and John Ebling.

Arthur Rook, a wise clinician with an encyclopaedic knowledge of medical literature, and a man of great linguistic talent and enormous energy, died in 1991 (see Preface to the fifth edition).

John Ebling, who continued as an editor to the fifth edition, died in 1992. He occupied a unique position in British dermatology, as a full-time Professor of Zoology, a distinguished research worker and a man of enormous erudition and editorial skills. His breadth of knowledge covered the whole of biology and we owe him a great debt for his tremendous and untiring work over 25 years on this textbook.

The fifth edition, published in 1992, was edited by Champion, Burton and Ebling, with invaluable advice from Darrell Wilkinson. Bob Champion and John Burton continued to lead the editorial team into the sixth edition, published in 1998, and we are indebted to them for their expertise and dedicated hard work for many years.

For this seventh edition, Tony Burns and Stephen Breathnach have been joined by two new editors, Neil Cox and Christopher Griffiths. As always, we would all like to express our gratitude to the three original editors who laid the foundations and provided a framework upon which this book has developed through subsequent editions.

Our aim is to continue to provide a comprehensive reference guide to all recognized dermatological diseases, and to encourage understanding and development of scientific aspects of dermatology, although the book is not intended to provide details of research in the basic sciences.

For this edition, every chapter has been updated, and several have been completely rewritten. There are several new contributors, and a new chapter on AIDS and the skin is a reflection of the impact this disease has had in recent years. We would like to acknowledge our indebtedness to contributors to earlier editions, who have generously allowed some of their original material to be retained for the present edition.

We are also very grateful to all those colleagues who have donated colour photographs, and the origin of these is given in the legend to each figure. Where no acknowledgement is given the figures have been provided by the authors of that chapter.

Our wives and families deserve our thanks for their forbearance and support over many years.

We should also like to thank the staff of Blackwell Publishing for their efforts throughout the production of this edition, in particular Rupal Malde, Nick Morgan, Katrina Chandler and Stuart Taylor. We are once again extremely grateful to Caroline Sheard for her excellent index. Her index for the sixth edition deservedly won the Wheatley Prize (1998). Our heartfelt thanks also go to the team of copy editors and proof readers who, in deciphering and analysing reams of verbiage, are the ultimate refiners of these four volumes.

> D.A. Burns S.M. Breathnach N.H. Cox C.E.M. Griffiths

Preface to the First Edition

No comprehensive reference book on dermatology has been published in the English language for ten years and none in England for over a quarter of a century. The recent literature of dermatology is rich in shorter texts and in specialist monographs but the English-speaking dermatologist has long felt the need for a substantial text for regular reference and as a guide to the immense monographic and periodical literature. The editors have therefore planned the present volume primarily for the dermatologist in practice or in training, but have also considered the requirements of the specialist in other fields of medicine and of the many research workers interested in the skin in relation to toxicology or cosmetic science.

An attempt has been made throughout the book to integrate our growing knowledge of the biology of skin and of fundamental pathological processes with practical clinical problems. Often the gap is still very wide but the trends of basic research at least indicate how it may eventually be bridged. In a clinical textbook the space devoted to the basic sciences must necessarily be restricted but a special effort has been made to ensure that the short accounts which open many chapters are easily understood by the physician whose interests and experience are exclusively clinical.

For the benefit of the student we have encouraged our contributors to make each chapter readable as an independent entity, and have accepted that this must involve the repetition of some material.

The classification employed is conventional and pragmatic. Until our knowledge of the mechanisms of disease is more profound no truly scientific classification is possible. In so many clinical syndromes multiple aetiological factors are implicated. To emphasize one at the expense of others is often misleading. Most diseases are to some extent influenced by genetic factors and a large proportion of common skin reactions are modified by the emotional state of the patient. Our knowledge is in no way advanced by classifying hundreds of diseases as genodermatoses and dozens as psychosomatic.

The true prevalence of a disease may throw light on its aetiology but reported incidence figures are often unreliable and incorrectly interpreted. The scientific approach to the evaluation of racial and environmental factors has therefore been considered in some detail. The effectiveness of any physician in practice must ultimately depend on his ability to make an accurate clinical diagnosis. Clinical descriptions are detailed and differential diagnosis is fully discussed. Histopathology is here considered mainly as an aid to diagnosis but references to fuller accounts are provided.

The approach to treatment is critical but practical. Many empirical measures are of proven value and should not be abandoned merely because their efficacy cannot yet be scientifically explained. However, many familiar remedies old and new have been omitted either because properly controlled clinical trials have shown them to be of no value or because they have been supplanted by more effective and safer preparations.

There are over nine hundred photographs but no attempt has been made to provide an illustration of every disease. To have done so would have increased the bulk and price of the book without increasing proportionately its practical value. The conditions selected for illustrations are those in which a photograph significantly enhances the verbal description. There are a few conditions we wished to illustrate, but of which we could not obtain unpublished photographs of satisfactory quality.

The lists of references have been selected to provide a guide to the literature. Important articles now of largely historical interest have usually been omitted, except where a knowledge of the history of a disease simplifies the understanding of present concepts and terminology. Books and articles provided with a substantial bibliography are marked with an asterisk.

Many of the chapters have been read and criticized by several members of the team and by other colleagues. Professor Wilson Jones, Dr R.S. Wells and Dr W.E. Parish have given valuable assistance with histopathological, genetic and immunological problems respectively. Many advisers, whose services are acknowledged in the following pages, have helped us with individual chapters. Any errors which have not been eliminated are, however, the responsibility of the editors and authors.

The editors hope that this book will prove of value to all those who are interested in the skin either as physicians or as research workers. They will welcome readers' criticisms and suggestions which may help them to make the second edition the book they hope to produce.

Chapter 1

Introduction and Historical Bibliography

D.A. Burns & N.H. Cox

What is dermatology?, 1.1 The evolution of dermatology, 1.1 The dermatologist's work, 1.3

Selected historical bibliography, 1.5

What is dermatology?

Dermatology is defined in the *New Oxford Dictionary of English* as 'The branch of medicine concerned with the diagnosis and treatment of skin disorders' [1]. However, dermatologists do not confine themselves merely to a study of intrinsic disorders of the skin, but must also study internal medicine and the many environmental and occupational factors that so frequently cause skin problems.

A plethora of external factors, including numerous chemicals, can adversely affect the skin in some circumstances. The clinical dermatologist must be knowledgeable about these potential hazards, and this will often require a detailed study of the multiplicity of chemicals, plants, animals, parasites, microorganisms, radiation, climatic conditions, etc., to which the skin is exposed. In many cases, the dermatologist will need to obtain exact details of what is involved in the patient's occupation and hobbies, and many dermatologists build up a considerable knowledge of the different jobs involved in their local industries.

The dermatologist must also have a good knowledge of internal medicine, as most systemic diseases can occasionally affect the skin, either directly or as a result of a complication of the disease or its treatment. Drugs taken by the patient have to be considered by the dermatologist, because the unwanted effects of many drugs include provocation of rashes. This applies not only to prescribed medication, but also to over-the-counter and 'complementary' remedies.

A dermatologist must also pay attention to the psyche, as psychological factors play an important part in dermatology. The skin is of major importance in our 'body image', and the fact that skin diseases are often regarded with revulsion by the general population adds to the distress they cause, so that the psychological disturbance induced by skin problems may be out of all proportion to their 'medical' significance. Sometimes, these psychological problems are exacerbated by the reactions of the patient's relatives, friends or colleagues, and in other cases they are partly accounted for by feelings of guilt or despondency, induced by the belief that skin diseases are due to 'uncleanliness' of some kind (with or without sexual overtones). In recent years, there has been increasing awareness of the impact of skin diseases on social and leisure activities, work and sexual relationships, and questionnaires such as the Dermatology Life Quality Index (DLQI) have been employed to measure the impairment of quality of life (see Chapter 71). In addition, skin diseases not only cause stress or depression, but psychological stress from another cause can exacerbate, or even be involved in causation of, some skin diseases.

Whatever the complexity of these psychological nuances, the dermatologist must be aware of their existence and try to deal with them accordingly. As described later (Chapter 61), some patients have 'skin problems' that are imagined or self-inflicted, and the presentation to the dermatologist seems to be a 'cry for help' with marital or other social problems. In other cases, the dermatological consultation may be a manifestation of an underlying psychological disease such as depression or schizophrenia.

REFERENCE

Pearsall J, ed. The New Oxford Dictionary of English. Oxford: Oxford University Press, 1998.

The evolution of dermatology

Skin diseases predate written records, and many of the earliest medical writings deal with dermatological subjects. The history of dermatology is too large a subject to be covered in this book, although a selected historical bibliography is given at the end of this chapter. The development of modern dermatology is briefly outlined below.

1.2 Chapter 1: Introduction and Historical Bibliography



Fig. 1.1 The title page and facing plate from the 6th edition (1824) of Thomas Bateman's *Practical Synopsis of Cutaneous Diseases, According to the Arrangement of Dr Willan.* The plate shows the eight orders of cutaneous eruption in Willan's classification.

Dermatology evolved as a branch of internal medicine during the 19th century. Previously, many diseases of the skin had fallen within the province of the quack or the surgeon, and indeed many of the older surgical textbooks devote much attention to the treatment of skin disease. The physicians of that time were little concerned with the skin, apart from the eruptions of the acute infectious fevers. In the early 18th century, individuals such as Daniel Turner advocated use of preparations applied to the skin as treatment for internal diseases. During the last decades of the 18th century, however, many of the great physicians began to record their observations on the diseases of the skin, and this continued throughout the 19th century. Towards the end of that century, skin diseases, particularly the chronic infections such as syphilis and tuberculosis, formed a significant part of the general physician's practice, and by the beginning of the 20th century some physicians were beginning to specialize in dermatology. This trend towards increasing specialization has continued ever since.

In the first half of the 20th century, dermatology was slow to develop along scientific lines. The emphasis was very much on the clinical description, naming and classification of the numerous skin disorders, and this led to a profusion of synonyms, which are daunting to those attempting to get to grips with dermatological nomenclature. Only empirical treatment was available, and it was often ineffective, messy and malodorous. Dermatology certainly lagged behind some of the other medical specialties in its understanding of basic disease processes. In retrospect, this seems to have been due to two main factors. The first was that most skin diseases could be identified by external examination alone, and therefore seemed to need no further investigation. The second and perhaps more important factor was that most skin diseases could not be investigated by the relatively crude tests that were available at that time. It was only when skin biopsy became a standard technique, with the plethora of pathological knowledge that followed, that an understanding of the pathogenesis of many skin diseases began to emerge.

In the second half of the 20th century, there was an explosion of dermatological knowledge, mainly as a result of the introduction of sophisticated research techniques which not only led to a better knowledge of the pathogenesis and treatment of skin disorders, but also facilitated the development of more targeted treatments. More recently, the techniques of molecular biology have also been applied (Chapter 8), leading to, amongst other things, important developments in genetics and the understanding of mechanisms underlying cancer. As a result, increasing numbers of non-medical scientists are studying the skin, and its accessibility, which paradoxically inhibited investigation in the first half of the 20th century, is now of course very helpful to the research worker.

Dermatological treatment patterns have changed over the last 50 years, and will no doubt continue to do so. Recent advances in treatment include topical immunosuppressants, immune response modifiers and biological therapies for psoriasis. Further sophistication in treatment



Fig. 1.2 Impetigo contagiosa, from the *Portfolio of Dermochromes* by Professor Jacobi (1903). The English adaptation of the text was performed by J.J. Pringle of the Middlesex Hospital. The majority of the illustrations were of models in the Breslau Clinic.

should parallel increasing knowledge of the roles of inflammatory mediators in disease. Some older treatment modalities, such as radiotherapy, are used much less.

Dermatology is thus changing at an ever-accelerating pace, both in the amount of scientific knowledge and treatments available, and with regard to disease patterns and patients' expectations. Increasing specialization within dermatology is becoming more common, with the expansion of expertise in dermatological surgery, laser therapy, chemosurgery, photobiology, contact allergy, genetic counselling, histopathology, etc. Certainly, dermatologists can no longer be regarded only as general physicians with an interest in the skin, although some training in internal medicine is still regarded as desirable in most countries. In the UK, trainee dermatologists are expected to have completed a minimum of 2 years of general professional training and to have passed a postgraduate examination in general medicine (Membership of the Royal College of Physicians, MRCP) before they can start their specialist training in dermatology. The specialist training entails 4 years in an approved training post, with an annual assessment of progress, on satisfactory completion of which the trainee is awarded a Certificate of Completion of Specialist Training (CCST).



Fig. 1.3 Argyria, from Radcliffe Crocker's *Atlas of Diseases of the Skin*. Henry Radcliffe Crocker (1845–1909), physician to the skin department of University College Hospital, London, made a number of important contributions to clinical dermatology, and was also a pioneer in skin microscopy and the therapeutic use of radium. His textbook *Diseases of the Skin* and the *Atlas of Diseases of the Skin* contributed to his reputation as one of the leading dermatologists of his day.

It seems possible that the days of the generalist dermatologist are numbered. Future dermatologists will perhaps regard themselves as dermatological physicians, surgeons or researchers and train accordingly. The future cannot be predicted, but it seems certain that with the increasing sophistication of populations throughout the world, the demand for dermatological expertise is likely to increase.

The dermatologist's work

There are probably at least 2000 different skin conditions that might present to the dermatologist, and most dermatologists treat patients of all ages, from the neonate to the very old.

1.4 Chapter 1: Introduction and Historical Bibliography



Fig. 1.4 Lupus vulgaris with epithelioma, from Crocker's Atlas.

The conditions seen vary enormously in severity. They range from cosmetic problems, such as dry skin or wrinkles, through a huge variety of acute or chronic diseases, which may be disfiguring, itchy or painful, but are rarely fatal, to life-threatening conditions, which, if untreated, may prove fatal within days (e.g. toxic epidermal necrolysis), weeks (e.g. pemphigus), months (e.g. malignant melanoma) or years (e.g. cutaneous lymphoma). In the UK, about 70% of consultations for dermatological problems are related to skin cancer, acne, psoriasis, viral warts and other infections, benign tumours, leg ulcers and various forms of dermatitis [1].

Obviously, the pattern of disease varies from one country to another, and even in the same city the work of dermatologists will differ, depending on their particular interests and expertise and on the social mix of their patients. Involvement with cosmetic procedures, in particular, varies according to the constraints of the health care system in which the dermatologist works.

Space precludes any detailed consideration of the work of dermatologists throughout the world, but in the British system patients are normally first seen by a primary care physician (general practitioner, GP) who refers the patient to the hospital consultant if he or she thinks it necessary or advisable. It has been estimated that around one in seven primary care consultations relates to a dermatological problem [2]. In a semirural practice in Cornwall, England, 21% of patients seen in a 5-year period by one GP had a dermatological diagnosis [3], and the most common skin diseases seen were viral warts, eczema and benign tumours. In another survey of GPs in the Bristol area of the UK, 47% of those replying to a questionnaire managed nearly all skin problems themselves in primary care [4]. The hospital dermatology services are provided by consultant dermatologists and their supporting staff. In the UK at present, each consultant is responsible for a population of around 200 000 persons, although the British Association of Dermatologists recommends a ratio of one consultant per 85-100 000 to cope with the need for specialist advice. About 12.5 people/1000 population are referred to a hospital dermatology department annually [1].

Other countries have different systems and services. In the USA, there is a ratio of 3.3 dermatologists for every 100 000 persons, although there is considerable interstate and intrastate variation in this ratio [5]. For example, it is 1/100 000 in Alaska and 3.9/100 000 in California, and within California varies from 1.26/100 000 in Fresno to 7.66/100 000 in San Francisco. There is continuing concern about provision of an adequate number of trained dermatologists to satisfy increasing demand, and that an increase in the number of dermatologists specializing in surgical and cosmetic procedures might lead to a shortage of those dealing with 'medical' dermatology patients [5-8]. It is also important that planning should take account of the high proportion of women in dermatology, and of the changing roles of nursing staff [9]. There are, of course, other countries from which dermatologists are conspicuously absent.

Many skin diseases, for example warts, acne vulgaris or psoriasis, can be quickly diagnosed by their clinical features, and need little or no further investigation. At the other extreme, there are some patients—for example, those with lymphoma—who need detailed and time-consuming investigations both to confirm the diagnosis and as a basis for treatment.

The most common investigations performed in a dermatology clinic, other than simple blood tests or swabs for microbiology, are skin biopsies. Other investigations include the extraction and identification of scabies mites, the microscopic examination of hairs, patch testing and photo-patch testing (Chapter 20). In occasional cases, special procedures may be needed, such as the examination of pets for animal parasites, or a visit to the patient's work-place or home to search for possible allergens.

The management of this infinite variety of skin disorders ranges from simple reassurance and explanation



Fig. 1.5 Discoid lupus, from Crocker's Atlas.

through the gamut of topical and systemic remedies, to the performance or supervision of numerous physical procedures such as ultraviolet irradiation, photochemotherapy, curettage and cautery, surgical excision and laser treatment. Some dermatologists will also undertake complicated and specialized techniques such as prenatal investigation and Mohs micrographic surgery, which may require close collaboration with other specialists, and newer techniques such as photodynamic therapy are finding a niche in the dermatologist's armamentarium.

In addition to this clinical workload in the hospital, UK dermatologists also sometimes undertake 'domiciliary' visits to assess and treat at home patients who for one reason or another cannot attend hospital. All consultant dermatologists in the UK are also involved in administrative and managerial work, audit and continuing medical education. All dermatologists, and not just those few employed by a university, are involved in teaching, whether of nurses, undergraduate medical students, GPs or trainee dermatologists, and a surprising number of

Selected historical bibliography 1.5

National Health Service consultants (i.e. 'non-academics') manage to undertake other commitments such as writing and research.

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1.6 Chapter 1: Introduction and Historical Bibliography

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Chapter 2

Comparative Dermatology

D.A. Burns

The evolutionary sources of the skin components, 2.1 The epidermis and the dermis and their derivatives, 2.1 Invertebrates, 2.1 Vertebrates, 2.2 Glands, 2.5 Evolution of glands, 2.5 Glands of vertebrates, 2.5 Pigment cells, 2.6 Animal colours, 2.6 Chromatophores and melanocytes, 2.6 The skin of mammals, 2.8 The skin of primates, 2.10 Origins and classification of primates, 2.10 The evolution of Hominoidea, 2.10 From *Tupaia* to *Homo*: a variety of skins, 2.12 Comparative anatomy, 2.15 The trend to nudity, 2.17

The evolutionary sources of the skin components [1–5]

All organisms have an outer layer that delimits the body and separates it from the environment. Its main functions include protection of the animal against physical damage, including that from radiation, defence against biological invasion, the regulation of the inward and outward passage of materials, and the receipt and transmission of signals to other organisms.

Dermatologists may consider matters relating to other animals unimportant, but an appreciation that many of the structures and much of the biochemistry of skin has an evolutionary history that antedates the origin of the vertebrates not only gives perspective to the human condition but also may provide clues to its understanding and models for its investigation.

Although the anatomy of skin differs greatly between animal classes and shows considerable variety in relation to the exigencies of lifestyle even within groups, it is nevertheless possible to recognize various long-standing elements. Structural materials, such as cross-linked proteins similar to collagen, are found in the most primitive animals. For example, supporting structures of aromatically cross-linked proteins associated with polysaccharides are found in coelenterate polyps, and the cuticles of parasitic worms such as *Ascaris* are composed of collagen proteins linked by disulphide bonds. Among the vertebrates, keratin first seems to have occurred in the lips and in the breeding tubercles of some fish, but similar materials are found in invertebrates.

Glands and pigment cells have an equally long history. The simplest glands are the unicellular goblet cells, which secrete mucus in coelenterates and fish alike. Multicellular glands of various degrees of complexity are ubiquitous.

Melanins, which are pigments produced by the oxidation of tyrosine, are equally widespread and are found, for example, in worms, molluscs, arthropods and echinoderms, as well as throughout the vertebrates.

The questions of most interest in dermatology concern the skin changes, including loss of long hair on the body, which have occurred in hominid evolution. However, the appreciation that the biochemical machinery of human skin was established much earlier makes it relevant first to review briefly the integument in the more primitive forms of life.

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The epidermis and the dermis and their derivatives

Invertebrates

Life began in the sea, just as the human fetus develops bathed in the amniotic fluid. Among the simplest and most archaic animals are the coelenterates, namely the

2.2 Chapter 2: Comparative Dermatology

corals, jellyfish and their allies. Such forms have only two layers of cells: an ectoderm in contact with the aquatic environment and an endoderm lining the gut cavity. The ectoderm may, nevertheless, contain gland cells, stinging cells, pigment cells and sensory cells, and its outer surface may bear microvilli, suggesting an absorptive function [1]. Microvilli are similarly found on the outside of the integument of flukes and tapeworms, which are internal parasites [2,3], and on the amniotic border of periderm of the human embryo.

Marine worms and their relatives in fresh water and on land have a thick cuticle outside their epidermis [4,5]. Arthropods, animals with jointed limbs of which crustacea and insects are examples, have a tough exoskeleton, which has helped some of their forms to colonize land. In crabs and lobsters this cuticle is hardened by the inclusion of calcareous material. Insect cuticle is composed of chitin, a polysaccharide containing amino groups, and protein, which may be tanned or otherwise cross-linked to form a hard natural plastic [6,7]. A coat of wax prevents desiccation of the animals. An obvious disadvantage of the exoskeleton is that growth can only occur if it is periodically shed, a procedure that leaves its owner vulnerable to predation or other damage [8].

One interesting feature of annelid worms is that they bear stiff bristles or chaetae, made of a keratin-like material with properties similar to that of human hair. Although of epidermal origin, chaetae are not composed of aggregated cells produced by an active matrix. Lateral cells may add substance or provide tanning agents, but the bulk of each chaeta is secreted by only a single basal cell [9,10].

Vertebrates

Origins and trends

A continuous evolutionary narrative starts with the vertebrates—animals with a backbone, which is preceded in embryonic development by an elastic rod known as a notochord. The simplest known chordates, which have only notochords and no vertebral column, are the planktonic larvae of sea squirts and a small, bottom-living marine animal known as the lancelet or *Amphioxus*.

Amphioxus has no more than a single layer of epidermal cells, but this is attached to a basal lamina below which is a cutis made up of a jelly-like zone sandwiched between two layers of collagen [11]. This appears to be a simple version, perhaps the forerunner, of the thick dermis that gives support and instruction to the complex epidermis and its elaborate derivatives, scale, feather and fur, in the various vertebrate classes, fish, amphibia, reptiles, birds and mammals.

In all vertebrates, the skin is characterized by an outer stratified epidermis and an underlying dermis, also known as the corium or cutis. The epidermis consists of closely



Fig. 2.1 Placoid scale of a shark.

packed cells, which are renewed from the basal layer and which constitute a barrier. The dermis is a connective tissue of mesodermal origin and is made up mainly of extracellular ground substance and collagen fibres manufactured by scattered cells.

The evolution of the vertebrates and their successful colonization of land are associated with a variety of structures, such as glands, scales, feathers and hair, as well as horns, claws and nails. Some of these, notably the scales of fish, are derived from the dermis or have substantial dermal components. Most, however, are epidermal, although their formation is orchestrated by interactions with the dermis.

Fish [12–14]

With few exceptions, such as eels and some catfish, fish have scales of one type or another. Sharks have placoid scales or denticles, which project from the skin. It is their presence that gives shark leather, or shagreen, its characteristic rough feel. In essence, the placoid scale has the same structure as a mammalian tooth, of which it is regarded as a forerunner (Fig. 2.1). Its bulk is formed by a cone of dentine, of dermal origin, which during its formation becomes capped with enamel deposited by an epidermal enamel organ.

Bony fish have elasmoid scales, consisting of plates of collagen with superficial mineralization. There are two main types. The more primitive cycloid scales found, for example, in the cod and the carp, are thin, large, round or oval, and have smooth, free edges, which overlap and show growth rings (Fig. 2.2). Ctenoid scales, found in perches and sunfishes, differ in having stiff spines on their posterior borders. All elasmoid scales remain covered by a thin layer of dermis and epidermis.