Textbook of Dermatology

VOLUME ONE

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Preface to Second Edition

The generous reception accorded internationally to the first edition of this book has imposed on us the obligation to prepare a second edition considerably sooner than we had expected. The general plan of the book remains unchanged, but in some fields of dermatology very important advances have taken place in the past five years and in consequence most chapters have been extensively revised and very many have been entirely rewritten. It has not always been possible to omit old material to give place to new and despite our strenuous efforts to restrain its growth this edition is therefore considerably larger than the first.

Some of the contributors to the first edition wished to reduce the number of chapters for which they were responsible. We are happy to welcome the new authors who have joined our team. Some of them have chosen completely to rewrite the chapters they have taken over, others have, with the approval of its authors, incorporated parts of the original chapter. Dr. Naylor and Dr. Wells have been compelled by other commitments to leave the team but the chapter on bacterial infections still owes much to Dr. Naylor. Dr. Wells' contributions to the original chapter on Genetics and the Skin have been revised in this chapter in the present edition although he no longer appears as its co-author and is therefore not responsible for any errors which may have found their way into it.

We are grateful to the many reviewers and correspondents who have helped us by constructive criticism or by drawing our attention to errors or omissions. We hope that we have profited from their suggestions, and we look forward to receiving more. It is only with such cooperation that we can hope to achieve our objective of providing a textbook which is scientifically based but is nevertheless essentially a practical work of reference for the serious student of dermatology whose main responsibility is the clinical care of patients.

Arthur Rook
D.S.Wilkinson
F.J.G.Ebling

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The preparation of this textbook would have been impossible without the willing cooperation of a great many colleagues. Most chapters have been submitted to the criticism of several members of our team and this mutual assistance has been greatly appreciated. Some contributors have sought the advice of other authorities on technical or specialized aspects of their chapters. We should like to express our gratitude to all those who have helped us in this way and in particular to Professor Denis Bellamy of the Department of Zoology, University of Wales, who has contributed the introduction to Chapter 64 and has given his advice on certain biochemical matters in this chapter; Dr. John Smart, Department of Zoology, University of Cambridge, for his advice on entomological problems; Dr. Eric Waddington, Cardiff Royal Infirmary, whose account of the clinical features of variola, written for our first edition in the light of his extensive personal experience, has required little revision; Dr. Joseph Marks of Cardiff, who offered very helpful suggestions in the field of mycobacterial infections; Mr. P.G.Watson, who gave his advice on matters of common interest to ophthalmologists and dermatologists, Dr. Thelma Bates of St. Thomas's Hospital, for her valuable comments on radiotherapy; Dr. J.N.S. Mitchell, who has given us valuable assistance in the selection of new illustrations and in proof reading; and Dr. V.Kirton, Dr. T.W.Turner, Dr. D.Boxley and Dr. J.G.Reid, who have also helped in many ways.

The source of almost every photograph or diagram is acknowledged in the legend which accompanies it. We are grateful to the publishers, editors and authors who have given us permission to reproduce those few illustrations which are not original. The unacknowledged photographs in Chapters 24 and 44 are from the authors' own collections.

A large proportion of the photographs are from the collections of Addenbrooke's Hospital, the hospitals of the Aylesbury and High Wycombe Group and St. John's Hospital. We are very grateful to all those consultants who have allowed us to use photographs of their patients and apologise if we have inadvertently omitted any individual acknowledgement. The late Professor J.T.Ingram, Professor F.F.Hellier and Dr. S.T.Anning have kindly permitted photographs of their patients to be included in Chapters 35 and 36. The Addenbrooke's photographs are the work of our art editor, Mr. Leonard Beard, or of his predecessor, Mr. Vince. Mr. D.G.Standen provided most of the photographs from Stoke Mandeville Hospital. The St. John's photographs are the work of Mr. R.B.Phillips, Director of the Department of Medical Illustration and Lecturer in Medical Illustration at St. John's Hospital, or of his predecessor, Mr. R.J.Lunnon. Mr. A.L.Pegg and Mr. W.Blackledge are responsible respectively for the clinical photographs and photomicrographs in Chapter 36. We are grateful to them all for their cooperation and technical skill. Messrs. Glaxo have kindly covered the cost of Figure 24.4.

Our registrars have given us valuable assistance in many ways. We ask them to accept this collective acknowledgement of our appreciation.

In conclusion, on behalf of ourselves and the many contributors who are his former pupils we wish to place on record our indebtedness to Dr. G.B.Dowling and our gratitude for his teaching and example.

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CHAPTER 1
Dermatology

ARTHUR ROOK

Dermatology, the science of the skin, was one of the many specialities which evolved from general internal medicine during the course of the nineteenth century. Most diseases of the skin, as 'external diseases', had for many centuries fallen within the province of the surgeon or of the quack. Until the eighteenth century was well advanced, physicians, with few exceptions, were little concerned with the skin, apart from the exanthematic eruptions of acute fevers. However, during the last decades of that century many of the great physicians recorded their observations on diseases of the skin. The solid contributions of some, such as Heberden and Cullen, which have received too little attention from the historians of dermatology, laid the foundations on which the pioneer specialist dermatologists of the following century were able to build.

For a century concerned almost exclusively with the identification, clinical description, naming and empirical treatment of diseases of the skin, dermatology was slow to develop along scientific lines, largely because the congested conditions of work in most clinics imposed this time-saving superficial morphological approach. In the past 30 years the character of dermatology has changed and the work of the dermatologist now embraces every aspect of the biology of skin, normal and abnormal. His present task is to integrate the accumulated wisdom of his clinical forefathers with the explosively expanding knowledge of fundamental biological processes as they involve the skin.

The history of dermatology. This book contains few historical references. They have been omitted to allow the inclusion of material of more obvious practical application. The decision was made regretfully. The system of named disease entities on which all Western medical practice is founded is an artificial concept. The frontiers of each disease are constantly shifting and a true understanding of their present significance is impossible without knowledge of their historical development. The literature on the history of dermatology is large, but much of it is anecdotal and unreliable and biased by national pride. It is hoped that this short list of references may give the reader some pleasure and encourage him to make scholarly contributions, international in range and outlook, to fill the many vast gaps in our knowledge.

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CHAPTER 2

The Normal Skin

F. J. EBLING

INTRODUCTION

To understand fully the cause, nature and treatment of skin disease requires a knowledge of the physiology, structure and chemistry of normal, as well as of pathological, skin. Whilst it may no longer be true to say that the skin is a neglected organ, it must be admitted that a scientific basis for causation and treatment can be offered for relatively few skin disorders.

If a scientific textbook of dermatology thus remains an ideal which cannot at present be fulfilled, it is nevertheless an ideal which should be kept in mind. In this book, therefore, we try to provide a limited account of the basic science of skin, and some reference to the currently developing fields of research, even though their relevance to clinical practice may as yet be tenuous. As far as possible this material appears throughout the book in the sections to which it is most appropriate. In this chapter, the functional, developmental and comparative aspects of skin as a whole are discussed, but structure and physiology are only reviewed in outline, with cross-references to the particular chapters in which a fuller treatment is given.

THE TISSUES OF THE SKIN [1,3,5,6]

The skin consists of a stratified, cellular epidermis, and an underlying dermis of connective tissue. Below the dermis is a fatty layer, the panniculus adiposus, usually designated as 'subcutaneous'. In most mammals this is separated from the rest of the body by a flat sheet of striated muscle, the panniculus carnosus, but the layer is vestigial in man.

There are two main kinds of human skin. Glabrous skin (Fig. 2.1) found on the palms and soles, is grooved on its surface by continuously alternating ridges and sulci, in individually unique configurations known as dermatoglyphics (p. 12). It is characterized by a thick epidermis divided into several well-marked layers, including a compact stratum corneum, by the presence of encapsulated sense organs within the dermis, and by a lack of hair follicles and sebaceous glands. Hairy skin (Fig. 2.2), on the other hand, has both hair follicles and sebaceous glands but lacks encapsulated sense organs. There is wide variation in different areas. For example, the scalp, with its large hair follicles, may be contrasted with the face, which has large sebaceous glands associated with very small vellus-producing follicles, whilst the axilla is notable because of the presence of apocrine glands in addition to eccrine sweat glands which are found in every region of the body. Regional variation is further considered below.

The superficial epidermis contains cells of several types. Keratinocytes are formed by division of cells in the basal layer. As the cells move outwards, forming the successive layers (Figs. 2.1 and 2.2), they synthesize an insoluble protein, keratin, which remains within them (Chapter 37). Pigment-forming cells, or melanocytes, are present in the basal layers of the epidermis and in the matrices of the hair follicles. Melanocytes are secretory cells and they inject pigment granules by way of dendritic processes into epidermal and hair cells (Chapter 40). The epidermis also contains Langerhans' cells (p. 6) and Merkel cells (p. 8).

The hair follicles comprise pockets of epithelium which are continuous with the superficial epidermis. They undergo intermittent activity throughout life. During the active phase the follicle envelops at its base a small papilla of dermis (Chapter 55). A bundle of smooth muscle, the arrector pili, extends at an angle between the surface of the dermis and a

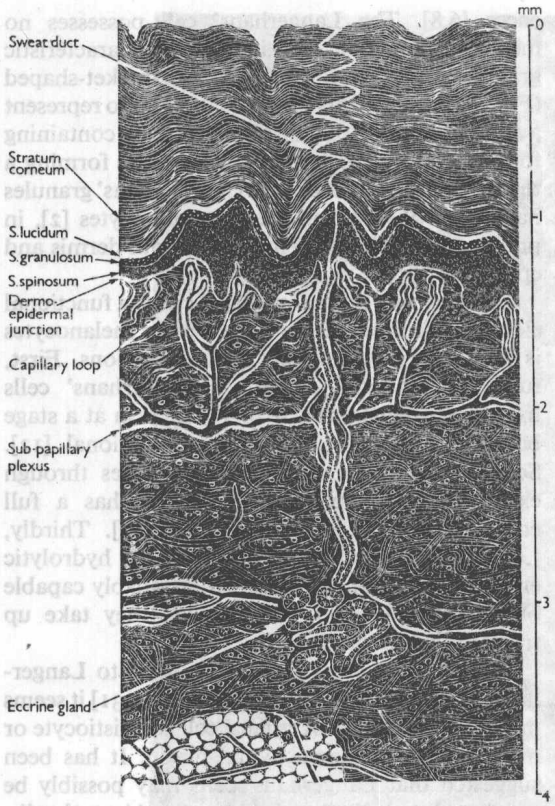

FIG. 2.1. Section of glabrous skin of sole. Blood vessels have been injected.

point in the follicle wall. Above this insertion the holocrine sebaceous gland (Chapter 54) opens by a short neck into the pilary canal, and some follicles in certain areas of the body, notably in the axilla, have, in addition, an apocrine gland (Chapter 53). Also derived from the epidermis, and opening directly to the skin surface, are the eccrine sweat glands [4], present in every region of the body in densities of 100–600 per cm^2 (Chapter 53).

The major constituent of the dermis (Chapter 50), apart from water, is a fibrous protein, collagen, which is embedded in a ground substance composed mainly of mucopolysaccharides. Elastic fibres are also plentiful, though they constitute only a small proportion of the bulk. The cellular constituents of the dermis include fibroblasts (Chapter 50), mast cells (p. 12 and Chapter 49) and histiocytes (Chapter 12). The dermis has a very rich blood supply, though no vessels pass the dermo-epidermal junction (p. 12 and Chapter 28).

The motor innervation of the skin is autonomic, and includes a cholinergic component to the eccrine sweat glands and adrenergic components to both the eccrine and apocrine glands, to the smooth muscle of the arterioles and to the arrector pili muscle [2]. The sensory nerve endings are of several kinds; some are free, some terminate in hair follicles and others have expanded tips. Only in glabrous skin are some encapsulated. The problem of cutaneous sensation is considered on p. 8, and the innervation of skin receives further attention in Chapter 62.

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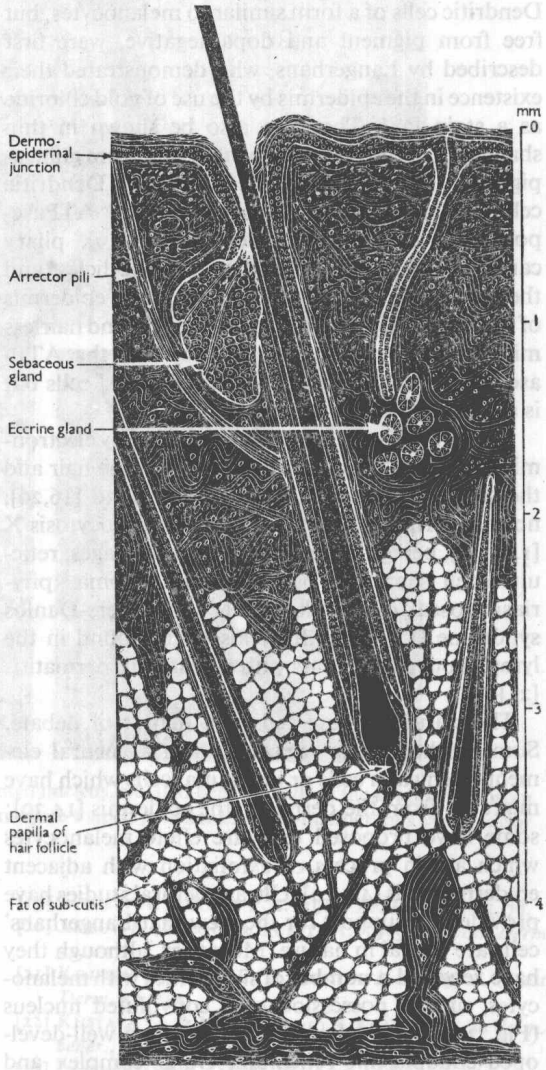

FIG. 2.2. Section of hairy skin of scalp.

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LANGERHANS' CELLS [9,10,13,27,28,29]

Dendritic cells of a form similar to melanocytes, but free from pigment and dopa-negative, were first described by Langerhans, who demonstrated their existence in the epidermis by the use of gold chloride as a stain [23]. They can also be shown in thin shavings of living, non-pigmented skin from guinea-pigs, by the use of methylene blue [3]. Dendritic cells which are dopa-negative but ATPase-positive occur in human epidermis [19], pilary canals and outer root sheaths of hair follicles, and they have also been demonstrated in the epidermis of rhesus monkeys [18], guinea-pigs [34] and hairless mice [35]. Some authors believe, however, that ATPase activity is not specific for Langerhans' cells but is also shared by melanocytes [7,26].

Langerhans' cells have been identified by electron-microscopy in the outer root sheath of the hair and the secretory duct of the sebaceous gland [16,20], normal dermis [22,36], in lesions of histiocytosis X [1,25,31], benign tumours of the appendages, reticulum-cell sarcoma, basal-cell epithelioma, pityriasis rosea, oral leukoplakia and Ehlers-Danlos syndrome [17]. They have also been found in the lymph nodes of patients with eczematous dermatitis [21].

The status of these cells is a matter of debate. Some authors have regarded them as neural elements, Schwann cells or interstitial cells which have migrated from the dermis to the epidermis [14,30]; some have proposed they are effete melanocytes which are in process of exfoliation with adjacent epidermal cells [4,5,24]. Ultrastructural studies have provided no support for the view that Langerhans' cells are neural in nature. Moreover, although they have revealed a number of similarities with melanocytes, such as possession of a convoluted nucleus (Fig. 2.3), relatively clear cytoplasm, a well-developed endoplasmic reticulum, Golgi complex and lysosomes, they have also demonstrated clear differences [6,8]. The Langerhans' cell possesses no melanosomes, but has instead a characteristic granule [9,13,36,37]. This is rod- or racket-shaped (Fig. 2.3), and its appearance is thought to represent a sectional profile of a disc-shaped body containing four sheets of regularly spaced particles forming a three-dimensional lattice [32]. Langerhans' granules have been observed in foetal keratinocytes [2], in prickle cells and extracellularly in both dermis and epidermis [33].

The view that the Langerhans' cell is a functional element unrelated either to nerves or melanocytes is supported by a number of observations. First, fully differentiated epidermal Langerhans' cells have been demonstrated in foetal skin at a stage before the melanocytes become functional [12]. Secondly, skin deprived of melanocytes through exclusion of neural-crest derivatives has a full complement of Langerhans' cells [11]. Thirdly, Langerhans' cells contain a variety of hydrolytic enzymes [35]. Fourthly, they are probably capable of division, since in skin wounds they take up tritiated thymidine [15].

Since cells in every respect identical to Langerhans' cells occur in histiocytosis X [1,25,31] it seems probable that the Langerhans' cell is a histiocyte or macrophage, of mesenchymal origin. It has been suggested that Langerhans' cells may possibly be concerned with the breakdown of epidermal cells, or the loosening of intercellular connections by desmosomes and cement, and they might thus be termed 'epidermoclasts' [10,29], though such functions are far from established.

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