AIDS TO DERMATOLOGY

MACKENNA & COHEN

FIFTH EDITION

BAILLIÈRE, TINDALL & COX

AIDS TO DERMATOLOGY

by

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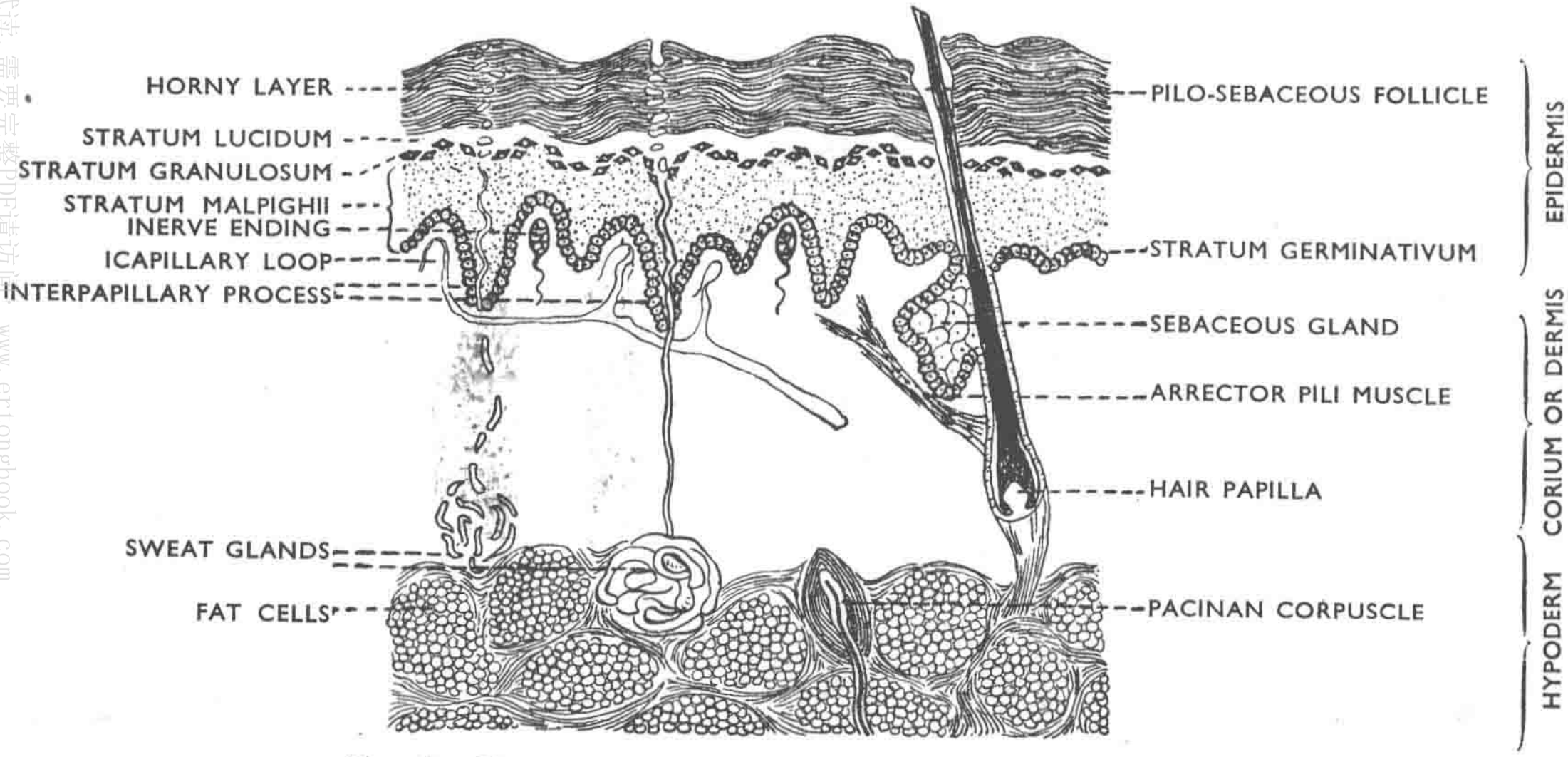

FIG. 1.—DIAGRAM SHOWING THE STRUCTURE OF THE SKIN.

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PREFACE TO THE FIFTH EDITION

THIS book is designed to fulfil the double purpose of providing a volume which will give the student a survey of many dermatoses and their treatment and of placing at the disposal of the newly qualified doctor in practice a handy guide to the diagnosis and treatment of skin diseases. We are pleased that it has met with such approval that another new edition has been demanded within a relatively short period since the publication of its predecessor.

We have endeavoured by suitable additions, omissions and amendments to make the work as up to date as possible, but we have not stressed the uses of corticosteroids, as, though they may be a valuable tool in the hands of the expert, their employment involves certain risks. To meet the wishes of various reviewers, a short chapter has been added concerning venereal diseases. This addition has been made more in deference to our critics than because of any belief we possess that such a large subject can be adequately dealt with in less than a volume.

It will be noted that as in previous editions there is some lack of uniformity in the manner of writing prescriptions. This is intentional, for we consider that it is advisable that readers should have some practice in writing and reading recipes in Latin as well as those in English, for a certain type of patient will have more hesitation in copying out a Latin prescription for the benefit of his friends than he will in doing the same with an English script; it seems to us important that the practitioner should, by recourse to a " dead " language, be

able to avert temptation from the patient and save the latter's friends from his good intentions.

We have to thank Dr. R. G. Cochrane for much assistance concerning modern views on leprosy, Dr. H. Haber for information concerning histology and histopathology, and Mr. J. R. Elliott, Ph.C., Pharmacist to St. Bartholomew's Hospital, London, who has advised us concerning many problems we encountered in Chapter I concerning the formulation of dermatological prescriptions. We are also indebted to Mrs. Lipman Cohen, who very kindly undertook the duties of an amanuensis, to Mrs. Norman Elliott, who made the drawings for Figs. 1 and 5, and Messrs. May and Baker for their kindness in allowing us to use the illustration of *Sarcoptes scabiei* for Fig. 4.

Finally we should like to thank Mr. R. F. West of Messrs. Baillière, Tindall and Cox, who has always taken much personal interest in this book and whose advice, given over a period of many years, has always been invaluable.

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CHAPTER I

INTRODUCTORY

Anatomy and Physiology.

THE skin consists of the *epidermis* or scarf skin and the *corium* (*cutis vera, dermis*) or true skin. The epidermis is formed from the ectoderm, and the *corium* from the mesoderm of the fertilized ovum. The skin has five chief functions:

1. It forms a pliable and elastic covering for the body.
2. By means of its blood vessels and sweat glands it regulates the temperature of the body.
3. Through its sweat glands it acts as an excretory organ.
4. Because it contains the end organs of many sensory nerve fibres it enables the organism to appreciate the sensations of heat, cold, pain, itching and light touch.
5. Under suitable conditions the skin supplies vitamin D to the body. This vitamin is formed by the photochemical action of ultra-violet rays on a sterol, possibly dehydrocholesterol; it is believed that this is excreted in the sebum, irradiated and converted into vitamin D on the surface of the skin and then absorbed.

In addition to these functions it is extraordinarily impermeable to chemical substances which are applied to it, and it possesses a mechanism of self-disinfection which, though little understood, is of great importance not only for the maintenance of the health of the skin, but for the wellbeing of the individual. Research by J. M. L. Burtenshaw* indicates that there are present in the skin, its appendages and its secretions, long-chain fatty acids with their esters and soaps which all are lethal to *Str. pyogenes* and *Str. viridans* and to certain other organisms, in-

* *Journal of Hygiene*, 1942, **42**, 184.

cluding *Coryn. diphtheriæ.* Under optimum conditions healthy skin can destroy *Str. pyogenes* within one day, and *Staph. pyogenes* within three days. Bacterial invasion is also retarded by the desiccation of organisms unable to penetrate the skin, the constant exfoliation of the epidermis, the acidity of the skin surface, and the activity of the reticulo-endothelial system when organisms penetrate the skin.

The skin possesses two appendages—nails and hair. The former, which probably originated as weapons of offence and defence, have become degenerate in man; the latter was probably developed to assist the temperature-regulating mechanism of the body.

Epidermis.—Commencing at the surface of the epidermis and passing inwards, we have:

1. The flattened, non-nucleated cells of the *stratum corneum.* These are keratinized epithelial cells, and contain a fatty or waxy substance which does much to make the skin waterproof. The superficial cells of this stratum are constantly being shed and replaced.

2. The clear non-granular cells which form a thin layer known as the *stratum lucidum.* These cells are not nucleated, and contain an oily fluid in tiny drops, called *eleidin.*

3. The thin layer of spindle-shaped, nucleated, granular cells, known as the *stratum granulosum.* The granules are composed of *keratohyalin*; these granules refract light and help to impart the white colour to the skin.

4. The *rete mucosum of Malpighi* (also known as the *stratum malpighii* or *Malpighian layer*), which consists of:

(*a*) A thick layer of prickle cells, which are so called because the intercellular spaces are bridged by fine fibrils. These cells are flattened where they are adjacent to the *stratum granulosum*, but are polyhedral in the deeper parts. They are nucleated.

(*b*) The single row of nucleated columnar cells which form the *stratum germinativum* or *germinal layer.* They are believed to be "the mother cells of the epidermis." Melanoblasts, which are melanin-

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producing cells having branching dendritic processes, are interspersed between the columnar cells. *Melanin* is produced in the former cells and transferred to the latter where it may be seen as granules in the cytoplasm. Melanin shields the nuclei from the deleterious effects of ultra-violet rays; also, it may help to protect the delicate endothelium of the blood vessels of the *corium*. R. Aitken has suggested that this statement, which is generally accepted, is incorrect, and that pigment is produced in greatest abundance under the influence of the visible rays of the spectrum to protect the deeper parts against these rays.

The epidermis, therefore, consists of the four strata enumerated above, and it is obvious that it can be described in its entirety as a coat of stratified epithelium which ensheaths the body. As the superficial layers become worn away they are replaced by the cells of the *stratum malpighii*. The horny cells of the *stratum corneum* are highly specialized cells which have arisen in the *stratum germinativum*, and have been pushed slowly up to the surface. There is a basement membrane between the dermis and epidermis.

The epidermis does not contain blood vessels. Until recently it has been taught that its interpapillary processes interdigitate with the papillary processes of the *corium*, but E. H. Leach has shown that actually there are cup-like depressions in the epidermis into which the papillary processes fit; it is the "sides" of these "cups" which under an ordinary microscope appear to be interdigitations.

H. Haber in a personal communication informs us that the epidermis is kept in place by four factors: (1) by protoplasmic filaments of the basal cells interlocking firmly with reticulum fibres placed immediately under the epidermis; (2) by the integration of the papillary processes with the epidermal "cups"; (3) by the basement membrane; (4) probably by a garland of elastica fibres which originate in the *corium*.

Dermis.—The dermis (*corium* or *cutis vera*) is chiefly

composed of fibrous tissue, which is more dense superficially than internally. It may be divided into two layers:

(*a*) The *papillary layer*, which is composed of fibrous tissue bundles with a small amount of elastic tissue. Fine fibres of elastic tissue pass upwards and split into fibrils which end between the cells of the *stratum germinativum*. The papillæ contain sensory nerve endings, blood vessels, and lymphatic channels.

(*b*) The *reticular layer*, which consists of a network formed of bundles of white fibrous tissue. This tissue is formed of an albuminoid substance called *collagen*; therefore the bundles are often referred to as "collagenous bundles." Elastic fibres, formed of an albuminoid substance, *elastin*, are arranged parallel or obliquely to the collagen bundles; they are more numerous in the reticular than in the papillary layer of the *corium*. Elastic fibres envelop the sebaceous and sweat glands, the hair follicles and the *musculi arrectores pilorum*; they anchor the distal ends of these muscles in the collagenous bundles, and are also in intimate connection with the blood vessels.

In the *corium* there is an interfibrillar substance composed of mucoproteins which contain mucopolysaccharides of the nature of hyaluronic acid and chondroitin-sulphuric acid.

Histiocytes are present in the *corium*; they are mobile cells having large oval or round nuclei which form part of the reticulo-endothelial system of the body; they can store within their bodies soluble acid dyes and colloidal iron; in xanthoma (*q.v.*) the "foam cells" are histiocytes containing cholesterol. The reticulo-endothelial system is also represented in the *corium* by fixed endothelial cells.

Hypoderm.—This is a transitional zone between the skin and the underlying adipose tissue. The hypoderm contains fat cells and white and yellow connective tissue. The coils of some of the sweat glands and the roots of some of the hairs are situated in the hypoderm.

Blood Supply.—The blood supply of the skin, including the hypoderm, is derived from two plexuses: the first is situated in the *corium* immediately above the subcutaneous tissue; the second is an arterial network just

below the level of the bases of the papillæ. Branches are given off from these plexuses to the sweat glands, hair roots, sebaceous glands, etc. Blood circulates via looped blood vessels in the papillæ.

There are four venous plexuses in the skin: the first immediately below the papillæ; the second a little deeper; the third in the *mid-corium*, and the fourth immediately above the hypoderm.

The skin is divided into "arterial territories," which are demonstrable all over the body, but particularly on the extremities when they are cold. Each of these areas consists of a central pale zone where the arterial supply is good, the vascular tone high, and where there is a maximum of vitality and resistance. The border of each territory is darker in colour because of venous engorgement and here there is lower vascular tone and vitality. When, as a result of cold, the territories become easily visible, the reticular pattern is called *livedo reticularis* or *livedo frigore.*

The glomus is a peculiar type of anastomosis between the arterioles and venules in the upper level of the *corium*; having a large nerve supply, it is a device whereby the pressure and amount of the capillary blood can be quickly controlled by closing or opening the anastomosing blood vessels. These anastomoses are chiefly found in the toes and fingers.

It should be noted that the *corium* is dependent for its nourishment on the veins and the lymphatics, for even the thinnest arterioles in the upper part of the reticular layer have a few muscle fibres. Some anabolic products from arterial blood undoubtedly reach the papillæ, but it is chiefly from the venules, which are formed solely of endothelial cells, that the skin gets its nourishment. This unique vascular arrangement is probably due to the fact that, unless the blood supply of the skin can be fully controlled by relatively excessive contractions or dilatations of the capillaries and arterioles in the *corium*, the skin cannot be adequately used to regulate the body temperature.

Lymph circulates in the intercellular spaces of the epidermis. There are lymph spaces at the tip of each

papilla, and lymph circulates in intercellular spaces between the fibres of the *corium*. Also lymph channels accompany the blood vessels.

Nerves.—Both myelinated and non-myelinated sensory nerves are found in the skin. G. Weddell has shown that cutaneous pain is appreciated by nerve-nets which interweave with one another and from which small beaded terminals arise. Touch is appreciated by Meissner's corpuscles, by Merkel's discs and also by hairs. The corpuscles are situated in the papillæ and are most numerous when tactile perception has to be most acute—*e.g.*, in the finger tips. Merkel's discs are placed in the superficial layers of the dermis. Pressure is subserved by the Pacinian corpuscles of the hypoderm. Krause's end bulbs, which subserve cold, lie at variable depths below the skin surface. Ruffini nerve endings, whereby warmth may be appreciated, are scattered in the *corium*. The nerve supply of the cutaneous blood vessels consists of both motor and sensory nerve fibres. Vaso-constrictor fibres are derived from the sympathetic nervous system.

Recently R. P. Arthur and W. B. Shelley* have shown that besides heat, cold, pain and light touch, itching must be regarded as a specific sensation, and not—as hitherto—as a variant of pain. Certain endopeptidases having activities in the physiological *p*H range will produce itching when introduced into the skin; possibly their chief site of action is in the epidermis. Trypsin and pancreatin are examples of these substances, but others may be obtained from vegetable sources (*e.g.*, mucunain) or from fungi (*e.g.*, fungal proteinase).

Sweat glands consist of a glomerulus or secreting part and a duct. The glomerulus consists of a coiled tube formed by a single layer of columnar cells; these are surrounded by a layer of involuntary muscle, and a thin fibrous capsule supports the whole structure. There is a relatively copious blood supply. In the *corium* the duct is lined by two or three layers of cells, and pursues a straight course to the epidermis, which it enters in an interpapillary projection. Here it winds in a corkscrew fashion and opens on the surface of the horny layer.

* *Nature*, 1955, 175, 901.

The gland and its duct are formed by downgrowths of the epidermis.

Perspiration (sensible and insensible) is said to represent 25 per cent. (600 ml.) of the total amount of water given off from the body in twenty-four hours under ordinary sedentary conditions.

Sweat is a slightly turbid, almost colourless fluid, containing some 99 per cent. water. It contains small quantities of chlorides, urea, ammonia, uric acid, creatinine, phosphates, lactic acid, sulphates and certain enzymes; also small amounts of the fatty acids up to caprylic, and perhaps lipoids. Sweating is under the control of the sympathetic nervous system. Acetylcholine is thought to be the chemical mediator of sweat-nerve impulses.

In the genital and anal regions, the axillæ, the nipples and areolæ a special variety of sweat gland is found. This is an apocrine type of gland in which the tips of the cells lining the glands disintegrate and mix with the fluid secretion. The apocrine sweat glands are larger than the common (eccrine) sweat glands; many open into the hair follicles above the sebaceous glands and their secretion has a definite odour which has a sexual significance. The odour is produced mainly by the action of bacteria (chiefly micrococci) on the apocrine sweat. The glands are more numerous and more active in women than in men, in coloured than in white peoples; they secrete actively during pregnancy and menstruation.

Appendages.—The hair (*crinis*) is epithelial in origin, and is made of modified horny cells, which arise in a follicle formed of invaginated epidermal cells situated in the deeper layers of the dermis. The follicle is a complicated structure which need not be described here. It is itself invaginated by a small projection derived from the *corium* known as the *papilla.*

The hair is formed by proliferation of cells of the hair matrix, which is a layer of epidermal cells covering the underlying papilla. It is composed of three layers:

1. A thin layer of flattened horny cells—*the cuticle.*
2. A thick pigmented layer of spindle-shaped cells—*the cortex.*
3. A column of cells, nucleated near the papilla,

which lose their nuclei as they become more distant from it—*the medulla.* The medulla extends only for a variable distance up the shaft.

Lanugo hairs have no medulla.

A small band of unstriped muscle fibres is attached to the follicle—this forms the *arrector pili* muscle.

As each hair passes through the superficial layer of the dermis it is lubricated by *sebum*, which is the excretion of a small saccular gland* formed from the *stratum malpighii.* The gland lies adjacent to the hair shaft, and consists of one or several saccules with a duct which opens into the neck of the hair follicle. Sebum is formed by the fatty degeneration and disintegration of large, nucleated, polygonal cells within the gland. Human sebum is a mixture of fats and waxes. It contains free fatty acids, glycerides, esters of higher aliphatic alcohols and of cholesterol (waxes), and hydrocarbons, including squalene; its function is to lubricate the skin and keep it supple, and to protect it from becoming sodden when immersed in water, or cracked when exposed to a dry atmosphere.

Besides the sebaceous glands which are associated with hair follicles, there are others which discharge directly on to the skin surface and which are associated with the lanugo hairs. The Meibomian glands on the eyelids and Tyson's glands on the *glans penis* and inner surface of the prepuce are modified, large sebaceous glands. The wax glands of the ear, the glands of the mucous surfaces of the lips, the areolæ and the genitalia are also modified sebaceous glands.

The nails (*onyx*, a nail) consist of modified horny cells firmly united. They are formed proximally in the nail matrix, which consists of modified cells from the *stratum malpighii.* The nail bed, which underlies the main mass of the nail, consists of somewhat modified prickle cells, to which the nail is firmly attached. The *papillæ* in the dermis underlying the nail bed are arranged to form a series of longitudinal ridges. As a very rough estimate, it may be said that a nail takes from five to six months to grow from the matrix to the finger tip; but there are seasonal variations in the rate of growth. The nail on the

* *Vide* p. 56.

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