

On
the Factors which determine Distribution
in
Cutaneous Eruptions,
being a Thesis
most humbly and respectfully presented to the
UNIVERSITY OF EDINBURGH

by
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M.D. 192

an
Alumnus.



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This drudge or diviner, laid claim to me;
----, swore I was assured to her; told me
what privy marks I had about me, as,
the mark of my shoulder, the mole in my
neck, the great wart on my left arm,
that I amaz'd ran from her as a witch:

Shakespeare-
Comedy of Errors Act III,
Scene 2.

- I. Introductory.
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- IV. The nature of the infective or causal agent and its mode of access; continued action in the skin; regional distribution.
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Introductory.

Whatever difference of opinion there may be in regard to the reasons for the distribution of the many and varied eruptions which appear upon the skin, there can be no doubt that, underlying, there must be reason based upon fact which is both definite and real.

This conclusion will be arrived at when there is considered the regularity in the advent and in the progressive appearance of eruptions and, in so many instances, the definite sequence of events from the commencement, which we anticipate and expect in any given case. Their efflorescence, occurring in a definite way, and in certain regions, suggests some particular factor or factors which compel its appearance and its development in the manner in which we shall find it and, to some extent, may explain how and why such eruptions possess features which are both constant and characteristic.

In considering disposition and distribution, the whole subject must be viewed broadly and a foundation, based upon observation of scientific fact, laid, and built upon tier by tier till the whole is complete, if sometimes indeed a laborious task. Too often will one placate oneself with an opinion or conjecture as to the why and wherefore of the distribution arrived at more by guesswork than by argument supported by ascertained fact. I am convinced that a true explanation should present itself as to the fundamental reason

behind the lay-out and arrangement of most eruptions.

The histology and the position in the skin itself is of first importance and, after a careful general survey and examination, the anatomy of the primary or elementary lesion and the layer or layers of skin chiefly implicated are to be determined - in other words, the depth plumbed. This study of the initial lesion is of great value, but only after due examination has been made in reference to the case as a whole so as to seek out, if possible, some tendency, predisposition, or likely cause, which is general or local in its effect and which may be of assistance in explaining the pattern of the eruption. A searching anamnesis and physical examination may be unnecessary, or thought unnecessary in many, but in a few obscure instances these cannot but be productive of much help in elucidating facts which will have a distinct bearing upon the subject. Nor should one neglect to make use of the more modern methods which will include blood examination, the culture of infective material, and the determination of hepatic, renal, pancreatic, and alimentary functions, the judicious use of which may supply information or explanation so as to fill some blank in the clinical picture.

I would submit then that the broad and comprehensive view must be taken in each dermatological case based upon sufficient examination, general and local, before the complete chain can be forged, and that each link must be built upon established fact, so far as that is possible. The relationship between cause and effect would appear in many cases to be set far apart but they can be approximated more closely

as symptom and sign are revealed and studied and placed in their proper perspective and significance; like a jig-saw puzzle, the whole cannot be complete if one component part be missing. We can, however, even in the absence of certain links be, for all practical purposes, reasonably certain that our deductions are probably correct because much of the evidence which goes to explain the distribution is necessarily circumstantial and often partial and, at best, scrappy.

With this knowledge, I would humbly submit this thesis, hoping at the same time to show that in many cases, at least, the particular mapping and distribution are capable of scientific and satisfactory explanation, and offering an apology should I, unwittingly, encroach without acknowledgment upon the work of others.

PRELIMINARY CONSIDERATIONS:

It would appear that the origin in any disease must necessarily be at first local, the subsequent distribution being determined by contiguous spread, assisted possibly by mechanical or other means, or by infection or toxæmia, original or superadded, where such exists and is vessel-borne, the arterial, venous, or lymphatic, stream acting as vehicle. It is noticeable that some eruptions have a predilection for the face, or the hairbearing areas; others for the trunk, or for the limbs. On the other hand some, commencing locally tend, should they persist for a time, to become more widely distributed, or even generalized, developing at the same time alterations in character which will obviously depend upon various factors acting locally or systemically. The means by which distribution is effected must necessarily be limited to the method mentioned namely, to direct extension or to the circulatory, or lymphatic, system of vessels. This must hold whatever be the primary source or the nidus upon which the organism, or virus, or agent, is implanted.

With the passing of time, and with increased knowledge, it is borne in upon us that many, if not most, skin eruptions are ascribable to microorganismal or toxic origin, depending upon the presence of organisms which find a suitable soil, or upon the toxins produced by them, or upon both. Others may depend upon autotoxaemia or the effects of chemical or physical agents, animal or vegetable parasites, including saprophytes and moulds, or upon the ingestion of drugs. It may be easy to argue that the causal agents of the different infectious fevers, for example, produce rashes of different kind and extent simply because produced by different infections; but, it appears to me to be of some importance to determine why, in spite of different causal organisms or agents to produce them, one rash is erythematous, another morbilliform, another polymorphic - punctate on the chest, and coarsely papular, morbilliform, or even urticarial, in other situations. Again, why do many rashes follow the same course and become distributed in a direction downwards so as to appear last upon the lower extremities and feet, fading in the same order. Widely different lesions occurring in the skin cannot always be simply or easily explained when the why and wherefore of their distribution is considered. Again, two diseases may be incubated at the same time so as to appear simultaneously in the same patient, or to develop the one upon the other. In most, the causal agent or infection must be inhaled or ingested or applied to a breach of surface, however minute that may be, or to the follicle of a hair or coil gland, where, possibly, at the moment, the resistance may be lowered. The great body of skin eruptions may be viewed as being the result of a reaction, inflammatory or other, to hurtful agents. If organismal, a nidus is immediately found and toxins elaborated locally, to act locally or generally. It is unusual, except in the few when lesions appear secondarily, to find multiplication of organisms in the circulating blood. Their cultivation and increase usually take place at the point first invaded which may be the fauces as in diphtheria, the nasopharynx and accessory air-sinuses as in measles, the alimentary tract as in typhoid fever, or upon the skin itself and, in some, may then be conveyed to a further nidus or station in the spleen or other internal organ, or gland, whilst becoming generalized. It is probable that in the infectious fevers the appearance of the rash coincides with the time during which the particular toxin is first poured into the circulation, development of the eruption occurring up to a fastigium, at which time the full force of the particular toxaemia becomes exercised.

In attacking the question of distribution in any given case it is, as already stated, the occurrence of the primary lesion and its character which has to be noted - its position, its history, and its tendency, if any, to grouping, with its method of spread thereafter; because, although the primary element may persist throughout the whole duration of the eruption, it may have become so trans

formed as to be polymorphic and, perhaps, difficult of recognition. Bilateral or serial symmetry, asymmetry, grouping, or the occurrence simply of discrete lesions, may all suggest a mode of distribution and, providing there is no locus minoris resistentiae, there will be expected some regularity in appearance. Apparent symmetry need not necessarily point to a systemic cause, nor asymmetry to a local. It has been pointed out that the lesions, in some, would appear to be guided by the natural lines of cleavage in the skin. These lines of cleavage of Langer are presumed to be produced by the lie and distribution of the connective tissue fibres and bundles in the dermis², and running roughly parallel with these are to be found the cutaneous vessels and nerves. The branching appearance of a vascular system, or of a cutaneous nerve supply, is not followed by any skin eruption except in the case of zona, which may trace the course of a nerve but only approximately, and in an interrupted way; or, in the case of an obvious lesion involving the vascular network of Renault, the pattern of which is netlike rather than linear. On the other hand, those lines of cleavage may determine the angular plan of the elementary papule in lichen planus. Sir Norman Walker² believes that its outline is determined by the natural fine lines on the skin. In some, then, distribution may be guided by structural conditions. There are a few where distribution occurs by successive foci appearing, and then coalescing, or by a spreading serpiginous border, where the earliest and most characteristic lesions usually appear in the advancing edge. In others, there is the occurrence of grouping and of irregular patches; again, local spread in the same patch may be centrifugal or centripetal or both, or may form rings as in tinea circinata or impetigo contagiosa circinata. In tinea capitis and impetigo contagiosa, small patches may occur around the original patch by local extension or autoinfection; or neighbouring patches may meet, coalesce, then begin to clear up at the junction, or, a patch may spread at the edge and at the same time clear gradually in its centre with, or without, scarring. Changes such as these require explanation. It appears to me that lesions like these, in working out their life-history are influenced to some extent by their relative age - by the interval of time elapsing between their appearance and their clearing up after an evolutionary process has been gone through. Possibly relative greater or less resistance in parts involved may also account, in some degree, for such phenomena. At the same time, one expects a tendency to a circinate, gyrate, and outwardly convex, configuration and spread, as being usual and, indeed, as natural a result as the patterns made by dropping a few pebbles into still water. A straight or angled margin is exceptional and rarely found; ~~two~~ examples occur to ~~one~~: the linear outline often seen in dermatitis autophytica, and the angled plan often seen in the lichen papule brought about by the stretching of the epidermal layers due to tension underneath and the easier give at the edges because of the natural fine lines in the skin which limit its edges.

II.

The Influence of the History and Anatomical Structure of the Lesions.

Distribution on, in, and under the skin itself is determined to some extent by the anatomical structure of the layers of which it is composed, as also by the particular or specialised function and structure in various areas or regions. At the same time, different layers will react differently to the same and different causes, or be affected each in its own way by the same cause; certain diseases have a selective action upon certain layers:

1. *Stratum Corneum*.—This layer is chiefly involved in ichthyosis, xeroderma, clawis and corns, and psoriasis. In such diseases there is parakeratosis chiefly but little induration, or thickening, or much affection of other layers of the skin, providing no superadded infection occurs. They tend to remain true to type; much dryness and scaliness and a wide distribution is usual with little or no itchiness or other subjective symptoms, except in the corn, where the distribution is limited strictly to the part irritated.

2. *Stratum Granulosum*.—In disease, pigment generally deposits itself in the deeper layers of the epidermis, but if there is some intensity of pigmentation the overlying layers, especially the *stratum granulosum* is found to contain some amount. Pigment is found in the same situations when photo-therapy and helio-therapy are employed in treatment. Most cases of melanosis and pigmentary deposit are either actinic in origin and affecting exposed surfaces, or are more

local and caused possibly by a chemico-fermentative action.³ They may, however, result partly from the one cause and partly from the other.

3. Rete Malpighii and Papillary Layers.-These are chiefly affected in dermatitis, secondary syphilis, exanthemata, no scarring being left after lesions affecting these layers have cleared up. If thickening or oedema occur in the skin as in dermatitis, then there has taken place the effusion of serum from the vessels and probably a reactionary infiltration of cells round the fine vessels to explain it.

4.- Cutis and Subcutaneous Layers.-Zona, variola, erysipelas, tertiary syphilis, lupus vulgaris, lepra, carcinoma, each affects these layers and scarring results. Elephantiasis, xanthelasma, scleroderma, each affects the cutis and the subdermal tissues. The feel of the lesion usually suggests depth and indicates the position in relation to the epidermis.

5.- Coil glands.-Sudamina, obstructive in relation to the gland duct.

6.-Sebaceous glands.-Comedo, acne, phenomena of which both are partly obstructive.

7.-Hair and Hair-follicles.-Ringworm, favus, sycosis, and furunculosis are diseases which upon these parts because of the presence of hairs and of the facility the follicles offer to the lodgement of septic organisms.

8.-Nail and Nail-beds.-Onychia, onychomycosis, and psoriasis amongst other diseases affect these parts, the structure of which, the uses they are put to, and their exposed situation, favouring sepsis and contagion. In

the case of psoriasis, the fact of the nail corresponding in its position and relative structure to the stratum corneum of the glabrous skin, determines its situation there; autoinoculation by direct contact may account for some instances of the disease as it is occurs in the nails.

Histological investigation has gone far towards the elucidation of those structural, physiological, and pathological processes which take place in the skin diseased. Vessel-borne disorders are noticeably distributed first to the deeper parts only becoming more superficial when established. Similarly, those diseases which appear to involve superficial layers of the epidermis tend to remain superficial and are, as a rule, without tendency to a deeper penetration.

Roughly, the more superficial the disease in the epidermis the more chronic and the more likely is it to spread, but the less serious; at the same time, lesions more deeply placed do not tend to spread widely but may be more serious. It has to be kept in mind that lowered vitality, even if local, may cause weakness by offering less resistance and so may alter distribution and appearance. With improvement occurring, it is frequently evident that advance during recovery may proceed with the layers first affected, complete recovery following upon the clearing up of those layers last involved. Lesions which show involvement of the finer vessels and the development of a perivascular infiltration of round cells and leucocytes are usually slow in evolution and tend to an eruption which is more or less

discrete and which may persist rather deeply placed, mechanical irritation such as scratching causing extension and alteration in appearance and in the minute anatomy of the dermis and epidermis, an example of such being lichen planus with lichenification, where the areas of thickened skin affected are oval in shape and have their long axis in the length of the limb, but **are** fairly circumscribed and never reach more than a limited patchlike distribution.

The pathological processes which take place in the skin are of a varied nature and are modified by its anatomical structure. They originate alterations in its histology which produce the cutaneous signs visible in the elementary lesions, each variety of lesion possessing characters which distinguish it clearly from the others, such as size, shape, consistence, colour and relative depth. There are a few which may be found to exist in a transitional stage- a papule in process of becoming transformed into a vesicle or a vesicle into a pustule. Component individual lesions may lose their elementary character so as to cause the eruption to alter its distribution and so undergo a change in appearance; yet outlying lesions may be found retaining their initial individuality. Secondary lesions may produce the same effect by accident or in the usual evolutionary change which may occur naturally or from other, such as mechanical, cause. There is little doubt that so soon as the particular factor producing a skin disease ceases to operate, there is a natural tendency to recovery. Yet some, such as the malignant tumours, and mycosis fungoides, are progressive,

if perhaps slowly so, in the direction of greater depth and destruction, until absorption and exhaustion become so extreme as to end the scene, the tendency to inward permeation having remained more or less local throughout. Glandular and visceral metastases certainly do occur in all malignant tumours, even in rodent cancer⁴, but it is usually the original tumour which executes the damage which is vital in skin cancer and that, in one of two ways: namely, either by its growth damaging vital structures, or by ulceration causing a fatal auto-poisoning.

Apart from these, most lesions in skin disease evolve in a definite way and ultimately disappear, sometimes only temporarily, sometimes permanently, but usually the more quickly with treatment, most of the individual lesions having, in the process, become altered so that their original characters are masked or hidden. In lichen planus, the shiny polished-looking papule, in spite of much scratching, may remain discrete from start to finish, and without shewing appreciable scaliness. In this disease, as in certain others, lesions are found in the mouth and such, when they do occur, readily ulcerate because of constant moisture, irritation, and sepsis. In fact, ulceration in disease may result from pure activity strangulating the blood supply in the process. Such ulcerations, with their infective discharge, easily produce surrounding inflammation which usually persists until the ulceration disappears.

III.

The Vessel and Nerve Supply and Pathway of Dissemination.

Arterial and Venous System.-

Bloodvessels are supplied to the skin by means of two plexuses in the dermis. These provide offshoots to the papillae and, again subdividing, form capillaries which anastomose with each other on a definite plan so as to form a network of arterioles whose main supply arrives by the central papillary vessel. This vessel forms the apex of a cone, the base of which is placed more superficially and towards the skin. The vast network is made up of this conelike arrangement, and constitutes the arterial supply to the skin. Renault described this dermal network with its contained meshes. Each cone is fed by a small deeply-placed central arteriole at its apex; anastomoses link up these cones to form a complete and continuous network to supply the entire integument. In tall people, this network actually possesses rather larger meshes than in short persons. The fine terminal arterioles in the skin appear to mark the punctae such as are found in rashes like that of scarlet fever, and the colour of the eruption, as well as the distribution it has locally, be it bright crimson and red, or purple and venous, will depend on whether this arterial network or its accompanying venous field is the more involved or, alternatively, upon the fact of delay or sluggishness in the arterial and the return circulation in the skin causing a greater loss of oxygen and at the same time

a greater adsorption of carbon dioxide and bye-products. If diapedesis occurs, and corpuscles find their way out of the vessels, the colour may partly depend upon chemical change altering the composition of the haemoglobin. If the hyperaemia is arterial, digital pressure will produce quick blanching and a quick return of colour; if venous, slow blanching and a slow return of colour. Even a minute haemorrhage into the skin substance will not, upon digital pressure, alter appearance or definition.

Accompanying those arterial plexuses are the venous plexuses which represent the centripetal or returning circulation. They are formed by anastomosing tributaries proceeding from the bases of the papillae to the deeper venous plexus. The pilosebaceous and coil glands have their supply from the deep arterial plexus, and the deep venous plexus.

The general infections are distributed by the bloodvessels, and it is the only means by which extensive dissemination is effected. Examples are found in the erythemata, exanthemata, syphilis, and in multiple lupus after measles. The actual agent conveyed is toxic and, in many, appears to operate in the terminal plexuses and fine vessels of the skin. The network of Renault can explain much as to distribution, not only in reference to the position of the lesions in the generalised eruptions, but also in those localised. In the syphilides, and in erythema annulare, livido annularis, livido frigore, and in Bazin's disease- to take a few examples, this network more easily explains the arrangement seen.⁵ The colour of an eruption may aid

us in determining whether the arterial, or the venous, plexus is involved, and it is possible that, where the colour indicates neither the one nor the other, - neither crimson or red on the one hand, nor venous on the other; lymph-vessel spread may exist. Angles and corners in this vascular network system may also, by causing delay and stasis, have to do with the distribution of lesions by allowing the vessel-carried toxin or organism there to operate, and to irritate the tissues in the immediate proximity into reacting against its presence. If the condition is acute and bright crimson, then the fine arterioles are involved; if of bluish or livid hue, , it is likely to be subacute or chronic, and the venules chiefly concerned. On the other hand, stasis in the arterioles by backwardation may cause the colour to become venous purely from the delay and loss of oxygen. Heart disease may modify colour in an eruption,⁶ in addition to favouring its more chronic course. A lesion about the fine vessels where the epidermal layers are ~~stretched~~ tightly stretched over it, may characteristically modify colour. Gravity and stasis render more evident the vascular network so often outlined in the legs in erythema ab igne, and in the mottling seen in the backs of the hands where there there is a blue or sluggish circulation. Macleod has pointed out the imitative appearance of the network pattern in parakeratosis variegata. Local thrombosis occurs in the fine skin vessels in gangrene produced by the use of weak carbolic lotion dressings. I have seen this happen in the fingers and in the back of the neck, the thrombosis obstructing

blood supply, and being an early phenomenon in the process which leads up to the gangrene.

The purpuric spots seen in the legs in chronic Bright's disease, and in the trunk in subacute ulcerative endocarditis, and also in purpura, and in certain acute suprarenal lesions, are small haemorrhages occurring out of the central papillary vessels, probably due to toxic injury to the vessel walls themselves. Such maculae continue to appear in crops corresponding, most likely, in time with transient increase in the potency of the toxin circulating or, possibly, to an embolic shower of microorganisms either dead or of lowered vitality. It is easy to understand how a toxin may vary in its toxicity from hour to hour and from day to day. In ulcerative endocarditis, those tiny spots are perhaps most likely to result from organismal embolism; in uraemia, and chronic Bright's disease, from blood-borne toxins, likely arising out of blood-waste retention; in purpura, from a pure autotoxaemia.

The sympathetic control of bloodvessels, exercised through their vasomotor nerves, renders them, particularly when in the face, liable to contract and dilate easily in a transient way, and to favour the occurrence of such conditions as rosacea and lupus erythematosus. There is a secondary flush area in the neck which shows vasomotor lack of stability also, especially evident in Graves' disease and in emotional states in women. Variation in activity and in sensitiveness of the sympathetic nerve supply, on account of endocrine activity, appears to affect the

liability to flushings in the face and neck, in that way predisposing to, and even determining the distribution of, the certain affections which occur in those areas. Vasomotor dilatation or paresis may occur from causes acting centrally as the result of toxic action, or acting reflexly, or may occur in the course of the excretion of certain drugs; for example, quinine. The phenomenon of vasomotor spasm is seen in Raynaud's disease in the fingers, and may so strangulate the peripheral circulations there as to cause trophic ulcerations and gangrene.

It will be convenient to mention here the tuberculides, and the means by which they are distributed. They may be asymmetrically placed but are usually symmetrical, the lesions tending to remain localized, although they have a tendency to ulcerate. They are commonest in the early years of life and presuppose that those afflicted are tuberculized previously, usually by the bovine tubercle bacillus. Most are definitely found to be secondary to tubercle elsewhere, such as in glands, bones, or joints, and appear to occur in the skin somewhere in the vascular network, but particularly about sebaceous and coil glands, which are supplied by the deeper arterial plexus. If nearer to the surface, the lesions appear to occur round, and actually in, the mouths of the follicles, as if an attempt were being made to get rid of the mischief by excreting it. Because of the more or less localized distribution of the tuberculide, it seems to me impossible that it can be brought about

by a primary tuberculous infection. At the same time, there is always the possibility that a previous focus which is tuberculous has paved the way for a fresh infection producing the tuberculide. In lichen scrofulosorum, the eruption occurs on chest, abdomen, buttocks, thighs, and upper arms; in acne scrofulosorum, on the extensor surfaces of upper and lower extremities in crops, the lesions not being grouped, but leaving scars, this tuberculide being secondary to tuberculous adenitis.

Acne cachecticorum occurs upon face, chest, back, and legs; the nodular tuberculide in infants, may be found in any region of the skin, is single, and secondary.

Bazin's disease occurs in young girls in the calf of each leg, so does the vascular type which is found in women thirty-five to forty-five years of age. Other forms of tuberculide which occur may follow a mild infection; for example, lupus erythematosus disseminatus, acnitis, and folliculitis, which latter condition affects those parts liable to acroasphyxia.

The tuberculides, then, appear to be secondary to open tubercle existing elsewhere in the body, or are the result of an inoculation by the bacillus in certain regions, occurring at a time previous to the appearance of the tuberculide upon the skin. In young children, tuberculosis generally attacks glands, bones, and joints, and it is, I believe, commonly understood that the bovine bacillus is the chief offender. Of all the theories which exist to explain the cause and the distribution of the tuberculides, it appears to me that the idea of bacillary embolus most nearly approaches the truth. It explains

distribution at once, and in this way: the patient is tuberculized and, at the same time, is in process of being detuberculized naturally; an autoinoculation, or a fresh infection arises, or a dose of Koch tuberculin is administered, with the result that a temporary recrudescence occurs in the primary focus, emboli of bacilli of low virulence being set free and carried thence by the bloodvessels to the skin plexuses, the actual locus of the eruption depending upon the position of the primary focus, and upon the particular vessels traversed by the bacilli. However, it may be said that this cannot account for the fairly regular distribution of each tuberculide, nor for the difference in type, but I would submit that the sites where tubercle catches hold, especially in childhood, are fairly constant and regular, so that it is almost bound to be found either in the nose, or in the lymphatic glands of the neck on one side or the other, or in the glands of the hilus of either lung, or of the mesentery, or in the joints of the spinal column, the hip-joint, or knee-joint. Is it not then possible that a tuberculide will depend for its situation and type upon the site of the primary lesion, and upon the particular route which the infection has taken on its way to the skin? It is possible that type and extent of the eruption may partly depend upon the strain of the infecting bacillus and upon its virulence, as also upon the extent of the patient's protective immunity. The actual lesion itself appears to be the result of a local inflammatory reaction at those places where the bacilli are held up in the vascular network and

attempt to find a nidus there and to produce their own toxin which calls out the patient's own autotuberculin. This, with phagocytic action, destroys the bacillus, which ceases to exist, and so is rarely found on examination. The mischief in the tuberculides is vessel-borne, and it is likely that the lymphatic channels sweep up the products at the same time, although the reactionary enlargement of lymphatic glands does not occur to a palpable extent in the case of the tuberculides. The role of the lymphatic vessels in the distribution in lupus vulgaris is of real importance, but even in that disease, the lymphatic glands are not affected to any degree because of the disease process having obliterated the lymph channels by granulation. Apart from the tuberculides, the lymphatic vessels are of great importance as a means of spread in tuberculosis.

The Lymphatic Vessel System.-

The lymphatic system has two plexuses which collect from the skin and the vessels of which course alongside the bloodvessel plexuses. Lymph spaces exist in the corium and rete mucosum, but without being in direct communication with the interior of the vessels. These spaces become flooded by osmotic pressure from the "blind finger-like culs-de-sac" in the dermal papillae, and drain themselves into a collecting vessel situated in the deeper layers of the dermis, passing thence directly inwards to the fascial plexus in the subcutaneous fat, and onwards to the corresponding group of lymphatic glands.⁵ Handley has pointed out that lupus vulgaris is primarily a disease of the lymphatic

vessels of the subcutaneous and cutaneous tissues which takes the form of a lymphangitis, destructive in character. His view is that each skin lymph area is about half-an-inch in diameter and is independent of other areas, the vessel draining each, passing to the deep fascial plexus which lies close upon the muscle layer. He also believes that the phase of clinical lupus depends upon lymphatic channels being converted into granulation masses, and upon the extent of venous, followed by arterial, stasis in the area of the disease.

The centripetal flow of the lymphatic stream and its detoxicating purpose, demonstrate the fact that, by lymphatic spread, a disease must necessarily remain more or less limited to the lymph-vessel distribution, and the immediate neighbourhood, including the field of lymph spaces close to them, and will be relatively slow in progress. Lupus vulgaris and sporotrichosis⁹ are examples of diseases distributed in this way. Actinomycosis commences its spread in the same manner, but soon continues by direct extension, attacking any tissue with which it comes into contact. One of the important peculiarities of the disease, however, is that, even in severe cases, there is no lymphatic gland enlargement; in this it differs from the tubercle, where adenitis is so evident a sign. Possibly, as actinomycosis slowly advances, the vessels become impregnated, then obliterated, bit by bit, so as to fail of their purpose of conveying adventitious material to the nearest gland, there to be dealt with. This certainly happens in lupus, and so causes such

delay in the growth and spread of the disease, and also of lupus carcinoma when it occurs, as to constitute both diseases as local entities. The low malignancy in lupus carcinoma is explained in the same way.

None of the diseases named can become widespread by lymphatic infection alone; the only manner in which generalisation may occur is by the disease process presumably perforating the lumen of the bloodvessel supply, and so being thereby disseminated. In lupus, the disease usually destroys the bloodvessels, spread and generalization being then impossible by that means?

Local trauma is a precursor in most lymphatic infections of the skin. The chief function of the lymphatic system is to protect the organism against infections. The streptococcus, the anthrax bacillus, the sporotrichium,⁹ and the tubercle bacillus, attacking, are in turn attacked by the tissue of the lymphatic system, the inflammatory signs seen in the swollen vessels and enlarged glands being purely reactionary. Those microorganisms invariably gain access to the skin through a breach of continuity. A case has been described¹¹ where the pharynx had been painted with silver nitrate solution for about ten years, argyria developing in consequence. The pigmentation appeared on the face, head, and lips which became greyish in colour. the discolouration extended towards the lower part of the neck and invaded the conjunctiva, gums, and mouth, the mucous membrane of which was reddish-grey in parts; there was no silver in the urine. This case appears to me to be one where

the pigmentation occurred chiefly in, and about, the lymphatic vessels and spaces before being deposited in the epidermal layers. If the veins or arteries had absorbed the silver nitrate, there would have been a more general distribution and, certainly, a positive result with the test for silver when the urine was examined.

Nerve Supply.-

By its very anatomy, the nervous system can have little to do with distribution, except in the case of herpes, accompanying and following which a descending degenerative neuritis occurs as far as the periphery in the sensory nerve supply involved. Head and Campbell believe it to be the result of an acute posterior poliomyelitis. The neuritis and the herpes develop consequent upon an intensely acute inflammation in the posterior spinal ganglion to which the affected afferent nerve proceeds, and to which it carries sensory impressions from the periphery. Each sensory spinal ganglion possesses cells which supply sensory nerves, and some portion of these is also concerned in the trophic supply of the skin area to which they are distributed. It is a wellknown fact that in certain nervous system diseases trophic ulcers may occur; they are not uncommon where the sensory nerve supply is impaired or cut off; they are also found where a nerve is destroyed by pressure or division. An evident similarity exists between the appearances in the skin in herpes and those in trophic ulcer occurring in other conditions. Like these, the herpes is symptomatic, wherever it happens to be, and is the result of injury,

toxic in character, affecting corresponding ganglion cells in the posterior nerve root. It is suggested that such infection finds its way to the ganglion along the lymphatics accompanying, or in close proximity to, the peripheral nerves proceeding there, and this seems likely enough; there is no other, or easier, explanation. A milder type of infection producing a neurotoxin may account for the occurrence of certain cases of alopecia areata, and for their distribution. I have the record of the case of a young man who had had malaria three years ago, and who has since suffered repeated paroxysmal attacks of hemicrania; Six months ago, the alopecia commenced in the parietal, then in the temporal regions, of the corresponding side only. I believe that this case of alopecia was due to a poison which had a selective action upon the particular ganglion supplying the trophic function necessary for the parts affected. In zona, Brisseau indicated that the lesion did not always follow the precise distribution of the cutaneous nerves, the skin area affected more closely corresponding to the diseased spinal segment of the cord. Abadie¹² believes the lesion to have its seat in the arterioles and vasomotor nerves of the skin, which so often coincide. He points out that in supraorbital herpes the supraorbital nerve is affected without the other fifth nerve branches, and that the manifestations are in the area of the supraorbital, frontal, and nasal, branches, and that along the walls of the supraorbital artery run fibres derived from the superior cervical ganglion via the carotid plexus. Lodge¹⁵ believes that the extensive scarring after trigem

inal ganglionitis becomes more common as age advances and one certainly finds that supraorbital herpes is more prolonged and severe in those up in years, and that the postherpetic neuralgia in them is more intense and intractable; not only so, but the herpetic lesions are often more copious and more widely distributed. Thoracic herpes is said not to affect the first and second intercostal spaces; Abadie explains this by pointing out that the arteries of the spaces come from the subclavian and not from the aorta as do the others, and that the vasomotor supply is different. However, I have seen a girl of 18 years who had arsenical herpes appear some five weeks after starting to take liquor arsenicalis for psoriasis; she had reached the five drop dose taken thrice daily when herpes erupted quite painlessly, a crop appearing of about twenty vivid vesicles in a group. This patch appeared over the second rib and interspace, and third rib, between the parasternal and mammary lines, on the right side.

Dermatitis herpetiformis has been supposed to result from a neurosis, severer cases being thought to show peripheral neuritis; others have believed it to be due to a toxin in the blood. Indicanuria and eosinophilia certainly suggest a toxaemic cause, and so does the tendency to symmetry- at least, it points to a cause acting generally; the recurrent nature of the eruption would appear to indicate variation in the amount and toxicity of the poison which, no doubt, produces it. The whole circumstances of the distribution and the character of the disease

point to its being the result of a chronic toxæmia, most probably of intestinal origin, the toxin having a selective action upon the central nervous system, and upon its peripheral parts particularly; in other words, the disease is likely to be caused by a chronic autogenetic neurotoxæmia. The nervous symptoms which commonly occur suggest that this is so, and at the same time rather incriminate the system of ductless glands, in the glycosuria amongst other signs. A similar type of toxæmia may account for the character and distribution of the eruption in pemphigus, but its origin is more likely to be exogenous, many cases appearing to follow trauma. Nerve damage has been known to occur in pemphigus, and bullous eruption in certain nervous system diseases. Pemphigoid bullæ appear more easily and more usually where the skin is thin and loosely stretched, and indicate speedy excessive secretion of serum, probably in response to a virulent toxin which allows no time for a reactionary redness and inflammation to occur round about. The bulla is the primary lesion and shows no tendency to group as occurs in dermatitis herpetiformis; rather does it seem to occupy a vascular area in the skin. The rete cells suffer most at the commencement, the tendency afterwards being destructive; there is a surprisingly little inflammatory reaction, and or evidence of resistance, locally or generally. Such may be the explanation of the easier systemic absorption and the resulting serious toxæmia so difficult to control; the defensive mechanism of the skin is inadequate, and ineffectual, in pemphigus.

Cheatle has suggested that rodent cancer occurs at the maximal nerve points of Head in the face, but the proof he adduces is not convincing; although his explanation of the distribution in this way seems not unlikely. Most cases occur in the middle horizontal third of the face; this area is the most vascular, the least protected, and is the part most exposed to the light rays of the sun, which strike obliquely, as well as to many other adverse influences.

IV..

The Nature of the Infective, or Causal, Agent and its Mode of Access; Continued Action in the Skin; Regional Distribution.

Disease of the skin, whether symptomatic or other, differs in distribution like disease elsewhere, depending partly upon the cause which may operate to produce a lesion which is local, or one more widespread in its arrangement. Whatever be the chief causative factor, it has to be borne in mind that nervous system influence, sensitization, and anaphylaxis¹⁶ may determine further spread and a new distribution; or, again, the pattern may also depend upon the extent of the reaction of the tissues in response to an agent acting alone, or upon the reaction to different agents acting coincidentally. Roughly speaking, the skin lesions which result can be enumerated as follows:

Inflammations

Those due to poisons in the blood

Newgrowths

Atrophies

Hypertrophies

Congenital malformations

haemorrhages

Pigmentations

Those due to neuroses and disturbed innervation

Those due to anomalies of secretion

It is a surprising fact that the organisms found to be pathogenic in diseases of the skin can almost be numbered by the fingers, being comparatively few. As a rule, they show quite clearly their tendency to fasten upon certain tissues and certain areas, often in a particular manner and way; mixed infections also occur with frequency, being more common later on in the course of the eruption.

Streptococcal infections have a partiality for deep-seated tissues, and presuppose a previous breach of surface; the reaction, if mild, is erythematous and oedematous; if more intense and depending upon a virulent infection, or the medium is more suitable for its culture, there is a sharp inflammatory oedema with swelling accompanied by systemic reactive symptoms, toxic in nature. Streptococcal lesions almost constantly show an abrupt edge. Behind the ear, about mouth or anus, and in the nose and face, such infections are of common occurrence, but the lesions tend to remain more or less sharply circumscribed and margined, extending their limits by continuous spread, aided by the lymphatics. Invariably, some wound, it may be minute, permits of access to the streptococcus and provides a

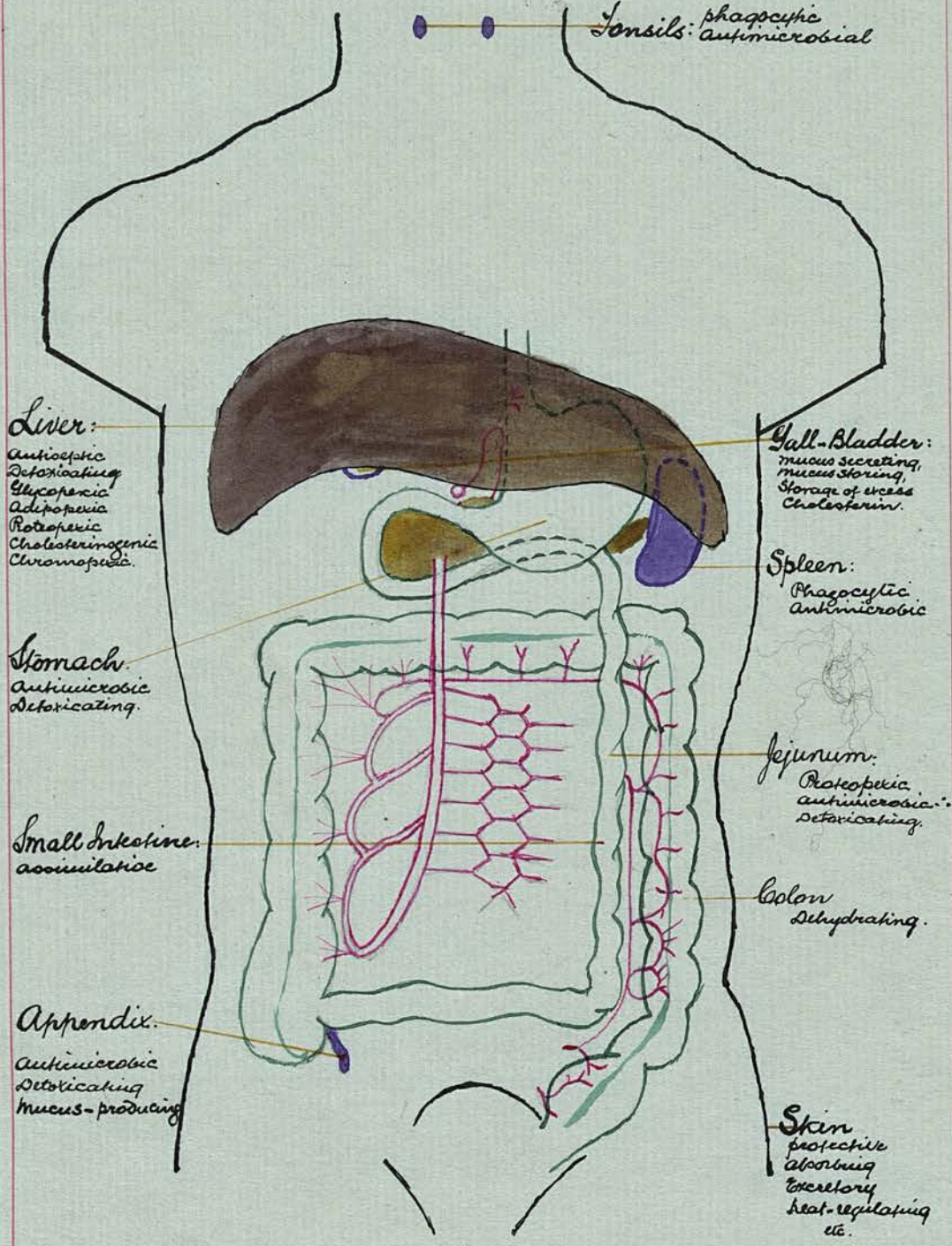
medium which favours its cultivation. The streptococcus of low virulence commonly found in the mouth is now believed to be pathogenic, and the agent, probably, behind certain diseases such as lupus erythematosus of one form, at least, and alopecia areata. It is likely that the streptococcus, whether buccal or intestinal, or growing on the skin itself, with the toxins produced by it, plays a greater part in the causation of, and ⁱⁿ determining the locus of, as well as in maintaining, certain skin diseases than has hitherto been thought.

The staphylococcus, if of the white variety, may be quite innocuous, or may simply cause scaliness in hairbearing areas; if of the aureus variety, it may pick out the hairfollicles upon scalp or limbs or trunk, and thrive there, the extent of its spread being defined and limited by the follicles and the edge of the hairbearing areas. By its deep penetration, it determines the furuncle, the carbuncle, and such types of folliculitis as sycosis.

A number of other bacteria and organisms produce their effects and indicate their presence by the appearance, rate of spread, and particular distribution of the lesions they produce. Lowered vitality, such as is caused by breach of surface, which breaks down the natural protective mechanism of the skin, secures the nidus, the only remaining factor needed to produce the lesion being the presence of the pathogenic organism.

In certain skin diseases causal organisms, although suspected, have so far not

Diagrammatic figure to illustrate the chief surfaces exposed to harmful agencies: namely, those of the skin and of the alimentary tract, from mouth to pelvic colon. These two systems offer, at the same time, an active resistance by virtue of their protective mechanism, which, in the skin, is constituted by the epithelial cells and the cells of the Lymphatic System it possesses, and in the case of the alimentary tract, by the hydrochloric acid and cells of the mucosa of the stomach, by the cells of the mucosa of the intestine, but of the jejunum in particular, and by the lymphoid and mucus-producing cells of the vermiform appendix like the pharyngeal tonsil, the "abdominal tonsil" has its detoxicating and antibacterial function, and therefore is of some real use in the economy. It can be understood how the greater exposure to injury of those two systems with the means of resistance and protection they possess, may limit distribution & spread in skin disease.



Tonsils: phagocytic antimicrobial

Liver:
 Antiseptic
 Detoxicating
 Glycogenic
 Adipogenic
 Proteogenic
 Cholesterologenic
 Chromogenic

Gall-Bladder:
 Mucus secreting,
 Mucus storing,
 Storage of excess
 Cholesterolin.

Spleen:
 Phagocytic
 Antimicrobial

Stomach:
 Antimicrobial
 Detoxicating.

Jejunum:
 Proteogenic
 antimicrobial
 Detoxicating.

Small Intestine:
 assimilation

Colon
 Dehydrating.

Appendix:
 Antimicrobial
 Detoxicating
 Mucus-producing

Skin
 protective
 absorbing
 excretory
 heat-regulating
 etc.

been separated and cultivated, or found to fulfil Koch's postulates. In molluscum contagiosum occur small infective tumours, the contagion of which is apparently transferred from one person to another by fomites; a disease of a similar character is found in certain birds. It is noticeable that the disease has a greater incidence in those who frequent public swimming, and turkish, baths; this fact appears to explain at once the distribution of the lesions upon the skin. Take the case of the small boy who is commonly the victim: he enters the water at the shallow end of the swimming bath, and may duck his head - if he obeys the advice almost always given to beginners. He then plays about, the water level reaching perhaps to the upper abdomen or lower thorax and the corresponding level on the arms. Believing the contagion to occur on the surface of the water, I would suggest that he at once picks up on these parts the organisms from the surface of the water. He gets out of the water and using, shall we say, a towel, sterile as regards the infection, hastily attempts to dry himself; he rubs down first his face, then his chest, then abdomen, and last of all his arms and legs, in the order named. He troubles little about his back and the posterior surfaces of his limbs, the reason being that those surfaces are less sensitive to the feel of water upon them. The back may, of course, partly escape the infection because the bather usually keeps moving forward in the water. However, in this way the microbe, being then upon the skin, becomes rubbed by the towel into the regions named. The towel has become infected and, in

rubbing down his legs and feet, as he will do last of all, he infects these. No towel, however clean, could disinfect the skin under such circumstances, but rather itself becomes infected. A second jolly bather comes along, and if a little more thorough in the drying process, develops a widespread eruption - solely from the towel this time. This towel may then be washed and dried as towels usually are, but still remain infective, and possibly so for many weeks, because it is known that a long incubation, lasting even to three months, may occur before the nature of the infection becomes obvious; the organism being unknown, it follows that its life-history is unknown and its vitality uncertain. This infection upon the skin surface appears then to depend for its distribution entirely upon the area of skin surface to which it is applied. Other obvious means of dissemination will occur by contact one way or the other, for example: upon the breasts of nursing mothers, the faces of infants, the genitals, the groins, and inner thighs.

Animal parasites usually select hairbearing areas so as to find sanctuary, more especially for their nits. The pediculus pubis is furnished with powerful crablike tentacles so as to retain hold upon the pubic hairs, where friction and movement are likely to dislodge it. The pediculus corporis finds lodgement in the clothes and upon the lanugo hairs, preferring parts where there are folds in the clothing and where there is greater warmth. He always tends to work upwards upon the trunk and limbs so that the shoulders suffer much from his activities,

and show signs of this in scratch and other marks. The pediculus capitis is the most active of the three, and its presence favours the production of impetigo contagiosa, the presence and site of which, and its special character, all suggesting his previous presence.

In scabies, the acarus scabei burrows, choosing parts where the skin is more vulnerable on account of its situation and thinness, the act of scratching infecting other regions. The mechanical irritation caused, brings with it infection by septic organisms with resulting impetigo and dermatitis. To the extent of three or four itchy spots and burrows, scabies is not uncommon upon the inner front aspects of the wrists, especially in nurses and medical men; in fact, the lesions may be so few, and the patient so refined, that the diagnosis may be missed; or, on the other hand, in such a case as this the correct diagnosis may mean the loss of a good patient and a reputation damned with the help of sulphur for the time being, as happened to me in my first year of practice! Cleanly habits prevent the spread of scabies and, at times, even its diagnosis. Soap and water may limit, without curing, the disease as regards its distribution and intensity. Obviously, such infections are derived purely by direct contact with the infecting agent.

Insect and gnat bites occur commonly upon the face and neck, wrists, and about the ankles, and may produce urticarial lesions ~~with~~ with punctate haemorrhage in their centres, in the centre of these again being the punctured wound produced by the bite. Flea bites are more widely distributed, as a

rule, and, fading, may leave purpuric appearances, the minute bite being found in each spot to indicate the cause and the reason for the eruption.

Moulds and vegetable parasites have their distribution limited depending upon the type, for example: the microsporon *Audouini* affects the scalp hair, the trichophyton megalosporon the glabrous skin and nails. The type of infection offers the reason for the local nature of the mischief, and the spread will depend upon contact and local extension; the same is true of favus. The microsporon furfur confines his activities to the front of the chest, and to the back, invading the corneous layer, particularly about the hair follicles. The sporotrichium and blastomyces gain an entrance to the skin through a breach of surface, and have a lymphatic and continuous spread.

Poisons in the blood, organ: ismal, toxic, or autogenetic, tend should they be acute in their manifestations, to effect distribution of lesions upon the face and trunk, and then upon the limbs, running a course which terminates progressively as antibodies in sufficient amount are manufactured to counter their evil effect; as examples of those may be cited certain urticarias, erythemas, and exanthems.

If slower in evolution, the limbs only, or chiefly, may show lesions. Considering the number of toxaemic states known to exist and to be conveyed by the blood stream few, comparatively, show involvement of the skin which is so efficiently protected against harmful agencies both from without and from within. However, with the source and origin known, as also the means

of spread, we have the explanation of the distribution which so constantly shows surprising regularity in arrangement of the lesions, and in their evolution.

Newgrowths commonly occur in the skin and are of various types. Both the benign and the malignant may occur practically anywhere on the surface, but the latter are to be found chiefly upon the face, hands, scrotum, or any part which has for long been exposed to various kinds of irritation; it is peculiar that some tumours, especially those which prove to be malignant, occur upon those parts which have a highly organized or specialized function. Certain types of benign growth, such as the seborrhoeic wart, may at once determine the distribution of a squamous cell carcinoma. Not so with the basal cell carcinoma, which has its greatest incidence on the face, but may, though rarely, be found on other parts, or even be multiple. Their most usual situation is upon the face on either side, above a line drawn from the point where the ala meets the cheek to the suprameatal tubercle, and below one drawn horizontally across the middle of the forehead. Cheatele advanced the nerve-distribution hypothesis to account for their site, but it is not convincing; Adamson believes their position coincides with that of the benign cystic adenoma. Melanotic carcinomata depend for their position upon the presence of pigmented moles. Paget's disease is by no means confined to the nipple alone, nor to the female sex; it appears at first in the skin, growing afterwards along the lymphatic channels towards the deep plexus, then laterally. The disease may occur in the nipple

umbilicus, on the genitals, and in the axillae, in both sexes;¹⁵ in these situations, there is certainly more likelihood of irritation exciting the disease. Connective tissue tumours are deeply placed, like the tissues out of which they develop; hypertrophic scar and keloid are two exceptions, their position being determined by previous trauma having occurred on ^{the} site where they arise. Neurofibroma is usually multiple and may occur internally as well as on the surface; associated with this tumour, there is commonly found a high-grade type of mental deficiency, which circumstance suggests a congenital predisposition to the growth of the tumour. The mental deficiency is thought by some to be caused by the neurofibromatosis, but the smallest tumour of that nature produces pressure symptoms when it grows anywhere within the cranial cavity, its usual situation, when it does occur there, being at the cerebello-pontine angle; and I do not know of a case of neurofibroma, found there at autopsy, which had produced no symptoms during life. Malignant connective tissue tumours such as sarcomata, or those associated with the chronic nodular form of lymphocytic leukaemia, appear to affect chiefly lymphoid tissue at first, but that only partly explains their distribution. In their rapid growth and dissemination, the lymphatic channels are invaded, and the subsequent uncontrolled and indiscriminate spread allows of the scattering of metastases by the bloodstream. It is certainly possible that a particular organism may ultimately be found which will explain their occurrence and their spread.

The following record of a case rather suggests a lymphatic followed by a bloodvessel propagation:

J.C., age 44 years, a grocer by trade, whose place of business was a damp and dingy old shop in a street of slums, came complaining that a small lump in his back was causing some discomfort because of friction by his braces, which kept rubbing against it. He had noticed the lump for the first time three weeks previously, but otherwise he insisted that he was fit and well and that, in fact, there was nothing else wrong with him. On examining the swelling, there was found a tumour the size of a small marble, freely movable each way, except superficially, where it was fixed to some extent to the overlying skin; a few distended tiny veins coursed over and about it. The mass was soft and painless to the touch and was slightly reddened round about, due apparently to the rubbing of the braces. From the man's age, his darkly pigmented hair and irises, sallow skin, as well as the appearance of the tumour and its short duration, I believed it to be a sarcoma, and had it widely excised next day. The pathologist's report indicated a small round-cell sarcoma. Three months after the first sign of the tumour, a large rapidly growing mass was found in the right maxillary (superior) region, occupying the antrum of Highmore and the right wall of the naso-pharynx. This tumour disappeared entirely with radium treatment in about six weeks after an intensive course had been administered. In six months more, a large deposit occurred in the liver, followed by a progressively deepening

jaundice, and death ensued in a few weeks. A small tumour such as this, may appear to be innocent enough at first glance; there is little doubt that it was the individual primary lesion, and that the posterior mediastinal glands were quickly invaded, then the superior maxillary region, and following this occurred metastatic dissemination and deposit in the liver. Repeated general examination, frequently made, failed to show anything abnormal elsewhere than in those parts named; there was no pressure symptom or evidence of mediastinal growth clinically, and there had not been, at any time, indication of previous disease in the skin at the position of the original tumour. It is an interesting fact that the application of radium to the maxillary tumour was followed in six weeks by its complete disappearance; much scarring and contraction of tissue occurred, the right half of the soft palate having become so shrivelled that the uvula was drawn over to the affected side of the naso-pharynx. The distribution of the primary tumour was confined to the hypoderm and dermis, and invasion of the lymph channels must have taken place before excision, which though thorough, did not effect complete removal of all the disease. Although the lesion was solitary at the commencement, the mischief was, within weeks, carried via the posterior mediastinum to the superior maxillary region and then, in six months more, was generalized by the dissemination of metastases by vascular channels, and their deposit in the liver. One was under the impression that the radium treatment, by causing rapid dissolution then absorption of the maxillary tumour

and hastening dissemination, ^{may} have so hastened death. This treatment, though excessively painful, saved the man a more ghastly death.

Xanthoma appears to occur only where there is, or has been, hypercholesterolaemia¹⁹, but it is difficult to explain satisfactorily the fairly regular distribution. It is, after all, as it appears on the skin, symptomatic, and its occurrence in the upper eyelid, arm, ear, and hands, probably the result of a locus minor resistentiae determining the site. Hypercholesterolaemia occurs in arteriosclerosis, in cholelithiasis, pregnancy, diabetes, and chronic nephritis²⁰, and is a fact of great importance, occurring as it does in those conditions where we know that strict suitable dieting will reduce the cholesterol content of the blood to within normal limits, and so clear up the xanthomatoses which appear upon the skin, and which possibly show multiple lesions in other systems of the body.

The atrophies following upon inflammatory changes are most likely to be toxic in origin. Secondary atrophies occur in many conditions, and their distribution depends upon the position of the primary lesion which they follow.

Hypertrophies are probably always secondary and their site fixed by previous trauma, or inflammation, from one cause or another.

Congenital malformations occur in various situations and show abnormality in the direction of excess or defect in growth, or in the way possibly of growth in tissues misplaced. They are often

coincident with internal congenital defect. Such malformations are, perhaps unconvincingly, believed to be due to default at or near Voigt's lines which represent the meeting lines and folds existing during embryonic growth.

Haemorrhages must necessarily take place from arterioles and venules in the dermis whatever the cause, and presuppose damage to the vessel wall; heightened pressure locally, or stasis, may determine the actual area of distribution, and aggravate the damage done to the vessel wall from toxic cause.

Pigmentations are generally the result of the deposit of melanin manufactured out of haemoglobin. Melanin colours the hair and iris, and in its innocence, causes much racial strife. In the negro, the greater deposit of pigment is a natural protection against light rays. In the white man, there may be general deficiency of pigment as in the albino, or local loss as in leucoderma; there may be abnormal deposit as in melanoderma syphiliticum, or in areas of previous prolonged active or passive congestion, or about lesions of chronic duration, especially when there had been much pruritus or irritation. This pigmentation is secondary, being consequent upon inflammatory lesions, the position of which determines, approximately, the distribution. Melanin, and other pigment, deposits itself in and around the vessel plexuses in the dermis, and in the deeper layers of the epidermis. Increased endocrine activity which occurs in pregnancy may account for the pigmentations seen, and such activity probably determines the pigmentation in syphilitic melanoderma to the

neck. The adrenal glands, particularly, appear to have to do with pigmentary deposit; deficient adrenin has to do with the occurrence of Addison's disease. Hopkins has suggested that the pigment deposit in this disease is caused by adrenin 'gone wrong'. It is known that, in some circumstances, the action of adrenin is opposed to that of thyroxin, therefore it is not unlikely that this fact may partly account for the pigmentations seen in pregnancy and in certain other conditions, and for the position of the luetic collar, the neck being the 'battleground' between the two. Others believe that acute hyperaemia followed by passive congestion producing dilatation of the vessels is sufficient in itself to account for pigmentations; there seems to me to be more in it than that.

Neuroses and disturbed innervation have little to do with distribution. An apparent influence which is nervous occurs, as already described, in herpes; it is possibly the result of the trophic portion of the nerve supply suffering injury. In certain other diseases, toxins which have a selective action upon the peripheral nervous system may exist to play a part in their causation, and distribution.

Anomalies of secretion occur where the coil glands are usually most numerous and most active, such as in the axillae, and on the palms and soles. It can readily be understood how the sebaceous and coil glands may become infected, and how they, being excretory as well as secretory, can guide distribution where byproducts of various kinds set up irritation during their excretion.

In considering the subject of regional distribution, it is usual to divide the cutaneous surface arbitrarily into regions or areas, as follows:

1. The hairy scalp, axillae, pubis.
2. The face and external ears.
3. Front of neck, chest, abdomen.
4. Sides and back of neck, shoulders, loins.
5. Arms, hands, fingers, their flexor and extensor aspects.
6. Buttocks, and flexor surfaces of thighs and legs, the soles; extensor surfaces of thighs and legs, dorsum of foot; the inner aspects of thighs and legs, the toes.
7. Genitals.
8. Nose, mouth, eyes, external auditory meatus, anus, vulva.

In most skin diseases, the lesions appear to confine themselves more or less so that the description can be fairly approximately outlined in regions. Frequently one area is affected first, or shows the eruption more copiously than others, and we are accustomed to tack the particular disease to a particular area, or to particular areas, of the skin, and this seems to be justified. At the same time, I feel that for descriptive purposes such a division into regions can be improved upon, and greater exactness and necessary detail as to distribution obtained if the numerous fixed anatomical ^{points} in the surface anatomy were made use of. Actual measurements in centimetres or in fractions of an inch from two such fixed points will do more to

describe, say a solitary lesion like rodent cancer than many words, and will do it more exactly, especially when the height and weight ^{of the patient} are known. Not only so, but the more accurate record of position and exact distribution in disease of the skin might, in the mass, be productive of much valuable information, and with the advance being made all along the line in every branch of the science and art of medicine, dermatology must advance too. I believe that greater accuracy and a more exact descriptive method would open a wide field of interest; by joining up the numerous fixed points, areas are created arbitrarily certainly, but fairly exactly, which lend themselves to an easier and more satisfactory method of describing position and distribution in skin diseases, and which if used might open our eyes to many details of importance hitherto missed.

Easily the most exact method in use, apart from photography, is the Edinburgh one, casts being made; in such a way changing character and distribution can be more carefully watched than even by photograph. I believe, however, that the tape measure should come into its own again in charting the arrangement and lay-out of eruptions; an easy, rapid and exact method of description and record.

As a rule, diseases of the skin find their characteristic distribution, for various reasons, upon different areas, just where we expect to find them; they are not necessarily limited exclusively by the confines of the particular region where they occur at first. Conditions found characteristically in certain regions are tabulated in the following enumerat

Suggested Method for the more precise descriptive localization of lesions of the skin by the use of fixed anatomical points and the areas or regions contained by their being interjoined so as to facilitate measurement; an exact method for use in the effort to further determine the reasons for their position and for their distribution.

Fig. I-Scalp 1 Bregma 2 Mid-point 3 Suprameatal spine
4 Lambda F Right & Left Frontal AP Anterior Parietal
PP Posterior Parietal O Right & Left Occipital

Fig. II-Face & Bust, 1 Glabella 2 Bregma 3 Inner Canthus 4 Ext.
Angular Process 5 Preauricular Process 6 Alar
Junction 7 Ext. Oral Angle 8 Acromion 9 Coracoid
Process 8 Level of second Rib

Fig. III-1 glabella 2 bregma 3 mid-point 4 lambda 5 inion or
ext. occip. process 6 suprameatal spine 7 preauric-
ular process 8 alar junction 9 ext. oral angle
F frontal T temporal AP ant. parietal PP post. pariet.
Occipital.

Fig. IV-Arm-A line is drawn upwards from the tip of the
middle finger through the middle of the wrist
and elbow, and crossed horizontally by planes
which divide the forearm and arm into thirds.
similarly for the back of the limb.

Fig. V-Addison's Method: 1 ext. triangle of neck 2 int. of
neck 3 mid-line 4 $\frac{1}{2}$ point 5 $\frac{1}{4}$ point 6 $\frac{3}{4}$ point 7 trans-
tubercular plane 8 transpyloric plane 9 transthor-
acic plane 10 ant. sup. spine 11 vertical dropped
through mid-Poupart 12 mammary line 13 lateral
sternal line. RH & LH-hypochondrium RE & LE-epigast-
rium RU & LU-umbilical RL & LL-lumbar RI & LI-iliac
RH & LH-pogastrium

Fig. VI-A perpendicular is dropped through the middle of
Poupart's lig., knee-cap, and ankle-joint to the
tip of the third toe; transverse planes divide
thigh and leg into thirds. Similarly, for the
back of the limb.

Fig. VII-1, vertebra prominens 2, spine of twelfth dorsal
vertebra 3, transtubercular plane 4, infrathoracic
plane. RC & LC-cervical RMD & LMD-thoracic RLD & LLD-
lateral dorsal RML & LML-lumbar RLL & LLL-lateral
lumbar G-gluteal.

Fig. VIII.-1, perpendicular dropped from the anterior
axillary fold= ant. axillary line. 2, mid-ax-
illary line. 3, posterior axillary line.
4, hip-joint region.

Fig. I

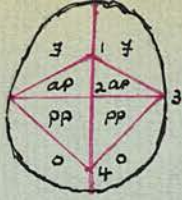


Fig. II

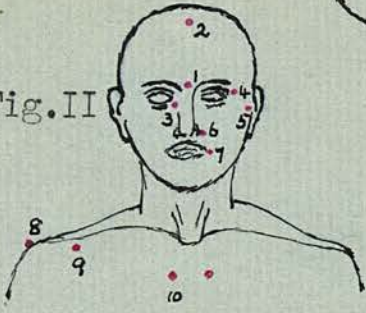


Fig. III

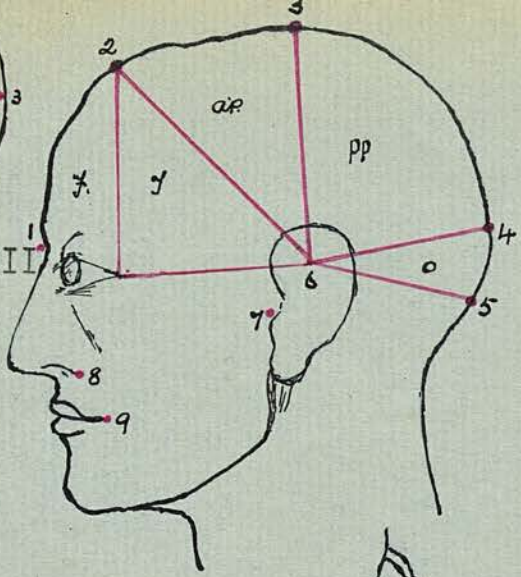


Fig. IV

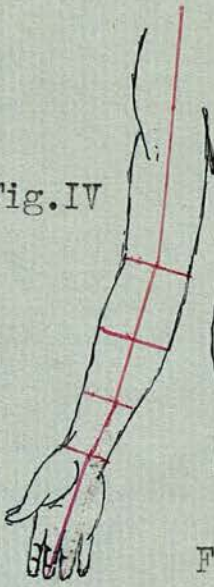


Fig. V

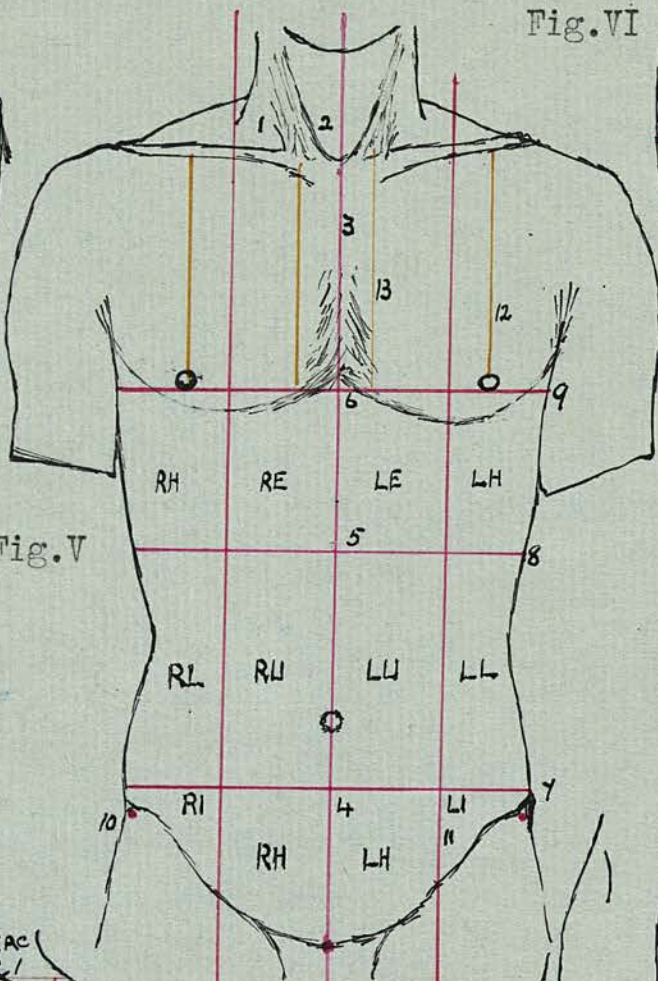


Fig. VI

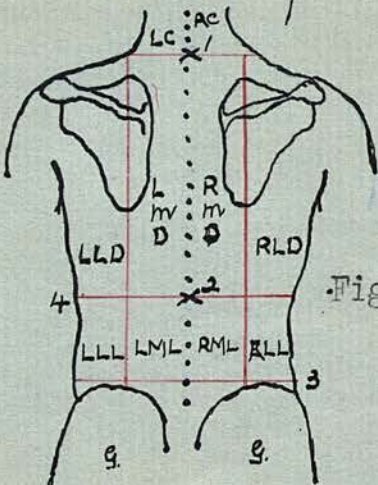
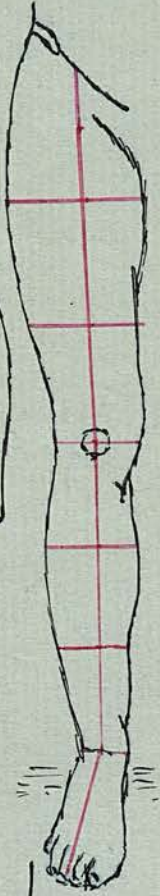


Fig. VII

Fig. VIII



ed list:-

1. Scalp- seborrhoic dermatitis, impetigo contagiosa, pediculosis, favus, ringworm, alopecia, folliculitis, are each usual in the scalp area, the presence of the hair and hair-follicles determining their position. In infants and young children are commonly found dermatitis which is usually seborrhoic, impetigo, and pediculosis, but with little or no hair loss; in ringworm and favus, there is patchy hair loss. The scalp at all ages is much exposed to irritation and, because of the hair, to those infections which have a selective action upon the hair and hair-follicles; it is much less vulnerable at any time than the skin of the face.

2. Face-dermatitis, seborrhoic dermatitis, ephelis, measles, smallpox, syphilis, erysipelas, lupus vulgaris, rosacea, acne, are each commonly found upon the face. Because of greater exposure and want of protection against many causes of irritation and sepsis, the face suffers many troubles. At puberty, sex and the resulting greater ductless gland activity determine the presence of acne and its secondary infections, by rendering the hair-follicles more vulnerable. In the same way, menopausal changes encourage rosacea. Psoriasis is never seen limited to the face, nor the rarer diseases such as lichen planus and pemphigus.

3. Forehead- supraorbital herpes, acne varioliformis, chloasma, the so-called corona veneris and rupia of syphilis, all may occur here.

Why such ulceration happens in supraorbital herpes and even in acne varioliformis is difficult to know, unless

in the case of herpes the relatively greater intensity of inflammation of the gasserian ganglion and the short peripheral length of the supraorbital nerve may account for it, and in the case of acne varioliformis the greater pressure and sepsis from the headgear and hatband which may contribute towards the reason for the distribution, as well as towards the cause.

4. Eyebrows- seborrhoeic dermatitis, and alopecia occur. It is peculiar that in myxoedema there is an alopecia confined to the outer half of the eyebrows; this constitutes an important sign in diagnosis, and likely has reference to the nerve distribution, as well as to the absence of thyroxin.

5. Eyelids- xanthoma, milium, and sebaceous cyst are found here. The eyelids rest little except during sleep, and they are exposed in many directions in their effort to protect the eye itself. The laxity of their tissue allows of easy formation of xanthoma cells and the laying down of pigment. For the same reasons retention cysts occur in the lids.

6. The nose and cheeks- lupus vulgaris, adenoma sebaceum, rosacea, lupus erythematosus, and seborrhoea, are diseases often found here. In lupus vulgaris, trauma may allow access to the tubercle bacillus in early life. As to rosacea and lupus erythematosus, instability of the vasomotor supply to the vessels has much to do with their occurrence.

7. Orifices of the nostrils, point of the nose, and the lips:- Sycosis and furunculosis are of common occurrence in nostrils and upper lip because of the easy access of sepsis there from the atmosphere, or from a septic

handkerchief, or septic finger. In the same way, the lips may become affected with a local dermatitis or an impetigo. Granulosis rubra nasi appears to arise from obstruction in the ducts of the coil glands about the tip of the nose, an inflammatory reaction ensuing. The upper lip is commonly the seat of symptomatic herpes caused by toxic irritation of peripheral nerves and nerve endings. The lower lip, from its exposure to trauma and irritation, is a site of election for squamous-cell carcinoma.

8. Beard region- Sycosis, alopecia, impetigo, ringworm, each occurs often in this region because of the presence of hair and hair-follicles, and the ease with which sepsis attaches itself to them.

9. Ears- Lupus erythematosus, dermatitis, xanthelasma, tophi, erythema pernio, squamous epithelioma, are each found here. Exposure to irritation of various kinds, and the fact of the ear possessing a terminal circulation, and being easily vulnerable, determines those diseases more readily to the ears.

10. The neck- The front and sides of the neck may be affected in impetigo, melanoderma syphiliticum, leucoderma, and transient erythemas. The front of the neck may be invaded secondarily to disease upon the face, or, as in scarlet fever, the eruption may appear right away upon the neck. The front and sides constitute the secondary flush area and are ready to collect the products of infection from the mouth, fauces, and throat by their ample bloodvessel and lymphatic supply, these frequently being seized upon early, as in scarlatina, because they are so close up to the source of the

infection. Pigmentation in these parts is the more readily explained when we know the part played by the thyroid and suprarenal glands in its production, and the great vascularity of the parts, as also their close proximity to the source and point of access of most of the general infections.

Dermatitis, furunculosis, carbunculus, and folliculitis, all are apt to fix upon the back of the neck, but each has little tendency to spread laterally; they rather show an inclination to penetrate deeply, being encouraged in this respect by the depth of the hair-follicles. A septic collar or neck band is probably a common cause of furunculosis in this situation, and the lesions produced, may be exceedingly painful from inflammatory tension.

11. Shoulders and back - Fewer eruptions occur on the back than on the front of the body and limbs. Psoriasis, pediculosis, and acne, and also commencing mycosis fungoides, each occur on shoulders and back and proximal ends of the upper arms. The eruption caused by the pediculus corporis is worst high up about shoulders and scapulae, probably because the pediculus works its way upwards for purposes of aeration.

12. Arm- Dermatitis, herpes, syphiloderms are commonly found upon the inner and flexor aspects; psoriasis and ichthyosis upon extensor surfaces.

13. Forearm- Lichen planus, dermatitis, and erythemas, have a greater incidence upon the flexor surfaces; on the extensor aspects, dermatitis and erythema multiforme are looked for.

14. Hands- On the dorsum, erythema multiforme, lichen

planus, ringworm, dermatitis, lupus erythematosus, lupus vulgaris, erythema pernio, pompholyx, and sporotrichosis are each found to occur, and the same lesions affect the webs and backs of the fingers. Interdigitally, the most frequently found are pernio, dermatitis, tinea, pompholyx and scabies. On the palmar surfaces, dermatitis, keratoses, squamous and bullous syphilides, and pompholyx are each usual.

15. Axillae and groins- Amongst other diseases, occur furunculosis, erythrasma, intertrigo, epidermophytosis, and anomalies of secretion. Each is favoured by the numerous coil glands and hair-follicles, and by the presence of greater warmth, moisture, and friction.

16. Sternum- Keloid, seborrhoic dermatitis, and pityriasis versicolor, are often found over the sternum and about the middle line of the body.

17. Flexures of joints- Intertrigo and seborrhoic dermatitis easily affect the flexures, the more readily because of the friction between skin surfaces.

18. The chest- Syphilides, exanthems, pityriasis versicolor, each are looked for in this situation. About the breasts occur impetigo, scabies, molluscum contagiosum; under the breasts, intertrigo; about the nipples, dermatitis, Paget's disease, and pigmentations.

19. Abdomen- The typhoid eruption occurs especially above the transumbilical line, about the front and the sides of the abdomen; sometimes there is an occasional typhoid spot on the sides of the chest. Pityriasis rosea flowers out upon the sides of chest and abdomen, then upon the front, forming an oblique arrangement of the lesions when the disease is completely erupted. The

pattern roughly follows the lines of the ribs, the distribution roughly corresponding to the vest area.

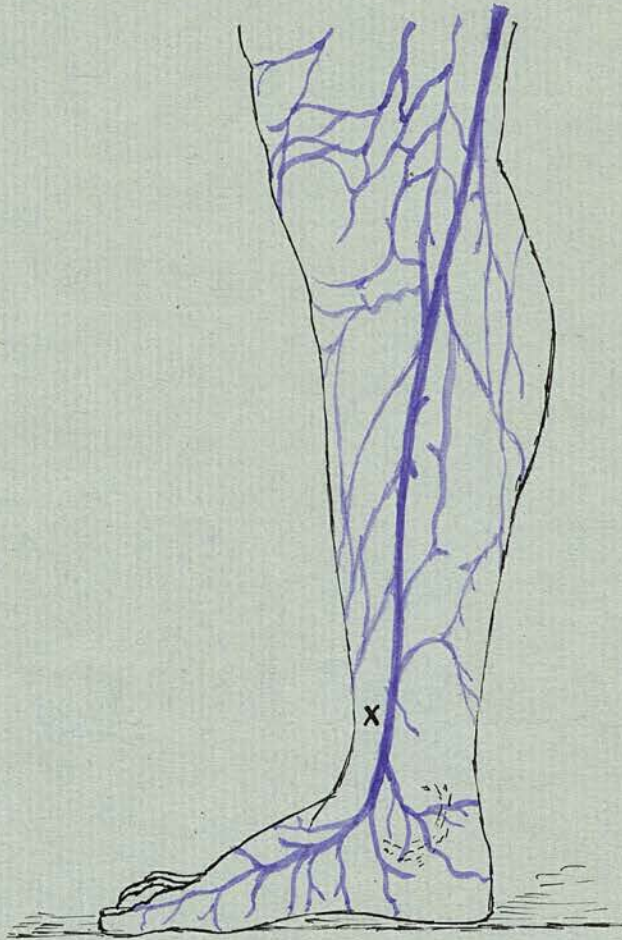
Zona and the nodular syphilides, affect the sides and front of the abdomen. In regard to the typhoid eruption, the spots were formerly thought to arise from reflex causes, but there is nothing truly urticarial in its appearance, nor anything suggestive of such a cause.

The bacillus typhosus has been found to occur in the spots; possibly these are caused by bacillary emboli. How this can come about is not easy to explain, except by local intestinal ulceration having opened the circulation to the bacilli, which are then broadcast by the bloodvessels to the terminal arterioles in the skin. But, the eruption occurs before ulceration can have taken place in the small intestine; the spots may appear even in the common three-weeks type of typhoid in which there is no ulceration at all. It is noticeable that the rash corresponds in situation proximately with the girdle, or circle, of fine vessels which appears in the abdominal wall in people who have portal delay or congestion. Certainly the eruption does not exactly correspond with the venules which constitute the caput medusae, but seems to correspond with the tributaries of the collateral system of vessels which is made up partly by the mesenteric vein with others in the abdominal wall, and the accessory portal of Sheppey,²² as well as the lateral vein sometimes seen to run up about the midaxillary line,²³ and those veins about the round ligament. The distribution of the inferior mesenteric vein does not appear to explain the typhoid eruption. A bloodborne infection of the gall-bladder is common in

typhoid fever; indeed, it is a usual means of its involvement.²⁴ It is therefore possible that the eruption may coincide with, or be consequent upon, invasion of the region of the gall-bladder by the typhoid bacillus. I would suggest that the microbe is absorbed from the bowel ~~by the~~ lymphatic channels in the mesentery; by the venules, and by phagocytic action, they are then conveyed to the skin plexuses in the abdominal wall, the spot itself being the result of a local reaction to the presence of the bacilli. It is peculiar that, in mild cases of typhoid fever, there may be a rash called copious if a dozen spots exist and, ~~and~~ that in severe cases, there may be no spots at all; that the rash is more definite, brighter in colour and usually more copious, in paratyphoid A and BB fevers and, again, that leucopenia is the rule in typhoid. The leucopenia may possibly explain why severe cases of typhoid may show no rash upon chest or abdomen; it may explain the circumscribed distribution and, at the same time, the reason why the eruption never becomes general. As a rule, the typhoid spots appear in crops on successive days, so that at any particular time spots may be observed which are one day old, two days old, or three or more days old; disappearing, they retrogress in a regular way. Such circumstances seem to me to confirm the suggested view of phagocytosis, along with lymphatic and bloodvessel, convection, being the likely means of distribution.

20. The legs- Varicose dermatitis, varicose ulcer, and lichen planus, occur on the inner aspects of the legs.

x The cross marks the stretch of the superficial Internal Saphena Vein most subjected to the weight of the head of venous blood which occupies the incompetent vein in its continuous extent and as far even as the entrance of the Inferior Vena Cava into the right Auricle of the Heart. In the lower third of the leg, the surface area corresponding, are usually found varicose dermatitis and varicose ulcer. The distended, unsupported vein dilates here so as to form a pool or sac



ported vein dilates here so as to form a pool or sac which, because of gravity as well as want of support remains overfull, and is not easily emptied. (Vide A Treatise on Applied Anatomy, Taylor, 1904, p 668.)

About the knees, on the extensor surfaces, psoriasis and the crusted syphilides are found; on the flexor surface, dermatitis; and on the inner aspect, lichen planus may be seen in its initial stage. Varicose ulcer and dermatitis are each predisposed to by delay and stasis in the venous return circulation, by the dependent position of the legs, and are excited by friction and scratching - these determine the positions of the lesions. It is thought that syphilitic ulcer of the leg chooses the lower third of the extensor surface because the site of election for varicose ulcer is the lower third on the inner side, but it has to be noted that a positive Wasserman reaction occurs in a number of cases of varicose ulcer; this fact may explain the delay in recovery where syphilis is unsuspected. The site of varicose ulcer corresponds to that area which is drained by the internal saphena vein where the full force of the head or column of blood retarded exerts its weight, the valves having early become incompetent because of dilatation of the vein. This dilatation is the first step in the process of any vein becoming varicose, and generally results from insufficient support by the tissues through which the vein runs. The syphilitic ulcer, on the other hand, occurs on the outer side because tertiary syphilitic lesions are commonly distributed to extensor surfaces when occurring in the leg, and for the reason that the vessel supply in these situations is distant from the main supply vessels, the spirochete so escaping the

effect of the drug used in treatment, and at the same time finding a nidus peaceable enough to allow of its uninterrupted cultivation.

23. The foot- Dermatitis, pompholyx, callositas, and hyperidrosis, are to be expected in this situation, as also scabies and a dermatitis occurring between the toes. The tendency at anytime for the feet to perspire suggests that such is protective and will account for the comparative freedom of the feet from disease.

The group of generalized eruptions includes dermatitis, exanthemata, psoriasis, urticaria, erythema multiforme, secondary syphilides, and drug eruptions. Commonly the cause acts 'centrally' and, likely enough, the sensitive nervous system has a commanding influence both directly and indirectly upon certain of the general eruptions; it holds the reins and a controlling hand, as it were, upon all the other systems of the body. The system of blood: vessels, as already described, guides distribution. The physiological and pathological chemistry of the intestinal tract, from mouth to pelvic colon, no doubt, ^{holds} the key to many of the processes which underlie, and are associated with, the general skin eruptions; those chemical changes which are in process of observation and investigation will, when explained, lead to a better and fuller understanding of those reactions concerning which we have hitherto been ignorant.

Universal eruptions like some cases of dermatitis, psoriasis, ichthyosis, erythema

scarlatinoides, dermatitis exfoliativa, and pityriasis rubra pilaris, present many problems for solution; their origin is probably infective, and in a few of these diseases, sensitization surely plays an important part in generalizing them.

With the cessation of the action of the particular causal agent, its influence may be at once seen in the appearance of the eruption, which may speedily improve and then disappear; on the other hand, the influence exercised may continue to act in spite of the withdrawal of the causal agent. Such continued action indicates a condition of susceptibility or of sensitization on the part of the sufferer, or the fact of some fresh source of irritation having cropped up. Exacerbation or recurrence may be similarly explained. The study of any subjective symptoms present is important and may confirm ^{our opinion of} the situation held by the lesions in the epidermis and the extent of nervous influence. It would seem that the more deeply placed the elementary lesion in the epidermis and dermis, the longer it remains discrete and true to type. On the other hand, a lesion usually tends to evolve along the line of least resistance, namely; towards the surface, unless the spread is almost purely lymphatic or venous. When secondary elements are added to an eruption, the changed appearance which they produce are usually easy of explanation. Itchiness or pruritus may be a local incident or it may be general; in many cases it is a phenomenon difficult to account

for. A likely explanation is that it is due to lymph becoming toxic from chemical process or from defective elimination of poisons by the kidneys or even by the skin itself. This toxic lymph may, by altering tension in the lymph spaces, and by irritating nerve endings and nerve bulbs produce itchiness, and so explain the general pruritus which is such a prominent feature in many cases. The persistence of the cause, then, acting alone may offer aggravation to the disease; acting intermittently, it may induce recrudescence, relapse, or recurrence. Or, again, a disease may cause the development of such a degree of sensitization that an apparent trifling exposure to the original irritant may, after a believed cure, light up the mischief again and cause its distribution to be much more rapid and widespread, and, at the same time, difficult of control. An eruption being established, it would appear that the continued action of the causal agent, in some cases, becomes unnecessary and persistence or extension may result simply from diminished resistance, local and general, which treatment has failed to overcome. Defective elimination of abnormal products of katabolism which cause an auto-intoxication, or the actual manufacture of toxins in a local lesion may ~~may~~ maintain an eruption; it has, however, not so far been conclusively proved whether, or how far, auto-poisoning is responsible for the production or the maintenance of disease of the skin. Altered character may be accounted for by situation, or by the superaddition of an accessory cause, or conceivably, by altered composition of the circulating poison, or in the presence of two distinct diseases



operating at the same time, or one after the other. The polymorphic eruption of syphilis, at one stage, would seem to depend upon local variation in vitality of the spirochaeta at various times after its generalization, or upon the actual amount of endotoxin liberated at any particular time in various positions in the circulation, and upon the fact of the organisms invading the tissues and digging themselves in after the manner characteristic of it. It is well known that the spirochaeta has a selective action upon the walls of the smaller vessels particularly in certain situations, and it seems that recrudescence in limited areas may be due to latent foci becoming reactivated for some reason; here is a likely reason for the later syphilide which is thought to appear upon the sites formerly occupied by the lesions of the secondary exanthem.²⁵ There is no doubt that that the Edinburgh method of illustration by plaster-cast can be of use in determining the truth of this assertion, especially if exact measurement by centimetre rule be employed, with the help of the fixed anatomical points to aid localization. In syphilis, the mischief, in time, becomes progressively more deeply placed and as the disease advances; most of the lesions become circumscribed in the natural effort of the tissues to wall in the spirochaeta as they do a foreign body, and so to protect themselves against the invader and to overcome it.

Symmetrical eruptions are, as is to be expected, usually the outcome of an auto-intoxication or toxæmia. One of the best examples is lupus erythematosus,²⁶ and Dr Pernet has seen good illustrations

in cases of leprosy and erythema haemorrhagicum faciei. He also cites pellagra as being a condition where symmetry may be well shown. Bilateral or serial symmetry is probably invariably the result of a general cause, and is the result of a blood-borne poison.

V.

Food, Drugs, Occupation, Habits; Seasonal Variation, and the Influence of Race, and Climate, and Country.

Food- Articles of food of various kinds, and products of defect in their metabolism, and the action of intestinal micro-organisms, acting singly or together, are the chief factors which determine the cause and the distribution of urticaria which is general, and of certain erythemata. The lesion appears first to affect the finer bloodvessels so as to produce dilatation, with diminished coagulability, and some damage to the vessel-wall, in local areas. Effusion of serum follows, and mechanical irritation from itching aids the production of wheals, then patches. The face, limbs, and trunk may each, or all, be involved, and if the toxic action is sufficiently intense so as to produce damage a little more severe than usual, then the fine vessels may rupture so as to produce haemorrhagic forms. If, on the other hand, effusion of serum be excessive, then bullae will form by the upper layers of epidermis becoming ballooned. Any rise in blood-pressure such as may accompany the pyrexia consequent upon an attack of urticaria, or by the taking of hot foods or drinks, may conceivably intensify, and promote spread of, such eruptions.

The intense itchiness of the urticarial lesions would appear to be explained by tension in the tissues and by the toxin-bearing lymph in the vessels and lymph spaces being of an irritative character, or by the presence of products in the lymph, such as bile-salts in excess, which alter the tension in the contained spaces.²⁷

Drugs-The toxic effects of drugs, whether shown by skin eruption, or in other ways, depend in the majority of cases upon undue sensitiveness or upon idiosyncrasy on the part of the individual and, curiously, it is the small dose which causes the mischief, its steady continuance not necessarily producing tolerance. Cumulative effect, such as may be produced by repeated small doses where the excretory powers as regards the kidney may be defective, may explain some cases of iodide, and bromide, of potassium poisoning, where the skin is called upon to perform its excretory function at greater pressure and in aid of the kidneys. It is not to be forgotten that the skin itself constitutes an important part of the so-called excretory system. In bromism and iodism, the changes appear to occur primarily in the blood-vessels. These vessels become dilated and there is found a perivascular leucocytosis, the process going on to abscess formation which has its foundation in the region of the vessel plexuses; follicles of hair and coil glands become affected secondarily and subsequent to the involvement of the vascular network, in local areas. The following case of iodism is of interest:

M.R., a girl, aet. 18 years, who suffered from valvular disease of the heart, primarily in the mitral valve,

and probably of rheumatic origin, and who had extensive anasarca, was given five grains of potassium iodide in a mixture with tincture of digitalis and aromatic spirit of ammonia; she had a high percentage of albumen in the urine. After six doses, an eruption of spots appeared on the face and chest, arms, and legs; these rapidly became bullous. Although the mixture was at once stopped- after the six doses of iodide of five grains each, the eruption persisted and became crusted. There is no doubt that the girl's death, which followed on the tenth day after the first dose had been taken, was hastened by the toxaemia consequent upon the type of eruption produced. Obviously, defective elimination of the iodide by the kidneys already diseased, and the extensive dropsy, were the factors determining the iodide eruption in this case. The drug was obviously vessel-borne. It is interesting that exposure to sunlight may encourage an iodide rash to appear upon the face; in my case,³⁷ however, although the girl was in bed in a dark room, lit only by a gas jet, the rash was still copious on the face. This tendency to suffer toxic disturbance upon the ingestion of small doses of certain drugs would appear to be common to several members of a family. Nor do such skin eruptions happen only after the internal use of drugs; the application of certain medicaments externally may produce eruptions: for example, quinine, as a lotion, which may cause an erythema. An erythemato-papular eruption may appear on applying a belladonna lotion or liniment for sprains, or injuries, to muscles and joints. In a case of mine, such an eruption occurred in a lady who I already knew

suffered excessive dryness of the tongue and mouth after taking the occasional laxative pill with belladonna in minute quantity entering into its composition, showing an unusual sensitiveness to belladonna. The liniment of belladonna she applied to the region about the ankle-joint for a sprain, and in a few days, an erythematopapular eruption appeared. Believing this result satisfactory, she continued the use of the belladonna and, in a day or two more, the whole leg became erythematous and swollen from oedema: an oedematous dermatitis occurred which was followed by an acute exfoliative dermatitis, quickly lit up and involving the whole body surface from top to toe. Many weeks went by before the mischief was overcome and, although a year has now passed since clinical recovery, yet the patient constantly complains of discomfort in the skin, and of itching in paroxysms. It is an important fact that the particular lady has been asthmatic for years, and that she leads a nerve-wrecking existence.

Erythema, urticaria, or either with an oedema of the cutis and subcutaneous tissues, vesicular and bullous eruptions, herpetic eruptions, keratoses, pigmentations, pustular and purpuric eruptions are each of them known to be produced by the use of drugs, the chief offenders, amongst others, being quinine, copaiba, potassium and sodium bromide or iodide, arsenic, and silver nitrate. It is peculiar that the same drug may produce different eruptions, or different elements in the eruption, at the same time. Their internal use is followed in the susceptible individual

by an eruption, the elements of which occur at first deeply placed, and probably about the vascular network in the skin,^{39.40} the distribution then depending upon the intensity and duration of the poisoning. Such an eruption will, as a rule, remain erythematous, or papular, or become vesicular, or bullous, or purpuric. In one class of drug eruptions, the effect would appear to be exercised through the vaso-motor nerves to the vessels; these nerves may become paretic or temporarily paralyzed so causing persisting dilatation of the vessels, and even a symmetrical arrangement, with either an erythematous or an urticarial appearance predominating.

Roughly, then, distribution of such drug eruptions will depend upon the drug, the way it is exhibited, and the question of idiosyncrasy and sensitization,⁶ as also upon the excretory functions.

At the same time, it is to be remembered that the effects of such drugs may extend far beyond the immediate area exposed to their action.

Serum rashes are most commonly erythematous, and may take one of three forms:²⁸ namely, 1. urticaria, 2. erythema marginatum, blotchy erythema, less often morbilliform, and 3. scarlatiniform erythema. They are probably manifestations of protein sensitization, and show such evidence of symmetry as will point to a systemic cause. The administration of serum to an individual who has already been sensitized by previous injection is sufficient to produce the rash, and to bring about an anaphylaxis so intense as to cause danger to life. An astonishing imitation of

scarlet fever may be produced by another cause which is uncertain, but which, in such a case as the following may be put down to sensitization to some foreign protein ingested:

Miss E.M., aet. 19 years, went to bed with a temperature registering 103F., pulse 100. The only subjective symptoms complained of were: slight frontal headache and malaise, with "tired pains" in the back and leg muscles.

By next morning, her appearance at once suggested scarlatina. The pink cheeks, circumoral pallor, bright appearance of the eyes, and the punctate and erythematous eruption on the front and sides of the neck, the chest, back, and upper limbs, seemed conclusive enough. By the third day, in the morning, the eruption was found to cover the whole body except the face. Doubt existed in the mind, however, because there was no injection of the fauces, no scarlatinal throat, no "blanket" or swollen papillae on the tongue, and no act of vomiting had occurred, a sign to which is, by some, attached considerable importance, as an initial prodrom.

Moreover, on the evening of this day, an occasional spot appeared here and there upon the face, an incident most unusual in scarlet fever. Although, in a day or two more, early desquamative signs began to appear, one was definitely certain that the case was not one of scarlet fever, but was a case of erythema scarlatinoides.

At no time was there any albuminuria. A second, then a third, medical opinion confirmed the diagnosis.

Presumably, the scarlatinal toxin acts in the same way, or similarly, by producing sensitization,²⁹ and it is possibly that, absorption having taken place in the

throat, explains why the scarlet rash first presents itself on the sides and front of the neck. In measles, the morbilliform eruption appears first upon the face, possibly because infection first invades the nasopharynx and accessory air-spaces which are placed higher. Then again, in scarlet fever, the glands in the neck are not enlarged to begin with as they are in measles, and more noticeably in rubella: can this explain the erythematous rash in scarlatina, and the morbilliform rash in measles? I rather think that it can, and in the manner following: the effect of the scarlatinal toxin is to produce vaso-motor paresis involving the arterioles; the rash is bright red or scarlet and appears to confine itself chiefly to the arterial system, the resulting congestion increasing metabolic processes in the skin: this, with the direct action of the toxin itself, amplifies and hastens the normal desquamative process, so as to produce the "pink-hole and flake" peeling of the skin. In measles, on the other hand, the colour of the morbilliform eruption is dark-red and more nearly approaches a purple, and it seems to me that the toxin acts more upon the venous network and, naturally, ease of absorption in such circumstances by the lymphatics and glands is demonstrated by the glandular swellings. It is presumed that there is slight injury to the vessel walls which is sufficient to cause some diapedesis of red corpuscles, possibly even haemorrhage of minute extent and quantity: that there is the effusion of haemoglobin-stained serum is certain by the feel of the spots in measles and by the fact of their being raised slightly

from the surface of the skin, as also by there being a positive result for bilirubin, of one type, with the use of the Erlich diazo test.

Occupation - The great body of trade and occupational dermatoses come under this head, and these constitute eruptions of varying severity depending upon the nature and potency of the irritant, the area to which it is applied, and the susceptibility on the part of the individual, as also upon the capacity of his skin to resist. Their distribution, as a rule, will depend upon their local application and must, at first, be limited to the part to which they are applied, adjacent spread usually by pure extension following. As regards the depth of the skin and the particular epidermal layers implicated, these may be said to differ little compared with the naked-eye and minute appearances seen in any case of dermatitis from other cause. One point is of importance, namely: the occurrence of inflammatory oedema of a reactionary kind which is specially diagnostic of the occupational dermatoses. Distribution in this class, then, depends upon the nature of the employment, the nature of the hurtful agent, and the particular manner in which the worker handles and performs his job. These dermatoses follow the same grouping, mode of appearance, position, and situation, and the same spread and evolution in each, and remain usually quite local. If found away from the area of contact, the phenomenon will most likely be accounted for by sensitization having existed or occurred. The area involved, apart from this possibility, is usually margined, and the lesions observed show a uniformity of

appearance: clothing, to some extent, partly determines the limits of the eruption. As a rule, the dermatitis is inclined to be worse on the right limb in those who are right-handed, and occurs especially upon the hands, their dorsal aspects, and upon the fingers, wrists, and forearms, back and front.

Many hyperkeratoses depend for their situation on intermittent mechanical pressure with friction, for example: in the violinist, all the fingertips of the left hand tend to become hyperkeratotic; in the 'celloist, the left thumb escapes except on its inner, palmar, aspect, but the second, third, and fourth, fingertips are thickened, although progressively less so down to the fourth and fifth: in the harpist, the tips of thumb, index, middle, and ring, fingers of both hands, suffer. In the same way, hyperkeratosis and chronic teno-synovitis are found in wood turners and in carpenters especially over the thenar eminences, and there are numerous other examples to be cited of workers suffering similarly as the result of, and depending upon, their particular kind of employment. Then again, pitch and tar produce eruptions varying from an erythema and an acne to an oedematous dermatitis, a folliculitis, and the occurrence of warty growths which, after twenty or more years, may have, developing upon them, squamous-cell carcinoma.³⁰ With the employment of mulespinner, occurs the risk of epithelioma of the scrotum from local irritation. Irritant dusts, causing inflammations, will naturally seize upon the eyelids, lips, insides of the nostrils, flexures, the scalp and beard regions, the ears, and the undersurf:

aces of the nails, causing eruptions purely by direct contact; such parts are ready to catch up dust and irritants which find their way into the atmosphere, or are transferred by means of the fingers. Even in trade eruptions, however, it is to be remembered that, although all workmen may be exposed, only a small proportion suffer.

In dermatitis venenata, the lesions are always distributed on uncovered parts, such as the hands and face, although not necessarily so: the extent of the eruption may suggest at once the cause which can usually be confirmed by careful interrogation. Sensitization and idiosyncrasy influence the occurrence and spread and extent of such cases of dermatitis. If found to affect the face, then in the greatest percentage of cases, the fact will point to a plant or wood being the exciting cause,^{3/} these commonly giving rise to an erythematous and oedematous dermatitis there.

Habits - Want of cleanliness as regards the skin from disuse of soap and water does not, by itself, produce skin disease, contrary to the popular belief; rather does it appear, in many persons, to protect against it. Bad habits certainly do, and these are probably more common, or more frequent, in the neurotic young subject where the skin within easy reach of the hands, especially the right, and of the nails, is apt to suffer.

A neurotic boy of eleven years had intractable dermatitis of the distal portions of the left fore and middle fingers; I afterwards found that it was caused by the habit of sucking them, which habit he had not outgrown.

Bad habits may determine the position of an extra-genital chancre, or even a genital chancre. An erythema of subacute or chronic character, going on to a scaly dermatitis, is not uncommon on the outer aspect of the leg from sitting sideways near a gas fire; it is next to impossible to cure the condition until the habit is noticed and given up.

Seasonal Variation, and the Influence of Race, Climate, and Country.

Season appears to have its influence. In winter, pruritus hemialis, dermatitis, and psoriasis, are more prevalent and severe on account, probably, of cold and damp causing lowered vitality in the skin with lessened vascularity and stasis and greater inactivity of skin glands, as also of the greater necessity for extra body clothing; those diseases show improvement with the advent of summer. The contrary also occurs, some diseases such as miliaria, hydroa vacciniforme, and pellagra, being more common or more severe in summer. Again, erythema multiforme would appear to have its greatest incidence in spring and autumn. Warmer weather induces greater activity on the part of the glands of the skin, their secretion offering a good protection against disease; the coincident greater vascularity of the skin may also be protective.

With the influence of race, it follows that habits and environment must be considered, factors which combine to influence distribution. It is likely that race alone can affect world distribution little, if at all. Rather would it appear that the diseases which any particular race may suffer are

traceable to environment, using the word in its wide sense. Amongst the Jews, xeroderma, and melanotic carcinoma, are relatively more common. Negroes are liable to suffer, for example, from keloid and from chilblain, but are much less liable to contract lupus vulgaris than are White races: favus is commonest amongst the Poles and the Italians.

As regards Country, favus is prevalent in North Italy, Germany, Austria, Poland; if found in this Country, or in America, it is usually in the alien or his progeny. Prurigo is of frequent occurrence in Austria, but rare in the British Isles; urticaria is commoner here. In the Tropics, yaws, Dehli boil, mycetoma, tinea imbricata, and elephantiasis of the type caused by the filaria, are common, these diseases not being endemic in other zones. Pellagra occurs with frequency in Spain and in certain parts of Italy, in the Tyrol, and in Roumania: but the disease probably has a more general distribution than has been generally believed. Actinomycosis is common in Germany and in France. Of all those diseases, leprosy has a wider distribution than any; it occurs in Norway, Sweden, Asia, South Russia, Japan, North and South America, Cuba, Mexico, the West Indies, and also in Madeira, Spain, Portugal, Italy, Greece, France, and many British Possessions. Until segregation was effectually carried out in various lepra infected places, the disease was even more widely distributed than it is to-day.

VI.

Clothing and Environment; Questions of Light and of Temperature.

The face and hands, being uncovered, are thereby exposed in a number of ways to harmful agents and agencies against which covered parts are protected. The opposite also true, namely, that parts, being covered, develop a greater liability and incidence as regards certain other affections. The following short comparative list roughly demonstrates the greater range of diseases affecting, or commencing in, the face and hands. Many more which affect the trunk chiefly, may show a tendency to expand on to the face and limbs. There appears to be a greater incidence in the diseases affecting the uncovered face and hands as compared with those affecting trunk and limbs, which are normally covered.

UNCOVERED PARTS.

Adenoma sebaceum
 Rosacea
 Plant dermatitis
 Keroderma pigmentosum
 Moles and naevi
 Carcinomata
 granulosis rubra nasi
 Impetigo contagiosa
 Acne vulgaris
 Dermatitis
 Sycosis
 Ephemelis
 Hydroa vaccini forme
 Hypertrichosis
 Lupus vulgaris
 Pellagra
 Erythema pernio
 Lupus erythematosus

COVERED PARTS

Acarodermatitis urticar:
 ioides
 Seborrhoea corporis
 Pityriasis rosea
 Psoriasis
 Secondary syphilis
 Drug rashes
 xeroderma
 Parakeratosis variegata
 Pityriasis rubra pilaris
 Pityriasis versicolor
 Pruritus
 Urticaria

Apart from frequency, such a list shows the the range of diseases affecting each of the areas mentioned and in a comparative way. It would be interesting to know

to what extent exposure to day-light and light rays affect the incidence and character, as well as the distribution, of the common and the rare diseases of face and hands: some part of this information we have already, but assuredly we shall have learnt more by and by.

Some diseases, such as rosacea and sycosis, are confined to the face only, not appearing at any time upon the body; others, such as xeroderma, and pityriasis versicolor, occur invariably on parts covered other than the face. Commencing upon face or hands an eruption may spread to trunk and limbs respectively, or appear simultaneously upon face and trunk. Clothing, by becoming infected, may induce lesions such as we see in pediculosis corporis, or flannel rash may follow the wearing of flannel upon a skin infected with seborrhoea, or a dermatitis may result from the continued use of a soiled napkin in an infant. Dyes used in the manufacture of cloth and fur may cause urticaria or dermatitis as in the case of one, (Mr J. McF.), who suffered an attack of urticaria of great intensity by wearing a new natural-dyed homespun suit of clothes.

My detective instinct was not at first aroused even by the powerful smell of the cloth. It was at once noticed that the eruption, which, by the way, had appeared for the first time on the evening of the day upon which he had worn the suit for the first time, disappeared progressively after he went to bed, to reappear almost at once when he wore the suit on being once more up and about. Again, in the case of a young married woman, (Mrs M.S.) who developed an acute erythemato-vesicular eruption on the neck and shoulders over the area covered by a

fur collar attached to a cloth coat worn. This eruption was found to be due to the dye in the fur (paraphenyl: enediamine) and disappeared readily enough with treatment when the coat was put aside, only to reappear as promptly when the coat was again worn. The rash occurred about ten days after the coat had been bought; from what I could gather, this coat had been worn each evening for the ten days before the eruption presented itself.

Local friction and constriction by clothing worn appears in some to determine the position of a skin eruption, and to aggravate and alter it in others. Clothing worn tightly about the knees, or the pressure of a tight or firm shirt wristband, appear to determine the position at the wrist of lichen planus when it first appears: but, from the position occupied to begin with, I would submit that the disease depends for its situation on constriction and pressure caused by clothing, with friction in addition, friction alone appearing to me to be less likely to do it. This can be the more readily understood when the early eruption is noticed to make its first appearance upon the inner surface at the knee above the joint, and on the inner front aspect at the wrist. At the same time, I believe that the proneness to linear arrangement in some cases of lichen planus is caused by repeated efforts at scratching made in the long axis of the limbs or back - the normal direction for most people who scratch themselves. Those parts of the back which may escape the eruption are usually out of easy reach of the fingers. May this not, then, explain the

triangular distribution in lichen planus when it does occur upon the back? Further: the neck, waist, wrists, and garter areas, are each of them parts where the eruption may be noticeably severe, and such being so, might suggest the same explanation of the distribution: namely, pressure and friction combined. In lichen planus, the vascular or nerve-like arrangement regarded by some is not obvious anatomically, by the order and set-out of the eruption as we see it.

Pityriasis versicolor may be determined upon the chest and shoulders by the wearing of a much soiled and much worn vest in the case of an uncleanly person who has hyperidrosis, and allows the accumulation of glandular products upon the skin. Individuals such as these would almost seem to stitch themselves in, the elements of the fungus following suit by digging themselves in. The distribution in this disease practically always confines itself to the vest area, as it also does in pityriasis rosea, though to a greater extent of surface.

Environment

Social position and environment affect distribution by, in some, increasing the risk of infection, or by placing one in an atmosphere or surrounding favourable to the development and spread of infections such as those of the exanthemata, or those caused by animal and other parasites. Parasitic diseases are more prevalent amongst the lower and poorer classes, and syphilis is apparently more frequent amongst those classes because more often untreated or insufficiently treated. Armies in the field, and individuals crowded together, are

much more liable to contagious skin and other disease, and it is well known that the infectious fevers have their virulence and intensity multiplied in such circumstances. Amongst soldiers on active service, in the field and in barracks, scabies and accompanying impetigo may assume almost epidemic incidence.

Questions of Light and Temperature-

In a group are placed certain affections caused, or or predisposed to, by exposure and light rays. Sailor's skin (Unna) results from exposure, and is distributed to the backs of the hands, chiefly: there are cases of dermatitis brought about by the Rontgen rays and by ultra-violet rays; and others by photosensitization. Such dermatoses confine themselves only to those areas of the skin which are actually exposed to the light rays. In hydroa aestivale, porphyrinuria which is congenital and acquired, may or may not be present; it has been found associated with chronic acquired and congenital cases only, and is known to render individuals sensitive to light, so that it may be assumed to be the actual cause of hydroa aestivale where the association exists.³² After the first attack of this disease, the condition dies down in the winter to light up again each spring and summer coincidently with increasing sunshine. The scarring left behind after each attack corresponds with the points where lesions had previously existed. The parts exposed such as the face, ears, front and sides of the knees, and even the top of the scalp, have all, at times, presented lesions in cases of the disease. Xeroderma pigmentosum is another rare condition characterized by the appearance of

permanent freckling, teleangiectases, atrophy of the skin, and the formation of warty growths which become malignant. A family affection, it appears to be brought about by some inborn error of metabolism, or what is more likely, by the presence of some photosensitive factor common to all the members of the family affected. Such photosensitive factor may be endogenous and due to katabolic error, or exogenous and ingested with the food: for example, sensitive maize. Some there are who believe the disease to be the result of a precocious senility of the skin; I would suggest as the cause, a massive and cumulative repeated exposure to some sensitizing agent equal in amount to that which an ordinary individual is subjected to in the course of his three score and ten years; the crowding into a short space of time what will amount to a life-time's exposure: this then might cause premature or hastened senility of the skin. The distribution occurs upon uncovered parts, and depends upon exposure to sunlight and weather as the important factor.

Pellagra is also, apparently, the example of a disease occurring in an individual of lowered vitality who has become sensitized to light. It appears that want, privation, and unsuitable diet, may predispose, but that the actual exciting cause is either deficiency in regard to some protein or other element, or the consumption of , in some cases, photosensitive food, or of a parasite or mould taken with the food which conceivably might render the individual photo-sensitive: any of these acting in the presence of sunlight. It is , on the other hand, possible that

the disease is a photo-dynamic intoxication.³⁴

There is the feeling that pellagra has a greater incidence and a wider world distribution than has generally been believed, and that the disease may have, formerly, been more prevalent than records show. It appears to have been frequent, at least among the soldiers, during and after the Crimean war. Recently, I saw several painted models in wood of old soldiers discharged on arrival from the Crimea whose uniforms had become merely rags: their faces, necks, arms, hands, legs from the knees, and feet, were exposed and had a deeply tanned brown colour. Those models were said to have been made and painted by a clever artist, and were believed to be wonderfully exact and true reproductions, particularly as regards the tint of colour in the skin. It is generally understood that many soldiers suffered hardship of every kind during and after the Crimea, and were illnourished, underfed, and underclad. The whole appearance and the expression of face in those models at once suggest pellagra with dementia; the colour of the skin reminds one of cases of pellagra which are seen illustrated now-a-days. The disease is known to be endemic in Europe. (An effort is being made to secure the five models mentioned for the Ward II.E.R.I. Dermatological Museum). Dr Cranston Low in Sir Norman Walker's Introduction to Dermatology,³⁵ has drawn attention to the distinct line of demarcation which occurs at the upper border of the erythema on the forearms, and to the upward convexity which it takes, and to the fact that it reaches a higher level on the extensor than on the flexor aspect. In our

opinion, the reason would appear to be that the arms are usually held in the natural easy attitude against the sides whether the elbow-joint is flexed or extended, and halfway between pronation and supination, thus exposing to the light a greater portion of the extensor than flexor surface. At other times, the sharp demarcating line described may correspond with the lower level of a vest sleeve or a shirt-sleeve rolled up; such is often rolled so as to lie higher on the outer than on the inner side of the arm. The ulcerations found in the mouth and on the tongue point to a digestive system participation in the mischief and, at the same time, suggest a general cause.

Temperature -

Low temperatures predispose to erythema pernio and frostbite by diminishing and delaying the bloodflow in the terminal circulation: hence the distribution in chilblain and in Raynaud's disease too; in both of these there is, superadded, some toxic element. Any condition produced by excessively low temperatures must first affect the ears, nose, fingers, and toes, the functions of the trophic nerve supply suffering at the same time from want of nourishment. In erythema pernio, the tips of the ears, and extensor surfaces of the fingers are chiefly affected, these surfaces being more exposed and less vascular than the flexor. The arrangement of most vessels is such that they are placed where least likely to suffer injury by stretching or other trauma: namely, deeply in the flexor parts of the limbs. Vessels on the extensor aspect have a longer course to their terminals than on the flexor, and lie more superficially

and nearer the surface; they therefor, though of smaller size and of less importance, suffer greater risks and greater effects from all kinds of injury. Variation in temperature may affect appearances and distribution, as in scarlet fever and measles. To confirm the character of the rash in these, it is usual to sit the patient up in bed so that the back can be better examined. The sudden chilling of the surface defines the punctae and maculae more clearly. The rash is often more evident and better developed there, the elements of the eruption becoming more decided because the general vaso-motor flush has temporarily faded. This transient fading of the hyperaemia on cooling, with the resulting venous turgescence of the macules, shows up the elements better: for example in the subcuticular rash of typhus fever as seen in the forearms, and in the roseola of syphilis, especially if gentle friction by rubbing be used to congest the already congested macules and papules. The intensity of many rashes which appear on back and lower abdomen seems to be due to greater local temperature, to decubitus and position of the patient, to gravity, and to friction by the body, and bed, clothes. The common distribution of many rashes on the front of the body may be the result of its greater exposure to various agencies, as well as to the greater vascularity of the ventral parts, and the fact of such agencies as toxins arriving upon the skin there more quickly, and more readily, than they can in the case of the dorsum of the trunk. The same reason may determine the greater distribution to the flexor surfaces of the limbs.

Variation, then, in temperature, acting with other influences, may affect distribution.

High temperatures, per se, may cause injury of the skin in various degrees from an erythema, or a congestion, to actual necrosis. Acting slowly, a temperature above normal produces at first hyperaemia, more especially in those parts dependent as the legs, and in those parts of the skin closest up to the source of heat. There is simple dilatation of the blood-vessels which persists so long as the heat is applied, and to a lesser extent, afterwards, for a varying time. On the legs in elderly persons, whose habit is to sit much before the fire, a reticulated and meshed appearance of congestion readily occurs. A similar condition is noticed in the lower abdomen in many who use hot water-bottles applied for the various pains that are suffered there. In time, the appearance changes, and the colour gradually becomes more venous as the result of stasis; at the same time, pigmentation progressively develops which takes, approximately, the same distribution and pattern as the vascular network. This anastomosing network explains the appearance of the eruption in livido annularis, and in erythema ab igne³⁵, as also in cases in children and adolescents who suffer from bad circulation, a state of affairs, the exciting cause of which is cold or, more likely, damp plus cold, and a toxic origin which ~~is~~ produces reflex spasm.

VII.

Age and Sex; Congenital and Diathetic

Influences.

AGE-

It is common knowledge that certain exanthemata and diseases of the skin are more frequent during certain periods of life and, for the same reason, may be modified as regards distribution.

INFANCY- Because of the comparatively small extent of surface and its easier vulnerability, the spread of an affection appears to be facilitated, and may become more speedily extensive. Even scabies may, in the infant, extend on to the trunk and face surprisingly quickly and, of course, be as quickly cured. The skin is more easily injured by hurtful agents in the infant than even in the child or adolescent. Head and face usually suffer most and syphilis, naevus, impetigo, and dermatitis of face and scalp, are of common occurrence there.

CHILDHOOD- The age of childhood brings with it numerous troubles, the commonest being the exanthems, erythemas, intertrigo, favus and ringworm of the scalp, impetigo contagiosa, lupus vulgaris and scrofuloderma, which last is usually secondary to, and consequent upon, infection of the lymphatic glands occupying the two triangles of the neck on either side, the bovine tubercle bacillus being the infecting agent and derived from the use of contaminated cow's milk.

ADOLESCENCE- At this stage, the face and limbs are chiefly affected, ecthyma, erythema nodosum, and lupus vulg

:aris, being frequent.

IN THE YOUNG ADULT- The face and trunk suffer most and acne vulgaris, sycosis, lupus vulgaris, the typhoid eruption, and psoriasis, are chiefly seen, exception: ally impetigo contagiosa.

AT AND AFTER FULL DEVELOPMENT- An age is reached when the subject becomes more or less immunologically protected against many of the diseases of childhood, and has developed an acquired protection and resistance. This being the active working period of life, trade dermatoses have a greater incidence. There are found all types and kinds of dermatitis, also psoriasis, lichen planus, the syphilides, sycosis, and tinea barbae; the limbs suffer most.

IN ADVANCING YEARS AND OLD AGE- The legs are frequently seized upon because of blood stasis, and there may be oedema of the tissues the result of the action of gravity. In other areas such as the face, the ageing of the skin determines the presence of disease. At this period of life, the precancerous dermatoses are looked for, and the malignant tumours. Such present themselves upon the face commonly, there being a greater liability to their occurrence in that situation than elsewhere, because of its exposure to irritation from many sources. Inflammations, such as the hyperkeratoses including seborrhoeic keratoses, horns, and warts; chronic ulcers; atrophic conditions such as senile keratoses; scars following upon syphilitic lesions and lupus vulgaris: these are all frequent, and any one of them may have implanted upon it a growing malignant tumour, usually a squamous - cell carcinoma. Such malignant growths

then, depend for their distribution upon a preexisting lesion of the skin which, in many instances, can be traced back to some long-neglected condition such as a seborrhoea. Dermatoses such as are seborrhoic invariably hold to a course in the downward direction, and it is quite apparent that these diseases, as regards their incidence and distribution, occur in progressive diminution in the same direction; they are more frequent in the head and face, and less so in the lower extremities.

Age, then, may influence the position as well as the production of malignant tumours because of the circumstance that the latter make their attack usually during the years of decline, and in those parts more exposed to trauma and prolonged irritation such as the face, lips, ears, hands, genitals, and anus and vulva: these are all areas of selection. Another disease associated with years: namely, pruritus, may be general or more or less local, and appears to depend for its distribution upon, in the case of its local occurrence, a preexisting dermatosis, and in the case of its more general distribution, nervous system influences or, more likely still, the circulation of excess bile-salts or blood-waste retention products in the vessels and lymph-spaces in the skin: in other words, upon defective elimination rather than upon extraneous causes. There is the suspicion that true pruritus may at times result from disordered or disturbed endocrine balance, this suspicion arising because of the frequent successful use of the dried thyroid gland substance employed in its treatment. In the aged, it seems to me that the generalized dryness and scaldiness of the skin is likely

to be consequent upon hypothyroidism: desquamation is repeatedly seen followed by an improved state of the skin in the elderly after the use of small doses of thyroid substance given in disease, the doses being suitably spaced. With the same treatment, improvement occurs when the dryness and scalliness are caused by deficient secretion of the gland, or some endocrine defect, the pruritus gradually disappearing. There is little doubt that pruritus can be caused by the progressive diminution of the thyroid secretion which is to be expected in the later years of life. In several ways, the following record of a case is of interest: Mr J.W., aet. 75 years, came complaining that his boots would not go on in the morning, because his feet were swollen. This surprised me, for the reason that in most such ambulatory cases the oedema of feet and legs is worse at night, but the boots can generally go on in the mornings: examination revealed the reason why.

A second complaint was made of excessive itchiness of the skin all over, but particularly in the legs, especially at night. On further interrogation, he said his hat wouldn't fit because it appeared to be getting too small for him: that he was more breathless than formerly, and that he could not summon up energy to walk far or to do much. His appetite was poor and the mouth constantly dry, a common complaint in hypothyroidism; he was gradually becoming bald and his skin so uncomfortably scaly that quantities of scales were everywhere when he took off his pants and socks at night.

On physical examination, he looked old and frail

beyond his years, and exhibited coarse tremors of both hands and shakiness of the head, though not of the type seen in paralysis agitans; the hands and feet were big, and the fingers bulbous; the spine kyphotic; the legs were sabre-like, having an antero-posterior bend forwards; there was a right-sided inguinal hernia; a well-defined arcus senilis; the hair on the outer half of each eyebrow was gone. Albuminuria was found in small quantity, with a few hyaline casts. Cerebration was slow and the blood-pressure reading registered =160 mm Hg systolic: there was a degree of arterio-sclerosis in the radial and brachial arteries which is expected at the age of seventy-five years. The colour of the skin was not peculiar, but over the whole face, body, and limbs, it was dry, harsh, and scaly, and had a peculiar thickened feel when pinched up between the fingers; it did not wrinkle to any extent. All those signs were much more evident in the legs where the oedema was of the mucoid, or gelatinous, type. A little pitting could be made out about the ankle-joint and tendo achilles and for several inches above the joint, but not elsewhere on the legs, or other parts.

This case was diagnosed as Myxoedema in association with Acromegaly, but what relationship there was as to time it was not possible to say. Dried thyroid substance was given in three-grain doses each morning and evening, and a diet rich in vegetables and fruit with, in addition, foods known to contain the necessary vitamins: even after four weeks, the result was surprisingly good. The albumin disappeared, the skin at first threw off an excessive quantity of scales,

but afterwards became more soft, moist, and pliant; the oedema disappeared, except that about the ankles; the tongue became more moist, and there was decidedly less breathlessness and a greater ability to move about and to exercise. This progress continued so that six weeks of the treatment appeared to have done all the good likely to be obtained. In the course of a year after his return home to the country, the patient died of some intercurrent acute affection: opotherapy had, I believe, been gone on with right up to the last.

SEX-

By itself, sex can have little or no influence upon distribution, but rather upon incidence, if there is excepted certain diseases such as Paget's disease of the nipple, cancer en cuirasse, varicose dermatitis and ulcer of the leg, and syphilitic melanoderma, each of which is commoner in women. Again, lupus erythematosus is also commoner in women, but epithelioma, severe forms of rosacea, and the occupational dermatoses and sycosis, of much more frequent occurrence in men.

Menstrual disturbance associated with active vaso-motor disorder is a potent cause which disposes to skin affections in women, especially about the time of the menopause. Their special liability to other disease, such as gallstones, may influence the occurrence and position of skin lesions. Xanthomatosis is a condition commonly found to occur coincidentally with cholelithiasis, both being the result of hypercholesterolaemia. In xanthoma palpebrarum, the lipochrome deposit appears to have preference for the upper eyelid so often darkly pigmented about the menstrual period, and in those who suffer

from cholelithiasis. Use and friction may partly determine the presence of xanthoma cells and xanthoma pigment in the eyelids and, as often occurs, in the hands and fingers, as well as in other places where they are found in the skin. For want of a better reason, the same: namely, use and friction, may be applied where xanthomatosis occurs in internal organs such as the blood-vessels. In young women the psychic flushings and, at the climateric, reflex flushings, depend for their occurrence upon endocrine activity especially in relation to the ovaries and, for their distribution, upon the fact that the vaso-motor system has its most active field in the flush area of the face and in the secondary flush area, if one might name it so, upon the front and sides of the neck and front of the chest to the level of the third and fourth ribs. In chloasma uterinum, the pigment would appear to avoid the flush area and to deposit itself where the circulation is less active and variable. It is usually seen on the forehead and temporal regions in women, in the region round the nipple, and in the linea nigra: once established, the condition refuses to disappear entirely until the menopause. Hypertrichosis occurs in the female sex in abnormal situations due to disordered endocrine balance; these situations are normal hair-bearing areas in the male.

CONGENITAL INFLUENCES-

Imperfect development in utero is put down as the cause of a few skin diseases and defect or excess of growth, or the occurrence of the growth of specialized tissues in an aberrant way and situation, can easily be under:

stood to affect distribution. Naevi, supernumerary nipples, ichthyosis hystrix, harlequin foetus, each can be placed in the category of developmental defect. Their sometime apparent nerve distribution has been thought to be the result of intrauterine spinal cord injury: in other cases, to pressure against the walls of the bony pelvis because of the faulty lie and position of the foetus; both ideas are difficult to reconcile with the characters and distribution. That some correspond with the position of Voigt's lines is a more likely explanation, and one can better conceive such happening where the various folds meet and fuse, or in localized areas fail to fuse, in embryonic life. Surface developmental defect is often associated with a hidden defect of similar congenital origin internally, and Ballantyne recorded the fact that, in cases of congenital skin defect, birth had generally been premature. In one case the thyroid gland was absent,³⁶ and in ichthyosis, the coincidence of asthma had been noticed by Dr Jamieson. In the case of mental deficient children suffering congenital skin defect, it is notoriously difficult to get a truthful family history from parent or guardian for the reason either that a bad family history is as a closed book to them or, more likely, that because of lack of interest, the history is forgotten. The accurate record of family and personal history might possibly do much to help in the way of elucidating the reason for the presence and position of congenital skin disease. Some popular ideas die hard: - a young married primagravida came to see me in great distress on one occasion because a beggar woman, to

whom she had refused alms, threatened her that the coming infant would have a mark - a large naevus on the face- like hers. I admit to feeling some considerable relief when the infant was born without a blemish. Many maternal and paternal impressions are handed on apparently, but there is no reason to believe that any skin disease of congenital origin or abnormal structural defect may be handed down in that way. At the same time, it appears to be not impossible that structural weakness and defect, existing unnoticed in the mother or father, may become exaggerated in the child so as to become the congenital disease which declares itself in the offspring.

CONSTITUTIONAL and DIATHETIC INFLUENCES-

For long, it was believed that skin diseases must result from some constitutional dyscrasia and they were welcomed out: that the body fluids such as the blood, phlegm, and bile, being disordered, produced them, the variety being presumed to depend upon mixtures of these in varying proportion. The classification and distribution would then depend upon whether one's temperament or diathesis happened to be sanguine, phlegmatic, bilious, or melancholic. Ascertained facts have long since exploded such theoretical considerations and shown that ideas such as these could not bear examination; nor is there any evidence that the skin mirrors the state of the blood or body-fluids in the sense formerly thought and believed. On the other hand, for want of better explanation, many still hold that a constitutional influence underlies the occurrence of : for example, asthma, and it is well known that paroxysms are found

to alternate with attacks of pruriginous eczema. The modern explanation of such tends to disprove the constitutional influence and to substitute a more definite reason in unstableness of the broncho-motor portion of the vagus nucleus, brought about by one of several factors either psychic, or reflex, or an endocrine disturbance, or a protein sensitization. Increasing understanding of physiological principles is relegating to a back place the older idea of constitutional and diathetic influences entering into the question of skin diseases, and, one by one, other reasons are being determined, the truth of which is based, not upon surmise, but upon ascertained scientific fact.

VIII.

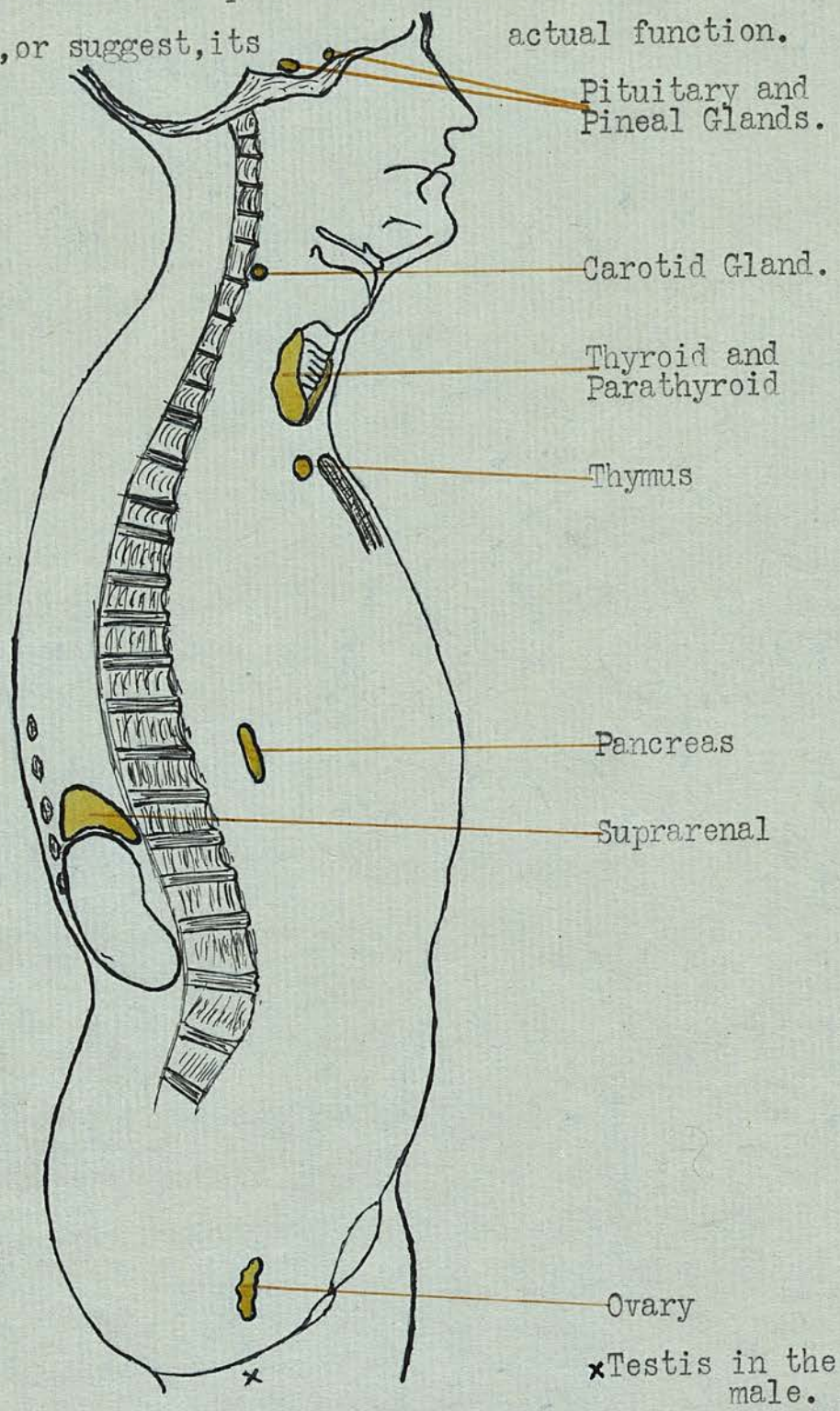
THE INFLUENCE OF THE SYSTEM OF DUCTLESS GLANDS.

Endocrine disorder takes the direction of excess or deficiency or possibly of a perversion of the secretion of one or more of the glands which constitute this system; or of a want of balance in functioning which may exist between them. Such occurring, it is not always easy to pick out the offending gland or glands: the recognition of endocrine defection, and the diagnosis of the gland chiefly concerned, may best be made by noting age, sex, family and personal history, the presence of skeletal changes, the blood-pressure readings, and the extent of arteriosclerosis, as also the presence of glycosuria; but, most important of all, is the condition of the skin as

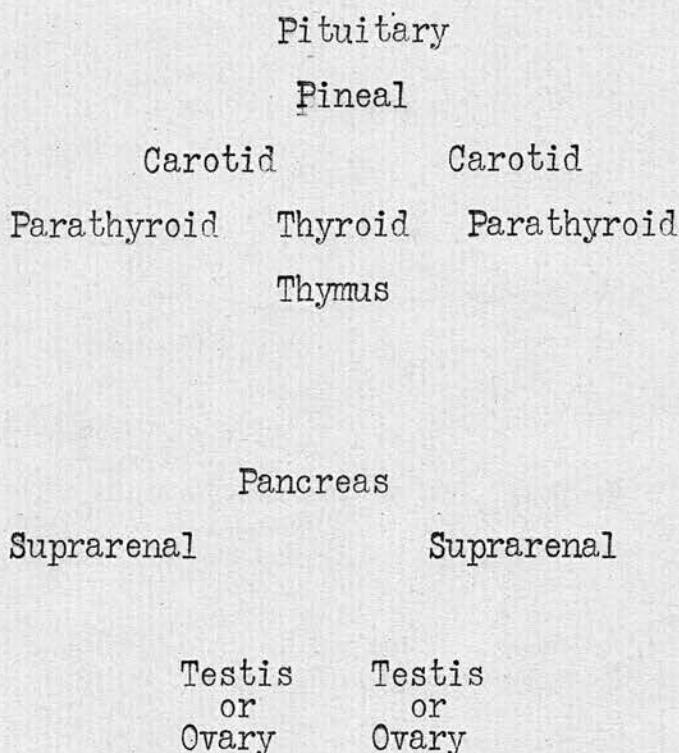
to its dryness or moisture, its scaliness, and the presence of pruritus, gelatinous oedema, or pigmentations. The skin and hair-bearing areas might almost be looked upon as the window through endocrine function or dyscrasia may best be viewed, and as affording the best means, in its examination and in the treatment of certain of its defects, of assessing those functions at their true value. In those growing old, it is easily understood how such important functions as those of the ductless glands can no longer be efficiently performed; they share the tendency to failure shown by other organs of the body. Therefore, as in the case of disease in other systems, signs and symptoms should make themselves evident, and they actually do. A more definite symptom-complex in reference to each defaulting gland may ultimately be worked out, but a common endocrine defect is more usual, combining symptoms indicating multiple gland defect. The interdependence of the various glands forming the system means that there is a liability and a likelihood of more than one gland being involved at any one time. The endocrine system appears to be, in importance, second only to the sympathetic nervous system which one looks upon as having such control over vital functions as to be even more important again than the central nervous system itself.

The following diagrammatic chain of ductless glands illustrates the relative position of one gland to another. Of all those glands, the thyroid is placed most superficially, and lies almost immediately under the skin of the neck, close

Diagram illustrating the position of each Ductless Gland relative to the skin, and to each other; the thyroid gland is the most superficially placed, the Pineal and Pituitary Glands the most securely placed against trauma. The position of each gland would seem to hint at, or suggest, its actual function.



up to the commencement of the circulation ; its secretion can thus command a prompt and effective distribution, and there is little doubt that its position does indicate the importance of the thyroid gland in relation to the functions of the skin .



Furthermore, the chief indications of want of thyroxin ~~are~~ actually seen in the skin, and in the nervous symptoms which result; the nervous system and skin are both derived from the same elements in the embryo. So far as the skin, or indeed any other system of the body is concerned, it would seem that the functions of the thyroid gland should take precedence of those of the system and should be placed on the top rung, those of the pituitary, pancreas, and suprarenal being placed rather lower, while those of the remaining glands are to be placed lower still, in importance. The secretions of the thyroid, parathyroid, pituitary, pancreas, and adrenal, are the only which have any definite pharmac:

ological action of use in diagnosis and treatment, but only when suitably exhibited. The extract of thyroid gland alone is the one capable of being absorbed from the alimentary tract unaltered. It is for that reason, probably, that preparations of thyroid are so active pharmacologically, and so usefully therapeutically: others are apt to be destroyed in the course of digestion and assimilation.

The influence of this system can be traced in certain diseases affecting the skin such as generalized pruritus, the senile skin, xeroderma, psoriasis, possibly, xanthomatosis, myxoedema, pigmentations, and in all degrees of hypothyroidism, as well as in some of hyperthyroidism. In opotherapy, the use of the extracts of the various glands proves this influence, providing the dosage employed has not too explosive an effect, but is graduated and arranged so as to imitate the likely steady secretion of the glands which obtains in ordinary and normal circumstances. Hypersecretion of the thyroid gland causes a hot moist skin which perspires freely and easily, and transient flushings which indicate also a sympathetic system instability as the result of its excessive action. Loss or defect of its secretion causes cutaneous signs indicating, in the child, cretinism, which is congenital; in the adult, myxoedema, which is acquired, and is the result of exhaustion of the secretion of the gland. The cretin probably never had any secretion from the thyroid, and is born of a parent who had an acquired hypothyroidism: this fact lends some support to the view which I have already expressed, namely, that a

weakness in the parent may become more apparent in the child, even to producing a very obvious congenital defect. Excessive secretion of adrenin, on the other hand, causes pallor of the skin, and erection of the hairs, whereas loss or defect of the secretion produces Addison's disease with its pigmentary changes occurring in skin, mouth, and other parts. Excess of pituitary secretion causes enlargement of the skeleton; loss of its secretion is followed by a prodigious deposit of fat subcutaneously.

The case of Mr J.W., just cited, is a good example of the effect of multiple gland defect, and want of balance- of hyperpituitarism coincident with hyperthyroidism or, possibly, of the latter following the former: it was not possible to be definite which had happened, although there could be no doubt of a relationship existing. It is within the range of possibility that diminution of thyroid secretion gave undue control to the pituitary secretion, the action of which went uncontrolled.

PRURITUS-

Generalized pruritus is not uncommon in elderly people and can be explained by dryness of the skin and scalliness causing itchiness and, in others, by diminished thyroid gland secretion, therefore want of control over the production of bile-salts which, in excess, cause alterations in tension in the fluids occupying the lymph-spaces of the skin. The administration of thyroid substance, by controlling their production, can cure such a pruritus.

THE SMOOTH SKIN-

THE SENILE SKIN-

The scaly dry skin seen in old age and involving the skin of head, body, and limbs, is likely to be due partly to diminishing thyroid efficiency which, when the secretion ceases, gives rise to such signs and to an increasing proneness^{ne} to a mucoid oedema which does not pit on pressure. Concurrently with those changes will occur an advancing arterio-sclerosis and other degenerative and involutionary changes in internal organs which again reflect their presence in further skin changes, these taking the shape of those alterations which we vaguely signify when "ageing" of the skin is talked of. The fact of certain skin signs such as dryness and scaliness being amenable to thyroid medication constitutes additional proof of a thyroidic cause.

Xeroderma-

In this disease, the face, palms and soles, and joint flexures usually escape; treatment generally depends for its success upon small doses of thyroid substance being given at regular intervals.

Ichthyosis and harlequin foetus may be mentioned at the same time but they appear to have no clear relationship to endocrine disorder, because opotherapy produces no benefit and because such symptoms as occur in those two diseases are never found in cretinism which, like them, is congenital, but the result of absence of thyroid secretion.

Xanthoma Diabeticorum-

A definite cure for this condition exists in the use of insulin which can be depended on to clear up the lesions quickly. Possibly, its use may have the same

effect in other lesions occurring in xanthomatosis, if suitably guarded so as to protect against hypoglycaemia. The pancreas may, like the liver, have some influence in the production of hypercholesterolaemia which may take the direction of an inhibitory action, similar to that which it possesses in controlling the amount of glycogen from time to time liberated and doled out for the needs of the body.

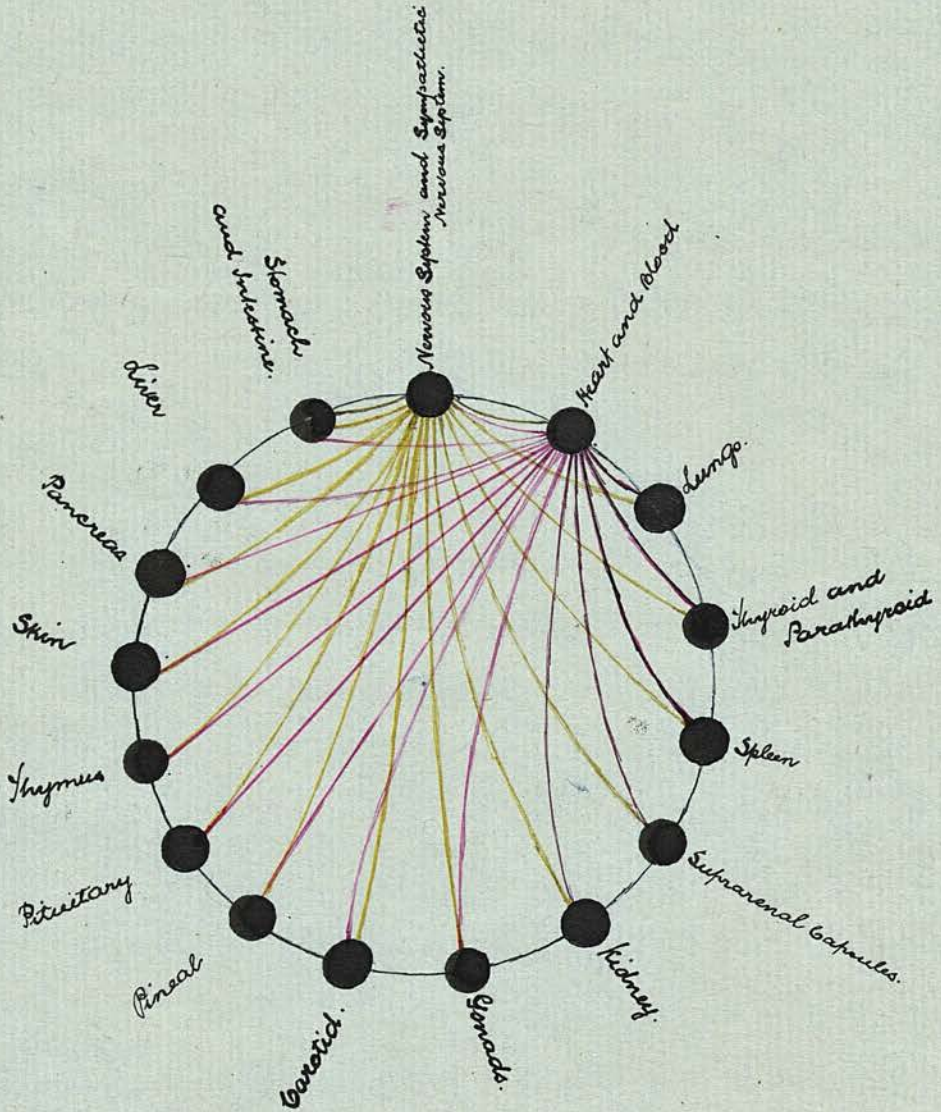
Psoriasis-

The cause of this disease is uncertain. May it not be sought for in the direction of a perverted thyroid secretion? Massive dosage with thyroid substance has, in some, temporarily cleared up cases of psoriasis.

Pigmentations-

Those of pregnancy and Addison's disease, among others, appear to be influenced by diminished suprarenal gland secretion, or by want of balance, whereby the products of other ductless glands such as the thyroid overwhelms that of the adrenal; perversion of a portion of the adrenin may have to do with the pigmentations. The use of suprarenal substance has no influence whatever in removing such pigmentations when once deposited.

SCHEMATIC CYCLE.



This schematic circle or orbit indicates the commanding control of the nervous system, circulatory system, and blood, over other organs, and the functional interdependence and interrelationship of the ductless glands with other organs.

IX.-CONCLUSIONS.

1. That it is becoming increasingly necessary to the full understanding of the reasons for distribution in cutaneous eruptions, for complete physical examination, aided by exact chemical and laboratory methods, to be made.
2. That distribution in cutaneous eruptions depends upon the nature of the cause producing them, the particular epidermal and dermal structures implicated, and upon the resistance offered by the skin locally, and by the individual generally.
3. That, in disease occurring in local areas, contiguous spread is usual, and limits distribution; that direct extension involves the layers of the skin, the lymph-spaces contained therein, and the vessel plexuses.
4. That the invasion in any skin disease must necessarily be local at first, whether originating in the skin itself or in any other organ or part of the body; and that, explaining the cause and the distribution of many skin eruptions, may be found an infection existing about teeth, gums, naso-pharynx and accessory air-sinuses, alimentary tract, urinary system, the skin itself, or other focus which may even be latent or masked, and that such, if extant, must be controlled before complete success in treatment is assured; in other words, general detoxication, and in tuberculous lesions detuberculization, must be

effected before certain skin diseases will answer to local treatment.

5. That the chief vehicle in disseminating infections and toxins, where the skin is concerned, are the blood, and lymph, streams, and the chief channels the blood, and lymphatic, vessels; that the arrangement of the vessel plexuses in the skin determines the plan and pattern of many eruptions.
6. That many skin eruptions are symptomatic, and possess a general or symmetrical, distribution; whereas many others, entities in themselves, possess a local and asymmetrical distribution.
7. That anaphylaxis and sensitization to certain extraneous and endogenous proteins determines the general distribution as well as the character of many cases of urticaria, and of erythemata, and of several exanthemata.
8. That regional distribution depends, among other things, upon age and sex, and upon the fact of parts being covered, or exposed and so being subjected to irritative factors such as chemicals, or physical agents as light-rays which are usually beneficent but, at other times, malevolent.
9. That constitutional and diathetic influences do not exist in evidence in cutaneous diseases.
10. That environment, in the wide sense, besides influencing incidence, may also influence, or may modify, the distribution of a cutaneous eruption.
11. That the influence of the ductless gland system in the diseases of the skin does actually exist, and that it is confirmed in certain of those

diseases that distribution is determined and modified thereby.

12. That the influence of the part played by the nervous system in the determination and distribution of cutaneous eruptions is still obscure.

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Say weill is throughly a worthy gude thing;
Of say weill great vertew forth does spring;
Say weill from do weill differs in letter;
Say weill is gude, bot do weill is better.

Say weill in words is wondrous trick;
But do weill in deeds is nimble and quick:
Lord, quick and trick together knit,
And sa sall they pipe a merry fit.

From:Scottish Poems of the XVICentury
(Dalyell), Constable,Edinburgh,
1801.