Observations

ON

OCCUPATIONAL DERMATITIS*

BY

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Dermatoses due to industrial employment were recognized early in the sixteenth century by Paracelsus and Agricola,¹ who described skin disorders occurring in metal and salt miners. Ramazzini,² in 1700, wrote a treatise on diseases of tradesmen, in which he described with accuracy the dermatoses of bakers, farmers, and other artisans. In 1775 Percivall Pott described chimney-sweep's cancer, and later Robert Willan described the skin affections of bakers, shoemakers, washerwomen, and metal workers. Until recently, however, the references to occupational dermatitis were surprisingly scanty. But, latterly very numerous and considerable contributions to the subject have been made in France, Germany, America, and other countries, as well as in Great Britain, where Prosser White's *Occupational Diseases of the Skin*³ constitutes a summary of the subject which has a world-wide reputation for its valuable and encyclopaedic information.

The reasons for the increased interest in these conditions are not far to seek. We live in an age where new industries have a high birth rate. Chemistry and physics have advanced with great rapidity, and these advances are ever being applied to industries of all and every sort. Our bread must be whitened, our leather dyed, our rabbit skins converted into rarer furs, our metal and furniture polished, our faces "lifted," and our hair and complexions transmogrified. Moreover, as has been aptly pointed out by O'Donovan,⁴ our modern town homes have been turned into miniature chemical factories.

"The home worker," he states, "has her hands immersed in water for hours at a time; hot alkaline cleansing lotions are in frequent use; strong soaps and sodas, quick chemical cleansers, and even chloride of lime are employed to save time, while strong or dilute acids are used to clean lavatory basins and closet pans. Metal polishes, furniture polishes, leather preservatives, and metal pastes are sold extensively. Quick-drying enamels and paints, varnishes, special rapid paint renovators, storage batteries, disinfectants, insecticides, and artificial plant manures are in daily use."

These circumstances account for the greatly increased incidence of occupational dermatitis—the enormous increase in the statistics has probably other causes also. The provisions of the Workmen's Compensation Act have focused the attention of employer and workman on the subject, a whole host of chemical and other experts have investigated it, and dermatologists—especially those practising in large industrial centres—have become familiar with the clinical aspects, so that many cases heretofore unrecognized are now speedily entered up in their proper category.

PROBLEMS CONFRONTING THE DERMATOLOGIST

For the proper diagnosis and treatment of these cases much more than a mere knowledge of skin lesions is requisite. Painstaking and subtle inquiry, and an intimate and detailed knowledge of industrial processes, as well as of chemistry, are needed, and experts in these matters may have to be consulted. One great difficulty is that we are frequently concerned with matters of degree rather than kind.

The skin or external covering of our bodies reacts to an infinitude of stimuli, and it is difficult to name almost

anything which in excess, or under special circumstances, may not give rise to skin lesions. It may not be easy to assess how far such an agent is merely actuating or is to be held fully responsible. Thus, sunlight, for all its health-giving properties, may produce an acute dermatitis if exhibited in excess to a healthy skin; it may also determine, or at least aggravate, the lesions of lupus erythematosus, or pellagra, in special subjects. Air can cause damage by pressure, or the lack of it, and cold drying winds are baneful to certain skins. Even water can be an instrument of harm in many different ways. The skin damage may range from the painful and frequently fatal cancerous conditions produced by x rays, through the severe types of dermatitis caused by irritant chemicals, to the quasi-physiological callosities on a workman's hands, or to the so frequently seen rough patches on a child's cheek, due to an injudicious use or choice of soap. Nor is the skin a definite constant in the equation. It does not react as a mere chemical. The individuality of the patient, his previous history, and general health have to be examined, and such conditions as focal sepsis, xeroderma, and seborrhoea considered. Idiosyncrasy to outward applications or substances taken internally may have strange consequences.

I have seen a patient covered from head to foot with a most intensely vivid irritating scarlatiniform rash a few hours after taking a single grain of quinine. The same accident had occurred in her case twice previously. An old lady's skin, which appeared to be irritated by nearly every soothing application I could think of, reacted most satisfactorily to a weak solution of picric acid, which had proved irritating to two surgical patients I had seen in the same week.

NOMENCLATURE

It would be helpful if we could have an *ex cathedra* pronouncement of the exact meaning of eczema, as well as of anaphylaxis and allergy, all of which fluctuate in meaning with different users.

As regards eczema, one school, finding the name a source of confusion, excludes it from its terminology, preferring "dermatitis." Another includes under the term all cutaneous reactions which are clinically covered by Tilbury Fox's definition, whether due to an external or an internal agency. Brocq regards eczema not as a specific disease, but as a specific type of reaction of the skin to a variety of causes in predisposed individuals. He prefers the use of the adjective "eczematized" to the noun "eczema." Raoul Bernard⁵ prefers the term "eczematoid," and speaks of occupational "false" eczemas. These are, he says, all vesicular or weeping epidermites of which we do not know the cause; when we do know the cause they cease to be eczema. He quotes Sabouraud to the effect that when we know all the causes there will be no more eczema. Percival⁶ states that the terms "eczema" and "dermatitis" are now generally regarded as synonymous. Many other conflicting definitions could readily be amassed. For myself I can see no cogent reason to depart from what Wallace Beatty taught me—namely, that if an eruption possesses the clinical and histological characters of eczema it is eczema. Eczema to me connotes a clinical syndrome. It is a particular form of dermatitis, just as dermatitis itself is a particular form of dermatosis (Darier, I think, holds a similar view). In this sense eczema is not a full diagnosis: I freely admit it. But I regard the term as useful, and I am indebted to the London Hospital for two excellent qualifying words—Sequeira's "diathetic" eczema, and O'Donovan's "exogenic" dermatitis.

What are the differences between an exogenic dermatitis and a diathetic eczema? In a majority of cases we have in the former a history of a capable irritant, the lesion

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confined to the seat of its application, not tending to spread, healing quickly when, and only when, the irritant is absolutely withdrawn and not recurring in its absence. In addition, we may get confirmatory evidence from patch tests, etc. On the other hand, a trade dermatitis *may* give rise to lesions appearing symmetrically, and in regions far remote from the application of the irritant, just as I have more than once seen a similar condition break out in a patient suffering from neglected varicose ulceration of one leg without a previous history of eczema. Foerster⁷ would appear to restrict the term "dermatitis" to the localized form; he would, as I understand him, regard the spreading form as due to an induced allergy, and therefore coming under his definition of eczema—a dermatitis occurring in an allergic or specially sensitized skin. Allergy has, however, been frequently incriminated for the localized forms.

And what of eczema? Can we say that we are surely familiar with a diathetic eczema in which external irritation plays no part? I think not. No child is born with eczema, but eczema frequently makes its appearance after the infant's skin first meets such trivial irritants as soap, air, or light. Adamson regards protection as the keynote of the successful treatment of infantile eczema. Surely a profound truth. Lane⁸ proposes what appears to me an excellent method of nomenclature, which would be valuable from the point of view of obtaining accurate statistics. He suggests "dermatosis industrialis" as a generic term to be in every case particularized, as, for example, "dermatosis industrialis, eczema, baker"; or "dermatosis industrialis folliculitis, oil." Incidentally both might be further particularized.

Percival⁶ has quite recently investigated the "eczema" reaction to certain groups of skin irritants in different concentrations. He has shown that in the first group the reaction of the concentration to the percentage of positive reactions obtained was similar to many dosage and action relations known to exist between other drugs and tissues, under conditions where the intervention of antibodies need not be considered. Their relation, he remarks, seems to depend on an unexplainable individual variation in the population. I consider his paper a most apposite contribution at a time when almost every individual difference of reaction is labelled "allergic." He concludes with the observation that the common factor of individual variation which governs the cutaneous response to Group 1 substances raises a delicate point in connexion with the question of compensatable disability. One of our most difficult problems is to assess the liability where a dermatitis is in part due to occupation and in part caused by some slight departure from normal of the patient himself—for example, xerodermatous skin. There is also often a very considerable difficulty in getting a correct history of an exogenous dermatitis.

A most truthful lady with an eruption on her neck strenuously denied the possibility its being due to any external irritant, but at her next visit remembered a necklace of lacquer beads, which were most obviously responsible. On the other hand, a man who developed a scalp irritation from a hair restorer, and subsequently suffered from eczema in other parts, denied previous attacks, but I afterwards learnt of his having been previously treated for eczema.

Another difficulty, the psychological factor, is, as has been stressed by our president,⁴ not sufficiently recognized. He maintains that "just as pains and disabilities (following a surgical accident) may disappear marvellously after a county court settlement, so too an application of "golden" ointment can work equal wonders in dermatology.

In dealing with the difficulties of symptomatology and diagnosis Raoul Bernard⁵ lays it down that:

1. One substance can give rise to several different clinical syndromes.

2. Different substances may cause the same clinical picture.

3. A given profession may give rise to the most diversified dermatological entities (Oppenheim).

He recommends the cuti-reaction by test patches as a diagnostic method, and also its prophylactic use prior to employment; but he quotes Steiner as saying that only 12.5 per cent. give specific reactions, and Oppenheim that these cutaneous reactions vary from time to time even in a few days. He mentions that simulation is practised by methods which would appear to require an intimate knowledge of the action of drugs and other substances on the skin. Dr. Overton⁹ has stressed a most important point—namely, that in many cases a trade dermatitis is caused not by the substances encountered at work, but by their removal by injurious substances—for example, strong alkalis, methylated spirit, turpentine, paraffin, petrol, naphtha, acetone, etc., used as cleansers, degreasers, etc.

It is obviously impossible in the space at my disposal even to touch on many of the occupational dermatoses. I will therefore refer to one or two particular instances, as examples of the type of problems that confront us, and the different opinions of authorities.

BAKER'S DERMATITIS

This was recognized more than two centuries ago. It was supposed to have become much more common during and after the great war. Prosser White,¹⁰ investigating the condition, arrived at the conclusion that "there is no eruption specific to or distinctive of these industries (bakers and confectioners), unless eczema can be so labelled," and suggests that the majority of these cutaneous disorders are "incidents in, rather than consequences of, the work." A. C. Parsons¹¹ investigated the matter very fully. He found the increase in general exaggerated, though there was considerable increase in some localities. Probably some 50 per cent. of the supposed cases were sugar dermatitis; others were scabies. The alleged causes of the condition are very numerous.

Cases are relatively common where the dough is hand-mixed, especially in the lack of proper cleanliness (dough drying on the skin), and Parsons regards protein sensitization as culpable in some of those cases where elderly workers become suddenly intolerant. The dry flour can hardly be to blame, as millers do not suffer similarly. (On the other hand, Mummery¹² shows that flour dust contains mycelium, which gives rise to an itchy vesicular rash resembling sudamina, from the vesicles of which the mycelium can be recovered. The condition can spread in the patient and to others by inoculation of skin abrasions.) McCormick Mitchell, quoted by Parsons,¹¹ stated that 55 to 65 per cent. of his cases were due to an acarus. Parsons was not impressed by the likelihood of the condition being due either to inferior war flour or to the chemicals used for whitening it. On the other hand, Teleke and Zitzke¹³ found skin tests positive with ordinary flour in half the patients treated, with improved flour in two-thirds. Ammonium persulphate caused the severest reactions, and should, they consider, be discontinued as an improver. Dr. Zitzke¹⁴ has carried out satisfactory desensitization experiments with rye flour and improved flour. Hansman,¹⁵ as the result of experimental investigations, definitely incriminates ammonium persulphate, and believes the allergic nature of the dermatitis proved. C. Stern¹⁶ finds no foundation clinically or experimentally for the belief that flour, or the substances generally used

in Germany for bleaching or improving it, are responsible for the eczema. Attempts to desensitize with flour are useless. Baker's eczema is a disease, like other industrial eczemas, in which a series of injuries can act like eczematous irritation and have a cumulative effect. De Jong¹⁷ attributes the condition to salt, and compares it with that produced in drysalters and packers and rock salt workers. Probably excessive sweating is a predisposing factor. Ichthyosis has also been blamed. K. Wills¹⁸ found dandruff a frequent accompaniment. Barber¹⁹ refers to "inborn intolerance of certain substances applied externally." He also quotes a case of baker's eczema showing the phenomenon of local sensitiveness of the forearm skin to flour.

DERMATITIS DUE TO DYES

The dye industry gives rise to a number of cases of dermatitis occurring amongst workers in it and also in wearers of dyed material such as furs or the users of cosmetic hair dyes. The most commonly incriminated substances are para- and meta-phenylenediamine and para-amidophenol. But the mordants (metallic and chrome salts) used are also culpable. The skins themselves (if improperly cured) and the tanning materials may also prove irritants. The impregnated substance of the dye used is oxidized to the required colour, and it is somewhat generally held that these dyes and their fully oxidized products are comparatively harmless, while their intermediate oxidation products are the noxious irritants. In France this manufacture of artificial furs is an industry of considerable national importance, and it would appear from the French literature that by general hygienic methods—withdrawing the noxious dusts by fans, using machinery to replace the handling of the dye when in noxious concentration, and the use of gloves, etc.—the risks of dermatitis have been reduced to a low minimum. Balsac²⁰ states that, on examination of the employees in a factory using up to twenty-four million rabbit skins per annum, he found no case of acute anilism, but a certain number of minor chronic conditions. He concludes that these would become rarer and more benign were the prophylactic rules more rigorously applied. Dr. Carles,²¹ speaking of the aniline dyes, states that they are not certainly always noxious, but often become so if the skins have been insufficiently washed, or as a result of imperfect oxidation of the dye, or by predisposition on the part of the wearer. He stresses the importance in diagnosis of the topography of fur dermatitis. It is essential to bear this fact in mind, for if not so recognized and appropriately treated, scratching will cause the lesions to become eczematized, infected, lichenified, and deeply infiltrated. M. Audistère²² emphatically states that if oxidation is complete the dyed fur ceases to be harmful, but adds that there is an individual factor, and that a person who for long has worn a fur without inconvenience may suddenly be affected for no known reason. He also mentions "emanation" from certain dyes which is manifest on the paper in which the article is wrapt. Theoretically, he says, this should be harmless, but evidently is not. Caseneuve²³ mentions a case in which an impurity (arsenic) in the dye, rather than the dye itself (in this case fuchsine), was the noxious agent. Ingram²⁴ does not consider the intermediate oxidation product theory proven. From his experiments he concludes that dye dermatitis is essentially allergic. Some 4 per cent. of normal individuals show an idiosyncrasy to the phenylenediamines. His positive patch test cases had a latent period of from twenty-four hours to twenty-four days. This renders the test a formidable matter to use, as has been suggested, prophylactically, on workmen prior to

employment. Babalian and Reitlinger²⁵ are of opinion that urticarial dermatitis is not allergic, but a purely local reaction of eczematous or pruriginous type. As regards the identification of a dye in a suspected fur, H. E. Cox²⁶ has worked out a very complete method of chemical analysis, and has demonstrated the different microscopical appearances of the furs of different animals. Callan and Strafford²⁷ show that these tests may be interfered with by leather extracts or tannin materials, a conclusion which Cox fully endorses.

CANCEROUS CONDITIONS

The frequency of an occupational cause in cancer of the skin is probably insufficiently recognized. Creosote and coal tar and its derivatives are potent sources, and they are being increasingly employed in road making, wood preserving, gas making, etc. Soot, tar, creosote, anthracene, and other products—at any rate in their impure forms—are known to be carcinogenic. Mineral oils are a well-recognized source. X rays have made a costly death roll. Chronic solar dermatitis may give rise to the classical "sailor's skin," but is probably a carcinogenic factor of far wider action than is implied by this condition. O'Donovan²⁸ has observed cancers of the hand in many outdoor workers (scavengers, farmers, road sweepers, etc.). Arsenic, used in sheep dip, paints, smelting operations, etc., is also a cause. The cause is apt to be overlooked in many instances on account of the considerable latent period in cancer production. Bland-Sutton²⁹ has recorded a case of soot cancer with a latent period of thirty-five years. Many of the recorded cases of occupational skin cancer had long ceased to work at the incriminated industry ere the malignancy was recognized. S. A. Henry,³⁰ investigating mule-spinner's cancer, has shown that the affection most frequently occurs in men employed at the industry for from thirty-five to fifty years, though it has been known as early as sixteen or as late as sixty-three years. In many cases, however, the tumours did not develop until a later date, the workman having retired from the industry some years previous to its appearance. Similarly, it has been shown that if animals are subjected to a cancer-producing substance for a time, and the treatment is then stopped, tumours will develop later, just as if the agent had been in operation the whole time. O'Donovan has shown that tar and creosote produce multiple carcinomatous skin lesions of a squamous and prickle-cell type, mostly on the face, forearms, and scrotum. Secondary growths are uncommon. Anthracene in the pure form does not appear to be carcinogenic, but handlers of anthracene cake are liable to skin carcinoma. These are usually single, and squamous or horn-celled. Other lesions—for example, acne, pigmentation, and telangiectasis—are common in such workers. Atrophy, vascularity, and some pigmentation of the skin are characteristic of x-ray dermatitis, and O'Donovan records fifteen recognizable erythematous superficial rodent ulcers on the trunk of a professional radiographer.

TREATMENT OF OCCUPATIONAL DERMATITIS

In respect of treatment of industrial dermatoses our first care should be prophylaxis. Persons whose skin suggests vulnerability should be excluded from skin-irritant industries. These include the young, and those with delicate-looking "thin" skins. By this I mean that type in the treatment of which we instinctively shrink from using any but the mildest remedies. It also includes those with a tendency to hyperidrosis, the markedly seborrhoeic, the xerodermatous, and persons whose circulation is especially defective, thus rendering their skin

more vulnerable and their healing power less. Next, employers should see that the handling of noxious substances is reduced to a minimum by the substitution of machinery, and should supply all possible facilities to the worker for the proper cleansing of his skin. The workman should be instructed in this essential procedure, and warned against the undue use of deleterious skin cleansers—for example, alkalis and defatting agents. Attention to the proper cleansing of workers' clothes is also often necessary. When required the use of gloves, or the preparatory treatment of the skin with unguents, varnishes, protective soaps, should be obligatory, and close-woven overalls tightly buttoning at wrists and neck may be necessary. Dust should be reduced to the utmost by means of special ventilators, electric fans, etc. In certain cases dermatitis may be avoided by the use of pure products where the crude substance may be baneful. The next essential in treatment is that the afflicted worker should be removed immediately from the irritant. The remedial applications employed will in every case depend on (a) the appearance of the skin lesion produced, and (b) the nature of the irritant producing it. It may require experience and careful investigation to determine the latter. In general, methods of desensitization appear to have met with only limited success. Radon is of special use in the malignant cases. Whatever remedies may be employed the importance of protection of the skin should never be lost sight of. Scratching may give rise to a vicious cycle of prolonged irritability, even apart from secondary infection.

CONCLUSIONS

Occupational dermatitis is probably a much more common condition than is popularly supposed, and is becoming commoner daily.

It is ever more important that dermatologists and others should be competent to recognize it, and diagnose fully its causes.

To do so is, in many cases, no easy matter. The co-operation of expert chemists and physicists, as well as employers of labour and employees, is necessary if in the future we are to succeed in doing the best for our patients and giving the fullest help to the State in the economic and hygienic questions involved.

It is regrettable that we are not in full agreement as to the meaning of all the terms we employ.

In many trades we are as yet far from unanimous on the mode of action of the agent or agents causing dermatitis.

In these matters we welcome all expert aid, from within and without the profession, and trust that a meeting such as this may help to solidify the foundation of this increasingly important subject.

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OCCUPATIONAL DISEASES OF THE SKIN*

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Diseases of the skin caused by occupation not only present a difficult problem to those concerned with preventive measures, but they are also an increasing burden on industry in those countries where they are the subject of compensation, such as is the case in Great Britain. I should offer some apology for presuming to address members of this Section, and my excuse for doing so is conveyed in the first sentence of this paper. I look for guidance from members of this Section, with their greater knowledge of dermatology, who, by their expert advice, can assist those of us who are engaged in the preventive side of industrial medicine.

In Great Britain the diseases of the skin which we recognize as due to occupation extend over a very wide field. They may be divided very broadly into two groups. The first, and by far the largest, is covered by the comprehensive title "dermatitis and ulceration of the skin due to dust or liquids"; the second comprises diseases due to specific causes—namely, chrome ulceration due to chromic acid and certain chrome salts, and epitheliomatous ulceration of the skin produced by the now well-recognized carcinogenic agents, pitch, tar, paraffin, mineral oil, bitumen, and the compounds and residues of these bodies. Lastly, comes infection of the skin by the *Bacillus anthracis*.

DERMATITIS FROM DUST OR LIQUIDS

Dealing first with dermatitis and ulceration of the skin produced by dust or liquids, Table I, showing the number of cases compensated from the year 1927 to 1931, clearly demonstrates the importance of the subject to which I have referred in my opening remarks.

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