If the cells at the most distal site of tubular reabsorption of water were partially permeable to urea, then the "effective" osmolality of the urea in the urine would be less than that measured by freezing-point depression, the difference varying with the urea concentration. Thus, urines with different urea concentrations might have the same "effective" osmolality (as regards the tubule cells) but different total osmolality as measured by freezing-point depression. Selective distal permeability to urea might also permit increased water economy without an increase in osmotic work.

If this hypothesis is correct it may mean that specific gravity is fortuitously a better indication of "effective" osmolality than we have shown it to be of total osmolality, for when the urea concentration is high the specific gravity is relatively low.

Summary

The specific gravities of normal urines have been compared with their osmolalities. Considerable variation of specific gravity may occur in urines of like osmolality.

Dehydration for less than 22 hours gives an unreliable indication of maximum osmolality.

In some subjects with good renal function 5 units of pitressin tannate in oil produce a urine concentration significantly less than that obtained after dehydration for more than 24 hours. In patients with impaired renal function no difference in concentration is apparent.

Unexplained fluctuations in urine osmolality occur during progressive dehydration. Possible causes are discussed.

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SOME CURRENT PROBLEMS IN INDUSTRIAL DERMATITIS

BY

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It seems probable that industrial dermatitis is not decreasing; and the incorporation of industrial insurance in the national insurance scheme has by no means eliminated litigation, although it has altered its mechanism and character. It is often impossible for the physician, whether general practitioner or specialist, to remain entirely aloof from the medico-legal problems which arise. There are three main groups in which the difficulties encountered are mainly or entirely medical.

1. Doubtful Diagnosis

Doubt about the original diagnosis arises principally in distinguishing between eczematous industrial dermatitis and eczematous eruptions of "natural" or "constitutional" origin such as the common nummular or discoid eczema. Many authors—for example, Bettley (1948)—have summarized the salient diagnostic features in these cases, particular attention being given to the site of origin of the eruption and its fluctuation in severity according to changes

in or cessation of work. In such a case the family doctor, who has to deal with the case at the outset, is at some disadvantage. He has the advantage, very often, of seeing the onset and studying the earliest appearance of the eruption; but he is usually required to issue a certificate at once and to decide definitely whether the eczema is industrial or not. In some cases it is impossible to do this without a prolonged period of observation, considering the behaviour of the disorder over a period of many weeks or months. To give a firm diagnosis and certificate which has to be altered later gives rise to great dissatisfaction to all parties, not least to the patient, who is likely to feel that his doctor is letting him down. Whenever necessary, therefore, the diagnostic doubt should be very clearly explained to the patient so that he will not feel disgruntled if it is later decided that his disorder is not going to prove a source of income to him. In some such cases, when an early and hasty diagnosis has been amply disproved by subsequent events, the denial of compensation leads to dissatisfaction and a sense of grievance which largely dominates the rest of the patient's life. This unfortunate situation can be avoided by refusal to yield to a demand for exact and firm diagnosis in cases which are still doubtful. In justice to the employer it should be remembered that compensation and damages once paid can seldom be recovered, even though it be proved later that the diagnosis of industrial dermatitis was, from the outset, incorrect.

It is, of course, important to obtain a detailed description of the nature of the patient's work, and of the substances with which he comes into contact; patients are often misinformed about the chemical nature of their contacts, and information should be obtained from the factory manager or chemist if possible. A personal visit to the factory may yield vital information which can be obtained in no other way. No less important is an assessment of possible causes of dermatitis in the patient's home or hobbies. If a housewife develops an eczematous dermatitis it may be, very reasonably, attributed to household detergents; but if, in addition to her own housework, she works as an office cleaner for two hours a day, handling the same detergents, her dermatitis is apt to be labelled industrial, and to be compensated as if her paid employment were the sole cause. The amateur gardener may get dermatitis from handling certain plants; if he is an office worker the correct diagnosis may be reached quickly. But if he is a chemical process worker it is easy to jump to the wrong conclusion and to certify industrial dermatitis; in such a case the diagnosis can often be settled only by a period of observation combined, perhaps, with the results of patch tests.

The prognosis is often of greater concern to the patient than anything else. In general the dermatitis due to a primary irritant clears up in a few weeks, and after some months the skin loses any increased susceptibility to recurrence. Most of these patients can return to their former work provided they take more care than formerly to limit contact with irritants in general, and particularly with the class of irritant which caused their dermatitis.

On the other hand, when there is an allergic hypersensitivity, as can be evidenced by patch tests, the complete avoidance of contact in the future is essential, even if this means permanently abandoning a highly skilled occupation. This type of sensitivity is usually highly specific and relates only to the one substance or perhaps to a group of substances which are closely allied in chemical structure; resistance of the skin to primary irritants in general is not impaired. Unfortunately, many cases, with psychiatric and other factors intervening, do not fall into these clear groups, and in these a period of observation may be required to give the physician a shrewd idea of what the future is likely to hold.

2. The Friction Element

In most cases industrial dermatitis gives rise to comparatively little itching, and visible excoriations are unusual. A certain proportion of patients, however, complain of intolerable itching and even provide a demonstration in the

consulting-room; gross excoriations appear on the skin. As the weeks and months pass the eruption fails to clear up and gradually takes on different characteristics. The skin becomes thickened and lichenified, closely set with excoriated papules of a dusky reddish colour. These extend beyond the parts originally affected and may come to involve large areas on the limbs, face, and less often on the trunk. Those areas originally affected may even recover completely. These patients, more often middle-aged or elderly, are tense, anxious, and dogged by fears that they will never recover. Their claims for compensation usually occupy most of their waking thoughts, and, not above the average in intelligence, they seldom have a clear understanding of the medico-legal issues involved, but pursue their litigation with a strong sense of grievance and with much emotional bias. Temporary improvement in their condition may lead to a return to work, but unless the work is completely to their liking their dermatitis will probably relapse within a short time. Recurrences of their dermatitis are likely to follow any work of a dusty nature; slight exertion is said to bring on excessive sweating and irritation; even the thought of work and the preparation for work is sometimes enough to cause a relapse. Indeed, many of these patients keep reasonably well only while they are away from work and receiving compensation, or if they can find a paid occupation, such as watchman, which involves virtually no work at all.

Although a history of previous emotional maladjustment is not particularly common, these patients are usually unskilled workers who have drifted from one job to another at intervals of a few months or years. It seems probable that they are always people of inadequate personality for whom industrial disease with financial compensation provides a measure of security which, as they approach middle age, is lacking in their lives. Treatment, whether psychiatric or dermatological, is seldom more than palliative and their condition will clear up only if financial compensation is adjusted to their satisfaction. This syndrome may be observed not only in connexion with industrial disease but with other types of compensation—for example, for disease or injuries contracted during military service.

It seems clear that in these cases psychiatric predisposition is the most important causative factor. On the other hand, the law takes the view that the disorder is of industrial origin if the industrial factor formed the essential, final, and immediate cause. In other words, if industrial irritants pulled the trigger it matters little how heavily the gun was loaded. In some of these cases it is evident that the disorder did start as industrial dermatitis; in a great many, perhaps the majority, however, the origins are more difficult to ascertain, particularly if the patient is seen for the first time when the compensation syndrome is well developed. Not only has the objective appearance of the disease then altered, but the patient himself and his attitude to his illness are likely to be very different. After much questioning by doctors and solicitors, combined probably with wishful thinking, the patient himself may evolve an erroneous recollection of the exact way in which his illness began; to this, of course, may be added an additional factor of exaggeration or occasionally deliberate falsification. Thus it is that when objective appearances have become completely altered and the history no longer reliable it may be impossible to say whether or not the disorder was industrial in origin. Almost without exception these patients are given the benefit of the doubt by their doctors and, if the occasion arises, in the law courts. It is concerning these patients particularly that Hewitt (1951) speaks of industrial dermatitis as a psychosomatic disease. At the same time he recognizes that minor trauma may act as a trigger; so also, presumably, may mild chemical damage or a mild attack of true dermatitis.

3. Eczema Sequels

It sometimes happens that an attack of apparently typical eczematous industrial dermatitis is followed, either at once or after a short lapse of time, by the development of eczema

elsewhere on the body of a type which would otherwise be considered non-specific or constitutional in origin. An eczematous dermatitis on the hands, for example, may be followed by nummular eczema on the backs of the hands and forearms which is apparently typical both in appearance and in its future behaviour. In such cases a decision must be reached on the relationship between the original dermatitis and the eczema which follows.

In general, it is accepted that nummular eczema is comparatively little affected by contact with irritants, and it is quite unusual for any precipitating cause to be identifiable. When a "dermatitis" case is seen for the first time after the nummular eczema has developed, it is tempting to suppose that the original diagnosis of industrial dermatitis was incorrect, and that the patient has really been suffering from eczema of constitutional origin from the outset. Alternatively, if a period of several months elapses between recovery from the dermatitis and the onset of nummular eczema, most dermatologists would probably prefer to say that there was no connexion between the two disorders. When, however, the eczema follows shortly upon the attack of dermatitis it is difficult to dissociate the two and to say categorically that the eczema would have developed in exactly the same fashion even though the dermatitis had never occurred.

Seborrhoeic dermatitis, appearing for the first time soon after industrial dermatitis, presents a somewhat similar problem. In some cases the latter takes on quite gradually the characteristics of seborrhoeic eczema, and it is impossible to dissociate the two disorders. The seborrhoeic dermatitis then proceeds to run the chronic relapsing course typical of that disorder. The consultant, in these cases, usually has to attempt a retrospective diagnosis and to satisfy himself that the original disease was truly industrial; often he can do no more than guess. It must, of course, be presumed that seborrhoeic dermatitis can be thus provoked only in people who are constitutionally predisposed and that its persistence thereafter is a measure of that predisposition. It seems unsatisfactory that a man should continue to draw compensation for an indefinite period when the "fault" lies so largely with his own constitutional predisposition.

Medical issues of this complexity are seldom debated in the courts. When they are, the diversity of opinion expressed by medical witnesses is often such that a judge has to decide, not by a critical evaluation of the views expounded, but by choosing which witness to believe or by a common-sense estimate of the position. At the least, nobody will venture to assert that the eczema or seborrhoeic dermatitis would certainly have developed when and as it did without the industrial provocation, and this usually puts the decision in the workman's favour. Constitutional predisposition is at best a vague, unassessable, and largely presumptive factor.

Certainly the argument *Post hoc, ergo propter hoc* is likely to arouse so strong a doubt in the legal mind that the patient will receive the benefit of it if he decides to claim that his eczema was the consequence of his dermatitis. It is particularly in this class of case that the most careful attention to details of the history and onset of the disorder may lead to the correct diagnosis.

Medico-legal Considerations

Under the old Workmen's Compensation Act the employee had to prove that he had dermatitis due to the nature of his employment; this done, the employer had to pay compensation in respect of disablement and incapacity to earn wages. Under the National Insurance (Industrial Injuries) Act (1946) the workman has to satisfy the certifying surgeon, and if necessary a medical board, that he has industrial dermatitis; when he has done this, injury benefit is paid at a standard rate from the Industrial Injuries Insurance Fund. On the whole, this latter procedure and the system of appeal works fairly well. There is, as is natural, a tendency for the workman to receive the benefit of the doubt, and it must be very uncommon for a man with dermatitis to be refused compensation. It is, however, by no means so sure that

compensation is as adequate as under the Workmen's Compensation Acts, and that hardship is less common.

Completely separate from this procedure are the regulations made under the Factories Acts (1937 to 1948) and the duty at common law by which the employer has to provide for his employee a reasonably safe system of work and a reasonable degree of protection from industrial skin hazards. Generally speaking, this statutory duty under the Factories Acts is absolute and depends upon the precise terms of the statute or regulations which are framed to provide for individual occupations and industrial risks. The duty at common law was defined by Lord Herschell* in 1891 as follows: "The contract between employer and employed involves on the part of the former the duty of taking reasonable care to provide proper appliances and to maintain them in a proper condition and so to carry on his operations as not to subject those employed by him to unnecessary risk."

The interpretation of this duty admits, evidently, of considerable latitude, and the courts may, and often do, have to decide what are "reasonable" care and "unnecessary" risks.

It is over these matters that a great deal of litigation has taken place in recent years. In these claims the decisions of the certifying surgeon and of the medical and appeal boards are not admissible as evidence, and the workman must bring independent proof that his disorder is indeed industrial dermatitis. After this he seeks to prove that his employer was in some way in breach of his duty and exposed him to undue risk of dermatitis. If he can do this he may be awarded damages of very considerable amount which will take into consideration his degree of suffering and his actual and probable financial loss. The courts often seek medical advice in making this assessment, and doctors should be prepared to help in this respect.

Prevention of Dermatitis

As mentioned above, regulations made under the Factories Acts specify in detail precautions which are to be taken in respect of certain occupations. Apart from this, some general principles are worthy of mention.

In providing a safe system of work an employer must give consideration, firstly, to the nature of the industrial process used and of the substances which are handled; secondly, to the design of plant and apparatus so as to keep workmen as far as possible removed from substances apt to cause dermatitis. In practice, claims are often based on either of these two points. Other matters which the employer may be expected to attend to are:

(1) *Personnel Selection*.—Men who have previously suffered from dermatitis or who are already suffering from a skin disease should not be accepted for employment in an occupation in which dermatitis is at all likely.

(2) *Work-places* should be properly ventilated, if necessary with special installations to remove dust and fumes.

(3) *Protective Clothing*.—This applies principally to aprons, gloves, and rubber boots. Although, no doubt, these, particularly rubber gloves, will protect the skin from contact with chemicals, they are not always practicable. The wearing of rubber gloves for many hours a day may itself do the skin harm, and some work, such as french polishing, cannot be done when the hands are made clumsy by gloves.

(4) *Barrier Creams*.—The value of barrier creams in certain occupations has been established, but it is easy to overestimate their efficiency. No doubt they limit contact for some time, but their effectiveness may last for only an hour or so, and thus a false sense of security may arise. Apart from this, the use of barrier cream makes the hands easier to cleanse at the end of the shift. This is a very important point, since industrial dermatitis is so often related to over-vigorous attempts at cleaning the hands rather than to the actual substances involved in the work. However, although the medical value of barrier creams is sometimes doubtful, it is difficult to deny that a failure to provide barrier cream implies that an employer has left untaken a simple step to protect his workmen. The cost of barrier cream is likely to amount to less than sixpence a week per workman,

and it seems that in most occupations the courts regard an employer as negligent if he does not provide it and take reasonable steps to see that it is used.

(5) Facilities for washing and efficiently cleaning the skin after work must be provided; time must be allowed for this out of the working day; warm water, soap, and towels should be within reasonably convenient access from the workroom. Failure in any of these points is likely to go against an employer even though the connexion between washing facilities and the actual development of dermatitis may not be at all clear from a medical standpoint.

(6) Finally, it is an employer's duty to make sure that his workmen understand the risks of dermatitis in the particular work they are doing; that they understand the precautions that should be taken; and that they know what to do should any sign of skin irritation appear. It has been stated by the Court of Appeal that the employer should ensure through a foreman that employees actually do carry out preventive measures recommended.

Most of these points are dealt with in the Ministry of Labour and National Service Forms 330 and 1863, pamphlets to which the courts rightly attach much importance, though they are in no way obliged to accept them. They give guidance which conflicting medical witnesses rather often, unfortunately, fail to provide.

Under the Workmen's Compensation Acts the employee's compensation was entirely met by the employer, and very substantial lump sums could be obtained from insurance companies in redemption of the employer's liability; common-law actions were therefore seldom necessary before 1948. Since the National Insurance (Industrial Injuries) Act such actions have greatly increased, presumably because compensation under the Industrial Injuries Scheme provides only a comparatively small weekly sum of money, insufficient for the needs of most workmen, and a very small lump sum. It is no doubt right that a man should have means of redress against an employer who carelessly exposes him to risk, and this is not provided under the Industrial Injuries Act. His recourse is to common law.

The hygienic conditions in factories have, of course, been subject to inspection by officers of the Ministry of Labour for many years past, but, although a factory might receive no criticism from an inspector, there were before 1948 many which could be made the subject of complaint if the full scrutiny of the law were brought to bear upon them. The result of the change in the law has no doubt been that employers have in recent years paid greater attention to conditions of work and to the legal as well as the medical value of preventive measures.

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Speaking in a debate on cancer research at the Conservative Party Conference last week the Minister of Health, Mr. IAIN MACLEOD, declared, "I give you an absolute undertaking that no new and hopeful line of inquiry will be thwarted through lack of public funds." He was replying to a motion introduced by Mr. J. WARNOCK, of Hendon South, which stated that the Conference considered that the funds made available by the Government for cancer research were quite inadequate. The motion urged the Government to take more active measures by financial assistance and positive leadership "to inject a real sense of urgency into the search for the cause and cure of this disease." "You cannot buy results," continued Mr. Macleod. "Because you spend twice as much money in this field, it does not mean that you are going to make twice as much progress. I cannot guarantee, nor can anyone else, that however much money you spend you will resolve one of the unsolved problems in the medical field. That is just as true for this terrible scourge of cancer as it is for the common cold—another problem to which we have not yet found the answer."

**Smith v. Baker & Sons Ltd.* Appeal Court.