condition associated with psychological factors. There is, however, no evidence that there is any constant primary psychopathic or psychoneurotic component in the ichthyoses, except in the case of some of the variants of Rud's syndrome, where congenital ichthyosis is associated with spastic diplegia and mental deficiency (Richards, 1960).

In the two cases described above it seemed unlikely that there was a psychological factor in the aetiology, and both showed some definite conformity to the suggestions, though this conformity was not exact, for the response included improvement extending outside the designated areas, and a relative failure in other areas which were intended to respond. Finally, though there was a mild improvement in undesignated areas, it was quite overshadowed by the changes in those intended to benefit.

As Schneck's patient commented, and as shown by the subjective response of Case 1 and the objective response of Case 2, there seems to be some relation between depth of trance state and efficacy of suggestion. This could be explained if it were generally true that suggestibility is enhanced in proportion to the depth of the trance state in hypnosis. This, however, is certainly not true in the "charming away" of warts, for here if the suggestion is assertive enough it is likely to be effective, whether hypnosis is used or not.

If, therefore, the credulity or suggestibility of the subject does in fact exert an influence on the outcome, it would be logical to use all possible means to increase this suggestibility. Nevertheless, in most cases emphatic and optimistic assertions of cure by hypnosis remain morally indefensible so long as the outcome is in fact uncertain, while to give the subject a more sanguine prognosis is to spike one's own guns by undermining the authority behind one's suggestions.

While there is at present no clear solution to this dilemma, there can be no doubt that hypnosis has a rightful and potentially important place as an ethical therapeutic measure in this and in many other conditions.

REFERENCES

- Brocq, L. (1902). *Ann. Derm. Syph. (Paris)*, 3, 1.
 Cockayne, E. A. (1933). *Inherited Abnormalities of the Skin and its Appendages*. Oxford Univ. Press.
 Ljungstrom, C. E. (1941). *Acta med. scand.*, 108, 98.
 Mason, A. A. (1952). *Brit. med. J.*, 2, 422.
 — (1960). *Hypnotism for Medical and Dental Practitioners*. Secker and Warburg.
 Rapaport, H. G., Herman, H., and Lehman, E. (1942). *J. Pediatr.*, 21, 733.
 Richards, B. W. (1960). *Brit. med. J.*, 2, 714.
 Schneck, J. M. (1954). *Dis. Nerv. Syst.*, 15, 211.

Hong Kong 1960, the Colony's annual report, reviews the fascinating subject of the water supplies of a community with a total land area of 398 square miles, no natural lakes or large rivers, a summer rainfall of around 85 inches, and a population which has risen from 90,000 when the first reservoir was planned in 1895 to a figure now thought to be in the region of 3,200,000. Reservoir after reservoir has been built, and yet demand is continually overtaking supply. The latest schemes to be embarked on will cost over \$1,225m. in the next ten years, and will practically exhaust conventional sources of supply. If the demand still grows, the report says that it can only be hoped that the use of nuclear power to distil sea-water will by that time have become an economic proposition. However, in spite of the restricted water supply, the overcrowding, and the rapidly increasing population, the Colony's general health has remained remarkably good. (H.M.S.O., 12s. 6d.)

TREATMENT OF PLANTAR WARTS IN CHILDREN

BY

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Plantar warts are often thought to be trivial lesions, but they are a very real cause of disability in childhood. There appears to have been a rapid rise in the incidence of such lesions, Horwitz and Marker (1960) noting a fivefold increase in the past 25 years. Treatment is time-consuming and often disappointing, and, as the spontaneous cure rate may be as high as 27% in three months, assessment of results is difficult (Horwitz and Marker, 1960).

Over the years many treatments have been tried. Curettage is probably the oldest and remains popular. It can give good results in the hands of experienced dermatologists, but a painful scar may result (Duthie and McCallum, 1951). Apart from this, the injection of a local anaesthetic into the sole is almost always painful and often there is considerable discomfort for several days after the operation, especially if the silver nitrate stick is used as a haemostatic. Radiotherapy was used to a large extent in the armed Forces during the second world war, but has fallen into complete disrepute owing to the reports of disastrous after-effects (Shaw, 1948; McLaughlin, 1948). Duthie and McCallum (1951) used occlusive "elastoplast" dressings combined with podophyllin and cured 60% of their patients in two months. This method is time-consuming to the medical attendant and probably entails frequent visits to hospital or surgery; also, the cure rate seems disappointingly low. Morgan (1952) used liquid nitrogen in the treatment of 14 patients, of whom 10 were cured. In our experience this method is associated with considerable pain and a high recurrence rate.

In 1943 Thomson, using 3% formalin solution for hyperhidrosis, made the accidental discovery that plantar warts responded to such treatment. He reported a 75% cure rate in a small group of patients, though Warin (1958), using a slightly different technique, cured only one-third to one-half of his patients. The results with formalin are entirely dependent on the co-operation of the patient and the enthusiasm of the doctor in encouraging persistence with treatment. With these facts in view it was decided to undertake both a retrospective and a prospective survey of the results of treatment with formalin in this department.

Material

Retrospective Survey.—Between January, 1957, and January, 1959, 465 children under 17 years of age had been treated for plantar warts. All were contacted by letter and were asked to attend the department for personal review between July and September, 1960 (an average follow-up period of 2.7 years, with a minimum follow-up of 1.5 years): 391 (84.8%) attended as requested, a further 55 (11.1%) replied by letter giving sufficient information for the study, and only 19 (4.1%) remained untraced.

Prospective Survey.—A series of 200 consecutive patients (148 girls, 52 boys) with plantar warts who were

under the age of 17 were treated with formalin for up to 16 weeks: 74% were between the ages of 10 and 14; only three were less than 5.

Technique

In the initial stages of treatment 3% formalin solution was used. The patient was instructed to remove scale and dead tissue from the top of the wart by scraping with a nail-file or the side of the blade of a pair of scissors. The wart-bearing portion of the sole was then soaked in the solution for 15 to 20 minutes (it is important to stress that the wart must not be placed in contact with the bottom of the receptacle). The whole process was repeated each night. Several patients developed interdigital cracks due to hardening of the skin. To prevent this, if the warts were near toe clefts the patients were instructed to place a little petroleum jelly between the toes before starting treatment. If there was little hardening of the skin after three weeks' treatment the formalin was increased to 5%, 7%, or even 10%.

Results

Retrospective Survey.—In this series 407 (91.3%) of those traced were cured at the first attempt, while 39 (8.7%) had suffered recurrence or reinfection (warts appearing at a different site at least six months after the original lesion had cleared). Only two methods of treatment had been used during the period under review, and the results are shown in Table I. The cure rate was higher and the recurrence rate much lower in the group treated with formalin at some stage. The

TABLE I

Treatment	Total	Cured	Recurrence	Reinfection
Curettage alone ..	102	65	30	7
Formalin ..	223	222	1	—
.. followed by curettage ..	121	120	1	—

recurrence rate after curettage did not depend on the experience of the operator. There were seven cases of reinfection after curettage alone but none in those treated with formalin. Only 31 patients whose warts were removed with the curette had visible scars and only two were painful.

Prospective Survey.—In this series 191 (95.5%) patients were cured by formalin. In seven, formalin treatment was abandoned after 16 weeks and the warts were curetted, as it was felt that no useful purpose would be served by continuing. Two patients developed contact dermatitis due to formalin, and, though they are classed as failures, the violence of the local reaction caused the death of the warts. The average time taken to clear the warts in the successful patients was 8.2 weeks. Age and sex bore no relation to the time required, but a definite relationship existed between the child's weight and the time taken for clearance (Table II). The weights were adjusted for height and age from tables of Mitchell Nelson (1945). Further analysis of those patients needing more than eight weeks to clear showed that, in addition to excess weight, many had large warts (greater than 1.25 cm. in diameter), either solitary or multiple, or mosaic warts. Of warts less than 1 cm. in diameter 80% were

clear after eight weeks' treatment. There was no obvious relationship between the length of time taken for cure and the time the warts had been present. Each patient was carefully questioned in an attempt to find the source of infection. In 32 the only possible source of infection was bare-foot dancing or physical training at school; 30 of these were girls, and it seems that few if any boys' schools indulge in such practices.

Discussion

When the first group of children were treated the routine therapy for multiple plantar warts was formalin, but many solitary warts were curetted without prior formalin therapy. The results of the survey clearly demonstrated the value of such prior therapy in the prevention of recurrence and reinfection, but it was impossible to deduce the optimum length of treatment with formalin or to estimate the true cure rate with such treatment.

In the second group of children, treated with formalin alone for up to 16 weeks, the child's weight was the only factor constantly related to the time needed for cure; presumably this is due to increasing skin thickness on the sole with increasing weight.

Excluding patients with very large or mosaic warts and those occurring in overweight children, the length of treatment justifiable appears to be six to eight weeks, by which time 80% of all warts up to 1 cm. in diameter will be cleared. Any present after this should be curetted. Solitary or multiple large warts may respond in this time (48%), but it seems wise to curette such lesions after three weeks' treatment with formalin, by which time about 25% will be cured and the remainder will not be liable to recurrence or reinfection.

It is difficult to explain the lower recurrence and reinfection rate after formalin therapy. It may be that many of the so-called reinfections and recurrences merely represent the continuous growth of other warts present in microscopic size when the original wart was treated. Formalin is extremely effective in dealing with small warts, and it is probable that it cures such microscopic warts.

The advantages of formalin therapy are therefore considerable, but it must be remembered that technique is all-important. Many of the patients in the second series had been treated with formalin before attending the department, but 45% of these had not used the correct technique, variations ranging from holding the uncorked bottle of formalin solution over the wart (a difficult manoeuvre) to soaking the foot once a week or merely placing pads of cotton-wool soaked in formalin over the wart for a minute a day (cf. Warin, 1958). The correct treatment is time-consuming, but five minutes spent with the patient at the first visit explaining the advantages of the method will usually ensure co-operation.

Summary

As a result of a survey of 646 children with plantar warts, it is shown that formalin foot-soaks used for 15 to 20 minutes each night for six to eight weeks will cure 80% of all plantar warts up to 1 cm. in diameter. Larger warts should be curetted after three weeks' treatment with formalin. By these means the recurrence and reinfection rates are reduced to extremely low levels. The other advantages of the method are its simplicity and painlessness.

TABLE II

Child's Weight	Time Taken to Clearance
25% underweight (35 children) ..	5.6 weeks
Average weight (122 ..) ..	6.7
25% overweight (34 ..) ..	9.3 ..

I thank Drs. I. B. Sneddon and R. E. Church for permission to treat their patients and for much advice and encouragement. I also thank the parents and children in the second series for their patient co-operation.

REFERENCES

- Duthie, D. A., and McCallum, D. I. (1951). *Brit. med. J.*, **2**, 216.
 Horwitz, O., and Marker, T. (1960). *Acta derm.-venereol. (Stockh.)*, **40**, 127.
 McLaughlin, C. R. (1948). *Lancet*, **1**, 168.
 Morgan, J. K. (1952). *Brit. J. Derm.*, **64**, 55.
 Nelson, M. (1945). *Textbook of Pediatrics*, 4th ed. Saunders, Philadelphia.
 Shaw, M. H. (1948). *Brit. med. J.*, **1**, 11.
 Thomson, S. (1943). *Brit. J. Derm.*, **55**, 267.
 Warin, R. P. (1958). *Practitioner*, **180**, 371.

"MONDAY HEAD": AN INTERESTING OCCUPATIONAL DISORDER

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It has been recognized almost since the first introduction of organic nitrates into therapeutics that these compounds are capable of producing headaches.

It is a common experience of the physician that patients with angina pectoris who are under treatment with these compounds have headache as a leading side-effect. However, this is of little importance in practice, partly because habituation occurs readily (Goodman and Gilman, 1955; Laurence and Moulton, 1960) and partly because the therapeutic response producing relief from anginal pain overshadows the discomfort of the side-action.

Industrial workers handling nitrates may absorb sufficient through the surface of the body to produce symptoms, the commonest of which is headache. This, too, has been known for many years, the first description of the effect being published in 1910 (Laws, 1910). Since no therapeutic effect is intended in these cases and since the substance is introduced into the body accidentally, one may legitimately call this an industrial disease referable to chemical toxicity.

There have been many instances of "nitrate head" reported in the literature, the greatest incidence of the condition being just before and during the two world wars, when production of explosives was at its peak. It is indeed interesting to note that the earliest report on nitroglycerin-induced headache is attributed to an Army officer serving during the Boer War (Ebright, 1914). All publications hitherto have understandably dealt with the characteristics, mode of prevention, and treatment of this troublesome disorder produced by nitroglycerin in munition workers, Service men, and miners (Laws, 1910; Ebright, 1914; Rabinowitch, 1944; Schwartz, 1946; Forssman *et al.*, 1958). There have been no accounts of the condition affecting workers using different nitro-compounds in other occupations, and this paper describes, for the first time, nitrate headache in workers in a pharmaceutical manufacturing plant where a new coronary-artery dilator drug was being made.

Basically, the process consisted of the nitration with aqua regia of the dianhydro derivative of sorbitol to produce isosorbide dinitrate, which was then recrystallized from absolute alcohol. After filtration through sintered glass the salt was dried on trays in a vacuum oven at room temperature. When dry the powder was scraped by hand from the trays into glass dishes, in which it was passed to another laboratory for compounding into tablets containing lactose. The final product is a tableted form of the active compound intended for human experimental therapeutics.

The three cases reported below occurred in the development laboratory where the isosorbide dinitrate was in preparation. The manufacturing process was conducted by a team of three men.

Case 1

The subject was a male chemist aged 31 who had always been fit and was not particularly prone to headaches in the ordinary course of events. He was well built and apparently in normal health at the time of starting work in the nitrate plant. He began synthesizing isosorbide dinitrate on the morning of Thursday, April 20, 1961, and continued full-time at the process, working from 9 a.m. to 5.30 p.m., with a break of one hour for lunch, until the afternoon of Saturday, April 22, at 1 p.m.

He was apparently well until 11 a.m. on Saturday morning when he first developed headache, which persisted on that day until 2 p.m. He had no headache on Sunday. On Monday morning, April 24, he started work on the process again and continued full-time each day, being first seen on Thursday, April 27. He gave a history of recurrent headache which reappeared on Tuesday, April 25, and which he experienced every day that he was in the nitrate plant.

The headache occurred about mid-morning and persisted for the rest of the day until he went to bed at night; it dispersed overnight and he felt well each morning until about 11 a.m. Although not severe it caused sufficient discomfort for him to take 5 gr. (0.32 g.) of aspirin. Relief was attained for about 15 minutes on the one occasion that he took the analgesic. The ache was bitemporal in site, it was persistent, and was not throbbing. There was no lancination, and he described it as being "like pressure on each temple." There were no other symptoms at the time; he was not nauseated, nor did he experience tinnitus, vertigo, palpitations, or flushing of the skin.

He always washed his hands thoroughly before meals, did not smoke during working hours, and handled the active compound relatively little. The route of entry of the substance is difficult to trace with certainty; inhalation is a possibility, since the compound is dried from absolute alcohol and it is possible that isosorbide dinitrate dust was present in the atmosphere.

Case 2

A male chemist aged 28 who always enjoyed good health had been employed as an ammunition examiner in the Army between the years of 1951 and 1954, when he was doing his national service in the Middle East. During this employment he had been accustomed to handling guncotton and other explosives in the form of many common varieties of land-service explosives. He experienced headaches during his tour of duty when handling these nitro explosives. He and his fellow Service men called the attacks "N.G. heads," which they regarded as of nuisance value only and which they treated by lying down in a darkened room and drinking cold beer. This method of treatment achieved great repute in the Canal Zone of Egypt.

He began operating in the nitration plant on Wednesday, April 19, at 9 a.m. He first noticed headache on Friday, April 21, during the morning. He recognized the symptom