supply of the follicles, and not directly on the follicle or hair bulb itself. Applied locally, thallium acetate has no depilatory action. The endocrine glands are clearly concerned in the action of the drug. By means of thallium feeding Buschke was able to keep animals (rats and mice) permanently bald. The *post-mortem* examination of animals which had undergone prolonged thallium feeds revealed in all cases changes of an atrophic nature in the suprarenal glands, the thyroid, and testes. By such feeding the animals developed a condition like cretinism. Buschke noted that only hairs which have a sympathetic nerve supply were affected; vibrissae supplied by motor nerves were not affected.

A recent paper read by Professor W. E. Dixon to the Section of Dermatology of the Royal Society of Medicine shed some light on the subject of thallium alopecia. The experimental work described proved that thallium heightened the excitability of the sympathetic system, and he compared its action to the heightening of the reflex excitability of the spinal cord by strychnine. For example, if the cervical sympathetic is stimulated with an electric current of certain strength specific effects are produced: erection of hair, dilatation of pupil, etc. If a subminimal current is used these effects are absent. If, however, a dose of thallium has been previously injected, the same subminimal current now produces a marked effect. He stated further that the action of thallium was probably upon the cell stations along the course of the sympathetic nerves, and not on the nerves themselves. This appears to narrow the field of inquiry enormously. It remains to be shown whether the fall of hair is due to a heightening of sympathetic excitability, so that reflex impulses which should normally be blocked at the cell stations can now pass through, or whether the alopecia is due to a further action of the drug of the opposite kind—that is to say, a blocking of sympathetic impulses for the time being, resulting in a temporary cutting off of the nutritional nervous supply. The latter appears at least as probable, considering that the intensity of reflex impulses passing along the sympathetic must vary greatly from time to time,

whereas the actual effect of a particular dose of thallium on the hair is absolutely constant. Professor Dixon added that it had been demonstrated histologically that the effect of thallium was to inhibit the transition of the polygonal cells of the follicles to the flattened cell of the hair.

Summary.

I will end by summarizing what appear to me to be the advantages and disadvantages of thallium depilation compared with x-ray treatment.

The advantages are that:

- (1) This treatment is extremely simple and costs almost nothing.
- (2) It can be used for children under 3 years of age.
- (3) It can be used in country districts where x rays are not available.
- (4) It can be used for cases where x rays have proved unsuccessful.
- (5) It may be used for cases of inflamed ringworm.
- (6) There is no danger whatever of permanent alopecia.

The disadvantages are:

- (1) Its toxic effects.
- (2) It is not as certain to cure as a good x-ray depilation, though this difficulty may, I think, be overcome by very careful local treatment.

In conclusion I would say that were thallium absolutely non-toxic I would use it on all cases, because I am convinced that, apart from these effects, all the difficulties can and will be overcome, but in view of the fact that it is toxic, particularly in children over 4 or 5 years old, I would reserve its use for very young children of 4 years and under, and for cases in which x rays have already failed, or are not available, or are contraindicated for one or more of the reasons I have mentioned. Regarded from this aspect I believe that thallium has found a permanent place in the treatment of tinea of the scalp.

I wish to acknowledge my indebtedness to Dr. G. C. Millis for his valuable assistance in the treatment of this series of cases.

THALLIUM ACETATE DEPIILATION FOR RINGWORM OF THE SCALP: ITS ADVANTAGES AND DANGERS.

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As it has been customary to treat cases of ringworm as in-patients at Booth Hall Infirmary there has been considerable scope for the use of the thallium acetate method of treatment and observation of its effects.

Mode of Administration.

A preliminary examination of the urine should be made for albumin and casts, since the presence of these, even in small quantity, is a definite contraindication to the treatment. The child is then weighed nude, and the dose reckoned at the rate of 8 mg. of thallium acetate to each kilogram of body weight.

We have found it convenient to make a solution of 0.5 gram of the drug in 5 c.cm. of distilled water; 1 c.cm. of this contains 0.1 gram, 0.1 c.cm. contains 0.01 gram, and so on. Satisfactory results have been obtained by reckoning the dose to the nearest centigram (that is, the nearest 0.1 c.cm. of the solution). A little sugar is put in a teaspoon, and the suitable dose of solution, accurately measured by means of a Record hypodermic syringe graduated in cubic centimetres, is added. This is readily taken by even the smallest child, and should be followed by a drink of water.

Further Treatment.

This single dose of thallium acetate ends the treatment by the mouth. The period of treatment where the closest medical observation is required is then, however, only

beginning, as the case must not be left to itself. Further measures may be classed under three heads:

1. *Treatment during the Pre-depilation Period.*—During the pre-depilation period every child should wear a cotton bonnet to prevent spread of infection, and it is desirable to apply a germicidal ointment to the affected areas. The pre-depilation period is very intimately associated with

2. *Observation for Toxic Signs.*—These may be manifested either as albuminuria (existing kidney disease is a contraindication to the treatment), or as bone and joint pains. One case excepted, symptoms have, in our experience, occurred in the second week. We have not noticed any roughening of the skin of the extensor aspects of the arms and legs, nor to any extent a dermatitis of the scalp. (See BRITISH MEDICAL JOURNAL, June 18th, 1927, p. 1097.) The importance of daily routine examination of the urine for albumin over a period of at least two weeks after administration must strongly be insisted on.

3. *Supervision and Cleansing of the Scalp.*—Loosening of the hairs has been observed as early as the seventh day, but the best time for epilation by forceps is about the fourteenth day after dosage. This operation should be completed by the nineteenth day. Epilation of the longer hairs which are unaffected is an easy matter, but the short, broken stumps of the diseased hairs require special handling. After the former have been removed, the ringworm areas are strapped with rubber adhesive plaster, which is allowed to remain in position for several hours; it is then stripped off and will bring away the stumps with it. New growth commences very soon, so it is essential to get epilation and strapping completed as soon as possible after the fourteenth day. We should mention that in two cases the scalp became reinfected with multiple patches of ringworm, probably because spores were left in the hair follicles. Further experience may detect in this a possible flaw in the method, but in the cases referred to the condition quickly cleared up with simple fungicidal applications.

The first thirty cases treated at Booth Hall were in the early part of 1927 and were all complete failures. The preparation used was probably stale and inactive, the demand for the drug being negligible at that time. Evidently it does not remain active indefinitely, and we suggest that thallium acetate in contact with the air may slowly become changed into the carbonate.

With a fresh supply of thallium acetate about fifty children have been treated, and with the exception of three all have been successfully depilated. There were three failures where, at the end of twenty-one days, there was only patchy depilation, the remaining hairs being absolutely firm. We cannot explain this, but it is interesting to note that the statement of another observer, that fair children depilate more readily than dark-haired children, is borne out, for the failures were dark children in the proportion of two to one. On the other hand, we have had perfectly satisfactory depilation of a considerable number of dark-haired children.

Signs of thallium toxæmia were manifested in five children. Two of these, aged 3 and 6 years respectively, had very transitory albuminuria; the former showed albumin on the thirteenth day only, and the latter on the first and second days after the dose. In the other three children (girls—two aged 11 and one 10) pains in the knee-joints and down the tibiae to the ankles arose between the tenth and twelfth days, and were evidently severe. In one there was definite effusion into the right knee-joint, but the two others showed nothing on examination except tenderness and some pain on full flexion. No rise in temperature occurred, but in one girl the pulse rate increased with the onset of pain. All three cleared up in less than a week on salicylates, with the methyl salicylate liniment applied locally on lint; they depilated well, and up to the time of their departure to the convalescent home showed no other untoward symptoms. These three girls were the oldest and heaviest children who were given the drug, and consequently received the largest doses; this may give some clue as to the limit at which the method is applicable, since we understand it has been shown that serious toxic signs develop in adults given doses far short of that which would be required to produce depilation. The heaviest child among our cases which depilated without showing any toxic signs weighed 23 kilos; the lightest among the bone and joint cases weighed 23.9 kilos, and the heaviest 32 kilos. The two cases of albuminuria occurred in younger and lighter children.

Conclusions.

We have in thallium acetate a drug which may have a great future in the treatment of ringworm of the scalp, both in institutions and in private practice; but we consider that more observation is needed before its use becomes general. We do not know the ultimate effects of thallium acetate on the kidneys. The questions which demand answers are: Why does it produce albuminuria in some cases and not in others? Are any changes produced in the kidneys in those who do not show this symptom? Is there possibly irritation which may pave the way for future kidney trouble? How soon is all the thallium acetate excreted by the kidneys? We presume it is all excreted in this way, and we need a suitable chemical test for its presence in the urine. We also do not know what the exact changes are which produce the bone and joint symptoms, and, so far, we can only assume from their short duration that no lasting damage is done.

We can say definitely that treatment by thallium acetate, thoroughly carried out, shows a 90 per cent. standard of efficiency. Local treatments with tincture of iodine, ointments, etc., are unsatisfactory compared with thallium and x-ray depilation, and thallium has the advantages over the x rays of producing a speedier and equally efficient depilation; of a speedier occurrence of new growth after treatment; and, so far as we have seen, no permanent alopecia. X-ray depilation is unsuitable for children under 3 years of age, and in these cases thallium is successful. We have dosed a child as young as 10 months. At the other end of the scale we are driven to conclude that there is a limit of body weight beyond which toxic symptoms tend to arise readily. We do not yet know if with this type

of case a lesser amount of the drug per kilo of body weight would be efficient in procuring depilation without the occurrence of such signs, but in the next cases which weigh 23 kilos or over we intend to try seven milligrams per kilo instead of eight.

When applying this method of treatment it is necessary to bear well in mind the following salient points:

1. Remember the routine examination of the urine and the nature of possible toxic signs.
2. Weigh the child naked.
3. The drug must be of recent manufacture, and, if the solution method is used, the solution should not be kept more than a day.
4. Depilate between the fourteenth and nineteenth days, and above all strap the patches thoroughly as suggested. The old patches should be examined with a lens after this to see that no stumps are left. A few dirty stumps will reinfect the new growth, which comes very quickly.

Our acknowledgments are due to Dr. J. D'Ewart, medical superintendent, for permission to publish our observations, and to Dr. Gibson, visiting dermatologist, for his interest and help in the supervision of the treatment.

NASAL HEADACHES.*

BY

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To bring forward again the well-worn subject of headache may appear to be in the nature of flogging a tired horse; but, in the many papers recently published on this symptom, I have found few references to nasal disease as a possible causative factor. This is my excuse. In what follows I shall omit consideration of those cases in which the headache is obviously part and parcel of some acute nasal infection, and confine discussion to those of cryptic headache where there is no definite signpost to the cause.

Every medical man frequently has to deal with the type of case to which I refer. Some of the patients suffer almost constantly, and look ill, run down, and toxæmic; others have violent attacks of headache with periods of freedom; some suffer in silence, as far as any reference to a medical man is concerned; others seek remedies everywhere. If they have sought medical advice they will probably have been investigated for bowel trouble, menstrual disorders, errors of refraction, and possible sources of toxæmia such as septic teeth; but comparatively rarely will the nose have been examined. I am far from suggesting that these other conditions are not important and frequent causes of headaches, or that some nasal lesion is more common than any of them; but I wish to suggest that, other possibilities having proved negative, the nose should be thoroughly examined for any possible source of the trouble before labelling the patient as, for example, a case of toxæmic headache, or of atypical migraine.

There are essentially two conditions in the nose which may give rise to headaches of nasal type—sinus disease and some form of nasal obstruction. The more usual and more important of these is the former, and unsuspected pus held up in one or more of the sinuses is productive of many obscure complaints. There is a widespread belief that accessory sinus suppuration is always associated with nasal discharge, either anterior or posterior, or both, and that in the absence of this symptom sinus disease can be excluded. This is erroneous. Many cases do not show this symptom, and manifest only a concealed focus of sepsis by their general toxæmic appearance—sallow complexion, listlessness, undue mental and physical fatigue, and the headaches, which may be general or may be of special type according to the sinus involved.

It will make for simplicity to take the various sinuses in turn and describe the kind of headache to be expected in each case.

Disease of the maxillary antrum produces no typical variety: the headache is toxæmic, sometimes frontal,

* A paper read before the Bath and Bristol Branch of the British Medical Association.