onstrated by the fact that their mosquitoes, when applied from five to ten days after their contamination, have invariably given negative results. The investigators thought, no doubt, that by providing their contaminated insects with food and water, besides giving them the benefit of several additional days since their contamination, they were actually improving upon my original technique; their argument being that since their inoculations had failed, even with those improvements, it was incredible that I should have succeeded in any of my attempts with my simpler method.

It has, apparently, not occurred to those able investigators while criticising my former experiences, to consider a fact which they have themselves demonstrated, namely, that there are two different ways by which the specific germs of yellow fever may be conveyed from the sick to the healthy. One way consists, as I infer from their experiments, in allowing the yellow fever mosquito to become infected in such a manner that, after the lapse of a certain number of days, the salivary and venom glands of the insect appear to become the seat of a local, chronic, lifelong infection, which is attended with a constant reproduction of yellow fever germs, so that the contaminated mosquito will thereafter inoculate some of those germs with every bite. The other way consists in injecting the germs contained in the blood of a yellow fever patient directly under the skin of a non-immune. I am not aware that any attempts have been made to determine the length of time during which the specific germs in the blood may retain their vitality within the glass cylinder of the hypodermic syringe or in any other receptacle,¹ but it stands to reason that they will survive more readily within the blood-sucking apparatus of the yellow fever mosquito, normally moistened with the insect's saliva, which admittedly constitutes the ideal culture medium for the yellow fever germ. Yet there must be a time limit beyond which the germs retained within the sucking apparatus must lose their vitality or perhaps undergo transformations which may temporarily deprive them of the power of reproducing the disease. During that limited time, under favorable circumstances, they may even sporulate and multiply as they might have done within the human host, but, on the other hand, it must be remembered that their position in the internal mouthpieces of the insect must be a precarious one, being at every moment liable to be washed out by a discharge of saliva or to be drawn into the stomach of the mosquito whenever food or water is sucked.

From these considerations it must be inferred that the bite of a yellow fever mosquito which has sucked the blood of a severe case is likely to prove infectious for non-immunes at two separate periods, namely, during the first few days after the insect has bitten the patient, provided that, in the meantime, the mosquito has not had access to any food or water, nor been allowed to bite another subject. After this short period the bite of the insect may be harmless until ten or fifteen days later, when the germs within the body of the insect will have had time to multiply and to invade its salivary apparatus.

The direct infection through the bite of recently contaminated mosquitoes, so far as I can judge from personal experience, produces much milder pathogenic effects, the fever is much less prone to develop albuminuria, and the period of incubation is often prolonged. I

1. Since writing the above, I have been informed of a recent experiment by Dr. Carroll, at Camp Columbia, showing that the blood of a mild experimental case of yellow fever, kept over night and part of the next day (some 14 hours) and injected to a non-immune has produced a mild but characteristic attack of the disease.

believe that after this mode of infection has been duly verified, and with certain improvements, including the employment of home-bred insects and the proper adjustment of the number of these necessary to secure visible pathogenic effects, it will be found to constitute the only method which may be safely used, upon a large scale, for the purpose of conferring immunity.

I certainly do not claim for my experimental results, obtained under difficulties and with considerable personal inconvenience, the significance and conclusiveness of the experiments so admirably carried out by the Military Commission at Camp Lazear; but, after the preceding explanations, every reader must admit that my method of inoculation has, so far, not been investigated by that commission, and that they are, therefore, in no position to pass judgment upon its merits before having done so.

160 Campanario Street.

TREATMENT OF RINGWORM OF THE SCALP IN INSTITUTIONS.*

HENRY W. STELWAGON, M.D.
PHILADELPHIA.

The hospital or institution which escapes the misfortune of having to care for cases of ringworm of the scalp has much for which to be grateful. Many such cases occurring in private practice, among properly cared for children of good physique and robust health are, if the disease is at all recent, usually rapidly responsive to well-advised measures. Not so with hospital and institution cases. Even in private practice observation shows that in cases of any duration the disease is frequently rebellious and persistent, and that in many instances the practitioner pronounces the cases cured when the hair has begun to fill in in the affected area or areas; whereas, in reality the disease may still persist in a less conspicuous but chronic state, and the case remains an active center of contagion for other children. In almost all institutions in which children with this disease are admitted or in whom it may develop subsequently to admission, the subjects are almost invariably of poor stock, of impoverished nutrition, and have had, as a rule, the disease many months before coming under treatment. The consequence is that one has to deal with a persistent, rebellious and troublesome type scarcely known to the average practitioner, but an all too common experience with the specialist in skin diseases. With persevering treatment even the most of these cases may be made to yield in some months, or say within a period varying from several months to a year. Exceptionally a longer time is required for cases of great extent and of long duration. Without the methodical and persistent carrying-out of treatment, however, such cases last almost indefinitely—or till Nature begins to look after the cure as the child verges into puberty.

Ringworm of the scalp is in the larger number of cases due to the small-spored fungus, and, as a rule, it may be accepted as a fact that this fungus is the agent in most of the refractory cases. In a fair proportion of scalp cases, however, the disease is due to the large spore variety, and while such yield much more rapidly in most instances, still there are cases due to this variety of fungus which also prove persistently obstinate. Whichever fungus is the causative factor, the treatment

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remains the same. As yet we know that the recognition of the fungus variety has a bearing simply upon the prognosis as regards the probable time for a cure.

Strong remedies must, as a rule, always be used in the treatment of scalp ringworm in institutions. There are cases, it is true, in which the inflammatory element is, at first at least, quite marked, and milder applications are usually demanded. In such cases, indeed, this inflammatory element may be said to be a natural attempt toward casting off the disease. In almost all cases, sooner or later, however, the strong remedies are to be prescribed. What are they? In a great measure, one might say that the selection depends upon the habit or the prejudice of the prescriber. Still there is considerable unanimity among those having to do with these chronic cases as to the several remedies possessing greatest value. My own experience emphasizes the usefulness of sulphur, naphthol, iodine, chrysarobin and croton oil. Sulphur and naphthol are most valuable and appropriate for those cases involving a greater part of the scalp. Chrysarobin and iodine for circumscribed areas, and croton oil for those patches which have persistently failed to yield to other remedies.

There are certain adjuvant measures which should be mentioned first, before taking up the manner of application of the above several remedies. First, the hair of the entire scalp should be kept clipped very short, about one-fourth to a half inch in length. The disease is then more easily watched, and any new spots detected in their incipency and promptly treated. In extensive and extremely obstinate cases it is even desirable to have the scalp shaved every five or six days. The spread of the disease to other parts of the scalp and to other children should be prevented by certain routine measures. With this object in view, the scalp is to be washed daily or every second day with warm water and medicated *sapo viridis*:

R. Sulphuris præcipitat. 3i
Naphthol gr. xxx
Saponis viridis 3i M.

The lather should be permitted to remain on for five to ten minutes, as it has in itself, as experimentally shown by Thin, an inhibitory or destructive influence upon the fungus which may be scattered about the parts. If there is fear of taking cold, the scalp may be enveloped with some covering. The lather is thoroughly rinsed off, the parts rubbed dry, and then a general remedial application made, chiefly for the purpose of prevention, to the entire scalp. The following is useful for this purpose:

R. Sulphuris præcipitat. 3i
Naphthol gr. xxx
Petrolati 3i M.

Or, instead of the salve, a lotion may be used for this general application, consisting of:

R. Acid. carbol. 3ii
Resorcin 3i
Solut. acidi boric. (saturat.) Oi M.

It is possible that the salve is more effectual in preventing the dissemination of the spores, although it is not so agreeable.

A word as to depilation of the affected areas. This is a measure of some importance, if carefully and repeatedly done, but if the disease is at all extensive or the patient very young, it becomes almost impracticable. As an efficient substitute for this, originally suggested, I believe, by Dr. A. W. Brayton, and in my judgment of superior value, and also possessing therapeutic properties of its own, I can cordially recommend a good depil-

atory powder. The following, if properly and freshly prepared of good materials, will answer the purpose:

R. Barii sulphidi 3iii
Zinci oxidi
Amyli pulv. aa 3iiss M.

At the time of application enough water is added to this mixed powder to make a paste, which is spread in a layer of the thickness of the back of a table knife on the areas, slightly overlapping the edges; this to remain on for three to fifteen minutes, according to the character of the hair and the sensitiveness of the skin; or until heat of the skin or a burning sensation is felt. It is then thoroughly washed off, and if it has acted as it should, the hair of the patch, including the stumps, will have been destroyed deep into the follicles, and possibly to the full depth of the latter. Should there be accidentally much irritation from this, a soothing ointment may be applied for a few hours or a day; as a rule this is never necessary. The depilatory should be applied every five to ten days, depending upon the rapidity of the re-growth.

As to the remedial applications to the individual areas, the same ointment as above, with double the quantity of sulphur and naphthol, will prove valuable in recent cases and especially in very young subjects. The following is the formula:

R. Sulphuris præcipit. 3ii
Naphthol gr. xxx-lx
Petrolati 3i M.

Occasionally the larger amount of naphthol, in those of extremely sensitive skin, gives rise to a feeling of considerable burning, and in such cases this ingredient can be reduced in quantity. As a rule, however, the feeling of burning is over in a few minutes, and no active irritation follows. Ordinarily, the best application for the areas in young patients and in recent areas is iodine tincture, containing a small quantity of mercuric iodide:

R. Hydrarg. iodid. rubri gr. i-iii
Tinct. iodini 3i M.

I am convinced that the value of iodine tincture applications in this disease is much underrated. The preparation is painted on twice daily, two or three coatings at each time, till the parts become somewhat tender or till the film thus formed cracks or begins to loosen. The parts are then anointed with the milder of the above salves, and as soon as the film is detachable it is picked or pulled off. If there is active underlying irritation, which is rarely the case, a mild ointment may be applied for a day or so. According to circumstances as indicated above, the depilatory powder is again used, and the paintings resumed. This is continued till the new growing hairs show no evidence of fungus, and then the treatment is discontinued, and the patient kept carefully under observation for several weeks. Should signs of the disease again present—if necessary their significance should be confirmed by the microscope—the paintings are again resumed. Or, if the iodine paintings seemed to be slow in bringing about a complete cure, another plan is to be instituted.

Chrysarobin is by far the most valuable application in most of the hospital cases. It must be of the first quality. It is made by various manufacturing chemists, and varies considerably in quality; naturally an efficient preparation is essential for success. It may be used in all cases, but must be employed with greater care in patients under the age of three years. In most of the younger patients in fact the sulphur naphthol salve or the iodine paintings will suffice to bring about a cure.

Chrysarobin is most satisfactorily applied as a solution in chloroform:

- R. Chrysarobini q. s.
 Chloroformi 3i
 M. Make a saturated solution.

The areas are painted over with this till well coated with a film of chrysarobin, the chloroform rapidly evaporating. Over this is then painted three or four layers of good collodion. The plain collodion is a little too brittle, and the flexible collodion scarcely compressible enough; a mixture of equal parts is more satisfactory. In eight or ten hours the collodion is again applied. No further application is to be made till the film so formed begins to crack or break way or begins to loosen, which it usually does in two to four or five days. It is usually loosened by the growing hairs beneath. As soon as it becomes detachable it is gently pulled off, and if there is any active irritation beneath, a mild ointment may be used for a few hours or a day, till this is subdued. If there is any sign of stumps or growing hairs, the depilatory is again to be used, and the paintings with the chrysarobin and collodion resumed. This plan is to be continued, as with the plan with the iodine paintings, till the disease is finally cured. In some instances, but if used with care not in many, a mild or moderately severe dermatitis of the surrounding skin may be set up, and under these circumstances it becomes necessary to suspend the remedy temporarily. In rare instances this tendency to dermatitis may repeat itself, the skin of the patient being intolerant to chrysarobin, and it must be set aside and give place to another plan. Such idiosyncrasy is, however, rare. If the patient or attendant is careless, some of the chrysarobin may be carried to the face or eye and a temporary disturbance of these parts brought about. This rarely happens, however, with the chrysarobin treatment as here advised, as the remedy is kept covered with the collodion film. In addition, it is advisable to have the patient wear a lining of paper or other material in the hat, which will admit of frequent washing or destruction.

In some instances these several methods will fail to bring about a cure; or more frequently will cure most of the areas, but fail to make sufficient impression upon a few patches. It is just in such instances especially that croton oil has its particular field of usefulness, a plan of treatment warmly commended by Alder Smith. In those cases, too, in which there are throughout but two or three patches, and in which for various reasons a rapid cure is desired, recourse may be had to this application. It is a severe remedy, and the parts are made actively inflammatory. Indeed, the object in view is to bring about an artificial kerion—a somewhat boggy and pustular inflammation, which upon abatement usually results in the cure of the patch. In such cases as here mentioned the application is most valuable, and while it may in some instances destroy groups of a few follicles here and there in the areas thus treated, the subsequent growth of hair covers up these small points of baldness completely, so that this possibility is practically of no importance. The careless use of the remedy and the pushing of the inflammatory action beyond a reasonable limit would, of course, result in considerable follicular destruction, and should be guarded against. If carelessly used or its application be unnecessarily long continued, complete baldness of the area could result, but this has never occurred in my experience; and it seems to me that such disaster could only be from gross carelessness, or possibly from some idiosyncrasy of the patient's skin. The scalp will fortunately stand a

good deal of even reckless treatment, and yet finally show but little trace of it. Croton oil is, however, a strong remedy, and must always be used with caution. For this reason it is never to be employed in very young children. The general scalp is to be looked after in the same manner as when other methods are used. With croton-oil applications the use of the depilatory may be omitted. At first it is desirable to apply the oil weakened with two or three parts of almond oil, and if it is found that no active inflammation arises, it should be applied stronger. In most cases the pure oil is required. It should be scantily used, as the oil seems to have a distinct tendency to spread beyond the part to which it is applied. It is to be applied two or three times daily, and to bring about the desired amount of inflammatory reaction usually two to six days are required. When it is possible to have poultices repeatedly applied, the oil applications may be discontinued as soon as slight swelling and minute pustulation present; the subsequent poulticing will bring about sufficiently pronounced inflammation. In most cases, however, I have continued the oil applications till this end was reached and then applied boric acid ointment till the inflammation subsided. This ointment or the mild sulphur naphthol ointment can then be used till the new hairs appear, and then all applications be discontinued; at the end of several days or a week the parts and new growing hairs are examined. If there are still signs of the disease the same method is to be repeated. One should be sure, however, that there is still disease there, before resuming the treatment. If the inflammatory action and pustulation have been of sufficiently high grade, a repetition is not usually necessary. If there are several patches to be treated, not more than one if a large one, or two if small, should be treated at one time with the oil. As soon, however, as the inflammation has subsided a new area can be attacked.

In some cases of scalp ringworm the disease is disseminated—disseminated ringworm of the scalp—consisting of scattered small-sized areas presenting five to ten diseased hair or hair stumps. Such cases can be treated by either of the three active methods—iodine paintings, chrysarobin or croton oil. If the spots are numerous the number should be brought down and then, if necessary for final cure, the oil be employed to the remaining areas. In such cases many of the areas yield readily with any good treatment, leaving behind six or more obstinate spots. In those instances of scalp ringworm in which the disease is so extensive as to practically involve the greater part of the scalp, presenting large and irregular areas, it is advisable to use the stronger sulphur naphthol ointment till the disease is reduced in extent. Or this plan can be used, and a small part treated with the iodine or chrysarobin paintings. Croton oil, if finally required, should be left till the disease is brought down to several circumscribed areas; it is never to be used in the beginning of treatment in these confluent cases, nor should it in fact be applied to an area more than two inches in diameter, at the very most.

The several plans here outlined can also be used with advantage in private practice and with intelligent patients of the dispensary class—in the latter excepting, however, the croton oil applications; this even with private cases must be used with caution, and its action daily inspected.

Cheifez reports the cure of two cases of drosy by massage, applied for 12 to 15 minutes, 6 times in one case and 17 in the other. Massage is commenced at the feet and worked upward.