THE THERAPEUTICAL VALUE OF THE X RAYS IN MEDICINE.*

By EDUARD SCHIFF, M.D.,
Vienna.

UNTIL two years ago scarcely anything was known respecting the influence of the *x* rays on the human body. Only now and again a statement would appear in the papers respecting inflammation of the skin or falling off of hair. Yet so vague was the form of these notices that one was at a loss whether to take them seriously. About that time Dr. Freund had a remarkable case under his observation of a child whose back was covered with a thick-haired *nævus pigmentosus pilosus*. The case seemed a desperate one, for, with the methods of treatment then in vogue one could do nothing. Dr. Freund, however, decided on making an experiment with the Roentgen rays. He began the irradiation by exposing the back of the little patient two hours daily to the *x* rays. After twelve days the hair, to our astonishment, fell out in thick tufts, so that in a short time the irradiated place was quite hairless. That was the first instance of a genuine and scientifically-regulated treatment and cure effected with the Roentgen rays. Unfortunately, in consequence of too long irradiation, an extremely violent inflammation set in subsequently on a circumscribed spot, which took a long time to heal. But this untoward circumstance proved highly instructive, seeing that it put into our hands the means of thenceforward avoiding such disagreeable drawbacks. By carefully moderating the length of the sittings all troublesome incidents could soon be avoided.

The powerful efficacy of the *x* rays shown in these experiments suggested to me the idea of employing them in the treatment of severe skin affections having their seat in the deeper layers of the cutis. The experiments I next instituted for lupus vulgaris yielded very favourable results. The first case of treatment and cure was that of a girl who for many years had been treated medically, surgically, and with Koch's lymph in vain. This girl I was able after a few months to present to the Vienna Dermatological Society as cured with Roentgen rays. [I wish here to take the opportunity of stating my priority in having been the first to treat and cure lupus with Roentgen rays.] The method according to which we proceed is as follows;

The set of instruments needed for treatment with the Roentgen rays consists, as is well known, of, first, the screen of the current (obtained from the main or from accumulators with suitable resistances); secondly, a transformer (Rumkorf's induction coil); thirdly, vacuum tubes (large tubes are to be recommended); fourthly, an amperemeter and a voltmeter inserted in the primary circuit; and, fifthly, protective material (sheets of pasteboard covered with lead foil $\frac{1}{8}$ in. in thickness) for those parts of the body which are not to be exposed to the rays.

In Freund's opinion there is ground for assuming that the therapeutic effects obtainable by these means are due to electric waves arising in the case of the electric discharges in the vacuum tube under the same potential of discharge as *x* rays. As far as our present knowledge goes, these electric waves appear to possess a more intense physiological action than those waves which arise in the production of d'Arsonval's high frequency currents, and by the action of the statical machines, an action which often goes a long way beyond the mark, and, far from working curatively, may operate injuriously on the organism.

For this reason it is advisable to take note of these factors, which in our practice proved deleterious. These are as follows: (a) A too great strength of the primary current ($1\frac{1}{2}$ ampere with 12 volt tension should never be exceeded); (b) a too high tension on the pole screws of the secondary coil of the transformer (induction coils of over 30 c.cm. striking distance should never be used and the mercury vessel should not be screwed too high to the interrupter); (c) too long and too

frequent irradiations; (d) the too short a distance of the vacuum tube from the skin.

Obviously certain factors which for purposes of illumination are very useful prove unsuitable for treatment with Roentgen rays. Such are the larger induction coils, greater intensities of the primary and higher tensions of the secondary currents. The rapidity with which the interruptions of the primary current occur is in inverse proportion to the tension of the opening currents. For purposes of treatment 800 to 1,000 interruptions per minute were found to answer. Among the effects of the Roentgen rays, those produced on the skin were first observed, studied, and therapeutically utilised. There are certainly communications to hand according to which the *x* rays exercise an intense influence on the whole organism and certain diseases affecting it, such as neuralgia, rheumatism, and tuberculosis. These facts, which are intelligible in the light of the analogous effects of the high frequency currents and of the electric waves, which are in all probability the most operative in both procedures, require however still further investigation.

The influence of the *x* rays on the skin consists first in a relaxing effect on the deep vessels of the corium, an effect with which is certainly associated a slight exudation into the tissues of the epidermis and cutis. This process causes a swelling of the hair papilla on hairy parts of the body, and consequently also the detachment of the hair bulbs. In cutaneous affections, with inflammatory infiltration and new growth of young tissue, the cellular formative elements get altered in their molecular composition and thus prepared for absorption. Whether the *x* rays operate injuriously on the micro-organisms, or whether it is only that phagocytosis, becoming more pronounced under the inflammation, proves serviceable in parasitic affections of the skin, has not yet been determined. As indications calling for treatment with Roentgen rays are to be enumerated: Abnormal growth of hair and all cutaneous diseases caused or rather prolonged by the presence of hair, as sycosis, favus, wounds of the hairy parts of the body, and trichorrhæxis nodosa; and as furunculosis, acne, lupus vulgaris, lupus erythematosus, eczema, and elephantiasis.

The method is very simple. The Roentgen tube, at 15 cm. from the skin, is so disposed that the anticathode stands exactly opposite and parallel to the irradiated field. Sittings are daily held, lasting at first five, later on ten to twenty minutes. The distance of the tube may also be slightly and gradually lessened. The parts not to be irradiated must be protected with pasteboard sheets coated with lead. As soon as the skin appears turgid, or shows a pale pink or brownish tint, or when at the place in question the hair becomes loose, then the irradiation of this part must be stopped. This is the case with hypertrichiosis after 17 to 25 sittings, and with sycosis and favus after 7 to 13 sittings.

In the case of a general growth of hair on the face, it is of advantage to treat both cheeks at the same time, and after these have been depilated, to treat the chin. Occasionally there are disagreeable occurrences, such as slight conjunctivitis, pruritus, and erythema. Conjunctivitis may be avoided by the use of lead masks, and by advising the patient during the sittings to close the eyes. For the rest the usual astringent collyria proves effective. Against erythema and pruritus the 15 per cent. boracic lanolin acted in all occasions as an excellent remedy. Both these symptoms, as well as conjunctivitis and the slight bronzing of the complexion to which many women are averse, disappear spontaneously in two to three days. In the case of lupus, the irradiation may be more intense, and one need not be afraid of the appearance of slight dermatitis. As we have already in several publications insisted, the affection proceeds by imperceptible stages towards cicatrization. The scars, moreover, are very tender, and resemble the normal skin. Quite striking, too, is the improvement that takes place under this treatment in the complexion disfigured by scars, pustules, comedones, and this may be due to the circumstance that in the uppermost layers of the skin a small exudation stretches the epidermis, and therefore removes elevations and depressions.

With this treatment, however, the cure is not yet completed. Hypertrichosis, especially, still needs for its radical removal a long after-treatment, consisting of 3 to 5 short

* The author of this paper, which was contributed to the Section of Pharmacology of the meeting of the British Medical Association at Portsmouth, prefaced his remarks by alluding to the general bearing of the *x* rays on medical science, the development of the original apparatus, and the use of the rays in diagnosis.

sittings held at intervals of from four to eight weeks. Should this after-treatment be neglected, the hair at the depilated places will in by far the majority of cases begin to grow again in about two and a-half months. Only in some cases did the first treatment suffice to accomplish a radical cure.

I would here call attention to the fact that the results of the ingenious Finsen method of treatment by light correspond to those obtained with Roentgen rays, as far as regards lupus. It should, however, be noted that the Finsen treatment seems suitable only for smaller lupus patches, whereas for large areas the Roentgen treatment is preferable.

When we consider what progress towards the well-being of humanity still lies in store from the discovery of the x rays, we may congratulate our century on such an achievement, and must not refuse the meed of our admiration for the man to whom we owe it.

TREATMENT OF LUPUS BY THE X RAYS.

By ROBERT ERNEST SCHOLEFIELD, M.A., M.B. OXON,
Blackheath, S.E.

[SEE SPECIAL PLATE.]

IN connection with the interesting account of phototherapy as conducted by Professor Finsen, of Copenhagen, which was given in the *BRITISH MEDICAL JOURNAL* of September 30th, 1899, it will be of interest to some of your readers to observe from untouched photographs what effect may be obtained in the treatment of a serious and disfiguring form of disease—namely, lupus—by the action of the x rays. The result of surgical interference with such cases has been uniformly disappointing, not only in often intensifying the virulence of the growth but in the destruction of the parts which are the seat of the same, and, in the case of the nose—which was affected in my patient—productive of a hideous deformity, which the greatest skill in plastic operations, even if the disease has been completely removed, suffices barely to make presentable.

When the patient, from whom the photographs were taken, came under my care, the disease was so extensive that, before submitting him to any surgical interference, I decided to try the effect of the rays, of whose efficacy I had read in the annals of the Roentgen Society. With great kindness my friend, Mr. William Webster, F.C.S., who possesses a most excellent apparatus of extreme power, offered to carry out the details of the treatment, and it is also to his skill that the excellent photographs are due.

The history of the patient is as follows:

B. H. A., aged 18, first noticed the affection of the nose in September, 1897. He then underwent various kinds of treatment, in which the nose was submitted to the action of ointments, powders, douches, etc.; and even on one occasion in December, 1898, a slight scraping or scarification was undertaken, luckily of a very superficial kind, otherwise a great loss of tissue would, I think, have inevitably followed. For some months before I saw him he had, under the advice of a medical man, been poulticing it, but the disease had steadily advanced from the tip of the nose, where it was first noticed, till both alæ and the bridge were affected, and isolated nodules were to be noticed almost as high as both inner canthi, though they hardly show in the Skiagraph No. 1.

On June 30th he was first exposed to the rays from a Jackson high vacuum tube attached to a Newton-App's coil giving an 18-inch spark, a hammer break of ordinary kind being employed. An important condition in the tube was aimed at—namely, the so-called "sun effect" first described by Webster in October, 1896, at his demonstration at the Royal Artillery Institute. The rays, under this condition, are capable of taking a photograph of the bones of the hand in a fraction of a second, or of penetrating a $\frac{1}{4}$ -inch steel plate in ten to fifteen minutes' exposure. The face, other than the affected area, was protected by a rubber mask of some thickness, and exposed to the rays for ten minutes at each sitting at about 5 in. to 6 in. distance from the tube. Sittings were given every other day throughout August, and it was noticed that the exposed skin dried into a scaly condition and peeled off, the lupoid area, where thickest, forming a kind of scab, as shown in Skiagraph No. 2.

On September 1st, 1899, the patient informed us that the night sweats, which for some months had been profuse, were much alleviated, and though no treatment was undertaken in September, by October 9th they were reported to have quite ceased and have not reappeared up to the present. There are now no signs of disease in the lungs, though I regret that I did not examine them before treatment was commenced. On October 9th hardly any trace of lupus was to be found, but as a few pinkish or brownish nodules were to be seen high up on the nose he was exposed on alternate days up to November 12th when the final skiagraph, No. 4, was taken.

The peeling of the skin as in severe sunburn is well shown in Skiagraph No. 3, and the retraction of this hardened layer produced slight ectropion

and epiphora as shown in that skiagraph also. From this he has recovered since.

These results are sufficiently startling in their similarity to those produced by Professor Finsen to make one wonder whether the rays from the tube and the ultra-violet or photochemical rays of the solar spectrum and the electric light may not be identical.

Still further, the most important element is the penetrative power of the x rays, and the conclusion cannot but be drawn from this case that if dermal tuberculosis may be cured, why not pulmonary. Nay, further, may we not take the relief of profuse night sweats as an indication of some such effect? May we not then hope to go even a step further than the fresh-air treatment towards the cure of phthisis and supplement it with either concentrated sunlight or exposure to concentrated x rays?

AN EXAMPLE OF THE USE OF THE X RAYS IN THE EXAMINATION OF ENLARGED METATARSO-PHALANGEAL JOINTS.

By GEO. H. RODMAN, M.D.,
East Sheen.

SKIAGRAPHS of the two following cases were shown at a recent meeting of the Thames Valley Branch of the British Medical Association, and, at the request of Mr. Edmund Owen, who expressed great interest in the pathological condition therein found, are published.

The abnormal processes of bone, for such they appear to be when photographed by means of the Roentgen rays, were in both cases unexpected, and, as far as I have been able to discover, have not been described previously. Whether the gouty diathesis, which appears to be common to the two cases, is more than a coincidence and in any way productive of the outgrowths, I am unable at present to state, but I trust that, with the light of future investigation of similarly enlarged joints, we may be able to arrive at some more definite conclusion as to the causation and frequency of the condition. The similarity in their shape and of the position from which these processes spring is a striking feature. Radiographs of the corresponding joints in hands, crippled by gouty enlargement, do not apparently show bony outgrowths of a like character.

Fig. 1.

CASE 1.—The skiagraph in this case shows what appears to be an exostosis growing from the outer aspect of the head of