very little affected in the right hand. The bones and joints most affected are those of the middle and ring fingers. In these there has been more or less occasional pain, although none at the present time. The other fingers are also at present and have been free from pain. There is no oedema of the soft parts. Measurement across the middle of metacarpal bones of the right hand, 9 inches; of the left, 9 $\frac{1}{2}$; of the middle finger at the first phalangeal joint on the right side, 3 $\frac{1}{2}$; of the left, 3 $\frac{1}{2}$; of the right ring finger at the first phalangeal joint, 3 $\frac{1}{2}$ inches; of the left, the same. The dorsum of the hand is hot and swollen, but there is no oedema or fluctuation to be made out. Wrists enlarged and thickened; no oedema, fluctuation, pain, or tenderness. The movements are somewhat restricted in all directions. The lower ends of the radius and ulna on both sides can be felt and appear to be enlarged. On measurement, taken round the lower ends of the bones of the right side, 7 $\frac{1}{2}$ inches; of the left, 8 inches. At the carpal articulation of the right, 8 inches; of the left, 8 $\frac{1}{2}$. Forearms and arms soft and flabby, muscles not well defined. Elbow-joints freely movable, no crackling or swelling. No pain or tenderness. Shoulders show no deformity, pain, or tenderness, and the same applies to the temporo-maxillary articulations, to the cartilages of the nose, ears, and neck, and spinal column. There is no retrosternal dullness. Hip-joints are not in any way fixed or swollen, but the muscles of the thigh are markedly soft and flabby, especially the adductors.

"*Knees*.—No limit of movement, no creaking or crackling, no enlargement of patellae. The knee-joints, however, distinctly swollen, and the left rather more so than the right, slightly hot, and appears to contain a small amount of fluid. No oedema and no pain or tenderness. Both legs swollen and slightly oedematous, pitting slightly on pressure, more markedly so on right side. The muscles soft and flabby. The outlines of the leg bones not easily made out, but the lower end of the fibula somewhat enlarged on both sides. Ankles enlarged and swollen, with some limitation of movement. Feet, 11 $\frac{1}{2}$ inches long, are large and clumsy. All the toes clubbed and the nails marked with longitudinal ridges. If a measure be carried over the heel and across the dorsum of feet, the measurement of the right side is 14 inches, of the left 15 inches. If the measure be carried across the plantar and dorsal surface on a level with the metatarsal phalangeal joints, the measurement of the right side is 10 inches, of the left 11 inches. The joints of the toes not markedly affected, but the ends of the bones rather would seem to be thickened. The patient's reflexes, both superficial and deep, are unaffected."

During the patient's stay in the hospital the temperature chart showed variations diurnally of from a little above or below normal in the morning to 100° or 101° at night; but there was no marked exacerbation of fever, and he steadily improved in weight, in his appetite, cough, and general symptoms. The joints were never very painful or tender to the touch. The patient had never suffered from gonorrhoea, syphilis, or other form of venereal affection, or from rheumatism, gout, or dysentery; neither was there any family history of phthisis or rheumatism.

REMARKS.

This case then should in all probability be looked upon as an example of hypertrophic osteo-arthritis confined to the wrists, hands, knees, ankles, and feet. It is, I think, especially interesting in consequence of its appearance in connection with a comparatively limited tuberculous lesion of one lung, from which there was little expectoration, although in the expectoration tubercle bacilli were present. As regards the affection itself, the most noticeable changes were to be seen in the hands. Each finger, especially the middle and ring fingers on each side, was generally enlarged and thickened; the enlargement was not more marked in the terminal phalanx, as appears in some cases of finger changes in chronic suppuration, but was uniform; neither were the outlines of the joints much more prominent than usual; the enlargement was both of the bones and joints as well as of the soft parts about them. Only in the knee-joint could any marked evidence of fluid be obtained. As a rule the tissues about the joints were hard, and did not pit to the slightest degree upon pressure. There was practically no pain and very slight tenderness on hard pressure, yet the affection appeared to be distinctly subacute and not chronic.

As the pathology of this affection has been so recently discussed in the BRITISH MEDICAL JOURNAL, it is unnecessary to attempt any further generalisations, even if such were permissible, from the consideration of a single case. One or two points about the case, however, may be emphasised, namely, (a) that the joint affection appeared to be secondary to other changes in the neighbourhood; (b) that its amount varied considerably from time to time, and as the general condition of the patient improved, so did also the condition of the joints. On the diminution of the swelling the more permanent thickening of the fingers, etc., could be more easily gauged; (c) that the affection was comparatively painless, and that there was an absence of tenderness, differing in these respects so much from an ordinary gouty or rheumatic affection of the same parts.

THE Local Government Board have written to the Lewisham Board of Works stating that the Department cannot undertake to arrange for the analyses of samples of water sent to them by the metropolitan local authorities.

A CASE OF DERMATITIS FROM ROENTGEN RAYS.

[WITH CHROMOLITHOGRAPH.]

By H. RADCLIFFE CROCKER, M.D., F.R.C.P.,
Physician for Diseases of the Skin to University College Hospital.

A LARGE proportion of scientific discoveries which benefit the human race on the whole, bring in their train a certain amount of evil also by producing directly or indirectly some special injury or disease. The *x* rays of Roentgen appear to be no exception to this rule—at all events, as far as skin structures are concerned—and several cases have already been reported. The following instance is very definite and severe, and as the consequence of a single exposure its course can be readily traced:

E. H., aged 16, apprentice to a surgical instrument maker, sought advice at University College Hospital on October 24th under the following circumstances: On October 13th his employer was trying to radiograph the spine, and the following experiment was made on the boy: A Crookes's tube was placed about 5 inches from the epigastrium, a flannelette shirt intervening between the tube and the skin, while the trousers were turned down on each side. An exposure of one hour was made, the coil being run by means of an accumulator. Nothing was noticed at the time, but the next day the skin felt irritable and was of a deep red colour in the area subjected to the rays from the tube. The irritability increased, and on the 19th—six days after the experiment—the skin felt stiff when he bent his body. On the 22nd vesicles began to form, and they increased in size and number until the 24th.

When I saw him there was then situated at the epigastrium a patch the size of a hand, very sharply defined, and raised about $\frac{1}{2}$ inch above the surface at the lower border corresponding to where the trousers were turned down, the transition from healthy to diseased skin being quite abrupt, and perceptible to the touch. The upper border was much less defined, and had a bright red areola beyond it; this areola was not uniform, but in radiating streaks. The general surface was of a dusky or purplish red, with flat vesicles extending to within $\frac{1}{2}$ or $\frac{3}{4}$ of an inch of the red margin, and forming an irregular band $\frac{3}{4}$ inch wide round the umbilicus, with nearly clear areas on each side of the median line. These vesicles had increased considerably in number and size since their first appearance on the 22nd, and in the upper portion of the oval had coalesced into irregular compound vesicles in many places. The affected area felt sore, but not very tender, and there was only moderate itching. A lactate of lead lotion was ordered to be applied on lint and covered with oiled silk. The vesicles began to rupture on the afternoon of the 24th, and by the 27th the epidermis of the vesicular portion had separated, leaving a raw surface, and on the erythematous portion the skin was loosened and opaque white, partially due, no doubt, to the lead lotion.

On October 31st the whole of the epidermis had separated, and the skin was quite sound and level with the surrounding skin, except where the vesiculation had been most pronounced, which was still excoriated. The downy hairs with which the abdomen was rather thickly covered were still present on the site of the affected area. Subsequently many of them came away, except in the median line, where their presence was noted on November 10th. The excoriated part healed very slowly, and was not quite sound on December 19th, there being still a painful ulcer the size of a sixpence, with raised edge.

The persistence of the hairs on the inflamed portion of the skin is interesting in connection with the depilatory action of the *x* rays recorded by Professor Daniel, of Vanderbilt University, and quoted in the *New York Medical Record* for April 25th, 1896. In this instance the experiment was made on a co-worker, Dr. Dudley. The tube was only half an inch distant from the hair, and the exposure was also, like my case, for one hour. Twenty-one days later a bald spot, 2 inches in diameter, was formed corresponding with the size of the *x* ray field close to the tube. In this case there seems to have been no inflammatory or other visible lesion or sensory symptom preceding the falling out of the hair, thus differing from my case and that of a demonstrator of the *x* rays who records the effects on his hands in *Nature*,

October 29th, 1896. In this instance, where there was repeated and prolonged exposure of the right hand to the rays, a vesicating dermatitis was excited, attended with great irritation and smarting, which was allayed by an ointment, but was followed by exfoliation of the epidermis where the inflammation had been present. In the third attack the ends of the fingers were affected with serous exudation, which led not only to the exfoliation of the epidermis, but also of the nails, the old nail turning black and hard. This sufferer compared the effects of the rays to acute sunburn, which accords with the views put forward by Dr. Bowles as to the nature of these rays. The free application of lanolin and wearing grease-soaked kid gloves was found by "S. I. R." to be to a great extent a protection from the irritating effects of the rays. It is noteworthy that in my case there were no visceral symptoms of any kind.

Other instances in which lesions of the skin have been produced under similar circumstances are multiplying rapidly. In the *EPITOME* to the *BRITISH MEDICAL JOURNAL*, August 15th, 1896, a case of dermatitis and alopecia is abstracted from *Deut. med. Woch.*, July 23rd, 1896. Marcuse relates that in a young man, aged 17, investigations were carried on for four weeks once or twice a day for five to fifteen minutes, a Hittorf's tube being placed close to the body. When Marcuse first saw him there was a sharply defined patch just above the ear where the hair was very thin, and what remained could be pulled out without pain. There was diffuse redness in one half of the face, with some desquamation and infection of the conjunctiva. On the back there was a space as large as a plate over which the epidermis had separated, and the part was very tender. Recovery soon occurred.

A case closely resembling my own is published in the *BRITISH MEDICAL JOURNAL* for November 7th, 1896, by Dr. H. C. Drury. Here an attempt was made to demonstrate a renal calculus. The first exposure, of an hour's duration, produced nausea; the second lasted an hour and a half, with 10 cells of the battery. A large sore at the epigastrium resulted, the deeper portion of which obstinately resisted all attempts to promote healing, and was associated with profuse discharge for many weeks.

Dr. Edmund E. King, of Toronto, reports in the November number of the *Canadian Practitioner*, a case resembling that quoted from *Nature*, but with some interesting differences. Here, again, the victim was a demonstrator of the Roentgen rays before public audiences, and was exposed to their influence sometimes at first for only two hours a day, without evil effects, but when it was increased to six to ten hours, his right hand, which was most exposed, began to blister, and the nails to separate from their attachment at the proximal end. The application of picric acid not only gave relief to the burning sensation, but appeared to have some protecting influence. After resting, the hand soon recovered, and he resumed his work, his left hand being this time exposed; similar phenomena ensued, and in addition, the left side of the face became swollen and red, and the hair of the head, in front of the ear, fell off, together with the greater portion of his eyebrow and the left side of the moustache and left whisker, which was almost bare, leaving the skin very soft and smooth. He thought also that his sight was somewhat impaired.

The consideration of these cases shows, that while the x rays may excite a dermatitis very like severe sunburn, and even ulceration of the skin, which is extremely difficult to heal, and also shedding of hair and nails with or without antecedent inflammation, these ill-effects are only produced when the exposure is very prolonged and the Crookes's tube is placed very close to the skin, or when the exposure is frequently repeated, as in the case of public demonstrators of the phenomena. Dr. Drury's case suggests that possibly the strength of the battery used to run the coil may have some influence. In my case an accumulator was used, so that possibly the current was extremely strong. No ill-effects from the exposures usually required for an ordinary radiograph need be feared. The fact that in the Canadian case picric acid seemed to be protective to some extent, suggests that perhaps it was due to the yellow colour of the acid, and that Dr. Bowles's suggestion of protecting the face against the sunburn of snow mountains by coating it with black—or, better, red pigments might possibly be prophylactic against the x

rays also, and workers with these rays might wear red cloth gloves, or coat their hands and face with red paint which could be easily washed off.

A CASE OF SNAKE BITE TREATED WITH ANTIVENOMOUS SERUM.

BY

PROFESSOR H. P. KEATINGE and PROFESSOR M. A. RUFFER.

(From notes by Dr. KHAYYAT, Pathological Laboratory, School of Medicine, Cairo, Egypt.)

THE patient is a girl, called Hamida, 13 years of age, but looks much younger. The child, while collecting cotton on October 7th, 1896, at Ghizeh, near Cairo, a place well known to be infested with Egyptian cobras, especially in flood time, was bitten by a snake in the forearm. She stated later on that she did not notice the snake until, on clasping a bough with her right arm to pull it down to her level in order to pick the cotton flower, she suddenly felt the bite. She then saw the snake, which she described as being about 3 feet long and of a yellowish colour. She shouted for assistance, and her fellow workers, including her brother, carried her home. The brother was positive that she became unconscious almost at once, but anyhow the village barber made several small incisions on the whole arm and forearm. She was later on carried by the police to the hospital.

On admission at 7 P.M. she was quite cold and collapsed, with sunken eyes; the pulse could not be felt, and there was slight rambling delirium. She was then in such a precarious state that it appeared doubtful whether it was advisable to carry her up to the wards. The forearm was covered with a filthy rag, and the whole arm was thickly coated with Nile mud (a favourite remedy with natives), but about 3 inches below the bend of the elbow were two distinct holes, penetrating through the skin to the tissues below, evidently corresponding to the fangs of a snake.

At 7.30 Dr. Keatinge and I. R. Ruffer examined the patient, who was then in much the same state as on admission. The pulse still could not be felt, the patellar reflexes were absent, and the moderately-dilated pupils reacted sluggishly to light. The child was practically comatose, lying covered up in bed, and evidently in a very precarious condition. After consultation, Dr. Ruffer injected, with all antiseptic precautions, 20 c.cm. of antivenomous serum under the skin of the abdomen. The child groaned a little when the injection was made, but gave no signs of pain otherwise. She could not be made to take any nourishment nor brandy.

At 11 P.M. the patient's condition was distinctly improved, though still precarious. The pulse was 140, compressible, but the patient was warmer and answered questions; 10 c.cm. of antivenomous serum were again injected on the other side, the patient shouting lustily when the needle was introduced. She then slept quietly during the night, passing urine four times under her.

On October 8th, at 8 A.M., the pulse was 140; she took an egg beaten up in milk and 3 g. of brandy. She was evidently much better, and answered questions intelligently, but was still drowsy. There was no tenderness at the point of injection of serum. She remained in the same state during the day, but took a little nourishment.

On October 9th the pulse was 125, much stronger, but the patient was still drowsy. The same diet was continued.

On October 10th she had slept well and felt comfortable. On examination of the wound a little tenderness and swelling at the point of the bite was found. Lead lotion was applied every four hours, and ordinary diet ordered.

On October 11th the place of the bite was brawny and painful. There was evidently a good deal of tension, and the holes made by the teeth were discharging pus. After consultation with Dr. Milton, Dr. Khayyat made an incision and let out a small quantity of pus.

On October 12th she had slept well, but the pulse still kept up. The bowels were opened well, and she took food very well.

On October 14th the incision was enlarged, as the tempera-