some slight septic contamination of the blood, owing to the operation involving a naturally septic region like the bowel; but there must be some other factors, the nature of which is not obvious. The only other complication was, in one case, septic infection of the abdominal wound, which led to separation of some of the buried silk sutures. The deep part of the wound was not involved, and the bowel healed normally.

Immediately successful results are very gratifying to the surgeon as showing the perfection of his operative technique, but, unless the remote results were good also, there would not be much encouragement to perform operations which are attended by so many grave risks. I have already stated that with the exception of the first patient on the list, who lived in complete comfort for four years and then died suddenly from heart disease, all the patients are alive and in good health at the present time, and they have all put on flesh. All the patients have been examined recently, and no evidences of recurrence can be detected either from the presence of symptoms or by physical examination of the abdomen. In three cases sufficient time has elapsed to give good grounds for hoping that the cure in them will be permanent. One case was operated upon over four years ago, another two and a-half years ago, and the third two years and two months ago. The remaining three cases were operated upon too recently—nine, six, and two months ago—to warrant any prediction regarding ultimate prognosis.

There is but little more for me to say. It is unnecessary for me to describe the parts removed, for the specimens are here, ready for your inspection; and, as they will be preserved in the museum of University College, they will be open to the inspection of any one else who is interested in the subject. I need only state that in five cases the growths were columnar-celled carcinomata, and that in one, Case III, the growth, which was a very large one, was a colloid carcinoma.

RADIUM BROMIDE:

NOTES ON SOME CASES IN WHICH IT HAS BEEN TRIED.

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It seemed highly probable that the radiations from radium bromide, considering their nature and properties, would prove serviceable in the treatment of cases which were benefited by x and ultra-violet rays (Finsen treatment). In the early part of May, 1903, I obtained 5 milligrams of radium bromide in a sealed glass tube.* The exact strength of the radium bromide I use I am unable to state in figures. Mr. Soddy, who has done such excellent work on radium, kindly examined it for me, and it is said to be of the finest quality.

It may be well to preface the notes of cases in which I have used it by stating briefly some of the physical properties of this remarkable substance which concern us. In the solid state it gives off three kinds of rays;

1. *Alpha Rays*.—These are minute material particles propelled at an enormous velocity, and which, if they impinge on a suitable fluorescent screen, cause brilliant scintillations. This was first noticed by Sir William Crookes, who has called the little instrument devised to show the phenomena the "spintroscope." The glass tube in which the radium is enclosed entirely cuts off all these α rays, so that their action in the cases presently to be described was *nil*.

2. *Beta Rays*.—These rays are similar to the cathodal rays inside a Crookes's tube, but have a much higher velocity and consequently have the power of penetrating the glass tube and our tissues to some considerable depth. It seems pretty certain that it is these rays which cause the burning and destructive action on the skin.

3. *Gamma Rays*.—These resemble in some respects x rays of extraordinary penetrating power, somewhat similar to the rays produced by an extremely high Crookes's tube. The glow on a barium platino-cyanide screen can be seen from one of my 5-mg. tubes through half an inch of copper.

The many other extraordinary properties of radium, such as its power of producing heat and its emanations when in

* Sir William Crookes gave me the address of a firm in Germany likely to supply what I wanted, and this address I handed to Mr. Martindale, 10, New Cavendish Street, W., who obtained it for me, and through him I have from time to time obtained further supplies.

solution, etc., have no bearing upon the method employed in the following cases, and so nothing need be said about them here. The action upon a photographic plate is rapid and intense. If the salt be shaken down to one end of the tube, and this then used to write upon a photographic plate enclosed in the usual opaque envelopes for x -ray work, it will be found on development to show the writing extremely black.

CASE I.—Rodent Ulcer.

Mrs. F., aged 69, was sent to me at the x -ray department, Charing Cross Hospital, by my colleague, Dr. Macleod, for x -ray treatment.

There was a typical rodent ulcer on the right side of the nose, the upper border being close to the inner canthus. It was 1 in. in length by $\frac{1}{2}$ in. in breadth, and had resisted both Finsen and x -ray treatment.

I was glad to have this opportunity of trying radium bromide, and, having no data to guide me in its application, it was tried tentatively at first, and the following are extracts from my casebook.

On May 21st, 1903, a tube of 5 mg. of radium bromide was placed on the upper part of the ulcer for fifteen minutes, and again on May 22nd as before, only further down.

The salt was always shaken down to one end of the tube, so that the point of application was definite. The tube was held in position by a strap of rubber plaster put across the upper part of the tube which fixed it to the skin.

On May 26th there was apparently slight reaction. Two tubes now applied for a short time (exact time not recorded). On May 29th the ulcer was apparently greatly improved; its edges were levelling. The tubes were applied for twelve minutes. On June 11th the ulcer was practically healed, but some thickening could be felt at the upper border. Two tubes were applied for eighteen minutes, and on June 26th they were applied for eight minutes over a slightly thickened part.

On July 10th a slight tendency to breaking down was noticed in the centre, and one tube applied (time not stated). Treatment was now stopped.

This patient was carefully examined on December 7th, and there was no trace of recurrence; the skin was quite natural over the part and freely movable, and it was only on very careful inspection that any difference could be detected between the two sides of the nose. Thus for five months there has been no recurrence.

CASE II.—Tuberculosis Verucosa Cutis.

P. V., aged 10. Sent to me by Dr. Macleod. The patch, about the size of a sixpence, was situated on the skin of the palm of the right hand, between thumb and forefinger. It had been under treatment for three years.

June 12th. Two tubes of radium applied for twenty-five minutes.

June 15th. Two tubes for twenty-two minutes.

June 28th. Two tubes for twenty minutes.

July 13th. Two tubes for thirty-five minutes.

July 16th. Greatly improved; two tubes applied for thirty-five minutes.

July 20th. Two tubes for half an hour.

July 22nd. Two tubes applied for twenty minutes. The patient went to the country for six weeks, on return he was nearly well. I sent him to Dr. Macleod, who tells me that there was a small spot, to which he applied a radium tube, and this effected a complete cure.

CASE III.—Rodent Cancer.

Miss S., suffering from rodent cancer of the nose, was sent to me by Mr. Rickman Godlee.

July 22nd, 23rd, 24th, 25th. Two tubes applied for thirty minutes. The tubes were placed on different parts of the ulcer on each occasion. There was no reaction.

July 28th. Greatly improved. Two tubes applied for forty minutes in one position and for twenty minutes in another.

August 5th. A bluish round the border, but thickening all gone. Yellow crusts in centre.

August 20th. Greatly improved. The crust came away. Put single tube in the centre for half an hour.

August 30th. Put single tube in lower border, where there is a slight thickening left.

September 24th. Quite cured, apparently. Placed a single tube at lower part, where there are a few dry scales, for fifteen minutes.

October 15th. Cured.

CASE IV.—Rodent Ulcer or Epithelioma.

Miss H. presented what appears to be an extensive rodent ulcer of right side of the face.

This case was brought to me by Dr. Powell. It seemed hopeless. Three operations had been performed, recurrence following; x rays had been tried with a slight improvement at first, only to be followed by what appeared to be increased destructive activity. The surgeons who saw this case in the early stages state that it is an undoubted case of epithelioma.

The condition when I first saw her was as follows: The whole of the right cheek had been destroyed, the tongue and teeth being laid bare; the upper and lower lips were destroyed to within an inch of the middle line; the patient could not speak. The tongue was foul, and there was a very offensive discharge from the whole surface; the hard palate and part of the soft palate were invaded.

It was agreed that radium should be tried on the lips, where any improvement could be readily noted. If arrest or the process occurred,

then it would be reasonable to hope that we might be able to arrest the progress of the whole.

July 30th. Two tubes were applied to the upper lip for fifty minutes, on July 31st for forty minutes, and on August 1st for forty minutes. In addition I gave her some thorium nitrate enclosed in "oil silk" and guttapercha outside it, to be worn as a pad in the cavity; a piece of lint was interposed between this pad and the parts.

August 3rd. Two tubes applied for forty and forty-five minutes to different parts. Several applications were made subsequently, and on August 20th, having obtained some more tubes, but not of such good quality as the first, these were also used, so that on this date four tubes were applied for an hour and a pad of thorium hydroxide given for the patient to wear. The hydroxide is more powerful than the nitrate, and is not deliquescent.

As Dr. Powell is joining me in publishing this case with more details later on it will suffice at present to state the progress made.

On September 1st three tubes were applied for one hour in the forenoon and two and a-quarter hours in the afternoon.

On September 2nd an erysipelatous blush was observed round the parts. A severe attack of what appeared to be erysipelas ensued; the temperature went up to 105° ; there was sickness, with vomiting, etc.; some of the parts that had skinned over broke down; but, on the whole, when the attack subsided the parts looked better.

Applications began again on September 17th, and these have been continued ever since. Sometimes as many as eleven tubes were applied at the same time.

All went on slowly improving till after a longer exposure than usual, when another attack of what appeared like erysipelas occurred. The temperature did not during this attack go higher than 103.4° , and it subsided more quickly. Serum, blood, and some of the discharge were placed in sterilized tubes for cultivation, and Dr. Bulloch, of the London Hospital, reports that they remained entirely sterile.

There is a steady gain, the discharge is much less and not at all offensive, the tongue clean, and the patient can now speak distinctly, cicatrization going on slowly and steadily. That the disease has been arrested is obvious, and it seems reasonable to look for a complete cure.

When the palates, hard and soft, were treated, the nurse had to hold a narrow strip of thick lead upon which two or three tubes were fastened with a rubber plaster. In this manner the radium tubes could be held up against the diseased parts, while the thick lead screened the normal tongue, etc., from the radiations.

It seems fairly clear that the radium radiations produce profound changes in rodent cancer, and that absorption of the altered products leads to the blush that so often follows the application of radium in this disease; and, if the exposure has been too long, then the blush may be succeeded by a severe inflammation resembling erysipelas. There seems a possibility that the products absorbed may act as anti-toxins. There is no evidence, meantime, that this is so. It is obvious that with a large surface care must be taken not to overexpose the parts to radium, otherwise serious constitutional disturbances may be produced.

CASE V.—*Malignant Degeneration of Mole.*

Miss D., aged 46, had a mole on her left cheek, which took on a malignant character, and excision had been advised. After several applications of a single tube of radium it disappeared, leaving only a slightly pigmented area which is gradually fading.

During the treatment of this case, after a long exposure a relapse appeared to occur, but it turned out to be only the reaction from over exposure, for on stopping the radium the inflammation subsided and a cure effected. It is therefore a matter of consequence to give a correct exposure, and what this should be can only be ascertained by tentative trials in each particular case.

The results in the above cases justify the hope that radium will prove to be a very valuable therapeutic agent. It now remains to find out in what diseases it is potent and what may be the best method of using it. In sealed glass tubes it can be applied readily to any part; can be introduced into cavities, and by means of easily-devised flexible tubes it can be applied to the throat and other regions quite inaccessible to either x rays or Finsen treatment. It is quite painless in its application, and need not prevent the patient from reading, etc., while the treatment is going on.

CARCINOMA.

Radium has been tried in several cases with no good results. In one patient two small nodules had prolonged exposures; ulceration resulted and they shrivelled up, but a thickening remained which showed no tendency to disappear. In this same case a mass on the breast the size of an egg had such long exposures that ulceration and sloughs were produced and yet no appreciable good was done. The conclusion forced upon us is that radium, with the present method of application, is no use whatever in carcinoma.

Thorium gives off emanations and rays the same as radium, but about 1,000,000 times weaker. The hydroxide of thorium

can be obtained in any quantity and at a moderate price. A large quantity can be enclosed in a rubber bag and applied to the part. The duration of this application must depend on the reaction produced. It would be well to try thorium in this way in septic ulcers, and it can be used with advantage in cases in which radium is being also applied at intervals.

A CASE OF RODENT ULCER TREATED WITH RADIUM.

By GERALD SICHEL, F.R.C.S.,

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G. T., aged 65, presented a rodent ulcer of the lower part of right cheek of six months' duration. Four years earlier another had begun higher up on the same cheek, which was operated upon twelve months back.

The active ulcer was treated by applications of 5 mg. of radium bromide, each sitting usually lasting fifteen minutes. There were forty-two sittings in all, spread over a period from October 14th, 1903, to December 31st, 1903. The radium bromide was contained in a small sealed glass tube.

Fig. 1.—October 14th, 1903.

After the first application the patient stated that the pain was easier, and that he slept better. After five sittings there was no bleeding and no pain or tenderness. At first the ulcer had bled readily on touching. After seven sittings the granulations had become pale and smoother.

The ulcer was rather a deep one compared with its extent, and it took a long time to fill up. Eventually a depressed, slightly reddened, indurated circular scar was left, which latterly remained unaffected by treatment. The condition of things at the beginning and the end of treatment are shown in the accompanying photographs.

It is interesting to note that the radium salt was held in a glass tube, which, of course, must stop some of the rays from passing through the glass, which was at first ordinary white glass, has been changed to a violet colour (Experiments in Radio-activity and the Production of Helium from Radium, by Sir William Ramsay and Frederick Soddy, abstracted in the *Journal of the Chemical Society*, November, 1903). In the same journal is the abstract of another paper by William B. Hardy and Miss E. G. Willcock, in which the authors conclude that the physiological action of radium rays is some process of oxidation; also, they found experimentally on a solution of iodoform in chloroform that decomposition is accelerated by certain substances, of which sodium chloride