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.,

Surgeon in Charge of the Actino-Therapeutic Department, Guy's Hospital.

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

is one, so latterly I have been bathing rodent ulcers treated with radium with a strong solution of common salt before the radium is applied. In the present case I do not think this made any difference, but I am not certain it has not been of some help in two other cases now under treatment. The patient used to hold the radium in position himself.

Fig. 2.—January 4th, 1904.

It was by the direction of Sir Cooper Perry, who sent the case to the electrical department from his out-patients, that the radium treatment was adopted.

THE LEISHMAN-DONOVAN BODY AND TROPICAL SPLENOMEGALY.

BY

SIR PATRICK MANSON, and GEORGE C. LOW,
K.C.M.G., M.D., F.R.S., M.B., C.M.,
London School of Tropical Medicine.

THE great majority of the cases of splenic enlargement which every year return to Europe from India, Africa, and other tropical countries are undoubtedly of malarial origin. Their histories, their liability to intercurrent acute malarial phenomena, the presence in the blood during these acute attacks of the malarial parasite, and their response to quinine prove this. But over and above these malarial cases and those of leucocythaemia, cirrhosis of the liver and other well-recognized pathological conditions associated with enlargement of the spleen, there is a considerable residuum of cases of tropical disease in which enlargement of the spleen is a prominent feature, and which hitherto have not been adequately recognized or explained.

Clinically, the cases we refer to seem to fall into two categories—the subacute and the chronic. In the more acute forms there is a history at first of a malaria-like condition with recurring attacks of high fever, which, after some months, and in spite of liberal dosing with quinine, leads to the development of a very definite cachexia. This cachexia is characterized by quotidian fever—afternoon chill followed by high temperature and profuse sweating, and terminating by the following morning in a subnormal temperature—and anaemia. Although in some instances there may be intervals of apyrexia of several weeks' duration, in others there is little variation in the quotidian recurrence of fever, which is absolutely uninfluenced by quinine. In time the spleen enlarges, the anaemia becoming intense. According to our experience the patients die in a few months. The fatal

event is brought about sometimes by pure asthenia, sometimes by cerebral thrombosis, sometimes by diarrhoea, sometimes by other intercurrent disease.

The second type of febrile splenic enlargement to which we refer resembles the foregoing, only the fever is much milder, rarely exceeding 101° F., the splenic tumour and the anaemia being less pronounced. There is, however, always a malaria-like initial stage; and, just as in the other type, this and the subsequent course of the disease are unaffected by quinine. What the ultimate fate of these more chronic cases may be we cannot say, but it seems probable that they drift along as valetudinarians until they are ultimately cut off by some other affection, to which their persistently enfeebled state renders them specially liable.

In both types of the disease the tongue is clean, the appetite good, and, but for weakness, the patient feels fairly well. Occasionally, as might be expected in persons coming from malarial localities, attacks of genuine malarial fever may be interpolated. In this event there may be considerable gastric derangement, and quinine may be of temporary service.

In certain instances the skin becomes deeply and fairly uniformly pigmented. Owing to this latter circumstance, and because most of the cases which have passed under our observation have come from Assam and the Indian Terai, we have arrived at the conclusion that the disease is none other than what is known by the natives in Assam and India as kala-azar or kala-dunkh.¹ We have seen an exactly similar condition in a patient from South Africa, but whether his case and the Indian disease are identical we are not prepared to say.

On the discovery of the trypanosoma as a factor in human pathology it occurred to us that possibly in this or a similar organism the obscure cases we have attempted to outline might receive their explanation. Accordingly in two instances of non-malarial febrile splenomegaly—one from India, one from Africa—we made careful examination of the peripheral and splenic blood, but without finding any parasite. It may be that in the Indian case our failure was attributable to the fact that the puncture in the spleen was made into sloughy and gangrenous tissue.* Notwithstanding these failures, and encouraged by Leishman's and Donovan's discovery of what appears to be a new protozoal organism in cases of the type we have described, when some time ago such a patient from the Darjeeling district consulted one of us, we persuaded him to enter the tropical wards of the Seamen's Hospital and submit to splenic puncture. This little operation was performed on two occasions—December 18th and 28th, 1903. The first tapping was followed by a slight rise of temperature, which quickly subsided to normal; the second tapping was also followed by fever and some perisplenitis.

At the first tapping we got very little blood, barely enough to fill the needle of the exploring syringe; at the second tapping quite a drachm of blood was obtained. In both specimens, on submitting them to microscopical examination, we found Leishman-Donovan bodies in great profusion. They were especially numerous in the first specimen, many fields of the microscope showing dozens of them.

Although Leishman and Donovan, and latterly, working with Donovan slides, Laveran and Ross, have described them, our observations on these bodies may be of some interest and value, inasmuch as they confirm and perhaps supplement the descriptions of the earlier observers, but more especially as they completely disprove Laveran's contention that the parasites are parasites of the red blood corpuscles, and a species of piroplasma. We may at once state that although parasites were frequently encountered superposed on or underlying a red corpuscle, we have not once seen anything that would lead us to believe that they were inside the corpuscle.

Our examinations were made in ordinary wet blood preparations, in hanging-drop preparations, and in dried and stained films. The stains employed were the Leishman-Romanowsky carbol-fuchsin and carbol-thionin; fuchsin was a failure. The Romanowsky stain gave by far the best results.

In the stained films we recognized the following:

1. Oat-shaped, oval, and circular bodies, clearly defined in outline, stained a faint blue, and having a rather large and deeply-stained usually spherical nucleus lying against the capsule about the middle of the parasite, and a still more deeply-stained, short, bacillus-like body on the opposite side

* This case died. Smears of blood from bone marrow and spleen showed many Leishman-Donovan bodies.