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Some Cases Treated by the *X*-Ray.

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BY

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NEW YORK.

PROFESSOR OF ELECTROTHERAPEUTICS AND OF DISEASES OF THE MIND AND NERVOUS SYSTEM IN THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL.

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WHATEVER early expectations may have been, later experience has shown that the treatment of cancer by the *x*-ray is, in many instances, a long and difficult one. True, cases of the rodent ulcer type get well most rapidly; again instances of sarcoma and of recent recurrent nodules or of infiltrations in the scars of operations, disappear in a few weeks, and also certain primary carcinomatous tumors of the breast disappear in a reasonable time. But the process of ascertaining the true limitations of the *x*-ray in cancer, in general, is a slow one. And to add to the difficulties of the problem there are those whose opinions are entitled to great confidence who claim that the high-frequency, high-potential electricity associated with a certain class of *x*-ray administrations, exercises, if not the whole, at least the preponderating influence toward the cure, when this is effected,

To arrive at an impartial view of what may be expected of the *x*-ray treatment, it would be essential to report all cases, both favorable and unfavorable, and this, so far as my own experience extends, I intend to do at an early date, but at the present moment I present a few cases in which the *x*-ray has relieved, or caused the evidences of disease to disappear and thus apparently cured. But although a doubt as to whether the *x*-ray itself or whether the high-potential, high-frequency current accomplishes the result may be said to be arising, still the fact itself is well established that cancerous disease, when not caused to disappear

altogether, exhibits, at least for a longer or shorter time, a retrogression under *x*-ray treatment. There are, however, exceptions even to this statement, for I have watched an advanced and inoperable carcinoma of the neck, and in another instance equally advanced and inoperable carcinomatous glands of the axilla steadily growing in size in spite of and in the face of most faithful treatment. And, again, in a case of extensive ulceration of recurrent and inoperable carcinoma I have observed recurrent cancer areas steadily disappear, while at the same time the case went on to a fatal termination, due to the existence of cachexia and of secondary septic infection. Or, again, I have caused local cancer to disappear and yet known death to ensue from distant and unexpected metastases. If then we would still claim that the *x*-ray is as nearly a cure for cancer as any other method of procedure yet found, we must also, at the same time, admit that from a comprehensive point of view it is certain that it is meeting with cases of certain stages and types which it cannot under present management and conditions overcome.

While all admit that the more superficial the growth, the greater are the chances of cure, be the case one of epithelioma, of primary or recurrent carcinoma or of sarcoma, my own experience furthermore leads me to believe that the newer the new growth is, the more certainly will the *x*-ray act favorably upon it. But as a modification to this view I would suggest that the more preponderant the "scirrhus" or fibrous character the slower is the action of the *x*-ray.

When an open ulcer with much secondary septic infection exists, the case is almost sure to progress unfavorably.

There is also reason to believe that the connective tissue stroma in some cases of scirrhus is caused to grow, while at the same time the cancer cells degenerate and decrease. Much time, therefore, will yet be required before we may differentiate what cases of cancer may be successfully combated by the *x*-ray, and until we can decide what the limitations as to treatment are. In the

meantime, looking the field over—taking conservatively into account both successes and failures in my own as in the reported result of others—I think there is ground for the belief that in the *x*-ray we possess a relief or cure for cancer, especially in its early stages, which in its ultimate results compares favorably with operative treatment. It would seem to me that a case of primary carcinoma of the breast may as hopefully, and with as little ultimate danger to the patient, be submitted to the *x*-ray as to any other procedure. I believe that properly selected cases of primary mammary carcinoma or other cancer may be submitted to the *x*-ray before resorting to an operation with a certainty that no valuable time will be lost. For if the *x*-ray does not succeed in effecting a cure, the patient is at least in a better condition for operation than before, for the reason that the outlying areas of infection are cleared up and the actual remaining disease is more accurately localized to a given and known position.

It is now pretty generally accepted that the *x*-ray should be employed after an operation in order to prevent a recurrence. It may reasonably be asked if the *x*-ray is effective to prevent a recurrence or to cause a recurrence to disappear, why is it not equally effective in the first instance and before an operation. I trust that some of the cases I here report may help substantiate this view.

I am fully aware of what it means to advise a patient with a primary carcinoma of the breast or elsewhere to delay operation. Could the operation positively preclude a recurrence or, again, could the *x*-ray present a certainty of cure, there could, of course, be no hesitation as to the advice to give. With wider experience before us, as to the capabilities of the *x*-ray the time of doubt should soon be over, and at the present moment there exists no other course than frankly to lay before the patient or the patient's family "the present state of the art" of *x*-ray therapy and of surgery, and if the *x*-ray course is chosen, to follow it only so long as the patient makes decided progress toward recovery. If no progress is made, an operation,

if one were ever possible, may still be done and the *x*-ray continued later on. At this point some one will remark, "but "valuable time will be lost." This I do not believe. For in breast cases I have observed that infected, indurated, swollen, and sensitive lymphatic vessels and lymph glands have become, to all intents and purposes, normal, even though, in several instances, I have thought it wise to have a rebellious (to the *x*-ray) scirrhous lump removed finally by the knife.

I may say here in general that one class of cases which all have found to be the most resistant to *x*-ray treatment and altogether incurable by its aid is precisely that class of cases which have advanced to a stage where no surgical operation is possible. On the other hand the *x*-ray has already cured some of these inoperable cases.

One fact at least stands forth most clearly, and that is that cancerous disease in its incipiency, when not too deeply located, is decisively arrested in its growth and caused to disappear.

CASE I.—Carcinoma of the left orbital region; inoperable. George Van A., aged sixty -three years, Jamesburg, N. Y. June 24, 1902. (See Figs. 1 and 2.) The disease began about fifteen years ago as an apparent mole on the cheek, below the lower canthus of the left eye. During ten years this mole-like growth laid fairly dormant, and then broke down into an ulcer with the formation of scabs. The ulcer increased in size until two years ago it was about one-half an inch in diameter and quite deep. It was now treated by a cancer paste, and apparently healed in about a month. But soon hard nodules formed around the edges and quickly broke down into an excavation larger than ever before, and discharged much pus. The bone of the orbit now became involved. In November, 1902, the paste was again applied, but the disease still continued to spread angrily in every direction.

He then took the Alexander treatment of about thirty-seven injections, but with no benefit; on the contrary, the disease has spread rapidly until it presents the appearance shown in the accompanying illustration. (Fig. 1.)

Present appearance: Both the upper and lower eyelids are more than half destroyed, both presenting at the junction of the diseased with the normal tissue a raised and indurated edge. The orbital socket presents a deep excavation; the raised and indurated edges of the ulcer extend outwardly beyond the orbital ridge, forming altogether an ulcer about one and one-half inches in diameter. Beyond the ulcer, extending on to the temple outwardly, is a mass of hard nodulated tissue about two inches in area, and feeling as if it were bone. The ulcer has an angry appearance, and discharges pus freely.

Since the patient had already lost the sight of the right eye by an accident, he was extremely anxious about a possible injury to the sight of the sound eye, and his anxiety led to a mild and discreet use of the *x*-ray.

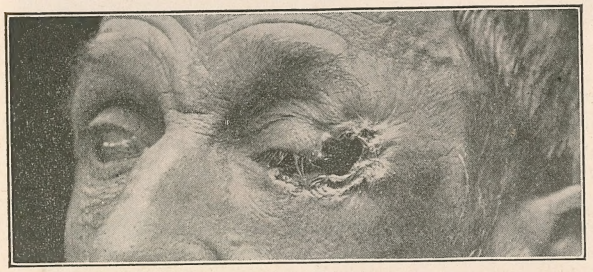

FIG. 1, CASE 1.—Epithelioma.

Treatments were begun June 4, and continued three times weekly until August 22; time of exposure, fifteen minutes; distance of ulcer from target, nine inches; medium strength *x*-ray from a hard tube, showing plainly in the fluoroscope double bones at the wrist at a distance of two feet; a lead mask as usual; fifteen inch Ruhmkorff coil, mercury jet interrupter. In twenty days the nodules were visibly diminished in size and the ulcer was evidently almost healed (Fig. 2), and treatment might have stopped at this time except for the anxiety of the patient to make sure of a cure. In all, thirty-two treatments were given, extending over a period of eighty days.

It is interesting to note that this ulceration has not, apparently, healed by the usual process of cicatrization, for there exists not the slightest trace

of contraction. The upper eyelid presents now a normal appearance, and the lower is new skin, but not scar tissue.

On January 31 the patient returned for precautionary treatment of a small point about the size of the head of a pin, and a photograph taken

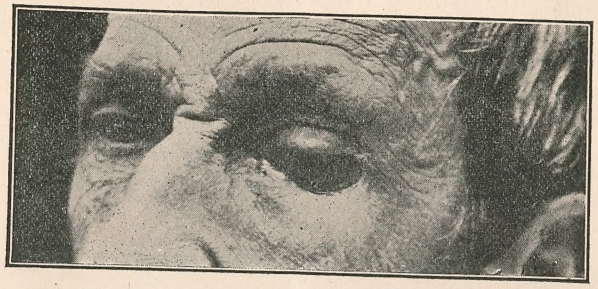

FIG. 2, CASE 1.—Epithelioma.

to-day would present even a better appearance than the one here reproduced.

CASE II.—July 2, 1902. Wm. L., aged fifty-two years, Astoria, L. I. Cutaneous carcinoma on both cheeks. Patient referred by Dr. Walter Eyre Lambert. Disease began one and one-half years ago as a small pimple on the right cheek just below the eye. Scabs formed and dropped off frequently. Soon an ulcer formed about one inch in diameter.

Treatment began July 2 and continued three times weekly up to thirteen treatments. About the eighth treatment, the ulcer showed signs of healing; it grew smaller and smaller, and ceased to form scabs and was perfectly healed in five weeks.

About one year ago a similar growth appeared on the left cheek one-half inch below the left eye. The growth was at first a round and hard lump the size of a pea. Six treatments, three times weekly, caused the ulcer to heal entirely.

Patient again examined October 17, and the skin appears to be sound. There is no sign of cicatricial tissue and no scar, nor can the site of the ulcers be found by examination.

CASE III.—October 10, 1903. M. W., aged eighty years. Epithelioma of nose. (See Figs. 3

and 4.) Existent since two years. Treated constantly by experts and no progress toward cure made. The ulcer is a deep hole with irregular, indurated, and rounded edges surrounded by a reddish areola. A scab forms continuously over the ulcer. The entire bridge of the nose is involved and a perforation of the bone and an opening into the inside of the nose has occurred.

The swelling, redness, and scab disappeared after twelve treatments, say at the end of six weeks. At the end of three months (with altogether twenty-four treatments) the epithelioma appears to be completely cured.

A perforation of small caliber from the outside to the inside of the nose remains as a result of tissue already destroyed by the cancer. The imperfections of the photograph of Figure 3 are largely due to senile tremor.

CASE IV.—April 25, 1902. B. H., aged sixty-two years. Epithelioma of lower lip. Referred by Dr. Am Ende.

Disease began fourteen years ago on the under lip as a hard, defined area. At the time of beginning treatment, the lip presented a most grievous

FIG 3, CASE 3.—Epithelioma.

and "ugly" appearance. The disease had invaded the entire length of the lower lip, precluding any reasonable operation by the knife. Roughly speaking, the lip looked to be very much swollen and projected forward. It was of a dark purplish color and intensely hard to the touch. Inside the

lip and involving the mucous membrane there existed a firm and indurated horizontal ridge, painful to examination and constituting an inside border to the cancer. Patient suffered much pain.

Treatment: *X*-ray, shield for upper lip and face.

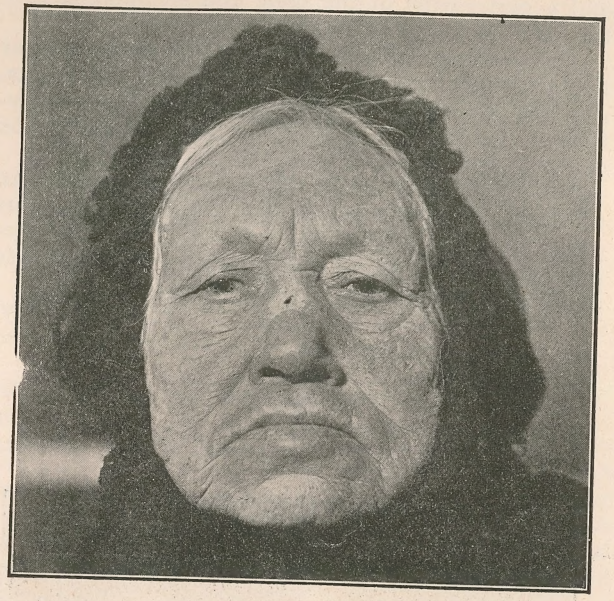

FIG. 4, CASE 3.—Epithelioma.

May 2: Complete relief from pain for twelve hours.

May 7: Scab from central and hardest portion of tumor fell off.

May 26: Now no pain at all. Hair of beard where exposed to *x*-ray has fallen out.

June 13: Cancer entirely disappeared—no symptoms and no indications of disease can be discovered.

Duration of treatments about seven weeks and about twenty-one treatments.

It should be stated in connection with this case that Dr. Am Ende during the *x*-ray treatment maintained for his patient a dosage of thyroid extract manufactured especially by himself, in order to be sure of its quality, and full weight in

securing the excellent result should be given to the medicinal remedy. Up to the time of treatment by the *x*-ray, however, the thyroid by itself had produced no effect, although its use had been for a long time continued.

CASE V.—October 6, 1902. Mrs. G., aged thirty-seven years. Epithelioma of lower eyelid. (See Figs. 5 and 6.)

Twelve years ago injured the lower eyelid; four years ago the injured spot began to itch and a scab appeared, forming altogether a small ulcer with an indurated base and elevated and rounded margins. The tumor has been cut out once, once scraped out and various ointments and nitrate of silver have been used, but it refuses to heal and is now enlarging.

Patient reports that specimens examined by Dr. I. Danforth of Chicago and by Dr. Ard of Plainfield, N. J., have been pronounced to be epithelioma.

December 27: In about eighty days, or with about thirty-three treatments, the ulcer appears to be cured. (See cut.) Incidental to the disappearance of the ulcer is the appearance of a notch in the lower lid showing where previous operations

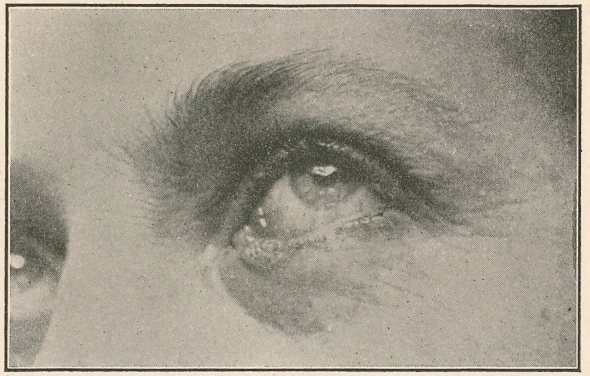

FIG. 5, CASE 5.—Epithelioma.

had taken place. The new growth had previously filled up this notch.

In this case I frequently employed adrenalin 1-1,000 sol., one drop, to produce a primary ischæmia of the ulcer before *x*-radiation. As is well known, the blood offers, by reason of its density, some

obstruction to the penetration of the *x*-rays, and it is quite possible, by securing an artificial pallor, to increase the effect of the treatment. I pursue the same plan frequently with other cases.

The patient now went to Europe with the under-

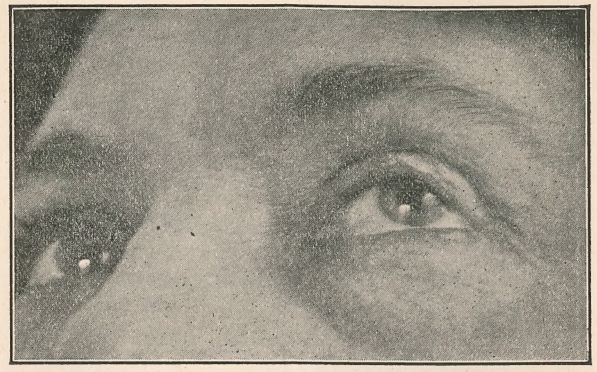

Fig. 6, Case 5.—Epithelioma.

standing that she report progress on her return this spring.

Bearing in mind the case reported by Dr. Wilbur B. Marple of this city, of favorable effects due to adrenalin alone in such a case, I had thought of advising her to use this remedy while abroad, but a week's preliminary trial satisfied me that the secondary reaction more than counteracted any advantage gained from the primary pallor. I therefore am satisfied to use adrenalin merely as a mechanical producer of pallor preliminary to *x*-ray treatment and not for an otherwise curative purpose.

Case VI.—April 4, 1902. H. W., aged forty-four years. Epithelioma of face, on cheek below the eye. First noticed a small red speck like a "broken vein" about fifteen years ago. About five years ago this spot became sore and increased in size and began to form scabs which from time to time fell off. The ulcer now measured about one inch in diameter, while the disease also extends beneath the adjacent apparently sound skin. Patient has tried caustics and various measures of treatment with no avail and is much discouraged.

Treatment: *X*-ray with shield.

May 23: Ulcer began to heal at once but slowly. Measurement to-day, one-half by one-half inch in diameter.

June 24: A very thin, delicate, new skin entirely covers the ulcer. This skin looks as if it might break down at any moment and causes doubt as to the results for a while yet. Referred to Dr. L. Duncan Bulkley, who writes, "There seems to be no doubt about there having been an epithelioma, but now there are almost no elements for a diagnosis. The *x*-rays have certainly done excellent work."

The case had been really cured in seven weeks with twenty-one treatments. In July, however, a very small persistent hard spot, perhaps double the size of a pin head, caused him anxiety and I gave a number more of treatments and the patient returned to Canada.

On October 17 he writes that the cure seems to be permanent, and this is corroborated on February 1, 1903.

Dermatitis was freqeuntly established. The healing is not like cicatricial tissue, but is true skin, which is indistinguishable from the adjoining skin.

Case VII.—Miss S., epithelioma of the face, has been quite fully reported in the issue of this journal of March 8, 1902, as Case VII. It is presented here, together with an illustration, Fig. 8, as an offset to

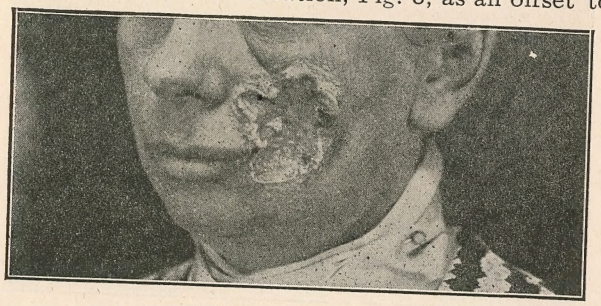

Fig. 8.—Epithelioma of face not cured by *x*-ray.

any too favorable impression created by anything in this paper in regard to cancer of the face. The patient made, as reported, steady progress for a few months; the edges inverted, the indurations softened, the ulcer steadily decreased in size and a

peninsula of healthy skin projected some distance toward the center of the ulcer. Then there steadily and slowly developed an extensive spread of the disease which no effort on my part with the *x*-ray or the violet ray could stem, and I was obliged to admit defeat. I saw but one hope remaining for her, and sent her, also with the advice and consent of Dr. Clement Cleveland, who had originally sent her to me, to Dr. A. R. Robinson, for an attempt to curtail and cure the ravaging ulcer by means of

FIG. 9.—Sychosis.

caustics. I understand that the unfortunate patient is now making favorable progress under the caustic treatment. I have no explanation to offer of this failure, except that others like myself have found this type of deep-seated epitheliomata with everted edges and "pearly nests" to be difficult if

not impossible to cure with the *x*-ray. In all fairness it may be stated that doubts of the disease being an epithelioma were expressed by good authorities, but Dr. Robinson, on the other hand, whose opinion carries great weight, believes it to be unmistakably a true epithelioma.

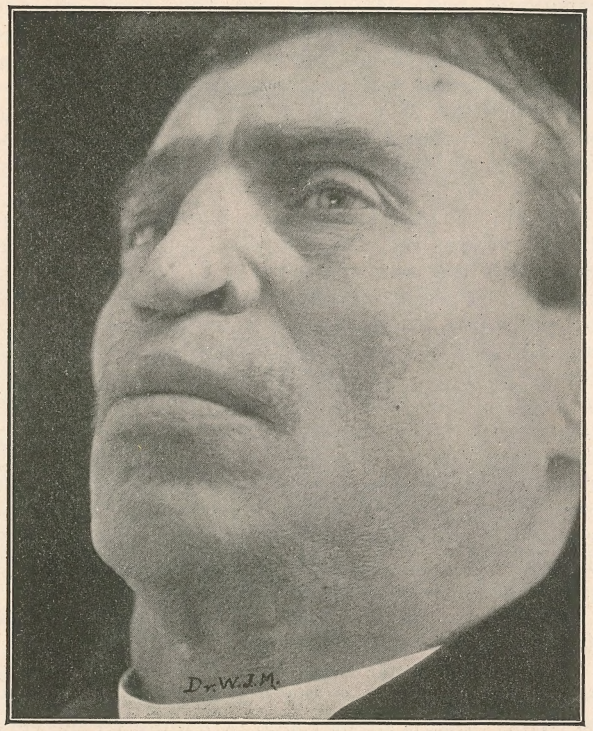

FIG. 10.—Sychosis.

CASE VIII.—Carbuncle. April 13, 1902. The patient was brought to me by Dr. J. M. Liebermann, who has kindly furnished me with the data relating to the onset and final outcome of the case.

Thomas P. D., lawyer by profession, forty-four years of age, appearance of good health. Had a carbuncle a year ago. Had to stay in bed for two weeks in succession, suffering intense pain awaiting the softening of the tissues; duration of attack alto-

gether between six and eight weeks. Two ugly scars now on the back of the neck attest the severity of the case. The patient was first seen by Dr. Liebermann on the 11th day of April; he had been suffering intense pain then for three of four days, with high temperature; a new and large carbuncle had developed on the back of the neck. The pain extended down the neck to the left scapula and induration extended to the occipital protuberance as well as downward over a large area.

Application of *x*-rays, a "high tube," powerful *x*-ray, six inches distance, hole generously large cut in a sheet of lead for a shield, duration eight minutes.

Within two minutes the immediate carbuncle area turned violent red, then purplish red and dusky in hue; this hue was maintained to the end of the treatment of eight minutes, when, upon examination by palpation, it was found that what had a few minutes before been a hard, stony tumor had now broken down into a softened mass three-quarters of an inch in diameter, leaving still, however, a crater-like ring of moderate induration round it; the *x*-ray had self-evidently forced a resolution in this brief space of time. At the same time the patient was completely relieved of pain and could with the greatest freedom turn his head from side to side. This in marked contrast to the fixedness of the pose of his head when beginning treatment.

Second treatment, April 14, with precisely the above effects over a wider area.

Third treatment, April 16. This treatment was really unnecessary, for the carbuncle was evidently so "ripe" that a slight touch of a knife to the very thin layer of skin over it would have permitted of an escape of its contents.

On the night of April 16 the carbuncle burst spontaneously, and on the next day in cleansing the wound no pus, except a mass of cheesy matter, was removed, and by slightly pressing on the border of the wound, the root of the carbuncle was removed in the shape of tenacious tape-like matter of two and one-half inches in length and about one-eighth inch in width.

Neither during the closing of the wound, nor at any

time during the attendance, was pain experienced by the patient.

Full recovery of the wound occurred on April 22, when the patient was discharged, making altogether eleven days for treatment of this most ugly carbuncle.

Patient during all the time was able to attend to his usual occupation in court and in office without inconvenience.

CASE IX.—Cheloid. March 7, 1902. Patient, a young lady, Miss E., aged twenty-one years, referred to me by Dr. Robert T. Morris, had unsightly cheloid on the neck. On a trip up the Nile she had contracted variola; three pustules had formed and in one of these the cheloid grew. Dr. Morris removed the cheloid by the knife, but it

FIG. 11. CASE 16.—Lupus vulgaris.

promptly returned; he removed it again, and again it returned, larger and more vigorous than ever before. Under these circumstances a third operation was deemed inadvisable. It now measured two inches in length by three-quarters of an inch in breadth and one-third of an inch in height. It was bright red, of cartilaginous consistency and permeated by a rich and fine network of capillaries.

Treatment: *X*-ray, high tube, powerful *x*-ray, nine inches distance, shield, three times weekly. The shield left exposed an area of sound skin one-one-quarter of an inch around the growth, in order to be sure of including the entire edge of tumor within the influence of the radiation.

At the third treatment the tumor looked and felt "flabby" and was soft. Soon extensive dermatitis was established on the ring of exposed sound skin, but in the cheloid tissue itself the dermatitis was much more severe and the mass discharged serum and pus.

By May 22 (twenty-seven treatments) the inflammation seemed to be too great safely to proceed further and treatments were suspended.

June 7: Patient returns. Cheloid has greatly reduced. It measures about one inch by one-quarter of an inch, is flattened to the level of the sound skin, and offers little sensation of thickness to the touch. Patient now left the city for the summer under promise to report in the fall.

October 20: A small ridge of cheloid tissue remains at one end of the original tumor, but otherwise the cheloid has entirely disappeared.

To this spot three treatments were given, making a total of thirty treatments.

November 11: Nothing whatever now remains of the cheloid. The skin is soft and smooth.

Across the former site of the cheloid runs the thin linear cicatrix of the last operation. On either side of it a still somewhat pigmented area represents the space occupied by the cheloid. No cicatrix or scar tissue has resulted from the *x*-ray treatment.

Practically the actual time occupied in treatment was from March 7 to May 22.

Case X.—Cheloid. October 1, 1902. Mr. McF., cheloid on neck. Began about four years ago at the site of a linear scar on the neck. It now measures three inches in length by one-half an inch wide and is elevated quite one-half an inch. Ingrowing hairs of the beard within the mass cause him much annoyance.

Treatment: *X*-ray.

November 11: Cheloid growth highly inflamed and appears like a raw sore exuding serum and pus. It is flattening out and diminishing in size rapidly.

December 16: Still an open granulating surface. The amount of serous and purulent discharge is great. To palpation no cheloid thickening can be felt except a small spot at one end, apparently not so fully exposed to the *x*-ray as the rest of the tumor.

January 27: Open sore entirely healed over. Site of tumor flat and on level with sound skin. As the cheloid tissue finally retreated the patient removed from time to time three hairs about one and one-half inches in length which had been left freely exposed. The original linear cicatrix not before discernible has also come plainly to view, and, as in the prevous case here reported, on either side of it remains a pigmented area of sound and normal skin. And, as in that case, so in this, the result has not been the formation of a cicatrix but simply a retreat of a diseased condition leaving behind it a normal skin. Cheloid completely cured.

Case XI.—Acne, April 3, 1902: Miss E. B., aged twenty-one years. Acne of face, chest, and shoulders. Disease began at the age of thirteen, first as red spots upon the nose, and has since spread over the entire face and on to the neck, chest, and shoulders.

The patient experiences what she terms "bites." There is first a stinging sensation, then a small white patch, which quickly swells to a reddish or purplish lump, at the top of which a small drop of serum appears. The lump subsides in about an hour. The face is scarred and "lumpy," thick with comedones and of a dull, dusky-red. dirty color, constituting a muddy and raw complexion very disagreeable to look at. The nose is thickened and, of coarse, contour from the disease.

Dr. G. H. Fox kindly confirmed the diagnosis.

Treatment: *X*-ray to face, suspending a lead disc three-quarters of an inch in diameter by adhesive plaster before each eyeball to defend the retina. Also shield for hair of head.

May 1: A continued dermatitis of a bright red has now been maintained for two weeks. There is a remarkable cleaning up of the acne, and the face complexion is becoming decidedly fine and velvety.

June 3: Now and then a "bite" coming to a pustule, Skin of face, even to that of the ears, cleared up. The, nose, which used to feel "thick and podgy," has resumed its normal shape.

At the same time the patient's general health has much improved. Her headaches have disappeared, also a general feeling of sleepiness. A distressed feeling of the stomach with frequent nausea and retching has ceased, and she can eat any sort of food without subsequent discomfort.

June 7: Some hair falling out at top of forehead. Face shows severe *x*-ray burn and is scaly, dry, and purple red.

June 21: Last treatment on June 11. Came for treatment June 14, but the face was too purple, red, and swollen to risk another application. Applied "cold cream." Face intensely red, but in three days the swelling subsided. During this week serum has flowed freely from the surface of the skin of the face and from the swollen lips. The skin burned and itched until the watery flow was established, then it felt comfortable. The eyebrows have fallen out and the lower lashes; the upper lashes still hold on fairly. The skin of the face has entirely peeled off, and a new skin is appearing clean and delicate and pure as that of a healthy baby. The nose likewise is fine in contour and entirely clear of disease and has a delicate new skin.

June 25: Remains of dermatitis are now simply a rosy color and the skin is of a fine healthy and beautiful texture, with, of course, no sign of the former acne. The neck and shoulders shared in the transformation.

Patient cured.

Duration of treatment about two months; total number of treatments 26.

Subsequent Note.—October 8: Patient called to report results. The face presents an absolutely perfect and fair complexion and without any sign whatever of disease. The eyelashes of both the upper and lower lids fell out completely just after the patient's last visit of June 21. Also at about the same time the eyebrows peeled off completely with the skin. In three or four weeks the eyelashes began to reappear, at first quite fine and light, but as they grew longer they grew blacker and stronger and are now fully restored. In about seven weeks the hair of the eyebrows returned. The hair for one inch back of the top of the forehead extending from ear to ear fell out, but is now growing luxuriantly and has attained at the present moment one inch in length.

Case XII.—Alopecia areata, Fig. 7, April 11, 1902. Began seven years ago with a spot the size of a five-cent piece on the back of the head. The hair fell out, and from that time on to the present new and large patches have continuously appeared. The new hair would grow in snowy white and the coloring matter only appear after a growth of about one inch in length had been attained. Perhaps in six months the hair would again fall out in patches. It is not my purpose to report this case in full, but

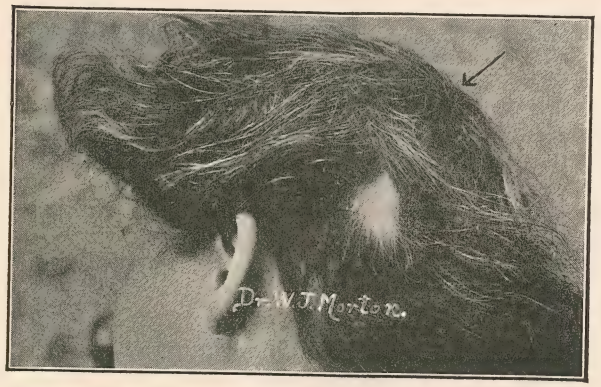

Fig. 7.—Alopecia Areata. Case XII.

merely to point to Figure 7 and to a large patch of dark luxuriant hair of an area about as large as the palm of one's hand, indicated by the arrow. When perfectly bald, *x*-ray treatment of this spot was begun, with the usual technique referred to in this paper. The hair at first continued to fall out. On May 2 it ceased to fall. On May 5 signs of growth of the hair in the denuded area began to appear. Treatment continued until July 1.

September 8: Patient returns after an absence of two months to report that the hair had grown luxuriantly in the formerly denuded part, and that

for the first time in her experience it had grown in black from the start.

At last reports, now about four months ago, the new hair remained. In the cut, Fig. 7, below the spot treated, is shown an untreated spot.

The favorable effect of the *x*-ray, is clearly demonstrated by the result in the large area alone treated by it.

CASE XIII.—Sychosis of the upper lip and chin. S. S., aged forty-two years. Has had sychosis on the chin for five years and upon the upper lip for two years. Patient has tried faithfully innumerable treatments with no avail and states that nothing ever acted upon his disease so quickly or so thoroughly as the *x*-ray. The skin presents the usual nodules, papules and pustules and is deeply infiltrated. Fig, 9 illustrates the case better than would further description. Fig, 10 represents the case after six treatments, three times weekly. There is now no infiltration and no sign of the disease. The hair of the upper lip fell out at the end of two weeks. With the danger of relapse characteristic of this disease in mind, treatment will be prolonged for some time yet. Of my other cases this disease have shown identical results under *x*-ray treatment.

CASE XIV.—Mrs. J. B., aged forty years. Fibroid tumor of the uterus.

August 4, 1902: Tumor began about five years ago as a swelling, noticeable in the iliac region. Present examination reveals the tumor to be a large, hard, rounded mass, filling the abdomen quite to the epigastrium, and resembling in contour an advanced pregnancy. Patient is "nervous," suffers from pressure symptoms and is continually subject to severe and dangerous hemorrhages. Frequently from month to month the flow of blood would not cease, and she often almost lost consciousness. The physicians summoned had endeavored in vain to arrest the hemorrhages by ergot and other measures. At times the pain attending the hemorrhages was excessively severe. She has been confined to her house now for nearly four years. I advised an operation for the removal of the tumor, but this the patient would

not listen to, but begged that the *x*-ray might be tried in her case as an experiment. To this I consented.

Treatment: *X*-ray three times weekly, externally 20 to 30 minutes, very high tube whose radiation was conclusively shown by the fluroscope to have passed through the tumor. Relation of tube to the patient externally was frequently changed.

August 25: Patient *x*-rayed nine times and reports that her menstruation had occurred with almost no pain, with almost scanty flow, and that this had been the first time for years when she had not been obliged to take to her bed and remain there, and take large doses of ergot and often summon a physician.

November 30: About three months' time and thirty-nine treatments to date. The tumor itself has reduced at least one-third in size and a complete symptomatic cure is obtained. The menstrual periods are regular, natural, and painless, and no hemorrhages whatever have occurred since treatment was begun. The *x*-ray therefore in this case has restored menstruation to normal, arrested the condition of severe and dangerous hemorrhages, and produced a symptomatic cure, together with a very considerable reduction in size of the growth. The patient can now get along very comfortably, but wishes soon again to resume treatment to see how much more can be attained.

CASE XV.—Psoriasis. Mrs. H. C. J., aged thirty-three years. Disease began when she was ten years of age, with a small patch beneath the eye. From that time on the patches have increased in number and size and have extended in large areas almost over the entire body, mainly on the back and toward the hips, the neck and chest, knees and elbows, and general extensor surface of the limbs, and has also invaded the scalp. There are many individual patches on the body larger than the combined area of two hands. A detailed description of the disease is not essential, since its characteristics are entirely classical and typical and a picture of similar cases may be seen in any classical atlas of skin diseases. The patient had taken many kinds of treatment during all these years and with-

out success. I had tried the brush discharge and statical electricity also, unsuccessfully. The patient was then put upon *x*-ray treatment. A large and powerful tube was provided, of high vacuum, and the patient, thinly clad, stood before the tube, taking the *x*-ray over the entire body for about half an hour or more, three times weekly. The patches of psoriasis began to thin and ceased scaling, and reduced in activity immediately after the first week's treatment. By the end of the second week at least thirteen large patches had entirely disappeared and the skin where these had formerly existed was perfectly normal, and by the end of the third week it was impossible to find the previous locality of many patches. By the end of the fourth week the arms and neck and back were perfectly clear of disease and the legs presented but faint blushes showing the locality of the disease. At the end of six weeks the patient is entirely cured, and, curious to relate, the patches on the scalp ceased at the same time, although no treatment had been applied to them specifically on account of a fear of affecting the hair unfavorably. Indeed, the patient wore a lead mask to protect the hair of the head. The fact that the scalp patches have been cured would seem to indicate that the effect upon this disease has been constitutional, as well as local, and taking into consideration that the *x*-ray thus generally administered acts as one of the best nutritional tonics to the general health, it is not strange that this should occur. Of course, in this case the usual possibility of a recurrence must be taken into account, but the rapid disappearance of extensive psoriasis in this short space of time establishes beyond question that the *x*-ray is a most potent form of treatment for this hitherto intractable disease.

CASE XVI.—Lupus Vulgaris. Miss H. M. T., aged fifteen years, Halifax, N. S. At eight months of age mother noticed a small lump, size of a pea, on the left cheek. In three weeks this formed an abscess which was lanced and it appeared to be well. Soon after this noticed that the spot was becoming red, and the redness spread slowly but surely, until at two years of age it was the size of a silver dollar.

The physician applied caustic and other agencies freely and frequently, but to no avail. Later on, the lupus, now larger than a silver dollar, was curetted several times, but still increased in size and activity.

Examination, 1902. On the patient's left cheek is a dull red patch measuring one and three-quarters by two and one-quarter inches and spreading aggressively on its anterior and lower borders, while posteriorly the color is paler (Fig. 11.) This patch is elevated above the surface of the cheek, firmer at its edges than in the center, and throws off fine scales. The infiltration extends deeply into the tissue of the cheek.

Microscopical examination by Dr. H. T. Brooks of the Post-Graduate Hospital Laboratory establishes the diagnosis.

I first tried in the treatment of this lupus, during a period of about two months, a fairly mild *x*-ray, producing simply a mild dermatitis of the adjacent sound skin. The lupus at first became swollen, and puffed up and looked angry, then gradually showed a shrinkage in its area and gave off large, flat scales. It presented a concavity instead of a convexity, and became saucer-shaped, but did not entirely subside, although showing a profound reaction and a great disposition to repair.

Becoming weary of mild treatment, I substituted more powerful treatment. An aperture in a lead shield was cut, so that one-half an inch of normal skin around the edges of the lupus was fully exposed, and the *x*-ray treatment was then carried on three times a week until the sound skin presented an angry purplish red *x*-ray dermatitis, while at the same time the lupus itself began to appear swollen, angry looking, very red, exuding serum, and elevated. The normal skin was thus left exposed for a control and guide as to the extent to which the *x*-ray could be safely pushed, the presumption being that the lupus area would receive a due and proper amount of treatment within the limits of severe dermatitis upon the normal skin. This management of the case was eminently successful, for upon ceasing treatment at a time when the severe limit of dermatitis of the

skin had been established and the lupus itself had been excited to an angry condition, the *x*-ray was stopped, and the lupus over a period of two or three weeks went on by itself without further treatment to a complete cure. The lupus area healed without the production of scar tissue, and the skin previously occupied by the disease is now as sound and natural as any skin of the face.

I am now treating all cases of lupus by using the sound skin as a control of the treatment, as above described, and find this method more successful than either milder or more excessive treatments.

CASE XVII.—Miss L. M., aged forty-five years. Diagnosis: Primary carcinoma of breast. Referred to me by Dr. Wm. F. Fluhrer, May 11, 1902.

In view of the extreme interest attached to the outcome of this class of cases I quote from Dr. Fluhrer as follows: "May 5, 1902. Dr. Wm. J. Morton, Dear Doctor: If you continue to think favorably of the curative power of the Röntgen rays in the treatment of cancer, I would like to refer to you for treatment a patient with scirrhus of the breast, early stage. I was about to appoint a day for a radical operation, but . . . published results dispose me to make a trial of the *x*-rays, especially as my experience has made me very pessimistic concerning the ultimate outcome of all operative procedures in these cases." In accordance with the above expressed intention to operate, the patient had already engaged a room at a hospital in this city.

History: A sister died of cancer.

The patient first noticed a tumor in the left breast three months ago. A bunch of external lymphatics running toward the axilla were sore to the touch and enlarged. There is an enlargement of a gland in the axilla and a "steady, aching pain in the left arm."

The actual tumor measures $2\frac{3}{8}$ by $2\frac{6}{8}$ inches, measurement of normal gland at the same point on the right breast $1\frac{3}{8}$ by $1\frac{6}{8}$ inches.

Treatment *x*-ray, high tube, three times weekly, 9 inches distant from target.

May 23: Seventh treatment. Tumor smaller and mass feels harder. The soreness in the lymphatic areas has continued until to-day when it, at least for the time being, has entirely disappeared, also the pain and discomfort of the arm has disappeared.

May 26: Soreness on pressure on inner side of breast remains absent, but on outer side again present. Tumor feels harder.

June 11: *X*-ray dermatitis to the extent of exfoliation of the epidermis and serous effusion established. Nipple and areola quite sore. Soreness and pain within breast long since entirely ceased.

June 16: Dermatitis subsiding, but skin quite sore and purple red, and areas of exfoliation and serous effusion exist. The dermatitis involves the entire breast and chest above the breast up to the chin and the entire axilla. This dermatitis could not have been carried a step further without danger. The patient was now *x*-rayed from behind.

Dr. Fluhrer examined the tumor and reports that, according to his judgment, it is reduced one-third in size.

June 27: No dermatitis. The skin appears clean white and new and all scales have rubbed off.

No evidence of tumor can be discovered, but the tumor region is still sensitive to pressure.

August 16: Measurement of tumor mass $1\frac{3}{8}$ by $1\frac{6}{8}$ inches; namely, the same as the corresponding mass in the right breast. No lymphatic channels or glands are enlarged, sore, tender or painful, and it is recorded that the case "looks very hopeful."

October 22: During the summer, treatments were given only twice weekly, and might possibly have been discontinued altogether in August, had I not believed it unwise to accept the evidences of disappearance of the disease as apparently final.

The patient was now again examined by Dr. Fluhrer, who stated there apparently was no tumor or trouble remaining. I thought wise to continue treatment once a week however.

November 2: The disappearance of the disease was again confirmed by Dr. Fluhrer who also referred her to Dr. Chas. Putnam, who agreed in the report.

Treatments are now discontinued and patient is well to date.

Total number of treatments to November 2, seventy-four, extending over a period of about six months. Disease, however, probably at an end so far as can now be known at end of August, three months, with twenty-five treatments.

I append in present conclusion of this case a letter from Dr. Fluhrer confirming the result thus far attained. I have previously in another publication referred to the fact that the breast treated by the *x*-ray is inevitably developed and becomes larger and firmer as referred to below:

"My Dear Dr. Morton: I have this morning carefully examined Miss M. The formerly affected breast is slightly larger and slightly firmer in texture than the other breast. There is no evidence whatever of the tumor in the breast which was previously present. The lymphatics along the edge of the pectoral muscle are no longer thickened. The glands in both axillæ can be felt. On the side of the formerly diseased breast they are very slightly more perceptible, but appear to have the normal softness of texture on both sides. The patient presents no evidence of cancer.

Case XVIII.—May 5, 1902: Miss V. R., aged twenty-five years. Ulcerated primary carcinoma of right breast, far advanced. Referred to me by Dr. B. Onuf with the above diagnosis; clinical diagnosis also confirmed by others. Disease began two years ago, two weeks subsequently to a trauma. She had received an accidental blow upon the breast, followed about two weeks later on by a second one on the same spot. First noticed a hard lump on the outer and lower aspect of the breast. This lump steadily grew larger and now measures $2\frac{3}{4}$ by $2\frac{1}{2}$ inches in diameter, extending deeply into the breast; it is firmly adherent below to the fascia and causes extensive retraction of the tissue. Extending from the tumor toward the axilla is located a further and continuing mass of indurated tissue, three inches long and one inch in diameter, evidently corresponding to infected lymphatic vessels. The axillary glands are involved to a great extent, some of them being agglutinated into a large mass; they

cause her much pain, and are sore upon pressure. A discharging ulcer, the size of a silver dollar, exists at the site of the initial tumor and a discharging fissure at the nipple. The right arm is painful and much swollen with brawny œdema. Pain involves the entire shoulder. She suffers sharp pain, generally at night, and loses sleep. Has lost thirty pounds in weight during the last year. Has concealed the existence of the disease by reason of modesty and fear of an operation.

Treatment.—*X*-ray, high tube, three times weekly, fifteen minutes usual technique.

May 21: Treatment gives relief from pain for at least twenty-four hours—in fact, has now very little pain either in breast or in axilla.

June 4: Severe dermatitis with serous effusion and exfoliation of epidermis.

June 16: Dermatitis disappeared and skin again sound. Feels more comfortable than for a long time. Main masses smaller and uses arms without fatigue.

August 8: A succession of attacks of dermatitis with subsequent desquamation had been set up. The ulcer has now entirely healed, and the initial tumor beneath it has disappeared. The mass corresponding to the infected lymphatic vessels is very much smaller, but still persists, as well as a small gland in the axilla. Sound normal skin, loose and flexible, covers the seat of the disease. The patient appears to be in excellent health, has a good color and good appetite, and suffers no pain anywhere. The œdema of the arm and hand has entirely disappeared and the patient has perfect use of the arm and without pain.

Treatment continued in November and December as usual.

Duration of treatment to December 6 is seven months. The number of treatments 93.

We have here a case of neglected primary carcinoma of the breast advanced to the stage of ulceration and profoundly involving lymphatics and lymphatic glands, and which shows most conclusively the healing effect of the *x*-ray.

Case XIX.—Mrs. E. P., aged seventy years. Diagnosis: Primary carcinoma of the breast.

May 14, 1902: Last August first noticed a small tumor on the outer and under side of the right breast. This tumor has grown steadily in size until it is now the size of a large goose egg, but with no especial pain. The nipple is retracted, and also there is a deep retraction of the skin over the central portion of the tumor. The tumor is of the scirrhous type; the entire mammary gland is apparently involved, and the tumor is rigidly adherent at its base, appearing to be attached firmly to the ribs. There are glandular enlargements in the right axilla. The patient has firmly declined an operation, saying she will die with her tumor rather than have the breast and surrounding tissue removed.

X-ray treatment, three times weekly, begun.

In about one month the tumor had reduced in size in a very marked degree, and now took on a longer and narrower shape, detaching itself out, as it were, from the remainder of the breast. By the end of the second month the tumor was scarcely the size of a small hen's egg, was freely movable as regards the attachment to the ribs or rib, but some retraction of skin still remained. The attached nipple and areolar region was now also freed and no enlarged glands in the axilla could be felt. At the end of the third month (forty-six treatments) only an extremely hard mass about one and one-half inches in length by one inch in width remains. This mass is freely movable, but retains some adherence to the skin immediately over it. It could be surgically removed by a very simple enucleation from its surroundings, and this I advised as the shortest way out of her trouble. The patient took this view into consideration. It is my opinion in this and in similar cases that the cancerous and malignant nature of the new growth has disappeared, and that only a connective tissue stroma remains, which it may be impossible to cause to disappear by the *x*-ray.

December 4: The patient has taken desultory treatments during September, October, and November, amounting to fifteen in number, and presents to-day about the appearance above described, except that the remaining hard and slowly reducible

nucleus is still smaller. The patient refuses even the minor operation above proposed.

January 2, 1903: Dermatitis well established with serous effusion over the remaining tumor, which is now about the size of a walnut. Have desisted from treatment to await further absorption.

Case XX.—Mrs. L., aged seventy years. Diagnosis: Primary carcinoma between left breast and axilla.

March 24, 1902: Last summer patient first noticed a small kernel which has steadily grown to its present size. Examination now shows a flattish tumor six inches in diameter the central portion of which consists of a very hard disk-like mass measuring three inches across with irregular nodular edges and retraction and involvement and attachment of the skin to the tumor at the center. Most of the tumor was adherent at its base. The central portions of the skin were retracted, forming a saucer-like depression. The growth was sensitive to pressure and subject to "twinges" of pain. Patient has refused to submit to any operation.

Treatment.—*X*-ray, three times weekly, fifteen minutes, technique as described.

At the end of a month all of the comparatively soft and outlying parts of the tumor around the central hard mass had entirely disappeared, while at the same time the central hard portion had reduced one-half an inch in diameter. All pain and soreness had also ceased.

No shield was employed, and the axilla, side and front of the chest soon became intensely brown. From this point on there was nothing to observe except the steady but slow diminution in size of the central scirrhous mass, originally measuring, on October 8, three inches in diameter. After a fairly continuous treatment of six months this central mass still measured two inches in diameter and was much thinner from its surface to its base. It had also become detached at its base and was consequently now movable. The retracted center had flattened out. It was now evident that the greater part of the patient's disease had disappeared, and that she was free from danger of its spreading,

but also evident that the remaining nucleus yielded, while surely, it is true, still slowly.

The patient felt her age, and was feeble, and the journey to come for treatment was for her a long one. She had reached a stage where the remaining nucleus could be simply removed without resort to the extensive operation involving other areas which otherwise would have been deemed necessary. For the *x*-ray had already removed more than two-thirds of the mass and with equal certainty, if there ever was an inferential certainty, cleared up all involvement of surrounding lymphatics.

In November, without my knowledge, the patient was operated on by Dr. J. W. Wright of Bridgeport, Conn. Unfortunately, the tumor, by an inadvertence, was thrown away without microscopical examination. Dr. Wright, in a letter to me, states that the tumor was a carcinoma and, microscopically, seemed to be degenerated in spots. My feeling in this case, as in other similar ones, is that a primary carcinoma like this one should be *x*-rayed firstly and operated upon lastly, if necessary, thus substituting a minor and unimportant surgical operation for what is acknowledged to be a most severe one, and, what is more probable, offering a greater security to the patient against a recurrence than the grave primary operation.

Some weeks after the operation the patient died from exhaustion of old age and intercurrent conditions, but it does not appear that her death was due to cancer.

Case XXI.—Mrs. M. E. H., aged forty-five years. September 9, 1902—Diagnosis: Primary carcinoma of breast.

Eight years ago had both ovaries removed for ovarian tumor and one year later the uterus was removed for malignant disease. Soon after the second operation she noticed a tumor in the right axilla, which for the last two years has pained her excessively. For the last six weeks she has noticed a fulness and soreness in the right breast, and a sensitive tender ridge-like swelling extending from near the nipple toward the axilla. The breast gives considerable pain. On examination a small tumor is felt on the outer aspect of the breast,

attached to the gland, and running from it the sensitive chain of lymphatic vessels alluded to. The enlargement of the lymphatics was about as large and as long as one's little finger. The tumor in the axilla would seem to be a fatty tumor, and the patient was so advised, but the other tumor and the lymphatics were treated by the *x*-rays.

October 20: Patient has received about nine treatments. Severe dermatitis established. The painful ridge of lymphatics has resolved to two small lumps, each still quite sore to pressure. The sense of "fulness" of the breast and the pain have altogether disappeared. The tumor of the breast no longer exists.

Since the dermatitis was still quite severe, the patient refrained from treatment, and on returning three weeks later reports no further trouble remaining. On examination one breast appears to be as normal as the other. Disease entirely disappeared.

Case XXII.—October 1, 1902: Mrs. H. J., aged forty-five years. Diagnosis: Primary carcinoma of breast. Referred by Dr. J. McCroskery. Upper margin of the mammary gland of the right breast, the seat of a hard tumor adherent to gland tissue, and measuring, inclusive of the gland at a given level, $2\frac{1}{4}$ inches as compared with a similar measurement at the same level of the left breast, of $1\frac{3}{4}$ inches. Lymphatic vessels sensitive and enlarged and an enlarged gland in the axilla. On the under side of the breast and in the skin exists a kernel as large as a pea.

Patient suffering pain quite steadily and has been losing flesh.

Treatment *x*-ray; usual technique.

October 14: Soreness of lymphatics and tenderness on pressure over tumor and spontaneous pain have disappeared.

November 20: Measurement of tumor slightly less than two inches across. The kernel in the skin has entirely disappeared and the enlarged gland in the axilla has disappeared.

December 2: Patient has gained six pounds during the last month.

December 13: No pain. No tumor or enlarged

glands can be found. Patient referred back to Dr. McCroskery, who reports that he can find no tumors and wholly confirms the disappearance. Dermatitis with serous effusion and exfoliation of the epidermis was produced three times during treatment.

Duration of treatment ten weeks, and total number of treatments, thirty-three.

January 31, 1903: No sign of disease. The gland measurements are identical. The breast treated is, however, somewhat larger and firmer than the other breast, as is usual as a result of the *x*-ray treatment in these cases.

Case XXIII.—Mrs. A. A. N., aged thirty-five years. November 6, 1902. Diagnosis: Primary carcinoma of breast.

First noticed one year ago a small lump about as large as the end of her thumb in the right breast, outer and lower aspect. This grew slowly until two months ago it began to get larger and now is the seat of "crawling" and, at times, stinging pains. Examination reveals a hard, nodular tumor, attached to the gland and forming a part of it, one inch in diameter, and, extending toward the axilla from the tumor, a lengthened, elongated, sensitive mass, evidently affected lymphatic vessels, measuring two inches in length. Glands of the axilla are quite sensitive.

Treatment.—*X*-ray, high tube, corresponding to a nine-inch mark, fifteen minutes three times weekly. No shield. Breast, axilla, and thorax fully *x*-rayed.

December 9: Pain ceased after the second treatment. The elongated lymphatic mass has entirely disappeared, thus bringing into prominence day by day the individual hard tumor, which itself has now almost disappeared. Axillary glands no longer sensitive. Dermatitis with itching and burning well established.

December 16: Dermatitis subsiding. The epidermis is peeling off in large flakes, as in the case of a sun blister.

The tumor can now only be found with difficulty, and consists simply of a small hard kernel.

January 7: Careful examination to-day with

patient in recumbent position, reveals no sign whatever of the previous tumor, or of the lymphatic enlargements. Patient's treatments reduced to twice weekly for the present.

Owing to the full development of the right breast, namely increase in firmness, hardness, and roundness, it is necessary to administer *x*-ray to the left breast to even up the symmetry of the bust.

February 20: Patient remains well and is treated merely to make sure of the present result.

Case XXIV.—Mrs. M. L. D., aged forty-eight years. Diagnosis: Primary carcinoma of breast.

December 6, 1902: First noticed two days ago a hard tumor in the breast about the size of a walnut. No pain. Consulted Dr. W. H. P. Pratt of Brooklyn, who kindly referred her to me.

Examination.—Tumor, left outer aspect of left breast, measuring two inches by two inches in diameter, very hard, surface not smooth but nodulated, apparently movable only as a part of the mammary gland and apparently becoming fast to the skin. Complains that her clothing pinches the shoulder, and there is evidently tenderness in the axilla.

December 18: It is very remarkable to observe how rapidly the tumor is diminishing in size. It now measures scarcely one inch in diameter. She still complains of tension in the shoulder and arm.

January 8, 1903: This morning appears for the first time an *x*-ray rash in the shape of small papules not yet confluent.

January 15: Severe dermatitis has followed since last record, but is now subsiding, except for a spot denuded of epidermis just over the tumor.

Referred back to Dr. Pratt, who reported that the case was a "transformation scene," that he could not have believed that such a tumor could have thus far disappeared except on the evidence acquired by his own fingers. The main bulk of the tumor has disappeared, which is all that and more than could be expected in the short time of one month. A small kernel undoubtedly remains and treatment is continued.

April 1: Left breast firm, hard, and larger than right. Absolutely no sign of a tumor can be discovered and the patient is apparently cured.

CASE XXV.—Mrs. C. M., aged sixty-two years. Diagnosis: Primary carcinoma of the breast.

November 3, 1902: Kindly referred to me by Dr. Fuhs of Brooklyn as "a tumor which should be removed by surgical operation." This opinion was confirmed by Dr. Rushmore of Brooklyn. In August noticed a retraction of the skin forming a considerable depression of the contour of the breast, and soon noticed a second retraction near to the first one. These depressions are much increased on raising her arm above the head. October 28 noticed a "lump" near the retractions and nearly beneath them. No pain or soreness on pressure. Has lost seven pounds in weight.

Examination.—Tumor situated on the inner aspect of the breast, measuring 1½ inches in length by ¾ of an inch in breadth, nodulated, hard, attached to gland at its base. Enlarged gland in axilla.

Treatment.—*X*-ray.

November 17: Tumor somewhat smaller and harder and more defined.

December 1: Tumor reduced to one inch in length.

December 22: Tumor decidedly less than one inch in length. Dermatitis fully established. No sensitive glands in axilla.

January 5, 1903: Tumor, say, ½ inch in length and very hard to palpation. Retractions still persist but are less marked.

February 10, 1903: No sign of the disease can be found, except possibly a small remaining kernel and some retraction of the skin, forming a depression like a dimple.

This tumor was undoubtedly of the fibrous or scirrhous type and yielded slowly, and may be possibly yet far from total disappearance. As in case 18, treatment must be continued, but reasoning by analogy with other cases, all signs of disease will finally disappear.

CASE XXVI.—August 20, 1902: Mrs. J. L. S. Diagnosis: Recurrent carcinoma of one breast and a primary carcinoma in the other breast.

Disease began two and one-half years ago. Patient first noticed an intense itching and prick-

ling, as of needles, in and about the left nipple. In about six months a small lump appeared near the nipple. She consulted her family physician, who told her she was "hipped," and to go home and disregard the lump. In the following Spring she consulted him again, since her symptoms persisted, and he decided to "take it right out." The operation was performed by removing the entire nipple and areola and deeper adjacent tissues. The removed specimen was sent to two pathologists, who made the following reports, which I quote somewhat in full because of their important bearing:

College of Physicians and Surgeons, Columbia University, Department of Pathology. Mrs. J. L. S. New York, May 14, 1901: The tumor of the nipple presents rather unusual morphological features, some parts of it considerably resembling endothelioma. But a careful study of it leads me to the diagnosis of adenocarcinoma.

From the operative standpoint, the tumor should, in my opinion, be considered carcinoma.

Mrs. J. L. S. New York City, May 7, 1901: Specimen of tissue from nipple. First examination: Specimen hardened in paraffin, cut and stained forty-eight hours. Four sections examined. Diagnosis: Adenocarcinoma.

Second examination: Specimen hardened in celloiden, cut and stained one week. Five sections from various levels examined. Diagnosis: (final) Adenocarcinoma C. N. B. CARNAC, M.D.

Examination, Left Breast.—No nipple or areola. Linear scar, 1½ inches in length, remains from removal of the tumor at this point. In each of the three stitch-marks of this scar is situated a small, red, hard tumor, somewhat smaller than a pea in size. From the central tumor there extends downward an area of red and hard skin infiltration about the size of the thumb nail. The patient's chief anxiety is caused by a very sore and tender spot in the upper and outer quadrant of the breast. Palpation develops pain and a hard, corded, and sensitive mass of lymphatic vessels at this point. There are also sensitive glands in the axilla.

Right Breast.—Exactly the same condition exists

in this breast as is above described to have begun two and one-half years ago in the left breast, namely, a small, red, itching, hard kernel near the nipple. The nipple also is indurated and fissured as formerly on the left side. A lymphatic tenderness and swelling also exists in this breast at the same site as in the other. In this state of affairs, and recalling the pathological reports quoted, few would deny that the classical advice would be the complete removal of both breasts and the clearing out of both axillæ, if indeed, an operation would be advised at all.

It is well recognized that even a small carcinomatous tumor of the breast may quite early establish an involvement of the near lymphatics and a general infection along the line of the pectoral muscles, and within the axillæ, and in the case now under consideration such infection had evidently occurred on both sides. The tumors and the course of the spreading disease bore no resemblance to the course of a latent scirrhus of a local type. All surgically operative interference had been refused by the patient, and certainly the case should prove to be a severe test of the efficacy of the *x*-ray.

It is by reason of just such cases as this one that I long ago advised that no shields for the thorax ever be used.

Treatment.—*X*-ray, three times weekly.

October 8: An extensive dermatitis of the breast and axillæ has now existed for some weeks. The epidermis has exfoliated over an area of about four inches in diameter, and serous effusion is taking place. The pain in the lymphatic swellings of both breasts is much less, but the areas still feel hard and cord-like and are sensitive. The interesting point developed is that the cancer infiltration of the skin, of the size of a thumb nail, has entirely disappeared, as well also as two of the three small tumors. The small central tumor still remains.

At this time the general infection of the thorax on both sides was so marked and widespread that (considering also the appearance of the disease in the second breast) I took into account an abdominal tumor complained of by the patient, and referred her to Dr. Bache McE. Emmet for diagnosis of this

tumor. My fear was that it might be cancerous, or, at least, be breaking down and furnishing septic material. Dr. Emmet pronounced the abdominal tumor to be an inert and harmless fibroid.

October 22: Treatment continued since October 3 three times weekly. Dermatitis of left breast area entirely healed. No pain now, on pressure on the lymphatics. The one remaining kernel feels like a small grain of sand.

November 17: No signs whatever of trouble can now be discovered in the left, the originally affected breast. But the right breast is still short of recovery since the lymphatics are sensitive and "knotted," the nipple is still somewhat hard and the small kernel persists.

December 6: Right breast now apparently all right except for the persistent kernel. To attack this kernel a small hole is cut in a lead shield and a violent *x*-ray projected upon the tumor.

January 31: Patient leaves for the South at my advice, since her disease is now apparently cured, but she is advised to return at once upon the reappearance of any of her easily recognized symptoms.

Of course, this case must be kept under general observation for some time to come, but the outcome would seem to indicate that small carcinomatous tumors of a highly infectious type may be effectively controlled in their progress, and that the infected areas also may be cleared of the infecting cancer particles.

Duration of treatment about five months, and number of treatments sixty-five.

Case XXVII.—Mrs. M. T., aged forty years; married. Carcinoma mammæ, recurrent.

November 21, 1902: Four years ago (last January) a small tumor as large as a chestnut appeared in the left breast. In March immediately following it was operated upon in the Hospital Jesu Maria in Naples, Italy. In March, 1902, the first recurrence was noted, and on October 6 the breast and glands of the axillæ were removed at the Columbus Hospital, and the diagnosis of carcinoma made microscopically. To-day, about six weeks later on, there exists a second recurrence in the shape of a nodule,

in diameter about the size of a thumb, and situated in the skin of the chest, just below the axilla, and quite independent of the cicatrix. There exists also a considerable infiltration and consequent thickening of tissue at the edge of the pectoral fold near the upper limit of the cicatrix. At the latter situation, she suffers much pain, extending down to the arm and up to the occiput and throughout the shoulder. No pain in the nodule.

Treatment.—*X*-ray, usual technique, three times weekly, fifteen minutes each treatment.

November 28: Pain has abated.

December 3: Still some pain, but recurrences are diminishing in size.

December 15: Induration near upper end of cicatrix is very soft and flexible and has almost disappeared.

Now, at the end of twenty-four days and with seven treatments, the recurrent nodule has entirely disappeared. It first flattened out gradually, next left an indurated and firm base, and now its size is recognizable only by a reddish, deeply pigmented fleck or spot.

There is no fact better established in the *x*-ray therapy of cancer than this rapid and positive disappearance of recent carcinomatous nodules in the skin. I have seen groups of six to fifty such recurrent nodules fade away at the end of less than a month, leaving an apparently normal skin behind. No one will deny that in such instances the *x*-ray favorably displaces an operation, while all must admit that the fact distinctly indicates that recent carcinoma is the most susceptible to the *x*-radiation.

Case XXVIII.—Mrs. D. M., aged thirty-six years. Recurrent carcinoma of breasts and axilla.

August 27, 1902: Patient referred to me by Dr. John McCroskery of New York City. In 1885 noticed a tumor in the left breast. In 1887 this tumor was removed by Dr. Bedell of Lamar, Col., and the patient reports that the "tumor looked like a chicken gizzard covered with warts." Microscopical examination proved it to be a carcinoma. Soon the disease extended over the outer side of the breast and up to and into the axilla, and the arm began to cause her intense and continuous

suffering. The hand "goes to sleep" if the arm is allowed to press against the body.

Examination.—Left breast, three tumor masses of about one inch each in diameter,also an indurated, elongated tumor, representing the infected lymphatics, along and beneath the pectoral folds, and also one especially large gland the size of an English walnut in the axilla, as well as the other sensitive and enlarged glands at the same locality. In the right breast exists also a small tumor. The left arm is enlarged.

The patient suffered intense pain and had got into a highly demoralized and nervous condition, owing to the necessary use of morphine and alcoholic stimulants, to relieve the excessive suffering. She exhibited a most pronounced appearance of carcinosis—her color was "yellowish green" and had been so for about three and one-half years. The case seemed most unpromising for *x*-ray or any other treatment.

December 8: Patient has come for treatment very irregularly, but the results may be summed up as follows:

About November 8 extensive dermatitis had been established, and the patient, on this account, had remained absent a month, though I should have preferred to have gone on with the treatment. She reports that the dermatitis was very severe, that it extended over the under surface of the left arm and over the skin of the axilla and over the entire left breast, and even over the abdomen as far as the groin. On the breast at present is a large blistered surface with blisters full of yellowish serum.

But as a result of the treatment the patient is in a much better condition than for years. She has recovered her appetite and ceased her attacks of vomiting. Her yellowish green color has yielded place to a natural and healthy color. She has been able to cease entirely the use of large doses or morphine, and requires no alcoholic stimulants. She has regained full use of the left arm, and has no longer numbness nor pain nor swelling in the arm or hand. She has no pain in the breast and, most essential of all, the three tumors have entirely

disappeared, the mass at the pectoral fold has disappeared, though at that point a sensitive spot remains. The glands in the axilla cannot now be felt.

This case I submit as one of many I might bring forward in which the *x*-ray has produced a very decided retrogression in the progress of carcinoma and carcinomatous infection. The patient now went West on a visit, and I have no further knowledge at this date as to her condition, though Dr. McCroskery writes me that at his last examination the patient retained her improved condition.

Comments on Cases of Primary Mammary Carcinoma.—No shields, except for the hair of the head and eyes, are used, and except that the nipple is covered with a small metallic disk during about two-thirds of the treatment. Dermatitis is intentionally carried to a red purplish stage, followed by exfoliation of the epidermis and effusion of serum, and in certain cases purulent effusion, but in all but one case a complete restoration of the epidermis to its normal type has followed in from one to four weeks. These areas of dermatitis have often occupied the entire skin area of one breast and axilla. The patients are frequently *x*-rayed from behind the scapula, the fluoroscope showing that the thoracic cavity offers but small obstruction to the radiation. This measure seems to me very important in view of the researches of Volkman and Heidenheim, who have pointed out that, even in the case of a very small carcinomatous nodule the deep faciæ of the muscles of the chest may be infected. Or, again, the anterior portion of the ribs and the claving may only too effectively shield infected areas behind these bones. I do not hope for good results in these cases except by the production of a severe and extensive dermatitis. Fortunately, I have not overstepped bounds and reached a necrosis, and if I have escaped this it has only been by adhering to the most rigid and exact technique as to time of exposure, distance of tube, force of radiation, and number of treatments per week. This technique, I may mention, is fifteen minutes, nine inches, "high" tube (corresponding to six to ten

inches spark gap), clear view of end of radius and ulnar at two feet, and three times weekly. An inexact tehnique would surely lead to a too severe burn, and I am not sure but that an exact one will sometimes do the same. Thus far I have escaped producing this unfortunate result.

As to the exactness of the diagnosis of carcinoma in the cases reported, one must exercise their own judgment. It is, of course, impossible to excise a piece of the tumor for preliminary diagnostic purposes. But accepting the opinions of competent observers, the margin of error as regards malignancy is a fairly small one. Dr. George F. Shrady (MEDICAL RECORD, January 26, 1901), in arguing for an accurate early diagnosis, and in favoring an exploratory examination of every tumor before its actual extirpation, says: "Mammary growths, as a class, can never be trusted. The weight of evidence is so strongly on the side of malignancy, threatened or pronounced, that no conscientious practitioner can afford to have any doubts as to the responsibilities he should assume. There is hardly a 'simple tumor' in the breast which may not become malignant. Fully 90 per cent. of breast tumors in older women are probably malignant, and the remaining 10 per cent. are very objectionable tenants." Again C. V. Visher (*American Medicine*, August 24, 1901), arguing that "the success of operative intervention depends so much on its early performance that the question of diagnosis becomes second only in importance to that of the treatment," goes on to say, "It is true that not all neoplasms of the mammary glands are carcinomatous, but when it is borne in mind that 80 per cent. of breast tumors are of this nature, and of the remainder 4 per cent. are sarcomatous, and the balance, 16 per cent., consists of the more innocent growths, which include adenoma, and as these growths commonly undergo malignant changes, the opportunity for a mistaken diagnosis is slight, and the benefit of any doubt should always be conceded to the patient. How much safer would it be even to remove one breast for a benign tumor than to permit eight malignant growths to remain, and finally cause a fatal termination."

The "American Text-book of Surgery" gives 83 per cent. of tumors of the breast as carcinoma, and if 4 per cent. are sarcoma, then we have 87 per cent. as malignant from the start. If to this we add, say, 6 per cent., probably a low estimate, for the adenomata that become malignant, we have 93 per cent. of tumors of the breast that are or become malignant. I do not in the least contend that the cases I have here reported are in any sense conclusive as to the propriety of treating primary carcinoma of the breast by *x*-ray rather than by operation. Far from it. Such cases are merely preliminary and tentative. Had they lost ground at any moment I should have advised operation, even with the certainties of recurrence. I have one case of a primary carcinoma of the breast in which a diagnosis has been made by incision and removal of a section, which has now been under treatment seven months, and which, though greatly reduced in size, still persists. I have known of another case treated thoroughly for the same length of time by the *x*-ray with but little benefit, in which the tumor has just been removed and proved by microscopal examination to be carcinoma. Both cases were of the hard fibrous type. Therefore I feel sure that the whole subject is yet *sub judice* and merely offer some of my results as a contribution to the general whole. But I also feel sure that some cases of primary carcinomatous tumors disappear.

And here, lest I may be misunderstood in regard to producing, as above described, a *severe* dermatitis, I would add that nothing would be more unwise than to do this in an ulcerating carcinoma, for the carcinomatous infection will almost surely extend along the areas of the *x*-ray burn, and the disease become worse than if no *x*-ray treatment had been employed.

What is desired would seem to be to set up a mild leucocytosis with tissue reparation, and if in the case of a mammary and unbroken cancer the skin intervenes, this latter suffers a dermatitis lesion, merely to enable the operator to set up a similar but lesser lesion of the deeper tumor area. In this connection I have often observed, in cases of primary carcinoma, that at a moment when the patient complains of the soreness of skin due to a severe

dermatitis she also remarks that the tumor itself is unusually sensitive to pressure. But in a superficial or ulcerating carcinoma or superficial recurrent carcinoma of the skin a milder treatment with no dermatitis of note will set up (granting the correctness of the leucocytosis theory) leucocytosis and reparation. To resume, I do not believe that any dermatitis or outside *x*-ray burning effect should be set up in ulcerating carcinoma or sarcoma, while, on the contrary, this must be set up in the case of deeper and non-ulcerating carcinomas and sarcomas in order to submit them to a requisite intensity of radiation and secure tissue repair.

In conclusion, as regards both primary and recurrent carcinoma and other forms of malignant disease, it obviously would not be wise to try to do with the *x*-ray what might be better done by the actual or other cautery or by the knife, and the best future for *x*-ray and phototherapy in general should be one of extreme conservatism and desistance from the invasion of surgical procedures which offer an alternative of relief or cure to the patient superior to what the radiation treatment can offer.

ARTIFICIAL FLUORESCENCE OF LIVING TISSUE.

As is well known, the *x* and similar radiations produce a coloration of many salts in solution. Upon this quality is based radiography. These radiations also cause certain dry crystalline and other substances to fluoresce and phosporesce. And upon this quality is based radiofluoroscopy and the fluoroscope in common use. *X* and other radiations also cause fluorescence and phosphorescence of quite a number of salts and chemical substances when these are held in solution. This latter fact may be easily demonstrated by the following simple experiment: Dissolve in a test-tube five grains of bisulphate of quinine in, say, three drachms of water. Close, for convenience, the test-tube with a cork and place it in the ordinary fluoroscope box from which the usual fluoroscopic screen has been removed and replaced by a covering of several layers of black paper. Upon now exposing the

test-tube to the *x*-ray the solution of quinine will be seen to glow with a fine opalescent, bluish-purple fluorescence. The same experiment may be made with various other sustances, each affording a characteristic fluorescence.

Calculating the amount of blood in a human body to be one-thirteenth part in weight of the entire body, we may estimate that a person weighing 130 pounds will contain ten pounds of blood. This is equivalent to ten pints, or equivalent to one grain to eight ounces of water. We may, therefore, without doubt, conclude that the fluids of a person to whom twenty grains of quinine has been administered represent a solution of quinine equivalent to that above mentioned; and equally when such a person is exposed to the *x*-ray, that the person's tissue will be rendered fluorescent in the same manner.

Among fluorescent liquids, some of which may be used medically, Mr. W. J. Hammer, in a recent publication, enumerates the following: petroleum, quinine, Magdala red, eosine, uranine, saffronine, paviine, aesculine, amidophthalic acid, fluorescine, rhodamin, thalleen, resorcorufin, and resorcin blue.

In the treatment of cancer and other diseases it occurred to me that I possibly might avail myself of these facts to administer a drug medically, capable of fluorescence and at the same time establish its fluorescence in the tissues themselves by means of the *x*-ray. In the case of the quinine solution we should get the much desired violet radiation, and get it, too, in very close quarters with the tissue elements we desire to effect. A feeble fluorescence of a quinine atom lying against a tissue atom should equal in therapeutic result a much more powerful radiation from a fluorescing source much further distant. Acting upon this idea I have been in the habit, during the last year, of administering from five to ten grains or more of bisulphate of quinine about one hour before *x*-ray treatments. I cannot affirm it, for we have nothing thus far but clinical evidence to rely upon, but I believe that my cases thus treated by a combination of fluorescing medicines and the *x*-ray have made more improvement and more certain recoveries than patients not thus treated.

At all events, while all are so blindly groping in the treatment of cancer, the idea involved in the procedure I have ventured to term *x*-ray histo-fluorescence has seemed to me worthy of submitting to others for trial and investigation.

I have also employed this combined treatment of the *x*-ray and internal administration of fluorescing medicines to advantage, in cases of chronic malaria, Hodgkin's disease, lupus, tuberculosis, and tuberculous deposits, and, in short, whenever it is desirable to set up reparative tissue changes, important to accomplish *per se* or as resistance to bacterial and parasitic invasion. A solution of quinine may also be used hypodermically and locally if desired, or may be applied with a brush upon an exposed or denuded surface. Any portion of the human body thus artificially fluorescent may be photographed in a dark room by its own light, and I have already obtained several such photographs.

NOTE. Sept. 1903.—Since writing the above the scope of radio-therapy has been enlarged by the use of radium and other radio-active substances. The little radium tubes, by reason of their convenience of application, offer great advantages in local internal treatments and in some cases of superficial cancer. I am using the Radium salt of 7000 luminosity.

19 EAST TWENTY-EIGHTH STREET.

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Some Cases Treated by the *X*-Ray.

FACIAL CANCER, CARBUNCLE, CHELOID, ACNE, ALOPECIA, AREATA, SYCHOSIS, FIBROID TUMOR, PSORIASIS, LUPUS, PRIMARY AND RECURRENT CARCINOMA OF THE BREAST; ARTIFICIAL FLUORESCENCE OF LIVING TISSUE.

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