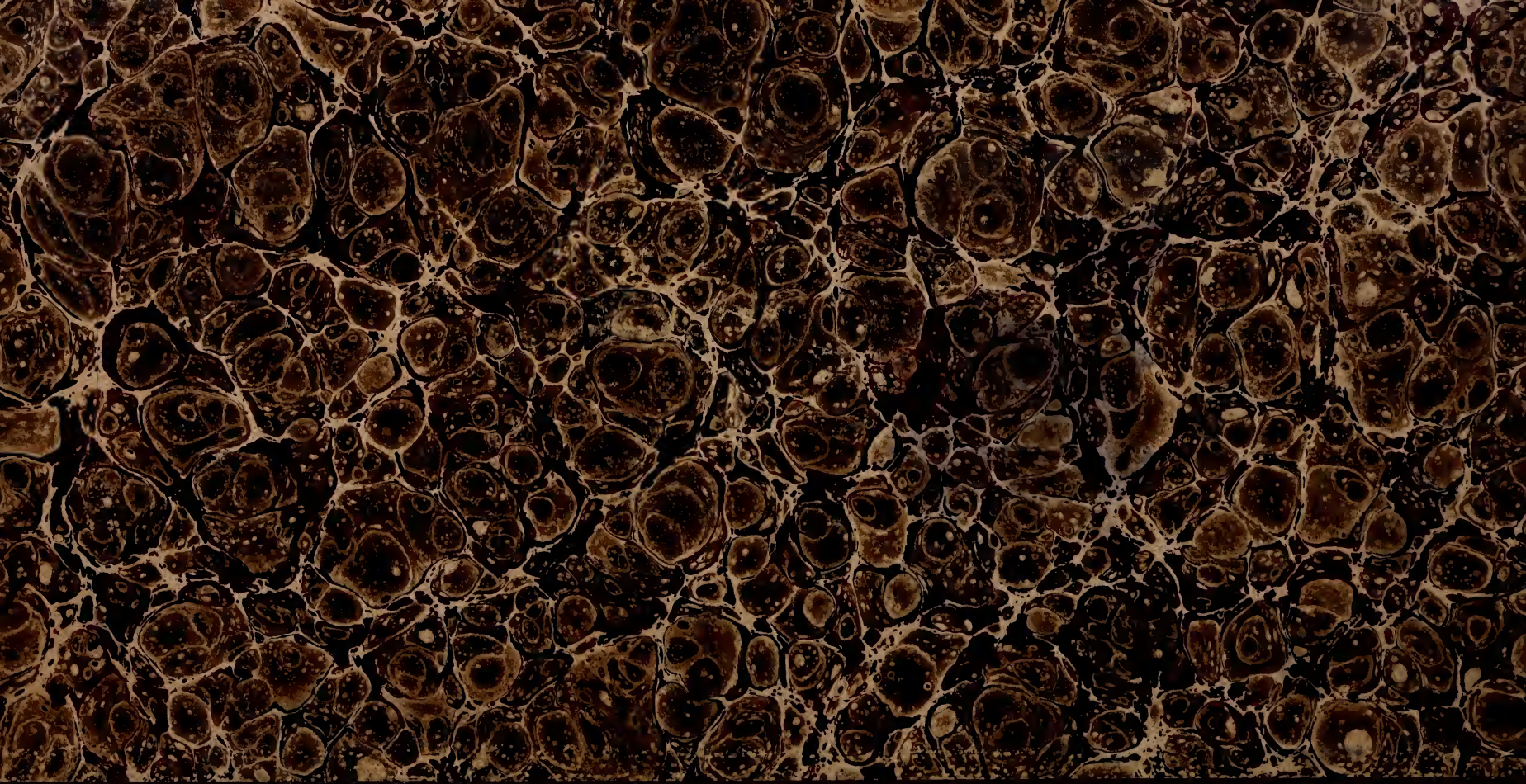

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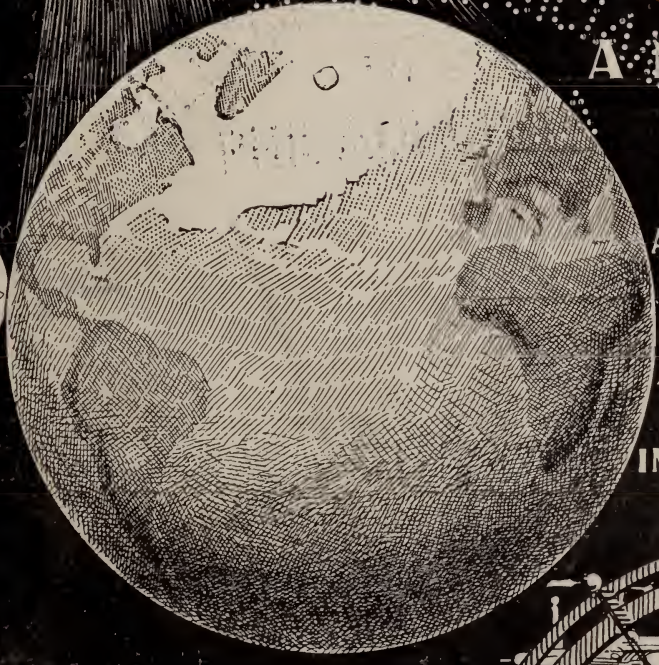

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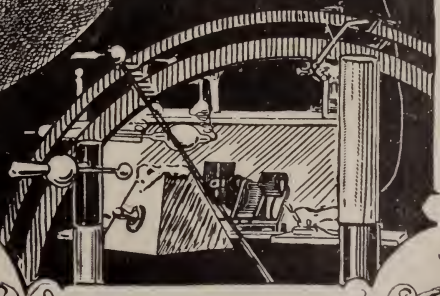

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PROFESSOR ELMORE S. PETTYJOHN, M. D.

President of the Illinois State Electro-Medical Society.

THE AMERICAN
X-RAY JOURNAL.
Devoted to Practical X-Ray Work and Allied Arts and Sciences.

VOL. XII. ST. LOUIS AND CHICAGO, JANUARY, 1903. No. 1.

Technique of the Treatment of Malignant Growths with the X-Ray.*

BY J. N. SCOTT, M. D.
Lecturer on Electro-Therapeutics, University Medical College, Kansas City, Mo.

The object of this paper is to open up a discussion on the comparative value of the different methods of applying the energy obtained from an active Crookes tube for therapeutic purposes.

I think the members of the medical profession who are making a specialty of the application of the radiance are fairly well agreed on the greater portion of the technique, but there is much difference of opinion as to the details, which, however, are important, as success or failure may depend on them in cases in which this method offers the only hope of curing a disease or prolonging life.

The apparatus used should be powerful enough to excite the largest tube to its full capacity, and should be so constructed that the current is under absolute control, so that a given quantity of current, length of spark gap and rate of interruption can be obtained at any time.

I use both the coil and the static machine. My coil is capable of giving an eighteen inch spark of large volume. It takes from three to ten amperes at 110 volts of the direct current. A series rheostat is used in the primary. The interruptor consists of a break wheel with brushes immersed in engine oil or alboline. It is operated by a motor with rheostat by which any number of interruptions desired can be obtained. An adjustable mica condenser is connected across the brake wheel. Leyden jar condensers are so placed in the secondary that they may be switched in or out of circuit and used in multiple with the tube, or the induced current from the jars passed through the tube. There are adjustable multiple spark gaps on both the positive and negative sides of the secondary. They are made by screwing twelve brass balls one half inch in diameter and one-eighth of an inch apart on a strap of hard rubber, with a slide rod so placed that any number of them can be turned into circuit. A sliding rod is placed in multiple with the tube for determining the length of spark the tube will back up, and also for the purpose of taking part of the current from the tube when necessary.

With the above accessories I can operate many tubes effectually that could not be operated without the spark gaps or Leyden jars. Generally a high vacuum tube will operate better without jars, and with but few interruptions in the secondary current, but low vacuum tubes from which we wish considerable penetration can be connected with the multiple spark gaps. Tubes which are extremely low, and from which it is desired to obtain a moderate penetration can be connected with the Ley-

*Read before the Roentgen Ray Society, Chicago, Dec. 10, 11, 1902.

den jars in multiple, or to the induced Leyden jar current.

I do not believe there is a constant ratio of efficiency for photographic, fluoroscopic and therapeutic purposes. I often have a tube which will give a beautiful fluoroscopic effect of a particular part, but will not make as good a radiograph as some other tube which is inferior to it in fluoroscopic effect. Then there are other tubes which are efficient for radiographing but do not act satisfactorily for therapeutic purposes, when about the same thickness of tissue is to be penetrated.

At several different times I have used a tube on a malignant growth where I desired to penetrate a thickness of three inches. I would select a tube and adjust the vacuum so it would give a good fluoroscopic effect of an elbow of the same thickness as the growth. I would then use the tube for two or three weeks, but without beneficial effect. When I would change tubes, operating the second tube so it would give about the same penetration, the malignant growth would begin to improve in a very short time. At other times I would be obtaining satisfactory results from a certain tube, when it would get broken. I would then use a tube which would give nearly the same fluoroscopic effect, adjusting the vacuum so it would back up a parallel spark of the same length, but found that it would have little effect on the growth. In some cases the condition of the parts treated would grow worse until I again changed tubes. The tube distance was the same in all cases.

I have made many tests to try and determine what constitutes a good therapeutic tube before using the tube on a case, but without result. In order to avoid delays of testing a tube on a case to determine its therapeutic usefulness, I use a series of four or five tubes. I use one tube for a day, another tube the next day, and so on until I have used each, when I begin over again. In this way, if one or two of the tubes should be deficient in therapeutic properties, the others which are good will average up the results.

I do not use different tubes for different classes of cases, and those requiring different degrees of penetration, but use an adjustable vacuum tube and regulate its penetration by vacuum adjuster, multiple spark gaps, Leyden jar condensers, etc. I use as low a vacuum as I can and be reasonably sure of penetrating the part under treatment.

I treat the majority of my cases every day. I have had much better success with the cases I have treated daily than those treated every three, four, or five days.

I never apply the ray strong enough to produce necrosis, as I think this irritates and stimulates the part of the growth which is not destroyed, and is liable to produce intense pain.

I begin with a short exposure, usually about four minutes if the anode of the tube is six inches from the part to be treated. I generally use the tube at about this distance. At the end of four or five days I increase to seven or eight minutes for four or five days, then decrease to four or five minutes for four more days. If I then observe no tanning nor inflammation, I increase to eight or ten minutes for four days. When reaction appears I decrease to three or four minutes until I find how long it will last, and when it begins to decrease I increase the exposure to six to ten minutes, depending upon the severity of the reaction and its duration. I then try to expose so I shall have a slight inflammation, but no necrosis.

If the skin is unbroken about the growth, I expose long enough to destroy the effects on the skin if it is healthy, and get as even an effect as possible thruout the growth.

In malignant diseases of the breast I expose from the front and side, then have the patient raise the arm over the head,

and expose the axilla, whether the involvement is perceptible or not. If the axillary glands can be felt I expose the glands in the neck and around clavicle. If the growth is in the abdominal region I begin the exposure on the side on which the growth is nearest the surface and continue until I obtain a slight reaction on the skin, when I decrease the time, as described above. If the first exposure was on the abdomen I then expose the back and side of the body nearest the growth.

When exposing large areas, and especially if the growth is breaking down, I watch the general condition of the patient, and keep all the eliminating organs active. I take the pulse and temperature of the patient every day or so, and if these rise suddenly, stop the treatment until they are nearly normal, and then proceed cautiously.

In order to protect both the patient and myself from the ray except where it is required, I have had a box, without top, constructed of copper, in which I place the tube. It is 30 inches long, 14 inches wide and 14 inches high. It is suspended from the ceiling by a cable, which passes thru two pulleys and is connected with a weight, which thus balances the box. By this method it can be easily raised or lowered as desired. Two cross pieces of fiber are placed in the box, which act as a tube holder. There is a door five inches square on the side, which can be opened for fluoroscopic work. The bottom of the box has an opening which can be made from one half inch square to seven by ten inches, by means of four slides. The box is made of No. 18 copper, and grounded to a waterpipe, so patient cannot obtain a shock by touching it. I have placed a mirror above the box in such a place that I can watch the tube by its aid, and still be protected from the ray.

I place the patient in a physician's chair, in a horizontal position, and lower the box to desired distance above the part to be treated, and adjust the opening. If the area to be treated is very irregular I further protect normal parts by thin sheet lead.

I believe that all malignant growths which are operable, and in which the patient's condition will permit, should be operated on, and in all cases the ray applied immediately, daily, for a period of a month for small superficial growths, and as long as three months for the larger growths. If there are no signs of recurrence at the end of this time the ray can be stopped and the patient kept under observation for two or three years. If recurrence has made its appearance during the treatment the treatment should be continued for a month after all induration and visible growth has disappeared.

No difference how thoroly a growth has been removed, if it is shown to be malignant on microscopical examination, I think the surrounding area should be treated as above. The only exception to the above would be a growth on the face, in which the cure would be reasonably certain by the ray alone, and the cosmetic effect would be better than by operation and ray, but if it does not respond within thirty days it should be operated upon.

Inoperable growths of external origin, in which secondary deposits in internal organs cannot be determined, certainly should have a trial of the x-ray, as a certain per cent can be cured, and nearly all improved; pain lessened, and life prolonged.

Growths of internal organs which are not secondary will generally respond to treatment for some time, even years, and the growth disappear so far as can be made out by palpation. I hope some of the results will be permanent. I have several cases, in two of which an exploratory incision was made and the diagnosis confirmed by the microscope, one a sarcoma of the kidney, the other a carcinoma of the uterus, in which the patients have

regained normal weight, the cachexia has disappeared, and the general condition is good. In the patient with sarcoma of the kidney the hemorrhages have entirely disappeared and the man is working at his trade—that of carpenter—and has been for three months; says he never felt better.

In cases which are inoperable in so far as there is no hope of cure by operation alone, either on account of extent of growth or its location, but in which considerable of the growth can be removed by the knife, I believe much time can be gained by removing all the growth possible, if patient's condition will justify the operation; and then treating the remainder by the ray.

Some of the advantages of x-ray treatment over other methods are that we are not limited in the area that we may treat, unless it should be very large, so we can apply it to a sufficient distance surrounding the growth to include all.

I do not believe we would be justified in treating an area corresponding to more than one-fourth of the surface of the body, as it would destroy many of the sweat glands and might produce such an alterative effect that the eliminating organs would not be able to dispose of the destroyed tissues.

If care is used we can apply the ray to any organ in the body, whether vital or not. It can therefore be applied to parts which can not be operated on, or if operated upon would cause the loss of a useful organ.

I believe the application of the ray to any part, whether malignant or normal, produces a rapid tissue change, and that new tissue replaces that which is absorbed; but that it produces a more rapid change in malignant tissue than in normal. However, if too much ray is applied, new tissue, whether malignant or not, will not form, probably on account of a trophic influence.

I believe our aim in treatment should be to produce the tissue change so rapidly that the malignant tissue will not reform as fast as absorbed, but not strong enough to destroy or absorb the normal tissue until new tissue can take its place. We have all seen the effect on healthy skin under daily exposure. The outer skin will die, become hard, and come away in large scales, but unless the process is carried on too fast, new skin will be formed under the old, and take its place before it is destroyed. However, if too much ray is applied, all the skin will be destroyed and even the underlying muscle, and healing will take place from the edges, but will be very slow, and it may take months for a small area to heal. I think this tissue change takes place in the deeper structures, only in less degree owing to the ray being weaker.

The X-Ray in the Treatment of Intra-Abdominal and Other Deeply-Located Malignant Growths.*

BY CLARENCE EDWARD SKINNER, M. D.
NEW HAVEN, CONN.

This paper was based upon an experience with thirty-eight cases of deeply-seated cancer in various localities, and all of which were inoperable because of the advanced stage of the disease and offered a hopeless prognosis both as to arrest of the disease or the attainment of euthanasia under any other method of treatment.

Three of the cases were apparently

*Abstract of a paper read before the Roentgen Ray Society, at Chicago, Dec. 10, 11, 1902.

cured; seventeen had been continuously benefited or were still improving with good prospects of ultimate cure; thirteen were temporarily benefited; two experienced no benefit whatever: and in three the treatment was discontinued by the patient before enough treatments had been given to indicate whether or not any results would have been produced. Relief of pain, improvement in the general condition, and lessening of hemorrhage where present, usually followed the x-ray applications.

The four hypotheses that have been advanced as explanatory of the beneficial influence which the x-ray exhibits in connection with malignant neoplasms were exhaustively discussed and compared with the clinical phenomena. These hypotheses were first, that the curative power is brot about thru a directly cauterant action of the rays; second, thru a directly destructive action exercised selectively upon tissues exhibiting a low degree of vitality; third, thru a destructive or inhibitory influence acting against a possible parasitic etiological factor; and, fourth, that cancer is simply a departure from the normal of developmental activity, resulting in a reversion of the normal cell type to one of a more primitive form, which aberration is dependent upon deeply seated constitutional factors and local irritation, and that the vibration of the x-ray is of such a nature as to be capable of influencing the molecular motion of the atoms composing the abnormal cells as to restore the normal characteristics of their developmental processes. Dr. Skinner inclines to the belief that the last is the true explanation, and discusses the clinical phenomena which support his views. He states, however, that there is nothing in the history of x-ray therapy in cancer up to the present time which would conclusively exclude a parasitic element as an excitant of the local irritation.

The employment of surgical measures in combination with the x-ray is recommended under many conditions. The therapeutical relation of these measures to each other is described at length. Altho in most cases the judicious use of the rays appears to accelerate healing processes, yet the speaker cited cases in which the reverse influence seemed to obtain, and great caution was recommended in applying the agent to operation wounds before they had united.

The speaker prefers a static machine and a tube producing rays of high penetration for the treatment of deeply-located cancers, because it is possible with such apparatus to give longer treatments without calling up dermatitis than with a coil and slight penetrative power. Clinical results indicate at present that ray volume should be sacrificed to penetration in these cases. Ordinary gloves backed with rubber sheeting one-eighth of an inch in thickness are recommended for the protection of the operator's hands.

The paper concludes with the following paragraph which we most heartily endorse. "In conclusion I wish to state most emphatically that the therapeutic application of the ray should be intrusted, at the present time, only to the hands of operators who are skilled and experienced in this particular line of work, where it is possible to secure such, as the difference between efficient and faulty technique will frequently constitute the difference between success and failure in clinical results, as well as between safety and danger to the patient."

Practical X=Ray Diagnosis.

Prepared by J. Rudis-Jicinsky, A. M., M. D., M. E., Cedar Rapids, Iowa.
Revised by M. U. Dr. Joseph Hoffman, Vienna, Austria.

A series of A B C teaching for workers in x-ray diagnosis and therapeutics, to be concluded in twenty lessons. Fully illustrated.

Lesson 19.
Deformities and Diseases of Bones and Joints.

In order to determine a diminution in thickness, destruction, deformity, or any other disease of bones with impairment of function or interference with growth, in addition to other methods of examination skiagraphs should be made in every instance. Such pictures always will show the true condition, and help us to make a diagnosis earlier than the old way.

When the shadow of the bones is uneven, shows transparency at some places or very light or dark lines in any direction, the shaft with depressions, projections, or elevations, marked haziness at those places where the bone is not normally thinner, or gives irregular black spots with bright reflex around, or circumscribed spot of bright reflex with irregular lines around, we know at once that there is some lesion. To make a correct diagnosis we compare the bone examined with the normal shadow of a normal bone, see if the reflex is abnormally clear or if there are spots here and there, and if the internal structure and the substance are clearly defined in the midst of an area of dense shadow we may locate thus the size, degree, position, and relation of the whole areas diseased.

In this way we can study any thickening of the osteogenetic layer of the periosteum, see periosteal abscesses or nodes, and after incision observe the progress of the treatment, especially when iodoform is used, which gives an x-ray shadow. Osteitis, scrofulous, syphilitic or rheumatic; osteoporosis; osteitis deformans; necrosis; caries; or any localized collection of pus; may be made out on fluoroscopic examination by the general clouding of the area seen. Osteomas, osteochondromas, osteosarcomas and enchondromas may be well distinguished. If subcutaneous drilling or scraping is necessary, if bone chips are used, or iodoform-glycerin injected into tubercular joints, the progress of repair may be well observed during the whole treatment. In osteomyelitis the bone filling, the medullary canal, any suppuration, caries, necrosis, separation of epiphysis, or pyarthrosis with an abscess or tubercles, are diagnosed readily. The skiagraph would show plainly individual areas of osteoporosis, perhaps beginning osteosclerosis, purulent periosteal excavation, and possibly epiphyseal separation or pathological fracture in bone necrosis, giving to the surgeon the best evidence whether an operation is necessary or not.

The x-ray appearance of caries is dark shadows corresponding with the size and location of the area diseased. The shadows may be round, even or irregular. Death of bone in mass shows discrete shadows embedded in the shadows of the bones. These shadows may be dark, black, or, when the marrow cavity is filled with pus, show circumscribed shadows appearing as dark spots or when empty giving light areas corresponding with the density of the diseased bone. The texture and the shaft of the bone appear irregular, as does the marrow cavity. In syphilitic bone diseases the gummata may be studied well and the nodes discovered, which with all other symptoms, history of the case, etc., completes the diagnosis. Craniotabes or any other wasting of bones, alterations in the epiphyseal cartilages, or any other form of bony projections, about the

anterior fontanelle and on the tibia and humerus in children, can be seen fluoroscopically. Osteomalacia, characterized by general softening of the bones, gives light shadows in some places, or even translucency with comparatively darker shadow, medullary tissue, with all the destruction, fractures or deformity. The same is true in fatty degeneration. Any sequestration or general induration of soft parts may be observed and tuberculous foci found on x-ray examination. If necessary, the blood, bacteriologic and any other examination may be made for differential diagnosis, supplementing more detailed history-taking and more thoro clinical examinations.

In Pott's disease the angular deformity of the spine, in children especially; caries of the vertebræ: the irregular white lines of the intervertebral cartilages; anchylosis; abscesses; the region and the progress of our treatment when a plaster jacket is applied; may be observed and studied. Softening and distortion of the shafts of the bones in rickets with the direction and exact location of curvature of the spine. In obstetrics the rachitic pelvis gives an interesting object for skiagraphy. If tubercular, the isolated foci of the infection may be shown, and the irregular destruction of the bone tissue is seen in marked contrast with the normal shadow of normal bone. Besides the bone reproduction in all cases a bone sarcoma and benign osseous cyst may be readily differentiated, giving translucent areas irregular in the first, and well marked and regular in the second.

In coxalgia we decide at once whether it is femoral, acetabular or arthritic; how far fixation of the joint has progressed, with the compensatory curvature of the spine; or later see if there is a backward luxation of the femur. In these cases we have to remember that acute rheumatism never assumes the grave aspect of a septic infection, suppuration does not take place, and more than one joint is attacked. The leucocyte count is less in rheumatism than in osteomyelitis, where again pain is referred more to the shafts of bones. The skiagraph of a case of acute rheumatism would show nothing except perhaps the circumarticular and intra-articular exudation. Further, in all these cases to make a differential diagnosis we have to consider the absence of high temperature in tuberculous epiphysitis, syphilitic osteochondritis, scurvy, and sarcoma. In osteomyelitis again we have sudden onset, and the skiagraph will show the usual limitations of the osteomyelitic process. The onset in tuberculous joint disease is slow, and the skiagraph will localize the disease in the epiphysis. In tuberculous bone disease the leucocytosis is negative prior to abscess formation. In scurvy we may have epiphyseal separation, but will not see any osteoporosis, and in osteosarcoma the x-ray picture would show no tendency to involucrum formation, but as stated already, translucent areas of irregular osteoporosis.

The differential diagnosis of sprains and dislocations from fracture is very easy with the x-ray, but we may find that very often a "simple sprain" is a fissure-fracture of such a nature that the old means of diagnosis could not detect it at all. The wounds of joints, synovitis, arthritis, sacro-iliac disease, white swelling of the knee joint, rheumatoid arthritis, anchylosis, if bony or fibrous, talipes and loose bodies in joints, may be studied very nicely with the x-ray, and the diagnosis made positive. Exostosis in the bones, myositis ossificans, acromegaly, hemorrhage into the joint, may be diagnosed very readily, and the joint affections in locomotor ataxia with its osteo-fibrous growths within the capsules of the joints, studied plainly. There is no question that there is a large number of injuries to the bones and joints which in former years could not be diagnosed properly, but the

x-rays show always the conditions as they are, and do it without any special regard for great authorities and skilful experts in fractures. To make a correct diagnosis it is necessary to make at least two exposures in different positions in each fracture, but in the injuries to joints I would advise the operator to make a skiagraph of the normal joint also, at the same time, in the same position, and with the same projection for comparison. When the fluorometer is employed we get exact measurements besides the proper localization.

In anchylosis the x-rays decide always whether the fixed posture of a stiff joint, due to fracture or disease, is produced by a growth of an excessive callus, a deposit of earthy salts, or a growth of soft tissue, which all may equally obstruct its movements, while one is far more difficult to relieve than the other. The bony adhesions are opaque to the rays, and the fibrous bands are transparent, so the positive diagnosis is made very easy.

Lesson 20.

Soft Tissues, Examinations and Location of Organs.

The examination of the soft tissues is very interesting, especially in negatives which have been under-exposed. They are usually full of delicate ghost-like yet clearly defined outlines of skin, muscle, tendon, and sometimes veins and arteries, and where there is disease it may give us a different shadow, and locate the area over which the disease extends, if we know our normal shadows of the soft tissues or the organs first. To light and pose the subject properly is the most vital part of the photography of the invisible, and to read and interpret the different shadows correctly is the most important thing in diagnosis. The observation, examination, location and measurement of different organs with all the pathological conditions in function, etc., may be made with the fluoroscope and the organs plainly shown in outline and mapped out in relation to the usual landmarks, with more or less indistinctness. For permanent record we have the skiagraph, but both examinations are useful, and the results of the two in some cases confirm each other. Personal experience in examining plays certainly the main part.

The thorax is a region singularly adapted for examinations, and here the fluoroscope, or a flexible screen, is sometimes superior to the dry plate, on account of the movements of the heart, lungs, and diaphram. For demonstrations in a room where all the light is excluded, a screen large enough to show the whole chest may be used, or the stereoscopic fluoroscope. Rollins' seehear in this and similar cases is also handy. An intrathoracic growth or aneurism may be found, in case nothing definite is shown by strictly lateral examination of the chest, if we make a skiagraph, and know our shadows, remembering that the normal lung tissue is transparent. Appearances in disease result from two simple factors—shadow and motion. I am accustomed to make my physical examination first, then the fluoroscopical, and the skiagraph later if necessary. The clothing of the patient is removed. The heart is examined from the front, and the great vessels from the back of the chest, turning the patient laterally, if necessary, with his arms upraised. In examinations of the lungs or pleural affections the patient should be examined while lying down as well as while standing or sitting on a chair without back.

In examinations of the lungs we have to observe carefully any deviation or compression of the whole cavity, and the visibility, position, form and motion of the diaphram. This will help us to estimate the extent of any pulmonary disability, and give the first real sign of disease, when all other signs are wanting. We may rec-

ognize the range of movement in ordinary and in forced respiration, and any restriction is most likely to mean tuberculosis, pneumonia, pleurisy, or some other affection.

I would summarize the results of my own investigations as follows: Normal lungs are transparent (mark the rules given in the lesson on normal anatomy). Pneumonia in the first stage gives a shadow which resembles that of tuberculous infiltration but is not so marked; in the second stage the shadow is the same as in tuberculous consolidation, but clearer; in the third stage the same shadows as in first stage. In emphysema the reflex is abnormally clear. In asthma the reflex is abnormally clear and the movement of the diaphram restricted. Pleural effusions are shown in black shadows, the upper level of which may be agitated by succussion. Pleuritic thickenings show dark. Pleuritic thickenings over consolidated tissue show darker spots in the field of a marked shadow, especially at the lower portion of the lungs. Tuberculous infiltration is indicated by slight haziness in the beginning, enabling us to recognize more fully and accurately the degree, position, and relation of areas diseased which may or may not be accompanied by dullness. Tuberculous consolidation gives decided shadows. A cavity shows a circumscribed spot of bright reflex, with an irregular line around whose extent is in direct relation to the comparative density of the shadow thrown upon the plate of the fluoroscope or the dry plate while the patient holds a deep breath. They may be located also in the midst of an area of dense shadow. Examine posteriorly and anteriorly, going carefully over the whole field. If a skiagraph should be made, put the patient on his back over the plate, the tube being in the median line over the fourth and fifth ribs. Isolated foci of infection show slight haziness over small spots, clearly defined. Healthy tissues allow the ray to pass freely. The skiagraph is made, according to the location of the foci, with the plate anteriorly or posteriorly, the lesion being as near as possible to the plate. Adhesions are opaque, and fibrous bands transparent. Destruction of the lung tissue would be distinguishable, just as well as any other abnormality in size, etc., from the surrounding shadow, by a line of demarcation. Abnormal concretions appear about as opaque as bones. Foreign bodies are black, if metal, glass, lead, etc.

In examining the heart keep in mind all those rules laid down in the lesson on normal anatomy, its visibility, position, size, form, and movement. Hypertrophy, dilatation of aneurism of either ventricle or auricle may be seen and measured. Skiagraph anteriorly, patient lying over the plate. Pericarditis with effusion may be demonstrated nicely by screen or plate. An aspirating needle may be introduced into the sac, while observed on the screen. Calcification of the aortic wall and calcareous deposits on the valves may be made out.

Foreign bodies in the esophagus, stricture, and dilatation of the stomach can be detected fluoroscopically. In a stricture or dilatation of the stomach Turcks' gyromele will locate the site of the obstruction, and give us the size and movements of the stomach. Intestinal obstruction can be detected by giving an insoluble capsule containing a lead shot to the patient. The lead will show on the skiagraph, which has to be taken anteriorly.

The abdominal viscera are photographed with difficulty. The intestines and the stomach may be distended with gas, as stated already, and give a satisfactory picture, especially in children. But biliary calculi, and stones in the kidneys, ureters, and bladder, dermoid cysts containing bone or other opaque substances, and the

bones of a fœtus, may be successfully skiagraphed. The stomach and the bowels should be emptied before examination. The distended cecum and ascending colon, the enlarged liver or kidneys, may occasionally show upon the plate. The distended rectum and sigmoid flexure are not difficult to bring out. When skiagraphing renal calculi, give purgatives before examination, place the patient on his back on a large plate. The tube should be in the median line about 15 inches above the abdomen. Make a few exposures with low and high vacuum tubes, compare both kidneys, and ureters, and if necessary, put the tube in such a direction as to avoid the great bones. Take the same plan with vesical calculi, but do not be deceived by scratches, air bubbles and spots of a defective plate. The correct reading of the shadows of our pictures is not always an easy task, and every skiagrapher with proper aspirations should place a high standard in this regard before him, and make every exertion to reach it. It is better to aim high, and to be content with only the highest and best. Every one of us will judge for himself whether he is to content himself with mere routine or aspire to artistic and scientific productions. The times call for work of high order, further research, and further experimentation. If you use your judgment, study and try to make a careful execution in your applications you get results which will satisfy you and all of us who try and try again to do the best possible.

Lupus Vulgaris.

Dr. J. W. King of Bradford, Pa., reports a case of lupus vulgaris covering a surface as large as a silver quarter after a treatment of about one month, during which time he had administered several exposures from a Cromolume arc-light apparatus of from thirty minutes to one hour each; two x-ray exposures; and two applications of the static spray of thirty and twenty minutes, respectively, without producing a favorable result.

He then adopted a heroic measure, employing the x-ray from a tube which backed a four-inch spark-gap, for one hour. After this exposure no others were administered. A scab formed, and in a short time the spot had entirely healed. The doctor compares this to a case published in the April number of this journal by him in which case eight exposures had been made on alternate days of from thirty to forty-five minutes with the x-ray, in which the time had been thirty to forty-five minutes, at a distance of six inches from the tube, without improvement. He then made one exposure of one hour, after which the recovery was complete. He therefore concludes that long exposures are essential to derive sufficient reaction to bring about a prompt recovery. —*Journal of Adv. Ther.*

Dr. G. Betton Massey advises that in electric epilation the platinum or gold needle employed should invariably be insulated. "This is easily done after a little trial by heating the needle over a flame and bringing it into contact with a piece of burning hard rubber. The coating thus applied may be immediately reheated and made sufficiently smooth and tapering to permit of the needle being inserted as usual into the hair sheath, the tip only being bare. Such a coating will last only about a half hour, when it should be renewed. With such a needle epilation may be accomplished with a smaller current, less painfully, and absolutely without an after-scar."

Epithelioma of the Tongue.*

BY CHARLES DICKSON, M. D., TORONTO, CANADA.
Electrotherapist to Toronto General Hospital, St. Michael's Hospital, Hospital for Sick Children.

My purpose in presenting this brief paper is to seek information rather than to impart it, for I must confess that I have come to our annual meeting with a liberal supply of interrogation points, eagerly desiring knowledge; hence, my paper should properly be entitled, "How may we best treat Epithelioma of the Tongue?" and I trust that the question will be answered by the association.

The question has been brought before me prominently by reason of four cases which have consulted me in the last five months, and more especially by the first of these, and the chief points of his history I shall briefly state.

On April 11, 1902, I was consulted by J. W., age forty-six years. About March, 1899, he noticed a lump on the right side of his tongue, towards the back of it, which was not very painful. It was operated upon by a confrere on April 25, 1899, and again on May 25, 1899.

At the end of February, 1902, another lump began to form at the junction of the anterior pillar of the fauces with the tongue, and was much more painful this time; the pain being steady and chiefly occurring at night, preventing sleep. Any motion of the tongue, such as eating, or even talking, now became painful.

I determined to try the effects of the x-ray on his case, and beginning on April 15, 1902, he was exposed to the radiance almost daily for some time, the length of seance being at first ten minutes, and later from fifteen to twenty minutes. The tube was placed about one foot away the first time of using, the distance was gradually decreased at future treatments, until the globe was almost touching the lips occasionally.

For the first few applications a flat screen of thin sheet lead was used to shield the face, a hole being cut to correspond with the open mouth; then, a mask was constructed by coating a "false-face" with heavy tin foil, the lower jaw of mask being cut away and an apron of sheet lead substituted, both lips being protected by lead aprons. Next a funnel of lead for use with the mask was devised to hold the tongue to one side, and also to restrict the radiance to the parts affected. Then a self-retaining tongue depressor was tried with the mask. The location was by no means easy of access.

The patient reported that the first freedom from pain in ten weeks followed the second treatment, and that he had slept well for the first time since recurrence. This freedom from pain lasted for a couple of days, when the pain returned as severe as ever, but each treatment afforded some temporary relief.

On May 5 the lower jaw was rayed at about six inches distance. On May 20 less fetor was noticed; a slough came away during the evening. The following evening a second slough became detached and a comfortable night was passed.

On June 16, not being satisfied with the progress of the case, the x-ray was discontinued; mercurial kataphoresis was had recourse to about every other day—a zinc electrode being amalgamated with metallic mercury for the purpose—with a current strength of 10 ma. gradually increased to 20 ma. for fifteen minutes, and on the 17th and 19th, 10 ma. for ten minutes. On 20th the pa-

*Read at Twelfth Annual Meeting of the American Electro-Therapeutic Association at The Kaaterskill, Catski l Mountains, N. Y., on September 2, 3, and 4, 1902. From the Official Organ.

tient reported less pain, less swelling, and more sleep. Cocain anesthesia was employed at each treatment by means of a pledget of cotton wool saturated with twenty per cent solution placed against the affected portion of the tongue. On 21st mercurial kataphoresis, 30 ma. for five minutes and 20 ma. for five minutes; 23d, 10 ma. for ten minutes. On 27th he reported a good sleep for the preceding night and was able to take solid nourishment for the first time in several months, his breakfast comprising boiled eggs, bread, and butter. On July 2 the patient reports that he is sleeping much better, and on 9th he reports continued improvement in general health, that he has gained about ten pounds in the last two months, swallows better, sleeps better, and has less pain.

But, in spite of the cocain, the patient grew to dread the kataphoresis very greatly on account of the pain incurred at the time, and on July 30 this treatment was discontinued and the jaw rayed from the outside for twenty minutes at six inches range. The second raying afforded much relief from pain. The raying was continued on alternate days up to August 14.

But, as the disease seemed to be making progress and the pain increasing in severity, the mercuric kataphoresis was again resorted to on the following day, 15 ma. for five minutes and almost daily thereafter in addition to the x-ray externally for ten minutes, and the patient is still (September 3, 1902) under this treatment.

Immediately upon the appearance of an article by Mr. E. W. Caldwell on the treatment of malignant growths of the throat, rectum, etc., I ordered the tubes and shield described by him in the hope of improving my technique, but unfortunately, being a new form of apparatus, it has not yet been received.

The second case of this series of epithelioma of the tongue was referred to me by a confrère with the request that I should try kataphoresis, using a five per cent aqueous solution of chromic acid. The patient had already undergone raying by another confrère with the same result as my own, but in an aggravated degree, viz., much destruction of the substance of the tongue, with great enlargement of the glands, and swelling about the throat, rendering swallowing and speech difficult. On account of the great pain produced by the kataphoresis the treatment was only tried a couple of times, when the man declined further interference of any sort.

The third case of the series was sent to me for daily treatment by kataphoresis, which he received from July 1 to 16, using, on alternate days, five per cent chromic acid solution and a solution of arsenic four times the strength of Fowler's solution for ten minutes at a time, and varying the amperage from 20 to 30 ma., first applying adrenalin chlorid solution 1-1000, followed by twenty per cent cocain solution. It was impossible for the patient to remain long in the city.

In this case the trouble had only existed a few months, was not extensive, and was situated to the left of the frenum and beneath the front of tongue.

From July 8 to July 16 the latter half of each seance was occupied with mercuric kataphoresis, usually 20 ma.

No x-ray was employed in the case. The tongue was rendered very sore by the treatment.

A letter received the latter end of August states that the patient considers that the lump has disappeared completely, but that he will call for inspection.

For the fourth case of the series I am indebted to the same confrère as in the two preceding. In January last the right half of the tongue was excised.

About May 1 a lump was noticed at the angle of the right jaw.

From July 31 to the present time this gland has been rayed at close range thrice weekly. It has increased in size and is more tender than before treatment was instituted.

In my hands, hitherto, I have not derived from the x-ray that benefit in the treatment of epithelioma of the tongue that it has afforded in so many other malignant conditions.

Is this unsatisfactory result to be attributed to faulty technique on my part, or is my experience borne out by that of other members of this association? Cicatrical tissue exhibits a marked tendency to break down under the influence of the ray; perhaps results would be better in cases which have not been operated upon.

Again, what has been the experience of the members in regard to the employment of kataphoresis in this condition, *i. e.*, epithelioma of the tongue?

I would particularly ask the committee on kataphoresis what pressure is necessary to diffuse metallic mercury from a zinc electrode in the form of its salt into the living tissue? What is the correct strength of current to be employed in such cases, and what results can we reasonably expect? What is the correct technique to be observed? Is anesthesia by cocain kataphoresis the preferable method?

In a word, let me repeat my first question and ask for a very full and free expression of opinion on "How may we best treat Epithelioma of the Tongue?"

DISCUSSION.

Dr. G. Betton Massey said that a trace of copper or of tin would increase the amalgamating qualities of the zinc. He objected to the soft rubber insulation on the electrode presented by Dr. Dickson on the ground that it could not be readily sterilized. It was far better to freshly fuse sealing wax upon the instrument each time it was used. If the instrument were passed too slowly through the flame the mercury would be vaporized—indeed, this was an excellent way to get rid of the mercury when, for any reason it was not desired upon a metal instrument. The paper reminded him of two cases. One of these was a sarcoma of the base of the tongue. A strong treatment for those days (1898) was given with a current of 200 ma. for fifteen minutes, using a blunt and thoroly insulated electrode. The man was very much more comfortable the next day, and owing to the great shrinkage of the growth deglutition became less difficult. The second case was one of epithelioma of the tongue, the size of a quarter of a dollar, situated on the dorsum of the tongue, a little beyond the middle. The patient was a strong Irishman of alcoholic tendencies, so he took ether badly. He received a treatment with a current of about 400 ma. for half or three-quarters of an hour. The slough came away nicely, but a little point being left, a second application was made at the end of two weeks. The patient was placed upon a spring cot with a very large pad, connected with the negative pole, under the back. The other electrode was a blunt amalgamated zinc rod attached to the positive pole. The final result was a complete cure of the epithelioma of the tongue, a fact verified by Dr. G. G. Davis, of Philadelphia. One month later a lump developed in the glands of the neck, and the patient refused to be etherized or to submit to further treatment. When seen three months afterward, the growth was so large that the speaker hesitated to make use of the electrical treatment again. In a short time the man succumbed to the advances of the disease.

Dr. H. P. Pratt said that he had treated four cases of epithelioma of the tongue, and had succeeded in curing two cases. The other two died, as he now believed, because he did not know how to treat them. The first case was that of a physician living in Minneapolis. The growth had been examined by a number of pathologists, and had been pronounced an epithelioma of the tongue. She is at the present time perfectly well. The treatment consisted in opening the mouth, placing a celluloid speculum in it, and allowing the rays to strike the cancer. The treatment was given daily for five or ten minutes for a period of three or four months, and at the same time the x-ray was also passed thru both sides of the neck, the direction of the rays being frequently changed. He used celluloid because it afforded less resistance than any other material. He used it also in the treatment of vaginal and rectal troubles. In another case, after a time, he made use of the static breeze and this was followed by a rapid spread of the infection. It was for this reason that he had insisted, in a previous discussion, that the static breeze should not be used on muscular tissue.

Dr. J. D. Gibson said that on his way to this meeting he had seen an old sea captain in Georgia with a cancer of the tongue. The case was in a hospital and under the care of Dr. Daniels, and was said to be almost well. All enlargement had disappeared from the submaxillary and sublingual glands, and there was no open ulcer about the tongue. There was a large crucial cicatrix and the tissue around this seemed to be a little hard. The motion of the tongue was considerably restricted. He understood that the case had not been treated for twelve months, and the appearances indicated that it was not thoroly well; nevertheless it was a very interesting result of x-ray treatment.

Dr. W. B. Snow said that he had had a good deal of experience with the brush discharge in the treatment of open surfaces, and he had never met with infection as a result of this; indeed, there should not be any such infection in the treatment of these open cases. He used the brush discharge for its tonic effect. By means of a special electrode which he employed the discharge could be localized to the desired part, and it was certainly an excellent antiseptic application. The patient should always be negatively insulated, the discharging rods widely separated and the electrode made of wood and the ordinary pointed one might be insulated by a tapering covering of glass when it was desirable to make the application within a cavity, as the mouth, ear, or vagina. He believed many cases of malignant disease could be as well treated thru the face, or from below, as by the use of a speculum.

Dr. Pratt said that he had used the same thing, even to the wooden electrode, but he had moistened the latter, and the patient had not improved under the treatment.

Dr. F. B. Bishop said that one reason that Dr. Dickson probably had not gotten more effect from his galvanic treatment was that his active pole had too much surface for the amperage—only 20. The surface used was sufficient for a current of 150 ma.

Dr. G. B. Massey said that long experience led him to absolutely agree with the remarks made by the last speaker.

Dr. Dickson said, in closing, that it had not been considered advisable to use more than a local anesthetic, and it was for this reason that this size had been employed.

Chicago Electro-Medical Society.

The 17th regular meeting of the Chicago Electro-Medical Society was held in room 912 Masonic Temple, Monday, December 29th, at 8 p. m., the president, Dr. Elmore S. Pettyjohn, in the chair. Minutes of the last meeting were read and approved.

Pursuant to notice given at the last regular meeting the constitution was amended by the addition of an assistant secretary and an assistant treasurer to the list of officers, and a scientific research committee to the list of standing committees.

The following new members were elected:

Dr. T. S. Middleton, Dr. W. T. Stewart, Dr. H. J. Stewart, and Dr. Gustavas M. Blech; and Edward W. Carr an associate.

Dr. T. S. Middleton read a paper on the Therapeutic Value of Vibratory Electric Currents.

Dr. T. P. Hall read a paper describing an improved fluoroscope which he exhibited to the members present.

T. P. Hall, M. D.,
Secretary.

The Therapeutic Value of Vibratory Electric Currents.

BY T. S. MIDDLETON, M. D.

(Abstract and discussion.)

Old ideas and old methods are continually changing. Where formerly bleeding and depletion were almost universal we now find remedies of an exceedingly mild type in common use. It is so with electricity. Instead of torturing and burning the patient by shocks and heavy currents we now seek to attain and do attain much better results with exceedingly mild currents. I have been able to obtain results little short of the marvelous by using a vibratory current from the static machine when the disks are making only 20 revolutions per minute, with a current so mild that it would, to many operators, seem perfectly useless. My greatest success has been in acute and chronic nervous troubles, neuralgias, paralysis, doulourеux, rheumatism, fibroids, etc. In treating I use my two hands as one electrode, grounding one pole and having the other connected with the insulated platform upon which the patient is seated.

Dr. H. P. Pratt remarked that a fibroid can be destroyed by Apostoli's method or by the x-ray, but that the current described by Dr. Middleton was entirely too weak to accomplish this result. This method of treatment was first described by Dr. Morton in 1881, and has since been superseded by the hyper-static machine.

Dr. P. S. Replogle said that if he could do as much as Dr. Middleton claimed to do he would quit the practice of medicine and surgery and take up electricity alone.

Dr. O. W. McMichael expressed the same opinion.

Dr. Pettyjohn agreed with some of the statements made by the speaker. A regulation of the generator is important. It is advisable always to use mild currents, and the vibratory currents described by the speaker stimulate metabolism. Static machines are useful but he had never found them to act twice exactly in the same manner.

Dr. Middleton admitted that the method was not new but claimed that it was more efficient and less dangerous than any other known method and required much smaller apparatus. He had had constructed a static machine small enough to carry around in his hand, which was driven by a spring motor and which gave excellent results. He was accustomed to

keep his machine in good working order by means of an electric fan which kept the machine clear of ozone. He invited those who doubted his results to come to his office and see for themselves.

The Improved Fluoroscope.

X-rays emanating from a Crookes tube are partly transmitted thru any substance upon which they fall, and partly scattered or reflected irregularly from not only the surface but every part of that substance. The resulting shadows upon the fluoroscent screen or a sensitive plate are dimmed, because every particle of the substance under examination becomes a source of these secondary rays which spread a diffuse light upon the plate or screen. For this reason in photographing a thick portion of the body it is necessary, if a clearer image is desired, to screen off all rays except those which are necessarily required to give the desired shadow, and to place on the back of the sensitive plate a thick lead screen in order to prevent the same diffuse reflection from objects behind the plate.

It has not been found possible to diagnose thicker parts of the body so distinctly with the fluoroscope as by photography. This is partly due to the fact that a fluoroscope does not give a perfectly sharp image, partly to the fact that the eye is not as sensitive as the photographic plate and partly to the fact that no measures have heretofore been taken to shut off these diffusely reflected rays.

The fluoroscope which is here exhibited, which was designed by Dr. H. Preston Pratt and is the one exhibited to the Roentgen Ray Society at its Chicago meeting, has a metallic frame and is practically impervious to such scattered rays coming from the sides of the box. In making an examination with this fluoroscope, if an opaque screen with an opening large enough to expose only the parts to be examined is placed between the body and the x-ray tube, it will be found that the image is very much sharper and clearer than that obtained from an ordinary fluoroscope used in the ordinary way.

In examining a hand or some other thin object with a low vacuum tube no particular difference is seen. But in viewing a hip joint with a medium high tube the difference is very marked. The x-rays from a high tube produce secondary rays of much greater intensity than those from a low tube. Some estimate may be made of the amount of illumination of the fluoroscopic screen, when a high tube is used, by covering the screen with an impervious lead plate in front and looking into the fluoroscope in a darkened room. The screen is then seen to be distinctly illuminated by rays diffusely reflected from the body of the observer and from surrounding objects. In the improved fluoroscope under the same conditions the screen appears perfectly dark. It is evident that such general illumination of the screen must obscure the fainter shadows and diminish the clearness of those that are stronger.

The improved fluoroscope has also a plate of glass between the barium platinocyanid screen and the eyes, which serves to protect the latter from any minute particles which may be thrown off from the screen. It has also a valvular lid which closes the opening for the eyes so as to keep out dust when the fluoroscope is not in use. It is to be noted further that when the fluoroscope is standing screen downward upon a metal plate and the lid is closed the fluorescent screen is protected entirely from decomposition by x-rays, and is therefore likely to remain in good working condition much longer than the screen in the ordinary fluoroscope, unless the latter is kept in a lead box when not in actual use.

The Psychic Effects of Electricity.

BY T. PROCTOR HALL, A. M., PH. D., M. D.

Professor of Electro-Physics and Secretary of the Chicago College of X-Ray and Electro-Therapeutics, Secretary Chicago Electro-Medical Society, Professor of Electro-Therapeutics in the National Medical University.

The psychic effects of electricity are usually considered to be beyond either calculation or control. With most people to say "psychic" is to end the discussion so far as the scientific side is concerned. This view is incorrect. In recent years psychology has become a branch of natural science, and one with which every physician should have some acquaintance. The laws of psychological science are as definite as those of biology, and are as easily apprehended and applied.

By psychic effects I mean those involving the normal action of the central nervous system, with and without consciousness. Peripheral organs receive impressions through some form of physical force, the disturbances reach the cells of the brain or spinal cord and there produce effects which in turn act upon the rest of the organism.

Consider first the simple reflex result of sensation, whether consciously recognized or not. The remarks following apply to all sensations, but especially to those coming from the skin, namely, touch, heat and cold.

A very mild sensation is tonic. It stimulates all the efferent nerves, causes increased glandular activity in many cases, and contraction of the involuntary muscular fibers of the blood-vessels. The reflex effects are mainly local in the region of the stimulus. Congestive headache is relieved by lightly stroking the skin of the face and head. Bruises, before coagulation of the exudate, and swellings, are reduced by very light stroking of the skin over and about the swollen region for ten to twenty minutes. Pain in such cases, caused by the increasing pressure of the congestion, gives way as soon as the reflex stimulus begins to constrict the enlarged vessels and the exudate begins to be absorbed. The mother who "kissed the spot to make it well" made her kisses therapeutically useful. These are common and well known illustrations of the therapeutic effects of very mild sensations.

Stronger sensations are irritant. The arterioles expand and hyperemia results. The increased blood supply may be therapeutically valuable in increasing the nutrition of that part.

Violent sensations injure the nerve centers and stop the efferent stimulus. The extreme results are shock and death.

Electricity, especially the static variety, may be so administered as to give almost any degree of sensation. A gentle static breeze will by its tonic action reduce an acute swelling and relieve pain like magic. If the breeze is from the anode this effect is reinforced by the astringent effect of the acid ions. A mild breeze from the kathode contains antagonistic elements; the sensation is tonic, constricting the blood-vessels; the electrolytic effect is to relax the blood-vessels; result, often nearly zero.

A stinging breeze or a series of sparks is irritating, inducing hyperemia of that part. It is reinforced by the chemical action of the kathode, and wholly or partly neutralized by the anode. If the anode is indicated in any case, a gentle breeze is also indicated, and a sharp or stinging application is contra-indicated. So also, if the kathode is used a strongly stimulating application of the current is in order, and not a mild breeze, unless the solvent effect alone is desired. If static sparks from the anode are made very sharp and painful, they may cause so much irritation as to overcome the astringent effect of the anions; but the effect is inferior to that of the same sparks from the kathode.

The sensations of the patient may thus be made to have great therapeutic value. In electrical treatment the physician can not afford to overlook them. Their regulation is easy; their results clear and definite. The condition of the end-organs of the nerves is subject to considerable variation. What is to one patient a mild stimulus may be to the same patient at another time, or to another patient, an irritant. A little care and attention will be required in adjusting the treatment to the patient's condition.

We come next to the more strictly conscious side, namely, the implanting of ideas or concepts in the mind of the patient, commonly known as suggestion. The implanting may result from verbal or written statements, from the general character of the surroundings, or from the manners of the physician or attendants. But in order to receive their full effect the patient must be in a receptive or mentally passive condition. If the patient is resolved to accept and carry out the suggestions of the physician, he might as well, so far as this effect is concerned, be resolved not to accept them. The essential condition is one of irresolution. It is generally useless to ask the patient to assume this condition. You might as well ask him to cure himself. It is a part of your business to bring about the receptive condition; and here is where the electrical apparatus is valuable.

To the patient the electrical apparatus looks very complicated. It is unfamiliar. The fiery streams themselves are disconcerting. He feels that he is upon strange ground; and among the terrors of the unknown he sees but one familiar masterly figure, the physician. This bewildered condition is one of those required for successful suggestion.

Use it, for the sake of the patient first, and for the sake of your own success and reputation also. The results are positive, definite, calculable, if you obtain this condition and make use of it. A very good plan for the beginner is to explain to the patient the physiological effects of the currents he is using, and how they will effect a cure of the sickness. In this way you secure the intelligent as well as the subconscious co-operation of the patient's organism. The essence of "suggestion," however, is the positive assurance by the physician of the effects that will follow the treatment, or of the future course of the disorder, given in such a way as to be accepted by and deeply impressed upon the patient.

If the physician knows the pathological conditions, and applies his treatment scientifically, according to the known principles of electro-therapeutics, he is on safe ground and can bank upon the kind of results. This is just as true of the psychic part of the treatment as it is of the chemical and physiological.

The known effects of an electric current in or about its conductor are as follows:

1. Heat.—Every conductor is heated to some extent by a current, but therapeutically this effect is of no value. It may be well to remember, however, that a burn by accidental contact with a live wire is simply a burn, that is to say, complete or partial destruction of tissue by heat, and is treated in the same way as any other burn of similar nature and extent.

2. Magnetism.—This is not yet used to any extent therapeutically. In time, rapid reversals of magnetism may be found of value under some abnormal conditions of the tisues.

3. Induction.—When a positive current starts, very brief negative currents occur all round it; when it stops, equally brief positive currents occur round it. Rapid interruptions of a current or rapid alternations therefore produce rapidly alternating currents in the surrounding region, whose effects are similar to those of the Faradic current. Large coils of heavy wire are made, into which a limb or the whole body may be placed.

4. Electrolysis produces polar effects, at the kathode alkaline (solvent and hyperemic), and at the anode acid (astringent). Kataforesis is a variety of electrolysis, the basic ions (kations) moving down with the positive current toward the kathode, and the acid ions (anions) moving against the positive current toward the anode.

5. Stimulation is produced by changes in the current intensity. The more sudden the change the stronger the stimulus to muscles and nerves. A slowly intermittent current gives the best effect for muscles, allowing time for relaxation after each contraction. For the nerves no such relaxation is needed and the greatest result in a given time is obtained when the interruptions are rapid.

A smoothly alternating current (sinusoidal current) gives a minimum of nerve and muscle stimulus, and, on account of its changes of direction, gives no polar effects such as are obtained by electrolysis with a direct current. The ions have scarcely begun to move apart when they are brot back by the reversal of the current. Instead of reuniting as they were before, the ions advance a little in the direction of the changes called "metabolism," which may be roughly described as oxidation. The sinusoidal current is an accelerator of tissue changes or metabolism.

6. Sensory Reflexes are induced by all kinds of sensations, as already stated.

7. Ideation or Suggestion has also been discussed.

Physicians as a class pay too little attention to the last two classes of effects. Those who realize their possibilities, however, are liable to go to the other extreme and imagine that all the effects of electric treatment are psychic. Probably half the effects of electric treatment, on the average, are and ought to be psychic.

Treatment of Malignant Growths by the X-Rays.

As a pain reliever in malignant growths, acute and chronic neuralgias, as tic douloureux, hemicrania, coxalgia, joint inflammations and gastric crises the benefits to be derived in at least 80 per cent of cases are as astonishing as they are satisfactory.

It is in those very disorders where we have hitherto been so helpless to achieve success that we find the x-ray treatment giving the most satisfactory results.

X-ray treatment seems cumulative, so that in cases where for any reason the patient is compelled to cease treatment and passes from observation, when seen after days or weeks of interval the changes which have taken place are delightfully surprising where the disease has been checked or cured, or desperately embarrassing where a violent dermatitis has developed without having given a single sign of warning.

I would call attention to a fact, which if remembered may save humiliation and aid the operator to a more intelligent working knowledge. No one has yet referred to the fact so far as I know, yet it is none the less true that persons with blue eyes, light hair and fair skin are very sensitive to the x-ray, standing only very short exposures, and these with comparatively long intervals between the exposures. While dark haired, dark eyed brunettes seem quite immune to the perplexing and often distressing dermatitis, so treacherous in its onset and tardy in its departure.—The Medical Herald October, 1902.

Editorial Notes.

With this number ends the excellent series of 20 lessons on X-Ray Diagnosis, by Dr. J. Rudis-Jicinsky, which began in April last. The lessons have been much appreciated by our readers, many of whom are acquainted with Dr. Rudis-Jicinsky's excellent practical work.

Dr. Robert Newman in the Journal of Adv. Ther. for Dec., 1902, gives an interesting historic account of the American Electro-Therapeutic Association. The society was organized in New York, Jan. 22, 1891. The first annual meeting was held in Sept., 1891, with 44 fellows.

This society has done good work in stimulating investigation and bringing before the medical profession the possibilities and advantages that lie in electric treatment

The next meeting will be held at Atlantic City, in September, 1903, under the Presidency of Dr. D. R. Brower.

American Electro-Medical Society.

On the evening of December 29th, there was organized in Chicago the American Electro-Medical Society, whose object is the investigation of electricity and allied sciences and the encouragement of their application to medicine and surgery by the formation of district and local societies. Temporary officers were elected as follows:

President, Dr. H. Preston Pratt.

Vice-President, the president of the Illinois State Electro-Medical Society, Dr. Elmore S. Pettyjohn.

Secretary, Dr. T. Proctor Hall.

Treasurer, Dr. O. W. McMichael.

After appointing a committee upon constitution and by-laws the society adjourned to meet at the call of the president. The constitution recommended by the committee will be printed in our next issue.

The Illinois State Electro-Medical Society was also organized as a branch of the American Electro-Medical Society. Temporary officers were elected as follows:

President, Dr. Elmore S. Pettyjohn.

Vice-President, Dr. W. K. Harrison.

Secretary, Dr. Hamilton Forline.

Treasurer, Dr. P. S. Replogle.

A committee was appointed to prepare a constitution and by-laws and submit them at a meeting to be called by the president.

This society aims to unify electro-medical work thruout America, forming state and county organizations which are branches of the national society. Any physician in good standing, no matter what school he belongs to—since science knows no sect or "pathy"—may become a member of a local society, the state society and the national society for five dollars a year. The AMERICAN X-RAY JOURNAL is the official organ of these societies.

Previous to this there has been no organization of this kind. The American Electro-Therapeutic Association and the American Roentgen Ray Society are both national only, meeting but once a year.

The American Electro-Medical Society is broader in its scope and will cover the whole field of electro-medical work. Local papers and discussions do much to stimulate thot, so that the members come to state and national meetings with ideas clarified, and prepared to join intelligently in the discussions.

Associate members are entitled to most of the privileges of active members. The state and national societies are controlled by a system of representation from the local societies, minimizing the danger of political or professional cliques controlling the larger societies.

Static Electrotherapy.

The principles of static electrotherapy may be stated in the form of a brief catechism as follows:

1. Is hyperemia of any part of the body required?—Use the kathode with sparks or stinging breeze.

2. Is hardened or proliferated connective tissue to be dissolved?—Use the kathode.

3. Is ischemia, or diminished blood supply of any part, desired?—Use the anodal breeze.

4. Is accelerated tissue change desired?—Use the sinusoidal current if these tissues are good conductors; otherwise, the x-ray.

5. Is the patient in a passive condition?—Use suggestion.

6. Are none of these effects desired?—Do not use static electricity.

The Size of Atoms.

A paper recently read before the Physical Society of London on this subject by Mr. H. V. Ridout, purports to compute the size of atoms with unprecedented accuracy, based on certain convenient hypotheses. Some of these hypotheses are, perhaps, more convenient than reliable; such, for instance, as that atoms are spherical in form, and that in water, hydroxyl and hydrogen atoms occupy equal volumes; or are marbles of the same size in contact with each other. This view of the atomic structure of water gives a mental picture of the substance resembling piled cannon balls. It is then, virtually, demonstrated in the usual manner that a sphere which in free space would hold by virtue of its electrostatic capacity the same total quantity of electricity as the hydrogen atoms in a gramme of water, would have a diameter about one thousand times greater than that of the sun. In other words a cubic centimetre of water apparently stows away on its hydrogen atoms as much electricity as would be held by a sphere in free space a thousand times bigger than the sun and charged to the same potential. As, however, the capacity of a free sphere varies as its radius while its mass varies as the cube of the radius; the charge per unit of mass varies inversely as the square of the diameter. Consequently, a simple calculation leads to the result that if the fine-grainedness of water is sufficiently great to permit of eleven millions of these lilliputian marbles to line up in a millimetre, their electrostatic storage capacity in one centimetre cube of water would be equal to that of a single marble of a thouand sun diameters.

Since the thousandth of a millimetre is commonly called a micron (millionth metre), the millionth of a millimetre (billionth metre) may be conveniently called a bicron, and the result of the calculation is, therefore, that a linear series of 11.4 of these hydrogen marbles would fit in a bicron. Or, since a linear dimension of about one hundred bicrons is near the limit of visibility attained by the microscope, the diameter of a hydrogen atom would be about one thousandth times smaller than the microscope could render visible to the eye. Lord Kelvin's classical estimate of the size of atoms lay between a bicron and the tenth of a bicron; so that the lower limit of Kelvin's estimated range is about the same as that deduced in the paper here referred to. Of course the present limitations of knowledge in regard to the structure of matter prohibit any such computations from entering the regions of precision. All we can perhaps be permitted to say at present is that atoms of hydrogen approach a bicron in size.

In our last issue, we printed an article by Dr. S. N. Taylor, dealing with the measurements of corpuscles or chips of atoms. According to the results of the various measurements there described, a

corpuscle is a much smaller quantity of matter than an atom, and whereas atoms of different chemical substances have different masses and occupy different volumes, the masses of corpuscles of different chemical substances appear to be the same. A chip of a hydrogen atom cannot be distinguished in its behavior from the chip of an aluminum or oxygen atom. In particular, the mass of a hydrogen corpuscle comes out only about one thousandth part of the mass of a hydrogen atom, and this is derived not from a single experiment conducted in a particular manner, but from numerous experiments made in very different directions. Consequently, if the size of an atom may conveniently be expressed as a fraction of a bicron, it would seem that the size of a corpuscle may conveniently find expression in *bicrons.—Electrical World and Engineer,* Nov. 22, 1902.

Prostatic Treatment of Old Men.

Twelve cases are reported successfully treated with the galvanic current by Dr. H. M. Weed, of Oshkosh, Wis., in the Med. Mag. If the prostate is soft he uses the anode in the urethra, insulated except in the prostatic region, 10 ma. for 10 minutes every few days. When the prostate becomes firm he applies the kathode in the same way, coated with cotton wet with solution of potassium iodid; followed by the faradic current five minutes. The indifferent electrode is placed on the lumbar region or the abdomen.

Electrical Treatment of Phthisis.

Lagriffoul and Denoyes (Archiv D'Electricite Medicale) have shown that in the case of tuberculosis lesions experimentally produced in the guinea pig the action of high frequency currents is to retard or greatly mitigate the development of the disease. In the untreated animals which were used as control, the lesions revealed post mortem were much more extensive and more advanced than in those treated electrically.

Chisholm Williams (British Medical Journal), in a paper on the treatment of phthisis by currents of high frequency and high potential, gives the results of the method as applied to forty-three severe cases of pulmonary tuberculosis in the human subject. Of these forty-three patients, forty-two put on weight and lost all symptoms, except in some few a slight cough. The average duration of the treatment was three months, and the sittings were from ten minutes per diem upwards. —Pacific Coast Journal of Homeopathy.

The Removal of Superfluous Hair by a Combination of X-Ray Exposure and Electrolysis.

By David Walsh, (Lancet, November 2, 1901).

Some time since it occurred to the writer that a combination of the two methods of focus-tube exposure and electrolysis might be of advantage. He found the following method useful where the growth is not too thick The exposure to the focus-tube is made in the ordinary way, and a week or ten days later, when the hair becomes loose, each hair is extracted and the electrolysis needle is passed into the follicle. This method means that a large number of electrolytic punctures must be made in a small area. However, with a little management the removal may be made to extend over a couple of days, and in that way it is possible to remove, so to speak, alternate hairs. Sometimes a second exposure to the focus-tube is needed before the hairs become loosened.

He finds this combined method useful in some cases, as it increases the chances of effectual cauterization of the emptied hair follicle. At the same time it shortens the period of depilation, but, like pure electrolysis, it should not be undertaken unless the patient has enough resolution and patience to undergo the requisite treatment.—Interstate Medical Journal.

X-Ray in Therapeutics.

Applied to an ulcer, it lessens discharge, and makes it purulent, followed by rapid formation of epithelium and a very soft, pliant scar.

There is danger in the ray, and in the hands of inexperienced operators it has produced disastrous results. Even the most careful application cannot always avoid a burn which is largely due to the fact that x-ray effects are so late in showing themselves that sufficient radiation to produce a burn may have been given several days before the burn appears, so that subsequent treatments have been cumulative. We are always trying to produce as much effect as possible without the burn, and since some cases undoubtedly do not show improvement until a dermatitis is produced we are on dangerous ground in every case.

The effects of x-ray applications persist for a long time after the treatments are discontinued and we must therefore not be too hasty in concluding either that there will be no good results or that our cures are permanent.

My conclusions are—

1. In superficial malignant growths, the certainty of cure by the x-ray is so great and the recurrences after operations are so frequent that it is at least an open question whether it is advisable to operate at all. Some of the men most experienced in the use of the x-ray are decidedly opposed to any operative measures.

2. In cases that can be thoroly operated upon I believe a short period of x-ray treatment before the operation is desirable to destroy the outlying portions of the growths; and knowing the frequency of recurrence after operation it is important to direct attention to the desirability of giving the patient every possible chance by the immediate application of the x-ray without waiting for any new growths to take place. The patient should then be carefully watched and at the first evidence that the operation and x-ray treatment have been unsuccessful the treatment should be immediately renewed.

3. In large growths removal is desirable or establishing free drainage to prevent auto-intoxication, which is a very real danger in aged persons or those much debilitated as is shown by the number of patients who have succumbed to toxemia during treatment.

4. Inoperable cases should certainly be given the benefit of the x-ray for we have the reports of too many that have been relieved of pain, have had foul discharges stopped, hemorrhage lessened or stopped, and their lives prolonged and made comfortable, to refuse these sufferers any chance of relief.

Most important is the fact that some such cases have been permanently cured, and in affording these inoperable cases relief we shall give to some of them restored health.—W. P. Spring, M. D., in Northwestern Lancet.

The Velocity of the Röntgen Rays.

The theory of the Röntgen rays, which, up to the present, has received most general acceptance is that of Stokes. According to Stokes' theory, the Röntgen rays consist of irregular waves produced by the impact of kathode particles. The difference between Röntgen rays and light corresponds to the difference between noise and music as produced by sound waves. If this theory is correct, we should expect the velocity of Röntgen rays to be the same as the velocity of light. This has quite recently been shown to be the case by M. Blondlot, whose ingenious method of demonstrating this important result is described in the *Comptes Rendus* of October 27th and November 3rd. It is well-known that the Röntgen rays dissociate the molecules of air through which they pass, and thereby increase its electric conductivity. M. Blondlot took advantage of

this property to determine the velocity of the Röntgen rays. The rays were caused to act upon the spark gap of a Hertz resonator, excited by another spark gap, in parallel with and lying between the focus tube and an induction coil. By suitably regulating the spark gap of the exciter, it is possible to make the focus tube and the exciter work simultaneously, but the focus tube is extinguished immediately after the spark begins to pass, owing to the fall of potential between the leads. The E.M.F. at the spark gap of the resonator is a quarter period behind the current in the exciter, and, consequently, it is necessary to delay the extinction of the Röntgen rays at the resonator gap, if they are to have any effect in making the spark brighter. This may be done in two ways: (1) By increasing the distance between the resonator gap and the focus tube; (2) by increasing the length of the wires conveying the current waves between the exciter and the focus tube terminals. In the first case, the delay in the extinction of the Röntgen rays at the resonator gap is due to the time required by the rays to pass from the focus tube to the gap. In the second case, the delay is due to the time required by the electric waves to pass along the wires from the exciter to the focus tube. M. Blondlot adjusted the length of the wires and the distance of the focus tube till the maximum brightening of the resonator spark was obtained. Then he lengthened the wires and reduced the distance of the focus tube till the maximum brightening was again obtained. If the velocity of the Röntgen rays is the same as that of the electric waves in the wires, then the increase of the length of the wires should be the same as the reduction of the distance of the focus tube. Numerous experiments made by M. Blondlot showed these two distances to be practically equal. This shows that the velocity of Röntgen rays is the same as the velocity of Hertzian waves in a wire; and the latter is known to be the same as the velocity of light.

The theory of Stokes receives strong confirmation from these experiments.

We have evidently of late been making some progress towards a knowledge of the real nature of the Röntgen rays, and M. Blondlot's experiments will undoubtedly contribute greatly to this result.—*Electrical Review, London, Dec. 26, 1902.*

X-Ray Therapy.

Dr. Freund, in his paper at the Dermatological Section of Seventeenth Annual Meeting of the British Medical Association, says:

Skin diseases suitable for x-ray treatment: Clinically, one group is separated from the rest, its essential feature being the removal of hair—*e. g.,* ringworm, favus, sycosis, hypertrichosis. In this class the x-rays are much more effective than light-rays, but both methods stand much on an equal footing in the remaining class of cases.

3. The depilatory properties of x-ray tube are due to direct destructive action or to alteration in the blood supply of the follicles. X-rays possess no bactericidal properties.

4. In the remaining group, cell infiltration and proliferation are essentials—*e. g.,* lupus, epithelioma, in which the destructive influence of the rays is beneficial. The rays also exert a powerful influence in promoting the formation of connective tissue and cicatrices. They may act also directly on the specific poison.

5. X-raying has a more penetrative effect than can be obtained by use of chemicals. The rays in weak doses stimulate and in strong doses destroy hair growth.

6. Comparison of x-ray method and Finsen's method for lupus vulgaris. On the whole, much about the same length of time is required in the two methods. The cosmetic results of both are equally

good. First x-ray large surfaces and treat remaining foci by Finsen's method.

7. Should tubes be soft or hard? The best guide is to be found, not in the estimated qualities of the tubes, but in the reactions actually observed. Practically identical results can be obtained from either hard or soft tubes by adapting the time of exposure, strength of current and distance of tube. Reactions depend largely upon idiosyncrasy, and again upon the parts exposed. Hard tubes are perhaps safer. With these the radiation can be pushed till visible effects are produced, whereas with soft tubes one must work more in the dark and make allowance for reactions before they are visibly manifest.

8. Clinical effects of x-raying: (1) Intumescence of the skin; (2) mild erythema; (3) pigment changes; (4) loosening of hairs; (5) subjective phenomena, itching and burning, etc.

Interstate Medical Journal.

The X-Ray as a Therapeutic Agent.

Dr. John H. Duncan, in the Inter State Medical Journal for October, 1902, gives a classified report of 43 cases treated by x-rays during the past year, including nine cases of epithelioma of the face, of which five were completely healed and the remainder much improved; five cases of cancer of the breast, with "most satisfactory" results in four, and favorable progress in the fifth; five cases of carcinoma of the jaw, neck and hand, two of which were cured; two cases of lupus vulgaris of the forehead, one of which is cured, the other improving rapidly; two cases of cancer in the mouth, no improvement; two cases of epithelioma of the neck, one cured, the other improved; cancer in axilla, improved; epithelioma of the external ear, much improved; cancer of larynx, no improvement locally, but patient feels better; melano-carcinoma of the back, died; rodent ulcer, some improvement, case considered hopeless and treatment stopped; lupus erythematosus, apparently cured; tubercular gland in neck, no improvement; cancer of penis, improvement at first, then stopped, considered incurable; cancer of nose and orbit, some improvement; eczema of the popliteal space, cured; hypertrichosis of the legs, cured; acne of the back, cured; cancer of the stomach, two cases, both died; cancer of the uterus, two cases, one died and the other is apparently healed.

Dr. Duncan states that he has kept a full report of his treatments, and in many cases the results seem to be as good as could be expected under the conditions. Other physicians, however, report marked improvement, including relief of pain, in even hopeless cases; and if the technique had been slightly changed we think Dr. Duncan's results might have been more favorable in this class of cases. As Dr. Duncan says, however, he began this work less than a year ago, and experience is needed in this as in any other department of medicine in order to obtain the best possible results.

Sunlight and Electricity.—Professor Garbasso, of Turin, in a note communicated to the Nuovo Cimento, describes the action of the sun on the electric spark. This has been already studied by Professor Manuelli, who observed that the rays of the sun, falling near the electrodes, favored the passage of the spark. According to Garbasso, even diffused light acts, and with greater effectiveness. In a first experiment he counted 24 discharges in 30 seconds in daylight, to 8 in the same time in the dark. Another experiment gave the figures 18 to 6. The effect of the light seems to last some time after the illumination. Experiments made successively with a lens and a concave mirror showed that by concentrating the light on one of the electrodes, an uninterrupted

current could be obtained even when the distance between the electrodes was sufficient to prevent the passage of any spark at all in the darkness. These properties of the sun's rays persisted after they had been passed thru quartz or Iceland spar; but a few sheets of mica, a plate of glass, a cell 4 centimeters thick containing water or an alum solution, put a stop to the phenomena. These results seem to indicate that the Manuelli effect is due not to the presence of ultra-violet rays, but simply to the heating of the electrodes.—*The Literary Digest.*

At a stated meeting of the New York Post-Graduate Clinical Society, May 16, 1902, J. E. Stubbert, M. D., read a paper on "Some Practical Points on Sanitarium Treatment of Pulmonary Tuberculosis," from which we quote the following, which we believe accords with clinical experience:

"Superficial tuberculosis has been cured by the Finsen rays, but not as rapidly or as surely as when exposed to the x-rays; and, arguing from analogy, it would appear that the beneficial results obtained by the arc or Finsen light rays, in cases of empyema or any form of internal tuberculosis, should be much more decided, provided we can safely allow the x-rays to penetrate thru healthy to diseased tissues without interfering with the nutrition of the former. Thus far, we know that when the x-rays reach a pyogenic membrane, the discharge very quickly changes to a sterile one. This has been demonstrated in my hands in the treatment of lupus of the face and carcinoma of the fundus of the uterus. In the former, after two applications, the discharge was greatly decreased, and in the latter case the discharge disappeared entirely.

Whenever possible, pulmonary cavities, either of tuberculous origin or simple abscesses, should be exposed to the action of the x-rays.

The results that we should look for in this treatment are: First, decrease in expectoration; second, disappearance of the various pus cocci; and, finally, disappearance of the tubercle bacilli. Decrease in cough would, of course, be a necessary accompaniment.

The same method of x-ray treatment can be applied to empyema cavities. Possibly, the x-rays may have an inhibiting, if not a resolvent effect upon infiltrations and consolidations without cavities."

Tabes Dorsalis.

The rationale of the action of electricity in tabes dorsalis is still unexplained and more or less empirical but it has always seemed to me that, reasoning by analogy, if its action in other affections stimulates nerve nutrition, increases the circulation in the part, enhances elimination and promotes normal function, it is likewise true and applicable in this disease and the pathological fact that degenerating nerve tissue must precede sclerosis may explain this action. In any event speaking clinically, that it removes anesthesia, improves muscular tone, increases the circulation peripherally, relieves pain, strengthens the bladder action and promotes well-being, is the daily observation of those who use it much in this affection. I am constrained to believe where used alone the results are not permanent, but when it is merely the part of seems to me there can be no question as a general system of treatment, its action is enhanced and made permanent.—The Alienist & Neurologist, St. Louis, August, 1902.

Cancer of the Uterine Neck with Comments on the Present-Day Teaching (Baldy, American Medicine, August 3, 1901).—Cancer of the neck of the womb is practically incurable. At the present time there is no cure for cancer short of surgery. Forming our own conclusions from the Johns Hopkins Hospital reports: There were 73 cases of cancer of the cervix operated on; 10 cases are alive today, or 20 per cent; but 8 cases

were rejected as non-operable, so that the true per cent is a little over 10. Of these 15 patients the diagnosis was only made because of the excellent care and skill exercised at Johns Hopkins, both clinically and microscopically, by as good experts as there are anywhere, so that in other sections of the country that per cent would not hold. Then these 15 patients, who are reported cured, 9 have only passed from 10 months to 2½ years since their operation; only 6 are alive from 3 to 6 years after their operation. Who can say that every one of the 9 under 2½ years will not die of the disease in the next 2½ years? These same statistics report a number of cases who have died 4¼ and 5 years after operation. In view of these facts the real per cent would probably be 2 per cent. Winter's statistics show almost the same results when analyzed. In teaching, these statistics and the use of the microscope should be emphasized, i. e., there should be a full realization of the facts as they stand, and the importance of the early discovery of the disease must be insisted on. As soon as the diagnosis is made the case should be immediately hurried to the surgeon, for even with early operation only from 2 per cent to 5 per cent are cured. The clinical signs that are to be watched out for are, 1. A show of blood from the genitalia after the menopause, or if there should be a show of blood during menstrual life, that occurs between the regular periods. 2. A deterioration in the general health. The clinical symptoms should decide the operator, not the microscope alone; or in spite of the microscopical findings, if they are negative, and the symptoms are positive.

We commend the above statements to the attenion of those surgeons (now happily few) who are opposed to experiments with the x-ray. Even in cases of internal cancer the per cent of x-ray cures reported is better than the best results here claimed for surgery, namely, 2 to 5 per cent.

With a little more experience there is no reason to doubt that when x-ray treatment is begun early a very large per cent of internal cancers will be cured.

Even benign growths have a way of submitting gracefully to the potency of this unknown quantity of the light world (x-rays) e. g., enlarged prostates have ceased their worrying irritations, allowing the bladder and urethra to resume their normal eliminating function, the gland shrinking so that apparently a new lease of usefulness is given to these organs by these same rays.—Dr. Roland T. White.

Electricity in Chronic Bright's Disease.

The reconstructive influence of electricity on waxy or cirrhotic kidneys cannot be affirmed, but the evidences of its effects upon simple hyperemia, or upon inflammatory affections of the tubules or stroma, are many. My own observation and experience convince me that no other physical effect of electrization is better established than its influence over conditions of passive congestion. It sets up a sort of circulatory drainage that relieves congestive pressure. In renal congestion, where the uriniferous tubules are blocked by the products of inflammatory action, anything that heightens circulatory drainage increases filtration and directly relieves the burdened organs. It is a common experience that electrization does this, and so far forth may be relied upon to hasten the recovery of those cases that have not yet crossed the border line of incurable organic changes. Some time ago the writer reported five cases of renal disease, all of which had been under the observation and care of competent and careful physicians and by them had been referred for electrical treatment. Under persistent and regular treatment four of these cases completely recovered; the other, a chronic incurable, lapsing finally into insanity, received very positive benefit as manifested by increased well-being and the results of frequent urinary analysis.

I prefer the static wave current next, and perhaps equal in value to the static wave current is the high tension faradic current. Flexible electrodes are firmly

bound over the region of each kidney, and the strength of current gradually increased, almost to the point of discomfort, but not beyond the point of easy endurance. In other words, our aim should be to give strong rather than mild currents, and, too, the seances should be prolonged; from ten minutes, say, at first and gradually increased according to susceptibilities to three-quarters of an hour or more. In renal disease as in most other conditions where we wish to stimulate functional activity and improve nutrition, what are commonly called mild currents are, I am convinced, of little value. It is apt to be forgotten that the skin is the seat of chief resistance, and of pain in the passage of the current. With suitable and properly placed electrodes, however, the first is readily overcome and the second easily nullified, and the stronger the initial force, the denser the so-called threads of current that it is possible to concentrate locally.—A. D. Rockwell, A. M., M. D., in the International Medical Magazine, September, 1902.

The X-Ray in Cancer.—Dr. F. H. Williams, addressing the Academy of Medicine on this subject, said, in conclusion, that x-rays undoubtedly do good in cancer. Besides, they arouse no dread, hence patients will come for much earlier treatment than otherwise. There is no shock from their use, their employment is absolutely painless and the cosmetic results are better than from any other method of treatment. With regard to recurrence, one cannot as yet be sure. The x-rays, however, in this regard, certainly promise very well, and if there should be signs of recurrence one can promptly resume the treatment. With regard to internal cancer, the medical man is not justified in promising relief by the use of the x-rays; their employment may lessen discomfort, however, and all external cancers yield absolutely to them. Inoperable cancers will become much more rare, because in very early stages malignant growths will be submited to the x-rays.—The Medical Times, September, 1902.

At the convention of the Interstate Independent Telephone Association recently held in Chicago, a strong interest was aroused in the World's Fair of St. Louis, 1904, by the address of W. E. Goldsborough, Chief of the Department of Electricity of the Exposition. A brisk discussion was precipitated, as the result of which the following resolution was passed by the convention:

Whereas, The Interstate Independent Telephone Association appreciates the great opportunity that the St. Louis exposition affords for giving the independent telephone movement deserved prominence,

Resolved, The Interstate Independent Telephone Association favors holding its annual convention of 1904 in St. Louis,

Resolved, The Interstate Independent Telephone Association commends the St. Louis World's Fair to the support of the independent manufacturers of telephone appliances and supplies.

Tissue Changes Induced by the X-Ray.

Dr. A. G. Ellis is the author of a paper giving the results of investigations concerning these changes. Four cases are reported, in three of which microscopical studies were made both before and after exposures to the x-ray. The most interesting changes were noted in a scirrhous carcinoma of the breast, a portion of which had been given eight 10-minute exposures at intervals of two days, the remainder being covered by a lead shield. Softening of the exposed portion was noted after the fifth exposure. The entire breast was removed by operation and two

portions studied. The softening was found to be due to a cavity 1.5 by 1 cm. in dimensions, this containing a fluid showing many large cells the protoplasm of which was almost entirely filled by fat granules. Surrounding the cavity were necrotic portions of the tumor, the epithelial cells being granular and broken with destroyed outline and fragmented or entirely degenerated nuclei. The same degeneration, in varying degrees, was noted in the other cases, two squamous epitheliomas and an endothelioma. But little change was noted in one of the epitheliomas which contained a very large number of "pearls." A summary of the cases showed: (1) Necrosis of cells and trabeculæ of varying degrees; (2) increase of elastic tissue in the three cases examined both before and after exposure; (3) a tendency to occlusion of vessels by deposits on their inner surfaces. This was marked in some instances, slight in others; (4) practically entire absence of infiltration by polymorphonuclear leukocytes. In regard to the claim of Beck and others that the changes in x-rayed tissue are due to obliterative changes in blood vessels the statement was made that while these changes probably occur they are not in proportion to the necrosis. This suggests the probability of their being results of the same influence instead of cause and effect.—*Medical News, Nov. 22, 1902.*

Correspondence.

Dr. H. P. Pratt,

Editor American X-Ray Journal:

I have a patient whom, on Dec. 31, I treated for enlargement of prostate, using a celluloid rectal speculum; distance, 10 inches; time of exposure, 10 minutes; man on table in Sims' position. I followed this by a spray with static brush, on account of a "tender spot between the shoulders." This relieved his pain. In forty-eight hours he was taken with intense itching and burning all over his back, most intense about his shoulders. I used a lotion of carbolic acid and oxid of zinc with marked relief. At this time there was an eruption like scarlatina all over his back. Twelve hours later this was all gone and over the spine of each scapula was a copper-colored spot, one by three inches, with clear-cut edges not elevated, looking like an iodin stain. I gave him an ointment of subgallate of bismuth, which gave most relief of anything. Today, Jan. 8, the spots are desquamating, and itching is almost gone. The prostate is less and his urinary trouble seems cured; for the past three nights he has retained urine all night—a thing he had not done for two years. The day before the x-ray treatment he had taken 6 or 8 patent headache pills which he thinks may have contained quinine, which always causes hives in his case.

Now the question in my mind is: Did the pills cause the erythema and make the skin more sensitive to the static brush, or was it a real x-ray burn. If a burn, why should it appear at such a distance, 33 inches from the tube, while parts in direct focus were only 10 inches from the tube?

What is the best treatment for x-ray burns? And would an x-ray burn heal as quickly as these spots are doing?

Is a tin screen effective, or is lead necessary. O. E. C.

[Your treatment was good. It is not possible to decide the cause of the dermatitis. It was probably not an x-ray burn. It may have been caused by a drug, or by the static spray, which occasionally produces a burn like the x-ray.

For x-ray burns use some non-irritating anti-septic dressing, such as oxychlorine or lysol, and cover with a layer of cotton. Some advise the anodal breeze to be applied over the cotton. The time required for healing varies with the extent of the injury and the condition of the patient, from a few days to several weeks.

Common "tin" is iron coated with tin. When thick enough to obscure x-rays it does very well for a screen. The cheaper

grades of "tinfoil" are lead. Several thicknesses, say one quarter millimeter in all, make a good screen for face work, tho the rays penetrate double that thickness to some degree. Pure tin obstructs the rays slightly, and is bad material for a screen.—EDITOR.]

The Magnetic Field Outside of the X-Ray Tube.

Radiating in every direction into space from the exterior of the excited Crookes tube as a common center, are innumerable lines of magnetism, the degree of magneto motive force thereof varying with the electro-motor force of the generator and the degree of exhaustion of the tube from which they emanate.

We may liken the atmosphere of the apartment where the Crookes tube is operated to a huge magnet whose positive pole rests upon the excited tube and near objects, while the negative pole rests upon the floor, the ceiling and objects that are more or less remote.

Good conductors of electricity placed within the magnetic field become electrified. If insulated from other objects they obtain a static charge, otherwise they become the seat of electrical currents, positive towards the tube and negative at points more distant.

Hence, if a resistance lamp, e. g., 32 C. P., is held in the hand of the operator with its base towards the apparatus it will become lighted with a glow proportionate to the strength of the magnetic field that surrounds it. A Leyden jar held in the same manner becomes charged, negative within and positive without.

The magnetic condition of the Crookes tube causes it to attract floating objects of the air to its exterior. A flexible sheet of writing paper will be bent to conform to the shape of the globe, to which it will adhere firmly, requiring some force to remove it therefrom, at the same time the sheet of paper will facilitate the working of the tube when its vacuum is very high for electrical penetration.

Like a magnet, the Crookes tube has a lifting power, but this portative effect is slight, only sufficient to hold light objects such as bits of tin foil, paper, a feather, dust, carbon, etc.

An oblong sheet of cardboard balanced upon the highest point of the tube will place itself in the magnetic lines of force and at right angles to the electrical discharge that takes place thru the interior.

A patient who is receiving an x-ray treatment or being radiographed will always be positively charged, and the operator negatively. A spark discharge takes place between them whenever they come in contact with each other.

A small Crookes tube the size of your thumb held in the hand of the operator by its kathodal extremity lights up and generates x-rays of its own, whenever it is introduced into any portion of the magnetic field of another Crookes tube of recent dimensions, that is in turn properly excited by a powerful generator.

JOHN T. PITKIN, M. D.

Buffalo, N. Y.

The next meeting of the Chicago Electro-Medical Society will be held in room 912, Masonic Temple, Monday, Jan. 26, 1903, at 8 p. m.

The next issue of this journal will contain the first lesson of the series of twenty-four lessons on the principles and practice of x-ray and electro-therapeutics. As this is now one of the most important branches in medicine, and the practitioner has been deprived of the advantages of special courses in this line of practice, these lessons will tend to enlighten the busy physician in its principles and practice without taking time from his business to complete a post graduate course such as would otherwise be required. Every physician, whether he expects to follow up this practice or not, should avail himself of this opportunity of mastering its underlying principles. This course will be thoro. It will embrace everything that any practitioner would require to make him conversant with the principles of the subject and give to him all the technique except the clinical practice which can only be obtained by everyday use. This course is worth $100 to any practitioner. The lessons will not be theories alone, but will be built on scientific as well as experimental facts. There are many practitioners around the country who have numerous cases that are not amenable to medical treatment. With a thoro knowledge of electricity many of these patients would be greatly benefited, if not entirely cured.

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THE AMERICAN
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X-Ray Physics.*

BY T. PROCTOR HALL, PH. D., M. D.

The x-ray is produced by the impact of the kathode stream, or of its reflection, upon the inner surface of a Crookes tube. It is generally understood that the bulk of the x-rays start from the antikathode, where the kathode stream impinges upon it. The evidence, however, that has been presented so far is not sufficient to establish this view; and the question whether the x-rays are produced in any other way than by the kathode particles striking the inner surface of the tube remains open for further investigation. The kathode stream itself, it is now generally conceded, consists of particles of gas, which are projected with great velocity (nearly a mile per second) at right angles from the surface of the kathode. The kathode is made saucer shaped, so as to bring the kathode stream to a sharp focus on the antikathode, but since the particles in the stream repel one another quite strongly, the kathode is dished to a much greater degree than would at first seem necessary. In a very low tube the kathode stream is easily visible as a blue streak, and is seen to come to a focus at a short distance from the disk. This visibility is due to the vibrations of the gaseous atoms within the tube, which are relatively abundant in a low vacuum, and which are struck by the stream. In a higher vacuum the gaseous atoms are less abundant, and the light emitted by them as they are struck by the kathode stream is so faint that the stream itself can not be outlined.

Beyond the focus the kathode stream widens as the rays cross, and often the antikathode, instead of receiving all the stream, intercepts only a small portion and casts a sharply defined oval shadow upon the opposite wall of the tube. As the vacuum of the tube increases, the focus moves toward the antikathode. Some of the particles in the kathode stream, as they strike the wall of the tube with such great velocity, become entangled in it and remain there, diminishing to that extent the amount of gas in the tube; in other words raising the vacuum. These entangled particles can be restored to the gaseous condition by prolonged heating of the tube, so that the tube in which the vacuum has become too high for use can be restored to its normal condition by baking in an oven for an hour or two.

If the antikathode happens to contain some dissolved air or other gas when the tube is made, the first time it becomes hot some of the gas is driven out, lowering suddenly the vacuum of the tube.

A simpler plan for reducing the vacuum in a tube when it becomes too high is to use a capillary valve which allows the introduction of a minute quantity of air, as much as may be necessary. An-

*Read before the American Roentgen Ray Society at Chicago, December 10, 1902.

other plan which has been very successfully used is to place within the tube when it is first made a wire of palladium or some similar metal which has the power of holding among its atoms a large quantity of gas, which is driven out by heating. When it is desired to reduce the vacuum of the tube this wire is heated, either directly by a spirit lamp, or in another form of tube by causing the kathode stream to impinge upon it.

The kathode stream where it strikes the glass causes fluorescence, and if the stream is sufficiently impulsive gives rise also to x-rays. X-rays travel outward from the tube in straight lines, differing in this respect from the kathode rays within the tube, which can be slightly bent. X-rays radiate always. Up to the present it has not been found possible to bring them to a focus or make them parallel. They penetrate all substances to some extent. The substances most opaque to the rays are those having the greatest density and the highest atomic weight; namely, uranium (atomic weight 240), bismuth (210), lead (208), platinum and allied metals (atomic weight nearly 200). Of these lead is abundant and cheap and is therefore used for screening x-rays. Sheet lead 2 mm. thick seems to be a perfect shield.

X-rays are scattered to some extent by all substances. There is no very evident relation between the scattering power of a substance and its opacity to the rays. Rays that fall upon lead, iron, brass, copper or zinc are scattered little. Rays that fall upon silver, wood, or the human body are scattered much. Standing in front of a moderately high x-ray tube and looking into a fluoroscope in front of which is an opaque screen of lead, the screen is seen to be distinctly illuminated by means of x-rays reflected from near objects and especially from the body of the observer himself. These reflected rays obscure a faint shadow and greatly diminish the delicacy of the fluoroscope

The fluoroscope before you was designed by Dr. H. P. Pratt. Its box is made of metal, to exclude reflected rays, and it gives a much clearer shadow than is obtained in the ordinary instrument.

X-rays are all alike, so far as is known, except in their penetrating power. Those which are produced by a kathode impulse of great intensity, namely, in a high vacuum tube, in which the resistance is high, and therefore the electromotive force high, have very great penetrative power; it being easily possible, for example, to take a photograph thru a half-inch plate of steel. Those x-rays, on the other hand, which are produced by a slight impulse of the particles of the kathode stream, have small penetrative power. In a given tube the penetrative power may be increased without changing the vacuum by increasing the resistance in the circuit outside of the tube, so that a higher electromotive force must be used, and greater impulsiveness of the kathode stream is secured.

The intensity of x-rays from a given tube, or, if you please, the number of rays per square centimeter, varies inversely as the square of the distance from its center; following the same law as gravitation, light, sound and all other radiating forces. In determining the effects of a given tube at varying distances a mathematical calculation in accordance with this law is necessary. For example at 1 foot from the center of the tube the rays are four times as powerful as at a distance of 2 feet from the center, nine times as strong as at a distance of 3 feet, sixteen times as strong as at a distance of 4 feet, etc.

In treating a patient the distance of the tube from the body affects the intensity of the application in the ratio given above, and it is worth noting that if the

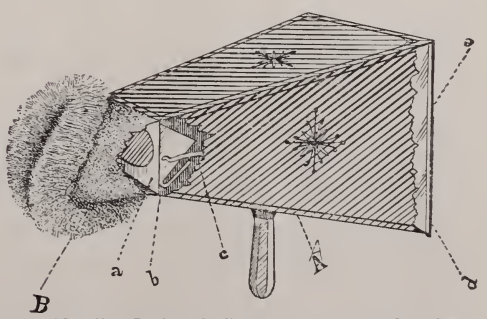
tube is very close to the patient a change of a single inch in the distance may cause a change of fifty per cent in the intensity of the treatment. For this reason it is advisable to treat with the tube at a distance of 10 or 12 inches, but if greater intensity is required, and the tube brot closer for this purpose, the distance must be carefully measured, else apparently erratic results will be obtained. There is another reason for not having the tube very close in treating tumors that have any considerable depth; namely, that the deeper part of the tumor is then treated with very much less intensity than the part near the surface, and the outer part of the tumor may be reduced in size, while the inner part is being stimulated to a more vigorous growth by the mildness of the ray.

The diffuse reflection of the ray from every part of the substance upon which it strikes makes it necessary to screen off all unnecessary rays, both in front of the plate and behind it, when great definiteness is required in an x-ray photograph.

The x-rays of high penetrative power, passing easily thru the tissues of the body, do very little work therein. Rays of lower penetration are almost wholly stopped in the tissues, and consequently produce in those tissues all the effect that they are capable of producing. For economy in therapeutic work, then, the tube should have its vacuum so regulated that the rays produced will be able to pass into and barely thru the part to be treated. If too high a tube is used, most of the rays pass entirely thru and waste their energy in the surrounding room. If the tube is too low the rays may be unable to reach more than the surface of the part to be treated.

The same remarks apply to a photographic plate. The rays from a low tube, being easily stopped by the film, produce a very distinct decomposition of the silver salts. Rays from a high tube passing thru a film leave only a slight mark. Since the photographic effect of the rays is cumulative, a lower tube can be used for photographing any part than could be used for examining the same part with a fluoroscope.

Several theories have been held regarding the character of the rays. The corpuscular theory, namely, that the rays consist of minute material particles projected thru the tube, is definitely abandoned. The wave theory, in some form or other, is now universally accepted. The theory of longitudinal ether waves, which was at first favored by Roentgen, meets now with little support; and the view that x-rays are electrical waves of some sort is almost unanimous. Indeed, when we consider that the only known source of x-rays is electrical, and that the most marked effects are also electrical, we can hardly avoid the conclusion that the rays themselves are electric disturbances. On this view, which was first proposed in 1896 by Dr. H. Preston Pratt, their electromotive force is the impulse of each particle from the kathode stream; the electric circuit is completed, as in other electric radiations, by the union of adjacent positive and negative rays at the end of their course, where their work is done; and there is in every substance some resistance to the ray, corresponding to (tho not identical with) electrical resistance.



A—Metallic Body of Fluoroscope. B.—Opening. a.—Opening. b.—Lid. c.—Fastening of Lid. d.—Screen. e.—Glass Plate.

Systematic Records.*

BY M. I. WILBERT, M. D.
Director of the Radiographic Laboratory at the German Hospital, Philadelphia.

The value of written records will readily be admitted by any one that has ever attempted to burden his memory with a sequence of happenings or events for comparison or study. The use of such records is obvious, both as an aid to the memory in the study of a large number of events or happenings and as a reliable method of preserving an account of the more minor details. At the German Hospital, Philadelphia, written records of the x-ray work have been kept for upward of six years, and a considerable amount of valuable material has been accumulated.

The records have been continued in book form, in preference to using cards, because it was found that in practice, where a number of persons had access to the records, cards were at times taken out and not returned, or if returned were put away improperly. A system of card records would certainly be practical and economical in such cases where but a limited number of directly responsible individuals had access to the cards. The records kept at the German Hospital are in triplicate, and are arranged (1) under the serial number of the radiograph, (2) under the alphabetical index of names of patients, (3) under an analytical reference to the part of the body involved. Under the index we record the month and date, the name of the patient, the part of the body exposed and the serial number of the exposure.

Under the main, or serial, number entry, we record the number of the exposure, the month and date, the part of body exposed, the side of the body, the direction of the exposure, the size of the plate used, the name of the patient, the age of the patient, the number of the tube, the spark gap on which the tube is working at the time, the distance of the anode from the plate, the time of exposure, a short history of the accident, or an outline of the condition, and an account of the x-ray findings.

Under the analytical record we have again, the month and date, the name of patient, the age, sex, side exposed, serial number of the negative and the size of the plate. Then under different headings we have an indication of the x-ray findings for quick reference, and finally a more extensive or complete description of the x-ray diagnosis.

The entry in the serial number is made before the exposure is made, then this serial number is put on one corner of the dry plate with an ordinary lead pencil. This effectually prevents any subsequent exchange or mistake of the resulting negative. After the negatives are washed and dried the record is completed and the negatives themselves, wrapped in packages of four or five, are put away in lock corner wooden boxes for subsequent reference or study. Each package has the number of the inclosed negatives inscribed on the outside, and the wooden boxes when filled have a card attached giving the included numbers. While this plan of making a record may appear to be quite complicated, in practice it is very simple and takes but a few minutes to complete. With a systematically arranged book or a card but little writing is required, the major part of the entry consisting of figures or abbreviations.

For reporting the findings of the x-ray examination two separate blanks are used. For hospital cases a special blank form is filled out, and this becomes an integral

*Abstract of a paper read before the American Roentgen Ray Society, at its third annual meeting, Chicago, 1902.

part of the record or history of the case. For reports to the out-patient department we use the record card of the patient. For instance, when an out-patient is referred to the x-ray laboratory, he is given his record card and a request blank for the examination. After examining the patient the x-ray diagnosis is written on the back of the card, and the patient goes back to the proper department for treatment, the whole examination consisting of making the proper exposure, developing and fixing the negative, and subsequently examining the same in daylight, need not take more than 15 minutes.

For records of exposures made for therapeutic purposes, a separate book is used. This consists of an index for the patient's name, and properly ruled pages for the records. Each patient is given one leaf of the book, allowing for records of about eighty exposures. The page is headed by the name, age, and diagnosis of the patient, the remaining portion of the page is ruled to include a record of the following data: month and date of the exposure, number of the tube used, spark gap on which the tube is working, distance of the anode from the skin of the patient, and remarks of the progress or change in the condition of the patient.

The advantage of such a record is self evident. A complete account of any particular case at a glance is alone worth any amount of effort that would be required to continue such a record systematically.

The advantages to be derived from a systematic record of radiographic work are numerous, not the least among them being the ability to actually demonstrate the amount of work that has been done in the laboratory.

Routine Use of the X=Rays.*

BY M. I. WILBERT, M. D.
Director of the Radiographic Laboratory at the German Hospital, Philadelphia.

The possible information that may be obtained from an examination by means of the x-rays has been referred to many times. The advantages that are to be derived from the systematic and routine use of these rays in all cases where a bone lesion might be found have not been sufficiently discussed.

At the German Hospital, Philadelphia, it is the practice to refer all cases of severe injury to the x-ray laboratory for examination. In case the injury is an evident one the patient is not sent to the x-ray laboratory until after the existing deformity has been reduced and the proper dressings applied. Then a radiograph of the part is taken and this either confirms or corrects the diagnosis, and also gives a very satisfactory proof of whether or not the part has been properly reduced, or the dressings suitably applied. In addition to this we have a permanent and very satisfactory record of the nature as well as the extent of the injury. In minor accidents, where a bone injury cannot be demonstrated, the patient is referred to the x-ray laboratory before treatment is begun or any dressings applied. How important a satisfactory x-ray examination is, in cases of this kind, is evident when we remember the long train of symptoms that may follow an injury to a bone at or near its articulating surfaces. An incomplete fracture or even an infracture into the articulating surface of a bone can by excessive callus

*Abstract of a paper read before the American Roentgen Ray Society, at its third annual meeting, Chicago, 1902.

formation interfere to a very marked degree with the subsequent restoration of function of a part.

Just a few cases to show how important this may be, and to illustrate how very difficult it sometimes is to make a correct diagnosis from the clinical signs or the available history of an injury as given by the patient.

S. L., 47, female, fell backward down a number of steps and "landed all in a heap." There was evidently considerable injury about the left elbow, and from the clinical signs a diagnosis of fracture of the outer condyle was made. X-ray examination showed that the patient had a comminuted fracture of the head of the radius, and also a partial backward luxation of both bones of the forearm.

H. A., 35, male, while walking on a wet pavement suddenly slipped and fell, striking on the palm of his hand. Patient says that after his fall his left elbow hurt him some, but not markedly. During the night the elbow began to swell and became more painful. When he presented himself at the hospital there was marked swelling, some pain on attempting to move the elbow, but no crepitus and no deformity. An x-ray examination revealed an extensive infracture into the lower end of the humerus. This case also illustrates the importance of exposing all suspicious cases in at least two directions. A side to side view in this particular case did not show any evidence of a bone injury.

P. C., 11, male, bumped his right thumb in a fist fight some days before applying for treatment. The thumb and hand were very much swollen and quite painful. X-ray examination showed a fracture of first phalanx of thumb, near metacarpal articulation.

J. C., 35, male, was sent to the German Hospital with what was supposed to be an osteosarcoma of right ulna, about 6 cm. above wrist. X-ray examination showed that the patient had evidently had a fracture of the ulna without displacement. There was considerable callus, and this had given rise to the suspicion of malignant bone disease. Inquiry later elicited the fact that some three weeks before, the patient, while acting as a motorman on a street railway, had been struck on his arm by a released brake handle, and that his forearm had been painful ever since.

Cases of this kind could be duplicated by the score, but sufficient have been cited to illustrate the necessity of a complete and accurate diagnosis of an injury before proper treatment can be carried out.

Too much stress cannot be laid on the importance of at least recognizing all bone injuries that involve articulating surfaces. The possibly serious after effects in these cases should be sufficient excuse to warrant their careful and systematic examination by means of the x-rays.

Instantaneous Skiagraphy.*

BY MIHRAN K. KASSABIAN, M. D.

I have chosen this subject for my paper because of the fact that this matter is very largely misunderstood and hence neglected. The majority of x-ray operators overexpose parts, and when I make mention of this or demonstrate to them the possibilities and advantages of rapid skiagraphy, they become exceedingly surprised. Many of the "old timers" refuse at first to believe that such a thing as instantaneous skiagraphy is possible, and become converted only after seeing for themselves.

TIME OF EXPOSURE, 1½ SECONDS.

Strictly there is no such thing as "instantaneous skiagraphy." By this phrase we mean the process of taking skiagrams of any part of the body with very short exposures. The time of exposure of one operator differs from that of another, so that thus far no universal standard has been attained. The time of exposure depends largely upon the size and character of the apparatus employed, the degree of vacuum of the tube, and the thickness of the part to be skiagraphed. The time of exposure has gradually been reduced from two hours (the time of exposure when the x-rays were discovered by Prof. Roentgen) to as many seconds, the time now in vogue. The minimum time now used by me in instantaneous skiagraphy is about one second; this being the time re-

*Read by title at the Chicago Meeting of the American Roentgen Ray Society, December 10-11, 1902.

quired to skiagraph the hand, and the time exposures necessary to skiagraph such parts of the body as the kidney, hip, skull, lung, etc., vary in direct proportion with the thickness of the parts. The following table will give you an idea of the time-exposures I employ for skiagraphing.

Upper Extremity—
Hand, 1 second.
Wrist, 2 seconds,
Forearm, 3 seconds.
Elbow, 3-5 seconds.
Shoulder, 10-15 seconds.
Lower Extremity—
Foot, 5-6 seconds.
Ankle, 5-6 seconds.
Leg, 5-7 seconds.
Knee, 10-15 seconds.
Hip, 40-60 seconds.
Head—
Face, 10-15 seconds.
Cranium, 40-60 seconds.
Thorax, 20-30 seconds.
Abdomen, 50-90 seconds.

This standard of exposures was attained after prolonged experimentations upon individuals that weighed between 125 and 145 pounds, and for any increase of weight (say for each 15 pounds increase) an addition of from 1 to 2 seconds should be estimated.

NORMAL SKULL, EXPOSURE 15 SECONDS.

The apparatus which I use is the Queen & Co. 15-inch spark coil, supplied with a 110-volt current. The tube should be of high vacuum; the resistance of the parallel spark gap being from 7½ to 8½ inches with a 3-inch spark gap in series to prevent blackening of the tube. The

distance between antikathode platinum plate and the surface of the part that is being x-rayed should be from 12 to 15 inches. The plate used is especially prepared for x-ray work, manufactured by the Cramer Co., of St. Louis. No intensifying screen is employed. All dressings and clothing should be removed and the part laid bare when using these short exposures. The time of exposure should be counted (in seconds) from the time the rays are penetrating perfectly (which is ascertained by using the fluoroscope), at the instant the shielding lead plate is removed. When a static machine is employed the time of exposure should be increased by 1/5 to 1/3. The time of exposure with a static machine depends upon the size and number of revolving plates and the number of revolutions per minute. I have used a mica plate machine which can stand a high speed without danger of breaking.

After the plate has been exposed it must be developed, and here is the point where individual skill is highly important. Most of the x-ray experts seem to be lacking in the knowledge how to develop the plate after it has been exposed to the action of the rays, and for their benefit I deem it expedient to give the following hints concerning the development of under-exposed plates: The developing solutions should be slightly stronger than the ordinary photographic formula; after the oxidizing power of the developer has been lessened by use, new or fresh solution should replace the old; and lastly the time of development should be lengthened, exercising care to not cause fogging of the plate.

The advantages of short exposures are the following: Avoiding the production of superficial burns; preventing the production of the secondary rays; and when taking a skiagraph of the lungs the plate

POSTERIOR VIEW, EXPOSURE, 25 SECONDS.

Acute Pneumonic Phthisis—whole left lung is hazy, indicating general infiltration and not consolidation; physical signs and clinical symptoms non-characteristic; case of four weeks duration; tubercle bacilli absent; notice the articulation of dorsal vertebrae.

will not be marred as the result of movement of the ribs and lung and diaphragm, which is always the case when long exposures are made. During short exposures the patient should be instructed to keep his mouth wide open. In renal, vesical and biliary calculi there will be no danger of the rays penetrating same, as is the case in long exposures. More differential detail is obtained by short exposures.

I shall contribute an exhaustive and more detailed report after I have completed my experiments in this line of work.

1831 CHESTNUT ST., PHILADELPHIA, PA.

Medico-Legal Proceedings.

Malpractice in Electro-Therapeutics.

WILLIAM H. MONTGOMERY, M. D.
CHICAGO

So far in this class of cases there has been no decision in any case by a supreme court and for this reason we are obliged to apply the general principles of common law to those cases which may come up in giving an opinion as to the probabilities of a verdict against the practitioner. In the first place x-ray work will no doubt be classed as a specialty and the principle of bringing to the aid of the patient "Ordinary knowledge and skill in his profession" will not clear the physician using it, for it will be held that as a specialist he must keep abreast of the times and make use of the latest and most approved methods and appliances, due consideration being given to the locality in which the physician is practicing, and it will be proper for the jury to decide, from the circumstances surrounding each case, whether or not he has fulfilled his duty in this respect. These points are well settled in the cases of Feeny vs. Spaulding, 89 M. 111, and McMurdock vs. Kimberlin, 23 Mo. App. 523.

There is no question but that a physician using the x-ray in Chicago will be required to possess a much greater degree of skill and proficiency in the use of these remedial measures than a physician located in a small town fifty miles distant, and the law will hold a physician to a strict accountability should untoward results occur in the use of the x-ray, for it is at the present time, in the eyes of the law, largely experimental, and whether its use was justifiable or not is a question to be determined by the jury trying the case.

The hazard is increased in this class of cases by the uncertainty of the effects of the x-ray as applied to different individuals, and farther that no judicial decision in a court of last resort has been rendered as to whether the use of the x-ray comes within the pale of medical treatment or not, and as no statute has been enacted upon this point there is really no law to apply.

The implied contract to follow established methods of procedure applies to this work, and I am of the opinion that when a final adjudication of this point is made it will take the character of an agreed method of procedure by experts in this particular line of work, upon the principle that every physician is entitled

to be judged by the principles of the school of medicine which he professes to practice.

It is essential that every operator of the x-ray give explicit and proper directions to the patient treated as to the care of any burn that may occur. It is also essential that no abandonment of the case, in a legal sense, is allowed to occur.

As the physician by his implied contract to his patient must use his best judgment, it is his duty to advise his patient whether or not the x-ray treatment will be of benefit, whether this opinion is asked for or not, and should he fail to do so he will be held liable for any damages that may accrue. Should he advise the patient that the use of the x-ray is improper, and against its use, and the patient insists on the treatment and in compliance with that insistence it is applied, we are of the opinion the courts will relieve the physician from any responsibility should injury occur.

In the cases so far tried in the lower courts, in all that have been brought to our notice, judgment in favor of the physicians has been rendered for reasons not germane to the actual effects of x-ray treatment, but from principles involved in the matter of evidence, contributory negligence, and of the procedure being taken along lines which could not be sustained by evidence; the incompetency of the attorneys prosecuting the case being quite apparent to an expert in medical jurisprudence, and for this reason we would caution physicians using this treatment in their practice, not to rely too much upon the fact that the verdict in the cases so far tried has usually been favorable to the defendant. To illustrate the above points, in the case of MacDonald vs. Shields and Jernigan and O'Connor, the latter being an x-ray specialist, lately tried, Dr. Shields was found to have had nothing to do with the case and Dr. Jernigan was merely an assistant. The entire operation was made by O'Connor, and as O'Connor was not served with any summons nor complaint in the action, in fact was not made a party to the action, in a legal sense, no case could be made out against him, and his share of the responsibility is the only one which interests us. The trial judge ordered the suit dismissed without letting it go to the jury *on these points,* none of which bear in any way upon the x-ray treatment. We note that the plaintiff in this case was severely burned by the ray and that she suffered epilation, leaving her entirely bald. We farther note that notice of appeal was given in this case, but the probabilities are that a new suit will be instituted against Dr. O'Connor for the reason that Drs. Shields and Jernigan could not be held to be responsible for the acts of Dr. O'Connor, under the ruling of the court as given above. It is found in these cases that the general rule holds which applies to all malpractice cases; that the physician is usually attacked by a comparatively incompetent and obscure attorney while he is driven to employ a much higher class lawyer to defend him; and as a consequence, in this new field, the inexperienced attorney is more largely at a disadvantage than where lines of procedure and decisions bearing upon the various points at issue are available to him, all of which has aided to bring about the favorable decisions in cases so far tried.

The practice of physicians of taking a written agreement from the patient relieving them of responsibility in case of untoward results and of any damages which may occur, is not binding in law, and in case of death could not be introduced as evidence in court, adverse to the interest of any party having an interest in the life or services of the deceased.

One point should always be borne in mind, and that is that in some individuals injury may result from exactly the same

treatment in all respects as that given another patient where no injury resulted. In what way this hazard may best be prevented is not within the scope of this article, and is within the province of the practitioner who makes x-ray treatment his specialty, rather than within the province of the specialist in medical jurisprudence.

In conclusion allow me to suggest that until a decision by some supreme court has been obtained, settling the status of x-ray treatment, practitioners should follow the most conservative lines in their use of electricity in general and the x-ray in particular.

Report made to the City Council of Chicago by the Hon. John E. Owens, City Attorney, which appeared in their Regular Proceedings, dated Jan. 12, 1903.

There are a number of physicians who make a business of appearing in personal injury cases, so-called experts appearing in case after case against the city for the same set of lawyers, and their testimony takes a wide latitude, both from scientific facts and matters of opinion for the benefit of the plaintiff. Anything in the symptoms of the plaintiff, any deviation from the normal appearance of the body, any outward symptom, is immediately attributed to the accident and as a consequence of the accident, and the defense has no way to controvert this sort of medical testimony, except by calling some reputable physicians to testify to purely theoretical questions based on the defense's theory of the case and may be far from the truth in the matter, but under the practice in this state it is the best that can be done under the circumstances. Many large verdicts are returned and judgments secured by venal medical testimony. Not only is the city mulcted by medical and legal harpies, but other corporations likewise. The defendants in personal injury suits in Cook County are at a disadvantage before juries and are often mulcted of heavy damages by the usual practice as followed in the state courts, by being denied the right of a true knowledge of the plaintiff's condition as ascertained by a medical examination by a disinterested physician, or a number of physicians, who will arrive at a conclusion as to the condition of the plaintiff in their best judgment, and give the court and jury their best opinion and judgment as to what extent the plaintiff in the action has been injured.

Under the practice in Illinois a medical examination is not compulsory on the plaintiff. He only suffers by the moral effect on the jury and refusal to submit himself for such examination as may be demanded of him from the court and before the jury, the defendant knowing, of course, such a demand can be legally refused, but hoping for its effect on the jury in the mitigation of damages.

Venal medical witnesses, experts and otherwise, often influence large verdicts for plaintiffs by their distortion and exaggeration of the plaintiff's symptoms that are absolutely untrue. Many large verdicts and judgments are secured for trivial injuries and gross fraud is often perpetrated upon the courts of Cook County by venal, biased and untruthful medical testimony. The remedy for these conditions is the amendment of the practice in Illinois so as to permit an examination of the person of a plaintiff, who claims such disabilities have resulted

from an accident to his or her person, by a reputable physician appointed by the court, who will, by nature of such appointment, be unbiased and have no interest in the outcome of a case and will give the court and jury a true and actual insight into the plaintiff's condition, and a true verdict can be rendered, based upon the actual merits of the case.

In order to remedy this evil, I would suggest that your legislative committee be instructed to secure the enactment of a law at the next session of the legislature, that the trial court and judge be empowered to direct the plaintiff in a personal injury suit to submit to a physical examination by one or more physicians or surgeons to be designated by the court or judge, and that such examination be had and made under such restrictions and directions as the court or judge shall deem proper, provided the defendant in an affidavit shall present to the court or judge satisfactory evidence that he is ignorant of the nature and extent of the injuries complained of.

I have introduced the x-ray into the trial of all cases where there is any question as to the nature of a fracture of any bone in the human body. By means of the x-ray an exact diagnosis of fractures and dislocations can be made. The process of repair can be watched and the exact condition known at any period. If there has been a fracture at any time or injury to the bony structure, the x-ray will reveal it even if several years have elapsed. Tumors and degenerations occurring in the bone as the result of injury can be distinguished from tuberculous affections, etc. Electrical diagnosis is another branch of medico-legal procedure which is very essential, especially in determining the amount of degeneration that may take place in the nerves and muscles, to locate the same exactly and clear up the diagnosis of many obscure cases. Exaggeration of symptoms and similar frauds are of no avail when electrical tests are made.

The Adjustment of Damage Claims.*

BY MASON B. STARRING,
Counsel to the Chicago City Ry. Co,

Not many years ago the caption of this paper was a subject which managers regarded in much the same light as that in which the modern horse first looked upon the automobile; it seemed sure enough an invention of the evil one and dead certain to hurt something or somebody, but with the growth of the street railway and the community it supplies with means of transportation, that cancerous growth, yclept damage claims, which had already fastened itself upon the steam roads, began to develop in the street railway body corporate, and as it grew so grew the study and care bestowed upon its treatment, and all careful managements have long since commenced to place experts in charge thereof. The successful adjustment of damage claims depends largely upon the personal equation; the personality and mental characteristics of claimant and adjuster are the prime factors in all settlements. No matter how fair a corporation may be, may its adjuster be never so able, yet if the claimant is so constituted as not to know fairness when he meets it, or so determined to bilk the company that no reasonable amount will appeal to his sense of right, then an adjustment must fail, and resort be had to the law; then, too, the question of locality

* From a paper presented to the American Street Railway Association, at Detroit, Mich., Oct. 18, 1902.

must be taken into consideration. Since cities are pest ridden with the itch for personal injury litigation; in Chicago, for instance, there seems to be from five to fifty "drummers" for personal injury suits to every personal injury, or person willing to claim one, to be drummed; and its taxpayers are even now being asked to add a large number of judges to the already large bench of the county in order to secure the trial of cases within a reasonable period of time after their commencement. What that city needs is not more judges, but an enforcement of the laws against champerty, barratry and maintenance. If I am rightly informed my own fair city is not by any means the only one suffering from such necessity.

To further the proper adjustment of claims of this class, a proper foundation must be laid at their very inception. * * * Some physicians think it to their interest to humor their patients, and having a natural distaste for antagonizing their patients by telling them that the complaints made by the patient and the conditions found by the physician have no reference whatever to the probable consequences of such an accident as that under consideration, leave them firm in the belief that all their troubles are due solely to the violence applied at the time of the alleged accident. This is especially true of pelvic and nervous disturbances of the fair sex; many a woman directs her doctor's attention for the first time to pelvic troubles subsequent to an accident, when her comfort and possibly her health for a life-time might have been subserved by consulting him promptly relative thereto when the first manifestations of disturbance made their appearance. Occasionally instances are met with where the courage to undergo voluntary torture for the sake of the few dollars that can be secured out of a claim, attains so abnormal a development as to amount practically to insanity. Of these strange phenomena an extreme example which came under my personal observation is so abnormal as to almost pass beyond belief by any person not confronted with proof. Shortly stated it was as follows: A woman physician, related to a fine family and of independent means, brought suit for damages. The only injury that she was able to show she sustained at the time the accident occurred was a slight sprain of one ankle. She was exceedingly heavy and in the course of the trial it developed she had had both breasts, weighing some twenty-eight pounds, excised and upon being asked the relation this operation had to the accident to her ankle or why she had it performed, she replied that it was done in order to lessen the burden of weight which her "poor sore ankle" was compelled to sustain. It afterward appeared that at some time antedating the accident she had undergone an operation known as oophorectomy for the purpose of bringing on an artificial menopause, in order that the conditions which nature had imposed upon her sex should not interfere with her attendance upon her duties as a physician. Subsequently to the trial and disposal of this case, it was said that having learned of an operation performed in France for the removal of flesh from the thighs she hied herself to Paris to try this operation.

Science has come mightily to the aid of the adjuster in throwing the tell-tale search-light of the x-ray machine upon the human anatomy. This marvelous discovery is effecting great and good results in all personal injury departments of those corporations which have had the good fortune to come in contact with, and secure the service of, an expert in its use; many and many are the cases of fraud and imposition which it has exposed, and a great, great many (how many I never have gone into the details to carefully ascertain) of the claims that bones have been broken or fractured in

steam or street railway accidents have thereby been shown to be mere frauds, and that no fracture or fractures existed. Previous to the invention of the x-ray instrument it was much more difficult for the adjuster to ascertain the truth in regard to this point. A limb placed in a plaster cast is thereby put beyond the close inspection of a physician, and it is manifestly impossible to compel the removal of the cast for the direct inspection of the wound; this afforded an easy and successful mask for deceit. Now, however, the x-ray reveals, almost at a glance, the real condition of the hidden bone. Could an instrument be invented which would as indisputably and as accurately determine the extent of injuries to nerves and muscles as this machine does to bones, the task of adjusting personal injuries would be greatly lightened and the uncertainty which prevents an always accurate decision would be very largely removed.

Facts are what win! He who can uncontrovertibly and openly place facts before a malingerer puts him at a disadvantage from which he can never recover. Facts, too, are the enemies of some physicians. Look out for the doctor who puts the plaster cast upon the unbroken limb. He is a stumbling-block in the path, but employ to meet him not one who has a beam to pluck from his own eye. Rarely should the attending physician, if honorable and a fair practitioner, be ousted from the care of his patient. Be the recovery of the patient never so good, if the company furnishes the surgeon who attends the injured person, by some perversion of mental vision it is claimed alike by patient, relatives and friends that he is and has been sent to the bedside of the patient to injure him in some occult way, and by so doing, affect detriment to his interests and protection to those of the street railway company, sight being lost of the fact that the complete and early convalescence and recovery of health of the patient is best for all.

A Recent Malpractice Decision, in which the Court Recognizes the X-Ray as an Approved Method.

A case of unusual interest to the profession is that brought in the Elkhart Circuit Court by Shelley against Dr. G. W. Spohn, of Elkhart, Indiana, for burns caused by the x-ray. The defendant procured a change of venue to the LaGrange Circuit Court, in which court the case was tried early in December last.

Dr. Spohn is a specialist of the eye, ear, nose and throat and has been using the x-ray in treating his patients for some time. The plaintiff came to Dr. Spohn last spring, suffering with a growth on the under left side of his tongue. Dr. Spohn diagnosed the growth as cancer and told the patient the only thing he could do for him was to treat him with the x-ray. The patient consented; the doctor told him of the uncertainties of a burn and then gave him about a dozen treatments, one each day for about two weeks. After the last treatment Dr. Spohn noticed a very slight dermatitis beginning on Mr. Shelley's face. He gave him a lotion to put on his face; no more x-ray treatments were given him, and the patient, after visiting Dr. Spohn a few times, left the city, he claimed, for treatment of his burns. He later brought his action for malpractice, claiming $10,000 damages and alleging that the burns were due to the doctor's negligence in not providing a covering

for the face to protect it from the action of the rays. He further alleged that he was directed to use his left hand to hold down the lower jaw during the exposures; that there was produced a severe burn on the hand, which has permanently crippled it; and that each exposure lasted an excessively long time. The doctor denied the complaint generally and set up contributory negligence on the part of the plaintiff.

Plaintiff appeared in court, his face showing no perceptible signs of having been burned, while his hand was badly distorted, a sore on the back, close up to the knuckle of the middle finger, on healing, having drawn up that finger and generally distorted the hand. The serious part of the case was therefore to explain away the injury to the hand. There was not much contention over the burned face. The doctor did not deny that the face had been burned. He contended that there was no way of telling what strength of ray would burn a particular patient, for a ray that would produce a dermatitis in the tissues of one person might not affect another at all. He said he used a medium vacuum tube and provided a suitable covering for those parts of the face which he wished to protect. At first this covering was a lead disc for two or three exposures, and then lead foil was used with other materals during the remainder of the treatments. These statements were all corroborated by the doctor's assistant, who attended each treatment, and who, during the most of the time, held the coverings on the face of the patient. The plaintiff testified that each treatment lasted thirty minutes, while the defendant and his assistant both testified that the treatments lasted from three to seven minutes. The questions of length of exposure and failure to use a proper covering were, therefore, one of fact entirely, with the statement of the plaintiff unsupported on the one side, and the statement of the defendant supported by that of his assistant on the other, and approved as good practice by his experts. The plaintiff attempted to strengthen this part of his case by introducing photographs taken of himself showing the conditon of his face from time to time. They showed the face to be greatly swollen at first, so much so that he said that he could hardly see. But that fact counted for nothing when once the use of a proper covering was proved.

Plaintiff further contended that his eye was injured so that the vision was considerably affected. Defendant's experts examined the eye and found nothing unusual. So that charge failed. There was nothing left then but to explain the distorted hand.

The plaintiff alone testified as to the use of his hand as alleged. Dr. Spohn, corroborated by his assistant, said that the plaintiff continually used his hand to wipe the saliva from his chin, against explicit directions to keep the hand down; and that in doing so the covering would be knocked off the face, necessitating the cutting off of the current. The plaintiff was suffering considerably from the cancer and had little vitality during the treatments, and his restlessness, together with his persistence in wiping off his chin, which, of course, was underneath the covering, brought his hand up to or near the path of the rays, and it would have been acted upon by the rays had there been no covering.

Defendant's experts took the view that the x-ray, when it burns at all, produces a dermatitis upon the tissues in the path of the rays, the greatest effect being where it is the strongest. In this case the rays were directed into the mouth of the patient, and accordingly they would be the strongest there. If plaintiff were required to use his hand to hold down his lower lip and jaw, as he claimed he was directed to do, it would be reasonable to expect to

find the burn the worst, if one should occur on the hand, where the hand approached the closest to the path of the rays, namely, on the tips of the fingers. These experts examined the hand of the plaintiff for that purpose, but found no evidence at all of burns on these parts of the fingers. Plaintiff could not then say that his hand mght have been so placed to his mouth that the back of it came into contact with the rays, while the fingers were out of the way. The simple experiment will show that the rays would probably be cut off altogether from passing into the mouth if the hand were so placed. The only reasonable explanation of the condition of the hand then was that it was due to an affection of some kind. This was considered by the experts to be accounted for by the hand coming into contact with the saliva when wiping off his chin the poisonous saliva getting into an abrasion of some kind on the back of the hand. Each expert so testified, and plaintiff could not dispute it, only by ridicule.

The case was very ably presented to the jury and it rendered its verdict for Dr. Spohn wthout much delay, and answered favorably each interrogatory propounded by defendant. Dr. Spohn's testimony was so clear and free from contradictions, and his statements were so accurately supported by his assistant, that the jury could not do otherwise than believe the defense. The case was too clear to leave any doubt. The point on which there seemed to be the greatest danger—that of the alleged burn to the hand—proved to be not so difficult when once the real nature of it was known. Plaintiff had no expert, save a few deposisions from physicians who were not present, to contradict defendant's experts, whose opinions were unanswerable.

There is little likelihood that the case will be appealed, although there is need of a precedent, there having been heretofore no x-ray case ever decided in any supreme court in the country. This case is so plainly one of fact that there is little chance of the Appellate Court reviewng it. It will assist in removing a sense of timidity which practitioners cannot help having in the use of the x-ray for the treatment of their patients. It is apparent by this case that the court did not consider that the defendant had made such a departure from the recognized methods of his school that he would be liable for any injury, whether or no he was negligent. But he recognized the x-ray treatment as one being quite generally adopted and used, and that the practitioner using it would be liable for ordinary negligence and for failure to exercise ordinary skill and care, just as any physician or surgeon is held.—*Medico-Legal Bulletin, Jan.* 1903.

Chicago Electro-Medical Society.

The eigtheenth regular meeting of the Chicago Electro-Medical Society was held in the Drill Room, Masonic Temple, on Monday evening, January 26. It was called to order by the president, Dr. Elmore S. Pettyjohn, at 9 o'clock p. m.

Minutes of the previous meeting were read and approved.

A. H. Reading, M. D., H. S. Tucker, M. D., S. S. Felker, M. D., F. G. Corbett, M. D., and Chas. Gilbert Davis, M. D., were elected to membership.

The following resolution, moved by Dr. Pratt, was adopted without dissent.

Whereas electric currents and x-rays produce effects upon the human body which are extremely valuable for therapeutic purposes, and which in the hands of persons who have not the necessary knowledge and training are liable to cause serious injury, therefore the Chicago Electro-Medical Society declares its unanimous judgment that every use of electricity and the x-ray upon any part of the human body should be by law defined as medical practice.

Under pretense of x-ray photography or of fluoroscopic examination any person may, as the law now stands, give a course of treatment with the x-ray. The law recognizes all other forms of medical treatment as belonging only to licensed practitioners. We see no good reason why the x-ray should be an exception to this rule.

The secretary is hereby instructed to transmit a copy of this resolution to the committee on medical practice of the state legislature at Springfield, Ill.

The following paper was then read:

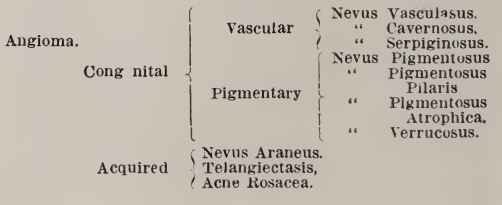
Angioma.

BY H. P. FITZPATRICK, M. D., PH. R.
Professor of Dermato'ogy in the Chicago College of X-Ray and Electro-Therapeutics.

The practical dermatologist recognizes that all abnormal pathological changes in the dermal capillaries, whether congenital or acquired, whether purely vascular or pigmentary, should come under one general heading.

While the author of our textbooks recognize this intimate and direct connection, they nevertheless so scatter their treatises upon these vascular hypertrophies thruout their books as to leave the association wholly to the intelligence of the reader. To obviate this I suggest a general heading of "Angioma" for all pathological vascular or pigmentary changes of the dermal capillaries.

Under this heading we will find two main divisions—first, congenital; second, acquired, with subdivisions as follows:



It would not be possible to thoroly cover this subject in this brief article and therefore using the diagram as a basis for comparison, I will merely outline the most important subdivisions and their treatment by electrolysis.

There are three congenital nevi and three acquired that I want to consider briefly. Of the congenital we have:

First.—Nevus Vasculosus, a term generally limited to vascular distension of superficial blood vessels at or soon after

birth. They may be either bright red, purplish, or violaceous, the color depending upon the preponderance of arterial or venous capillaries. They may be located upon any part of the body but are found most frequently upon some portion of the head, preferably upon the face or neck.

This is the typical Birthmark and Port Wine Mark of the laity.

Second.—Nevus Pigmentosus and Nevus Pigmentosus Pilaris, the so-called Mother's Mark, a congenital pigmentation of the epithelial tissue of the skin frequenting the unexposed surfaces, in contradistinction to nevus vasculosus, usually a light brown or black, varying in size from a pin point to more than the breadth of the hand. Rarely, unless of the pilaris variety, do these marks cause sufficient annoyance to require extirpation.

But when covered with coarse hairs, and especially when located upon the chin, neck, or shoulders of the society girl, their removal becomes imperative.

Third.—Nevus Verrucosus, congenital warty excrescence extending, in all the cases I have examined, from the lower angle of the ear to the chest. This is a rare type but one that readily yields to electrolysis.

Of the Acquired Angiomas we have:

First.—Rosacea and Acne Rosacea. The first is an enlarged and engorged condition of the superficial capillaries of nose and cheek; a much milder form, but if not combated a pretty sure precursor of the more aggravated Acne Rosacea.

Second.—Nevus Araneus consists of a central anurismal vessel with a perfect network of minute capillaries as offshoots. From its resemblance to a spider's web it is frequently called Spider Cancer. Owing to their sudden onset as a bright red spot under the eye or on the cheek, with a tendency to rapid and continuous enlargement, they are frequently the cause of unnecessary alarm.

Third.—Telangiectasis, the so-called red nose, uncomplicated with Acne as in Rosacea, but frequenting the same localities of nose and cheek and simulating the same appearances in modified form.

These six subdivisions practically cover the field of vascular disfigurements.

All are amenable to treatment. In my experience no treatment is so effectual for complete eradication with minimum scar as electrolysis. Other treatments that have been used with fair or partial success are: (a) Sherwell's method, by multiple puncture with a set of fine needles in a holder, the needles being first dipped in a solution of chromic acid of from 30 to 50 per cent, are then inserted into the growth. Bleeding is arrested by compression and the parts are covered with collodion dressing.

(b) Squire's operation. Freeze the parts with ether spray and make numerous crossed and closely spaced linear incisions parallel to each other and in a plane obliquely directed to that of the integument.. Bleeding is arrested by compression and a dressing of collodion is applied.

(c) Sodium Ethylate, applied by means of a glass rod. This is powerfully caustic, and the resulting crust formation is supposed to obliterate the capillaries as in electrolysis.

(d) The ligature, (e) puncture with hot needles, (f) nitric acid, carbolic acid and other caustics, (g) multiple vaccination, and (h) excision, have all been employed more or less.

My method of treatment is invariably electrolysis.

With a single needle, preferably platinum, and from 2 to 8 milliamperes of current I transfix the vessels with the needle. As soon as these vessels become blanched I remove the needle and reinsert at the point of furtherest eletrolytic action, continuing treatment in this way until the mark has been thoroly covered.

I do not use a set of needles in a holder as some advocate. I find a single needle, and care in inserting, will accomplish more than a set of needles inserted haphazard.

In nevus pigmentosus pilaris I have seen the growth disappear entirely by the time all the hairs were destroyed—with electrolysis. You can undoubtedly destroy any form of so-called birthmark and as the pain is inconsequential and the patient can continue his vocation, and further, as the textural changes are insignificant, I would advise electrolysis in preference to all other known methods of treatment.

Discussion.

Dr. H. P. Pratt—This is a most interesting paper regarding the use of the needle. Birth marks are difficult to get rid of, and there are many failures thru lack of knowledge. Of late the x-ray treatment has been much used for this work, but the needle is equally effective, tho it has been much abused.

Dr. Stewart—My experience in this kind of work has been limited. I have used caustics but the cure is then worse than the disease. The needle is much less painful. Is much irritation set up?

Dr. Fitzpatrick—Yes, very much, but it subsides in 24 hours. A crust forms and the cicatricial contraction closes the capillaries. No anesthetic is necessary, as the pain is slight. In removing a mole, which is always elevated above the skin, thrust the needle thru it. This cuts off the circulation; a crust forms, and a new skin forms underneath on a level with that surrounding it. The crust falls off in about ten days leaving a pink scar which in two or three months changes to the natural color of the skin. Either positive or negative electrode may be attached to the needle, which must be of platinum. The positive electrode acts more quickly, but makes more scar tissue.

Dr. Pettyjohn—I had a patient with a red nose, supposed to be alcoholic, but which was caused by eating starchy foods which the patient was unable to digest. I treated the bowels and the red nose was cured. Patients are easily frightened. One lady waited ten years before applying for the removal of a mole, which was removed in three minutes by electricity. I used for this the negative current and connected the positive with a large electrode held in the hand. I inserted the needle before completing the electric circuit and used one or two miliamperes. It is better to give four treatments with too little current than one with too much. In removing hairs I have not used Dr. Massey's insulated needle, but have found no trouble with the operation. Nevi can be successfully removed with the electric needle. General constitutional treatment must be given at the same time.

Dr. H. P. Pratt related a case in which a practitioner had used a faradic instead of the galvanic current in an attempt to remove hairs, and of course failed.

Dr. Fitzpatrick—I put the positive electrode in a bowl of water on the patient's lap. When ready I have the patient put one finger in the water, then the second and third if necessary. Each additional finger decreases the resistance and increases the amount of current. A small sponge in the hand soon dries out.

Dr. W. D. H. Brown—The flannel electrode in the hand does not dry.

The following paper was then read:

Cell Tonics as Adjuvant to X-Ray Treatment.

BY HAMILTON FORLINE, M. D., CHICAGO, ILL.

A cell tonic and nutrient as an essential adjunct to the success of the x-ray in the treatment of certain malignant diseases has been called to my attention by some papers from the pen of Dr. H. Preston Pratt, in which he points out the importance of animal extracts in this connection because of their ready decomposition by the x-ray.

Dr. Pratt's experience with the x-ray as a therapeutic measure dating back to 1896 entitles him to rank as the pioneer in x-ray therapy, and gives special value to his opinions relative to some of its beneficial effects.

The papers to which I refer are an article published in THE AMERICAN X-RAY JOURNAL, July, 1902, and another read last December before the American Roentgen Ray Society, at Chicago.

In these articles he lays great stress on the value of assistant treatment; the wisdom of his conclusions has been brought forcibly to my mind by a case which I will presently cite.

The beneficial action of the x-ray in malignant disease seems to depend upon a destructive or solvent effect on the growth, thus throwing into the tissues for elimination certain effete products, which reduce the physiological resistance of fixed and motile tissue cells, or at any rate, as explained more accurately, there is produced as a result of the influence of the x-ray, ionic changes or ionic displacement. It would appear from this that a most valuable indication to be met in every case of malignant disease treated with the x-ray is the raising of cellular vitality by every possible means to the highest pitch; in other words, in addition to the ordinary hygienic regimen, those remedial agents must be employed which act most powerfully as tonics, nutrients and eliminants, and at the same time are easily decomposed by the x-ray.

Without going into recent advances in physiological chemistry, which remove some of the nebulæ surrounding vital phenomena, and which in part, at least, account for the action of animal derivatives, I wish to hastily describe the nature of the physiological action of the animal product referred to in the title of this paper, and to present a few practical results exemplifying, I think, its cell tonic potency.

This product is obtained from the hardy, common goat, whose great physiological resistance (because, perhaps, of its enormous lymphatic system) is greatly increased by special nutritive diet and hygienic surroundings. The parts used are the lymphatic glands and orchitic fluid removed under anesthesia, with the spinal cord and brain. These parts are immediately submitted to a high pressure of 300 atmospheres and combined with a preserving fluid containing a small quantity of chlorid of gold and sodium, after filtration thro porcelain under pressure. The active principles obtained from these organs by this process have been demonstrated to possess powerful cell tonic properties by extensive experimental as well as clinical data. It would be impossible and probably unnecessary for me at this time to go into the details of these experiments, as they have been ably described by Dr. Joseph R. Hawley, others, and myself, in the proceedings of the American Animal Therapy Association and elsewhere, with an overwhelming amount of clinical data. An agent which will produce a few curative, and in the majority of cases markedly beneficial, results in such diseases as locomotor ataxia and other degenerative diseases of the spinal cord,

in a few varieties of chronic nephritis, tuberculosis of all types, arterial sclerosis, and many other types of chronic disease, must of necessity possess great power as a cell tonic. As an eliminant it has been shown by accurate data to increase elimination through the kidneys, bowels, skin and lungs.

I will cite one case in which the remedy was used in conjunction with the x-ray. A man 55 years of age had been suffering from what had been diagnosed by some of the leading surgeons of the United States as a small-cell sarcoma of the ocular cavity. He had been submitted to all forms of treatment for this condition thru a period of twelve years, without any benefit. One year ago he was given treatment by the x-ray for this condition, and continued it ten months, without any change. At the end of ten months we started him with ten drop doses, twice daily, of this lymph compound, and at the end of sixty days of this treatment there was marked improvement in his condition. The inflammatory area was much diminished, and healing at this time seems active, with every evidence that a perfect recovery will take place. During this period the x-ray was administered every other day.

I am anxious that other medical men interested in the treatment of malignant disease should verify what appears in this case to be an excellent result.

This remedy is administered by a simple hypodermic injection in such cases, and inasmuch as it possesses unquestionably, as demonstrated in other cases, a localized cell tonic effect when injected near the seat of lesion, it would seem wise that it be tried in these cases near the body of the malignant growth itself.

Discussion.

Dr. Pratt—This is a very interesting case. In a paper read by request before the Illinois State Eclectic Medical Society I took the position that the x-ray changes the position of the ions of the body, thereby changing the elementary structure of the cells. It is necessary to give remedies that will be split up and taken possession of by the cells. The x-ray causes septic poisons to be liberated which we want to get rid of. This lymph contains protonuclein which is easily decomposed and made use of by the cells. The body consists essentially of 15 chemical elements, which are associated thru their electrical pull, changes of which bring about decomposition. Food entering the body is taken hold of by the ions and built into the structure of the tissues. The x-rays destroy abnormal tissues in malignant disease while the normal tissue must be built up by nutrition. The cells of cancer and tuberculosis must be split up electrically or you cannot destroy them. The x-rays furnish the necessary electrical force.

Prof. L. M. Rader, chemist, Chicago, expressed the opinion that the success of animal therapy depends entirely upon the composition of the proximate principle administered; and that it had been proven by some of the oldest investigators that goat's lymph owes whatever virtue it may have in a therapeutic way to the lecithin contained in its elementary molecules.

Billon obtained pure crystallized lecithin, and named it ovo-lecithin because he had found it in the egg.

Therapeutists now universally recognize that lecithin promotes the active metabolism essential to the proper nutrition of the organism. It is considered probable that this active metabolism is induced more by the tonic and regulating effects of lecithin upon the protoplasm of the nerve elements than in any other manner. At any rate its favorable influence

upon progressive metamorphosis is seen in the prompt increase in appetite and weight. Therapeutists have demonstrated its specific influence upon the ratio of the red blood corpuscles, and its marked influence in the rapid assimilation of albuminoids.

Lecithin exists in relatively small proportion in vegetable and animal substances, but no method of extracting it at a reasonable cost in a pure state was known till the investigations of Billon made it possible.

Various preparations containing phosphorus were long administered in the hope that lecithin would, in some unexplainable manner, be evolved and become available in the process of cell assimilation, but the results were indifferent. The older forms, such as the phosphate of calcium, or the preparations which followed, including glycero-phosphate of iron, calcium, magnesium, etc., have not proved capable of promoting the required changes of organic matter.

Exhaustive therapeutic tests have demonstrated that the work of Billon has given medicine a nerve tonic that not only ably re-enforces the power of the elementary molecule, but does it without danger or damage to the vital organs, as the heart, lungs or kidneys.

Aside from the immortal work of Pasteur, the production of pure crystallized lecithin by Billon is the most noteworthy achievement of the last half century in the realm of medicine.

The speaker cited cases where the x-ray being employed without notable advantage, the addition of lecithin had caused a marked improvement in all the symptoms, and *vice versa*, thus demonstrating Dr. Pratt's idea of it.

Reduction of the Vacuum in a Crookes Tube.

BY WELLINGTON T. STEWART, B. A., M. D.

CHICAGO, ILL.

What causes a Crookes tube to elevate in vacuum while in use? Suppose that a tube has not been exhausted. If we connect this tube in series with a generator capable of furnishing a spark as great or greater than the distance between the electrodes in the tube and place a shunt circuit across the line, having an air space equal to the space between the electrodes in the tube, we will find that the current will discharge equally over both.

If the tube is now exhausted to about 1/100 of an atmosphere, we will observe an effect very similar to that which occurs in a Geissler tube. The shunt circuit can now be closed to within one inch, and the current will not pass that way, showing that a tube exhausted to a certain degree offers less resistance than before, and the same follows until we carry our point of exhaustion to about one-millionth of an atmosphere. At this point we have what is termed a Crookes tube, capable of furnishing the Roentgen rays.

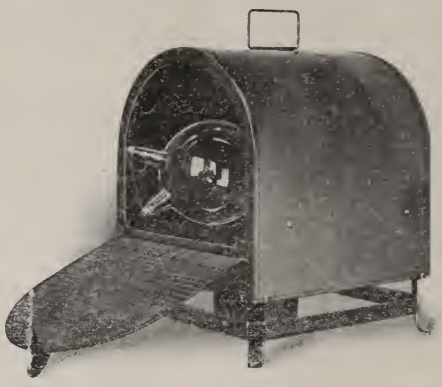
The tube has now been exhausted to a point capable of generating x-rays, and we find it works beautifully, backing up less than a one inch gap or shunt, and it is termed a soft or low tube. As we continue to use it, however, the vacuum rises.

In an exhausted tube the molecules are less numerous and therefore have greater freedom of motion when the tube is connected in series with a generator. The electrical energy is transmitted by means of the electrodes to the gas molecules within the globe. The stream is projected with considerable force against the kathode, or negative electrode, and in turn is

forced back against the anode. Striking the kathode with great force disintegrates to a certain extent the molecules of its substance. The kathode stream carries fragments to the target, a portion of which is deposited thereon and the balance projected, finding a lodgment against the inner structure of the glass on a line most marked where the fluorescing occurs, and where we find the greatest source of x-radiance. This point you can readily ascertain if you will examine the target of a high tube, and holding the tube itself to the light, see the marked line where the aluminum particles have been deposited. I believe that the force of these deposits are so intense that the gas is gradually buried or absorbed by the flying particles, thus raising the vacuum of the tube.

If you have any doubt about these deposits of aluminum on the target and the glass surface, you can easily verify the fact by destroying a hard tube and examining its target and the inner surface of the glass.

Some English writers have stated that a very high tube would give excellent results after having been baked for several hours. This led to the thought that the heat applied to the tube caused the metal particles to expand and liberated the gas which had been absorbed. The oven herewith presented was devised after a careful study, to obtain a uniform heat surrounding the entire tube, thus preventing any possibility of fracture, which would be liable to occur if heat were applied to one portion only. This device consists of an outer shell of sheet iron surmounted by a handle and lined with asbestos. Three-



quarters of an inch from the asbestos wall is another shell or wall of corrugated iron. Thru this wall are six rows of openings running parallel with the oven, which are so arranged that an equal distribution of heat is obtained in the entire chamber. The door consists of a double wall, openings in which allow for heat expansion. The device rests on a standard or table of sufficient hight to accommodate an alcohol burner or stove, consisting of a bronze cup filled with steel wool, 3½ inches in diameter and 2½ inches deep. A suitable handle is attached. Wood alcohol is the fuel employed.

This oven is the design of Mr. John McIntosh of the American X-Ray Company, to whom I am indebted for many of the suggestions contained in this paper.

It requires from five to fifteen minutes to satisfactorily reduce a tube.

Lupus with Report of a Case.

BY H. P. PRATT, M. D.

I wish to report to this society a case of lupus which has greatly interested me, and I am sure after you have heard the history, the subsequent treatment and final cure you will be interested also. It is a rare thing that a patient ever recovers from this disease where there is extensive destruction of tissue as in this case, and especially when in the location here involved. The patient was first seen by Dr. W. A. Pratt, September, 1900, with the following history. Mrs. H. S. C., age 40 years, American by birth, family history excellent. In 1893 a small pimple appeared on her cheek and had gradually enlarged in spite of all kinds of antiseptics and cauterizing treatment. It had given no particular pain at any time. Dr. W. A. Pratt found, on examination, a large ulcer extending from the inner canthus of the eye to about the lower margin of the lateral cartilage of the noze, and horizontally from a point opposite the center of the eye socket to the septum of the nose, exposing the nasal cavity on the right side. No definite diagnosis was arrived at at that time, but the opinion was that the case was one of lupus. Antisyphiletic treatment was given to clear up the diagnosis, but with negative results. The ulcer was dressed daily from this date for a period of 30 days. A solution of bi-chlorid of mercury and also peroxide of hydrogen were used as cleansing agents, and a dressing of boric acid applied, and this covered with a light pad of borated gauze. No bacteriological examination was made at this time to determine the nature of the trouble, but sebsequently this was done, which revealed its tubercular nature. At the expiration of thirty days the case showed improvement, the amount of pus was diminished and some granulations appeared. Dr. J. C. Delprat was called in consultation to determine the advisability of performing a plastic operation. Against the advice of the surgeons, the patient insisted on this being done, and on October 11th, 1900, a plastic operation was made by Dr. W. A. Pratt. Two flaps of skin were taken from the forehead with pedicles attached above the root of the nose, one being stitched to the mucous edges of the opening into the nasal cavity with the skin side innermost; the other was applied over this and covered nearly the entire ulcer, being stitched to the healthy skin surrounding it, with the skin side out. The operation was a failure, as had been anticipated, owing to necrosis of the flaps. The patient was sent to her home and supplied with corrosive sublimate solution and boric acid, with instructions to dress the ulcer daily herself.

In November, 1901, the patient returned to this city and was given treatment by dressings of about the same character as those that preceded. During the whole time the patient was given a tonic treatment, as she was inclined to lose strength and flesh.

When the patient was seen in November the ulcer had enlarged so that the left nasal cavity was exposed and about one-half of the lower eyelid was affected, as well as the inner part of the upper eyelid, the ulcer extending out farther on the cheek, there being but a small shred of the ala nasi remaining on the right side. At this time, the 15th day of November, 1901, I was called in consultation and advised x-ray treatments. At this time Dr. J. E. Harper examined the patient's eye, which was seriously injured by the disease. A film had formed over the eye, due to too

much exposure to light. We were considering the advisability of enucleation. On November 21st x-ray treatments were begun and continued daily until March 5th, 1902, when the condition present was that of healthy granulation. During all this time Dr. B. B. Masten dressed the ulcer daily. The absence of pus and everything being in good condition for another operation, it was performed by Dr. E. J. Farnum and Dr. W. A. Pratt. The condition before operation was as follows: All of the lower lid had been eaten away by the lupus. Also one-half of the upper lid and the cellular tissue around the canthus. The eyeball was entirely exposed. The conjunctiva and the cornea were ulcerated, and the latter was opaque. Sight had been permanently destroyed and enucleation was considered necessary to remove the source of irritation and to lessen danger to the sight of the other eye. A plastic operation was performed in order to build a new nose. Flaps were taken from the cheeks on both sides of the nose in order to accomplish this. The patient has fully recovered, has returned home and is in excellent health, with the ulcer entirely covered with healthy skin.

Constitution of the American Electo-Medical Society.

ART. 1.—*Name and Object.*

Section 1.—This society shall be known as the American Electro-Medical Society.

Sec. 2.—The object of this society shall be investigation in electricity and allied sciences and the encouragement of their application to medicine and surgery by the formation of district and local societies.

Sec. 3.—This society shall have complete supervision over the state and district societies, and shall be the court of appeals for said state and district societies.

ART. 2.—*Executive Council.*

Section 1.—All business of this society shall be entrusted to an executive council, which shall elect the officers, arrange for the annual meeting and the publication of the society's proceedings, decide all questions of membership and any and all business of whatever nature pertaining to the interests of the society, decide all questions on appeal from the state or district societies and report its proceedings to the society without unnecessary delay. The council shall elect its own chairman and such other officers and committees as it may deem necessary. The secretary of the society shall be secretary of the council, but this does not entitle him to a vote in the council.

Sec. 2.—The executive council shall meet on the day before the annual meeting for the transaction of business pertaining to the society, and again on the afternoon of the day before the final adjournment of the society to complete all unfinished business. Special meetings shall be called by the chairman on the written request of five members. One member of the executive council may vote by proxy for another.

Sec. 3.—The president of each state or district electro-medical society which is recognized as a branch of this parent society shall be a member of the executive council, and each state president who has served for one year shall continue to be a member of the executive council for the four following years, if during that time he remains a member of this society in good standing. These members, together with the president and all ex-

presidents, shall constitute the executive council of the society.

ART. 3.—*Officers.*

Section 1.—The officers of this society shall be a president, a vice-president from each state or district society, a secretary and a treasurer.

Sec. 2.—The president, secretary and treasurer shall be elected annually by the executive council.

Sec. 3.—The president of each state or district society shall be ex-officio a vice-president of this society. The vice-presidents shall rank in the order of the organization of the state societies.

Sec. 4.—The duties of these officers shall be those usually pertaining to their office.

ART. 4.—*Membership.*

Section 1.—All active members of this society or any of its branches shall be medical practitioners who are interested the state in which they reside.

Sec. 2.—Persons not legally qualified medical practitioners who are interested in the objects of this society, may become associate members upon complying with the other requirements for active membership. They shall be entitled to all the privileges of membership except that they cannot be members of the executive council.

Sec. 3.—When a state society is organized every resident member of this society shall be de facto a member of it, and thereafter only members of the state society in good standing in that state can become or remain active or associate members of this society.

Sec. 4.—Persons who are distinguished for investigations in electricity or allied sciences or in the application of the same to medicine or surgery may be elected to honorary membership by a two-thirds vote of the council. Honorary members shall pay no fees, shall not be entitled to vote, and cannot become members of the council.

Sec. 5.—Applications for membership shall be forwarded to the executive council and shall be reported upon by the president of the society of the state or district in which the applicator resides. The application shall be accompanied by the entrance fee of $3.00, which in case of election, shall be accepted as the dues for the next annual meeting, and in case of rejection shall be returned.

Sec. 6.—Membership in any recognized medical society, together with proof of the applicant's right to practice, shall be accepted as sufficient evidence that the applicant is in good standing, and shall entitle him or her, on compliance with the other requirements of the constitution, to membership in the society or any of its branches. The president and secretary of the local society of which he or she is a member shall sign the application blank with the applicant.

Sec. 7.—No application for membership shall be rejected by the council until the applicant has been notified of the objections against him and the persons by whom the objections are urged, and has been given an opportunity to defend himself. Any member who files against an applicant charges which he is unable to substantiate shall be deprived of all privileges of membership for one year.

Sec. 8.—The annual dues shall be three dollars, payable on the first day of the annual meeting. Members who are more than one year in arrears in their annual dues will, after notification, be dropped from the list of members, but may be reinstated within one year from that time upon payment of their dues in full.

Sec. 9.—Members guilty of immoral or unprofessional conduct may, after a hearing, be expelled from the society by a two-thirds vote of the executive council.

ART. 5.—*Annual Meeting.*

Section 1.—The annual meeting of this society shall be held at such time and

place as the executive council may determine.

Sec. 2.—At the annual meeting any ten members may appeal in writing from any act or decision of the executive council to the society, and a time during each annual meeting shall be set apart by the executive council for hearing such appeals and for the introduction of new business. The decision of a majority of the members present in regular session at such appointed time shall be binding upon the executive council. No new business shall be introduced to the society at such time except in writing on the motion of ten members.

Sec. 3.—Roberts' "Rules of Order" shall govern the proceedings of the society and its branches.

ART. 6.—*Official Organ.*

The American X-Ray Journal shall be the official organ of this society. Each member in good standing shall be entitled to receive it without additional expense.

ART 7.—*State Societies.*

Section 1.—A state organization of this society shall be known as the —— State Electro-Medical Society.

Sec. 2.—The officers of the state society shall be a president, one vice-president for each county society, a secretary and a treasurer.

Sec. 3.—The president, secretary and treasurer of the state society shall be elected by the state council annually.

Sec. 4.—The president of each county society shall be a vice-president of the state society. The vice-presidents shall rank in the order of the organization of the county societies.

Sec. 5.—The business of the state society shall be entrusted to a state council. The state council shall consist of: (a) the president of the state society; (b) all ex-presidents of the state society who remain members in good standing; (c) the presidents of the county societies in that state; (4) ex-presidents of the county societies who have served for one full year as county president and who remain members in good standing of the state society shall continue to be members of the state council for the four following years.

The secretary of the state society shall be secretary of the council, but this shall not entitle him to a vote in the council.

Sec. 6.—When a county society is organized, members of the state society resident in that county are de facto members, of it, and thereafter in that county only members of the county society in good standing can become or remain members of the state society.

Sec. 7.—The state council shall be the court of appeals for the county societies.

Sec. 8.—The membership fee for the state society shall be one dollar per year.

ART. 8.—*County Societies.*

Section 1.—Only one county electro-medical society shall be recognized in each county, but as many sections may be organized as are deemed necessary.

Sec. 2.—The officers of the county society shall be a president, one or more vice-presidents, a secretary, a treasurer, and such assistants as may be necessary.

Sec. 3.—The presidents of the sections, if any, shall be vice-presidents of the county society. Other officers of the sections shall be assistants to the corresponding officers of the county society.

Sec. 4.—The membership fee for the county society shall be one dollar per year, unless otherwise ordered by the society.

Sec. 5.—Rejected applicants for membership and members suspended or expelled may appeal to the state council.

Editorial Notes.

The American Electro-Medical Society.

It will be seen by the constitution which is printed elsewhere in this issue that the American Electro-Medical Society is broad in its scope, to bring together all those who are interested in this branch of medical work. It differs from the American Roentgen Ray Society and the American Electro-Therapeutic Association in being local as well as national, which we consider of the greatest importance. It differs from the American Electro-Therapeutic Association in not having an unlimited membership. The constitution as presented is clear and definite. All members will expect to belong to both county, state and national societies and thru the official organ will be able to keep closely in touch with every advance made either in the science or its application with a minimum of cost. Another feature that seems to us to be of great importance is the control of the state and national organizations on the representative basis. Prominence of policy is secured by some long term representatives but the democratic idea is thrown in, and is practically a referendum, with the provision that the executive council is bound to carry out the decisions of the national meeting. The utmost liberty is accorded to associate members. The only restriction laid upon them is that they cannot become members of the governing body. With this constitution it will be impossible for cliques or rings to obtain control of the national organization or for non-professional physicians to be sitting in judgment upon the ethical standing of physicians who apply for membership. The organization of this society meets with enthusiastic approval from every part of the country. Over a hundred members are now enrolled and applications are coming in fast. Any physician in good standing may become a member, be he a regular, eclectic or homeopath. No member will be allowed to oppose an applicant for membership upon personal grounds.

Electro-Therapeutic Guide.

This hand-book of less than 200 pages, by Drs. W. F. Howe and H. C. Bennett, is a concise introduction to the principles of electro-therapy. The language is plain and clear, and the illustrations sufficiently numerous. Some minor errors occur, but in spite of these the book will be found very valuable for reference by beginners in electro-therapy. 10 pages are devoted to x-rays; 35 to condensed instructions for the electrical treatment of particular disorders, and 28 to a glossary and index of electro-medical terms. The glossary alone is worth the price of the book. Published by The National College of Electro-Therapeutics, Lima, O. Price, cloth, postpaid, $1.00.

Correspondence.

DEAR DOCTOR:

I want to write you about a case of epithelioma of the lower lip. Patient about a year ago had an ulcerating spot on the lower lip removed by the application of a caustic paste in the hands on an itinerant. Result, the entire lower left half and a portion of the right half of the lip sloughed away. Tissue reproduced and healed with scar inside where infiltration began. The case was referred to me in October, 1902. On the 21st of October I began x-ray treatment, giving daily from 10 to 30 minutes until the skin showed severe reaction, then waited until the skin recovered, and began treatment again, pushing as before. It is now three months. The tumor has visibly decreased and the lip looks healthier, but the patient gets despondent and thinks the time too long. He has increased in weight and feels well. What has been your experience in these cases and shall I encourage him to keep on with the treatment? Will that scar ultimately soften and absorb. I am using a self-adjustable high vacuum tube. Any information you may impart will be gratefully received. I always await the coming of the X-RAY JOURNAL with pleasure, as it is a great source of information. Sincerely yours,

C. L. H.

[Keep on with your treatment. Lower the vacuum of your tube until you can barely see thru the fleshy part of the forearm. Treat daily ten to fifteen minutes and watch for a burn. When dermatitis appears omit one or two treatments and reduce the time of exposure. You have every prospect of a complete cure.—Ed.]

DEAR DOCTOR:

I see there is a quack in Detroit curing cases of deafness with a static machine, and as I have several such cases in my own town, I wish you would give me the treatment for them. Here is a case in particular: Fifteen years ago a man caught cold in the head, as he says; never got ear-ache, never suppurated, but has been deaf in one ear ever since. What would be your treatment in such a case. Hoping to hear from you soon, and thanking you in advance for your valuable information, I remain, Yours very truly, D. S. A.

[The causes of deafness under the condition described are so varied that with the information given it is impossible to do more than guess at the proper treatment. Possibly stimulation of the ear and throat by a mild use of the sinusoidal current or the hyper static might relieve the trouble. But it would be wiser to find out more exactly the condition before proceeding with the treatment.—Ed.]

H. PRESTON PRATT, M. D.:

Can the x-ray be depended on to remove hair from the face? I treat many ladies and remove them by electrical needle, a very slow and painful way.

About what distance should the tube be from the face, and what is the time of exposure?

I am a regular subscriber of the AMERICAN X-RAY JOURNAL, but have never seen anything on the subject. J. E. W.

[The x-ray can be depended upon for the removal of hair. Several articles on this subject have been abstracted in the Journal during the last few months. Use a low tube about six inches from the face and give five to ten minutes exposure. Guard with lead foil the parts you do not wish to expose. If the lead foil is in exactly the same position during successive exposures a dark line showing the position of this margin will appear and remain for some time after the hairs are removed. Be careful to shift the position of lead foil from time to time. The time required to permanently remove the hair depends upon the intensity of the ray from the tube and upon the depth and strength of the hair bulbs. It varies from ten days to two or three months.—Ed.]

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Address Communications to Dr. H. Preston Pratt, Managing Editor, Masonic Temple, Chicago.

PROFESSOR A. D. ROCKWELL, A. M., M. D.

THE AMERICAN
X-RAY JOURNAL.
Devoted to Practical X-Ray Work and Allied Arts and Sciences.

VOL. XII. CHICAGO, MARCH, 1903. No. 3.

Technique of X-Ray Therapy.*

BY H. PRESTON PRATT, M. D.

Nothing succeeds like success, and success cannot be obtained in this work unless the physician is well versed in the technique of its therapy, which implies a thoro knowledge of anatomy, physiology, pathology and physics. The greater portion of the technique centers in the working of the tubes independently of the apparatus which energizes them.

We are dependent entirely upon the number of lines of force projected from the tube to bring about ionization of the tissues. Ionization means changes in the elementary structures, an increase in metabolism; or, in other words, a hastened normal physiological change brot about thru electrolyzing the tissues.

We need to have the greatest possible number of these lines of force within a given space for our best therapeutic work. This is only possible with a low or soft tube. Each electrical movement in a line of polarized atoms dissociates a definite number of elements composing the tissue, and this dissociation and the reassociation of the freed ions decomposes and destroys the cancer cell, or the bacilli of various diseases. The various bacilli and the protozoon of cancer are practically identical in composition with the tissues of the human body. Now the x-ray will not destroy germ life by its direct action, any more than the sun's rays. The bacterioidal effect of both are due to ionization or electrolysis. We here assume that the sun's rays and the x-rays are purely electrical phenomena.

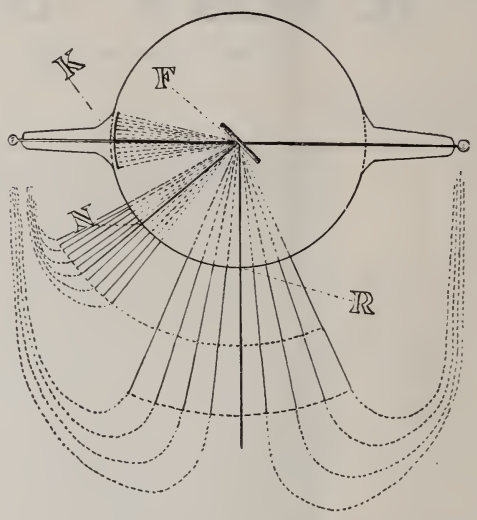
When we accept this theory of ionization, we must admit that all the elements (which number about 80) are independent centers of force, exhibiting polarity, that chemical affinity is only another name for the electrical forces of the ions, and that all changes in matter are due to the differences of electrical pull among the ions. If it be granted that the x-ray is an electrical phenomenon there must be an x-ray circuit, corresponding to any ordinary electric current. In electrolysis of the tissues the ions, according to my conception, are a part of the x-ray circuit, and are attracted or repelled according to the direction of the lines of force. Each element or ion moves in one direction or the other according to its polarity, if electro-negative it passes in the direction of the lines of force, if electro-positive, in the opposite direction. Now there are extending from the x-ray tube chains of polarized atoms, of varied lengths, the length of the chain depending entirely upon the force of impact of the particles of gas thrown out from the kathode stream, which strike the inner surface of the glass or other material. This impact is the source of the ex-ray. The force of impact varies in different portions of the tube, each particle of gas that strikes the inner surface of the tube gives a certain impulse to its chain of

*Read before the American Roentgen Ray Society at its third annual meeting in Chicago, Dec. 11, 1902.

polarized atoms, which is transmitted outward at right angles to the surface of the ordinary tube until its potential falls, when it meets its return element, which has proceeded at the same time from the tube, and by which the x-ray circuit is completed back to the tube. Each chain of atoms has its own potential. These varied potentials of the tube are considered by some physicists as different kinds of x-rays, when as a matter of fact they are all one and the same, without any other difference except that of potential.

The kathode stream is built up of streaming particles of matter, which serve to establish the electrical connection between the kathode and the anode. With an increased electrical current in the circuit which energizes the tube, more particles of gas are added to the kathode stream, hence a greater number of active particles are thrown out from the kathode stream, which bombard the inner surface of the glass, giving rise to an increased number of energized lines of atoms in the shape of x-rays.

A line in the middle of the kathode stream, from K, the center of the kathode, to the focal point F, of the antikathode, is in the axis of the tube. The greatest concentration of the particles of gas reflected from the kathode stream is in a line normal to or at right angles to the surface of the antikathode. The tube at this point, owing to the increased number of particles striking its inner surface, becomes heated much more readily than any other portion of the tube. This point is designated by the letter N. At any other point, say at R, in which the reflected ray is perpendicular to the axis of the tube, these particles of gas are less crowded, but have individually greater speed on account of having a freer path. We find that the greatest possible penetrating power obtainable from any tube is in this perpendicular line R, which is at right angles to the axis of the tube, starting from the focal point F. The point N, at which is the greatest



number of particles of gas, is the point from which the greatest number of atomic chains start out, but the penetrating power of the ray is there cut down. At the point N, the tube could be considered "softer" than at any other point. In the perpendicular line passing from the focal point F to R, each particle has a much freer path than from F to N, consequently the greatest penetrating power is at the point R. This would be commonly understood by the statement that the tube is harder at R than at the point N.

Physiologically the point at which the x-ray enters the body can be considered as the anode; and the point of exit, providing the ray passes thru the body, the kathode. But if the ray penetrates only a short distance, the point of zero potential can be considered the kathode. Certain chemical changes take place, namely, the accumulation of acids at the anode, and of alkalis at the kathode. The changes that take place between these two points are simply electrolytic.

The factors to be considered in raying are (1) the potential of the ray, (2) the resistance of the tissues to the ray,

and (3) the resulting intensity of radiation. Of these three factors the first only is under control, and it depends entirely upon the conditions in the tube, which is constantly varying, but which by corresponding changes in the current energizing the tube, the spark gap, etc., may be made approximately constant.

Nutritious remedies, containing elements required for the tissues treated, which readily enter into metabolic changes, are necessary in all serious cases. Otherwise the resistance of the normal elements will be reduced by starvation.

WORDS OF CAUTION.

In x-ray therapy always use a low or soft tube and crowd the current to suit the case. But if this is impossible for lack of the necessary apparatus, use a tube just high enough to cause the rays to penetrate the tissues to be treated. Never use a high tube near the body because the discharges from the terminals, which are alternating in character, produce muscular contractions which tend to pump the infection along the lymphatics. In using the static breeze to heal the skin-lesion of cancer, keep it far enough away from the body to avoid any danger of spark or other irritating discharge, for on account of the above reaction, while it certainly helps the local condition, it is liable to cause muscular contractions and make the general condition worse. Never expose a large surface to the ray at a time, because an increased amount of effete matter is thrown into the circulation, and may produce auto-toxemia. See that all of the organs of elimination are kept active. Change the position of the tube in relation to the patient, or the position of the patient with reference to the tube, every minute or two, so that a greater number of cells will come under the influence of the ray. Never expose a patient directly to the ray, but interpose a celluloid screen, of from 1/32 to 1/16 of an inch in thickness, between the patient and the tube. Before exposing a patient to the ray, be sure to render the parts to be exposed aseptic by the use of one to five per cent solution of carbolic acid or other antiseptic, and after treatment dress with antiseptic gauze. Never be afraid of an x-ray burn, watch carefully, that is all. Malignant conditions do better with an x-ray burn than without.

It is just as necessary for a physician to protect himself as his patients against too much raying, or he will himself suffer from irritation or auto-intoxication from time to time.

The x-ray is not a cure-all, and there are conditions in which the knife will be necessary to remove the septic matter.

In some cases of tubercular affections of glands considerable advantage has been derived from the use of a celluloid cream containing creosote, with the addition of laudanum at times; the invention of Dr. Alexander C. Wiener, of Chicago. The cream is placed on cotton on the skin over the gland, or over the affected pulmonary region, and the absorption of the medicaments is much facilitated by the x-rays.

Electricity in Medicine.

BY A. D. ROCKWELL, A. M., M. D.,

NEW YORK.

What is the place that electro-therapy should hold in the nomenclature or ethics of the healing art? For electro-therapeutics cannot be considered a specialty in the sense that neurology, or ophthalmology, or laryngology are specialties. Like hydro-therapeutics, it is simply the application of a single remedy, tho one having an enormously wide range, to diseased conditions. Thus electricity belongs to every general practitioner, but more distinctly, perhaps, to the neurologist. It often aids him in diagnosis and prognosis as no other instrument can, while as a palliative in some organic conditions, and as a curative in some of the functional neuroses, it is indispensable. It also belongs to the surgeon; for the cautery, electrolysis, and x-rays give him valuable adjuncts to his knife, and in some cases supersede it. Gynæcology, obstetrics, ophthalmology, laryngology, can all find more than occasional uses for its powers; while its well attested influence over nutrition must give it a place in general medicine.

Unfortunately a far more intimate acquaintance with the physics and physiology of electricity, and with the laws which govern its action on living tissues, is demanded, than the average practitioner can claim to possess. He must recognize that electricity is a generic term, not a simple, single manifestation of force, but susceptible of so many modifications of its units of measurement, that its various currents so-called, may be said almost to differ in kind as well as in degree. How many physicians who utilize electricity, have studied or even clearly understood Ohm's law? Yet this law is the foundation upon which is built the whole superstructure, and *without a knowledge of it no one can be a master in electro-therapeutics.*

This great law is expressed in the formula, C = E/R. In other words, current (C) equals the electro motive force (E), divided by the resistance (R). E, or electro-motive force, is the force that urges on the current. R (resistance) is that quality of a conductor that impedes the passage of electricity. C is the current strength, resulting from the two former. With no resistance, the current would equal the electro-motive force; but as every circuit must offer some resistance, the current can never equal the electro-motive force. The unit of electro-motive force is the *volt.* The unit of resistance is the *ohm.* The unit of current strength is the *ampére.* An electro motive-force of *one volt,* passed through a resistance of *one ohm,* yields *one ampére* of current.

The importance of Ohm's law can now be seen. The strength of the current varies directly as the electro-motive force, and inversely as the resistance. Therefore, by this law, one volt passed thru a resistance of 1,000 ohms, yields but 1-1,000th of an ampére, or one milliampére. The human body, generally speaking, offers some thousands of ohms of resistance; hence in therapeutics, the *milliampére* becomes the practical unit of measurement, rather than the ampére. The ordinary mind is often confused thru ignorance of the relationship of these units of measurement. The adoption of electricity in the state of New York as the method of execution, has made it generally known that "1,700 volts" are sufficient to kill; yet many thousands of volts are every day being applied to the human body for the relief and cure of disease. But it is simply a question of electro-motive force,

or potential, together with *amperage, or quantity.* A current of high potential, for therapeutic purposes must necessarily be of very low amperage; and when the amperage is high the potential must be low.

The "strength" of a current about which we say so much, is measured in ampéres, or fraction of an ampére. The quantity of electricity conveyed by a current of one ampére in one second, is called one coulomb, but in therapeutics it is more necessary to know the current strength, or amperage, than the absolute quantity as indicated by coulombs. Yet it should not be forgotten that it is quantity that decomposes chemical substances, and the operation of electrolysis largely depends upon the quantity of electricity that flows thru the tissues acted on.

Static electricity has but little quantity or current strength, but has an enormous electro-motive force or pressure; and thru the electro-tonic, and perhaps some chemic changes produced, and its influence over metabolism, it is capable of important therapeutic effects. It aids also in the relief and cure of disease by changing the electric condition of the patient, in giving a positive or negative charge, for a greater or less length of time. Still more remarkable are the effects of high-frequency currents of high tension, which often have subtle and far reaching effects. On the contrary, currents of magnitude, or large amperage, as the galvanic, or the faradic in less degree, do not charge the body with electricity, or leave in it any more electricity than they find there.

In thus emphasizing the importance of a clear understanding of Ohm's law, it is not to be understood that no one should use electricity who has not fully mastered its physics and physiology, or whose practical experience is but limited, or whose variety of apparatus is meagre. Let such an one work cautiously with what skill and appliances he has. His motto should be, "Much too little, rather than a little too much," for electricity in medicine is an important factor for good or evil; and he should always work aided by *measurements and records* of what currents or potential he is using. The greatest evil is the utterly unscientific spirit of many. The writer has received a letter from a physician asking, "What kind of electricity he should use in a case of neuralgia, and how to use it?" The idea of this correspondent, that but little preliminary study or experience is required to successfully utilize in therapeutics so powerful a force, and one having such a wide range as electricity, is but too common. Another correspondent wished to know my experience in the treatment of locomotor ataxia? "He had cured several cases, and had dissipated several fibroid tumors by internal applications of the faradic current!" Still another physician affirms that he has "broken his heart over electricity," that "he has found it almost worthless as a therapeutic agent."

It is thus not enough that one should be equipped with every modern appliance for electro-therapeutic work. Most sanatoria and many public hospitals are well equipped; but how much intelligent and effective electro-therapeutic work is done in these institutions? It is so far commendable to supply oneself with a complete working equipment, even while largely in ignorance of its proper use, provided one uses it as a basis of growth, and measures and records *how* it is used in every case; but worse than useless if there is no growth founded on real study. Aside from any actual injury, that haphazard and ignorant application may inflict, it does harm by conveying the impression that what the incompetent does, is all there is to be done in electro-therapeutics. In one establishment within the writer's knowledge, there was recently installed an enormous static machine at a cost of several thousand dollars. The

owner was (and still is) quite ignorant of first principles, but he now *poses* as a master in the art. It is so easy to learn to set in motion an apparatus, big or little, static, faradic, galvanic, sinusoidal, or high frequency; and it is so difficult for the *victim* to know whether he is receiving expert or non-expert treatment! The case of the correspondent who had cured both locomotor ataxia and fibroids with the faradic current, was simply that of an illogical mind having no adequate acquaintance either with the pathology of the disease, or the energy utilized.

One of the most difficult problems in electro-therapeutics is to correctly differentiate between the various manifestations of electricity, and select the form most suitable to the case in hand, adjusting its measurements accordingly. If we wish mechanical effects, we select alternated currents of slow or rapid make or break; for chemical effects only currents giving a considerable amperage are applicable; while physiological effects of some kind, like physical effects, are excited by every possible manifestation of electricity. Mechanical, physical, and chemical effects, although more or less modified by vitality, are not peculiar to living bodies. Physiological effects, on the contrary, take place by virtue of the vital properties of the body. Currents of enormous potential have undoubtedly widened the sphere of usefulness of electricity in developing physiological phenomena, yet it may be doubted whether they excite any really new physiological effects.

The fundamental idea of the therapeutics of electricity, is its *nutritional* influence, an idea enunciated and developed years before the discovery and utilization of high-frequency currents. There is no form of electricity but has a certain influence in this direction; yet for the purpose of increasing general nutritional activity, exciting metabolic changes, and developing the potential energy of cell life, it is the general *consensus* of opinion, that in currents of high frequency and potential we have an energizing motor principal, superior to other electric modalities. Still, while welcoming the new, let us not forget the old, remembering that the magnitude of these high potential currents is practically *nil,* and that magnitude or amperage is in a multitude of conditions absolutely essential.

As has been well said, "If we wish to do our work scientifically, our motto should be measurement, measurement, measurement." So if we would get the best and quickest therapeutic results, our motto should be "differentiation." Not only must we strive to adjust electric modalities to pathological conditions, but the personal equation in each case should receive due consideration. Some patients react better to one electric modality, while others suffering from the same apparent pathological condition, for no apparent reason react better to another. No matter for what form of electricity one may have a preference, the worker who is supplied as he should be with every necessary variety of apparatus, will frequently have occasion to call in the aid of each

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Recent Advances in Electrotherapeutics.—According to Morton the elevation of the electromotive force and its oscillations or alterations make possible the electrification of the whole body at once, increasing oxidation and tissue metamorphosis. This is especially useful in diseases of perverted nutrition like rheumatism, obesity, etc. He briefly discusses the applications of the static induced current, the wave current, the Tesla and the D'Arsonval transformers, and the Oudin resonator, the brush discharge, the Geissler tube, and the Bequerel and Roentgen rays. The apathy of the profession toward this branch of therapeutics is incredible.—H. M.—*Med. News, December 27, 1902.*

The Therapeutic Application of the X-Rays.*

BY MARCUS F. WHEATLAND, M. D.

Member of the American Electrotherapeutic Association; American Medical Society; American Association for the Advancement of Science; American Anthropological Society, etc.

At the present time we are unable to say just what x-rays are. Scientists are divided in their opinions, and various theories are advanced to account for the phenomena which take place when a Crookes tube is actuated by an electric current. It is generally considered to be a form of transverse ethereal vibration, in a series with the Bequerel rays and rays of ordinary light, the x-rays being irregular impulses, the Bequerel rays less irregular, and the light rays orderly impulses of the ether. We can go no further than to say that the x-rays are the result of the bombardment of the kathode stream upon the anode target, and from the bombardment emanates phenomena known as x-rays. These rays move in straight lines, and, unlike ordinary light, can neither be refracted, reflected, nor polarized. They penetrate in different degrees substances which are opaque to ordinary light, the degree of penetration depending upon the density of the substance acted upon. The greater the density, the lesser the penetration, and vice versa. The structures of the body offering the greatest resistance are the bones, on account of the large amount of inorganic material which they contain. The soft tissues are more penetrable, containing as they do a lesser amount of salts and a greater quantity of water and organic matter.

When the rays are applied to the healthy tissues of the body one of the first changes noted is the increased amount of pigment deposited in the area exposed. This deposit seemingly depends upon the complexion of the individual, the darker the color, the greater the change. Long continued applications of moderate doses (not sufficient to set up a violent reaction) produce a drying of the skin, and its modifications as seen on the hands of many operators. This is due to a thickening of the walls of the small blood vessels of the part, which tends to narrow their caliber and diminish the nutrition.

When the exposures have been sufficiently strong and frequent to set up a frank reaction, the changes may be similar to those of the three degrees of burning, with the exception that the devitalizing action on the cells is greater and the process of repair is slower to a marked extent; indeed my records show that Mrs. L. discontinued treatments April 3, 1902, when the first sign of dermatitis presented itself, and tho destruction extended to the second degree only, yet she was not sufficiently recovered to renew treatment until September 10, 1902, nearly five months after the development of the first symptom. Of course the age and debility of this patient had much to do with the slowness of the process of repair.

The curative action of the rays which was first called into use in the treatment of lupus and epithelioma has been extended to cover sarcomas and carcinomas, both superficial and deep, tubercular osteomyelitis and adenitis, chronic inflammatory processes of the skin and internal organs, callus sinuses resulting from operations, vascular and pigmented nevi, and filroid tumors of the uterus.

In malignant growths all agree with Morton when he summarizes the advantages of the rays as follows:

1. Relief from excruciating pain.

*Read before the Newport Medical Society, November, 1902.

2. Reduction of the size of the new growth.

3. Establishment of the process of repair.

4. Removal of odor if present.

5. Cessation of discharge.

6. Softening and disintegration of lymphatic nodes.

7. Disappearance even of lymphatic enlargements not submitted to treatment, and often quite distant.

8. Removal of the cachectic color and appearance of the skin.

9. Improvement of the general health.

10. Cure up to date of a certain number of malignant growths.

At this point it is quite pertinent to ask how these changes are inaugurated? From the various theories advanced, the writer accepts the following:

The x-ray vibrations acting upon the cancer cells tend to stimulate many to maturity, at the same time breaking down the weaker ones, which are absorbed by the lymphatics and enter the circulation producing the intoxication so frequently observed; the number of cells reaching maturity and those undergoing destruction depending upon the intensity of the reaction established. At the same time changes take place in the small blood vessels, their coats become thickened and tends to narrow their caliber, thereby lessening the blood supply and aiding the return of the circulation to the normal.

In the treatment of large malignant growths it is still debatable as to whether it is not better to remove the mass if possible and ray afterwards, so great at times is the toxemia resulting from the absorption of the disintegrated elements of the neoplasm. Many object to an operation preceding the ray, because of the difficulty encountered in setting up a healthy reaction in recurrent growths. The best plan seems to be to ray cautiously, avoiding a sharp reaction (lest the resulting toxemia overcome the patient) and after the ray has done its work remove the remaining nodule by a simple operation. My personal experience with x-rays in therapeutics covers the following cases:

Mrs. L—, age 64, consulted me in April, 1902, with regard to a lump in her left breast which had been growing for about a year. It was tender to the touch and from it sharp pains darted thru the side. On examination I found the nipple retracted and firmly bound to the growth beneath, which was about 3½ inches in diameter and not adherent to the chest. Manipulation increased the pain which generally continued long after the examination. The glands in the axilla were slightly enlarged. Her general condition was good, excepting an intermittent pulse which did not seem to affect her in the least. The picture shows the condition when treatment began. The breast was protected by a shield of tin foil, exposing only the tumor, and she was given the first treatment April 15, 1902, from a low tube 1½ inch resistance, actuated by a 10-plate Static machine. Exposures were daily of 20 minutes duration at a distance of 2 inches from the part. After the first treatment pain gradually

subsided and completely disappeared after the third seance. Treatments were discontinued on the 20th at which time she complained of a smarting sensation around the nipple. In a few days the skin became very tender, small vesicles appeared, opened and coalesced, forming a raw, angry surface, extending over the area exposed. About this time the patient showed signs of constitutional disturbance. Her appetite disappeared, diarrhea developed, and her pulse markedly intermitted. She was in and out of bed during the greater part of the summer. The greatest difficulty was found in relieving the pain which came on as a result of the burn; it was extreme. This, no doubt, was due to the nature of the part involved and not the agent which produced it. The condition of the burn did not warrant a resumption of the treatment until August 22. At this time the tumor was smaller, pain had entirely gone, the infiltration around the nipple was so much reduced that it was easy to separate the parts and examine the base of it. The patient was entirely free from discomfort and, remembering her experience with the burn, had to be persuaded to return. This was considered necessary, on account of the few exposures she had had and fearing that there might be cells remaining unacted upon by the x-light which in time would manifest themselves. When treatment was resumed the protecting shield was abandoned and the breast and side rayed for ten minutes twice a week with the tube 10 inches from the part. She had the last treatment September 29, 1902, after which time another dermatitis appeared, fortunately there was no greater reaction than sufficient to produce a slight pealing of the skin. The patient, I consider, is cured. There is a small lump in the breast. The nipple, while it has not come out as far as it originally was, is quite loose. No doubt many of the cells forming the ducts leading up to it are destroyed and replaced by tissues, preventing a complete return of the parts to their normal outline. The patient has recently developed a bronchial asthma which, with her weak heart and advanced age, forbids my suggesting an operation for the removal of the remains of the growth.

Case No. 2. Mr. W—, age 40, was sent to me by Dr. Bull, Aug. 25, 1902, for x-ray treatment for enlarged glands of the neck. The patient had been operated upon by him last December for cancer of the tongue. The surrounding parts were protected with tin foil and the glands treated for ten minutes daily with a tube of 3-inch resistance, eight inches from the part and actuated by a 20-inch spark coil with electrolytic interrupter. In about ten days the patient thot his neck less stiff and felt better. Treatment was discontinued from August 31st to September 6th, with the idea of avoiding a burn if possible. At this time there was no sign of a dermatitis and the applications were resumed as before. In the course of a few days, noting no improvement, the treatments were prolonged to 12 minutes and the tube brot closer to the part. The condition of the skin looked threatening, but as the case was a desperate one, a burn was thot of but little importance if by pushing the treatment the desired reaction could be established. The mass continued to enlarge and his health began to fail. Treatments were discontinued September 24, 1902, at which time he sailed for England, whence he had come some sixteen months previous. He is at present in London and has resumed the x-ray treatment, with what results I am unable to say, as I have not yet heard from him.

Case No. 3. Dr. A. W— called on me in July with reference to his wife who had had her right breast removed about two years previous. For recurrences she

had undergone several subsequent operations. She had been trying the x-light in Philadelphia and desired the treatments continued while she remained in this vicinity. She made her first visit July 10th, at which time there was an ulcerated surface about 2½ inches long and 1½ inches wide, at the site of the original trouble. The cachexia was pronounced and her appetite poor. She was treated every other day (with a tube of about 2-inch resistance, excited by a 20-inch-spark coil, with electrolytic interrupter; exposure 10 minutes; until August 6th, when she developed a pleurisy. She gradually failed in health and returned to her home in Philadelphia. She did not improve under treatment. A mass was formed under the clavicle, which her husband said he would have removed when they reached home. I have been told that the patient has since died.

Case No. 4. Mr. W—, age about 58, came to me September 11, 1902, for x-ray treatments for eczema of the head and neck. He said he had been treated during the spring for the same disease located elsewhere. When I saw him his head and neck was covered with crusts, from the edges of which oozed yellowish pus. The face was swollen, the infiltration in the cellular tissues of the eyelids produced eversion of their margins, and made it impossible to close his eyes for sleep. Altogether he made a very pitiable spectacle. Fortunately the itching was not severe. Treatment was begun immediately with a very low tube, ⅛-inch resistance, excited by a 10-plate Static machine. On account of the various angles of the parts, the tube had to be changed from time to time, giving each area under treatment an exposure of 15 minutes. The case progressed very slowly. September 20, the skin began to clear up, and fearing a burn, treatments were not pushed so energetically. He, however, came daily, but was only treated upon those parts which seemed to be uninfluenced by previous efforts. In a few days, it was seen that the reaction was only temporary and the exposures were repeated as in the beginning. The case did not improve very rapidly and as the patient's time in Newport was growing short, I gave the last three treatments with a Queen tube, adjusted to a vacuum of 1 inch resistance and excited by a 20-inch spark coil with electrolytic interrupter. On account of the greater energy of this apparatus, an area was not treated more than eight minutes. When he left Newport, October 1, 1902, his face was much clearer; the infiltration of the skin had disappeared, so that the wninkles in his forehead returned and his eyelids became normal; indeed this improvement took place before the discharge ceased. From a letter received from his nurse, October 8th, I quote the following:

"I am very glad to write you that Mr. W— seems very much improved, and I am quite proud of him. There is still a redness of the skin on the face and neck, but there is very little, if any exudation; even the ears look very well. There are still some scales on the top of the head and the skin is very tender in the beard. His eyes are much better, also the forehead and cheeks are quite free from scales. If there is any decided change I will let you know."

I have since heard that he has completely recovered.

Case No. 5 is that of Mrs. S., who was referred to me May 12, 1902, for x-ray treatment for sarcoma of the frontal bone, so diagnosticated by Drs. Bull and Coley of New York. When I saw the patient there was a decided enlargement of right half of the frontal bone. The temporal fossa was rounded out, the root of the nose widened and the right eye projected (exophthalmos), showing involvement of the orbital plate. The bone when pressed upon gave the sound similar to

the cracking of egg shells, the only subjective symptoms was a dull supraorbital neuralgia which readily responded to acetanilid before the x-ray was used. The surrounding parts were protected with lead foil and the area treated daily thru the forehead and temples alternately—with a tube 1½ inch resistance, 8 inches from the part, and excited by the static machine—until May 24, at which time she had an attack of muscular rheumatism which kept her away until the 29th, when she returned and was treated every other day until June 5, at which time dermatitis appeared on the forehead. The burn extended to the second degree, was not very painful and healed in about six weeks. During the latter part of the treatment the patient became forgetful: in the middle of a sentence she would become lost for words and in hunting for them would lose the idea she desired to express. From this state she gradually fell into a semi-comatose condition in which she remained until two days before death when the coma deepened. Death closed the scene August 23, 1902.

This case is interesting on account of the mode of termination connected with the report of a case by Dr. Gibson of Alabama at the last meeting of the American Electro-Therapeutic Association, in which cerebral symptoms developed during the use of high vacuum tubes on the temples which disappeared after the change to lower ones.

In the case of Mrs. S., the kidneys being negative, both Dr. Stewart, the attending physician, and myself attributed the aphasia to pressure of the growth on the anterior lobes of the brain. I have, since the report of the case of Dr. Gibson, made further inquiries in this matter and have concluded that while the x-ray may have had some influence in the case the symptoms and mode of death above described, are those often associated with pressure on the anterior (silent) portions of the cerebrum, and it is most likely that that was the cause of death. It is well, however, to consider the possibility of danger in treating diseased tissues situated over important organs.

Case No. 6. Mrs. Hattie J., age 51, (colored). Have treated the patient many times during the past seven years for recurrent attacks of gastritis. About two years ago during an attack, there was discovered a thickening of the pyloric end of the stomach. With the bodily rest and suitable diet enjoined, she improved and went about her work without discomfort for many months.

Present interest in the case began June 29, 1902, when she had a severe recurrence with much pain and tenderness over the stomach and the usual vomiting. She was now treated with the x-ray every other day, and in the course of a few weeks so improved that she discontinued treatments. She returned, however, in August when along with her other symptoms she vomited dark brown material suggestive of cancer of the stomach. X-ray treatments were again taken up, raying the whole abdomen ten minutes with the tube ten inches from the part, excited by the coil—the chest protected with lead foil. Improvement was slow, she emaciated rapidly and I referred her to a surgeon with the idea of having an operation performed. After examining the case, he advised pylorectomy as offering the greatest hope to her. This she refused and decided to take her chances with the x-ray. treatments were continued every other day as before. In about three weeks she began to show signs of improvement, which gradually increased until the present time. She is now able to eat ordinary food without pain and discomfort. The growth which at the beginning was the size of an egg, is now hardly perceptible; there is no tenderness about the abdomen and the patient is taking on flesh. These cases show a great field for the x-ray in cancer.

The Theory of Thunderstorms.

The Picking Up of Negative Electricity from the Air by Raindrops.

The phenomena of terrestrial and atmospheric electricity, though they were probably the first to attract the attention of the primeval electrician, offer even in the present comparatively advanced state of our knowledge as many, if not more, unsolved problems as any other branch of electrical science. Take, for example, the permanent negative charge of the earth, which is known to be about 160,000 volts. What process in the economy of nature gives rise to, and maintains this charge? Elster and Geitel have suggested that it is due to the pouring-in of free negative ions from the atmosphere into the earth. Wilson has shown that negative ions in the air form more active nuclei for the formation of raindrops than the positive ions, and this circumstance may lead to an excess of negative electricity being carried to the earth by rain. Lenard, on the other hand, has shown that when raindrops or waterdrops of waterfalls are shattered by impact with the earth's surface they impart positive electricity to the earth and negative electricity to the air. This latter process would, if not counteracted, impart a positive charge to the earth instead of a negative. Lenard, however, also found that if the falling waterdrops contained in solution a certain percentage of salt, the process was reversed, and therefore we have in the dashing of the waves of the sea against its shores a process that contributes to the negative charging of the earth.

Herr Schmauss, in an interesting contribution to the *Annalen der Physik* (Vol. 9, p. 224), shows that there is still another natural process continually at work which tends to maintain the high negative charge of the earth.

Schmauss started with the intention of finding out whether the artificial ionisation of the air through which the water drops fell had any influence on the Lenard effect. The waterdrops were allowed to fall on the bottom of an insulated metallic vessel, connected to one terminal of an electrometer, the other terminal of which was connected to earth. The insulated vessel and the water-dropping nozzle were enclosed in a metal container, to screen off the effects of external electrical charges.

After the water dropping started, the electrometer indicated a gradual accumulation of positive electricity, due to the Lenard effect. But it was noticeable that the increase of the positive charge was slower at starting than after some time had elapsed. This was when the air through which drops fell was ordinary atmospheric air. When the air was ionised by exposure for some time to the Röntgen rays, the electrometer swung for a short time to the negative side, and then gradually returned to the positive side, towards which it continued to move.

Schmauss proceeded to determine whether this production of negative electricity, when the air was ionised, took the place of the Lenard effect, or whether it was merely super-added to it. To test this he weakened the Lenard effect by allowing the water drops to fall on sheets of wire gauze, instead of on a solid metal plate. If the new effect had simply replaced the Lenard effect, it ought to be reduced by the same means; if it were superadded, and the resultant effect was due to the difference, then when the Lenard effect was weakened, the production of negative electricity ought to be more marked in the movements of the electrometer needle. The latter was found to be the case.

The explanation arrived at by Schmauss was that the waterdrops, in falling through

the air, picked up an excess of negative ions, and thus became negatively charged. Zeleny (*Phil. Mag.,* 46, p. 120, 1898) has shown that an insulated plate, against which a current of ionised air is directed, becomes negatively charged, on account of the greater velocity of the negative ions. The conditions are the same when a waterdrop falls through ionised air, the only difference being that in the latter case the air is stationary, and the conductor moves. The conclusion therefore was highly probable that the waterdrops pick up free negative ions in falling through the air. Many other experiments were made by Schmauss to confirm this view.

At first, when the air was rich in negative ions, the waterdrops acquired enough negative electricity to counteract the positive charge due to the Lenard effect. But gradually the available negative ions get washed out of the air, and the positive Lenard effect again predominates. Hence the initial swing of the electrometer needle to the negative side, followed by the permanent movement to the positive side.

It was also found that the negative charge of the drops increased with the distance through which they fell. In their longer course they naturally picked up a greater number of negative ions.

An interesting result from the meteorological point of view was obtained by making a test after the air had been shut up in the container for several days. The negative charge acquired by the drops was found to be much greater than in ordinary air. Elster and Geitel (*Phys. Zeitschrift,* 2, p. 116, 560, 1901) have shown that enclosed air masses acquire a greater percentage of free ions than free air. This, of course, accounts for the greater negative charge acquired by drops in stagnant air. The presence of moisture was also found to be favorable to the picking-up of negative ions.

These remarkable experiments of Schmauss must be of great value to meteorologists in helping them to form a satisfactory theory of the origin of thunderstorms. Evidently there are at least two great natural processes struggling against each other to create opposite differences of potential between the earth and the atmosphere. For the greater part of the year these processes counteract each other, and prevent a difference of potential from arising which would lead to a disruptive discharge in the form of lightning. But in hot summer weather, when the number of the free ions in the air is increased by the increase of moisture, by stagnant atmospheric conditions, and by the action of the ultra-violet light of the sun, then the Schmauss effect probably gets the upper hand of the Lenard effect, and the negative charge of the earth is so greatly increased that the electric pressure has to equalize itself in thunderstorms.—*The Electrical Review (London) October 17, 1902.*

Liquefied Oxygen.—This substance, which is ordinarily called liquefied air, but which more properly becomes liquefied oxygen by the rapid evaporation of nitrogen, is considered in some cases preferable to the x-rays for the treatment of malignant disease. White would employ it in the treatment of superficial epithelioma, but exclude it in cancer of the breast where no ulceration has taken place. For ulceration, followed by hemorrhages and excessive odor, it is indicated, and it would be an excellent change from arsenic and other caustic measures used as an adjuvant to hasten matters.—*J. A. M. A., Jan.* 24, 1903.

Chicago Electro-Medical Society.

The 19th regular meeting of the Chicago Electro-Medical Society was held in room 912 Masonic Temple, February 25, 1903.

Dr. Pettyjohn, the president, being absent, due to sickness, Dr. Replogle took the chair. Dr. T. P. Hall, the secretary being absent owing to sickness, F. K. Camp, acted as secretary pro tem.

Dr. H. P. Pratt said the minutes of the last meeting were not available, owing to illness of Dr. T. P. Hall, who is sick with typhoid fever.

The following paper was then read.

Views Concerning the X-Ray.

BY BYRON ROBINSON, B. S., M. D.
CHICAGO.

Medicine advances by epochs, a few of which may be cited, which have occurred during the last half century. About 1845 Semmelweiss, of Vienna, and Oliver Wendell Holmes, of Boston, announced that puerperal fever was a communicable disease, which was carried to the patient by the physician or nurse. Dr. Semmelweiss, who received the credit of the discovery, claimed that it was caused by cadaver poison, and introduced the method of washing the hands with chloride of calcium. This was an important epoch for humanity. In 1847 a far reaching epoch occurred when Dr. Long and J. Y. Simpson introduced chloroform to the world. In 1872 Hegar, of Freiburg, Germany, removed the oviducts for uterine myoma to control hemorrhage. In 1872 Battey, of Rome, Georgia, removed the ovaries to anticipate the menopause. In 1872 Mr. Lawson Tait, of Birmingham, England, removed the oviducts for salpingitis; and about 1880 Lister began introducing Listerism; all far-reaching epochs. In 1895 Roentgen discovered the x-rays and became the author of the last important epoch in recent medical history.

With every medical epoch there is a longer or shorter time in which the new discoveries are conducted by pioneers. Pioneers cannot be expected to do perfect work. Pioneers in abdominal surgery were very defective in their operations when compared with the abdominal surgery of today, after twenty-five years of cultivation in the field.

The x-ray epoch is but a few years old and yet it has worked marvelous changes in our views with regard to disease.

Wise men think that the practice of medicine should be placed in the hands of those having proper knowledge of it. It is my opinion that the x-ray should be employed only by those especially trained in its use.

One must be well versed in the x-ray technique necessary for successful results. A proper and scientific knowledge of the workings of the x-ray apparatus is also necessary and again the condition of the tube, which is the all important factor for the accomplishment of improvement, if not a cure, must be well understood. The ability to determine the vacuum of a tube at a glance, knowledge only obtained by long continued use, is evidence of superior skill and is paramount to other technique.

The question as to how long to expose a person for the first time to the x-rays, so as not to produce a dermatitis, is a matter of personal equation. Each person has his or her own personal susceptibility so that in reality we have to feel

our way. However, the successful operator, by his own personal intuition, acquired by long experience, need not have, nor does he have, any fear along this line; the beginner is at a loss to know.

The x-ray seems to have a special election for sperficial carcinoma influencing the growth by its irritant action upon the connective tissue but apparently not influencing the epithelium to any great extent. When the epithelium is unduly influenced to the extent of inflammation we note a rapid metastasis along the adjacent lymph channels; and a cessation of treatment is necessary.

On deep seated malignancy we are in the dark, due to the fact that we cannot watch the process nor the results, and once septic metastasis is established here the results may be fatal, septic pneumonia being the usual cause of death.

Again the x-rays appear to have a destructively selective action on tissue of low vitality, while healthy tissue exposed at the same time does not manifest the same changes.

The present general opinion is that the x-ray treatment demonstrates its efficiency in malignant disease and that renewed treatment may free the patient from disease.

The best method of treatment is a combination of an early radical surgical operation and the x-ray application.

The best results in general is the replacing of the diseased tissue by connective or fibrous tissue or by adipose tissue. Rapid results, but dangerous, can be obtained by sloughing or necrosing the tissue.

What is the x-ray? It is a stimulant. If one touches a frog's heart lying in normal salt solution with a steel needle, a piece of ice, a red hot rod, or passes a stream of electricity thru it, the heart will begin to beat. These various stimulants cause rhythmical movements of the heart. All nature tends toward recovery, and disease cells are in general of less vitality than normal ones. It is well known, for example, that a myoma uteri is a weak lived growth; as pregnancy, or ligation of a small artery will check or even cure the tumor; other growths almost entirely recover by the injection of carbolic acid; while salts of mercury, or K-I, cures syphilis, actinomycosis, etc. The x-ray, like heat, light, drugs, and exercise, is a stimulant. Its penetrating power to reach and act on cells is simply as a stimulant, and since stimulants induce the cells to act normally, the x-ray must be classed among these powers.

X-ray burns are very numerous and place the physician liable to damages. The burns are necessary for cure, because the x-rays necessarily act on the skin first. As in many instances the disease is located considerably beneath the surface, it will be requisite to endanger the skin cells to effectively reach the diseased locality. It is natural to suppose, from what we understand of the action of the x-ray, that the greater number of rays employed the more effect is produced on the diseased tissue. The x-rays act first on the skin as shown by the burns and necrosis of skin tissue, then on the underlying tissue, which is affected more or less intensely according to the degree of dermatitis set up. The reaction on the skin may be noticed in a few days or a few weeks.

W. Schultz, in his experiments on virulent bacterial cultures, claimed to have demonstrated that the action of x rays was practically nil. While Dr. Pratt, and others, claimed to have obtained totally different results. We know that the x-ray changes the tissues, as swelling and œdema of the epithelial cells arise; the nuclei shrink and the tissues resist cutting instruments.

Another view of the effect of the x-ray may be presented. For example: if I wish to cure endometritis I first destroy the endometrium by a cautery. If I wish

to cure an indolent ulcer I first destroy its granulating surface so that a new granulating surface will appear. Doubtless the x-ray works on a similar principle. It produces its final effect by first destroying certain tissues in order that new normal tissue may arise during the recovery.

We will call an x-ray burn one which produces pathologic symptoms; how numerous these may be is a matter which can only be determined by an experienced operator. We would consider that in ordinary practice there will occur 50 per cent of pathologic burns in every 100 cases of malignancy. An experienced operator alone can judge how often such patients should be treated without being liable to damage for incapacitating the patient for labor, and also the amount of suffering inflicted. X-ray burns recover slowly. In just how far the x-ray operator is liable to pecuniary rewards to the patient is still unsettled by the courts.

There are cases of mammary carcinoma of the atrophic scirrhus type which might probably be better off without x-ray treatment when in the hands of the unskilled, as the patient would not die of the carcinoma if let alone, but the application of the x-ray might produce, by the use of a high tube or exposing too much surface of the body to the x-ray, a dangerously acute lymphangitis from decomposition of epithelia or other cell structure overwhelming the system with sepsis thru the adjacent lymph channels. The proper treatment can be determined only by experienced operators.

In the treatment of cases with x-rays careful observation must be made as to the degree of infection after the first few applications, because extensive metastasis may arise in the adjacent lymph channels which may overwhelm the patient with sepsis and prove fatal. The operator must know by observation how intense and in what quantity, quality, and length of time to apply the x-rays, for each individual case. The x-ray produces a large amount of degenerative waste which must be eliminated and the operator must possess the standard of judgment of what the patient can stand.

Fractures.—In fractures the experienced operator who alone should be an M. D., is able to determine the condition from the skiagraph.

The shadow of the fractured parts requires interpretation, and much depends on the technique. For example, if the fractured parts are placed close to the target there is produced an altogether different shadow than if placed at a distance. The operator must possess experience and knowledge as regards age, relations in reference to cartilage and bone shadows.

Many professional disputes arise in courts as to the uncertainty of x-ray shadows in fractures of childhood. Practically the cartilage of a young child does not make a marked shadow. Hence the inexperienced x-ray operator might be induced to testify that the child had a fracture by noting a clear space between the epiphysis and diaphysis.

Calculi.—Recently acquired knowledge of the x-ray in regard to the shadows of hepatic and renal calculi, is of great importance, and since it came into vogue the ureter shows the presence of more calculi than the kidney. X-ray shadows of renal calculi in the tractus urinarius is quite certain in diagnosis, but experience is required to differentiate such shadows from those found in the tractus intestinalis, especially that of the colon, because in the last segment various mineral salts may accumulate. Heretofore shadows of hepatic calculi have been rather uncertain, due to faulty technique; however, since we have placed the patient with the region of the liver close to the plate the shadows of hepatic calculi have been more accurate.

In 1896 Dr. H. Preston Pratt began to

relate to me his treatment of disease by the x-ray. I met him now and then and his first claim in April, 1896, to me was that the x-ray destroyed pathologic germs, and that he would soon be curing various diseases, as tuberculosis, cancer, etc. For several years I have followed his work and have been pleased with his excellent and substantial results.

I wish here to thank Dr. Robert Gregg for his suggestions in the writing of this paper.

Dr. Gregg's long experience in the use of the x-ray makes him an authority on the subject.

In addition to the paper Dr. Robinson made a few remarks. He said in part, that after watching the x-ray treatment for three years he found that it had done a great deal more than he expected at first, and more than the x-ray men thot it would do. In his opinion the only man who is fit to use an x-ray machine is a man thoroly experienced in its use.

Discussion.

Dr. Rowell—How much truth is there in the power of x-rays to destroy germs outside of the body?

Dr. Pratt—Our original work along this line was in the first of April, 1896. We then succeeded, with the x-ray, in destroying cultures of eight different diseases. We were at that time successful, but all over the country they failed, and it was a year, or year and a half, afterwards before there were any favorable reports at all outside of our own. In discussing that part of Dr. Robinson's paper in reference to x-ray burns; the reason we have x-ray burns is because the skin has a greater resistance to the electrical current than any other part of the body. One method of partly avoiding the burn is to reduce the electrical resistance by using a cloth saturated with a solution of sodium chloride. With an ordinary direct dynamo by placing the hands on the pole pieces a certain amount of current will pass thru the body without apparent injury to the hands, owing to the high electrical resistance of the skin, but if the skin is moistened it would be a somewhat dangerous experiment. Now all people who perspire freely will not suffer from a burn as quickly as those who do not perspire at all. This is due entirely to the difference in electrical resistance.

I think there is a lot of meat worthy of digestion in Doctor Robinson's paper. He has the advantage of most of us in being a specialist in gynecological lines. He is very familiar with these malignant troubles and has followed up very closely the effect of the x-ray on the tissues. I think, of course, as he does, that we want to be careful and not carry the burn to an extreme degree; we must understand it. I know one thing, as far as sarcoma goes, it is sometimes necessary to burn, and I believe it is justifiable to carry it as far as possible without material injury to the tissues. By rendering the parts aseptic and using a celluloid screen, the extent of the x-ray burn is limited. There is no danger from it as long as it is aseptic; but the trouble is that the patient, either by scratching or otherwise, or for the lack of cleanliness, infects it. If there are any microbes flying in the air between the tube and the patient the celluloid screen prevents them from being driven into the body. Another trouble lies in the fact that in using a high tube the discharge from the terminals of the tube, sometimes known as streamers, have a tendency to produce muscular contraction and this is what causes the infection to be pumped along the lymphatics. This is the only danger as far as the x-ray tube is concerned. Another point, don't expose too much of the surface at a time.

if you do you will have a condition of auto-toxemia. When we watch the patients we will have no trouble. See that all organs of elimination are kept in good working order. If we find out it is impossible to get rid of a septic condition due to breaking down of the mass and nature will not take care of it, it is an excellent thing to remove it and treat afterwards.

I differ with Dr. Robinson in this: I think it is best to ray before operating and also to ray afterwards. To my knowledge, when this method has been carried out, there has not been a single case of recurrence reported.

Dr. Replogle—Would a Turkish bath be a good method of elimination?

Dr. Pratt—Yes, a very good one.

Dr. Robinson—A half normal salt solution is also excellent.

I think there is a lot of damage being done by x-ray workers. A man after treatment gets sick and he does not know what the trouble is. He calls in the doctor and the doctor does not know; tells him he has la grippe. The trouble with this man is that he has sepsis. Now is the time when great damage is being done all over the country by these inexperienced x-ray men. The average doctor does not know enough about the x-ray not to expose too much of the tissues at a time. Result, patient after treatment is sick, and the doctor does not know the cause.

Dr. Pratt—Do you think that is due to the extension of the cancer foci by metastasis or simply the effects of decomposition or auto-toxemia.

Dr. Robinson—Both.

Dr. Pratt—I was speaking of cancer cells in particular.

Dr. Robinson—I cannot answer that.

Dr. Pratt—There are a lot of operators, and first class ones, too, who do not understand that yet. I have, if once, a dozen times lately, in different medical meetings around the country, called the attention of the physicians to that one very thing, and yet the physicians say they don't believe it. After they have given 40,000 treatments, or more, as I have, I think they will change their minds.

Dr. Rowell—Does the x-ray in this instance show an irritation of the skin, necessarily?

Dr. Robinson—There is no irritation of the skin; it is smooth, but the patient becomes sick.

Dr. Rowell—In this metastasis, are the regional glands involved?

Dr. Robinson—Not enough to be felt, but a slight edema may be noticed.

Dr. Rowell—Does the x-ray stimulate fibrous tissue growth?

Dr. Robinson—The epithelial cells are so influenced by the rays that they do not grow; fibrous tissue multiples and crushes them out, yet the epithelial cells are influenced by the presence of the x-ray. What will be done in the next few years? Photo-therapy and the x-ray is a combination that is going to win. The light rays being used a very long time and the x-rays a short time.

Dr. Rowell—I know the x-ray will do some things that we would not look for it to do. I know of a case of eczema, treated by Dr. Hyde, that would not respond to other treatment, yet under the x-ray it disappeared and has not returned for eight months.

Dr. Robinson—In treating deep seated malignancy the inexperienced doctor knows nothing of what he is doing. When the patient begins to feel sick then is when the doctor should stop, but he doesn't. He keeps the patient coming expecting him to continue all summer. Every now and then I see a long article by a doctor who has had an x-ray machine for six months. When I read that he has only had his outfit six months then I stop. A man who has had an x-ray machine only six months cannot be an authority. The x-ray is a very efficient remedy in malig-

nancy and repeated efforts with judicious application may relieve the patent. If the man with the x-ray can make the malignant, non-fibrillated carcinoma, into a scirrhus, he will save the patient. The coming x-ray treatment is going to modify malignancy more than it will cure it.

Dr. Pratt—What we are striving to do, and what I think the x-ray does, is to change the malignant cell to a non-malignant; then, what is necessary after this is to bring about an elimination of the decomposed product.

Dr. Rowell—If it is the case that the x-ray will destroy or prevent the proliferation of epithelial cells would it not be of advantage in treating goitre?

Dr. Pratt—Yes, it would.

Dr. Robinson—Cannot these rays be changed by a modification of tubes?

Dr. Pratt—Partially so. This may be accomplished by making the glass thinner, which would possibly admit of stronger impulse, but the technique will hardly be changed. I do not think we can increase the lines of force above what we have now. There is a certain amount of gas in a tube of a certain size, and the minute particles of gas strike so many square inches of the inner surface of the glass of the tube, and only so many can strike it, and the greater the mass the less the impact, and consequently the less the penetrating power of the ray. It is simply a question of mathematics.

Dr. Replogle—I think the most important point tonight has been the elimination of toxin. I know of one case, which upholds Dr. Robinson's remarks, as to patient becoming sick after x-ray treatment. The patient was a woman who had had no drainage before treatment and a few days afterwards developed what she thought was the grippe.

I would like to ask Dr. Robinson if young persons under 15 with malignancy are very malignant.

Dr. Robinson—Yes, in the young malignancy is far more pronounced than in adults.

Dr. Pratt proposed the following names for membership: N. Le Doit Johnson, M. D., Stewart Johnstone, M. D., A. Ralph Johnston, M. D., Louis E. Zins, M. D., and E. L. Dennison, M. D., who were duly elected.

There being no further business, on motion the society adjourned.

F. K. Camp,
Secretary pro tem.

The next meeting of the society will be held on Monday evening, March 30th, 1903, on the 17th floor (drill hall parlor), Masonic Temple. An excellent program has been prepared.

Automatic Regulator for X-Ray Tubes.

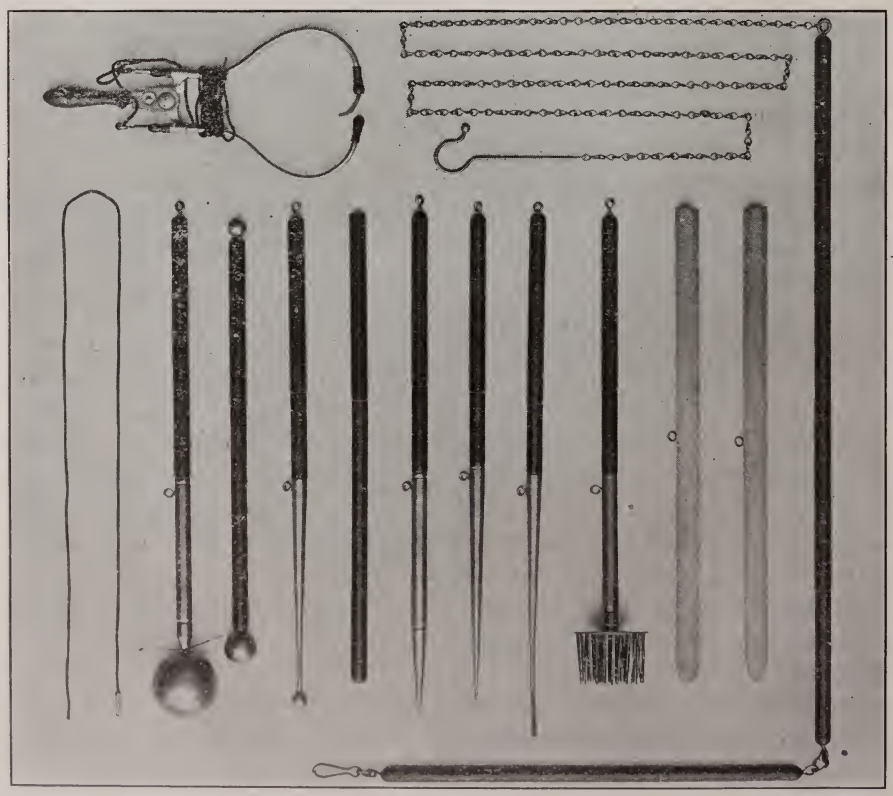
W. S. Andrews, Schenectady, N. Y. App. filed June 5, 1897. An electric heater for vacuum tubes comprising a number of conductors in series, insulated from each other and supported by an electrical insulator adapted to transmit heat to the tube.

American Medical Association Meeting, New Orleans, May 5-8, 1903.

For this occasion the Mobile and Ohio R. R. will make a rate of one first-class fare for the round trip, viz.: $18.00 from St. Louis. Tickets sold May 1–4, inclusive, limit 10 days, with privilege of extension to May 30th on payment of 50 cents. Write Jno. M. Beall, A. G. P. A., St. Louis, for full particulars.

Editorial.

Professor S. H. Monell, for the first time, made a short visit to Chicago, and called on all of his friends; and among them THE AMERICAN X-RAY JOURNAL was honored. His call was of such interest that the manufacturers of electrical goods and supplies, numbering some 20 firms, gave a banquet in his honor at the Victoria Hotel on the evening of March 14th, 1903. He being the only invited guest of the evening, addressed the meeting on the construction of static machines and electrodes, as well as the technique employed. During the address he said that the static machine manufacturers in the west are ahead of the eastern manufacturers as far as construction of machines go, and that the west has eight static manufacturers to one in the east, but he thot that the western manufacturers were behind in the design of electrodes. The professor took up and discussed the different forms of electrodes calling attention to their weak as well as strong points. He incidentally, but modestly, referred to his own special designs, which we take great pleasure in illustrating below. We regret that the professor did not have more time, as the Chicago Electro-Medical Society intended to have banqueted him. We only hope that the next time he calls the society may have this pleasure.



THE JOURNAL takes great pleasure in presenting to their readers, in the frontispiece, an excellent half-tone of our esteemed friend and co-operator, Prof. A. D. Rockwell, and also take pleasure in calling the attention of our readers to the fact that he is the father of electro-therapeutics of America.

We are sorry to announce that, owing to the sickness of Dr. Hall, the editor, we have been compelled to delay the commencement of the correspondence course, which should have started in the February issue, until the April or May issue. The first lesson will be a history of electro-therapeutics, which was being compiled by him.

Prof. John Uri Lloyd's famous satires, the first of which, "The Mother of Sam Hill's Wife's Sister," was published in the September Criterion (1902) are resumed in the January number, with the fourth paper of the series, "Sam Hill, Sheriff of Knowlton, Kaintuck," and purport to be related by "Chinnie Bill Smith," the famous story teller of "Stringtown on the Pike." These satires, written exclusively for the Criterion, will be illustrated by Martin Justice, whose character studies are second to none in the magazine field. Prof. Lloyd's inimitable style and daring, yet kindly humor, will be a rare treat to Criterion readers. A deeper meaning will be read between the lines of these unusual papers by thoughtful minds. The paper, "Why a Kentuckian Stands With His Back to the Stove," "The Testing of Milinda," by Sam Hill, appears in the March Criterion and the remaining stories will appear during the year 1903. The price of "The Criterion" is only $1 a year, monthly.

Dermatology and Syphilis.

January Dr. Martin F. Engman under this caption discusses x-ray therapy, having apparently just waked up to the fact that it is of great value in many cases. He credits Pusey, whose x-ray work began in 1900, with being the pioneer of x-ray therapy in America, oblivious of the fact that the pioneer work not only in America but in the world was done in 1896 by Dr. H. P. Pratt, of Chicago. It has been quite fashionable in certain quarters for writers to credit themselves or their personal friends with doing "pioneer work" in x-ray therapy, and perhaps we ought not to complain when Dr. Engman follows the fashion. Nevertheless a little more attention to truth would not injure the cause of medical science.

It is also stated that "several have demonstrated that radiations of cultures of organisms does not even retard their growth." Any one who has had experience with x-rays knows how very difficult it would be to "demonstrate" such a thing; and in the face of the strong and positive evidence that bacilli in cultures can be killed by x-rays, this is certainly an overstrong statement of a mere opinion.

There is really no excuse for such misstatements. They serve only to discredit the rest of the paper, which is in the main a fair summary of x-ray therapy in dermatology.

Science Notes.

Profs. Haga and Wind, of Holland, in 1899 announced that the x-rays were subject to diffraction. They have recently repeated their experiments and have again proved the existence of diffraction phenomena, and conclude that there is no longer a doubt that the x-rays are, like light waves, perturbations of the equilibrium of the ether. They have sought to evaluate the wave-lengths of the x-radiations, and conclude that these radiations have wave-lengths of the same order of magnitude as light waves.—*Scientific American, Feb.* 21, 1903.

American Electro-Therapeutic Association.

At the twelfth annual meeting of this Association, held at the Hotel Kaaterskill, Greene county, N. Y., September 2nd, 3rd and 4th, 1902, the following were elected, viz.:

1902-1903.

OFFICERS.

President—Daniel Roberts Brower, M. D., LL. D., Chicago, Ill.

First Vice-President—Maurice Fischor Pilgrim, M. D., Boston, Mass.

Second Vice-President—Charles Frank Osman, M. D., Boston, Mass.

Secretary—Clarence Edward Skinner, M. D., LL. D., New Haven, Conn.

Treasurer—Richard Joseph Nunn, M. D., Savannah, Ga.

EXECUTIVE COUNCIL.

Robert Newman, M. D., 101 West 80th street, New York, N. Y., chairman (2 years); W. H. White, M. D., Boston, Mass. (1 year); F. B. Bishop, M. D., Washington, D. C. (1 year); Ernest Wende, M. D., Buffalo, N. Y. (2 years); Charles O. Files, M. D., Portland, Me. (3 years); Fred H. Morse, M. D., Melrose, Mass. (3 years).

ORDINARY FELLOWS.

Boardman Reed, M D., Philadelpha, Pa.; T. D. Crothers, M. D., Hartford, Conn.; Harvey H. Roberts, M. D., Lexington, Ky.; John W. Daniel, M. D., Savannah, Ga.; Herman Grad, M. D., New York, N. Y.; Albert C. Geyser, M. D., New York, N. Y.; Theo. H. Newland, M. D., New York, N. Y.; Allen R. Thompson, M. D., Troy, N. Y.; Marcus M. Johnson, M. D., Hartford, Conn.; T. C. Lucke, M. D., Ocilla, Ga.; Hamblin B. Maben, M. D., Kingston, N. Y.; W. L. Kenney, M. D., St. Joe, Mo.; Almerin W. Baer, M. D., Chicago, Ill.; E. Hockheimer, M. D., New York, N. Y.; Josephine Walter, M. D., New York, N. Y.; Willis P. Spring, M. D., Minneapolis, Minn.; William Stevens, M. D., New York, N. Y.; Laura V. Gustin-Mackie, M. D., Attleboro, Mass.; George Z. Goodell, M. D., Salem, Mass.; W. W. Eaton, M. D., Danvers, Mass.; Sigismund Cohn, M. D., New York, N. Y.; Charles A. Covell, M. D., Syracuse, N. Y.; A J. Abeel, M. D., Syracuse, N. Y.; Russell H. Boggs, M. D., Allegheny, Pa.

ASSOCIATE FELLOWS.

W. E. Goldsborough, M. E., Lafayette, Ind.; William H. Hosking, M. D., Masterton, New Zealand.

RESIGNATION.

Elihu B. Silvers, M. D., Rahway, N. J.

COMMITTEES APPOINTED BY THE PRESIDENT FOR THE YEAR 1902-1903.

On Induction Coils and Alternators.

Margaret A. Cleaves, M. D., 79 Madison avenue, New York, N. Y., chairman; A. E. Kennelly, F. R. A. S., Philadelphia, Pa.; Burton Kinraide, E. E., Boston, Mass.

On Cataphoresis.

F. H. Morse, M. D., Melrose, Mass., chairman; F. B. Bishop, M. D., Washington, D. C.; M. F. Pilgrim, M. D., Boston, Mass.

On Electric Light Apparatus for Diagnosis and Therapy, and the Roentgen Ray.

W. Scheppegrell, A. M., M. D., 3723 Prytania street, New Orleans, La., chairman; J. B. Gibson, M. D., Birmingham, Ala.; T. D. Crothers, M. D., Hartford, Conn.

On Static Machines and Condensers.

William Benham Snow, M. D., 627 Lexington avenue, New York, N. Y., chairman; F. Schavoir, M. D., Stamford, Conn.; G. Betton Massey, M. D., Philadelphia, Pa.

On Electrodes.

Robert Reyburn, M. D., 714 13th street, Washington, D. C., chairman; W. H. White, M. D., Boston, Mass.; C. H. Lador, M. D., Chicago, Ill.

On Constant Current Generators and Controllers.

W. J. Herdman, M. D., 48 E. Huron street, Ann Arbor, Mich., chairman; Robert Newman, M. D., New York, N. Y.; Lucy Hall Brown, M. D., Brooklyn, N. Y.

On Meters.

R. G. Brown, E. E., 158 Montague street, Brooklyn, N. Y., chairman; Charles T. Scott, M. A. I., E. E., Pittsburg, Pa.; W. J. Jenks, M. A. I., E. E., New York, N. Y.

On St. Louis Exposition in 1904.

William Benham Snow, M. D., 627 Lexington avenue, New York, N. Y., chairman; William J. Morton, M. D., New York, N. Y.; W. E. Goldsborough, M. E., Lafayette, Ind.

The next (thirteenth) annual meeting will be held at the Hotel Windsor, Atlantic City, N. J., on Tuesday, Wednesday and Thursday, September 22nd, 23rd, and 24th, 1903.

CLARENCE EDWARD SKINNER,
Secretary.

Therapeutic Range of X-Rays.

Dr. J. E. Gilman (*Clinique,* Feb., 1903), shows a wide therapeutic range of the x-ray. Loring had found it curative not only of cancer and lupus but also of goitre, tuberculous glands and joints, prostatic hypertrophy, nephritis, rheumatism, phthisis, pruritis, eczema, and superficial malignant growths. Dr. Gilman adds to this list, asthma, impacted gall stone, inflammation of the gall duct, peritoneal and intestinal adhesions due to acute or chronic inflammation, Graves' disease, fibroid tumors, adenomas and indurations. Murphy regards it as superior to injections of formalin, iodoform and glycerin in tubercular disease of joints. Dr. Gilman cites three cases of tuberculosis of the spine from Dr. Murphy's report, where the x-ray produced gratifying results. In these cases he found that peraphlegia is caused by a granuloma within the spinal canal caused by rupture of the tubercle thru the compact bone, which compresses the cord. By doing a laminectomy, curetting the body of the vertebra, and opening the spinal canal the pressure is relieved. He cites three cases where the x-ray was used to cure the tubercular factor in the disease. The diagnosis was confirmed by microscopic examination of pus obtained by making a lateral puncture with a large hypodermic needle between the ribs, thru the pleural cavity and into the tubercular area in the body of the vertebra; the location being determined by the pain. In intestinal fistula he found that the x-ray increased the amount of conective tissue and closed the sinus. Edwards had used the x-ray in tabes. Under its use the knee-jerk returned and the ataxy diminished. He used the high tube over the lower dorsal and the lumbar vertebra. Dr. Gilman cites the opinion of Rainear as corroporative of his own experience that there is conclusive proof that the x-ray destroys or causes degeneration of malignant matter whether superficial or deep. He cites many authorities to prove that deep seated cancer and tuberculosis is amenable to an encouraging degree to treatment with the x-ray. He began his observations in 1896-7, the early cases being treated in the laboratory of Dr. H. P. Pratt.

Value of Electrolysis in Eustachian Tube.

N. H. Pierce offers the following conclusions: (1) In otosclerotic disease, electrolysis is useless; (2) In the great majority of cases of catarrhal disease, it has no advantages over other methods of treatment; (3) In a certain few cases where there is probably a soft exudate near the isthmus, it may be regarded as of some value.—*Archives of Otology.*

Twelve cases of malignant disease treated by the Roentgen Rays.

H. P. Moseley, M. D., (*American Medicine,* January 11, 1903), makes this report. He used a ten-plate static machine, and a 50-cm. coil; also a direct current of 110 volts, supplied by the hospital, directly into the interrupter, no rheostat or transformer being required. Areas treated at a distance of 15 to 30 cm. measured from the target of the tube; tissues protected by lead foil; time of exposure 5 to 10 minutes on alternate days; occasionally oftener. When using the coil 1½ to 2 amperes was passed in the primary. The tube giving out a large number of rays, not highly penetrating was found the best. Tubes of high vacuum cause x-ray burns but do not have a greater curative effect compared with low ones. Case. (1) Epithelioma of lip. Ulcer ½ in. by ¼ in. slightly indurated around edges; slight scabs on surface, bleeds easily. Treatment. Low vacuum tube, distance 30 cm., later 15 cm., time 5 to 10 minutes; total 19, treatment about 3 a week, from March 7 to May 24, ulcer healed; remained healed Oct. 7. Growth superficial, no glands involved, no burns. (2) Epithelioma of lip. Patient aged 80. Cancer similar to No. 1. Treatment. Very low tube, excited by coil; distance 8 to 15 cm. from area treated; 17 exposures of 10 minutes each at irregular intervals; no effect from treatment; afterwards 13 exposures given more frequently; result, area twice as large as at first; treatment discontinued; improvement; after about two months cancer had healed; in all 36 treatments. (3) Epithelioma of face. Was cauterized and treated with ointments but continued to ulcerate with the formation of lumps; ulcer 1 inch in diameter on a line with ala of nose and involving lower eyelid; discharges pus and blood and pains constantly. Marked ectropion of lower lid. Treatment. Low vacuum tube; exposure every other day for five minutes, distance 20 cm. skin very sensitive, becoming quite red; treatments twice a week. Began May 1, on Sept. 20 ulcer ¼ inch in diameter, no pain, new skin healthy. Had not entirely healed January 1, 1903. (4) Carcinoma of jaw. Began as ulcer at the inner side of left cheek from sharp tooth which persisted. Examination. At angle of left lower jaw swelling size of hen's egg; red, adherent to skin and underlying bone with thin, yellow discharge from summit; just above angle of mouth a reddened nodule exudes a thick, yellow discharge. Treatment: Tied left external carotid artery; wound healed by primary union. X-ray exposure 5 to 10 minutes, low tube, distance 20 cm. Eight treatments on alternating days without improvement. Patient died sometime after. (5) Carcinoma of breast. Inoperable. Examination. A large nodular, heavy, bluish mass in lower part of breast including axilla; no edema of arm; general condition fair. Treatment: High and medium tubes, exposure 5 to 10 minutes, distance 25 cm. Seven treatments; died after several months. (6) Recurrent carcinoma of breast. Had breast amputated and pectoral muscles removed and axilla cleaned out a year before. Had constant pain in wound shooting down arm. Recurrence after four months; excision; x-ray treatment after six weeks; low tube, exposure ten minutes, distance 20 cm. on alternating days; improved for a time; recurrence and metastasis later. Left hospital and is supposed to have died. (7) Recurrent carcinoma of breast. Amputation. Examination. Many hard, reddened, infiltrated spots ½ to 1 inch in diameter scattered over the site of the scar. Treatment. Medium and high tubes; distance 25 cm.; exposure 5 to 10 minutes on alternating days. Improvement. Treatment neglected

and finally her condition became so poor that they were discontinued. (8) Carcinoma of inguinal glands. No improvement from treatment. (9) Carcinoma of inguinal glands. Started in prepuce and extended to inguinal region; excised several times. Examination. Mass like irregular collection of small glands, firm and slightly tender. Treatment. Medium high tube, excited by coil, distance 20 cm., time 5 to 10 minutes, area treated 6 by 4 inches, at first on alternate days, when skin became red, at longer itervals, laterally every day. Improvement early, mass grew smaller, general condition improved, gained weight. Result most satisfactory. After nine months no recurrence. (10) Sarcoma of pharynx. Condition hopeless-Treatment afforded no relief. Died of exhaustion. (11) Sarcoma of buttock. Excised several times. Examination. A tumor size of child's head in site of former operation, passing thru the great sciatic notch. Coley's erysipelas toxin was tried but without apparent effect on the growth of the tumor. Treatment by x-rays. From January 30 to February 21 she was given daily treatments with two omissions. Distance of target 8 cm. to 12 cm. from surface of tumor, first two exposures 10 minutes, the rest 15 minutes; high tube. Tho there was marked improvement, she died of exhaustion. (12) Sarcoma of temporal region. Had a sarcoma removed from left temporal region. nineteen years before. Examination. Left zygomatic region occupied by diffuse, firm swelling; 7.50 cm. above and 5 cm. below the line of zygoma. Surface smooth not hot, red or tender, raised 2 cm. above surface of skin. Treatment, static machine, low tube, distance 15 cm., exposure 5 minutes. Improved. Treatment every day, time 10 minutes, coil used with 2 am. of current passing in primary. After seven treatments swelling entirely disappeared.

Roentgen Rays in Cancer.—From clinical experience up to the present time, Leonard considers the following conclusions justified: 1. We have a more potent remedial agent than any other in the Roentgen rays, but they can not be considered as a cure-all, and should not be employed to supersede operation, but to supplement it. The best interests of the patient will be served by early diagnosis, early radical removal by surgical intervention, and subsequent thoro treatment of the infected area by the Roentgen method. Inoperable cases and superficial growths not liable to produce death or give rise to metatases, and also recurrences, may reasonably be submitted to Roentgen treatment previous to operation. It should only be employed by practitioners qualified by education and experience to judge of the therapeutic effects and estimate the proper dosage. We need wider clinical experience before we can have an effective application of this remedy in deep-seated malignant disease.—*Journal A. M. Association, Dec.* 13, 1902.

In American Medicine, January 11, 1903, is an article by Dr. H. P. Moseley in which the following appears. He uses a 10-plate static and a 50-cm. coil, also a direct current of 110 volts. He evidently means that a 50-cm. spark coil in inches would be equivalent to a 20-inch spark coil. He says tubes of high vacuum give x-ray burns but don't have a greater curative effect compared with low tubes. As a matter of fact the low tubes burn long before the high one. The reason there is a greater number of lines of force thrown off from the tube. High tubes should never be used for malignant troubles. Unlike a good many operators the doctor has discovered what is true that the low tube is the one that does the good work in malignant troubles.—Ed.

Roentgen Rays in Practice.—Lowe, in a paper read before the Roentgen Society in London, gives an account of his experiences of the use of x-rays in the treatment of cancerous growths, lupus, rodent and other ulcers. In cases of new growths he found exposure to x-rays to be of very great benefit, and many diseases formerly supposed to be incurable now yield to this treatment. In one case of a malignant growth on the breast, he had given an exposure of 25 minutes; here an operation had been advised, but this was rendered unnecessary by the therapeutic action of the rays. Turning to radiography, he described cases in which this had been of the greatest service in his practive. It is of the highest importance in radiography to have the anode adjusted immediately above the line of fracture in order to secure good results. The reason for the slow advance seemed to lie in the want of definite lines of treatment and of suitable apparatus, which should be readily available.—*Lond. Elec. Eng., January* 9.

Theory of the Wehnelt Interrupter.—Klumpathy, in a paper presented to the Hungarian Academy of Sciences, says that the interruptions in the Wehnelt interrupter are caused by the development of steam in the acid which then acts as an insulator. Simon had explained the steam production as being due to Joulean heat. The present author shows that his explanation is not sufficent and that the Peltier effect plays an important part. A platinum electrode in sulphuric acid is heated as anode and cooled as cathode by the Peltier effect. As a rule the thin wire is made the anode of a Wehnelt interrupter, so that Joulean heat and Peltier effect here act together, producing a high temperature and causing a strong generation of steam. If the wire is made the cathode, it will be cooled by the Peltier effect, though it will receive its share of the Joulean heat. There will furthermore be a liberation of hydrogen at the cathode, and a voltaic arc will play between the cool wire and the warm, well conducting acid, provided the current intensity be high; as a result the wire cathode will be liable to fuse. If the currents are not very strong, the wire cathode will not make a very good Wehnelt interrupter. Klupathy further observed that the frequency of the interruptions of a wire anode which was not pointed, was increased when the electrode was especially heated by a branch current. As regards condensers and self-induction, he finds that when the condenser is joined in parallel to the interrupter, the frequency will rise if the anode wire is thin and the self-induction small, but will diminish if the wire is thick and the self-induction considerable. In his opinion, the process could then be explained in the following way: The heat produced in the wire electrode, both Joulean and Peltier, evaporates the acid in its immediate neighborhood; the steam generated insulates the electrode, and interrupts the current momentarily; the extra current then strikes thru the steam, the spark re-establishes the circuit, and the phenomenon repeats itself.—*Electrical World and Engineer, Jan.* 10, 1903.

Cancer.—The parasitic theory of cancer is discussed by Robin, who is not willing to go quite as far as the Harvard Commission in their conclusions. He is willing to admit that protozoön-like types are found in cancer, but this does not establish their interrelation. It is readily conceived how parasites may contaminate tumors which are exposed to the external air, and exist as a secondary invasion and perhaps accelerate the growth and cachexia.—*J. A. M. A. Dec.* 13, 1902.

Electricity in Gynecology.—Dr. G. Betton Massey (*Jour. Adv. Therapeutics,* Feb., 1903), counts electricity as our best remedy in developmental imperfection of function, and post-infective disorders in women. In young women menoralgia is due to imperfect development. Electricity promotes a healthy circulation in the pelvic sympathetic ganglia and affords relief in dysmenorrhœa. In older women this weakness leads to post infective changes, endometritis, metritis, sulpingitis, ovaritis, or perimetric deposits because there is not power to throw off the debris of the microbic-phagocytic contest constituting the original affection. Here electricity cures by stimulating errant metabolism or sterilizes by cataphoresis. Trophic disorders in mature women giving rise to displacements, even fibroid tumors, arise from infections or a faulty circulation. Nervous phenomena—neuralgias, hysteria, neurasthenia, etc., as well as sexual impotence, neural and muscular, are amenable to electricity. He uses a dispensing pad, half an inch thick, made of absorbent cotton covered with cheese cloth, with a flat spiral of brass wire on the under side for the current, 12x8 inches for over 80 ma., allowing half an inch of water between the skin and metallic conductor. For most vagino-abdominal applications he uses a large olive-bulbed electrode covered with absorbent cotton, the shaft insulated with black sealing wax, and re-fused and sterilized in an alcohol flame before each application. For cataphoric application the bulb is amalgamated with mercury before each application; the instrument being connected with the positive pole. From 50 to 80 ma. are employed for five or six minutes tri-weekly, the mercuric oxychlorides being driven into the affected region. The treatment causes some vaginal irritation, which is probably remedial. Menstruation may be arrested for a time. Following the mercuric cataphoresis a flexible intro-uterin instrument of platinum is used to cure residual endometritis. It is sterilized in the flame, covered thinly with cotton and moistened with water and synol soap solution. After using, the cotton is brushed off in water to avoid breaking the fragile tip. Intra-uterine mercuric applications are made with a Simpson sound, the tip amalgamated, and the shank insulated with soap. A current of 80 to 150 ma. is used and in treating uterine fibroids, with mercury on the electrode when application is positive. In tubercular glands of the neck a small electrode of thin zinc is amalgamated and inserted under the skin with cocaine anesthesia. A current of ½ to 3 ma. is turned on for fifteen minutes. A new sliver of zinc is employed for each treatment. A second application is made after a few days, lasting fifteen to thirty minutes, with current of such strength as the patient can bear. Sometimes chloroform anesthesia is necessary in unruly patients when 50 ma. may be used. In cancer of the breast treated by mercuric cataphoresis, 24 electrodes are prepared, each electrode attached to a No. 28 piece of insulated copper wire, and the whole divided by plaiting the wires into six groups.

The Use of Electricity in Sprains.—Drs. Charrier and Planet have called the attention of the French medical public to the advantages of using electricity in sprains. Apostoli recommended employing the Faradic current with very rapid interruptions. The electrodes should be of carbon covered with chamois skin, and while the positive electrode remains in one position, the negative is moved all over the painful area. The results would seem to be surprising. After five minutes the patient is able to get up and walk, the pain having ceased for the time being. Two applications should be made daily, and the patient told to walk as soon as possible.—*Med. Times, July* 1902.

Cases Treated by Roentgen Rays.—Childs, of Denver, reports a series of fourteen cases treated by Roentgen rays. Six were of epithelioma; all were cured or still under treatment with such improvement as to warrant the expectation of complete cure. Three were of lupus erythematosis; all were cured. One was of tuberculous glands of the neck; improved, but still under treatment. One was for secondary carcinoma of the spine and recurring nodules after complete excision of the breast; much relief from pain by the treatment, but the disease resulted fatally. One was of tuberculosis of the apex of each lung; the patient is improved and is still under treatment. One case of chronic eczema completely recovered. One case of Hodgkin's disease appears to be improved, and is still under treatment.—*American Medicine, Jan* 31, 1903.

The Roentgen Ray in Gynecology.—Eden V. Delphey enumerates the various conditions under which the Roentgen ray may be used in and above the pelvis; but the main use of the Roentgen ray in gynecology is in the treatment of malignant neoplasms. Whenever the diagnosis is made sufficiently early, the tumor and often all the pelvic reproductive organs should be removed by surgical means so as to get entirely beyond the malignant growth and prevent recurrence. When this can be done the protuberant portion, if of the cervix, should be removed, and the rest subjected to the influence of the Roentgen ray. Quite a number of cases of carcinomas have been very much improved and epitheliomas have apparently been entirely cured by this means. As certain death is otherwise the only outlook, the patient should be given the benefit of the chance.—*American Medicine, Feb.* 28, 1903.

Value of the X-Ray in Cancer—A. R. Robinson, M. D. (*Am. Jour. Surg. and Gynecology,* March, 1903), advises caustics and x-ray in the treatment of cancer. The greater majority of superficial cancers can be cured with caustics with slight deformity. We must first recognize the form of the cancer, its rapidity of growth, the direction of extension, and the degree of cancerous infiltration. Of the technique of x-ray treatment, we must observe the changes in tissue, normal and pathological, which are produced by it, the character of the exposures, the interval of time between each, the distance, etc. In superficial cancer use a low tube, and for deep-seated malignant growth use a high or medium tube. If applied before the deep-seated tissues are invaded, a large majority of superficial epitheliomata can be cured with x-rays. If the disease is single, and not larger than a silver quarter dollar, treat with caustics, as pyrogallic acid, arsenic, acid nitrate of mercury; if multiple and deep-seated use the x-ray. It influences the nutrition of the skin so as to prevent recurrence after curing the cancer. Here combine x-rays with caustics and internal medicines, as alkalis, arsenic, thyroid extract; and avoid a meat diet. If the cancer is a papule or a tubercle, surface unbroken, x-rays will cure; but caustics here are to be preferred, as caustic potash, the Paquelin cautery, or arseneous acid paste. Excision under local anesthesia with ethyl chloride or cocaine injection. In lesion of the eyelid with invasion of epithelial tissues, x-ray treatment is best; protect the eyeball. Papule or tubercle on the nose covered with normal skin treat with caustic potash or acid nitrate of mercury. The rays do best when the skin is broken. For epithelioma of the alae use x-rays; if a wart or eczematous patch use caustic and follow by x-rays. In cancer of bone x-rays is best. In rodent ulcer extending

into the deep tissues about the eye, etc., the x-ray is our only resource, even hopeless cases are cured. In mammary cancer cures have been reported after amputation. For superficial cancer of the lip use caustic potash; if deep the Paquelin cautery. In cancer of the throat use Paquelin cautery. The prognosis is unfavorable here, as also in cancer of the tongue. In internal cancer as of the stomach or uterus the pain may be lessened and the disease retarded but, so far, not cured. The rays should be used before and after amputation in cancer of the breast and in all inoperable cancers.

Electrolysis in Eustachian Salpingitis.—The following are the general conclusions of Matlack's article:

The 75 cases described represent applications of electrolysis extending into the thousands, which should be sufficient to allow a fairly accurate estimate of its value.

Excluding purely labyrinthine conditions, it has been of service in almost all other forms of deafness, and especially in cases of moderate degree, in which the most pronounced changes were in the tube.

The best results can not be obtained from its unaided use, so this should be supplemented by any other measures that have formerly been found of service. It is especially important to have free access to the tube, and to this end septum irregularities should always be corrected and hypertrophies of the turbinals cauterized. I use a routine way in all cases—solutions of iodin, menthol and camphor, conveyed to the parts by nebulizers—to improve the circulation in the nasopharyngeal mucous membrane. After electrolysis has restored the normal caliber of the tube, a further use of vapors to the middle ear after the method of Dench will be found of great value.

Patients who have been persuaded to continue in this line of treatment for a sufficient length of time are unanimous in their approval, and I am convinced that it marks a distinct advance in aural therapy.—*Jour. A. M. A., Feb.* 21, 1903.

Aortic Aneurysm Treated by Electrolysis.—H. A. Hare reports a case, and the conclusions which he reaches are as follows: Electrolysis, in properly selected cases of aneurysm, is a valuable measure, and prolongs life. The operation itself is neither dangerous nor painful. The failure of permanent cure does not depend so much upon the failure of the operation to limit the disease locally as on the fact that the adjacent parts of the blood vessel are weak and, when the most bulging area is solidified by the clot, these lateral areas may later on give way. Even in these cases life is prolonged by the closing of the weakest area, and it is not to be forgotten that in at least one case (Stewart's) life was prolonged three years, death taking place from an alcoholic debauch.—*Proceedings of the Philadelphia County Medical Society.—Medical Record, Feb.* 21, 1903.

Roentgen Ray in Obstetrics.—Cooke finds that the value of the x-ray for studying the dimensions of the pelvis is practically lost on account of the difficulties of its use, and at best it is probably not so reliable as mensuration and palpation performed by a skilled observer. In the study of the gravid uterus the results are wholly unsatisfactory when compared with those obtained by the ordinary recognized methods of examination. For diagnosing certain forms of ectopic gestation fairly reliable presumptive evidence may possibly be secured, but more positive methods will be needed before it can be accepted. Advanced pseudocyesis could doubtless be detected by the use of the rays, but a little chloroform will accomplish the same results more easily. In suspected twin pregnancies, where diagnosis can not be made the x-ray would be of service.

Correspondence.

EDITOR X-RAY JOURNAL:

In the case of a fibrous liver, enlarged and elongated so that the right lobe reaches several inches below free border of ribs, what would stand in the way of the x-ray bringing about repair, as in cases of malignant origin? Or have we on record the successful treatment of these cases?

Your reply to this inquiry will be appreciated. Sincerely yours, L. A. F.

[Use the ray by all means if the case is malignant, if not malignant to reduce the size of the liver use a direct current over the region of the liver. Interrupt this direct current frequently. Use a current as strong as the patient can stand from 25 to 75 ma.—ED.]

DEAR DOCTOR:

We desire your advice in regard to the treatment of the following cases:

The first was diagnosed as an epithelioma on microscopic examination, and located on the vulva. We excised the diseased tissue, and the wound healed to a spot the size of a dime, when disease appeared at other points about the vulva. We then employed the x-ray, giving twenty-minute treatments every second day. This caused x-ray burns of the mucous membrane, which rendered further treatment intolerable. While the burns were healing we used a spray from the wooden ball electrode, and also positive spray and Morton wave. No benefit resulted from the treatment, and, the disease progressing, we again resorted to excision and repeated the x-ray and static treatments, but without success. She is now so weak that treatments cannot be continued, and is in a most wretched plight, awaiting the inevitable end.

The second patient is a lady, aged 40, who has a tumor on the left side of her neck about four by five inches in size, which, on microscopic examination, proved to be a large-celled sarcoma. It is nodulated, varicose, of a bluish color, and at times bleeds profusely. It is slightly movable, extends deep into the tissues, and is raised about half an inch above the surface. She had x-ray treatments for three months, till stopped by burns, now two weeks since. The growth has shrunk a little, but the result is unsatisfactory. Shall we excise and treat with the x-ray? Shall we try Massey's mercuric cataphoresis? Is it safe to use 120 volts so near the nerve center and the pneumogastric nerve? Are there special conditions under which x-ray treatment of cancer is unavailing? J. F. M.

[In regard to the first patient there are several things to be taken into consideration. There may have been a general infection before the excision; or the static breeze may have been used so close to the parts as to cause muscular contraction which would tend to pump the infection into the system through the lymphatics; or too much surface may have been exposed to the x-ray at a time, breaking down an excess of malignant tissue with a resulting auto-infection.

In treating malignant cases with x-rays it is necessary that all the eliminating organs be kept active in order to carry off the effete matter which is produced thru electrolytic changes.

In regard to the second case, if there is a septic mass it is wise to excise, after a reasonable number of x-ray treatments have been given to prevent auto-infection; which will certainly take place if the septic mass is not removed.

We cannot say that there are conditions that contraindicate the treatment of cancer with x-rays, tho some patients do better than others under apparently like conditions.

Dr. Massey's treatment by mercuric cataphoresis will appear in our April number. In this paper he points out the danger of treating deep seated tumors of the neck in this way. With due care it might be practicable in this case but you would be the best judge of that as she is under your care.—ED.]

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G. BETTON MASSEY, M. D

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Indications for the Immediate Sterilization of Malignant Growths by Cataphoresis.

BY G. BETTON MASSEY, M. D., PHILADELPHIA.

The wide spread and almost phenomenal interest manifested in the treatment of malignant affections by Roentgen rays in the short time since its first suggestion has not been without its moral to the writer, who has labored steadily since 1895 to enlist expert attention to his operative method of immediate destruction of such growths and sterilization of contiguous parts by electro-chemical diffusion. It is evident that many have essayed radiation who have shrunk from mastering the electrical and surgical techique required in the employment of the major application of mercuric cataphoresis. It is, of course, true that the latter application usually demands full anesthesia, and this alone is enough to warrant a proper trial of a simpler remedy, and it is also happily true that many cures have resulted from the simpler remedy even tho its capacity for harm has been demonstrated. Meantime, many malignant growths have resisted intelligent applications of x-rays at times because of situation within cavities; at other times, probably, because of higher vital resistance of the particular germ involved and the patient, still free from metastasis, is daily subjected to the risk of internal implantation. It is in such cases particularly that the operator should turn to mercuric cataphoresis, for here we have a remedy that will insure the death of every living cell within the limits of the growth in a period of time varying from a half hour to three hours, and that will, moreover, carry the sterilizing process into the tissues surrounding the growth to a distance of an inch, or more, and this bloodlessly and painlessly (when anesthesia is employed). The demonstrated dangers of operative infection of the edges when the knife is used are, of course, entirely absent from this equally quick method of eradication of an operable growth.

SUMMARY OF THE METHOD.

The patient, lying on a well-padded conducting plate of lead as large as the dorsal surface, placed on a rubber-covered spring cot, is brot to full anesthesia; the large electrode is connected with the negative pole of the battery, and one or more tubular gold electrodes coated with mercury, or zinc electrodes coated with mercury, are connected with the positive pole of the battery and, one at a time, inserted into the growths. The current now being turned on gradually, a cataphoric diffusion of pure oxychlorid of mercury, or the mixed oxychlorides of mercury and zinc, takes place, the whole growth being progressively sterilized and necrosed by the diffusing chemicals. With a current of 500 to 1.000 milliamperes this process is so rapid that its progress can be actually seen, a growth the size of the breast being devitalized and softened in about two hours. As the lead-colored area of

necrosis extends to the whole of the apparent limits of the tumor, the latter becomes soft (and this is a particularly valuable index of completion of the process in growths within cavities), and the site of the subsequently formed line of demarcation is indicated by the edge of this lead-colored area. Beyond the area of necrosis, in which all elements are subsequently separated as a slough, a *zone of sterilization* of varying extent is produced, in which cancerous cells are devitalized with only irritation of normal structures. The process is bloodless, and the slough separates painlessly in from seven to twenty-one days.

This major application requires a battery of about 160 volts, capable of maintaining about 2 amperes for several hours, tho many cases require only a quarter of this current, or even less.

ADVANTAGES OF THIS METHOD OVER THE KNIFE.

It is bloodless, and hence capable of application in hemorrhagic situations; renders infection of the edges impossible as the latter are sealed before the current; the malignant cells are killed and an inch or more of possibly infected surrounding tissues sterilized; it is of easy application in certain cavities where knife extirpation is impossible; and a growth in an organ may be destroyed without destruction of the whole of the latter.

INDICATIONS FOR THE CATAPHORIC METHOD IN LIEU OF ROENTGEN RAYS.

This method is indicated as preferable to the x-rays in all considerable growths that are manifestly operable in the ordinary sense or in the wider sense made possible by this method, and where delay would place the patient in danger of metastasis; when accessible growths fail to yield to the x-rays; and when the growth is so situated within a cavity as to be beyond easy reach of radiance. As an effective current may be carried to the spot by any well-insulated conductor it is particularly applicable to growths within the nasal chambers, mouth, throat, vagina or rectum.

DISADVANTAGES OF THE CATAPHORIC METHOD.

A recurrent growth of the chest, possibly extending within the ribs, is too extensive, usually, for successful eradication by the cataphoric method, particularly if the edges are ill defined. A deeply-penetrating growth in the neck with ill-defined edges is also unfavorable, the large current required being poorly borne in this situation and demanding that the pulse and respiration be closely watched. (In less vital portions of the body the strong current actually stimulates the pulse and respiration.) The disadvantages involved in the necessity for general anesthesia in the destruction of large growths has already been mentioned.

Dark Cathode Space.—WEHNELT.—(*Phys. Zeit.,* August 1; abstracted in Lond. *Elec.,* August 15) gives results of measurements of free electric charges in the dark cathode space. The greatest amount of free positive electricity is found immediately at the cathode and at the outward limit of the dark cathode space. Between these there is a space having a surplus of negative ions. The cathode is concentrically surrounded by electric charges of different signs, but the algebraic sum of the whole free charges is always positive. This surplus of positive ions varies as the pressure of the gas and as the current strength. Corresponding to the positive surplus in the gas is a negative charge on the cathode itself, whose discharge is facilitated by the ultraviolet light given out by the negative glow.—*Electrical World and Engineer,* Sept. 13, 1902.

Interesting Features in a Fatal Case of Cervical Cancer.

BY J. W. KING, M. D.,
BRADFORD, PA.

Mrs. B., of this city, consulted me in June, 1902, and on examination I found that she had an epithelioma of the cervix uteri, with the characteristic cauliflower excrescence. The slightest touch with the finger or the blade of the speculum caused severe hemorrhage. The odor, cachexia and hydrorrhea were marked. Microscopic examination proved the disease to be cancer. In addition to this there were symptoms of chronic Bright's disease of a severe character. A microscopic examination of the urine showed the following record: sp. gr. 1,024, albumin, hyaline and medium granular casts. The patient had been a sufferer from Bright's disease for the past seven years, and was twice attended by Drs. Benninghoff and Nichols, of this city, for uremic convulsions, and twice tapped by them. The other organs were perfectly normal.

The patient could hardly come to the office, and had to be assisted in and out of a chair. The husband was informed of her serious condition and little or no hope was given him of her ultimate recovery. He was informed that in her present condition she could only live a few months unless treatment was instituted, and that treatment could only be by the x-ray, as an operation was out of the question on account of the condition of the kidneys.

In the course of the treatment two circumstances operated against its success. One of these was the instruction of her husband that the nature of the malady should not be made known to her; the other was the occurrence of severe x-ray burns on both thighs which obliged me to give up the x-ray treatment for a time.

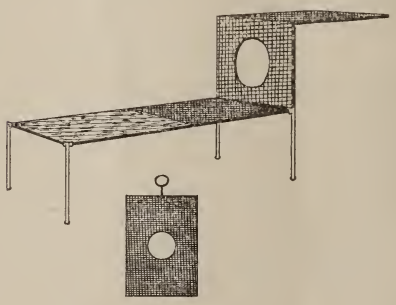
In cancer, as well as in other grave diseases, patients ought to be fully informed of the nature of the disease so as to secure their co-operation in the management of the case. When this is not done, many careless and indifferent acts inimical to them, and directly traceable to a supposed benefit or interest are allowed which would not be the case if they had full knowledge of their real condition. This practice of secrecy should be done away with and we should state frankly the truth to these patients. While information so imparted may have a depressing effect for the time, the primary shock is only transient, and reaction will come, and the patient will settle down with a grim determination to overcome the disease, and victory will often crown these efforts. This patient was told that nothing serious ailed her, only a little ulceration, which, of course, had to be doctored as it might lead to other diseases, and that it would take three or four months to cure her. Had she been informed of the true nature of the disease and that only patience and persistence in the treatment for a long period could effect a cure, she might have started with a firm resolution and so continued; but, as it was, she became careless and indifferent and the treatments, her only hope of recovery, were neglected.

The burns alluded to were very severe and were not entirely healed at the time of her death which occurred on the 28th of February, 1903. These burns were treated with various applications but none seemed of much benefit. There were hours when she was in comparative comfort, then again paroxysms of pain would occur which nearly crazed her. The burns were produced innocently on my part. I sent to the store for sheets of rubber but got a material called gasket, which looks very much like rubber. This material was used as a shield from the knees to the

inguinal region, and the tube brought as near to the vulva as possible. Around the speculum and parts not covered by the gasket, lead foil was used as a shield, and the parts other than the cervex were thot to be well protected from the x-rays. After the x-ray treatments the patient complained of pain in the thighs for which the usual treatment was ordered but without relief. The dermatitis was severe, progressing to the second stage, with deep-seated ulcerations and indurations. I now learned that the treatment prescribd for the burn in the first stage had not been carried out; which was, perhaps, the reason that she suffered so long a time from the burns. When she complained of pain from the treatment it was discontinued; this was from August 29th to October 17th; after this date it was renewed. The burns while severe, were not severe enough to make her cancel her social engagements, but were "awful" when I wanted her to come to me for treatment. After considerable parley the patient reported for treatment. I placed her in Sim's position and managed to give her a good treatment this time, and several more afterwards, but she got tired of the treatments, and complained on account of the pain, urging that we wait until the burns got better. These treatments were given thru an Allen shield. I did not see her again until a few days before Christmas, when it was suggested that I get a coil and treat her at her home. I went to New York, and other places to get a coil but could not get one to suit our current and so gave up in despair. On February 1st, however, a static machine was set up and a treatment given her. From this time treatments were given her every other day with excellent effect. The pains lessened, hemorrhage became more controllable and the outlook was more encouraging. She had been taking four grains of morphine a day but now the quantity was lessened to a grain and a half. Nausea and vomiting, which was attributed to the morphia, continued. This condition was not due to the raying as she had this trouble during January, when not being treated.

The last treatment given her, February 26, was a very successful one. Up to this time I could not open the blades of the speculum as I desired but now I was able to fully expose the cervix.

The first treatment was given her on a table of our own construction which gave excellent service. The Allen shield gave me so much trouble that I had this table made and it answered every purpose. It consists of a table eighteen inches wide with an adjustable upright part and a horizontal extension; the portion necessary to protect the patient being covered with sheet lead, one-eighth inch thick. The upright part has an opening with a slide covered with sheet lead having a smaller opening.



In the accompanying illustration the heavily shaded part represents the lead covering; the opening in the upright part gives easy access to the vulva, while the lead slide has a small opening for the end of the speculum.

The upright can be lifted off the table and also admits of being raised or lowered as desired. It rests in a groove and is held in place by a nail. In giving treatments the patient lies on her back with the buttocks brought close to the upright part which is then adjusted to the size of the patient by moving it up or down, and her legs supported on top of the horizontal

extension. The speculum being introduced and the cervix exposed the slide is put in place and the x-rays applied.

By this device the x-ray tube can be brought close to the opening in the slide, allowing the anode to be brought within ten inches, or less, of the cervix, without danger of causing an x-ray burn.

This table, which is made of pine boards, cost me about $5.00.

After applying the vaginal speculum the lead slide is adjusted so that the opening in it is opposite that in the speculum. The speculum rests against the slide. In order to protect the vaginal walls a rectal speculum is placed within the vaginal one. At first I used a tube made of sheet lead for this purpose.

The treatment of this case in detail is as follows. On June 18 I gave her a 30-minute exposure from a 12″ Chromolume arc light, using 25 amperes, 110 volts, with an alternating current of 125 cycles. Each treatment was followed by a 30-minute static insulation, for its tonic effect, and especially to electrize the kidneys, as I had often found that this treatment had given excellent results in certain cases of Bright's disease. These treatments were also continued daily at the patient's home when circumstances made it necessary to do so. June 1st treatment the same. On the following day all odor had ceased. Daily treatments were continued and on June 30 a marked improvement was noted. From July 1 to 15 daily treatments were given and the Chromolume light was often employed for one hour. Long before this the patient could get on and off the operating table without help, walked about town with ease, attended picnics, and informed me that she never felt better in her life. A gain of ten pounds in weight was noted after the treatments had been continued one month. While the odor had ceased and there was improvement in other respects the ulceration did not diminish in any great degree. I observed, however, to my great surprise, that on examining the urine at this stage of the case it was found to be free from the evidence of disease which the former analysis had shown. The x-rays were now used, as I no longer feared that this would set up mischief in the kidneys.

The first exposure was made July 16 lasting five minutes using a hard tube, with a current from a static machine of the Holtz type with twelve revolving plates (W. & B). The Chromolume light was also used with static insulation as before. She received three treatments with the x-rays during July, and daily treatments with the arc light. On the first of August a marked improvement was noticed in the cancer. The ulceration began to slough and healthy granulation appeared here and there. She had x-ray treatments on August 1, 5, 7, 9, 13, 17, 20, 22 and 25, after which the closest inspection failed to show anything left of the cancer, except a small area, no larger than a split pea midway of the external and internal os. On August 26 she complained of the dermatitis and the treatment directed for its relief, which was neglected.

The burns followed the first treatment after using the gasket, which I bought for rubber and was so informed at the time. Lead is heavy and often out of shape, and as rubber sheeting had been recommended, I was led to use it, and here I date the commencement of my trouble, and it was the actual cause of her death. The x-ray treatments did not kill her, but on account of the burns I could not follow up the treatment, relapses followed and the patient's condition became worse and worse. The treatments had to be discontinued for six weeks. Here too the ignorance of the patient as to her real condition allowed the disease to make fatal progress. She insisted on waiting till the burns healed. She would not come to the office for treatment but could have done so had she regarded herself as in any

danger. I was not at liberty to explain the nature of the disease to her, as her husband objected, and insisted that I wait a few weeks till she got a little better before treating her again. She left the city during November and was absent thruout December during which time she was able to have treatments but she preferred to wait. I explained that she might wait too long for treatments to be effective but she refused under any circumstances to have the treatments till she had recovered from the burns.

Where she was visiting she had a severe hemorrhage and took to her bed. At this time treatments were resumed. Her condition was most critical with severe hemorrhage at times, odor intense and the patient bed-ridden. She had to be carried from the bed to the table, but after each treatment marked results were noted. Two weeks before her death the mass began to slough, the odor lessened, the hemorrhage was slight and the kidneys normal. A day or two before her death she visited a neighbor, being carried there in a chair tho feeling strong. This I would not have allowed and the nurse tried to dissuade her but she was determined to go and stay a short time. She stayed two hours and showed considerable nervousness and fatigue as a result of the visit. On the following day she had a treatment and I never gave her a treatment so entirely satisfactory all around as this one and she seemed to enjoy it. This was at 5 o'clock P. M. On the following day at 5 o'clock P. M. she had a slight hemorrhage and a sinking spell, pulse 130, temperature 101. I regarded this condition as the reaction following the treatment, but instructed the nurse carefully on certain points and to report in the afternoon. The condition then seemed favorable, pulse 100, temperature normal. From this time till 3 o'clock P. M. she appeared to improve and said that she was feeling all right again. Not a minute after this statement was made, she collapsed, pulse absent at the wrist, temperature 96. She remained unconscious three hours when she rallied but died a few minutes afterwards. The loss of blood was estimated at a gallon.

Thus ended an unfortunate case which under more favorable conditions might have given brilliant results. These were partly due to the patient, who being kept in ignorance of her condition, neglected the treatments which she might have borne notwithstanding the burns. My own responsibility in that I consented to treat her, on the insistence of her husband, without first informing her of the grave character of her disease; and also for the x-ray burns. I do not hold myself entirely responsible for the burns, as I bought what was represented to be rubber sheeting which actually contained but little rubber, and hence was insufficient as a protection against the powerful x-rays. On the other hand the case being of a year's standing a cure could not be promised; yet who can doubt, with the results of treatment before us, that brilliant results would have followed had this patient been under my roof from the start, and been treated as a patient should be treated under the circumstances.

I believe a great deal can be learned from this case and have reported it in detail. Even if our cases prove fatal we ought to publish them just the same as in that way we may learn more than if the favorable ones are alone presented.

Electrolysis from Stray Currents.—*Elek. Zeit.*, December 4. Moerk, in a long communication repeats his former proposal to prevent the dangerous results of electrolysis due to stray return currents from tramway systems, by reversing the direction of the current of the trolley system at periodical time intervals.—*Electrical World and Engineer*, January 10, 1903.

The Early Diagnosis of Pulmonary Tuberculosis by Roentgen Rays.

BY MIHRAN K. KASSABIAN, M. D.,

In charge of Roentgen Rays Laboratory and Instructor in Electro-Therapeutics in Medico-Chirurgical College and Hospital, Philadelphia; Chairman Medico-Legal Committee of American Roentgen Rays Society; Member of the New York Medico-Legal Society; Philadelphia County Medical Society; Pennsylvania State Medical Society; American Medical Association, Etc.

Briefly, the importance of the early diagnosis of pulmonary tuberculosis has been proved more than once by statistics from the various sanatoriums, in that when diagnosis has been made, treatment is at once instituted, resulting in either arresting the course of the disease, or better still, effecting a permanent cure, thus lowering the mortality rate nearly seventy-five per cent.

Unfortunately, the earliest diagnosis of pulmonary tuberculosis is often delayed or neglected for two main reasons—first, because the patient does not present himself early enough to the physician; second, because the physician who takes charge of the case is often misled by the symptoms, which are usually insidious and non-characteristic in onset. In fact in the majority of instances the patient does not claim to be sick enough to call a physician. The symptoms complained of are usually first those of general ill-health, altogether deceptive both to the patient and the physician. Furthermore, the patient may present himself stating the symptoms, and the physician in turn being negligent or perhaps unskilful, treats the supposed ill-health symptomatically, failing to discover by the usual methods of examination the true cause and nature of the disease. In many instances the patient is treated for a simple cold, a form of bronchitis, or some similar disease, while the true condition is overlooked and the tuberculous process allowed to progress to a fatal termination, or when at last its true nature is discovered, it is too late for remedial measures to do any good.

It is a difficult task to make an exact diagnosis of this disease, but still there are certain symptoms characteristic, more or less, of this condition; so much so that when such symptoms such as I will describe below make their appearance, it is advisable to investigate thoroly the causation, using, of course, all the means and methods of diagnosis at our command, including the x-rays.

The development is very insidious, with increasing dyspepsia and anemia, loss of appetite, distress after meals, and feeling of general lassitude and weakness, often misleading the patient and the physician for some time, until the occurrence of an irritable heart.

Cough—This is one of the essential features of pulmonary disease, though often slight, and even wanting. When present it is slight, dry and hacking, referred to the throat or stomach.

Expectoration—Is not necessarily characteristic of pulmonary tubercular disease in its incipiency, but if there be any material expectorated a bacteriological examination should be made which will clinch the diagnosis, provided the characteristics causal bacillus be discovered. Often, however, this sign or symptom is absent.

Hemoptysis.—Hemorrhage from the lungs may be slight in amount, or on the other hand it may be copious and prove rapidly fatal, tho hemoptysis is rarely the direct cause of death in this disease. It is most apt to occur during the early stages, and usually it is the first clinical symptom which excites the suspicion of the patient.

History.—Heredity here plays a most

important role and often furnishes the examining physician a clue to the exact nature of the disease. The personal history, however, surpasses in point of import the family history. Age, occupation, general health, race, and previous diseases as influenza, bronchitis, pleurisy, etc., are all predisposing etiological factors.

Temperature.—The presence of a slight rise in the temperature in the afternoon or evening, if associated with either local or general disturbance, should arouse strong suspicion, since it would be difficult to overestimate the diagnostic importance of this symptom. Trudeau believes that when any disturbance of the health exists and the evening temperature ranges above 99.5 F. there is almost surely tuberculous disease present in the system.

Pulse.—In the early stage of this disease some observers believe that the pulse rate is quickened, this symptom usually preceding the appearance of the bacilli in the sputum by weeks and even months.

Sputum Test.—This consists in examining microscopically the sputum for the detection of the bacillus of Koch. Off and on undoubted cases of pulmonary tuberculosis are discovered in which the test for the bacillus is negative, altho the non-discovery of the bacillus in the sputum is not evidence of the absence of pulmonary tubercular disease. It must be conceded that unless methods of diagnosticating pulmonary tuberculosis other than the demonstration of the tubercle bacillus in the sputum be resorted to, not a small minority of cases would go unrecognized, some for many months, some for a year, and some, even, forever.

Tuberculin Test.—Our expectations of this have not been fulfilled as a diagnostic agent. The value of this agent has been espoused by some and by others condemned.

Physical Signs.—The most characteristic signs of an incipient or early stage of tuberculosis can be briefly summarized, as follows: Defective expansion (often termed "lagging") as demonstrated by inspection and palpation, a localized increase or intensification of the tactile fremitus above the normal, enfeeblement of the normal vesicular murmur with prolongation and the elevation of the pitch of expiration. To these signs may be added the characteristic clicking rales, characteristic when present, often better brot out by coughing, and when present almost conclusive evidence of the presence of pulmonary tubercular disease. Percussion may reveal an impaired or deadened note, but this sign is quite unreliable in the earliest stage, becoming more diagnostic, however, as consolidation advances.

After we have exhausted all these methods, of examination and are still unable to reach a positive conclusion, we are exceedingly fortunate to have at our finger's end a diagnostic agent which is invaluable, as we can "see" wherein and how the diseased condition extends, namely the Roentgen rays.

Examination by means of X-rays.—In order to make proper examinations of diseased lungs, it is necessary that the physician should be fully acquainted with the conditions of the normal lung. A certain amount of practice or experience and a thoro knowledge of the fluoroscopic picture of a normal chest are essential for the correct and successful use of the fluoroscope. There are two methods of examination, namely, fluoroscopic and skiagraphic. The fluoroscopic examination consists in placing the patient in front of the Crookes tube (twenty inches distant) and placing then the fluorescent screen over the chest of the patient. The clothing should have been removed previously over the entire chest, so that the sides may be compared with one another. The normal lung appears transparent A diseased spot in the lung area appears hazy or clouded. The diaphragm on the

affected side is somewhat lagging or impaired in its movements up and down during the acts of inspiration and expiration. The lung should be viewed with the fluoroscope at the end of the deepest inspiration and expiration possible, in order to determine any diseased areas, anteriorly first and then posteriorly, and lastly the two viewfields should be compared with each other.

Skiagraphic examination refers to the keeping of the shadow, permanently, on sensitive photographic plates.

As to the relative value of the fluoroscopic and skiagraphic examination, during my experience in the hospital and in my private laboratory, I have been able to show more detail by skiagraphic examination than by fluoroscopic examination. I prefer the skiagraphic method for the simple reason that the time of exposure is very short—10 to 20 seconds. During this time the patient is requested to remain absolutely quiet, stopping all respiratory movement by keeping the mouth wide open. The full details of technique are described in my text-book on the "Roentgen Ray," which is in press. To show the value of x-rays in incipient stages of tuberculosis, I desire to call your attention to the cases of Dr. J. M. Anders, professor of medicine, Medico-Chirurgical College, of Philadelphia, which cases I had the pleasure of studying with him.

Case 1.—S. H., female, married, age 28 years, cigarmaker, first applied at the outpatient clinic of the Medico-Chirurgical Hospital, June 6, 1899, for treatment. A brother died of acute phthisis. Patient had had some childish disease, but later in life nothing worthy of comment until the outset of the disease for which she sought medical advice. Her illness began with paroxysmal pains in precordia, and this lasted for a considerable period of time. The day previous to her visit, she had expectorated blood, which she states was "coughed up;" quantity of blood was small, bright red and frothy. The abnormal physical signs were impairment of percussion note and harsh breathing, with prolonged, high-pitched expiration at right apex; and lack of vesicular quality of the breath sounds, with prolonged, high-pitched expiration at left apex; all signs, however, were less marked than at right apex. Microscopic examination of the sputum gave a negative result. Later an x-ray examination showed an abnormal shadow or marked haziness at apex of both lungs, more marked at right, i. e., the apex which showed the abnormal signs the more pronounced. (See Fig. 1.)

Case 2.—P. K., age 29 years, cigarmaker, applied for treatment at outpatient clinic, November 10, 1899. The family history is entirely negative as to pulmonary tuberculosis. Patient escaped childish diseases; he had had typhoid fever one and a half years previously, confining him to bed for ten weeks. Since then has been complaining of persistent gastric disturbance, as evidenced by eructations of gas and dull pains in the epigastrium after meals; there has been some dyspnea on exertion and cardiac palpitation at intervals. A few days prior to his first visit, patient began to expectorate bright red blood; this was still present. Subsequently there was neither cough nor expectoration. The amount of blood lost did not exceed half an ounce. An examination of the throat and larynx gave a negative result, and the same was true of a physical examination of the thorax, altho the chest was of the phthisical type. After excluding all the causes of hemoptysis except pulmonary tuberculosis, an x-ray picture was made by Dr. Kassabian. This showed commencing consolidation over circumscribed areas on both sides just below the apices. (See Fig. 2.)

Case 3.—J. O., age 14 years, errand boy, was admitted to the wards of the Medico-Chirurgical Hospital, November 13, 1899. Father died, aged 52 years, of

CASE 1.

CASE 2.

heart and lung disease, the precise nature of which the patient does not know. One sister is in delicate health. The lad had had the usual diseases of childhood and a severe illness of unknown character a few years since; had always been in delicate health. The present illness began about four weeks before he fell under my observation. The first symptoms complained of were malaise, headache, a slight cough in the evenings and mornings; more or less abdominal pain associated with slight diarrhea. The evening temperature on admission was on the average about 100 F., but abdominal pain, diarrhea and cough had largely subsided. Physical examination showed a phthisical thorax, without any other abnormal physical signs. After excluding typhoid fever, latent tuberculosis was suspected, and tuberculin was injected; this was followed by a positive reaction. An x-ray examination was also made by Dr. Kassabian and showed a slight haziness below the left clavicle. (Cuts by courtesy of *Jour. Am. Med. Association.*)

The value of x-rays examination is understood by leading physicians in this country and Europe, and is in daily use by the majority of the phthisisologists, both in private and sanatoria and hospital practice.

The Relationship of Psychic Suggestion to Electro-Therapeutics.*

BY MAURICE FIESCHOR PILGRIM, A. B., PH. D., M. D., BOSTON, MASS.

Vice-President of the American Electro-Therapeutic Association.

At the threshold of this brief discussion, I would like those who compliment me with their attention, to distinctly understand that I am not in sympathy, either wholly or partially, with the popular movements of the present time, crusading under the various names of "Christian Science," "Mental Science," "Magnetic Healing," and the like. On the contrary, considered as *exclusive* systems of healing or caring for the sick, they should only be mentioned to be condemned. In order to justify the founding of a system upon any truth, the claim of which is its exclusiveness, it must be composite; not fragmentary; otherwise it is a menace to the safety of the individual and the community. Human life is too precious to be remanded to the care of those who, ignorant of the construction of the human body and of the laws under which it functionates, deny its existence and are unable to recognize its deviations from physiological function or changes in its structure. Nevertheless, from the point of view of ultimate results, there is very much that has happened under all these alleged systems of healing that might well and properly challenge the serious attention and careful investigation of the profession to which we belong. Is it not generally true that every great popular error has contained some germs of important truth? May not that be true in respect to those healing crazes which have been and still are sweeping over the country. There can be no more bitter error, it seems to me, than continued depreciation or denial of patent facts. The fact that the alleged cause does not appear to equal the observed effects, is not, to my mind, a valid excuse for ignoring palpable results.

To deny that scores of sick people—many of them unsuccessfully treated by

* Read at the meeting of the American Electro-Therapeutic Association at the Hotel Kaaterskill, Catskill Mts., New York, September 4, 1902.

those bearing the degree of our profession and abandoned to die—have gotten well under these alleged systems of healing, is almost as great an error as to believe the absurd propositions exploited as conditions-precedent upon which they insist that the cures are necessarily based. Had we better not proceed to investigate with a view of discovering a rational, a scientific explanation of manifest results rather than to continue the puerile and illogical course of doggedly denying them? Would not such procedure better comport with the traditions of an expanding and progressive profession? Besides, it is well to remember that our denials have accomplished little or nothing. They have utterly failed to stem the rising tide; on the contrary, it is greatly to be feared that they may have contributed to swell the current that has been setting in the wrong direction. At all events, "Eddyism" has steadily grown in popular favor and acceptance for the past thirty years. It now embraces two millions of adherents between the Atlantic and Pacific oceans. It has invaded Great Britain, crossed over into Germany, and is spreading over the European continent. And this has occurred, let us remember, while we as a profession have been persistently declaring that there is nothing meritorious in these metaphysical systems of healing,—that no one actually sick was ever cured under them. While we have been thus declaring, many of the converts to these fallacious systems were our patients, of whose cure by the means at our command we despaired, and whom we abandoned to what we sincerely but regretfully believed was speedy and inevitable death. We have seen them get well under these delusional systems of healing. Why did they get well? How were the cures brought about? What were the effective causes—for there must have been a cause or a series of them—of these unexpected recoveries?

Do we quite know, or have we, as a profession, really cared enough about it to try and find out? It is to be feared that our attitude has been that of standing disdainfully aloof in the presence of these interesting happenings. Is there not an ultra-conservatism as deadly to all progress as ultra-radicalism is to safety? Might we not have rendered these alleged systems of healing well nigh clientless had we been disposed to investigate, discover, and appropriate whatever of merit they possessed, instead of exhausting our energies in sneers, denials, and ridicule? Truth lies usually between the extremes. Dare we assert that while these so-called systems of metaphysical healing have hidden whatever virtue they possess under a grotesque maze of transcendentalism, we as a profession have not plunged deeper into the mire and bogs of abject materialism? While lost in our contemplations of the creature, have we not forgotten the Creator? Have we not accorded to mere matter too much consequence and force, and unconsciously permitted it to set narrow limitations and bounds to our activities and usefulness which fuller scientific investigation would have sanctioned? Have we not complimented matter with too much of our thought and life until it has throttled us in its tyrannous embrace and extinguished the "inner light?" It seems to me that the trend of so-called medical progress of more recent times has been strongly in the direction of intense materialism. Nevertheless, there is no attempt at denial upon the part of reasonable persons that the impossible of to-day is constantly becoming the realized possibility and accepted fact of to-morrow. Are the "Roentgen x-ray" really curing cancer? Some of us remember how chimerical the idea was regarded when first suggested, and by some electro-therapeutists, too. Time and opportunity have, however, shown that the idea did not or-

iginate "in a brain intoxicated with a superabundance of electrical enthusiasm." as a respectable writer of not long ago alleged. The quotation here given is his. What would he probably say to-day upon this subject?

For the purpose of bringing this subject to your attention in as concrete form as possible, and with no intention at this time of considering them in detail or in their order of arrangement, the following postulates are submitted:

I. Psychic suggestions made for therapeutical purposes, are physical stimuli initiated in, and sent from, the operator, which evoke in the patient the kinetic energy called *vis medicatrix naturae.*

II. Psychic suggestion, in many if not in all cases will, if properly employed, materially aid and spplement other forms of treatment directed to the relief and cure of diseased conditions of the human body.

III. A large proportion (if not an actual majority) of physicians now recognize, theoretically, the potency and value of this agent, and many of them are successfully using psychic suggestion in conjunction with other methods of treatment.

IV. This force, whether consciously recognized or not, has been an important factor, to a greater or less degree, in all systems of therapeutics. Like electricity, it has been an ever present, though, for the most part, an unrecognized and unutilized force; and is as ancient as the universe which it permeates and of which it constitutes an important part. It is only our beginning recognition of it as a potentiality that is really new.

V. All the conceded curative results which have followed the application of modern fads—"Christian" and "Mental Science," etc., etc., etc.—to disease of the human body, are due wholly to the unwitting employment of psychic force with occasional success, and not at all to any merit inherent in or peculiar to these alleged systems as such.

VI. This force can be made to serve our purpose more effectively when it is recognized, correctly estimated, and intelligently directed, thus removing or greatly minimizing the dangers which now attend its employment as an exclusive system of healing by those ignorant of the law under which it operates, and of the construction and physiology of the human body, and the morbid conditions which may affect it.

VII. It is the duty of the profession of medicine, while safeguarding the health and life of the community, to protect as far as possible the public against the baneful results of its own follies. This can be best accomplished by physicians utilizing in their own practice whatever of merit may reside in these so-called systems of healing, thus robbing charlatanry of its clientele and vocation.

VIII. Psychic force bears a close relationship, in many respects, to electric energy, and can be more advantageously combined with, and utilized in, electrotherapeutics than in any other department of practice. The methods of the electrotherapeutist are such as to make the employment of psychic suggestion easily available without discussion, or antagonizing the beliefs or prepossessions of the patient. The residual benefits inure not alone to the patient, but by enlarging its sphere of curative possibilities, to electrotherapeutics as well.

We speak of power, of force, and generally as though it resided wholly in matter. That it does to a considerable extent, it would seem that no really sane person would seriously attempt to challenge. But does all power reside there? Does it originate there? These, it seems to me, are basic questions which it becomes important to correctly determine.

It is a difficult task for anyone to attempt to define what power really is. It

certainly is not matter, though it works through matter, and thus manifests itself to our consciousness. But our conscious recognition of an effect is not power. Water is not power, nor is steam, nor wind, nor electricity, but power works through them all. What is electricity—that subtle, mysterious something that we electro-therapeutists are daily employing in our work? We have our hypotheses as to how the electric current when applied to the human body effects certain nutritional and structural changes—and we believe they are reasonable hypotheses—but dare we assert, unqualifiedly, that they are anything more than that? Could we demonstrate it even if we cared to make the positive assertion?

It seems to me that no perfectly balanced person will seriously deny that drugs and electricity do have an effect upon organisms—effects per se, inherent in the agents themselves regardless of the conditions under which they are administered or the personality through which their exhibition takes place. We do not always know their modus operandi and must frequently be content to recognize their effects empirically. Many of the valuable things in medical procedure and therapeutics came to us empirically at first. In some instances, their rationale was subsequently discovered; in others, it has never been satisfactorily explained. Nevertheless, we as a profession have not felt justified in rejecting a meritorious agent simply because the rationale of its action was not immediately and fully disclosed. Therefore, let me inquire if it is logical to assume after we have prescribed the indicated drug or administered the current of what we deem the proper voltage and amperage, and otherwise done all that or experience (and that of our colleagues, too, perhaps) dictates, that that is the limitation of all power? What right have we to assume that Infinite Wisdom has no other channels through which to reach humanity with its beneficent bestowals than through the *material side* of the profession of medicine?

Why should we assume that we have a permanent and perpetual pre-emption, *through our material methods and agents,* on all the revelations concerning the human body, and the laws governing its welfare, which a beneficent Creator may see fit to give to the world? To make such an assumption is, to my mind, as inconsistent and arrogant as are the contentions of the rankest Christian Scientist in denying to drugs or electricity a resident force and in absurdly insisting that all the power they possess is due solely to the accumulated thought of all the centuries which has been focused upon them!

As electro-therapeutists, our central aim and concern is, of course, the restoration of health to those temporarily deprived of it—to conserve and prolong life. How do we hope and expect to accomplish this beneficent purpose? Let us consider, for a moment, what sickness and health really mean, and how these opposite conditions are related the one to the other.

Being sick and getting well consist of certain bodily states and changes in contrast with another common condition called "health." It is one of the cardinal dogmas of biology that the structure of every living being is passing through a continuous transformation during the whole term of its existence; that each particular change which befalls it, whether healthful or morbific, is part and parcel of one unified corporeal history. Applying the logic of this broad doctrine, all diseases are included in this experience as phases of the cosmic process called evolution—temporary disturbances in the stream of continuous change by which the life of to-day hastens to become the larger life of to-morrow. In supporting this view, Dr. Bernheim asserts that "diseases are cured, when they are cured, by their own natural biological evolution.

Ordinary therapeutical methods consist in putting the organism in a condition so that *restitutio ad integrum* may take place. We suppress pain, we modify function, we let the organ rest, we reduce fever, we retard the pulse, we induce sleep, we encourage secretion and excretion, and by thus acting, we allow Nature, the healer, to accomplish her work." These words of the eminent French writer and physician are not the emanations of a mere psychologist. Nor was he writing as such, but as a physician. As a physician he would not be likely to underrate his own profession or credit Nature with more than her due. But he plainly intimates that the real healer is the native power within the patient. The physician and his drugs or electricity are only ancillary. They are servants who exercise their skill to clear the path of Nature to enable her the more perfectly to do her work. Having done his part, the physician must leave it to Nature to evolve health by means of biological changes which are ever going on in the system.

This recuperative action, which all physicians now recognize, is centralized under another name. It is well known that all living structure, animal or vegetable, possesses this instinctive power of self-recovery. It is a form of spontaneous, plastic energy which, acting through the proper neural channels, resists disease, tends to arrest its progress, repairs the damage done, and compensates the bodily losses sustained. This inherent tendency of the sick to get well or of disease toward recovery, we know as *vis medicatrix naturae*. The common people of the laity say it is Nature. The reverent call it the spirit of God. Dr. J. Mitchell Bruce, of Charing Cross Hospital, London, while reviewing the progress of medicine, recently said: "We are now able to appreciate, as never before, the constructive factor which takes the form of repair and convalescence. Just as the body possesses provisions for resisting the causes of disease, so it possesses provisions for arresting its beginnings . . . quite spontaneously; that is, without the help of either the surgeon or the physician." Elsewhere in the same address, he refers to this natural faculty as a recuperative factor making "spontaneous attempts at recovery."

The intelligent employment of remedial means, as drugs or electricity, is directed to reach and evoke in the patient the inherent faculty of self-help—this is vis *medicatrix*—just when and where it is needed. The essential meaning of all therapeutics, as it seems to me, is to summon and concentrate this inherent remedial force on the obstacle to be overcome. The locomotive engineer soon learns how many pounds of steam are required to keep his train moving at a given rate of speed along a level track; but, when there is a grade to be climbed, the pressure on the driving wheels must be increased or the train will "slow up." In some such analogous way the vital energy of the body may be regarded. A stream of given dynamic vitality is adequate to supply the human organism in health; but morbid conditions increase resistance which nature must overcome with a stream of greater intensity directed to the seat of the obstruction. This is precisely what takes place in the organism in cases of special need. When unusual demands are made upon the digestive organs, for instance, or the brain, an increased supply of blood is sent to those overtaxed structures. If there is not, the overwrought organ suffers, and disease ensues. When the flesh has been injured, Nature at once sets up a special process of healing by means of inflammation. The blood is thus made to flow faster towards the injured parts, the blood vessels dilate, corpuscles and fluids transude carrying the material to form the plasma from which the hurt is repaired. (To be continued.)

Chicago Electro-Medical Society.

The 20th regular meeting of the Chicago Electro-Medical Society was held in the drill hall parlor, Masonic Temple, March 30th, and called to order by the president at 9 o'clock p. m. Minutes of the previous meeting were read and approved.

The following paper was then read:

Experiments in X-Ray Therapy in 1896.

BY H. PRESTON PRATT, M. D.,
CHICAGO, ILL.

It is my purpose this evening to give a brief resume of my work in the field of x-ray therapy covering a personal experience beginning seven years ago.

My first experience with the physics of the x-ray commenced on Friday, the 7th day of February, 1896. Reports of my work during the months of February, March and April, were published in most of the daily papers, some electrical journals, one medical journal, and in some of the scientific periodicals. All of the experiments in this line of work were conducted under the auspices of Bennett Medical College. The Chicago Medical Times of March, 1896, was the first medical journal, as far as I am aware, to publish any of our experimental work.

On April 5, 1896, we exposed to the x-ray for one, two and three hours, respectively, three sets of cultures in tubes of the following bacilli: cholera, diphtheria, influenza, glanders, pneumonia, typhoid, tuberculosis, and anthrax. Several of the bacilli cultures were killed in one hour's exposure, and all by three hours' exposure (Chicago Times-Herald, April 13th, 17th, and 18th; Chicago Tribune, April 14th, 1896). On April 13th, 1896, we treated two patients who had cancer of the stomach, who were immediately benefited by the exposure of one hour each (Chicago Tribune, April 14th, 1896).

These two cases were also reported by Dr. J. E. Gilman in the Clinique of Jan. 15th, 1901; also reported by myself in an article read before the Roentgen Ray Society of America at Buffalo on September 11, 1901, and published in THE AMERICAN X-RAY JOURNAL of April, 1902, from which I quote the following:

"The most notable effects at that time were the relief of pain and the checking of the hemorrhages."

The following quotation also appeared in relation to the same cases:

"We did not expect marvelous results, in fact we did not know what to expect. We treated them daily for over four weeks and were surprised to find how quickly the x-ray relieved them of pain."

These patients came to me without the knowledge of their physicians, who, upon consultation, advised immediate operation. It was almost impossible, at that time, to secure other patients suffering from cancer; for every surgeon advised an operation as giving the only possible hope of relief. It was not until later in the year, that I managed to treat a few private patients who refused to be operated upon, and were referred to me by their own family physician(who was not a surgeon). On April 15, 1896, Prof. Roentgen himself, in a cablegram to the New York Journal, says as follows:

"Your dispatch tells me diphtheria was

slain outright in the Chicago experiments, while no final and positive verdict is as yet given as to the effect on the bacilli of cholera, pneumonia, typhoid, and other plague germs tested. This is astonishing and partly disappoints my anticipation. I consider diphtheria and cholera the most deadly of plagues and believed positively that the bacilli of the other scourges would be the least difficult to kill. But I am confident that eventually the x-ray will prove an effectual cure for all such diseases. I will rejoice when it will be in the power of every competent physician to kill those bacilli. Then once having located them, the modus of annihilation will be mere technicality. If Professors Pratt and Wightman have successfully completed their experiments, their names should go down to posterity as benefactors of the race, since humanity is immeasurably benefited by their work."

Guinea pigs were inoculated, April 18th, with tubercular bacilli (Times-Herald, April 19th, 1896) and exposed to the x-ray one hour daily. Those thus treated lived, tho with x-ray burns; the others all died of tuberculosis.

The reports of these experiments were offered to the Journal of the American Medical Association, as well as to other medical journals in Chicago, for publication. This included the Homeopathic as well as the Eclectic, and all refused to publish the report because they thot it was premature and our deductions might be wrong. The Chicago Medical Times published the first report in March, 1896, and hesitated about publishing any further report until corroborative evidence should come from various parts of the country. Dr. John B. Hamilton, the editor of the Journal of the American Medical Association, said that as soon as my reports were corroborated by other investigators he would be very glad to give me space in the journal; until then he did not wish to publish them. However at the time of his death I was preparing a report of my work at his request for publication. In the meantime I was continuing my experiments and treating patients with the x-ray.

About this time there were four typical cases referred to me to be treated with the x-ray, suffering from tuberculosis in one form or another. The first case treated was Mrs. J. B. She had the following history: Age 37, German-American, mother died of Bright's disease at forty-two, father of pneumonia at sixty, has three brothers, all healthy, was a healthy child, menses at fourteen, no trouble at that time, married at twenty-five, first child at thirty, no miscarriages, first child died when three years old of typhoid fever, the second, born at the seventh month, died the second day after birth. She had bronchitis and expectorated blood, with slight aphonia and hoarseness, a year ago; since that time she has grown weak, lost flesh, sputum yellowish, greenish, gray and lumpy, with a fetid odor, appetite poor, sleep interrupted by persistent coughing, menses regular, had a rise in temperature every afternoon. When examined the temperature was 100, pulse 100, respiration 36, breathing shallow, right lung consolidated at apex, and had a cavity; this was the first exposure, which was for one hour. The patient had a continual soreness in the chest, shortness of breath, and a persistent cough. This patient's sputum was examined at the Columbus Laboratory by Dr. William Harsha. A physical examination was made the same day by Dr. William Harsha and Dr. George F. Hawley, who made the following written report:

"Chicago, May 25th, 1896. Mrs. J. B., aged 37, said to have lost about twenty-five pounds in weight, temperature 100.3°, pulse 96, bronchial rales, tubercular bacilli in sputum in moderate numbers.

William Harsha, M. D., George F. Hawley, M. D."

The suptum was also examined by Dr. Finley Ellingwood and Dr. Hugo Wightman and both found the bacilli of tuberculosis in it. They gave a very unfavorable prognosis. She was also examined by Dr. J. E. Gilman. We treated her for about four months, after which Dr. Harsha made the following report:

"Chicago, November 14th, 1896. Examination of the sputum in the case of Mrs. J. B. shows the presence of tubercular bacilli in moderate numbers, there is a decrease in number since the examination three or four months since, clinical appearance is improved also. William Harsha, M. D."

The patient was discharged for the time being, owing to the fact that she was suffering from auto-intoxication. She was advised by us to discontinue treatment until she recovered from this condition which, at the time, we thot was due to too much raying. Later developments demonstrated the correctness of our deductions. We advised her to increase elimination by using saline cathartics, and to build herself up with ozonized preparations, cod-liver oil, maltine, etc., and especially such tonics as would be acceptable to the stomach. We advised her to leave the city, and to go west or south, but, to my surprise, about a week ago she presented herself at my office for examination, and stated that she had not been out of the city. She said that she had followed our advice as to remedies, and now felt well.

I learned from Mrs. B. that in 1898, she had another healthy child which died at birth from mechanical injury. Dr. Harsha and Dr. Hawley examined this patient today, March 30, 1903, with the following written statement:

"I have this day examined Mrs. B. and find her improved in every way. Weight now 155, pulse 76, respiration 20, no rales in lungs. This patient was examined May 25, 1896, and tubercular bacilli found. William Harsha, M. D."

The next certificate is from Dr. Hawley.

"I examined Mrs. B. today, March 30, 1903, seven years from the first examination, and found her much improved. I could discover no active trouble present. George F. Hawley, M. D."

I have this day taken an x-ray picture which you see before you to-night.

This case, and other cases, were reported by Dr. Finley Ellingwood (Chicago Medical Times of July, 1896). I will now give a list of typical cases in brief, treated by me with the x-ray, suffering from various disorders.

On April 17th, 1896, we treated a Mr. T. for a mitral lesion of rheumatic origin. He received daily treatments of one hour each for eight days and left us very much benefited. The murmur had changed in character considerably showing the marked effect the ray had on the disease.

On April 19th, 1896, we treated the second tubercular patient, who was suffering from laryngeal and pulmonary tuberculosis. This patient was examined by Dr. E. Fletcher Ingals, in the interest of the New York Journal, and a complete daily record of the case appeared in the Journal April 20th, 1896, giving the pulse, temperature and respiration, and changes that took place while under treatment.

This patient was exposed to the x-ray one hour each day for over a week, when business called him away from the city; he took cold and, as we understood, had an attack of pneumonia from which, after lingering for a time, he died.

On May 7th, 1896, Dr. Robert Sterrett, of this city, referred a Mrs. M. S. to me suffering from enlarged joints due to rheumatism. She improved very much

under the treatment, so much that the doctor commented on such excellent results.

On May 12th, 1896, we treated a Mr. J. J. C. He was suffering from interstitial nephritis. He was treated for about three months with the x-ray, alternating with the static current, after which time he went west and is still alive and enjoying apparently good health.

On May 13th, 1896, a Miss E. P., suffering from curvature of the spine, which we supposed to be tubercular, was put under treatment. The diagnosis was questioned at the time. At any rate she improved very much under the treatment. After a period of two months she discontinued. The x-ray seemed to have relieved her of pain and rendered the diseased portion free from tenderness or soreness.

On May 18th, 1896, we treated a Miss M., who was suffering from acne. She had a slight growth of hair on her upper lip, which was also destroyed by the x-ray. She was treated for three months and the acne cured. The hairs have not yet returned.

On May 20th, 1896, the third typical tubercular case was treated by us. This case was referred to us by Drs. Francis Dickinson and Effie Lobdell, of Harvey Medical College. This patient was examined by Dr. William Harsha, Dr. Geo. F. Hawley, Dr. J. C. Spray, Dr. J. E. Gilman, Dr. M. F. Sterling, Dr. Finley Ellingwood, and others. The sputum was examined at the Columbus Laboratory. The record of this case, as well as that of Mrs. B., was published in the Chicago Medical Times of July and September, 1896. The record of temperature, pulse and respiration, etc., of Mrs. B.'s ran about the same as that of Andrew G.'s. Mrs. B.'s daily changes were not published but Andrew G.'s were published in the Chicago Medical Times of July, 1896; and also was reported by Dr. J. E. Gilman in the Clinique of July, 1897. I also reported these cases before the Roentgen Ray Society at the Buffalo meeting in September, 1901. The full report of which was published in THE AMERICAN X-RAY JOURNAL of April, 1902. In the above three cases already cited the following changes were noticed: (1) The x-ray had a profound effect on the system acting as a sedative. (2) It brot about an increased elimination of effete matter, as demonstrated by the analysis of the urine, as well as by the odor of the breath, showing chemical changes. (3) Thru ionic changes it acted as a germicide. The two following facts were noted by Dr. Finley Ellingwood in the Chicago Medical Times of July, 1896, that there was always an increase in the secretion of urine in quantity as to both weight and solids, and there was an active exhalation of hydrogen sulphide with the breath after the first half hour of treatment.

On may 26th, 1896, a Mr. S. was treated by us for a hypertrophied liver. We used the x-ray in connection with the galvanic current. In two months he was discharged much improved. At that time there were symptoms of gall stones and he had frequent attacks of biliary colic. He has not had an attack since.

In the seven years that have elapsed since I began to use the x-ray this fact has been noted in a number of cases of this character which have come under my observation, that there is a complete cessation of pain after the treatment, especially if there was present a catarrhal condition of the gall ducts.

On June 8th, 1896, Dr. J. B. Murphy referred to me for treatment with the x-ray, a Mrs. J., suffering from lupus, with the following letter:

"Dear Dr. Pratt: This will introduce to you Mrs. J. She has a local tuberculosis from an infection following vaccina-

tion. This is a good case for the x-ray. Yours truly, J. B. Murphy."

This patient was treated for two months when she was discharged cured. There has been no recurrence up to the present date.

On June 18th, 1896, a Mr. A. H. D. was referred to us for treatment to see what the x-ray would do in atrophy of the optic nerve. He was under our treatment for about thirty days. He could begin to see a little light, and could distinguish a shadow. Owing to family disagreements he went home and committed suicide.

Mr. W. was the first case referred to me by Dr. J. E. Gilman. He had suffered from asthma for some time. He had daily treatments of an hour each for thirty days. At the expiration of the time he went south and entirely recovered his health. He has not had an attack since the x-ray treatments began, now about seven years.

On June 25th, 1896, a Mr. D. was referred to us for treatment with the x-ray for cancer of the walls of the bladder. We treated him about two months after which he went home and died later. His death was due to general infection.

On June 25th, 1896, a Mr. H. was treated by us with the x-ray for psoriasis. At the end of two months he was much improved.

On June 26th, 1896, V. V., an Italian, was referred to us for treatment with the x-ray for cancer of the stomach. We treated him for about two months daily with the x-ray for an hour at a time. He picked up and felt decidedly better. He decided to go home to Italy to see his father's family, and while there he was induced to be operated on, and died from the effects of the operation.

On June 30th, 1896, a Miss F. was referred to us, suffering from deafness due to syphilis. We treated her for about three months. Her general health improved. She claimed that she could hear a little better but we could not notice any difference.

On July 16th, 1896, we treated a Mrs. Q., suffering from pulmonary tuberculosis. She took daily treatments of one hour each for two months when she left the city, and I am informed by my sister-in-law, who visited her at her home in New York, that she entirely recovered.

On July 16th, 1896, we treated a Mrs. H., suffering from pulmonary tuberculosis. She was treated with the x-ray for about four months, daily treatments being given of one hour each, and was discharged cured. I examined her thirty days ago and found her perfectly well.

On July 27th, 1896, we treated a Mrs. C., suffering from tuberculosis of the bowels. She was treated for about three months, daily treatments being given of one hour each, after which she went south, and on her return, which was about a year afterwards, we followed up the treatment for several months. Her physician informed me the other day that she is still alive and enjoying reasonable health.

On July 29th, 1896, we treated a Mr. C. B. C. with the x-ray for diabetes. He was treated daily for one hour for about three months, and his health was greatly improved. I met him on the street the other day and he said that he was enjoying reasonably fair health.

On August 3rd, 1896, we treated a Mr. K. with the x-ray for locomotor ataxia. He continued the treatment for two months and over, and certainly improved. While he could not get around as rapidly as he would like, yet the disease, as far as progress is concerned, had been checked. He is now enjoying fair health.

On August 4th, 1896, a Mrs. L., suffering from arthritis deformans, was under our treatment for about two months. After the expiration of the treatment she was very much improved. The x-ray seemed to relieve the pain.

On August 28th, 1896, we treated a Mr. D., suffering from general neuritis. The improvement in his case was marked.

On August 26th, 1896, we treated a Mrs. J., who had been a patient of one of the best known surgeons in Chicago. He had operated on her for tuberculosis of the glands on one side of the neck excising them all. Finally the other side became involved, she not wishing to go thru another operation, as she was operated on twice before, came to us for treatment. This surgeon hearing of it became displeased and immediately condemned the treatment, telling her that no one but a quack would recommend it. He said that the ray had no therapeutic value, and finally persuaded her to discontinue the treatments, he agreeing to operate on her without further charge. The ray had a remarkable effect on the glands which were decreasing rapidly. Treatment lasted an hour daily. Now, this same surgeon is one of the x-ray's strongest advocates.

On September 10th, 1896, a Mr. Will C., suffering from pulmonary tuberculosis, was brot to our laboratory on a stretcher. He was too weak to walk being in the last stages of the disease. We treated him for about thirty days. He went home and died a month later. The ray had a decided effect on the temperature, pulse and respiration.

On September 16th, Mrs. W. W. was referred to me for treatment, suffering from pulmonary tuberculosis. She was in the last stage of the disease. We gave her daily treatments of an hour each until December 24th. At this time she took a severe cold, and had an attack of pneumonia from which she partially recovered, but died on February 19th, 1897. The immediate cause of her death was an ulcerative proctitis supposed to be tubercular.

On September 18th, 1896, we treated a Miss F., suffering from pulmonary tuberculosis. Having been a vegetarian, she refused to eat meat and living on a few nuts and a few grapes, which constituted her daily diet, she starved to death. In this case the x-ray acted as a powerful stimulant.

On September 26th, 1896, we treated a Dr. B., suffering from pulmonary tuberculosis. We treated him off and on for about three months after which he improved very much. He, however, sold out his practice and went to California and from thence to Denver. The doctor is now enjoying good health.

On October 5th, 1896, we treated a Mrs. S., suffering from pulmonary tuberculosis. She improved under our treatment, and I understand she is living today and enjoying reasonably good health.

On October 20th, 1896, we treated a Mr. B., suffering from asthma and chronic bronchitis. He was treated with the x-ray for three months and was very much benefited. He is now enjoying good health. The effect of the ray on asthma was quite marked in this and other cases treated by us in June of 1896. His breathing was rendered easier.

On October 21, 1896, we treated a Mrs. B., referred to us by Dr. Finley Ellingwood, suffering from tuberculosis of the kidney. She was under our treatment for about thirty days after which she discontinued for the reason that she, after each treatment, had a hemorrhage from the kidney. Dr. Ellingwood has lately informed me that three months after the treatment was discontinued she was from all appearances well, and is so today. The discharge from the kidney was analyzed at the Columbus Laboratory and they found, as well as Dr. Ellingwood, the bacilli of tuberculosis, which corroborated his diagnosis.

This case was reported by Dr. J. E. Gilman in the Clinique, January, 1901, and by myself in a paper read before the

Roentgen Ray Society at the meeting held in Buffalo, September, 1901, and published in THE AMERICAN X-RAY JOURNAL, April, 1902.

On November 16th, 1896, I treated a Miss W., suffering from pulmonary tuberculosis. She was under our treatment for about three months after which we discharged her cured. She is alive today and in excellent health.

On November 21, 1896, we treated a Mr. A., suffering from pulmonary tuberculosis. He was referred to us by Dr. Norman Bridge. He was under our treatment for about thirty days. He seemed to improve, owing to the cold weather he was unable to come to our office, and finally succumbed to the disease.

All of the above cases are typical cases which were treated during the year of 1896 with the x-ray. To the above list we add four more cases which were reported in the Chicago Medical Times of December, 1896. A case of sciatica. A case of emotional melancholia, spinal tenderness due to periostitis. The other case was articular rheumatism. There is nothing that will relieve articular rheumatism any quicker than the x-ray.

The following names were proposed for membership and duly elected: Joseph R. Hawley, M. D., John A. Whipple, M. D., and W. R. Schussler, M. D.

The society, on motion, adjourned.

A. W. SMITH, M. D.,
Secretary pro tem.

The next meeting of the society will be held on Monday evening, April 27th, 1903, on the 17th floor (drill hall parlor), Masonic Temple. An excellent program has been prepared.

Gangrene Following Operation on X-Ray Cases.—Dr. Samuel Lloyd (Medical Record, April 4, 1903), reports that he had seen two cases of epithelioma in which the proliferation had gone on very much more rapidly since beginning the x-ray treatment, altho the latter had been thoroly carried out by experts. He had recently operated upon two cases that had been subjected to x-ray treatment for a considerable time. In one there had been no x-ray treatment for some weeks prior to operation; in the other case the x-ray treatment had been continued up to the time of operation. In the latter case, altho the parts were brot together without tension, a gangrenous patch developed, and nearly covered the whole area that had been exposed to the x-ray. At the time he had not attached very much importance to this, believing that it was due to some fault in the technique, but when he had subsequently observed a second case of the kind he had been led to ponder over the significance of the observation. The case was one of carcinoma of the breast, and while he obtained easily an abundant flap there developed subsequently a gangrenous patch covering the whole side of the chest. He was inclined to think that in both instances the x-ray had produced an unfavorable change in the nutrition of the tissues. If further experience proved this to be true, it would suggest the advisability of avoiding x-ray treatment until after operation.

Electric Shock Fatality.—The *Review of the River Plate* records that about the middle of January a youth in charge of the switchboard at the Buenos Ayres market was killed as the result of a shock. The current, it is said, was low pressure. —*London Electrical Review,* February 20, 1903.

Editorial.

Special Notice.

All physicians wishing to join the American Electro-Medical Society as a charter member should send their names, with $3.00 accompanying, immediately to Dr. H. Preston Pratt, Masonic Temple, Chicago, Ill., who is chairman of the executive committee. The constitution and by-laws of the society were printed in the February issue of this journal.

At the meeting of the Chicago Medical Society on April 11th, 1903, the evening was devoted to a Symposium on Radiography.

The first on the program was the Physics of the X-Ray, by Dr. L. C. Pardee. Second, The Finsen Light, by Dr. F. H. Montgomery. Third, The X-Rays, by Dr. W. A. Pusey. They all did themselves proud, as their papers were excellent. The subject was ably discussed by Drs. J. R. Pennington, G. G. Burdick, R. V. Wagner and others.

The editor has just received a communication from Dr. Heber Robarts, the former editor of this journal, in which he states that he has been in the hospital for several weeks, having had an operation for gall stones. He is now doing well, having been relieved of about 300 of them.

The May Century will offer, apropos of the Emerson centenary, a full-page wood cut, engraved by Timothy Cole, of Ralph Waldo Emerson, and editorial discussion of "Our Inheritance in Emerson." The block from which the page is printed is an example of the great wood engraver's earlier work, and the print is a reproduction of what is generally considered one of the most satisfying photographs of Emerson in existence.

American Medical Association Meeting.—For the occasion of the meeting of the American Medical Association, at New Orleans, May 5 to 8, 1903, the Mobile and Ohio Railway will make a rate of one first class fare for the round trip, viz., $18.00 from St. Louis, $23.00 from Chicago. Tickets will be sold May 1 to 4, nclusive, limit 10 days, with privilege of extension to May 30th, on payment of fifty cents. Write John M. Beall, A. G. P. A., St. Louis, for full particulars.

The Action of the Static Current on the Atmosphere.

While treating patients with the static machine for various chronic and nervous affections Dr. Albert C. Geyser of New York city noticed that some of them were at the same time relieved of acute troubles of the throat and lungs. In searching for the cause of these unexpected cures he noticed rapid disappearance of the particles of dust in the room, usually visible in a sunbeam, as soon as the static machine was started. By means of culture plates placed in various parts of the room, (1) before the machine was started, (2) after it had been in action for a short time, (3) some time after the machine had stopped, other conditions being maintained as nearly as possible the same thruout the experiment, he showed that the number of bacteria and molds in the atmosphere while the static machine was in action was 80 per cent less than before the machine was started, and after the machine had stopped the number remained less than 50 per cent for a considerable time. The action of the machine causes the germ-bearing particles of dust to land upon the walls and floor or any object that may be in the room.

Dr. Geyser's investigation is certainly ingenious and, so far as we know, new. While the removal of bacteria from the atmosphere by the action of the machine can hardly be considered a prominent factor in the cures referred to, it is undoubtedly of importance as a preventative of throat and lung troubles in susceptible patients. It is also of some importance to note that dust particles carrying bacteria may be projected from an electrode of the static machine. The factor considered by Dr. Geyser as having equal or greater prominence in the cures is the presence of ozone, which is manufactured in large quantities by the action of a static machine, so much so as to completely surround and be inhaled by the patient and which acts as an antiseptic upon the throat and lungs.

A Conference on X-Ray Therapy will be one of the features of the Section of Neurology and Electro-Therapeutics at the Boston meeting of the A. I. H. It is hoped that physicians using the x-rays for the treatment of cancer, etc., will be prepared to give in from three to five minutes each the salient features of their methods and the lessons they have learned from their work. X-Ray therapy is still in a formative stage, and it is believed that this interchange of ideas and experiences will be of benefit to those interested in it. Physicians engaged in this work who look forward to being at Boston are asked to send a postal card to the Chairman of the Conference, Dr. Hills Cole, Hartford, Conn.—*Cleveland Medical and Surgical Reporter.* March, 1903.

X-Rays in the Spectrum—Lord Rayleigh, professor of natural philosophy at the British Royal Institution, has announced that M. Blondelot, a skilful French experimenter, very recently adduced evidence going far to prove that the Röntgen rays are susceptible of polarization, if they have not been polarized already, and can therefore be traced in the spectrum. If this is true and the rays are transversal, as M. Blondelot thinks, it follows that they are a species of ordinary light, but of extremely short wave lengths, perhaps a hundred times shorter than the waves of the light that one can see. Lord Rayleigh said he saw no reason to question the discovery, which is of first-rate importance in helping to determine the nature of the Röntgen rays, which has been in doubt ever since they were discovered.—*New York Sun. Medical Record* March 28, 1903.

Electrolytic Superoxides—Holland—(*Comptes Rendus,* January 26, abstracted in Lond. *Elec.,* February 20), gives an account of a chemical investigation of the lead peroxide deposited at the anode of a solution of a lead salt. The present author has found that the weight is too great for the peroxide and that higher oxides are deposited; the proportion of these higher oxides is greater the smaller the concentration of the lead in solution. It is probable that very high oxides are formed, but the author has not determined their exact nature. Lead is not the only metal which shows this phenomenon; an alkaline solution of nickel pyrophosphate yields a similar oxide, as does also a solution of sulphate of bismuth containing a little nitric acid and copper sulphate. These have been obtained only in dilute solutions, as the salts are rather insoluble.—*Electrical World and Engineer.* March 14, 1903.

"Electro-Therapeutics and Quackery."

A. D. Rockwell, M. D., (Medical Record, March 7, 1903) writes in reply to the Editor:

"With the spirit of your editorial note on this subject in the issue of February 28, I am in full accord. If, however, by quacks are meant men who are in no way reputably affiliated with the medical profession—then the statement of Mr. Edmund Owen before the British Electro-therapeutic Society—'that the medical use of electricity has fallen largely into the hands of quacks,' is quite erroneous. This could truthfully have been said twenty-five years ago, but not now. Quacks of this kind are quite as effectually driven from the field as are the advertising oculists, aurists and throat specialists. Electricity, as has been well said, 'has been wounded in the home of its friends.' In the same way as the x-rays, valuable as they are, have been made to stand for more than they have yet accomplished, so the various electric modalities, and especially static electricity have been lauded too much as cure-alls to satisfy rational medical conservatism.

You very properly dwell upon the significance of the fact that there are 'hordes of users of this method whose voicings betray their ignorance of even the elements of electrophysics.' It is this class, undoubtedly, that is in the main, but not altogether, responsible for the unfavorable judgment of the profession at large. I can hardly agree, however, with the editorial statement that there are 'scarcely a handful of reputable authorities in the world to-day who have any faith in, or knowledge of, the therapeutics of the static form of electrical manifestation.' There are hundreds of reputable and able men both here and abroad who fully recognize the influence of the various methods of electrization over general and local nutrition. As to those who have 'no knowledge of electrical manifestations and so have no faith,' it can only be said, so much the worse for them. If they possessed more knowledge they would have more faith.

How often is heard the remark from a medical standpoint, 'I do not believe in electricity.' Could anything be more senseless? One might as well say, I do not believe in heat or cold, or in any of the marvelous manifestations of universal force, upon which life and physical well-being depend. It is gratifying to know that the reproach of Mr. Lecky 'that the medical powers of electricity which of all known agencies bears most resemblance to life, are unexplored,' is no longer deserved; and if, in these explorations, there is developed with what is substantial and worthy, too much that is chaff and worthless, it is only another illustration of that dominant commercialism which, while it may abstract, cannot prevent scientific advancement or professional recognition."

Seventy-five Cases of Malignant Tumors.

W. B. Coley, M. D., (Medical Record, March 21, 1903) reports seventy-five cases of malignant tumors treated.

In an introductory paragraph he mentions Dr. Gilman, of Chicago, as among the pioneers in advocating the x-ray in the more deeply seated forms of cancer. Candor demands that this statement be qualified by the fact that all Dr. Gilman's early cases were treated in the laboratory of Dr. H. P. Pratt. The statement on the same authority (Gilman) that cancer is as curable under x-ray as is typhoid fever in ordinary practice, is calculated, in our opinion, to bring the method into disrepute.

We condense Dr. Cooley's report. Case (1) Round-celled sarcoma of the neck. Case considered hopeless. Marked improvement under x-rays; recurrence; x-rays again; steady improvement and

general health good. (2) Round-celled sarcoma of femur. Examination showed a large tumor, of left femur from the condyles to the junction of the middle and upper third; under x-ray treatment it steadily diminished in size, and after ten months the left leg measured the same as the right. Examination of tissues showed no sarcoma. Metastasis, tumor in pectoral region removed Feb. 4, 1903. It proved to be a typical round-celled sarcoma. (3) Sarcoma of parotid. No improvement under x-ray and mixed toxins. (4) Small round-celled sarcoma of the pectoral region. Twice operated upon but complete removal impossible. Mixed treatment with x-ray and toxins; tumor almost entirely disappeared. (5) Small round-celled sarcoma of the back. Excised twice. After five months' treatment with x-rays tumor had entirely disappeared. Recurrence; did not improve under x-ray. Excision January 20, 1903. (6) Sarcoma of the frontal sinus. Combined treatment; slowly improving. (7) Recurrent sarcoma of testicle. Retroperitoneal tumor the size of a man's head, with metastatic tumors of the back. Combined treatment. Unimproved. (8) Recurrent round-celled sarcoma of testis. Combined treatment; slight improvement; very foul discharge nearly ceased; recovery doubtful. (9) Sarcoma of neck. Recurrent. X-ray treatment. Little effect so far. (10) Sarcoma of right pectoral region and neck. X-ray treatment. No appreciable change. (11) Very large inoperable lymphosarcoma of the neck. X-Ray treatment with no effect on the growth; regarded as hopeless. (12) Sarcoma of neck. After excision x-ray treatment four times a week for three months; discharged apparently cured. (13) Melanotic sarcoma of the iliac glands. Four operations for recurrent growths. X-Ray for nine months; growths held in check without decrease in size; has gained fifteen pounds in weight. (14) Spindle-celled sarcoma of the cheek and back. Combined treatments. After ten months' treatment tumor diminished considerably in size; toxins discontinued; x-ray alone; growth increased rapidly; resumed combined treatment January 12, 1903, tumor decreasing in size, but patient is losing flesh rapidly and shows signs of internal metastasis. (15) Spindle-celled sarcoma of superior maxilla. Three operations; toxins; improvement at first; later none; x-ray; no effect on pain or growth of tumor. (16) Sarcoma of thigh. Enormous swelling of thigh. X-Ray fifteen weeks; tumor greatly diminished in size. With disappearance of tumor general health failed; died ten weeks later. (17) Recurrent spindle-celled sarcoma of chest wall. Six x-ray treatments as prophylactic; no recurrence. (18) Small round-celled sarcoma of thigh. Recurrence after three operations. Combined treatment for three or four months; growth retarded at first, but later no improvement; metastasis to lung. (19) Round-celled sarcoma of thigh; combined treatment for a month; no effect. (20) Round-celled sarcoma of parotid. Combined treatment; no improvement; died. (21) Sarcoma of neck. X-Ray treatment too short to note result. (22) Sarcoma of the parotid. X-ray four weeks; no improvement. (23) Recurrent sarcoma of orbit. Combined treatment three months; at first, growth held in check; later no effect. (24) Intra-abdominal sarcoma. Retroperitoneal. Involvement of right kidney. X-ray six weeks. Slight improvement at first, later no effect. (25) Sarcoma of right superior maxilla. X-ray had very little effect. (26) Sarcoma of axilla; excision; recurrence; x-ray treatment seventeen weeks; recurrence; x-ray; recovery. Afterwards developed tuberculosis of lymphatic glands. A case of advanced Hodgkin's disease under x-ray showed remarkable improvement. Two cases of Hodgkin's disease treated by

Williams relapsed after six months. Twenty-one cases of cancer of the breast were treated. Fourteen recurrent and inoperable. One case carcinoma under x-ray showed slight improvement. Four cases; x-ray immediately after operation as prophylactic; recurrence, with much pain. One of these showed improvement under treatment carried to dermatitis. One case recurrent cancer of the breast; radical operation; x-ray, thirty exposures; now no trace of disease. Third case, carcimona of breast; excision; x-ray, twenty-five exposures; no trace of a return. Fourth case, carcinoma of both breasts, axilla involved; excision; x-ray immediately after the wound healed; no recurrence; now appears well. Three cases recurrent carcinoma of breast, tumors disappeared after three or four weeks' x-ray treatments. Another case the tumor disappeared under the x-ray but the lung became involved and patient died. Most of the other cases were large recurrent masses in the breast and axilla; most of them showed slight improvement, but in none did the growth entirely disappear. There were fifteen cases of epithelioma of head and face. In none of these has the growth entirely disappeared. Eleven cases of abdominal cancer were treated with the x-ray. One case of inoperable cancer of uterus showed improvement after one months' treatment. In a second case of uterine cancer the discharge ceased entirely after a few treatments and she appeared to be cured. In a case of carcinoma of the rectum there was general improvement and a gain in weight after x-ray treatments. In a case of extensive inoperable round-celled sarcoma of neck, pectoral region and axilla, the tumors disappeared under x-ray treatment with recurrence in the region of the ascending colon. Under x-ray, high tube, four exposures a week for six weeks, tumor has diminished one-half in size and on February, 1903, the tumor was still decreasing.

The author favors the treatment of inoperable sarcoma, by toxins as more certain to effect a permanent cure than by x-rays. The round-celled sarcoma requires a mixed treatment. While the spindle-celled is amenable to toxins [of erysipelas and bacillus prodigiosus.]

The 1903 Standard Medical Directory.

The new volume will consist of about 1,300 pages comprising complete directories respectively of the physicians of all North America, colleges, societies, hospitals, sanitariums, mineral springs, publications and in fact everything related to medicine. The new features (including an alphabetical index of physicians, with post office addresses and rosters of practitioners of the specialties) will, it is stated, add about one-third to the volume of the work.

The Röntgen Treatment of Malignant Disease.—Leonard believes that even if recurrence does take place, the results of the treatment of malignant disease by the Röntgen ray demonstrate the efficiency of this method and that renewed treatment will free the patient from the disease. The best method of treatment seems to be the combination of early radical surgical operations and the Röntgen treatment. The best results, in the average case, are achieved through the replacing, as the result of a retrograde metamorphosis of the malignant tissue, by fibrous or adipose tissue. More rapid results, but possibly more dangerous, can be produced by the sloughing and necrosis of the pathologic tissue.—*American Medicine.* February 2, 1903.

Correspondence.

DEAR DOCTOR:

Will you explain thru your April issue of THE AMERICAN X-RAY JOURNAL the following questions: Why do we have to use a fluoroscope in making x-ray examinations? Does the screen stop the rays? Please explain fully. Yours truly, L. D. H.

[Your question is fully answered in THE AMERICAN X-RAY JOURNAL of April, 1899, volume 4, number 4, page 553, in an article written by Dr. H. Preston Pratt, from which we partially quote the following: "Lines of force, or electrical radiations, are thrown from the Crookes tube, and with every discharge of the tube produce decomposition of all substances in the path of the x-ray. It is a well known law in chemistry that when a chemical compound is decomposed, for instance a liquid, solid, or a gas, a spark is produced, we call this light, or fluorescence. The screen fluoresces, or lights up; this is why, in looking at a screen, the screen is lighted up by the x-ray due to the electro-chemical changes which take place, reducing the chemical on the screen into similar compounds, or converting the bromide of silver on the photographic plate into the oxid of silver. The amount of conversion depends upon the strength of the current, that in turn depends upon the resistance of the circuit. The greater the resistance of the circuit the less the change. The less the resistance of the circuit the greater the change. When we interpose between the screen or the photographic plate, the hand or any part of the human body, what we see is not the picture of the bones, but a shadow due to the difference of the resistance of the x-ray circuit as determined by electro-chemical decomposition. Bones affording greater resistance to the circuit than the flesh. The decomposition is less and hence the shadow. This follows Ohm's law. The current is equal to the electro-motive force divided by the resistance."—Ed.]

EDITOR X-RAY JOURNAL:

Does the shaft of a static machine have to be insulated from the revolving plates to prevent leakage of electricity from the machine? W. C.

[Yes, the shaft acting as a conductor as well as a condenser is liable to short circuit the plates, thereby cutting down the capacity of the machine.—ED.]

EDITOR X-RAY JOURNAL:

I have a patient (female) who has convulsive tic of facial nerve. The attack came on about one year ago and she is about fifty years of age. The menopause ceased several years previously. No assignable reflex cause. What would you suggest from an electro-therapeutic standpoint and what would be your prognosis? May I kindly ask for a reply thru the JOURNAL. Yours very truly, J. G.

[In the above case I would suggest the use of the x-ray alternating with the hyper static current. Prognosis would be favorable.—Ed.]

TO THE EDITOR:

I have noticed for several months the advertisement in your journal of the Seed Co.'s positive films for use in x-ray work. As I have been using the sun prints, and it is sometimes several days before the sun shines, which delays me very much, would you advise the use of the positive films? Kindly answer in the next issue of the JOURNAL. E. F. C.

[Yes, use the Seed positive films by all means, as it will save a good deal of time, even if you wish later to make a sun print. There are a good many x-ray workers who are using the films exclusively, and only make a sun print when they are requested to do so. After you are accustomed to them you will be well pleased.—Ed.]

DEAR DOCTOR:

I am much pleased with THE AMERICAN X-RAY JOURNAL. Your correspondence department is very helpful. There are some points on which I wish information, and hope you will answer through the JOURNAL, as I have no doubt the queries and answers will be of interest to other users of static machines.

I have written Mr. ——— for information on these points and have gotten brief and unsatisfactory replies.

I have a 16-plate Electro-Med. static machine, plates 30x33 inches. On account of not knowing how the revolving plates were kept from revolving on the main shaft, I have gotten a lot of very expensive experience.

The soft rubber washer between the brass jamb-nut and the front revolving plate became disintegrated by the action of ozone and the revolving plates turned on the axle, or, in other words, the axle turned without turning the plates. I did not know that rubber had been used to support the plates and made a a paste of Lepage's glue and plaster paris, applied it on the inside of the jamb-nut, and screwed it up. This temporarily stopped the trouble. When it began again from the operation of the same cause, on the other washers, I undertook to unscrew the jamb-nut and the union between the plate and the cement was so firm that I broke the plate. I then tried getting the plates out and broke or cracked several more. I have, at last, learned how to take the plates out and replace them. There is, however, some danger of cracking or breaking a plate, even after you understand the mechanism.

The shellac varnish has peeled off of some of the plates, leaving them partly bare. Is it essential to the working of the machine to have them varnished? As I have the machine together now, there is a crack in the front revolving plate extending from the center for about 6 or 7 inches, and there is a crack in the front stationary plate from the center to the circumference.

Does a crack interfere with the work of the machine, or the generation of the current? I can understand how that the crack weakens the revolving plate and how there might be danger to the machine when plates are revolving rapidly, but as there is no strain on the stationery plate, I do not see how that could interfere. Very truly yours, J. T. M.

[You had an unfortunate experience. It is always a wise thing to study the mechanism of your machine before taking it apart. Even after you understand it you are liable to have trouble. It is essential to the working of the static machine to have the plates varnished to prevent the accumulation of moisture. A crack in the plate decreases the possible energy obtainable from the plate thru a short circuit or partial polarization depending entirely upon the relationship of the plate to adjacent parts. A plate cracked into two pieces would be the same as two separate plates, and it all depends upon the location of the crack to the tin foil on the surface of the plate as to how much available energy is being lost. In both instances energy is lost. We must not lose sight of the fact that the principal of the dynamo and the static machine is the same. The revolving plates stand in the same relation to the stationary plate as an armature does to a field magnet, and consequently would be subject to the same governing law.—Ed.]

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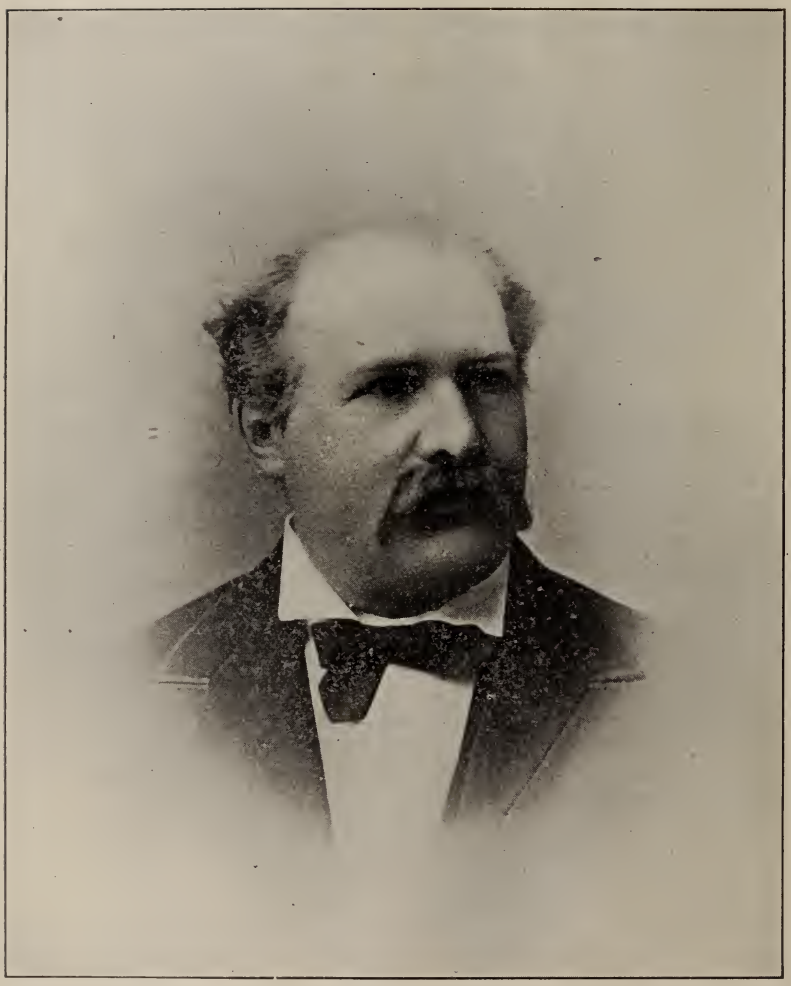


ROBERT NEWMAN, M D.

THE AMERICAN
X-RAY JOURNAL.
Devoted to Practical X-Ray Work and Allied Arts and Sciences.

VOL. XII. CHICAGO, MAY, 1903. No. 5

The Anode Rays.

BY JOHN T. PITKIN, M. D.

Some eminent astronomers maintain that the force generated by the sun results from a stupendous bombardment of that orb by innumerable comets while in perihelium.

The force thus generated is beyond the range of the human eye; as are the Lenard or kathodal, the anodal, the ultra violet, the magnetic and the Roentgen rays.

This force or these forces traverse an expanse of rarified medium, a portion impinges on our atmosphere and we receive light, heat, magnetic and active rays.

Under excitation our mundane sphere presents a green or active and a dark or relatively inactive hemisphere.

Our greatest human teacher, Jesus Christ, taught in parables or by analogy. In my puerile effort to emulate His example I will liken the target or anode of the Jackson-Crookes tube to the solar globe, the contained kathode stream of hypo-microscopic particles which bombard the reflector to the comets of perihelium, the anode rays to the ulterior force from our little sun. As these rays strike upon one-half the glass wall of the tube (the analogue of the atmosphere) they are converted into light, heat and the actinic force known as the Roentgen ray.

The total strength, density, or number of lines of force in a given x-ray field depends upon the volume and number of particles of matter in the anode stream, the volume is a function of the size of the tube employed; the number of particles is a function of the lowness of the vacuum plus an adequate current of electricity for its proper excitation.

Thus a tube eight inches in diameter presents four times as much glass surface for bombardment by the anode rays as another tube of but half its diameter, hence the volume of x-rays from the large tube will be four times as great.

All other conditions being equal, a static machine having forty revolving plates can energize twice as many particles of the anode stream as another apparatus having but twenty revolving plates.

As all normal x-ray fields are of the same general shape and have the same horizontal and vertical dimensions at a given distance from the target, the advantage of the large soft tube with an abundant electrical current back of it becomes obvious.

In shape the bundle of rays constituting the anode stream is hemispherical, its outer rounded surface terminates on the inner green wall of the (x-ray) active portion of the tube. This wall gives the anode rays their conformation and limitation.

At their source the area of their generation will be round, square, oblong, large, small, regular or irregular, depending upon the size, shape and integrity of the

free surface and edges of the reflector where they are formed from myriads of small particles of matter supplied to the target by the kathode stream.

From their area of generation the anode rays pass outward in straight lines diverging from each other. An imaginary plane taken in the direction of propagation will be fan-shaped. They are densest at the target and attenuated at the glass wall of limitation.

The velocity of the stream depends upon the degree of excitation of the tube; and its steadiness when normally excited, upon the nature of the electrical current which supplies it.

If from a static machine without spark gaps it will be perfectly uniform. If many spark gaps are used or an induction coil employed the anode rays will be rhythmical in quality but the fluctuations can not be detected by the sense of sight.

When the tube is (1) under or over-excited, (2) has too low or too high a vacuum for the electrical current that operates it, when (3) very many spark gaps are interposed in the electrical current so as to render it oscillatory, then the anode rays will be irregular, fitful and unreliable. Under these conditions they often encroach upon what is normally the dark or inactive hemisphere, the encroachment being symmetrical of asymmetrical: a symmetrical encroachment passing just over the normal equator of the tube, continuous or intermittent, or a wavering of the equatorial line between the normal and an excessive point signifies that the tube is either too high or over excited.

An oscillatory electrical current lights the two hemispheres alternately.

In the anode stream are metallic particles of platinum torn off from the target. These become implanted on the inside of the glass wall of the active hemisphere, causing a permanent bluish discoloration that serves as a register, informing the operator how much service a given tube has sustained.

For purposes of further investigation the field of the anode ray can be divided into conoid segments, whose apices rest upon the free edges and surface of the reflector, their bases upon the inner glass wall of the active hemisphere. The strength of any given conic segment of the field will depend upon the number of particles supplied to that portion of the target in an instant of time where its apex rests.

When the Lenard rays fall largely upon the outer circles of the target, that structure becomes red hot thruout! Then the anode cones near the equator of the tube are strong, but if the kathode stream is sharply focused upon the bull's eye as manifested by its taking on a white heat, the conic segments of the center of the anode field will be relatively intensified.

By the bombardment of the glass wall of the active hemisphere the glass thereof fluoresces green. The opacity of the color is proportionate to the density or strength of the anode rays on the one side of the glass wall and the x-rays upon the other side. The uniformity of color and the absence of all flickering testifies to their steadiness.

Born at the target, begotten of material and force obtained from a kathode parentage, the anode rays possess the traits of its antecedent force, such as volume, regularity or irregularity and velocity. These traits of quality and quantity with many others are in turn transmitted to its offspring, the X or Roentgen ray.

BUFFALO, N. Y.

The Relationship of Psychic Suggestion to Electro-Therapeutics.*

BY MAURICE FIESCHOR PILGRIM, PH. D., M. D.

If the sick have the inherent power to evolve a cure, what is the need of a physician? Why not leave Nature alone to do as she pleases, as in the case of all the lower orders of animals? We reply that if the injury or disease be of unusual severity the natural reparative property requires stimulation in order to become available in time to prevent degenerative changes within the organism. The physician endeavors to put the ailing organism in such condition as to readily permit the needed remedial changes to take place. Can he at the same time stimulate by his treatment the *vis medicatrix* so that it shall operate with greater force in overcoming deviations from normal physiological functions? Undoubtedly he does do so, but does he do it solely or mainly with his drugs or electricity? Are there not other if not more efficient means by which this may be and is accomplished? In my judgment, based on considerable observation and experience, much more can be accomplished in this direction by psychic suggestion in its varied methods of application, in combination with other appropriate treatment, than with either singly. This is believed to be a very temperate statement of a momentous fact and very much under-states the truth. Nevertheless, I have no desire to dogmatize nor claim what to the unprejudiced mind may seem extravagant, for I realize fully that the world has from time immemorial been cursed by attempts at making half-truths do the full duty of the whole truth.

Not very much is really known concerning this organic faculty—the *vis medicatrix*—but it is evident that its energy is sometimes kinetic and at other times merely potential. It is very similar to the action of a watch: when the watch is wound the spring slowly uncoils and the hands move; but some obstruction is liable to clog its wheels at any moment and thus hold the power abeyant.

It is not my intention to attempt by argument to establish even a *prima facie* case for psychic suggestion as a curative agent. The only purpose of this paper is to indicate the value of this newly recognized force to the electro-therapeutist in connection with his work, and, incidentally, to appeal to my professional colleagues to investigate and rescue it from incompetent hands and place it where it rightfully belongs and where it should always have been—with the medical profession. While adhering to that purpose, I may with entire propriety remark that psychic force, like many other agencies of acknowledged potency, does not make its strongest appeal to the eye or ear or any of the physical senses.

The Crookes tube, for example, does not appeal powerfully to any of our mere physical senses. Visually considered it is not intense; it feebly appeals to the sense of touch, and is noiseless in operation; nevertheless it will penetrate the densest substance, disclosing the hitherto unseeable and unknowable. And more remarkable than all this is the fact that this light which so feebly appeals to our outward senses, is at this very time demonstrating its power in the direction of destructive metamorphoses. What the surgeon has been unable successfully to accomplish with his knife, is now being performed by this noiseless agent. The x-ray

* Read at the meeting of the American Electro-Therapeutic Association, at the Hotel Kaaterskill, Catskill Mts., New York, September 4, 1902.

tube may fairly be said to have now brot the most malignant type of cancers within the classification of curable diseases. Still the question remains and recurs as to what the x-ray really is, and how these remarkable results are obtained. A recent writer, referring to the subject, says:

"In the x-ray we have a new and as yet imperfectly understood force, a new form of energy which is neither electricity nor light, although produced by one and closely related to the other."

And now we are hearing almost daily of new and successful experiments in wireless telegraphy and telephony which, considered from a material point of view, cannot and do not appeal to our physical senses or belief. The physical senses are not the only channels thru which we are made acquainted with the ceaseless unfoldings of the mysteries of that great cosmos in which we live, but of which we still know, comparatively, so little. Permit me to invoke for the psychic element in the treatment of disease something of that spirit of unbiased and reverent investigation that is being accorded to the recent developments in the realm of the more material sciences. Individual observation and experience must, after all, supply the strongest ground for belief here as well as elsewhere. In the beginning, however, reliance must to a considerable extent be placed upon the results of the investigations of others along a given line. Nor is such a course a radical departure from ordinary procedure. It is surely not asking an unusual or unreasonable concession. The whole pathway of electro-therapeutics has been illumined by the patient investigations and achievements of esteemed colleagues pioneering far in advance of us, whom we have felt it an honor and privilege to follow. Very much that is of value in electro-therapeutics today we owe to the labors of honored colleagues, many of them members of this Association.

Those mountebanks who endeavor to create the impression that a patient can expect nothing psychically unless all belief in the efficacy of every other form of treatment is absolutely and unreservedly renounced seem to me to reach the very consummation of absurdity. One of the leading physicians of Great Britain, the celebrated Dr. Tukey of London, has for years been treating his patients with drugs *and* psychic suggestion. He has found that the use of the one re-enforced the other, thus greatly enhancing his usefulness. In a personal interview three years ago he assured me that the results obtained by him thru this combination of methods were incomparably greater than he was ever able to realize with either alone. We have abundant warrant for expecting better results from the combined treatment than from either alone—an expectation justified alike by theory and practice.

The imperative condition to be attained in psychic treatment is to bring the patient into right relationship with the operator. The methods for accomplishing this are numerous and varied and must be determined to a considerable extent by individual preference and judgment. The administration of a drug or the application of any other material agent, apart from its inherent value, serves the very highly important purpose of what I may appropriately call "objectification." They tend to put the patient's mind and neural organism into a receptive condition and facilitate the necessary surrender to the action of *vis medicatrix* which it is the design of all forms of treatment to evoke. In other words, these material agencies, when judiciously employed, aid very powerfully in bringing our patients into the sub- or super-conscious state where psychic suggestion is most readily accepted and appropriated. The greatest barrier to success in psychic treatment is usually our inability to read-

ily bring our patient into this condition of passivity and surrender to the power that is evoked in his behalf.

The electro-therapeutist enjoys the exceptional advantage of accomplishing much if not all of this for his patient automatically. Patients usually come to us manifesting the keenest interest in what to them is a novel form of treatment. Electricity as a curative agent possesses a sort of fascination for most people. Faith in its remedial capabilities generally coincides pretty closely with the degree of interest that this agent arouses. Patients who seek electrical treatment come to us expecting to be benefited if not cured. Then, too, the armamentarium of the electro-therapeutist appeals to them; and his subsequent manipulations in the application of the electric current afford an almost ideal opportunity for initiating and completing the psychic impression. No other therapeutist possesses a tithe of his advantage. We do not have to explain, argue, or entreat; nor do we antagonize our patient's prepossessions or arouse his fears (not to mention those of his friends) as is too often the case in treatment through hypnosis. The patient ordinarily goes into our consulting rooms fully prepared to receive and appropriate all the help that we are disposed to offer, regardless of its character or the method of its application.

As the caption of this paper indicates, it is my firm conviction that the relationship between the two forces of psychic suggestion and electro-therapeutics is a natural and ought to be a close and intimate one. Experience will not fail to demonstrate that the one, if given the required opportunity, will supplement the other. The electro-therapeutist who treats his patients psychically as well as electrically will not fail to greatly enlarge his list of curable diseases. By such procedure he will discover possibilities in electro-therapeutics far surpassing his present fondest and most ambitious hopes.

Professor William James, of Harvard, in his statement of the psychological proposition that "whatever determines attention, determines action," has given us the hint which if intelligently applied to each case individually will lead to the solution of the ever present but oftentimes perplexing problem of how best to make the attempt to arouse the desired psychic stimuli in our patients. The correct solution of this problem and the intelligent application of right psychic methods will, in my judgment, remove many of the limitations of electro-therapeutics by converting into present actualities many of the impossibilities of the past.

Suggestions in the Treatment of Advanced Malignant Diseases of the Uterus.

BY ERNEST A. HALL, M. D, VICTORIA, B. C.
Fellow of the British Gynecological Association.

Those of you who have come in contact with cases of advanced malignant disease of the uterus will agree with me that of all conditions submitted to surgical treatment this has proved the most disappointing. It is withal a minor chord that we are compelled to strike in the discussion of this matter. After many attempts with the most elaborate methods the surgeon must often admit defeat, and is able to offer only methods of palliation.

It is a trite saying, that these cases come to us too late. It is these late cases that I wish to discuss. In order that I may not be misunderstood, I will classify the late classes as those (aside from papilloma of the cervix) which are characterized by ulceration with copious discharges, and which can be diagnosed by gross visceral, or digital examination, as distinct from those with less definite symptoms, in which curet and microscope are necessary for diagnosis. Cases with the condition practically confined to the endometrium, I will dismiss with the statement that they are amenable to complete hysterectomy (either vaginal or abdominal, or the two combined), the proportion of perfect cures varying with the skill of the operator.

Pozzi says "the more limited the disease, the more extensive the operation." In cases where the disease is confined to the cervix, a wide section with the galvano-cautery knife might be considered; but the engrafting of the cancer elements upon the raw surfaces can hardly be prevented, which will cause a return of the growth in the cicatrix.

Now, what can we do with the great proportiion of cases who have been led to consult us, from the foul discharge and progressive pain?

The answer will of course depend upon the condition. We must remember that malignant disease frequently increases rapidly in growth after being molested—probably on account of the opening up of fresh foci of absorption and irritation of the lymphatic elements, with consequent increased activity of the malignant cellular elements. For this reason, deep curetting is to be avoided; only the necrosed tissue must be removed. It is better, first, to apply caustics, which coagulate and destroy, thus sealing up the vessels. If there is periuterine infiltration, with any limit to the movement of the uterus or if the vagina and region of the bladder be affected, there is nothing to be done beyond the local cleansing, application of caustics, and general measures to relieve suffering.

Surgical measures, other than mild curetting, are absolutely contra-indicated, in such extensive involvement. The patient will live longer, and suffer less discomfort, than when radical operative measures are attempted.

Inoculation of the combined toxins of bacillus prodigiosus, and erysipelas, has not thus far been successful.

The x-ray has relieved pain, but we have secured nothing more, so far, in these cases, from its application.

It has remained to Massey to give us a treatment that apparently meets the indications in cases where the disease is still confined to the uterus and cervix, and also applicable, surgically, in all cases where radical measures are of as-

sistance. His treatment is based upon the fact that during the passage of a galvanic current through the body decomposition of compound chemical bodies is caused—the acids accumulating at the positive pole and the alkalies at the negative pole; also, there is the actual transmission of liquids and solids (in solution) in the direction of the current: "anodal affusion." This can be shown by an experiment: Place two porous cups, equally filled with water, in a pan of water of the same depth; then pass the galvanic current, by placing one pole in each cup; in a few minutes, the water in the positive cup will be lowered, while the water in the negative will be higher.

With an amalgamated zinc or copper positive electrode placed in contact with the diseased uterine tissues, and the negative attached to a large abdominal electrode the oxychloride of mercury and zinc (or copper) is formed, which is transmitted thru the tissues toward the opposite pole. Thus we obtain greater acticity with the nascent chlorids, and a greater degree of pentration than by the ordinary method of topical application. Massey says "the radiating stream of mercuric oxychlorids will be diffused to a considerable distance in decreasing density, depending in extent on the amount and duration of the current, and will produce a zone of sterilization in the cancer cells which succumb, while the normal cells show a mere irritative action."

The current required for the application of this treatment can easily be obtained in cities where the Edison direct current is used, otherwise a galvanic battery of from 20 to 50 cells will be necessary. The current which I use is a 500 volt direct, supplied by the B. C. Electric Ry. Co. By passing it thru a bank of lamps, it is reduced to 100 volts; then thru a graduated rheostat, with a milliamperemeter in the circuit. I use electrodes (preferably zinc), with a surface of 9-12C. and a felt abdominal electrode of 800C. The positive electrode must be sterilized by boiling; the zinc portion dipped in mineral acid, then into metallic mercury, then wrapt with cotton saturated with bichlorid of mercury, and inserted against or into the uterus. With both electrodes in position, the current is gradually turned on to the extent of the patient's ability to bear, generally from 50 to 150 ma., and continued for twenty or thirty minutes. This may be done daily if the patient can endure it. A removal of the fetor, and a cessation of the discharge are at once noticed, with a blanching of the surfaces and an apparent check in the growth. But of course a cure cannot be thus secured in these late cases—merely prolongation of life and diminution of discomfort.

To what extent must we rely upon the report of the microscopist? To follow the Johns Hopkins' clinic, one would be led to the opinion that the pathological report is all but infallible, but Hunter Robb reports the examination of the scrapings from 100 cases, and he found that in 95 he was unable to make a positive diagnosis by the microscope. And Coe says: "In younger women in the prime of life, with irregular hemorrhages, where we suspect malignant disease—unless the history is very strong—we should consider the case as doubtful, until proven by the microscope. But in women of advanced years with a fairly well marked history, especially of obstinate, atypical bleeding, when we remove material that is of a suspicious character, we are justified in making a diagnosis of malignancy, even though the microscope throws no positive light upon it."—*American Journal of Surgery and Gynecology.*

Spiral segment (utero-ovarian artery), 1, 2, 3, 4, 5, 6, 7-9, 6-8, 9, 10, 11, 12, 13, 14, 15.
Straight segment abdominal aorta, 16. Common iliac, 17, and internal iliac, 18.

DIVISIONS OF THE SPIRAL SEGMENT.

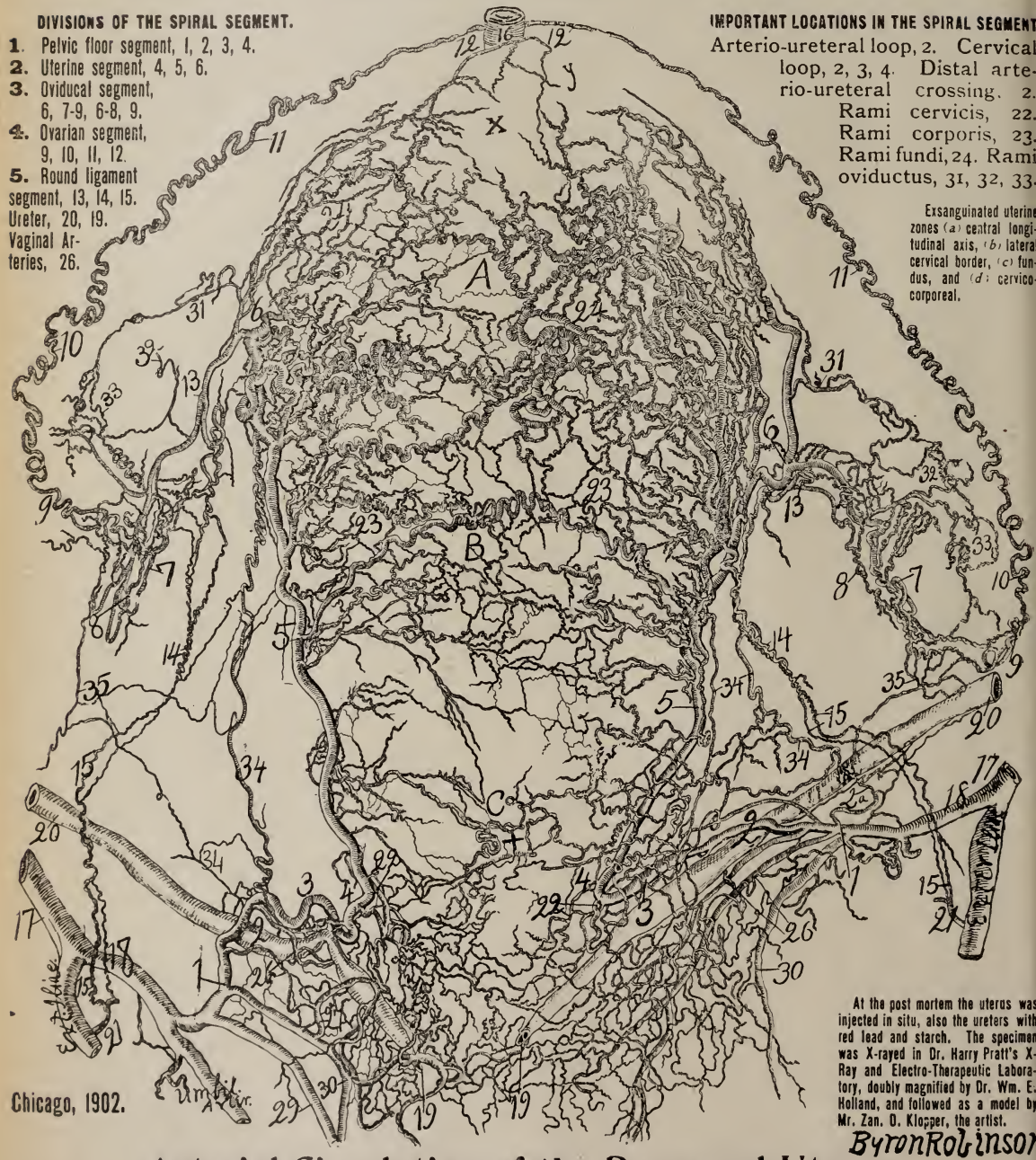
1. Pelvic floor segment, 1, 2, 3, 4.
2. Uterine segment, 4, 5, 6.
3. Oviducal segment, 6, 7-9, 6-8, 9.
4. Ovarian segment, 9, 10, 11, 12.
5. Round ligament segment, 13, 14, 15.

Ureter, 20, 19.
Vaginal Arteries, 26.

IMPORTANT LOCATIONS IN THE SPIRAL SEGMENT

Arterio-ureteral loop, 2. Cervical loop, 2, 3, 4. Distal arterio-ureteral crossing, 2. Rami cervicis, 22. Rami corporis, 23. Rami fundi, 24. Rami oviductus, 31, 32, 33.

Exsanguinated uterine zones (*a*) central longitudinal axis, (*b*) lateral cervical border, (*c*) fundus, and (*d*) cervico-corporeal.



At the post mortem the uterus was injected in situ, also the ureters with red lead and starch. The specimen was X-rayed in Dr. Harry Pratt's X-Ray and Electro-Therapeutic Laboratory, doubly magnified by Dr. Wm. E. Holland, and followed as a model by Mr. Zan. O. Klopper, the artist.

Byron Robinson

Arterial Circulation of the Puerperal Uterus.

Four Hours Post Partum.—½ Life Size.

Illustrating the Utero-Ovarian Vascular Circle (the Circle of Byron Robinson).

THE ABOVE IS AN X-RAY PHOTOGRAPH OF DR. WILLIAM E. HOLLAND'S CASE.

Report of a Case of Ventral Fixation, Pregnancy, Invagination of the Uterus, Death and Autopsy.

BY DRS. WM. E. HOLLAND AND BYRON ROBINSON.

In the obstetrical case and post mortem which I report this evening, I shall simply relate the patient's general history previous to and during gestation, clinical observations during delivery, and the revelations of the post mortem.

The patient, a well developed woman of twenty-six years, passed her early life without accident and suffered with but two of the diseases incidental to childhood, measles and whooping cough, from which she experienced little inconvenience and recovered completely. She began her menstrual function at the age of seventeen. The periods were extremely painful and the flow scanty. Her suffering being so intense as to necessitate rest in bed four to six days, and the use of powerful anodynes, etc. In consequence of increased suffering and disability her attending physician suggested operative interference and treatment at the hospital. To this the patient submitted, with the result that no improvement was effected, but on the contrary, pain was experienced, not only at the periods, but also in the interim. She was married in September, 1896. and had a miscarriage two months later, recovering from this accident within a week, with no evidence of infection, and apparent complete recovery.

Her sufferings continued increasingly until March, 1898, when a laparotomy to remove the ovaries, which were considered to be the cause of the trouble, was suggested by the physician having her case in charge. Upon opening the abdomen, the condition of the ovaries, in the surgeon's judgment, did not warrant their removal, but, on account of the extreme posterior displacement of the uterus, he determined to perform ventral fixation, which was done, according to Martin's method, in a manner and with results entirely satisfactory, surgically, but with no relief to the patient. August, 1901, she became pregnant. During the entire period of gestation, the patient suffered intensely and increasingly, with dragging sensations and pains throughout the lower anterior portion of the abdomen, until, toward the close of this period, they were so severe as to frequently cause faintness and nausea. Otherwise the conditions were, in general, satisfactory.

I first examined the patient about six weeks before delivery. The position of the uterus was such, that the os was high and directed backward so decidedly that I experienced considerable difficulty in discovering it. Labor began at 6 a. m., June 14, 1902, with a sudden escape of about half a pint of liquor amnii, while the patient was still in bed. Examination about two hours later revealed the os still markedly posterior and dilated to the extent of admitting two fingers. The presentation was L. O. A. Pains were very severe and effective, the patient complaining of greater suffering and exhaustion as labor progressed, until when the child was expelled alive and well at 12:45 p. m., she was practically in a state of complete collapse, and writhing in pain, referred to the back and lower abdomen. After tying the cord, etc., vaginal examination revealed the placenta partially protruding from the uterus, with no external evidence of hemorrhage or other local abnormal conditions. Continuous, extremely violent expulsive pains soon brought it to the vulva, its delivery being normal and unassisted, and complete with the exception of a piece of the membranes, about three inches square. The entire process of the third stage of labor was concluded within half an hour.

Pale, collapsed and in agony, with a pulse of a hundred and forty, respirations fifty, sighing and gasping in character, and covered with profuse cold perspiration, was the picture presented by the patient. With no local evidence of hemorrhage, or other apparent cause for this condition I introduced my hand into the vagina. This examination revealed an open condition of the os through which two introduced fingers could feel a peculiar, thin, membrane-like flap, apparently suspended from the fundus of the uterus, which organ was quite regularly contracted. Dr. Orville W. MacKellar, whom I called in consultation, carefully examined the patient, noted her desperate condition, and suggested a continuance of the stimulating and sustaining efforts instituted, but in spite of all local and constitutional treatment, she succumbed at about five p. m., three and a half hours after delivery, with all the typical symptoms of shock.

Being unable to determine the cause of death, I suggested a post mortem, which was allowed, and performed in the presence of Dr. MacKellar, with the assistance of Dr. Byron Robinson. Accurate observations were made concerning the topography of the pelvic organs, the uterine circulation was injected in situ, with red lead, the entire organ removed, carefully examined, and x-rayed, with results which will now be described by Dr. Robinson.

AUTOPSY.

Drs. Wm. E. Holland, Orville William MacKellar and myself performed a post-mortem on this woman who died three and one-half hours post partem.

She had been operated upon for ventral hysteropexy four years prevoiusly. The child was alive and well. Arriving shortly after death I made a bimanual vaginal examination. A large soft mass was palpable per vaginum but the parts were so soft that nothing could be definitely determined. Upon opening the abdomen in the median line from xiphoid appendix to symphysis pubis dense omental adhesions were encountered. Abdominal inspection revealed a completely invaginated uterus. A peritoneal band about the width of two fingers and some six inches in length and mainly composed of omental tissue, passed distalward, penetrating the lumen of the invaginated uterus. The invagination was so complete that the ovaries rested on the proximal rim of the uterus. The oviducal pavilion also projected proximal to the lumen of the invagination. The index finger alone could penetrate the neck of the telescoped uterus. The organ was easily disinvaginated by drawing on its omental band which was fixed to the proximal fundus, with one hand, while the other hand in the vagina forced the uterine fundus proximalward. On examination after disinvagination it was found that a fundal space about three inches square had become extremely atrophied from the dragging of the omental band which was fixed to the fundus.

The uterine wall adjacent to the atrophic fundus was six to eight times as thick. In fact the fundal wall was so atrophic and thin that the finger could press it distalward and proximalward like a movable diaphragm. The remaining pelvic organs appeared normal. A drawing was made of the conditions found and the uterus injected in situ with red lead and starch. The specimen was x-rayed, then prepared and followed accurately as a drawing model.

Subjects with ventral hysteropexy may suffer from (a) pain in the hypogastrium; (b) abortion or premature labor; (c) dragging from the fixation and nausea; (d) traumatic tension will prevent segments of the myometrium from developing —remaining atrophic; (e) the cervix may pass proximalward and the fundus remain distalward; (f) the cicatrix may form a depression in the abdominal wall.

Difficulties During Labor.—1. Parturition may be impossible on account of (a) the changed direction of uterine force;

(b) or the atrophy of myometrial segments; or (c) a mass of tissue may obstruct the pelvic canal.

2. Parturition may be delayed.

3. The cervix may be unable to dilate on account of abnormal position.

4. Malposition of the child is more liable to occur.

CONCLUSIONS WITH FINDINGS.

1. Death was caused by invagination of the post partum uterus due to a ventral hysteropexy performed four years previously.

2. The direct cause of the invagination was the atrophy of the fundus due to the dragging of the peritoneal band on the fundus.

3. The direct cause of death was heart-shock. The trauma was carried to the heart over the hypogastric and ovarian plexuses by way of the abdominal brain and splanchnics to the cervical ganglia. Here the nervous shock was reorganized and carried directly to the heart over the three cervical cardiac nerves. The force passed also over the II, III and IV sacral nerves by way of the spinal cord to the brain, where it was reorganized and emitted directly to the heart over the pneumogastrics.

4. This subject experienced suffering during gestation from dragging of the peritoneal band fixed to the uterine fundus. I have known of a number of cases of severe pain during gestation which had followed a ventral hysteropexy. Reports are constantly increasing in which Cesarean or other section is required at parturition subsequent to the performance of ventral hysteropexy.

5. It is rational to conclude, therefore, that ventral hysteropexy should not be performed in a reproductive subject.

6. Moreover the large majority of women with retrodeviations are not suffering from the uterine displacement but from the accompanying myometritis, which is the chief pathological factor and which is not cured by producing another fixation and dislocation of the uterus.

Chicago Electro-Medical Society.

The twenty-first meeting of the Chicago Electro-Medical Society was held on Monday evening, April 27th, 1903, on the 17th floor, drill hall parlor, Masonic Temple. The following names were proposed for membership and duly elected: Dr. Chas. P. Donaldson, Dr. E. H. Pratt, Dr. O. W. McKeller, Dr. J. A. Horne, Dr. H. R. Wallace, Dr. G. Tedtman and L. M. Rader.

The next meeting of the society will be on May 25th at 1207 Masonic Temple.

Papers were presented as follows:

Some of the Little Known uses of Electrolysis.

BY H. P. FITZPATRICK, PH. R., M. D.

Mr. President and Gentlemen of the Chicago Electro-Medical Society: In this brief article it is not my intention to take up the treatment of the more familiar facial defects, such as superfluous hair, moles, birthmarks, etc. The general technique and modus operandi for the application of electrolysis in such cases are pretty generally understood by all practitioners.

But I do wish here to emphasize a fact which those who blame electrolysis for failure to meet perfect success in its application do not seem to realize; and that is that no one can hope to compete with the busy specialist, except by making electrolysis a specialty. This operation is not for the general practitioner who treats one or two cases a year. It must go to one who works day after day

and by constant application becomes familiar with the texture of each individual skin.

In all my experience I do not think two persons whose skin would present exact counterparts have been under treatment. You cannot therefore put down a set rule for so many milliamperes for every case. I find as a rule that the brunette requires more electrolysis, to complete as much work in the same length of time, than is required for the blonde.

The insertion of the needle is a simple matter it would seem, but in a case of superfluous hair, for instance, how many of you who have attempted it can say you felt assured the needle followed the hair shaft accurately down into the sack. You know unless you do insert accurately you are expending electrical energy and setting up unnecessary inflammation, with even the possibility of a resultant eschar. Whereas with accurate insertion you will have minimum inflammation, and the possibility of eschar need trouble you no further. How then can you arrive at the point of nearest electrolytic success? Simply by devoting your whole time to the work. Practice in this as in no other specialty is the greatest element of success. Given the eye for accuracy, given the hand that does not tremble from lack of confidence, and add your experience, and we can call this a perfect electrolysis qualification. But I am digressing from the heading of this article.

Six years ago I met with a most obstinate case of acne pustulosa, in which diet, astringents, puncture, soothing and stimulating ointments were only palliative and the results but temporary. At last it occurred to me that electrolysis might be of some help and therefore with the idea of asepticizing the eruption I inserted the needle, previously attached to the negative pole, into each pustule. I used at first a minimum current of two milliamperes and decomposed the saccule pretty thoroly. Then I evacuated the contents of the pustule and cut out all other treatment in order to ascribe the result whatever it might be to its proper source. The patient was dismissed after the face was gone over thoroly and all visible pustules treated, with instructions to call in a week. Much to my surprise and greatly to the gratification of the patient the parts treated had healed mildly and with the exception of a pinkish dermatitis of the immediate tissue (which vanished completely later) new healthy granulated tissue had replaced the seat of the acniform lesions. Since then acne pustulosa has had no terrors for me. Now after years of experience I find but three adjuncts which are at all essential in the cure of what was formerly a hard disease. I use in conjunction with electrolysis weekly faradization of the face and neck to stimulate capillary circulation and accelerate perifollicular tissue changes. I use also the following:

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Hydrarg. bichloridi, grains five,
Spts. camphor,
Glycerini,
Tinct. saponis viridis, aa drachm one.
Spts. vini rectificat., ounce one.
Aquæ rosæ, q. s., ad. ounces four.

applied every night, for its aseptic, astringent and stimulating properties; and, finally, Cascara evacuant (P. D. & Co.'s) ¼ drachm one-half hour before breakfast, to overcome constipation, if present. I give one treatment a week, using electrolysis for removal of all visible pustules and comedones, and then faradize the parts previously treated. With reference to time, the worst cases have never taken more than three months, while less aggravated cases yield in two.

Powder Stains

are so disfiguring that any method that

will give promise of success in their elimination should be thoroly tested. Electrolysis alone is, I am sure, the best and most effectual method generally known, but I have never been entirely satisfied with the results. In order to entirely obliterate the stain too much disintegration of tissue occurs. A white scar replaces the blue stain, which, while not quite so unsightly, is not exactly satisfying to a conscientious operator. In recent cases, I have obtained good results by using peroxid of hydrogen in conjunction with electrolysis. I proceed as follows: Using from two to three milliamperes of current with negative pole to needle, touch with peroxid the spot to be treated, then tattoo the skin over the stain, by repeatedly inserting needle until the area of discoloration has been completely covered. Keep the surface of the stain saturated with peroxid and work with the idea of thoroly penetrating the decomposed tissue with it.

When the seat of the former stain has become blanched by electrolysis and bleached by peroxid until no stains are visible, suspend treatment on that spot and treat the remainder in the same way until the face has been covered. So far as I know, these are original methods. If they are generally used no mention has been made of them. When the peroxid is used you must go at it with the intention of penetrating the stain with the peroxid and at the same time tattooing sufficiently to create a crust formation, averting, however, the possibility of a cicatrix.

With above treatment the stains are so nearly bleached out or carried off by the crust formation as to leave scarcely a perceptible trace. I know of no other blemish that requires so much care and patience, but surely success in even one case justifies you for all the time and care so necessary to insure complete eradication. As you will not find soft follicular openings for easy insertion of needle in these cases, it is well to obviate pain as much as possible and therefore see to it before you begin treatment that the needle is exceedingly fine and very sharp pointed. You should not insert it below the depth of the stain. As the needle must be inserted repeatedly in a very small area, you should allow but a few seconds of electrolytic action to each insertion. To those physicians who do not care to take up the treatment of these cases by electroylsis and would like some other easily applied method I would advise, first, (if stains are recent) the hypodermic injection of peroxid. Insert the hypo-needle into the stained area and saturate it with injected peroxid. Secondly, Croton oil. By injecting a drop of Croton oil below the seat of the stain the oil will set up a sufficient inflammation to incite an artificial furuncle. All material foreign to the skin will be carried off when the pus contents are evacuated. I would not advise more than two or three injections in widely separated portions of the face at a sitting. A great many cases have been successfully treated in this way, but it is assuredly a most heroic method when compared to electrolysis and peroxid.

I intended to take up other treatments and especially tattoo (India ink marks) but this article has already taxed your patience, and I will take up other defects and their treatment at some future time.

I do not doubt but that the x-ray treatment of acne will soon relegate my present method of treatment by electrolysis as much to the rear as electrolysis relegated former methods. But, just at present, with the results I get, I find parting from electrolysis in the treatment of acne to be a great deal on the order of parting from a tried friend. Therefore I am not going to say good-bye just yet.

Combined Chemical and X-Ray Treatment of Cancer.

BY O. W. M'MICHAEL, B. A., M. D.

For the development of cancer two elements are essential, first, the presence of the parasite, and second, a chemical condition of the tissue favorable to the growth of the parasite. Upon the latter depends the degree of malignancy and the rapidity of the growth.

Two schools of investigators are at present trying to explain cancer, the one maintaining that the cause of cancer is a parasite, the other, that it is the result of a local chemical change in the tissue producing local katabolic stasis. It is not my purpose to discuss the two lines of argument, but to express the belief that both schools are presenting to us a half truth, and that both are right as far as they go. This belief led me to adopt the method of treatment employed in the case which I wish to present for your consideration this evening.

Dr. M., a surgeon from a neighbouring town consulted me in January last with regard to an epithelioma on his lip. It involved the middle third of the lower lip and was growing rapidly. He told me that for some months there had been a fissure in the median line which refused to heal, and that a few weeks previous to the time I saw him, he had accidentally put the lighted end of a cigar into his mouth. From that time the development was rapid. In consultation with Dr. H. P. Pratt, we decided to employ the combined chemical and x-ray treatment, a method which seems to promise better results than either method alone.

Various antiseptics were daily applied to the growth, and then the lip exposed to the x-ray for ten minutes, the dressing being allowed to remain for twenty-four hours. This treatment was continued daily for three weeks and then at intervals of several days for three weeks more.

Result, complete disappearance of the growth, and perfect healing, with scarcely perceptible scar.

By this combined method the parasite is destroyed by chemical action, while katabolism is stimulated by the x-ray.

The chemical treatment differs from the ordinary escharotic treatment in the employment of chemicals which are slowly absorbed, limiting the dosage to the quantity of diseased tissue, following this procedure by other applications which produce rapid necrosis. In the sloughing which follows lies the great advantage of this method of treatment.

Broken down cells and cells infected by the parasite escape by the shortest path and the lymphatics are relieved of the duty of disposing of infected material.

The x-ray assists katabolism, but unless there be an avenue of escape for the dead cells, we may expect disturbances of a toxic character.

Report of a Case of Vesical Calculi.

BY ORVILLE W. MAC KELLAR, M. D.

The patient was six years old, one brother, family history negative. Never was sick until two years ago. While playing he fell and was taken home, complaining of pain in the region of the bladder. A physician was summoned and means instituted to relieve pain. The patient from this time on has had series of excruciating, sharp shooting pains in the region of the kidney, ureter

and bladder, extending down along the course of the spermatic cord, sufficient to double him up and make him roar in agony, accompanied by nausea, rigors, restlessness and frequent attempts to pass urine. At times there was incontinency of urine. Numerous examinations have been made under anesthesia. Instrumentation of bladder with sounds has been resorted to. All this, and more, too, with negative results. A thoro course of medication has been tried to relieve the steady progressive pain, which necessitates the boy's parents watching him day and night. I first examined the boy March 15th; and made a probable diagnosis of urinary calculi, insisting, however, that the boy be submitted to an examination by the most reliable means known to the surgeon, namely, the x-ray. The examination was made two days later by Dr. Pratt, revealing two large stones situated in the bladder. The patient was taken to the hospital and prepared for operation. On March 20, I removed by a superpubic incision two stones, each about the size of a walnut. The bladder was not infected, but was large and extremely hypertrophied. The wound was closed by two rows of Lembert sutures, also superficial and deep sutures of the skin, no provision being made for draining. A catheter was placed in the bladder and permited to remain four days, after which the boy voided urine naturally. The patient made a complete recovery and is now attending school. The case is of more than ordinary interest, being a six year old patient with multiple stones. It also teaches the importance of resorting

Fig 1. VESICAL CALCULI IN SITU.
Taken in Dr. Pratt's X-Ray Laboratory.

to an early x-ray examination. In competent hands the value is positive. We know thru the investigations of Dr. Byron Robinson where to look for calculi, namely, in the calyces of the kidney and the ureteral spindles. He has been working with the x-ray and corrosion anatomy experimentally on animals, demonstrating that there is a zone in the kidney where it is safe to cut without producing hemorrhage. Upon looking up the literature he found that over 30 years ago Hyrtle demonstrated this fact. Therefore, Dr. Robinson very honorably named this region Hyrtle's exsanguinated renal zone. It lies one-half inch dorsal to the lateral longitudinal renal border. Calculi ordinarily vary in weight from a few grains to several ounces, the great majority being under one ounce. The smallest that ever came under Mr. Coulson's observation and was removed by him, weighed only five grains. The largest vesical calculus on record is said to have been in possession of the French lithotomist, Morand. It weighed six pounds three ounces. An enormous stone weighing 51 ounces was long preserved in the hospital of La Charte, Paris. It was extracted after death. In a great majority of cases the calculus is solitary, but two or more may be found. Sir A. Cooper extracted 242 at one time. An authentic case exists where a surgeon removed 1,000 calculi from Judge Marshall. As the chief constituent of healthy urine is urea, so does uric acid constitute the nucleus in the great majority of urinary calculi. Dr. Ultzmann, in examining 545 single vesical calculi, found that the nucleus was formed of uric acid 91 per cent. The occurrence of calculi in early life has been attributed to those infarctions of uric acid which are often found in the kidneys even of new-born children. The urine of children contains a large quantity of uric acid during the first week of life, crystals of which often form spontaneously when the fluid is at rest.

Fig. 2. VESICAL CALCULI.
Actual size is one-half larger than the cut.

The formation of a calculus may be either primary or secondary.

Primary stone formation takes place always in the kidneys, whereas the secondary stone formation is confined almost exclusively to the bladder. The primary stone formation originates with a few exceptions, from uric acid. The secondary stone formation from the earthy phosphates. Oxalate of lime is adapted for the formation of layers rather than nuclei.

Prof. J. J. Thomson on Radium.

Prof. J. J. Thomson, the discoverer of the corpuscle or electron, has entered the field with an explanation of the mystery of radium. In an article of the highest interest, in *Nature,* April 30th, he discusses and demolishes some of the explanations that have already been offered, and shows that the phenomena of radio-activity, as far as they are known, all point to the conclusion that the radiant energy is derived from changes taking place inside the atom itself.

Sir William Crookes (*Electrical Review,* p. 682) believes that the energy of radium is derived from the surrounding air. The radium is supposed to have the property of absorbing the energy of the high-speed molecules of the air, and thus raising its temperature above that of the surrounding air. Prof. J. J. Thomson fails to see that even the possession of this property would explain the behavior of radium; "for imagine," he says, "a portion of radium placed in a cavity in a block of ice; the ice around the radium gets melted; where does the energy for this come from? By the hypothesis, there is no change in the energy of the air-radium system in the cavity, for the energy gained by the radium is lost by the air, while heat cannot flow into the cavity from the outside, for the melted ice around the cavity is hotter than the ice surrounding it."

Another theory, favored by M. Curie, the discoverer of the energy of radium, is that radium has the property of absorbing some kind of Becquerel radiation constantly flowing in surrounding space. That some kind of highly penetrative radiation is being continually emitted from the earth's surface has been recently demonstrated by McClennan and Burton (*Elec. Rev.,* p. 746). Experience has shown that Becquerel radiation is most readily absorbed by substances of high atomic weight, and the high atomic weight (225) of radium is in favor of the view that radium would be a powerful absorbent of the radiation. But many other substances, such as gold, platinum, and lead have atomic weights nearly as high as radium, they are strong absorbers of Becquerel radiation, and yet none of them are strongly radio-active.

It appears, therefore, that all the theories hitherto put forward to show that radium derives its perennial supply of energy from external sources, are unsatisfactory. We are now driven to seek for the source of energy in changes taking place in the atom itself. Assuming that the atom of radium is made up of pairs of positive and negative corpuscles held together by electric attraction, J. J. Thomson has calculated that the expenditure of 1 per cent of this energy would be sufficient to supply the flow of energy measured by M. Curie.

It is necessary, however, to find a determining cause for the liberation of this sub-atomic energy, and herein consists the most ingenious part of J. J. Thomson's theory. It is the high-speed atoms which become unstable and radiate part of their internal energy into space. It is believed by physicists that the velocities of the molecules of solids and liquids, like those of gases, are continually changing, owing to collisions. The mean velocity remains the same at constant temperatures, but the velocities of single molecules are continually rising above and falling below the mean. Thomson assumes that the internal constitution of the atom may become unstable when it attains a velocity, say, 100 times the mean velocity. Under these circumstances the atom becomes partially disintegrated, and throws off the positive and negative electrons which are known

to be emitted by radium. The percentage of the total number of atoms which attain this high velocity, and become unstable, is always very small, but the number is sufficient to maintain the energy emitted by radium for 30,000 years if we assume that each atom loses only 1 per cent of its intrinsic energy.

The known phenomena of radio-activity fit in very well with this theory. Becquerel has shown that the radio-active element can be separated from uranium by precipitation, and Rutherford has shown that the active element of thorium, which he calls thorium X, can be precipitated by ammonia. Now uranium X, and thorium X, gradually lose their radio-activity, and the uranium and thorium which have lost their radio-activity by precipitation, gradually recover it again. What happens, according to Thomson's theory, is obvious. The precipitate carries down all the atoms whose speed is so high that they are in the unstable condition. In course of time these atoms radiate off the energy derived from their internal changes and lose their radio-activity. The original substances, in the meantime, are acquiring, by the inter-action of their atoms, a fresh supply of high-speed atoms in an unstable condition, and thus recover their original radio-activity. The steady state of radio-activity is reached when the emission of energy is equal to that capable of being supplied by the number of atoms which attain the critical velocity.

The demons of Clerk-Maxwell were imagined to show how the temperature of a gas might be raised by merely opening the doors for the high-speed molecules. If the theory of Prof. J. J. Thomson is correct, we have the high velocities themselves acting automatically to pull the trigger and liberate amounts of energy sufficient to permanently raise the temperature of surrounding bodies.—*London Electrical Review,* May 8, 1903.

Radio=Praxis.

Piffard (*Medical Record,* March 7th, 1903) began to treat lupus with sun's rays 25 years ago. He concentrated the rays on the ulcer and burned it out. The ultra-violet rays do not penetrate glass and were lost in these experiments. Draper found that even the violet rays possess caloric properties. Finsen was able by using ammonio-sulphate of copper solution as a ray filter to absorb most of the heat. This treatment was effective in malignant disease by long sittings daily at great cost. He then substituted the electric arc for sunlight, and quartz for glass in employing the ultra-violet light. Improvements have been made as to time and expense by the Lortet-Genoud and Bang lamps. He recommends a low tension arc lamp, French model, as the most practical. It has two arcs connected in series and so arranged that the light from both is projected to the same point. Being connected in series we obtain nearly double the effect, with a given electric current. The electric arc has a much larger proportion of ultra-violet radiations than sunlight. The condenser spark utilized in the Görl lamp gives still more of these rays. The Roentgen ray was found to be of more or less value in malignancy. Various experiments proved that the ultra-violet rays and the x-rays are clinically different. The Finsen light is suitable for superficial, and the x-ray for deeper lesions. In the Görl lamp an extremely high tension high frequency current obtained from an x-ray coil in connection with a condenser and metallic terminals is

employed. The parts treated must be anemic, and a compressor of quartz, rock-salt, or ice is used. With the Finsen light inflammatory reaction leaves no ill effect, whereas the x-ray may cause serious ulcerations. The Görl lamp, manufactured by the Waite & Bartlett Mfg. Co., he considers as the best. It has four spark gaps. Two or more of these lamps may be connected in series and their efficiency increased with the same amount of current. In using the apparatus firm pressure is made on the part by the patient, and the time need not exceed ten or fifteen minutes, repeated daily. If inflammation is caused, discontinue for a few days. By injecting suprarenal extract the part promptly blanches and permits the rays to act. It is best used by kataphoresis by covering the kataphoric electrode with lintin saturated with adrenalin chlorid, connected with positive pole of the battery, using a current of 3 to 4 ma. for five minutes. When using the high-tension arc the quartz compressure should be applied to protect the part from bulging up too near the spark gap. He uses the static machine as the source of high-tension electricity, and as a condenser Leyden jars having 100 square inches of internal and the same of external foil surface in connection with each pole of the machine. The lamp is then connected by its conducting cords to the other surface of the jar. The poles of the machine, in action, are separated one inch and the terminals of the lamp one-eighth inch. The high-tension arc may be actuated by coil or static machine and two or a dozen lamps may be connected in series and an equal number of patients treated simultaneously. By using a step-up transformer in connection with the static machine, the static induced current passed thru the coil of coarse wire induces a current of high potential in the secondary coil. An electrode connected with this latter coil and brought within one or two centimeters of the skin will cause a spark to pass between the electrode and the skin—the hyperstatic spark. The application of this spark caused an inflammation, and has proved curative of infiltrated eczema and other skin lesions. This spark is also proved to be like ultra-violet light in causing a piece of Willemite to fluoresce in a darkened room.

The Finsen light is invisible and constitutes the ultra-violet rays of the spectrum. The luminous rays, red to yellow, have been found to exert a calming effect in conditions of mental excitements; in exanthematous disease, especially small-pox, reducing the fever and lessening the suppuration. These rays are produced by passing sunlight or strong artificial light thru ruby glass. The blue to violet rays act as a general tonic and act specifically in tuberculosis. Case reported by Ciascia: "Child, nine years old, sick two months with fever, anorexia, vomiting, wandering pains in abdomen, intestinal disturbances, and for last forty days notable distention of abdomen. Lymphatics engorged in surgical axillary and inguinal regions with nodosities among the abdominal lymphatics. Diagnosis, tubercular peritonitis. Treatment, daily exposures to condensed blue-violet rays from the sun. After three months the child was entirely free from the former evidences of ill health."

American Medical Association.

At the New Orleans meeting of the American Medical Association Dr. DeForest Willard, of Philadelphia, opened the proceedings Thursday morning, May 7, with a paper on "Sunshine and Fresh Air vs. Roentgen and Finsen Rays in the treatment of Tuberculosis of Bones and Joints." His conclusions were that sunlight and fresh air, with fixation of the part, was the best treatment for tuberculosis of hard tissues; that treatment by tent life was successful both in winter and in summer; that there should be established sanatoria for the treatment of tuberculosis of hard tissues; that concentration of the sun's rays was beneficial in the treatment; that x-rays inhibit the growth of the germ in the laboratory, but that this is not definitely proved about the germ in the tissues; that both actinic and x-rays were to be used as adjuncts to other methods, not as superseding them. Dr. J. C. Stewart, of Minneapolis, followed with a paper entitled "Epithelioma Under the X-Rays. A Preliminary Report of the Histological Changes." This was an exhaustive report of the changes following upon the treatment of epithelioma with the x-rays. The changes shown were fatty degeneration, vascularization in the center of the pearls, the formation of elastic tissue in the vicinity of the vessels, hyaline degeneration in the pearls, and necrotic changes in the cells. Dr. Christian, of Boston, was not prepared to say what is the exact cause of the improvement, but does not think the fatty degeneration important. Dr. Nicholls, of Boston, said the x-rays were evidently beneficial, but all cures are to be regarded with suspicion. He thinks the action of the rays is a penetrating mild irritant, sufficient to cause necrosis of low grade cancer tissue. He calls attention to the fact that the x-rays can also produce cancer, giving a case illustrating this. He never saw a true Plimmer body in epithelioma. He believes in operative treatment first, followed by x-ray treatment. Dr. Ridlon, of Chicago, does not think sunlight alone curative in joint tuberculosis. The effect of outdoor treatment is rather a general improvement of the patient's health. He is not encouraged by his experience in the use of x-rays for bone tuberculosis. Dr. Lund, of Boston, agrees with Nicholls as to the caustic action of the x-rays in cancer. He thinks them specially indicated in epithelioma of the face. Dr. Willard, in reply, dwelt on the point that the light treatment was merely to be used as an adjunct to the other methods, in cancer and tuberculosis. Dr. Stewart dwelt upon vascularization as one positive fact in the curative effects of the rays.—*Phila. Med. Journ.*, May 16, 1903.

Opinions of Surgeons on the Therapeutic Value of the X-Ray.

Expressed at the Twenty fourth Annual Meeting of the American Surgical Association held at Washington, D. C., May 12–14, 1903.

Therapeutic Value of the X-Ray in Sarcoma.—Dr. William B. Coley, of New York, presented a series of thirty-six cases, two-thirds of the number consisting of the round-cell variety. Of this total number it could be claimed in but four that the growth had disappeared, and unfortunately in these there was recurrence. In all, however, there is no doubt that a certain relief of symptoms

can be obtained, although by the use of the x-ray alone sarcomata are not profoundly influenced.

Use of the Combined Mixed Toxins and X-Rays.—He said that the best results are to be obtained by this combination, there being no doubt that occasional cases which our knowledge does not yet permit us to choose from the unfavorable class, are profoundly influenced, and if not absolutely cured, much retarded in their development by the exhibition of this treatment.

Dangers of the Treatment —So far as this is concerned, it sums itself up into a judicious use of the agents, so that too much of the neoplasm may not be liquefied at once. Unless this precaution is taken, it is quite possible to make the patient extremely sick from septic absorption, and it is not outside the realm of the possible that metastatic growths may occasionally be caused by the absorption into the circulation of masses of still living malignant cells. Under no conditions does he consider it advisable to use the combination except in inoperable cases, or possibly very rarely in place of certain amputations. That the x-ray surely inhibits sarcomatous growth, particularly when used with the toxin, is not to be doubted. The cases upon which it acts favorably, so far as ultimate outlook goes, are, however, rare. But in these, it should be expressly noted that the treatment, particularly the rays, should certainly be continued for months and probably for years.

The Therapeutic Value of the X-Ray.—Dr. Arthur Dean Bevan, of Chicago, said that he had nothing strikingly new to present. Superficial epitheliomata melt away and disappear after twenty exposures from a soft tube at 100 volts and two amperes. In the lip, however, the outlook is not so favorable, since the mucous membrane of this part is peculiarly liable to the so-called burn. In the breast, which may be taken of a typical example of a moderately deep neoplasm, the rays will often produce an apparent cure, but the patient usually dies of metastasis. The effect of the rays is in general determined first by the situation of the lesion, the vitality of the cells having a very direct bearing. Second, the rapidity of their growth. Third, the size of the neoplasm determines the effect of the ray, inasmuch as their value varies inversely as the size.

Indications for Use of Rays.—If we assume, as we probably may, that the ray rarely if ever stimulates the growth of malignant neoplasms, its chief use seems at present to lie in superficial and slow-growing areas, particularly about the face. All others should be extirpated and followed as a prophylactic measure by at least twenty exposures from a soft tube. Naturally the most important problem is whether there be a possibility of extending the power of the x-ray which works so admirably on the superficial growth, to great depths. This might be accomplished along two possible lines, viz., the physicist might be able to augment their power of destroying low tension cells without increasing their danger to the normal tissue, or it might be possible to reduce the vitality of the cells of the deep neoplasms and get destructive effects with the ray as we at present know it. He has conducted a number of experiments along these lines, and with his associates has given to their experiments the name—"Radiochemic therapy." So far their chief work has been in the direction of attempting to liberate nascent iodin in the neoplasm by first giving the patient immense doses of potassium iodid, and then turning the rays upon the part.

The Value of the X-Ray in Superficial Epitheliomata and Tuberculosis. — Dr. W. L. Rodman, of Philadelphia and Dr. G. E. Pfahler, of the same city, presented this paper. Dr. Rodman said that most of the work had been done by his colleague, who in a series of 234 cases of epitheliomata had found that 63 per cent were reported cured and 36 per cent improved. The average number of treatments for these cases being twenty-five, and the time consumed about eight weeks. Rodent ulcer presented a somewhat lower percentage of cure, the condition demanding a longer period of treatment. Of seventy-five cases of lupus vulgaris sixty-five were reported cured in eight weeks after forty treatments. Lupus erythematosus was shown to be just as obstinate as the aforenamed variety. The final results in each, however, compared most favorably with all other methods of treatment. Tuberculous glands in ten cases had all shown favorable results, while in Hodgkin's disease, the results, even in glands very deeply situated, had been profound.

Action of the Rays. — This is not yet understood, but a certain degree of necrosis of the cells is early established, while at the same time a quantity of elastic tissue begins to develop. Some patients seem to have a marked idiosyncrasy to dermatitis and to loss of hair. One patient in their series having been burnt by a single exposure to a ray which had been turned twice a week for two years upon another case without even producing redness of the skin. Curiously enough the conjunctival tissue is not nearly so sensitive as the mucous membrane of the lip.

Some Experience of the Treatment of Inoperable Malignant Disease by Means of the X-Ray. — A. B. Johnson, of New York, presented the histories of ten cases, nine of carcinoma and one of sarcoma. Of this total eight had died. One, he believed to be markedly improved, and one he felt reasonably sure was cured. He did not speak with great hope as to the future usefulness of this therapeutic measure.

Dr. F. H. Williams, of Boston, said that the rays are probably of very little use after disease has involved a gland; that they are of value probably only in the absolutely superficial growths. He called attention to his fleurometer, by means of which an accurate measure could be made of the amount of rays which were passing from the machine. This ought to be used before employing the rays, so that burns might be avoided.

Dr. W. J. Hearn, of philadelphia, would operate in every case no matter where it might be situated if it had the least semblance to malignancy, the two solitary exceptions being keloid and rodent ulcer.

Dr. Bevan, in closing, said that there was no excuse for using the rays on anything except absolutely superficial growths, as a postoperative prophylaxis and as an experimental study in non-operable cases.

Dr. Rodman said that undoubtedly the best treatment for epitheliomata and tuberculosis about the face and also occasionally for tuberculous glands was the x-ray. In deeper tissues, however, their action was as yet problematical.

Dr. Johnson said that all operable tumors should be removed, save on the face, when superficial. We do not as yet know the value or the limitation of the x-ray, and particular attention should be paid to an effort not to allow the general public to become possessed of the idea that the rays would cure cancer.—*Medical News.*

Results of X-Ray Treatment.

N. Y. Academy of Science, Jan. 12, 1903.

Dr. P. R. Turnure read this paper, which was based on observations extending over a period of two years at the New York and Roosevelt hospitals. The total number of cases treated at the Roosevelt Hospital during the last twelve months was ninety-four, but he had been able to follow and keep satisfactory records of eighty-two. He had made use of three different coils, each one more powerful than the preceding. At present he was using a twenty-inch coil, and preferred this one, because the results seemed to be more quickly obtained with it. He had been unable to formulate any general rule about x-ray tubes further than that the resistance should be low, and the tube should be able to carry a large quantity of current without changing its vacuum. An exposure of five or ten minutes was given, and the method preferred was to give the exposures every day for the first week, then every other day for the second week, and then after an interval of two weeks resume the treatment as before. He had had five cases of epithelioma of the nose, all of which had done well. One now under treatment, after eight exposures, showed marked improvement. There were three cases of epithelioma of the lip. One of these had done badly after a vigorous x-ray treatment for fourteen days. The treatment caused deep sloughing. He had had two cases of epithelioma of the penis, one of which only had done well. The general results in all of the epitheliomas were good, and he thought the x-ray treatment was indicated in these before operation. The results were quite different in carcinoma. He had had five cases of carcinoma of the neck, and ten cases of carcinoma of the breast, three of the latter being primary. Two of these were absolutely inoperable. Of the seven recurrent carcinomata of the breast only one was successful to any extent. All of them, after a short period of improvement, seemed to follow the natural course of the disease. This temporary improvement could be noticed in all cases, and he attributed it solely to the psychic effect of the new treatment. Sometimes this lasted as long as six weeks, and then the disease progressed as before. In one case, to which great attention had been given, the disease spread quite rapidly, the progress of the disease actually seeming to be stimulated by the x-ray. In two cases of sarcoma, one of the limb and the other of the neck, the pain was relieved for a few weeks. He had only treated three cases of tuberculous glands of the neck, and all of these were in children. All of them improved greatly after four weeks of treatment, but all of this improvement he attributed to the good care the children received while in the hospital. Two cases of tuberculosis of the larynx were treated, one for four and the other for six weeks, without any improvement. Two cases of lupus were treated, one for eight and the other for twelve weeks. They appeared to have been cured. Three cases of erythematous lupus were treated. Two did extremely well, tho both of them required over four months' treatment. The third, after seven months of treatment, was only slightly improved. Five cases of chronic eczema of the leg were treated by the x-ray, and all were cured apparently as a result of the irritation produced; nevertheless, the treatment was much slower than other well-known methods. It was worthy of note, however, in this connection, that the itching ceased very promptly after the x-ray treatment. Dr. Turnure said he had treated one woman with the x-ray for the

purpose of removing hair from her face. The treatment had been carried out very cautiously, and after four months the hair had been entirely removed from the area treated without any burning. If this result proved to be permanent, he would treat the rest of her face, because the woman had tried the electrolytic method and had found it very painful.

Conclusions.—The results that he had observed in x-ray treatment were certainly confusing, but the first thot that occurred to him on studying these records was that x-ray treatment, to be successful, must be used upon superficial disease processes. If the x-ray exerted its influence very deeply, it was almost certain that some of these effects would be observed in x-ray workers, which, so far as he knew, was not the case. Glands, which were often secondary to epithelioma, were not really epitheliomatous deposits, but were the results of secondary infection. The speaker said he was extremely sorry to have to report such poor results, for, a year or more ago, he had been very enthusiastic over x-ray treatment. Undoubtedly, many cures were effected in superficial growths. Most of these cures appeared to be permanent, but he had had one recurrence take place eight months after what appeared to be a perfect cure.

Dr. H. Lilienthal said that he had watched some of the cases treated by the x-ray at the hospital. He had, apparently, seen epitheliomata cured, but he had never seen a deep growth cured by the x-ray alone. At present, he had under his care a small round-cell sarcoma of the scapula, which had been proved to be of the malignant type. Thru a generous incision, a piece had been removed for examination. Ordinarily one would not expect this incision to heal, but under the use of Coley's fluid and of the x-ray there had been a gradual flattening of the tumor, the wound had healed promptly, and the skin had become markedly pigmented. Of course, Coley's fluid was used here, and while there was only one reaction from this, and that might have been accidental infection, she was now taking enormous doses of this fluid without any reaction. This patient had been exposed to the x-ray for fifteen minutes on alternate days. The case had been doing so well that he had not felt called upon to operate. Dr. Coley was of the opinion that his fluid only benefited when it caused a reaction; if this were true, then it might be very properly argued that in this case the good result was due to the x-ray and not to Coley's fluid. While the results reported in the paper were disappointing, it was quite possible that we had been altogether too optimistic regarding this agent; for, as a matter of fact, we knew very little about it. The x-ray treatment at the present time should be reserved for inoperable cases.

Dr. Robert T. Morris agreed with the last speaker that, in this experimental stage, only inoperable cases should be subjected to the x-ray. He had had one case of lupus of the forehead, which was practically well, and a case of epithelioma of the lip in which the cervical glands had been so much involved that he thot operation was not indicated. The latter case was now apparently well. In a case diagnosticated as inoperable sarcoma of the parotid, the x-ray treatment had, apparently, produced a complete cure. In another case of very extensive recurrence in the glands of the neck, after amputation of the breast, some improvement had been effected, but the patient had not followed the treatment very closely. He was disposed to feel, as did the reader of the paper, that the x-ray was not of great value where the malignant disease was deeply situated. He had one case of epithelioma of the trigone of the bladder that was being treated by the x-ray by way of the rectum and a suprapubic incision. At last accounts the case was decidedly

better. A very interesting point was, that neoplastic deposits in the glands seemed to disappear under the influence of the x-ray.

Dr. Carl Beck said he was convinced that if sufficient treatment were given to any epithelioma it could be cured, but he also believed this was not so good a method as thru extirpation of the epithelioma by the knife. The x-ray should be reserved more especially for special cases, as, for example, epithelioma of the eyelid, where a particularly good cosmetic result was desired. He had seen a number of cases in which the disease had recurred just as rapidly after x-ray treatment as after operation. Last spring he had presented to a medical society an old man in whom an epithelioma of the upper eyelid had been completely cured by twenty exposures to the x-ray, yet very shortly afterward the disease appeared in the upper lip, showing how widely disseminated were the cancer cells. The use of protective shields was a mistake because our object should be not only to have the x-ray tube as near as possible, but to secure a wide effect. He had noticed that those who used the x-ray very carefully, in the hope of avoiding burns, were the ones who obtained only indifferent results. It was often well to run considerable risk of burning the patient. He had met with cases in which improvement had only been effected after the use of very strong doses of the x-ray. He would not advise the treatment of carcinoma of the stomach and of the bladder by the x-ray, on the principle that it was unwise to leave for the x-ray what could be done by the scalpel. He believed that there was not a case of lupus that would not yield to the x-ray.

Dr. Thomas H. Manley complimented the author of the paper on his practical and candid treatment of this subject. He thot the paper and the discussion showed clearly that the sphere of x-ray treatment should be limited to the treatment of lupoid growths. What had been said about the disappearance of glands bore out his own experience, that when the local source of irritation or infection was destroyed the glands would take care of themselves.

Dr. Turnure closed the discussion. He said he wished to make clear the fact that one of the cases, indeed the one that had apparently given the best result, had already recurred. He was not in a position to say at present how many recurrences there would be. The scar on the face from x-ray treatment had been found much less disagreeable than the scar usually left after a cutting operation. His experience had been that the recurrence from operation was greater than from the x-ray. This was his present opinion, although it was quite possible that he might have reason to change that opinion in the near future. The result in the removal of hair from the face was certainly far better than from electrolysis.—*Medical Record,* Feb. 17, 1903.

Electrolysis of Silver Nitrate.— It is generally said that silver nitrate becomes acid during electrolysis, yet Rodger and Watson found that the acidity of the bath diminished. This apparent contradiction has been explained recently by Leduc as being due to a difference of the conditions. With platinum electrodes in a sufficiently concentrated solution, a brown solid, containing a higher oxide of silver, is formed with simultaneous formation of nitric acid, when the bath has a certain concentration; when a sufficient concentration is reached, this reacts on the compound forming oxygen. He finds that corrosion or solution of the kathode deposit does not take place.—Lond. *Elec. Eng.,* November 7.—*Electrical World and Engineer,* Dec. 29, 1902.

Editorial.

Dr. Robert Newman, the president of the faculty of the New York School of Physical Therapeutics, and associate editor of the *Journal of Advanced Therapeutics*, was born and educated in Germany. In early manhood he came to New York, where he pursued his medical studies at various schools, graduating at the Long Island College Hospital in 1863, and later at Bellevue. Dr. Newman soon became prominent, both as a surgeon and as an earnest and progressive man. Many medical societies elected him to membership, and he has held many positions of responsibility and honor.

In electro-therapeutics Dr. Newman is prominent as the inventor of the electrolytic method of treating strictures, a method which the medical world is slowly coming to recognize as the most perfect yet known; but which makes its way slowly, since it requires in the operator some knowledge of the principles of electrotherapy. In 1886 he devised the galvanocautery sound for the treatment of hypertrophied prostate.

A number of Dr. Newman's published papers have been translated into other languages.

Personally Dr. Newman is the soul of integrity and honor, a gentleman in the best sense of the term, genial and loved by all who know him.

Results of X-Ray Treatment.

About a year ago medical journals were filled with reports of the successful treatment of malignant growths by x-rays. Today, while the reports of successful treatment are not less numerous, a very considerable number of failures are reported. This is only what was to be expected. When a new therapeutic process is brot into use only those who have had some measure of success are likely to publish the results of their labors. They are afraid of criticism. Later, when it is generally recognized that some failures are to be expected, these operators gain courage to report their failures and partial successes as well as their completely successful results. The brilliant reports of some of the earlier x-ray operators were possibly overdrawn. Most men who obtain even a moderate measure of success along entirely new lines are by nature enthusiastic and optimistic.

It is also true that the successes of the earlier x-ray treatments has encouraged experiments on the part of a larger number of physicians and surgeons, many of whom are quite unfamiliar with electricity in general and with the x-ray in particular. Treatments have been carried on by these men in ways which experts would unhesitatingly condemn as useless or dangerous. The idea that such a powerful therapeutic agent as the x-rays have proved themselves to be can be handled with impunity and with any marked degree of success by men who are ignorant of its properties, cannot be too strongly condemned. A cursory glance at the reports of x-ray treatments which are made at our medical associations emphasizes this view. One operator "always uses a low tube"; another prefers a "high tube in all cases"; while a third does not seem to consider the degree of vacuum of the tube as of any importance whatever, and contents himself with the statement that he used "two amperes and 100 volts."

It is still unfortunately true that there is no convenient and accurate way of measuring the quality and intensity of x-rays, so that very much depends upon the skill and experience of the individual worker. But so far as we have been able to examine the reports most of the failures in the treatment of malignant tumors, at or near the surface of the body, have come from two causes: first, ignorance of the

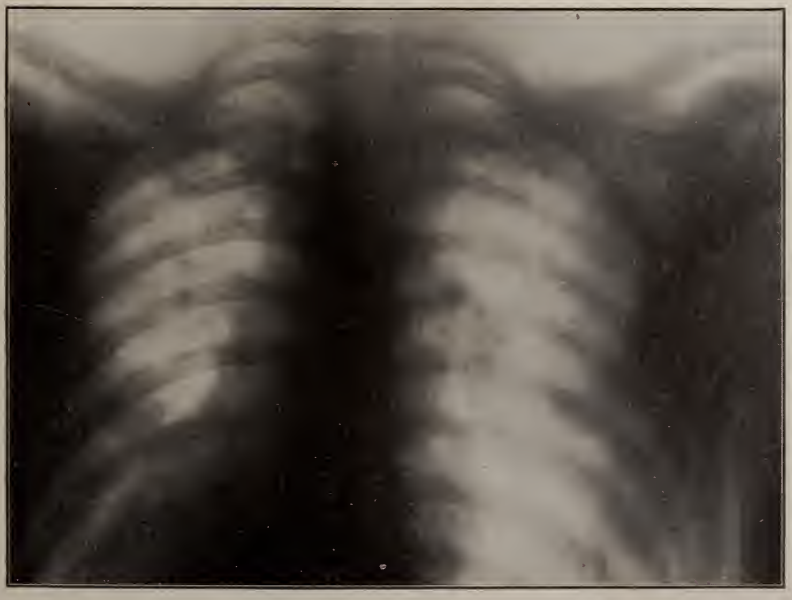
proper method of treatment; secondly, delay in beginning the treatment until systemic infection has taken place. The proportion of successes obtained in treatment by x-ray experts is greater now than it was one or two years ago; and while there are undoubtedly many conditions of malignant tumors in which the x-ray alone will not effect a cure, the value of the x-ray as a therapeutic agent is becoming more and more evident.

Radiations

We know that ordinary light consists of electric waves. We know that there is an unlimited number of electric waves which are invisible to our eyes, but which can be detected by photographic or fluoroscopic methods. The recent determinations of the velocity of x-rays, which radiate with the speed of light, and the probable discovery of their refrangibility, has definitely settled the view that x-rays are electrical waves, of the same sort as ordinary light, but very much shorter.

The rays emanating from a Crookes tube are various. The terminals and the outer portion of the tube are subjected to rapidly alternating electrical stress and give rise to electrical waves of various sorts. Within the tube the kathode stream consists essentially of minute gaseous particles, pieces of atoms probably, called elektrons. Along with these particles there are undoubtedly waves of various sorts, some of which may have the power of penetrating the wall of the glass tube. At the anti-kathode and still more at the walls of the tube the energy of the kathode stream is transformed into other types of radiation, of which a small amount appears as ordinary light and a considerable amount as x-rays. Whether any other (unknown) radiations are present in any considerable amount among the x-rays, we cannot, of course, say, but such a thing is not improbable.

On account of their similarity to x-rays the radiations from uranium, radium, etc., have been supposed to be waves. Thomson, however, considers them far more likely to consist of elektrons, and thus resemble the kathode stream more than they do the x-rays. It is probable that these radiations are complex, consisting partly of elektrons and partly of electric waves.



Mrs. B. X-Ray Picture of Chest of the First Patient Treated for Pulmonary Tuberculosis in Dr Pratt's X-Ray Laboratory, in April, 1896. Picture taken seven years after treatment. See page 117.

Correspondence.

Dear Doctor:

In your JOURNAL, which has just come to hand, I notice an inquiry as to whether it is necessary to insulate the shaft of a static machine, and that your reply states that it is necessary to insulate it.

I wish to call your attention to the fact that the Wimshurst machines which are made have the circles mounted directly on the brass hubs, also that some of the Toepler machines are made in the same way, and that a Holtz machine can also be made without any insulation whatever on the shaft.

If you will consider the matter carefully, you will see that insulation on the shaft is not a necessity, and has nothing whatever to do with the working of the machine, as there is no material that is a better insulater than the glass plate itself. Hard rubber is used on the shafts of static machines simply to make a comparatively soft surface for the circles to rest on, so that in case the circles get loose so that the shaft revolves without carrying the circles with it, the plate will not be crumbled and cracked as they would if the plates rested directly on the steel shaft itself.

I also notice a letter from a doctor explaining the trouble he has had with the jam nut used to keep the circles tight, and wish to call your attention to the enclosed card which shows our method of keeping the circles tight automatically, so that it is never necessary to have to tighten up the jam nut.

Yours very truly, H. F. WAITE.

[The cut will appear in our next issue.—ED.]

Dear Doctor:

I send $1.00 for three months' trial order for your paper. I have been looking for something about the removal of hair from face of females with the x-ray. I am comparatively a beginner. I have a fine static machine, am up with the technic for static work and x-ray examination, but I am pressed for the treatment of cancer and skin diseases, and the removal of hair. Can't you tell me in a few words what to expect—am treating this case by throwing the light on the chin and upper lip and the sides of the face for 10 to 15 minutes every other day. I am treating a case of sarcoma of the bony tissue of the nose almost the same way. A specialist removed from the nostril some of the growth and it was called osteo-sarcoma. I can't throw the light up the nostril sufficient so I let it fall over the nose. The skin is not involved. Is that correct?

I will appreciate a few lines on the technic and I hope you will freely incorporate technic fully in the various issues of the JOURNAL from time to time. That is what we need away from the cities, especially when in general practice. Yours truly, M. M. S.

[To remove hair use a low tube and expose only the parts to be treated for ten minutes each day till the hairs are loosened. Let the tube be six to ten inches from the face, and take care to have the edges of the face-screen in a slightly altered position from day to day. If strong indications of dermatitis appear early, stop treatment till it is under control. When the hairs are loosened decrease the time of exposure one minute each day, or remove the tube one inch further from the face each day for eight or ten days.

If the hairs return the treatment must be repeated. If only a few return they may be removed by the electrolytic needle. Some experience is required to succeed with only one series of exposures, but care must be taken not to make the first doses too strong or the skin may be permanently injured.

Treat the osteo-sarcoma from all sides, internally and externally.—Editor.]

Dear Doctor:

I took your course on electricity when I purchased the 24-plate Betz machine, and have been doing quite a good deal of work in that line since.

I see in an article on Albuminuria written by Dr. Neiswanger, that he cures some in 20 or 30 static treatments. He gives "Negative head breeze 15 minutes, then the positive insulated treatment for 15 minutes."

Will you kindly explain fully how to give the "positive insulated treatment" and oblige?

Yours fraternally, W. P.

[The negative head breeze is given by seating the patient on the insulating platform with his feet on a metal plate which is connected with the positive pole of the static machine, and suspending over his head the crown which is connected with the negative pole. The negative pole may be grounded or not, as you please.

When the negative pole is grounded remove the crown altogether and you have "positive insulation." It differs from the negative head breeze in being a milder current and in being distributed over the upper part of the body instead of all passing thru the head.—Editor.]

Dear Doctor:

A woman, 28 years old, married seven years, parents healthy, has two children, the youngest six months old nursing mother's milk. About ten months ago she observed some soreness within two-thirds of an inch of the left nipple, which continued three months, when a small, nodulated, hard tumor appeared, which has been slowly enlarging. On first examination (yesterday) I found at a few very small points and a thin milky exudate from the growth. For the last five months she has been having lancinating pains in the left breast. The diseased breast furnishes most of the milk for the babe. This growth is about as large as a hickory nut. There is no swelling in axillary or other glands. She is anæmic, appetite poor.

She has been wearing a tight corset. I sent her to an instrument maker, ordered careful measurement of the breast and a thin hard rubber disk to be made so as to lift pressure from the breast, and prescribed Gardener's Syrup of Hydriodic Acid; bowels to be regulated.

Would you advise removal of diseased portion of breast at once and begin using x-ray subsequently? If so, how soon after extirpation? Would you advise taking a few stitches or leave the wound open? I do not own Minin's ultra violet ray apparatus. Would you have confidence in using fresh made point maple electrode in place of x-ray? In short, please advise me in detail how best to treat this case.

I have treated the family for over forty years and am anxious to give her the best chance of life.

Thanking you in advance for your trouble, I remain, Fraternally yours,

S. J.

[First use x-rays or the hyperstatic current. If the tumor reduces steadily keep on with the treatment. If not, after three weeks or more excise as you would a non-malignant growth, and after a few days renew x-ray treatment mildly, thru the dressing. Continue treatment triweekly, then weekly, for three months.

The anode breeze from a maple electrode is good but is not so reliable as the x-ray.—Editor.]

Conduction of Electricity in Flames.—Lenard (*Ann. d. Phys.,* November 11) gives a description of a phenomenon which he calls "visible wanderings of ions in flames." A Bunsen flame is placed in a horizontal electric field. If now a bead of some salt is brought into the flame, as for spectrum analysis, it is seen that the comet-shaped strip of luminous vapor runs slantingly towards the negative electrode. The "wandering" only sets in when the bead is brought into the interior of the flame. In the outer mantle the vapor ascends vertically. — *Electrical World and Engineer,* Dec. 13, 1902.

THE AMERICAN X-RAY JOURNAL

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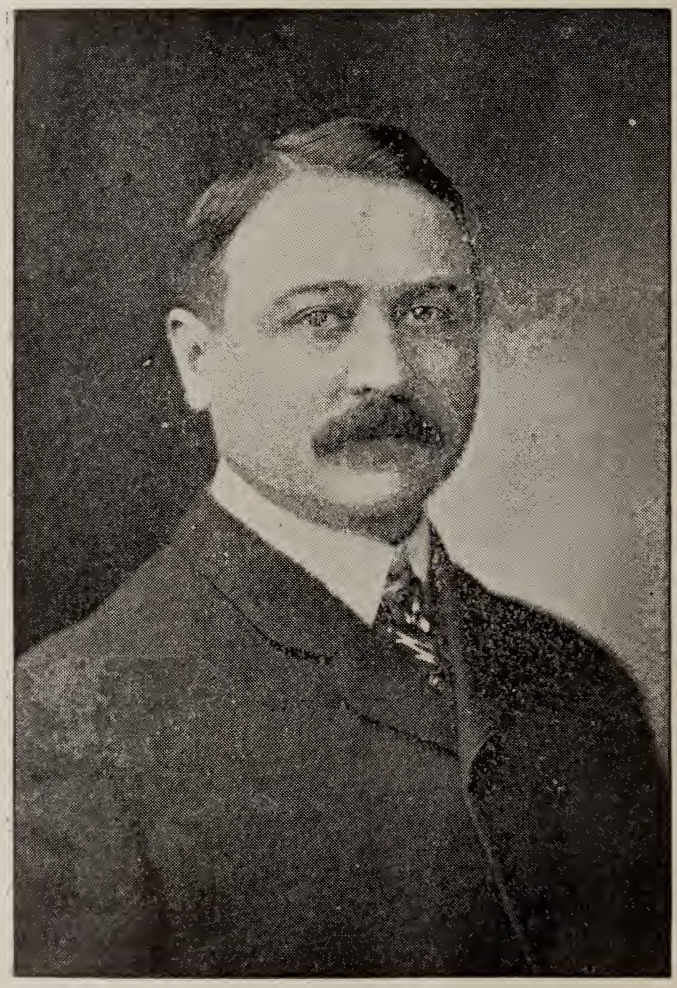

THE HON JOHN F. SMULSKI,

Attorney for the City of Chicago. The first legal department to establish an Expert Department of X-Ray and Electro-Therapeutical Di gnosis.

THE AMERICAN
X-RAY JOURNAL.
Devoted to Practical X-Ray Work and Allied Arts and Sciences.

VOL. XII. CHICAGO, JUNE, 1903. No. 6

Pain.

BY J. RUDIS-JICINSKY, A. M., M. D., E.
CEDAR RAPIDS, IA.

In the consideration of the symptoms of any disease pain will be accorded the chief place, but in cases of malignant growths the intolerable and excruciating pain radiating from the lesion proper in all directions is the first thing the physician tries to control, and if he has a method which relieves without opiates and injurious drug anodynes, the advantages of such a method are apparent. We know that for the relief of pain occurring without evident cause, or which is not affected by the treatment or removal of the cause, or when the condition is incurable, the resources of medical electricity are many and various. We have galvanic, faradic, sinusoidal, high frequency and high voltage currents, static electricity, etc., which if used intelligently will in most cases relieve the pain. With the discovery of the x-rays by Prof. Roentgen in 1895 and their immediate application to the cure of disease, it was found, especially in lupus and all malignant growths, that the pain in some very obstinate cases, after a few applications of the unknown rays, was controlled or disappeared altogether, and in the excruciating pains of tubercular joints, carcinomas, and sarcomas the results are marvelous. The application of the rays is practically painless, an advantage of no small consideration. The same is true of another method, the treatment by the ultra-violet rays of light, Finsen's treatment—a method which approaches very closely the x-ray method. In Finsen's light we have highly actinic rays which are similar to those of the x-ray order produced in a Crookes tube. To produce the x-ray we have to charge the terminals of the tube with an electrical current of high tension. The violet cathode rays produced give rise to the unknown rays of green color from the anode, the rays which act upon the living tissue, producing electrolysis, stimulate the normal, and over-stimulate, irritate, injure, or destroy the abnormal, the brunt of the attack being felt first in the periphery of the nerves. This seems to explain why the pain which is most intense in some cases of malignancy is checked from the start. The results in this direction, with many apparent cures, justify the hope that in the proper use of the Roentgen rays we have a pain reliever of the greatest importance in the most intractable diseases, with all the limitations of electro-chemical action within pathological tissues. General and local sedation follows often after a few sittings of the patient, and it makes no difference whether the pain is due to acute or chronic inflammation, stretching or neuralgia, or whether it is a subjective or cutaneous pain, or any other pain of malignancy, etc. But on the other side we may have cases where

not the x-ray itself seemed to be able to control the pain, and still others where the pain is not checked at all.

It seems to us that we must have abundance of the kathode rays, which are changed into the unknown rays, to get the anodyne effects. The x-rays alone or the kathode rays alone would not do. The kathode rays may be deflected from their straight course by a magnet, or pass through substances opaque to the light and cast "shadows" of objects less opaque. They act upon the emulsion of a photographic plate, they go in straight lines independent of the position of the anode, exhibit themselves in a beautiful violet color in very high vacua, produce fluorescence of the tube, or of certain substances contained within the tube, and may be focused. The Roentgen rays, on the other hand, are highly penetrative, cannot be reflected, refracted, or polarized. The kathode rays will not influence the deeper tissues, and the deeper nerves and nerve centers (just like the ultra-violet rays) unless these are deprived of their usual blood content; but the x-rays will readily traverse the superficial tissues and influence the nutrition of the deeper one, bringing on reorganization, restitution and different changes of electro-chemical character, like its effects on many photographic plates exposed in layers at once in skiagraphy. As far as we know we cannot produce the x-rays at their best without the kathode pencil stream. The kathode rays act more superficially. We must have, therefore, the kathode rays with all the other rays, along with those of the x-ray order produced in the vacuum tube between the terminals heavily charged with electrical current, if we wish to act upon the tissues and the supplying nerves. The high frequency and high voltage currents, static electricity, and other forms of electricity may give the same results in the relief of pain.

There is no question but that some superficial cases may be treated with the ultra-violet rays, the pain being soon relieved; or with the kathode rays alone, perhaps, with high frequency and high voltage currents, static electricity, galvanism, faradism, etc., but in malignant cases the x-ray seems to give as yet the best results. No exact directions can be given in advance to cover all cases, but the conditions of each individual case will suggest the necessary technique most likely to relieve, and if we fail with a "low vacuum" tube, another of "high vacuum" may be tried. The skill which comes with experience will usually select intuitively the most successful form of application, with proper protection of the patient. There is no fixed pattern in regard to the distance of the tube, the length of the exposure, the duration of the treatment, etc. The question whether the relief of pain is due to this or that kind of current and not to the x-ray proper, to high tension, the rate of change in the energy of current action, the kathode ray alone, or other rays of light, we do not need to answer. We know that an x-ray exposure relieves pain, and in some cases controls it altogether, the patient being near the tube in action; and we do not care exactly what form of electricity palliates incurable pain during such an exposure. Such a treatment possesses the enormous advantage over morphine, antipyrin, and other drug anodynes—which in malignancy have to be given sometimes in enormous quantities—that at the same time it is giving temporary relief it is also imparting a general nutritional benefit with proper stimulation of the healthy parts and irritation and destruction of the malignant growth. In some cases the relief of pain under the exposure to the x-rays is permanent. How much we do gain by such treatment in carcinoma or sarcoma? And if these rays should even fail to cure a malignant, inoperable growth, giving temporary relief only,

they are blessed palliatives to the patient, for, unlike drug pain-destroyers which also destroy vitality, the unknown rays of Prof. Roentgen build up the forces of nutrition, destroy the growth, and if possible not only relieve the suffering but prolong life.

The great sphere of the x-ray treatment includes not only the nervous, circulatory and muscular system, but it is also well suited to pains within joints, bones, cartilages, deep viscera and deep organs. It must act upon tissues which it penetrates, the penetrative power being greater with the greater amount of energy behind the tube. If the x-ray produces electrolysis, as said before, and if its effects are distinctly electric in character, is it not self-evident that the stimulating effect must be decided upon the nerves?

Altho in most cases we are to regard pain as a sensation which resides exclusively in the nervous system and may originate from various sources, being merely a symptom, to be removed only by means which remove the lesion which causes it, there are cases in which altho it is only a symptom it constitutes a chief element of disease, and one against which we have to direct our remedies. Malignant growths, superficial or internal, are the best examples. The limitations of the character of the physiological and therapeutical work done by the x-rays are now well known. In the x-ray we have an agent that rivals vaccination and antitoxin, and one whose possibilities have not as yet been thought of; but this treatment alone is not the panacea for everything. It is one of the most certain, definite, and effective remedies to relieve pain, and the anodyne effects of the raying are not produced by local anesthesia, they do not benumb, and act so far as they are either temporary or become permanent by repeated doses, by changing disordered sensation into orderly and normal sensation.

The best skiagraphs, and the best results in the treatment with the x-ray have been obtained in the hemisphere of x-ray activity, or the field of the best rays of penetrating properties from the middle of the hot focus point of the anode. These hemispheres of activity or non-activity of the x-rays in a Crookes tube may be seen better fluoroscopically, and determined photographically if we wish to. Within the limits of this hemisphere of activity, an object opaque to the rays will cast a shadow, easily detected with the help of the fluoroscope, or by the image it produces upon the photographic plate, but to find out exactly the best point of the best rays of x-ray order, is the main part in the new art of proper diagnosis and treatment in medicine and surgery. When this point is known it is comparatively easy to secure proper illumination, the proper position of the subject in skiagraphy, and in therapy the most astonishing results.

Musical Sounds from Vacuum Tubes and Flames —(Revue des Sciences.) Following up the experiments of Mr. Duddell on the singing arc, Prof. A. Righi, of Rome, has succeeded in obtaining musical sounds from vacuum tubes. A tube with aluminum electrodes, at a distance apart of 0.05 mm. for a rarefaction of 1 cm. of mercury, is connected thru a high resistance with a battery of 800 volts, a current of a few milliamperes being allowed to flow. The tube is shunted by a condenser and a telephone in series. Musical sounds are given out. Instead of a vacuum tube the flame of a Bunsen burner may be used, and in some cases the best results are obtained when the flame is rendered a better conductor by volatilizing common salt on the electrodes.—*The Electrical Age, April, 1903.*

Electro-Therapy.

A Course of Twenty-Four Lessons under the auspices of the Chicago College of X-Ray and Electro-Therapeutics.

Lesson I.—HISTORICAL REVIEW.

Electrical phenomena were noticed before any one thot it worth while to write about them. Lightning, electric eels, electric sparks from the fur of a cat or from the human body, all have been known from prehistoric times. The earliest written record of such phenomena appears to have been made about 600 B. C., but the first known attempt to investigate and to classify such phenomena was made by Gilbert toward the close of the 16th century, a little over 300 years ago. Gilbert invented the word "electricity," to express the unknown cause of the forces of attraction which he noticed between amber, pieces of paper, etc., after they had been rubbed, deriving the name from the Greek word for amber, *elektron*. During the next 100 years, from 1600 to 1700, very little was added to our electrical knowledge. Guericke invented a static machine which consisted of a ball of sulfur revolving on an axis and rubbed by the hand. Newton improved upon this machine by using glass instead of sulfur. Several other experimenters, among which Boyle was prominent, gave attention to electrical phenomena, but the facts known at that time were too few to lead to any valuable generalizations.

During the next 100 years distinct advances were made. Grey, in 1729, discovered that some substances were conductors of electricity and others insulators. Dufay, about the same time, discovered that the electric charges were of two kinds, "vitreous," which was produced by rubbing glass and which is now called positive electricity, and "resinous," which is produced by rubbing amber, paper, etc., and which is now called negative electricity. In 1745 the Leyden jar was invented, it is not quite certain by whom. This made it possible to experiment with much heavier charges of electricity than had ever been used before. Not long afterward, in 1752, Benjamin Franklin, with his famous kite, drew electric sparks from the clouds during a thunder storm, and by numerous experiments proved the identity of these with an ordinary electric spark, thus making known to the world positively for the first time the real nature of lightning. Experiments with atmospheric electricity immediately became popular among students of physics, and numerous similar experiments were tried. But in the following year Richman, of St. Petersburg, was killed by a "ball of fire" from a tall metal rod during a thunder storm. This acted as a damper upon their rashness.

About this time there was a discussion regarding the nature of electricity. A fluid theory of electricity was proposed by Watson, but the two-fluid theory of Symmer attracted for the time most attention. Symmer's theory, briefly stated, considers that a positive charge is an accumulation of positive electricity and a negative charge is an accumulation of negative electricity. A given positive charge is capable of neutralizing an equal amount of negative charge, and there are unlimited quantities of both positive and negative electricity in all substances. Franklin afterwards elaborated Watson's one-fluid theory, considering a positive charge as an accumulation of the one electric fluid, and the negative charge as a diminution in the quantity of the same electric fluid, in this way explaining most of the facts then known as well as by Symmer's theory.

In the development of a new science progress is necessarily slow. At first facts must be accumulated and experiments made. Before it is possible to discover and formulate the laws of the phenomena a large number of facts must be known. A correct theory then becomes of the greatest importance in the advancement of that science.. A theory of some sort, even if only approximately true, is much better than none, because it enables the investigators to classify the phenomena they find, and serves as a guide, tho a faulty one, for further investigation. Fluid theories of electricity, tho far from being true, have been of great value in the development of electrical science. The rapid advance made in electrical science shortly after their adoption is evidence of their value.

Up to the year 1800 practically nothing was known about electric currents. The more striking phenomena of static electricity had attracted attention almost exclusively. But in the year 1790 Galvani discovered that muscular contraction was produced in a frog's legs by contact with certain metals. This led to further investigation, and in the year 1800 Volta produced his electric "pile," which was the first form of the galvanic battery. For the next 25 years voltaic electricity monopolized the attention of investigators. In the year 1800 water was decomposed, both by the electric spark and by the current from Volta's "pile." Numerous experiments were made by Daniell, Grove, Bunsen and others, and many forms of galvanic batteries were devised, some of which are in use at the present date. The physical effects of the electric current soon came to be well understood.

In 1807 Davy, by means of a powerful electric current, decomposed quicklime and other alkaline earths which had up to that time been supposed by some to be elements.

In 1820 Oersted discovered the directive action of the electric current on a magnetic needle. From this time onward the laws of electricity and electro-magnetism were together made the subject of investigation by Arago and Davy, who in 1820 discovered electro-magnetism, Seebec, who discovered thermo-electricity in 1822, Ampere, who invented the galvanometer for the measurement of currents by their effect upon a magnetic needle and investigated very fully the laws of electricity and magnetism, and many others. Induced currents were discovered by Faraday in 1831, and the "induction coil" was brot to a high degree of perfection by Ruhmkorff. Two years afterward Faraday discovered the law of electro-chemical equivelence and constructed the voltameter, which measures a current by the amount of voltaic decomposition produced by it. In 1827 Ohm investigated the laws of electric currents and brot definiteness into electrical science by the invention of the electrical terms "electro-motive force," "current strength" and "resistance." He also formulated from theoretical considerations the relation between these three quantities in any electrical circuit, which has ever since been known as Ohm's law. The first crude dynamo was invented by Pixii before the middle of the century. In 1850 Weber produced the system of electro-magnetic units now in use and made exact work in electro-magnetic science more easy for investigators.

Thus the work that was done in electrical science during the first half of the 19th century, beginning with almost nothing, was the fairly complete elucidation of the laws and phenomena of the science; and it is due to work of such men as Ampere, Faraday and Davy that the rapid advances in the practical applications of electricity and magnetism which took place during the latter half of the century were possible. Since 1850 very little that is of fundamental importance in electricity and magnetism has been discovered.

Enormous improvements have been made in apparatus. Currents much more powerful than were then dreamed of are now produced with ease, and many phenomena which were then so slight that they could not but be overlooked have been, thru this more powerful apparatus brot into prominent notice. It has been distinctly true in electrical science that the scientist preceded the inventor, and the rapid development of inventions was made possible by the complete knowledge of electric laws which had been worked out by the scientists.

The history of electro-therapeutics may be conveniently divided into four parts: (1) the static era, which extends from the beginning of history, but more particularly from the discovery of the Leyden jar in 1745, to Galvani's experiments and the construction of Volta's pile in 1800; (2) the galvanic era, from 1800 to the construction of the faradic coil in 1831; (3) the faradic era, from 1831 to the discovery of the Roentgen rays in 1895; (4) the radiant era, since 1895.

In taking a general view of these periods it is worthy of note that the most striking progress in electro-therapeutics has been made in many cases by men outside of the medical profession, and that their discoveries have often been violently opposed by ignorant and conceited physicians. It is true that these discoverers were themselves in some cases extremely ignorant, and that their discoveries were announced along with the most absurd theories. But, just as the skilful miner is able to detect a valuable ore even when the metal is concealed by the admixture of an immense quantity of other material, so should the physician be able to recognize truths of therapeutic value wherever they are to be found.

During the static era therapeutic experiments were either entirely accidental or were made with scarcely any knowledge of the physiological effects of electricity; consequently very little that was of permanent value was then added to our knowledge. As is often the case, the more prominent and striking phenomena of the science, which were the first to be noticed, have remained for the longest time a mystery to the average student of electricity, so that altho improvements in machinery for producing static electricity have been made from time to time it is only during the last 25 years that much real progress has been made in the therapeutic applications of these currents. Dr. Morton has contributed more than any other one man to this advance. During the last six or seven years static machines have become much more popular, partly on account of improvements in manufacture and reduction of price, and partly because they can be used as the source of current for producing x-rays.

After the discovery of galvanic electricity in 1791 numerous experiments were made to determine its therapeutic value. These experimenters knew next to nothing about the physical and physiological effects of electric currents, and their experiments were necessarily crude; consequently the whole subject fell into neglect and disrepute, and it was not until long after the discovery of the faradic current that galvanic currents came to be reinvestigated. The researches of du Bois-Reymond and Pflüger in electro-physiology about 1850 were found to be of considerable value in electro-diagnosis. Remak, of Berlin, in 1855 showed the therapeutic value of the direct current and insisted that this was the only current that should be used by physicians. In 1858 W. B. Richardson made experiments in kataphoresis, but these met with strong opposition from other physicians and fell into disuse until revived by Adamkiewicz in 1886 and Peterson in 1888. The use of the direct current in medicine was made scientific by Apostoli, who in 1884 called attention to the different effects of

the positive and negative electrodes and introduced accurate measurement of the currents used. More recently Massey has applied the direct current successfully to kataphoric destruction of malignant tumors. Newman in 1867 proposed and successfully carried out his method of overcoming urethral and other strictures by the use of mild galvanic currents.

Faradic currents remained largely in the hands of charlatans until investigated thoroly by Duchenne, of Bologne, who began this work about 1847. Since that time the use of faradic currents has been more general among physicians. Its applications being comparatively limited the method has been supposed by many to be of little value. The invention of improved apparatus for producing a smoother alternating current has in recent years made it evident that the faradic currents have a far wider field of application than was formerly supposed. Beard, Rockwell, Morton and others have added much to our knowledge in this direction.

In 1873 Maxwell published his work on electricity and magnetism in which he revived Faraday's idea that an electric charge is a strain in the ether, and inferred that electric waves and waves of light are identical in their nature. Some years later Hertz succeeded in producing electric waves less than one meter long, and showed experimentally that their properties were similar to those of light, thus confirming Maxwell's theory. In 1879 Crookes published his researches on radiant matter, describing the behavior of gases in extremely high vacuum, one millionth of an atmosphere or less. In December, 1895, Roentgen described the x-rays he found issuing from the Crookes tube when excited by an electric current. In April, 1896, Dr. H. Preston Pratt found that x-rays were capable of destroying some kinds of bacteria and that the rays had marked therapeutic effects. Freund obtained similar successful therapeutic results with these rays a few months later, and during recent years a host of investigators have entered the same field. Finsen in 1895 experimented on the plan for curing malignant diseases by condensed sun light. d'Arsonval in 1893 investigated the properties of high frequency currents, and Piffard a little later modified his apparatus and constructed the hyper-static machine.

Contemporary history is the most difficult to write. No attempt is here made to apportion to living investigators their share in the advancement of electro-therapeutics. This must be settled by the cooler judgment which is possible only to those who come later. Some whose names are now prominent may then be passed over with a bare mention, while others whom we have scarcely heard of may be heralded as those who have marked out the true road for advancement.

Chicago Electro-Medical Society.

The regular meeting of this society was held May 30th, 1903. After the routine business the following paper was presented:

X-Ray and Its Adjunct Treatment.

BY H. PRESTON PRATT, M. D.

The subject assigned to me for this paper, "X-Ray Therapeutics," has been written upon and discussed so often in medical societies by essayists who were more or less familiar with the subject that a majority of the physicians have lost interest in it before they have fully realized its value. The field of its usefulness is so extensive that it would be impossible for me to do the whole subject justice in this short paper; and as there are other methods which can be used advantageously as adjuncts, and which are in some cases superior to the ray treatment, with your kind permission I will discuss the following subject: "X-Ray and Its Adjunct Treatment vs. The Knife."

The question of the treatment of deep malignant growths, such as cancer of the cervix and adjacent tissues, or of the rectum, by electricity, is one of the most difficult problems the electro-surgeon has to consider, especially when so little is known of their etiology and pathology. We depend entirely upon the clinical data to direct our treatment. In a paper read by Dr. A. F. Jonas, of Omaha, before the meeting of the American Medical Association at New Orleans last month, on cancer and immunities, he says, as a result of his review of the etiology of cancer, that the cancer question must be solved along chemical lines. "We are well aware that the infection energy does not depend on the bacteria themselves, but on their products, which are purely chemical." If Jonas' reasoning proves to be correct then our field of research must be directed along electrical lines; whether in the form of x-ray, electrolysis, or sterilization by kataphoresis, we cannot say. So far as the knife is concerned, the mortality has not been materially lessened by it, and consequently to follow further in the purely surgical direction would be unwise.

Now let us turn to the x-ray, which is a form of electrical energy, to see what has been accomplished. In a comparatively short space of time almost all kinds of superficial malignancy, when taken in time, have succumbed to x-ray treatment. As to deep-seated malignancy, it is still a great and unsolved question. Why have we been successful in treating superficial and not deep malignancy with the ray? There are two or more reasons: First, that the deeper growths do not receive as great an amount of x-ray energy from the tube as the superficial ones do. This is simply a question of physics. The difference is in the intensity of the x-ray effecting ionization, as Dr. T. Proctor Hall so ably expresses it in an article read before the American Roentgen Ray Society, held in Chicago last December, and published in THE AMERICAN X-RAY JOURNAL of February, on X-Ray Physics. "The intensity of x-rays from a given tube, or, if you please, the number of rays per square centimeter, varies inversely as the square of the distance from its center; following the same law as gravitation, light, sound and all other radiating forces. In determining the effects of a given tube at varying distances a mathematical calculation in accordance with this law is necessary. For example, at one foot from the center of the tube the rays are four times as powerful as at a distance of two feet from the center, nine times as strong as at a dis-

tance of three feet, sixteen times as strong as at a distance of four feet." So you see it is necessary to have a much more powerful electric generator, and larger and better tubes built to stand more current, in order to obtain the intensity required to reach the deeper tissues. We are dependent entirely upon the number of lines of force projecting from the tube to bring about ionization of the tissues. Ionization means changes of the elementary structures, increase in metabolism. We desire the greatest possible number of these lines of force within a given space for our best therapeutic work and this is only possible with a low or soft tube. Each electrical change in a line of polarized atoms dissociates a definite number of elements composing the tissue, and this dissociation and reassociation of the freed ions decomposes and destroys the cancer cell. The protozoon of cancer is practically identical in composition with the tissues of the human body.

Almost all pathologists believe that cancers are of epithelial origin. There are many opinions expressed as to the causation of cancer. It is immaterial, so far as the treatment is concerned, whether its origin is from a parasite, or is due to parasitic misplaced cells, or to bacteria. All clinical evidence would class it along with infectious diseases. I am of the opinion that the difference between a malignant and non-malignant cell is in the composition of the cell, in other words, the non-malignant cell has been converted into a malignant cell by an increased or decreased number of elements added to or subtracted from the normal cell, or by the rearrangement of the elementary structure of the cell itself in relation to the adjacent cells. These changes may be produced by a parasite or be due to bacteria feeding on the cell, which may bring about a change in the nerve supply.

In treating superficial growths with the x-ray, including carinoma of the breast as well as some forms of sarcoma, the distance of the tube from the growth varies from half an inch to fifteen inches. The closer the surface of the tube is to the growth the greater is the intensity of the ray, the greater its destructive influence, and consequently the greater the physio-chemical change in the tissue. There are no two cases that can be treated alike. The reasons are obvious; their susceptibility to electrical influence varies. One patient may be treated several weeks with a low tube two or three inches away without even reddening the skin, while another reddens under the same conditions after one or two treatments; and others would receive a severe burn at fifteen inches distance from the tube during the same period. To protect the parts I am using a protecting screen, with celluloid interposed between the tube and the patient to prevent microbes and other impurities from being driven into the body, which is the cause of so many septic burns.

In treating with the x-ray superficial growths we have a great mass of clinical evidence from which to make a satisfactory deduction as to its limitation; not so with the deep growths in the cervix, rectum, etc. This is due to the lack, as I said before, of stronger appliances. The technique, as far as principle goes, would be the same in all cases, provided the tube were suitably constructed for each individual case. We find it very difficult to treat successfully carcinoma of the cervix and rectum with the ordinary x-ray tube. We have been compelled to design specially formed tubes to conform to the part being treated. The object is to bring the tube as close to the part as possible, thereby increasing the intensity of the ray in the tissues. A method that I have adopted and used for several years in treating cervical cancer, especially when the vaginal walls are involved, is to increase the force of the machine as much as possible, using a low tube, and if I find

that it is impossible to get the desired results, then I use a specially made tube and pass it in thru the orifices, using a celluloid speculum so that the tube itself does not come in contact with the tissues. To treat the cervix, vaginal wall and rectum successfully it is necessary to get the tube as close to the parts as possible, hence the necessity for specially designed tubes for the orifices of the body. The tube itself should not come in contact with the tissues of the body, but should be within a celluloid speculum. The parts should be thoroly cleansed with a mild antiseptic before and after treatment, which should be followed by an antiseptic tampon.

The reason why there has been so many failures in the use of the x-ray is because the operators' experience has been limited and they have not known when to continue or stop raying. They did not realize that the ray threw into the circulation effete matter in large quantities, sometimes in larger quantities than lymphatics could handle. The patient succumbed to autotoxemia, not due directly to the carcinomatus infection but to the effect of the ray overloading the lymphatics. When a treatment is commenced with the x-ray it should be followed up until a final cure results. Otherwise it is not advisable to use the ray at all. Unless the treatment is followed up it certainly will make conditions worse.

It is sometimes advisable in treating carcinoma of the cervix and rectum to destroy the growth under an anesthetic by electrolysis. Another excellent treatment is the one first suggested by Dr. Massey, in which he destroys the growth thru electrolysis by kataphoresis sterilizing the surrounding tissues. He uses amalgamated zinc for the positive electrode, and from a half to an ampere and a half of current.

Dr. Massey's treatment is certainly good, but is not ideal. I am experimenting on a modification of his treatment. I have been able in several cases to sterilize the tissue successfully with a weak current without a destructive process. I am of the opinion that the coming method for treating malignancy is in the use of electricity in some form, and as an adjunct treatment the use of a sterilizing solution which will be readily decomposed and can be injected into the tumor and dissipated thru katophoresis or given internally. This sterilizing solution is just as liable to be in the form of an animal extract as in the form Dr. Massey uses.

The next meeting of the Chicago Electro-Medical Society will be the annual dinner, which will be held at the Albion Cafe, Pullman building, Monday, June 29, next, at 6.00 p. m. promptly. The city electrician, Edward B. Elliott, will read a paper on the effects of electrolysis upon the public health. Several eminent scientific investigators will take part in the discussion. The Society does not meet during July and August.

Radio-Activity Produced by Light.—Le Bon (*Comptes Rendus*, July 7; abstracted in Lond. *Elec.*, July 25) gives an account of experiments in which he studied the effects of light of different wavelengths upon all kinds of material bodies. He found that practically every kind of matter may be made to emit Becquerel rays by the action of light alone. If a body is exposed to sunlight, or, still better, to ultra-violet light, it gives off a form of radiation which is capable of discharging a positively charged electroscope. Amalgamated tin, copper or zinc show the strongest effect, black paper and lampblack are almost as good. Living matter shows least of all.—*Electrical World and Engineer*, August 30, 1902.

The Use of the X-Ray Picture as Evidence of Internal Conditions.

The x-ray is rapidly becoming an important factor in medical science. Its value as a means of diagnosis is well settled and its usefulness in the treatment of certain diseases is recognized, tho in the latter particular its properties are yet more or less a matter of doubt. It has shown its value beyond dispute in determining internal conditions of the human body, such as the extent of a fracture, the location of a bullet and deformities of the inner body, and it becomes important from a legal point of view to know what value as evidence a picture showing such internal condition has.

The word "evidence" includes all the means by which any alleged matter of fact, the truth of which is submitted to investigation, is established or disproved. The true question is not whether there is sufficient probability of its truth; that is, whether the facts are shown by competent or appropriate and satisfactory or sufficient evidence. If they are established by such evidence, they are said to be proved. What is satisfactory and competent evidence depends in each case upon the subject matter involved, with the underlying principle that nothing is competent and sufficient which does not refer to or grow out of that subject matter.

A witness's testimony, being an attempt to communicate to the court or jury the knowledge possessed by the witness, will usually employ the ordinary mode of expression—that of oral utterance in the language customary in judicial proceedings in the locality. But there are other modes of communication, and the need for resorting to them often arises. As to one and all of them, it is true that whatever mode of communication is employed presupposes a qualified witness as its testimonial support and cannot of itself have any standing independently of that witness whose knowledge it serves to represent. Examples of this class are maps, models and photographs, none of which are receivable in evidence of themselves, but must enter as representing some witness's testimony in graphic form.

The x-ray picture is a photograph, and what is true of the photograph as generally understood should be true of the x-ray picture. So far as concerns the accuracy of the photographic process, it would be a mistake to credit it with a necessary correctness independent of human control, notwithstanding the supreme court of Georgia said in an old case that the sun was "a truthful and impartial witness." The conditions of the process can be so manipulated that the photograph is as false as the falsest witness; such as illustrated in articles in the *Strand Magazine* for February, 1895, and for May, June and July, 1898. But this is no reason for excluding the testimonial use of the photograph. It stands precisely on the same footing as the map or model. It is legitimate as a mode of communicating testimony in appropriate instances and it may be most helpful, but it equally requires and rests upon the credit of some witness.

The ordinary photograph is everywhere recognized as a permissible mode of testimony where appropriate. It has been received in proof of land, buildings, human beings, and particular parts of the body when verified by some one, not necessarily the photographer, who has knowledge of the object represented and can testify that the photograph represents his idea of the object.

The x-ray photograph is taken of unexposed parts—parts that nothing else than an operation would expose—and the re-

quirement that the witness verifying it must have knowledge of the object represented and that the photograph represents his idea of the object, cannot be fulfilled. The witness may have an idea of the probable condition of the parts photographed, but he cannot in most cases say that the photograph represents that condition as he saw it. He must be the one who took and developed the plate, or was a witness at the exposure and developing of the same, to be of the most value, for, unless he knew the plate and the print from it to be the result of the exposure of the particular subject to the x-rays, his testimony would be useless. By looking at the picture a witness would not be qualified to verify its truthful representation unless he saw it taken and could identify it as the one taken. Here is where the admissibility of ordinary photographs differs from the admissibility of the x-ray photograph. Any one familiar with the subject matter of the ordinary photograph can testify as to the truthfulness of the picture, no matter if he never saw the picture before; while with the x-ray photograph, no one ever saw the subject matter and the witnesses can only say that they took it or saw it taken and that it probably represents the condition of things. The opponents would hardly be in a position to contradict the testimony, for they could not produce the best evidence—the actual parts themselves. So that the x-ray photograph stands upon a peculiar footing. It is the best evidence attainable in the absence of an operation, and if it could be shown by the evidence of competent witnesses that it truly represents the object it is claimed to represent, its value is inestimable.

The acknowledged importance of this photograph in assisting proper diagnosis, and the many successful results based on x-ray diagnosis, has broadened the field of admissible photographs under the general rule we have been discussing. The courts now are leaning toward its admission in suitable cases, and it is rightly so; for in most cases where the x-ray photograph is used there is not better evidence obtainable, and it would be an abuse of discretion on the part of the court to deny its admission. The discretion of the trial judge is not absolute in this respect and may not be arbitrarily exercised. The recent case of Carlson vs. Benton, decided by the supreme court of Nebraska, is the latest authority on this subject. It establishes the rule that where the evidence as to the accuracy of the photograph leaves no room for a difference of opinion, it is wrong to exclude it on the ground that a sufficient foundation has not been laid—that is, that it was taken by a competent person; that the condition of the apparatus with which it was taken and the circumstances under which it was taken were such as to insure an accurate picture, and that competent witnesses can show that it truly represents the object it is claimed to represent. The courts in prior cases in the states of Nebraska, Washington, Ohio, Massachusetts and Wisconsin have admitted these pictures in evidence, and each one did so on the ground that no better evidence was available and that the pictures were properly explained and authenticated.

It is, therefore, certain that the radiograph has received the approbation of the law as a means of conveying information to the court or jury of conditions otherwise unascertainable. "New as this process is," says the Tennessee supreme court in Bruce vs. Beall, "experiments made by scientific men, as shown by this record, have demonstrated its power to reveal to the natural eye the entire structure of the human body, and that its various parts can be photographed as its exterior surface has been and now is. And no sound reason was assigned at the bar why a civil court should not avail itself of this invention, when it was apparent that it

would serve to throw light on the matter in controversy." Every surgeon can well afford to protect himself in all doubtful cases by the use of the rays and thus save himself from what may prove to be a serious difficulty. The use of the x-ray is still in its infancy, but it is widening out rapidly. The law will keep abreast of this advancement and expand with it, and we will soon have a highly valuable piece of documentary evidence which will carry conviction with it and make it of great value in the damage suit against the physician and surgeon for malpractice.—*Medico-Legal Bulletin.*

Ultra-Violet Rays.

The method employed by Finsen, Lortet-Genoud, Bang, Görl and others, to utilize the violet rays, have induced lamp-makers to put upon the market a lamp that is economical yet powerful. The original lamp devised by Finsen is so expensive that but few hospitals and clinics have been able to buy and maintain them. Very naturally some ingenious and inexpensive machines have made their appearance, warranted and guaranteed to produce the desired rays at a nominal expense.

Dr. Henry G. Piffard, of New York, has devised a simple modification of the Görl lamp, and it is now manufactured by the Waite and Bartlett Mfg. Co. It has three spark-gaps protected by a quartz surface. It is compact, and readily attached to a static machine. It is convenient to use, and causes no annoyance to the patient.

The ultra-violet rays differ from the x-rays in their effects. They are supposed to be etheric vibrations with short wave-lengths. They can be reflected, refracted, and polarized; they will not traverse many bodies that are perfectly pervious to luminous rays, e. g., glass; they will not influence deep or superficial tissues unless dehematized; they may be stopped by a sheet of paper; they will rapidly destroy the vitality of bacteria; they will excite bright-green fluorescence in Willemite, and will traverse rock-salt and quartz. These latter tests will demonstrate the presence of the ultra-violet rays, otherwise they are invisible. Hence lamps that will not show the presence of these rays by these simple tests are not suitable instruments. A number of inferior lamps are advertised, made, perhaps, with violet globes and are called violet-ray lamps, but their therapeutic value is worthless.

The use of the ultra-violet rays is limited. So far they have demonstrated their efficacy in lupus and other bacterial skin diseases. The lamps are comparatively new, and only after an extended application to skin lesions can their value be ascertained.

A large number of instruments for light treatment have been manufactured that give results by concentration of the rays from the sun and from arc lights. Evidently they do some good by the concentration of rays on the diseased surface, —a burning, scorching or drying of the lesion. Such instruments are widely advertised to cure many diseases. They claim to produce all sorts of rays—actinic, blue, violet and ultra-violet. Their value lies only in their power of concentration; the results are tentative.

The light treatment like all other new forms of therapy will probably be enthusiastically overdone, and after a time will be tested by scientists for its true worth. The charlatan will reap a rich harvest with these imposing appliances, and the people will be experimented upon and victimized to their limit of endurance, and the depth of their purses.—*Northwestern Lancet.*

EDITORIAL

The Source of the Radiations from Radium.

The radiations from uranium, radium, etc., are in part a discharge of negative electrons, being similar in this respect to the kathode rays, and in part rays similar to x-rays. These radiations are found to be capable of giving out a continuous stream of energy, for when completely surrounded by ice so that apparently no energy can reach it from without, the ice in its immediate neighborhood is melted at the rate of an amount equal to its own weight in two hours. Here, then, is an apparently inexhaustible supply of energy. Prof. J. J. Thomson explains the source of this energy on the basis of the electron theory on the assumption of an explosion of the individual atoms of the radium, which he assumes to be unstable when their velocity greatly exceeds that of the average atom. While this explanation is undoubtedly ingenious and is something so new that it gives the average reader a sort of shock as tho some of his most firmly fixed ideas of atoms were being overthrown, it is not, as some have supposed, an attack upon the principle of the conservation of energy. Prof. Thomson calculates that there may possibly be enough of this explosive energy in the atoms of a piece of radium to enable it to keep on melting ice at the rate given above for 30,000 years. Without in any way opposing this ingenious theory we may point out that there is no real necessity for it in order to explain the source of this energy. Every scientist knows that there are innumerable ether waves, variously known as light and radiant heat, constantly passing in every direction, to many of which ice is transparent. It is only necessary to suppose that some of these radiations are transformed into heat by the radium; in other words that the radium is opaque to a considerable number of these ether waves to which ice is transparent; in order to have at hand a full explanation of the source of the radiant energy of the radium. A parallel case is seen in the melting of ice around a dark colored body in its interior under the influence of sun light.

Rays from the Living Human Body.

Prof. A. W. Goodspeed, of the University of Pennsylvania, is credited by the daily press with the discovery that under the action of x-rays the human body gives out radiations of sufficient power to affect the photographic plate. This effect of the x-ray, namely, its dispersion or irregular reflection from the human body as well as from other objects, was pointed out by Prof. Roentgen in one of his original communications, and attention has been called to it from time to time ever since. It is to be hoped that Prof. Goodspeed's experiments will be such as will throw more light upon this interesting characteristic of x-rays.

The Price of Radium.

The daily papers report with apparent satisfaction that radium has been reduced in price from $1,000,000 to $900,000 a pound. The total amount in the world in commercial form is about two pounds, so that those who desire to invest should send in their orders early.

Electro-Physics.

Excited Radio-Activity.— Rutherford (*Phil. Mag.*, January) contributes an article in which he shows that the production of excited radio-activity is one of the properties of the emanation from thorium and radium. It is due to the deposition of radio-active matter which is derived from the emanation given out by these bodies. Excited radio-activity is transmitted by positively charged carrier produced from the emanation, which travel in an electric field with about the same velocity as the positive ions produced in air by Roentgen rays. This velocity is about 1.3 cm per second for a drop of 1 volt per cm. These positively charged carriers are due to the expulsion of a negatively charged body from the molecule of the emanation. The emanations and the matter which gives rise to excited activity are the result of a succession of chemical changes occurring in radio-active matter. In thorium there is evidence of at least four distinct chemical changes.— *Electrical World and Engineer*, February 7, 1903.

Radioactivity of Uranium.—Rutherford and Soddy.—A paper in which they discuss the radioactivity of uranium, as compared with thorium. The case of uranium presents some interesting features and is in some respects simpler than that of thorium. They make an important distinction between the photographic and electric effects. The uranium radiation consists of two types: First, the easily absorbed rays; second, the penetrating rays which are readily deviable in a magnetic field. The former constitute by far the greater part of the electric effect, the latter practically all the photographic effect. The case of uranium is especially interesting on account of two points: First, the existence of non-separable activity consisting entirely of easily absorbed rays, as in the case of thorium; second, the non-existence of easily absorbed rays in the radiation of "uranium X." This is probably an example of a general law that when gotten by itself free from the matter which produced it, on the one hand, and the products of its further change, on the other, each type gives rise to homogeneous rays, and that in all cases the easily absorbed rays are produced first and the magnetically deviable and penetrating rays only result in the final stages of the disintegration. Uranium gives more definite evidence on this point than thorium.— *Phil. Mag.*, April, 1903.

Nature of Roentgen Rays.—Rayleigh.—An editorial note on an opinion expressed by him concerning the nature of Roentgen rays in a recent lecture on light. If Blondlot's recent observations can be accepted as perfectly reliable, whereby he found that they are polarized as usually obtained and that the plane of polarization can be rotated, then little doubt can be felt that they are really ordinary light of extremely short wave length, as was surmised by Stokes and J. J. Thomson several years ago. The wave length must be very short to yield such slight effects as have, up to the present, been observed. Of course, Blondlot's results must, till they are confirmed by other observers, be accepted with some reserve.—*Lond. Elec.*, March 27.

New Inventions.

It is claimed that Cooper Hewitt has devised a lamp which gives a pure steady light seven times brighter and cheaper than the incandescent light now in use. He has also designed a mercury vapor interrupter which is said to be far superior to those now in use.

Roentgen Rays and Others.—A recent discovery which is of very great interest seems so far to have attracted less than its due share of attention. We refer to the discovery by M. Blondlot of an entirely new set of radiations derived from an ordinary focus tube and capable of penetrating thin wood, paper, aluminum foil and the like. The striking feature of the newcomers is the fact that while possessing a fair amount of penetrative power they are unmistakably to be classified with ordinary light, and yet do not affect the photographic plate. They can, however, be reflected and refracted, are in themselves plane polarized, but can be given elliptic polarization or rotary polarization by the usual means, and can be brought to a focus by a lens and be deviated by a prism. M. Blondlot, using a tiny spark for an indicator, demonstrated all these properties and finally obtained a rough measure of the index of refraction through a quartz prism. It proved to be in the neighborhood of 2.0, although the radiation evidently covered quite a range of refrangibility. This would indicate that the Blondlot rays, as they deserve to be called, are allied to the extreme ultra-violet rays of the known spectrum. Ordinary metallic spectra rarely show anything beyond a wave length of about 200 bikrons. By putting source and apparatus in vacuo, wave lengths down to about 100 bikrons have been found by photography, but beyond this atmospheric absorption or failure of the photographic plates has blocked further progress. Now from the index of refraction observed Blondlot's rays are likely to be very much shorter in wave length even than 100 bikrons, so that at first glance the discovery would look as if we had passed beyond a great atmospheric absorption band and reached a new region one step nearer to the debatable ground held by other mysterious radiations. Each year we are getting material for the study of generalized radiation in place of our previous fragmentary knowledge, and sooner or later the time will be ripe for a general clearing up of the subject. Just now we are fumbling around rather in the dark and making very hard work of things that will probably turn out to be simple.—*Electrical World and Eng.*

Intensity and Wave Length of Roentgen Rays.—HOLTSMARK.—An account of experiments in which he utilizes the secondary rays produced by the impact of Roentgen rays in order to measure the intensity of the latter. This is necessary on account of the uncertainty which attaches to their measurement by means of the photometric and ionization methods. A plate of lead or platinum is enclosed in an aluminum box and exposed to x-rays. The secondary rays produce a negative charge on the aluminum and a positive charge on the lead or platinum. On connecting the latter with the earth, a continuous current may be observed and measured; this current is directly proportional to the intensity of the Roentgen rays. The author has used this method for the measurement of the absorption of x-rays by various metals. Taking the values obtained, and using Helmholtz's theory of dispersion, he shows that the wave length of a radiation is proportional to the square root of the coefficient of absorption. In Roentgen rays, the refractive index equals unity, as it should if the frequency is about the same as the frequency of vibration of the electrons or greater than that. The values for the wave length vary according to the metal used for absorption. The highest value is 51.8 millimicrons, obtained from gold, and the lowest 2.4 milli-microns, obtained from steel and zinc.—*Ann. d. Phys., No. 3; abstracted in Lond. Elec.,* March 20.

Electric Photography.—The subjoined cablegram from London of May 12 may refer to something very old or very new: John H. Heaton, M. P., who has returned from Italy, whither he accompanied Signor Marconi, says he saw at an observatory near Rome specimens of a new system of electric photography, by which clear pictures can be obtained of persons and scenes twenty miles distant. He thinks it conceivable that the system can be developed so as to enable the making of photographs of friends in distant lands while conversing with them by wireless telegraphy.—*Electrical World and Eng.*

Electrons and Ions.—Reinganum, in an article on the mechanism of electrochemistry [*Ann. d. Phys.,* No. 2; abstracted in Lond. *Elec.,* February 13] attempts to formulate a theory of the distribution of the electrons in the molecules entering into electrochemical reactions. He assumes that each molecule, say of H Cl, contains two pairs of electrons, the H atom being provided with one pair and the Cl atom with another pair. Electrolytic "dissociation" might then be represented by the giving off of one negative electron from the H atom to the Cl atom, so that the H atom has now one positive electron, while the Cl ion has one positive electron and two negatine electrons, and thus is negatively charged. When Cl is set free at the anode, each Cl ion gives off one negative electron and thus becomes neutral, having one positive and one negative electron; similarly with the H at the cathode. Through the external connection the negative electrons pass from the anode to the cathode, thus completing the circuit. The author works out this idea for the different compounds and shows why the dissociation constant is a measure of chemical affinity. It is probable that the transfer of the supernumerary electron is accomplished even before actual electrolysis takes place.—*Electrical World and Engineer,* March 14, 1903.

Magnetic and Electric Deflection of Kathode Rays.—Starke, (*Ber. Deutsch. Phys. Ges.,* No. 1, 1903) gives an account of an investigation of the reasons of the change of kathode rays due to reflection and transmission. It was formerly supposed that kathode rays suffer no change by reflection and transmission except in direction; but Gehrke and Leithaeuser have shown that a reflected or transmitted kathode beam is heterogeneous, and will be drawn out into a sheaf by an electric or magnetic field, altho the same field is quite powerless to split the beam before reflection or transmission. On the electron theory, it might be supposed that it is either the ratio of charge to apparent mass of the kathode rays that is altered, or their velocity. The present author has made some experiments to test which of these alternatives is true; and finds that the latter is correct, as the ratio of charge to mass is unaltered, while both reflections and transmissions have the effect of considerably reducing the velocity of some of the kathode rays.—*Electrical World and Engineer,* Feb. 28, 1903.

Unipolar Currents. — Christiansen (*Ann. d. Phys.,* No. 8) has a paper on a peculiar apparent departure from Ohm's law, observed in certain electrolytes. He applies the term unipolar current to the current thru mercurous nitrate in nitric acid, with mercury electrodes, because this current greatly depends upon the size of the kathode, and not on the size of the anode. The irregularity observed is that under certain conditions the current is independent of the e. m. f. It varies, however, directly as the surface of the kathode and as the percentage of mercurous nitrate.—*Electrical World and Engineer,* Sept. 13, 1902.

Light and Kathode Rays.—Zehnder (*Ber. Deutsch. Phys. Ges.,* No. 1, 1903; gives a description of some new effects of kathode rays and light rays. Many salts are known to be colored under the influence of kathode rays, and to lose their color subsequently when exposed to light. The author has found that if an object is traced on a dry plate by means of kathode rays and the plate is subsequently exposed to the light, it may happen that after development the portion illuminated by the kathode rays appears brighter than the rest, thus recalling the effects of solarization. "Celloidine" paper, once exposed to kathode rays, becomes less sensitive to the effects of light. If the paper is then exposed to diffuse white light, that portion becomes darker which was not previously exposed to the kathode rays. It is thus possible to obtain a negative of a positive image produced by kathode rays. Solio and other papers show similar effects. A circular patch exposed first to kathode rays and then to light, first becomes paler at the margin, where the kathode rays were presumably less active, and gradually the brightening extends to the center. A fixing bath bleaches the kathode-exposed portions much quicker than the light-exposed ones. Magnetically-deflected kathode rays have the same effect as ordinary ones.—*Electrical World and Engineer,* February 28, 1903.

Absorption of Electric Waves by Gases.—Lecher (*Phys. Zeit.,* October 10) gives a description of an experiment which proves that the rings in an exhausted glass tube, produced by J. J. Thomson in an alternating electric field, are not due to electrostatic charge, but to an absorption of electric waves by the gas. The present author winds a bifilar wire coil and a simple wire coil round the same tube, and sends strong electric oscillations through both. In spite of the high charge of the wire in both cases, a ring is only formed inside the simple coil. He describes a method of studying the electrical conductivity of gases by observing the luminous phenomena thus produced. It consists practically of a vessel resembling a Bunsen ice calorimeter, the secondary coil being placed in the interior and the primary coin outside, with the gas or electrolyte in question filling the space between them. He finds that at a pressure of about 0.1 mm the air conducts much better than the best electrolytes. Such a pressure exists at a height of about 40 miles in the atmosphere, and it is therefore evident that the upper atmosphere very likely absorbs long Hertzian oscillations coming from the sun. It also explains the electric discharges often accompanying the fall of meteorites.—*Electrical World and Engineer,* Dec. 13, 1902.

Ionization of Salt Vapor.—Moreau (*Comptes Rendus,* November 24) gives an account of some experiments made to elucidate the mechanism of flame conduction. He introduced two small platinum condensers into a flame, gave a high charge to the lower one, and observed the conduction across to the upper one. He found that this conduction was independent of the charge of the lower one, and hence concludes that the flame contains no free ions, since these would be absorbed by the lower condenser. In another experiment he mounts a salted flame between and in contact with two unsalted flames, in one of which an electrode is fixed. A movable electrode plunges into the other flames, and as soon as it touches the salted flame the conductivity goes up abruptly, to a great extent if the electrode is negative, and to a small extent if it is positive. This unipolar conductivity is analogous to that of a mass of hydrogen surrounding a carbon filament. The author believes that the presence of a metallic conductor is essential for ionizing a vapor.

Electro-Diagnosis.

Fracture of the Radius.—Journal of American Medical Association, Dec. 6, contains an article on this subject by Dr. Carl Beck, of New York, in which the author claims that X-Ray examinations have shown in Colles' fracture that with the upward displacement is generally associated a lateral displacement, as a rule in the outward direction. He has (as have others) observed a number of cases in which the lower fragment has turned backward on the sagittal axis which itself has turned round. The oblique type in which the joint surface is split was not recognized before the Roentgen era. Beck reduces the fracture thus: The hand of the patient is grasped as in a firm handshaking by the surgeon's left, while the thumb is held by the surgeon's right hand so that the thumb of the latter presses the fragment downward while his index finger presses it inward at the same time. Counter extension must be made at the elbow. In multiple fractures, even the Y-shaped variety, the articular arch of the radius may sometimes be restored by repeated efforts of reposition controlled and corrected by the x-rays. If this proves impossible, speedy osteotomy must be resorted to. He applies a plaster-of-paris dressing immediately after reduction. This embraces the thumb if the displacement is upward, or upward and outward. The direction of the thumb influences that of the fragment. If pressure of the index finger does not keep the fragment down, it must be pressed down with a stick. When this is bandaged down, the fluoroscope shows whether or not the fragment is in position. A dorsopalmar and lateral examination must always be made. In the T or Y-shaped variety the outwardly displaced fragment is pressed inward by a pad of adhesive plaster. The fragment, toward the ulna, after being shifted into place, is prevented from slipping back by rubber tubing between it and the ulna on the dorsal aspect. The circular plaster dressing in abduction is indicated. He declares we must not depend on palpation alone. Early massage for removal of extravasation is indicated in intra-articular fractures and contra-indicated when there are chips.—*Am. Jour. Surg. and Gynecology.* March, 1903.

The Roentgen Ray, Its Mechanics, Physics, Physiology and Pathology.

Dr. Edwin E. Delphy, in the *Medical News,* April 18, 1903, attempts a summary of our knowledge of x-rays. For their production either a static machine having 10 or more revolving plates or a Rhumkorff coil giving a spark six inches or more in length is satisfactory. The interrupters are the strong or vibrating, which is satisfactory for low tension currents; the slate wheel having on it segments of copper; the mercury interrupters; combinations of these; the thermo-electrolytic of Caldwell, and the Wehnelt or pure electrolytic. The structure of the tube and the modes of raising and lowering the vacuum are described. He points out that the actinometer measures the penetration of the ray but not its quantity (intensity). The latter may be measured by Bugnet's X-ometer, which measures the fluoroscopic effect, or by the chromo-radiometer of Holzknecht, which depends upon the photographic effect of the rays in a given time. Dr. Delphy considers the Becquerel rays to be ether waves much shorter than the waves of ultra-violet light, and the x-rays to be electrical oscillations of still briefer period. He describes the well known chemical and physical properties of the x-rays and of the kathode rays. S-rays is the

name given by some to rays which are produced when the x-rays strike some resistance, and the name S′ or Goldstein rays is given by some to the x-rays that have passed thru some transradiant medium. The physiological and pathological effects are briefly considered by the author who quotes the opinion of others on these subjects.

Roentgen Rays in Cranial and Cerebral Affections.—Benedikt calls the attention of the profession to the information to be derived from radiographs of the skull after traumatisms causing the so-called "shock neuroses." He takes radiographs of the profile and also of the front and back of the head, and finds that in many instances the bones are abnormally permeable for the rays at the points where pressure is painful, showing the existence of some inflammatory process at this spot. The facts demonstrated by radiography have been confirmed by the anatomic findings later in many cases in his own and Kienboeck's experience. In case of pachymeningitis, the inner layer of the bones of the skull may be less permeable than normal. This corresponds to the hemorrhagic tendency of pachymeningitis. In cases of unilateral meningitic swelling or hydrocephalus externus, the increased permeability will attract attention while pachymeningitic hemorrhages are distinguished by the reverse phenomenon. These shades of difference are best seen on the plate, and physicians should learn to read the plates and thus avoid the further errors of the copy. Roentgen rays thus applied avoid all confusion from simulation or aggravation on the part of the subject, and reveal the anatomic basis for traumatic neuroses which is too often denied.—*Jour. A. M. A.*

X-Ray in Medical Diagnosis.

Dr. S. P. Rees, of Minneapolis, writes an excellent paper on this subject in the *Northwestern Lancet,* May 1, 1903. After calling attention to the value of the rays in surgery, to the necessary apparatus, and to the methods of examination by the fluoroscope, he refers to the importance of correct interpretation of x-ray pictures. In one case the maker of a skiagraph showed a large round mass which he interpreted as a stone in the bladder, but which really was produced by a round ring pessary. Only a physician can make true interpretations from skiagraphs. The chest conditions in which x-ray examinations are useful are given in detail. His conclusions are that the x-ray is a very valuable aid in the diagnosis of many medical diseases, and of primary importance in the diagnosis of several, that under proper conditions the danger of x-ray burn is very small, and that the rapid improvement now being made in apparatus and technique render it difficult for the ordinary practitioner to at present make much use of this method of examination.

Stereoscope for Roentgen Ray Photographs.—An illustrated article in which attention is called to the fact that stereoscopic Roentgen ray photographs, produced by using two focus tubes, or by using a single tube in two successive positions, are always too large for use in the ordinary hand stereoscope. A direct-vision spectroscope devised by Walter is described which is capable of viewing photographs of any size, consisting of a combination of a wide-angle photographic camera and two simple eye pieces; for these latter lenses of the ordinary hand stereoscope may be used. In Walter's spectroscope there are neither reflectors nor prisms, but only lenses. The construction is described and illustrated in detail.—*Elec. Rev.,* April 24.

Electro-Therapy.

Electric Production of Sleep.—LEDUC [*Comptes Rendus,* July, 21; abstracted in Lond. *Elec.,* August 15] gives a description of a method of producing sleep and local anaesthesia by means of electric currents. Continuous current is used, from an accumulator, with a small resistance in the circuit. A non-inductive interrupter, giving 150 to 200 breaks per second, is inserted in the circuit. A moist electrode is placed on the animal's shaven head and another on the back near the tail. The e. m. f. is rapidly increased till the animal shows generalized contraction, and respiration is stopped. The current is then reduced to about 5 milliamperes, with 12 to 30 volts. Respiration then sets in again and the animal sleeps a profound and tranquil sleep. It lasts as long as the current is continued. "As soon as it stops, the animal wakes up and jumps about with every sign of delight, and no evil consequences appear to result." If the current is not first brought to the point at which respiration stops, some agitation is displayed, such as seen in the administration of chloroform. A similar current applied to the root of a human nerve, such as the median of the wrist, gives rise to complete anaesthesia of the region innervated, accompanied by a prickling sensation, which is not painful. *Electrical World and Engineer.* Sept. 13, 1902.

Kataphoric Medication.

Dr. J. D. Prather, of Oakland, Cal., in a paper published in the *Occidental Medical Times,* March, 1902, discusses kataphoresis on the mistaken theory of the conveyance of a fluid in the direction of the positive electric current. "There is an actual mechanical transference of material from the anode in the direction of the kathode." Such a mechanical transference is unknown to electricians, tho often referred to by writers upon electro-therapeutics. The experiments referred to by the latter to prove the existence of this mechanical transference are inconclusive, and that theory is not accepted by scientific electricians. On the other hand the facts of kataphoresis are all explained upon the hypothesis that it is simply electrolysis. Explanations of kataphoresis based upon "actual mechanical transference of material" fail to explain why the transference is frequently in the wrong direction. Salts of mercury move invariably toward the kathode; that is to say, more accurately, the mercury ions move toward the kathode while the acid ions move in the opposite direction toward the anode. In applying potassium iodid the iodin ions move toward the anode, the potassium ions toward the kathode. Dr. Prather recognizes that electrolysis is the principal element in kataphoresis, and quotes from Hedley the following table for a potential difference of one volt per linear centimeter:

Hydrogen travels at...	1.080 cm. per hour
Potassium travels at...	.205 cm. per hour
Sodium travels at.....	.926 cm. per hour
Lithium travels at.....	.294 cm. per hour
Iodin travels at.....	.216 cm. per hour

He quotes without comment Meissner's conclusions, which we reproduce because they are all wrong:

(1) Kataphoresis will take place from the positive pole only. (2) The electrode liquid must be a better conductor than the liquid within the tissues. (3) The current must be reversed every five minutes. (4) Both electrodes must be moistened with the liquid to be introduced. (5) Both electrodes must be placed as close to each other as possible.

In conclusion he gives a number of cases which have been successfully treated by kataphoresis.

Electrotherapeutics and Quackery.—At the first annual meeting of the British Electrotherapeutic Society, Mr. Edmund Owen delivered an address in which he deplored the lack of proper recognition of the treatment of diseases by electricity, on the part of the medical profession, and attributed to that cause the fact that the medical use of electricity had fallen largely into the hands of quacks. While we cannot agree with Mr. Owen as to cause and effect, our inclination being rather to reverse the order, we heartily concur with him in that the practice of electrical therapeutics is largely in the control of those whose consciences are somewhat blunted and those whose enthusiasm conjures up at times strange dreams. The fact that there are scarcely a handful of reputable authorities in the world to-day who have any faith in or knowledge of the therapeutics of the static form of electrical-manifestation, and that there are hordes of users of this method whose voicings betray their ignorance of even the elements of electrophysics, is significant at least. Turning to so-called galvanic electricity, which has been somewhat explored by able and reputable scholars and put upon a comprehensible basis, we find one recent writer speaking of "a boil that a surgeon had opened, and then the germs got in and the trouble began." He "placed a needle in the boil and turned on about two and one-half milliamperes of *negative electricity,*" and the cure was speedy, etc., while others are reporting cures of every ailment from chilblains to cancer, and reporting the same with the most ingenuous disregard for the accepted theories of electricity.

The wide-spread employment of the Röntgen ray will do more to bring about a dissemination, if not a deeply grounded knowledge, of apparatus and electric manifestation and effect upon the human system than anything that has occurred for many years.—Editorial *Medical Record.*

Progress and Promise of Electro-Therapeutics.

Dr. Samuel S. Wallian, of New York, in the *Medical Brief,* March, 1903, says electro-therapy is now for the first time ready to be developed into a satisfactory science which might aptly be called vito-therapy or dynamo-therapy, because life is mainly an electro-chemical phenomenon. He regrets the ignorance of medical electricity among doctors. A rule of thumb is no longer sufficient for the medical uses of electricity. An actual knowledge of electro-physics is required. "Electricity is the primal underlying force of the universe, and therefore no machine generates electricity, but merely diverts it into artificial or universal channels." This statement will hardly meet the approval of physicists. In speaking of the high tension current he points out that many non-conductors such as glass, air, rubber, allow it to pass readily, and consequently the fact that a conductor has a given resistance for a constant current gives little or no information of its power of resistance to high frequency currents. These facts are readily understood when it is remembered that high frequency currents are essentially electric waves.

Electro-Ozonation in Neuralgia.

Dr. G. Lenox Curtis, of New York, in the *Jour. A. M. A.*, August 9, 1902, describes his ozone generator (a high tension current). His process of ozonation appears to be simply the use of the high tension current with vacuum electrodes, which he finds efficacious in the relief of neuralgia of various kinds.

Removal of Tonsils by Electro-Cautery Dissection.

A case of mycosis tonsilaris affecting both tonsils was operated upon by Dr. Richmond McKinney, of Memphis, Tenn., under cocain anesthesia followed by application of adrenalin chlorid, by an electric cautery, resulting in a complete cure. (*Jour. A. M. A.*, April 11, 1903.)

X-Ray Therapy.

X-Rays Cure Xeroderma Pigmentosum.—At the Edinburgh Medico-Chir. Society Dr. Allan Jameson showed a case of xeroderma pigmentosum which had been treated by the x-rays. The patient was a little girl, the youngest of two children, who had suffered from the disease. At the age of 12 months she began to develop freckles at the side of the nose. Later telangiectasis and whitish spots began to develop on the face. The disease had extended to the hands and wrists. When seen on October 1 there was an epitheliomatous growth on the tip of the nose of the size of a sixpence, and numerous warty growths on the face. Thirty-four exposures to the x-rays, each of 5 minutes for the face, and 13 minutes for the right hand, were given. The growth on the nose and all the warts on the face disappeared. An x-ray dermatitis was produced. The nose is now whiter than the rest of the face and there is marked improvement of the right as compared with the left hand. This case shows the difference between the action of the x-rays and the ordinary actinic rays of the spectrum, for the latter tend to increase pigmentation of the skin.—*Jour. A. M. A.*, Feb. 14, 1903.

Treatment of Acne by X-rays.

Dr. R. R. Campbell, of Chicago, reports 15 cases in the *Jour. A. M. A.* for August, 1902, more or less completely cured by the x-rays alone. He used a medium soft tube, moderate illumination about 15 centimeters from the patient, with exposures of ten minutes each, usually every other day.

X-Rays for Hodgkin's Disease.—A case of lymphadenoma treated by x-rays with marked improvement at the University of Colorado Hospital at Boulder suggests the value of further investigations along this line.—*Jour. A. M. A.*

The Therapeutic Use of the X-Ray.

Dr. G. H. Stover, in the *Denver Medical Times,* cites a number of cases successfully treated by x-rays. Ulcers of the leg, cured; cancer at base of bladder, much relieved; cancer of the cervix, improved; epithelioma of face, cured; Hodgkins' disease, much improved. Regarding cost, he says, "I don't know of any operator who has made a cent on his x-ray work so far. Sometimes a tube will last a month; many times one will last 15 minutes or less. The supplying of tubes to a machine reminds me of feeding eggs to an elephant, and if the eggs cost $20 apiece the similarity would be still greater."

Radio-Therapy Observations.

Dr. Joseph Zeisler, of Chicago, in a paper read before the American Dermatological Association at Boston, Sept. 19, 1902, considers the therapeutic effects of exposure to the x-ray tube to be due to the direct action of the rays upon the tissues. The rays from the soft tube give energetic clinical effects, being mostly absorbed in the upper layers of the skin. A good induction coil he considers much preferable to a static machine for dermatological purposes. He uses self regulating tubes of the Müller type. One exposure to the rays for 20 minutes in a single sitting often produces dehiscence of hair from the exposed area. After such treatment wait several days to find intensity of the reaction. He prefers 10 minute exposures at intervals of a day or two to the number of from 5 to 8, after which the further treatment will depend upon the condition of the patient and the amount of reaction present. The accumulative character of the effect must not be overlooked by beginners.

He has never found ulceration or gangrene result from his treatment. This

fact is explained by his use of a soft tube exclusively, which does not penetrate into the deeper tissues. The ideal way of using x-rays is to produce results with the least irritation. He protects the parts which are not to be exposed by thick sheet lead lined with flannel. He gives a summary of the results in 81 cases. In hypertricosis he finds that 3 to 5 20-minute exposures to intense radiation given at intervals of a week or two will produce complete epilation. This results in pigmentation and temporary erythema which gradually yield. He concludes: "I can only say that my experience with radiotherapy so far has made me an ardent advocate of it, and I believe that until it is replaced by something still more marvelous it will constitute one of the most effective weapons in our fight against a large class of dermatologic infections."

Resume of X-Ray Therapeutics.

C. H. STOVER, M. D., DENVER, COLO.

Denver Medical Times, in a very able article on x-ray therapy gives credit to Dr. Pratt as the pioneer in this line of work, as follows:

"The first therapeutic use of the x-ray was made, I am led to believe, by Dr. H. Preston Pratt, of Chicago, who, on April 13, 1896, began the treatment of two patients suffering from cancer of the stomach. These patients claimed to be benefited for the time, but I have no report of the outcome of the cases. On April 19, 1896, Dr. Pratt began a week's treatment of a case of pulmonary and laryngeal tuberculosis; the patient was improved by the treatment, but left the city at the end of a week and later died."

Cancer of the breast is reported cured. One case recurrent, by Ferguson; two cases by Morton, and three by Bryant. In carcinoma an x-ray treatment should follow excision. The x-ray is preferred to excision in superficial cancer of the face. Microscopic study of sections from superficial cancer shows at first a fine granular condition of the cells of the growth, then a loss of the nuclei of the cells, and finally their complete disappearance. He has cured lupus vulgaris, lupus erythematosus and lupus hypertrophicus, by the x-ray; the healing takes place without scarring. Cases of keloid and rodent ulcer are reported cured by x-rays; also indolent leg ulcers, and slow healing and infected wounds. In sarcoma favorable results are reported by Skinner and Morton. Coley favors the conjoined treatment with x-rays and the toxins of erysipelas and bacillus prodigiosus. Allen found it to relieve the pain in chronic rheumatic arthritis, discharging tubercular sinuses, varicose ulcers, and in chronic ulcer of the foot. Hart cured two old sinuses of the abdominal wall after other treatment failed. Soiland speaks of the benficial effects of x-rays in cases of tuberculosis of the lungs; "in 1899 Dr. H. P. Pratt treated three cases of lung tuberculosis, one of them being improved and two apparently cured. [These cases were reported in the Chicago Medical Times in July, 1896.] Of five cases of pulmonary tuberculosis treated at the Royal Infirmary, Edinburg, recently, one has been cured, two were improving, one was not changed, and one, an advanced case, was growing worse; of four laryngeal cases, one was cured, another recovered his voice and was improving, and two had not improved when the report was made. Campbell reports fifteen cases of acne, some inverterate, cured, when other treatment failed. Rebelious cases of acne and indurated eczema, even scrotal eczema, is amenable to the x-ray; other superficial parasitic diseases—sycosis, alopecia areata, and favus are reported cured by x-rays. In the opinion of the writer, the x-ray is the best treatment yet discovered for superficial tubercular diseases, Hodgkin's Disease and epithelioma.

X-Ray Dermatitis.

Dr. Philip M. Jones (*Brooklyn Medical Journal*, April, 1903) says that there is no question whatever in the minds of physicists, tho he believes there is in the minds of some medical men, as to the cause of x-ray dermatitis. It is practicable to eliminate all questions of electrical action, heat action, or conditions of that sort, and to narrow the whole investigation down to the point where the action becomes one of absorption of radiant energy. Having established that point we reach the domain of a very wide field.

The action of energy in chemistry is exceedingly interesting, but very complex. Its characteristic form is in the explosion of high explosives. If, for instance, you hit a cap of fulminating mercury with a hammer, you have a chemical change the result of energy. The molecule in the fulminate is highly complex, composed of a very great many atoms. When it is destroyed the resulting gases take up a wonderfully increased volume, and the result is an explosion.

If we consider the next step we come to the action of light on the photographic plate. Here the action is composed of molecules highly complex in their structure, a large number of atoms that are unstable and easily affected. When the light or any other form of radiant energy that is supplied strikes the emulsion on the plate, we have the same result that may be produced not only by light, but by pressure or electrical discharge. In using a kodak if you twist the roll quickly on a hot day, you frequently find that your film is vague, that there are radiant lines all over the film. It is simply a question of energy in some shape or another being expended on unstable molecules and rearranging the atoms and producing a chemical change. This is exactly what takes place in an x-ray dermatitis.

The x-rays are nothing but radiant energy. They are exactly of the same sort as heat rays or ultra-violet rays or light rays, but they vary in their physical characteristics. If we consider the spectrum, that portion which includes the ultra-violet and light rays we may arbitrarily say represents one-half inch in extent. Then if we skip a blank space of four or five inches, we come to the rays that are known as x-rays: the intermediate rays are undetermined. The longest gap between the x-ray and the rays of the spectrum would represent a reading of four or five inches. The x-rays that we can determine would represent a space of six or seven inches.

The use of these rays of great variety of wave length in medicine is exceedingly interesting. We are just barely scratching the surface. He reported a case in 1897. The patient was a woman of 60 years who had the entire right side of her face one large open sore of lupus, commencing to involve the lower eyelid and involving more than half the right ear. He took this patient to the meeting of the California Academy of Medicine and had her looked over carefully, and told them that he thought theoretically the x-rays should have some effect on these tissues, because the lupus cells are of a decidedly higher organism than the cells in the normal healthy skin tissue. The molecules in the pathological cell are more highly organized than the molecules in the normal cell. The theory on which he based his treatment was, that if this was the case, and if the action in the skin and tissues were similar to the action in the photographic emulsion, then there should be a decided result.

The treatment was commenced and lasted several weeks, at the end of which time almost the entire surface had been healed over with fairly good healthy skin. The ear remained still inflamed and swollen. While he was treating the case he was called away from the city and had to turn the patient over to some one else,

but the treatment was continued with a perfectly satisfactory result. That was sufficient evidence to him that the theory was correct. The theory from a purely physical standpoint is unquestionably correct. At the present time there is no electrician acquainted with the subject that disputes the action of the x-rays in producing this x-ray dermatitis as being similar to the change in the photographic plate.

The further development of this matter of treatment is going to be exceedingly interesting. The variation in wave length is due to two factors: First, the degree of vacuum in the tube, and, second, the rate of interruption in the current thro the tube. The conditions are precisely the same whether we use the coil or static machines. The variation in the rate of interruption of the current going thru the tube can be controlled by a number of physical devices. The question of vacuum is one not readily controlled, and it is an exceedingly vexing question. We can, however, use tubes of different vacuum for different sorts of experiments, and by taking the tube of a given vacuum and changing the rate of interruption, we can produce rays of very great difference in their wave length.

He believes that careful research along these lines will prove that the absorption of the light rays by pathological cells in the deeper tissues is quite possible; in other words, that we will find these pathological cells will be in a certain way selected; that they will be affected by waves of different length, when other cells will not be affected in this way. Certainly it is perfectly possible to make x-ray examinations without producing x-ray dermatitis, if the proper tube is selected and used in the proper manner.

The X-Ray as a Therapeutic Agent.—An interesting discussion upon this subject took place in the Cincinnati Academy of Medicine a short time ago, called forth by a paper by William Jordan Taylor. According to Taylor the x-ray treatment is valuable in the following five conditions: (1) In hypertrichiasis, for the removal of undesirable hair; (2) in diseases of the hair and hair-follicles, such as sycosis, tinea tonsurans, favus, and when the removal of diseased hair is essential; (3) in the treatment of inflammatory troubles, such as chronic eczema, in which it is necessary to stimulate the tissues and produce absorption of inflammatory products; (4) In certain affections in which it is desired to cause destruction or absorption of tissues of low vitality; (5) to relieve pain and to produce sleep. This list, however, by no means exhausts the affections for which the x-rays have been and are employed. In the discussion, which was participated in by Ravogli, Shields and Heidingsfeld, Shields expressed the belief that the results attributed to the x-ray are not due to the action of this agent at all, but to rays of a different sort produced in the tube with the x-ray. He also gave it as his emphatic opinion that the x-ray has absolutely no power to relieve pain. This is in strong contrast with the views of others, particularly with those expressed by Moseley in *American Medicine,* January 31, 1903.—*Am. Medicine,* Feb. 14, 1903.

The Roentgen Ray in Ophthalmic Practice.

Dr. Don M. Campbell, in the *Ophthalmic Record,* July, 1902, illustrates the finding of foreign bodies in and about the eye by means of x-ray photographs, and calls attention to the very great value of this discovery to the ophthalmic surgeon. He mentions also the great value of a powerful electromagnet in removing pieces of iron and steel from the eye.

Laryngeal Cancer.—The actual position of x-ray therapeutics as regards laryngeal cancer at the present time, according to Delavan, is that not a single case has been apparently reported cured, but few cases have been thus treated. In one case treated by Dr. W. J. Morton for the author, apparently good results were produced on the growth, but the patient died of Bright's disease after twenty applications of the x-ray. He thinks that the victim of advanced laryngeal cancer should at least be allowed the benefit of this method.—*Jour. A. M. A.*, January 31, 1903.

Cancer of the Larynx Cured by the X-Rays.—W. Scheppegrell (*N. Y. Med. Jour.*, December 6, 1902) reports a case of carcinoma of the larynx in which a complete cure was obtained by the x-rays alone. The growth involved the left wall and left vocal cord. A high tension Tesla coil was employed, and a tube with a medium vacuum was selected in order to gain some penetration. The face and chest were protected, but the neck was freely exposed in the hope that any involvement of surrounding glands might be influenced by the treatment. At first the platinum reflector (anticathode) was placed at a distance of fifteen inches, afterward this was reduced to seven inches from the neck. The exposure lasted ten minutes and was repeated daily for twenty days. No dermatitis developed. The platinum reflector was brought to a dull-red heat, and the vacuum was maintained about the same from the beginning to the end of the treatment. At the end of three weeks congestion seemed more marked and the tumor unchanged; pain, however, had disappeared after the second exposure. Some ten days later, upon examination, it was found that the tumor and most of the symptoms had disappeared. Treatment was recommenced and carried on for ten days, by which time the ulcers were healed. The patient, when seen three months later, seemed in good condition, the aphonia due to the loss of tissue of the left cord had been partially overcome by compensatory overaction of the other cord.—*St. Louis Med. Era.*, Feb., 1903.

Roentgen Ray in Cancer.—Medical Mirror gives a synopsis of a paper on this subject read by Dr. Charles W. Allen before the New York State Medical Society. Dr. Allen's work with the x-ray has not been experimental but follows the established practices of others. He considers the rays as an important and valuable supplement to one's armamentarium, but does not think that they supplant the older methods of treating these conditions entirely. Twenty-eight cases of cancer are presented, all of which have shown satisfactory progress. Eight of the patients have been discharged as apparently cured. One patient died after improvement had occurred. Four were looked upon as practically well, and thirteen are still under treatment. Five of the whole number were cancer of the breast, all recurrent; one of the rectum; one of the pelvis, secondary to removal of the uterus; one of lip secondary to operation; one of jaw, which was suspected to be sarcoma; two of nose; one multiple epithelioma of face, nose and eyes in a lad of 15, one globe being so widely involved that the sight was destroyed; the opposite eye being involved in a growth which had been pronounced non-malignant but which is clinically very suspicious of malignancy. In conclusion he says that (1) the method is one of decided value; (2) it is not without disadvantages and can cause serious troubles if unskillfully handled; (3) that the method will not wholly supplant the older methods, but has its decided place of utility.—*Am. Jour. Surg. and Gynecology.*

X-Rays in Lupus and Malignant Growths. Dr. T. J. Buchanan, of Philadelphia, reports a number of cases in the *Phila. Med. Jour.*, April 25, 1903. Case I, lupus of the nose and cheek. After several operative treatments without success the x-ray alone cured with 80 exposures. Case II, epithelioma of the cheek, nose, floor of the mouth and superior maxilla. The patient is 45 years of age. The sore began on the lower lip 12 years ago and was excised one year later. Present trouble began in the cheek July, 1901, and was excised in October following, along with some subaxillary glands. Recurrence followed in two weeks, so large as to be considered inoperable. X-ray treatment began January 9, 1902, with ten-minute exposure at 12 inches distance every third day. Improvement was immediate. When treatment stopped a short time the growth advanced. The mass has entirely disappeared. Case III, epithelioma of the nose in woman 65 years of age, had exposures of five minutes at intervals of three or four days. At the end of five weeks the nose was completely healed and there is no recurrence to date. Case IV, epithelioma of the nose and superior maxilla. Rapid growth begun from a wart two years ago. After excision the growth recurred. After the second x-ray exposure pain entirely ceased. After twenty exposures improvement is very great but the patient is not yet cured. Case V, lupus of the forehead in man aged 42, begun September, 1900. Exposed twice a week for five minutes. After 14 exposures the growth disappeared but recurred in one month. Eight more treatments were given, producing apparent cure. No recurrence since. Dr. Buchanan considers exposures of five to ten minutes long enough and has three or four days' interval between. He protects the surrounding tissue by sheet lead or tin foil, and has the tube two inches distant. He finds that a tube of medium high vacuum is better than a tube with a low vacuum. He prefers one that will make a good skiagraph of the hip joint of a normal person. He considers that only skilled operators should have charge of the treatment.

Epithelioma Engrafted on X-Ray Burn.—Dr. Lloyd (*Medical Record*, April 4, 1903) reports that at one time he had worked in Edison's laboratory with the x-ray. The tube maker there received very severe burns on his hands and head. Finally he lost all of the skin on his hands. He was skin-grafted in two or three hospitals, and finally returned to New York with an epithelioma developed on the x-ray burn of the right hand. This epithelioma grew rapidly while he was under x-ray treatment, and eventually Dr. Lloyd had been compelled to perform amputation.

Fibrosarcoma Cured by X-Rays.—J. P. Torrey, M. D. (American Medicine, March 14, 1903), reports a case where a post mortem examination of the site of the tumor showed no trace of the fibrosarcoma. Surgery was resorted to at first and the tumor removed. The wound healed but afterwards reopened and discharged a bloody fluid. Later a recurrent nodule the size of a cherry was removed. The wound did not heal completely. Examination proved the growth to be a fibrosarcoma. Dr. W. B. Coley advised serum injections of the mixed toxins and x-ray exposures. Treatments were given two or three times a week from ten to fifteen minutes at about eight inches from the target of the tube. Injections were also used once or twice a week. Under this treatment, varied somewhat from time to time, the tumors entirely disappeared. The patient, not long afterwards died of typhoid fever and an examination of the scar and adjacent tissue showed no trace of sarcoma.

A Case of Rodent Ulcer of the Nose and Eyelids Treated with the X-rays.—The case is reported in the *Lancet* by Stopford Taylor, whose patient was a sailor aged eighty-two years. The condition has existed for some twenty years. Treatment was begun on May 15, 1901. A current of three amperes was used for twenty minutes twice weekly. From June 12 the sittings were increased to four times a week. Up to about August 19 healing had been very slow, but on this date treatment had to be suspended because of the sharp reaction, indicated by a sudden appearance of a dusky red erythema surrounding the ulcer, attended by the destruction of the newly-formed epithelium upon its surface and of the surrounding epidermis, brought about, I think, by change of the x-ray tubes from one of high vacuum to one of medium vacuum. It took five weeks for the effects of this reaction to disappear, when spontaneous healing began and was very rapid, for on October 15 the ulcer had cicatrized with the exception of a small area, which proved obstinate and where an application of potassa fusa had been made six years previously. On this date treatment by the x-rays was resumed, but they were applied to this unhealed spot only for ten minutes three times weekly, the newly-formed scar tissue being specially protected from their action with double lead foil shields.

Treatment was completed by December 20. At that time there was not the slightest evidence of the disease, neither has there been any recurrence. It is interesting to note also that the conjunctiva of the everted lower lid and that of the inner canthus was covered with a smooth layer of opaque horny epithelium and no trace of the puncta remained.—*Medical Record.*

No progressive physician can now afford to be ignorant of the principles of electrotherapeutics and x-ray and light therapy.

To the Editor of the American X-Ray Journal:

Sir:

I herewith report a case that was of interest to me and hope it may be of use to some of your readers.

On June 3rd, 1903, Mr. H. came to my office for treatment. About six hours earlier he had attempted to get on a moving car, missed his hold and fell to the ground.

On examination I found the right hand much swollen, and almost entire loss of motion from pain. Diagnosis: Sprain.

I applied the roller connected to a static machine on both front and back of hand, after that a medium tube at eight inches for five minutes; then an adhesive plaster dressing. Next day the swelling was slightly increased, the pain less and motion increased. Treatment the same. On the third day the swelling almost disappeared and there was no pain and normal motion. Treatment the same except that I left off the adhesive plaster bandage.

For three days his hand gave no trouble, so no treatment of any kind was used. On the fourth day he wrote all day and that night his hand was again swollen and painful. Treated him that same evening as at first, except using no bandage. Since then has been entirely well.

R. R. Farquhar, M. D.

Washington, D. C.

Correspondence is invited from other manufacturers upon the subject discussed by Waite & Bartlett in our last issue, regarding the best construction for static machines. Editorial comment is reserved until later.

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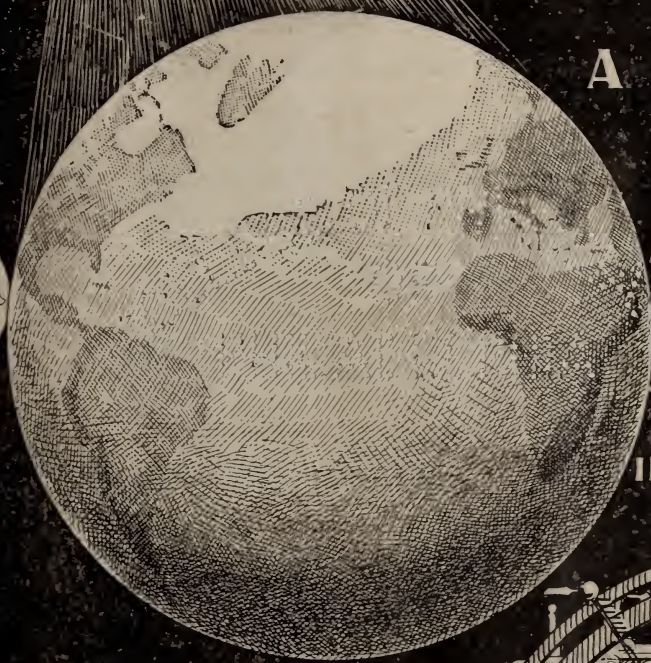
THE AMERICAN X-RAY JOURNAL



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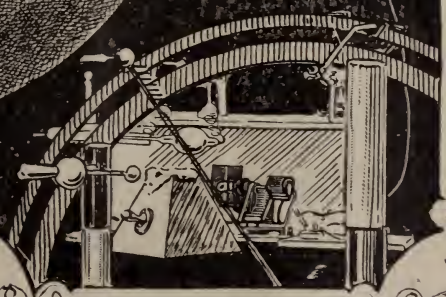

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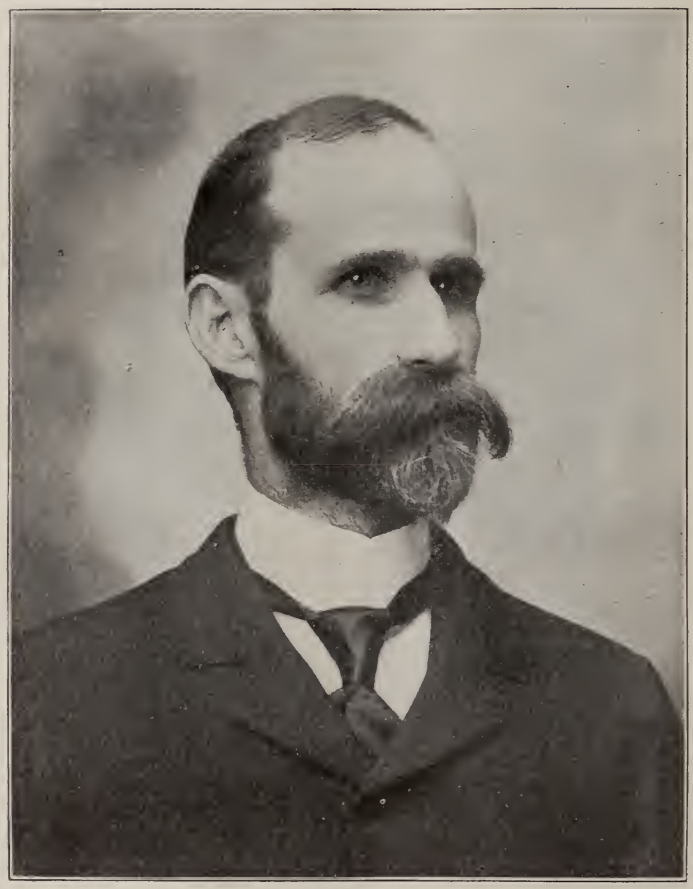

DR. T. PROCTOR HALL,

Secretary of the American Electro-Medical Society.

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Electro-Therapy.

A Course of Twenty-four Lessons under the auspices of the Chicago College of X-Ray and Electro-Therapeutics

LESSON 2.—WHAT IS ELECTRICITY?

In seeking an answer to this question, we leave the realm of facts and enter the domain of theory. A theory is useful when it assists us in understanding the facts that we already know and also when it assists in the discovery of new facts. A theory, then, may be very useful without being true, tho a true theory is, of course, the most useful of all.

As already stated, the earliest theories of electricity were based mainly upon electro-static phenomena, and assumed the existence of one or more ethereal fluids. These one-fluid and two-fluid theories have been of great use in the advancement of the science of electricity, tho they are now known not to be true.

In every useful theory there is more or less of implied truth. It is not true, as is assumed in the fluid theories, that an electric current is a flow of some fluid along the conductor; but it is true that there is a flow of energy along the conductor wherever an electric current exists. It is not true that an electric charge is an accumulation of a positive or negative fluid; but it is true that in an electric charge there is an accumulation of strain, of matter or ether, in which the potential energy of the electric charge resides. An electric discharge in gas, while it is not a flow of an ethereal fluid, consists largely of, or is, at any rate, accompanied by, a stream of material particles. It is thus seen that instead of having to be completely abandoned, fluid theories of electricity require only a reconstruction in order to fit fairly well the facts of electricity as they are now understood.

Numerous mathematical theories of electricity have been worked out from time to time, based upon more or less definite physical assumptions. While these theories are exceedingly useful in the development of the science, and in the case of electricity have actually preceded, in many instances, our knowledge of the physical nature of the phenomena to which they apply, it is unfortunately true that not more than one man among a million is capable of thinking clearly and easily in mathematical terms; consequently a theory, in order to be of general use, must be expressed in mechanical or, at any rate, physical terms.

The first distinct advance in this direction was made by James Clerk-Maxwell who was both mathematician and physicist. He showed that on the assumption that an electric charge upon a surface consists of an ethereal strain in and about that surface, it becomes possible to deduce mathematically the laws of these phenomena. Maxwell was unable to find a definite strain which would fulfill all the required conditions as a basis for his mathematical calculations. His views, in spite of this defect, were quickly adopted

by the leading physicists of the world, tho they made little headway among scientists in general until Hertz succeeded in producing experimentally electro-magnetic waves of the sort whose existence had been theoretically described by Maxwell.

Apart from his mathematical work, Maxwell's contribution to the theory of electricity consisted in showing that electro static phenomena can be explained by the assumption of a strain in the luminiferous ether. Previous to his time it had been fashionable to assume one ether in order to explain light, another to explain sound, another to explain magnetism, etc. In fact, everybody who had something to explain felt himself at liberty to invoke a new ether for that purpose. By showing that the phenomena of elctricity and of light could be reduced to a single theoretical basis, Maxwell established the luminiferous ether upon a firm foundation and gave the death blow to the numerous wild-cat ethers of mere speculators.

When the existence of electro-magnetic waves (ether waves) had been experimentally proved, attempts were made to explain all electrical phenomena upon this basis. Poynting's theory was of this class He supposed that an electric current in a wire was not in the wire at all, but consisted of a series of "stationary waves" in the di-electric surrounding the wire. This assumption rested upon the flimsiest kind of evidence, and gave rise to many more difficulties than it could possibly explain. The theory enjoyed a brief popularity and then died a natural death.

Additions in our knowledge of physical chemistry, and particularly investigations upon the dissociation of salts in solution, led to the development of the theory of ions; namely, that some molecules in solution became separated into two separate parts which are electrically charged. The one bearing a positive charge is called the positive ion or anion, the other a negative ion or kation. The electro motive force of a battery is derived from the tendency of oppositely charged ions to unite, and the force of union must be overcome before salts can be decomposed by an electric current or any other force.

"Start with the hypothesis that electricity is a persistent force which is a part of the atomic structure of matter, that this force is constant, and is the vital force so far as the seventy-odd elements now discovered are concerned, and each element is endowed at all times with a constant electrical pull. Its presence is made known to the senses by the attracting and repelling phenomena, each element bearing a definite relation with the others, in proportion to their electrical pull and rate of oscillation or harmonic condition (better known as the combining power). This constancy of electrical pull, which is the vital part of the elements associated with a definite rate of oscillation, gives to us the various forms of matter, known as compounds."—*Pratt.*]

The ionic theory explains satisfactorily most of the facts of electrolysis, as well as a great many other physical phenomena, and must be considered as at any rate very close to the truth. Attempts to apply the same theory to gases have been only partially successful, and when we come to consider solid conductors the theory seems to fail altogther. It is a theory which deals essentially with matter in a liquid form.

Dr. Pratt's view of an electric current is that every electromotive force causes the molecules to form themselves into closed magnetic chains wound spirally about the lines of electric force. It further causes an oscillation of the molecules which is transmitted as an impulsive push in the positive direction along the spiral chains, and as a pull in the negative direction along these chains.

For a long time mathematicians have

known and made use of the analogy which exists between an electric current and a vortex ring. Some years ago the Vortex theory of electricity and magnetism was developed by T. P. Hall upon a mechanical as well as mathematical basis. According to this theory an electric current is a vortex ring, consisting of a bundle of closed chains (not spirals) of polarized atoms which are lying parallel and rotating in the same direction with great velocity. Each atom or molecule behaves as a magnet, taking hold of its fellow as soon as the electro-motive force is applied, and forming a complete chain or circuit. All the atoms in a single chain rotate with the same speed. If the atoms at any part of the chain are held so as to prevent rotation, none can rotate, and there is a polarized condition, but no current.

There are two possible directions of rotation, right handed or positive and left handed or negative. Any particular rotation, however, is right handed looking in one direction, and left handed looking in the opposite direction; so that every electric current is both positive and negative according to the point of view. A conductor is a substance which allows the rotation of these chains of atoms to take place.

In a nonconductor the atoms are so held in connection with their fellows that they can rotate only a little way; remaining in this strained condition so long as the original twisting force (electro motive force) is acting, and returning to their usual condition when this force is removed. The twisting strain produced by a positive current is called a positive charge, and may in turn give rise to a positive current. A left handed twist, produced by a negative current, is a negative charge, and may give rise to a negative current. Thus there can be two, and only two, kinds of electric charges as well as of electric currents.

About each electric current there is produced by the rotation of the atomic chains a shearing strain in the dielectric. This shearing strain is the source of magnetism.

An alternating current produces in the surrounding region alternating strains which, passing outward from the wire, constitute polarized ether waves of the kind produced by Hertz. An ether wave such as would be produced from the end of a conductor subject to an alternating electromotive force is a cylindrical wave, and answers the requirements of a wave of ordinary light.

A permanent magnet is a piece of steel thru whose interior the ether has been pushed slightly from the south end toward the north end, returning on the outside in the direction of the well known lines of force.

This theory explains the attractions and repulsions existing between electric charges, electric currents and magnets, and shows clearly the relation between these and electromagnetic waves. It is entirely satisfactory as an explanation of electric currents and charges.

Electric discharges thru gases during the last thirty years have received a great deal of attention. Sir William Crookes' theory that the discharge in a very high vacuum (the kathode stream) is a stream of gaseous particles from the kathode, is all but universally accepted. J. J. Thompson's research upon the kathode stream led him to suspect that he was dealing with particles of matter very much smaller than atoms, and calculations made it probable that each one of these particles has about 1/700 part of the mass of an atom of hydrogen. He found further that the mass of the particles composing the kathode stream was independent of the nature of the gas from which they were derived. These researches, along with those of a considerable number of other physicists, have led to the Electron theory, namely,

that atoms are composed of a large number of excessively minute electrons, some of which are positive and some negative. Each electron is, or is indissolubly associated with, a minute electric charge. Under certain conditions negative electrons are discharged from the atoms, leaving the latter positively charged. The negative electrons constitute the kathode stream in a Crookes tube; they fly from a negatively charged metal in air; they constitute the material part of the radiations from radium and similar metals; and have the power of penetrating thin layers of metallic substances. One atom of hydrogen contains about 700 of these electrons. Calculations made upon several distinct lines show that the diameter of an electron is in the vicinity of one-millionth part of the diameter of an atom. Waves of light, which are known to be so short that they could not originate from the motion of atoms as a whole, are now supposed to arise from the oscillations of these electrons or bundles of electrons in the atom. So far, investigators have found only negative electrons. Whether the positive electrons are equally small, or whether the part of the atom which remains when one or more negative electrons have escaped from it constitutes the positive electron, it is too early to say.

The electron theory is so recent that it is difficult to say definitely what phenomena can be satisfactorily explained by it and what must be referred to other causes; but we are reasonably safe in saying that the theory has such broad and deep foundations that it has come to stay, and forms a valuable addition to our knowledge of electric phenomena.

The word "electricity" which Gilbert used to express the unknown cause of the forces of attraction and repulsion which he observed, can hardly be defined in the present state of our knowledge. The word is now usually restricted to the cause of electro-static phenomena, and with this meaning may be defined as an ether strain.

All attempts to identify electricity and matter are puerile. Electricity is a form of potential energy. Electric currents are a form of kinetic energy. And tho matter and energy are intimately and perhaps eternally associated, they are essentially distinct and incommutable.

The things which exist in the universe and whose existence is absolutely independent of human power are (1) Time. (2) Space, (3) Matter and Ether, (4) Energy, (5) Spirit, or whatever other name may be applied to the basis of consciousness. The physical scientist knows that the first four of these are eternal and indestructible. Of the last we have not the same knowledge, tho analogy leads to it being classed with the others.

Chicago Electro-Medical Society.

The June meeting was an informal banquet held in the Pullman building at 6 p. m., June 29. The president, Dr. Pettyjohn, in the chair. The business meeting was adjourned to 1208 Masonic temple, July 13, at 8 p. m. At the close of the banquet Dr. F. A. Leusman addressed the meeting as follows:

Electrical Illumination as Applied to Urethral and Vesical Disease.

F. A. LEUSMAN, M. D.

Professor of Genito-Urinary Diseases in the Chicago College of X-Ray and Electrc-Therapeutics.

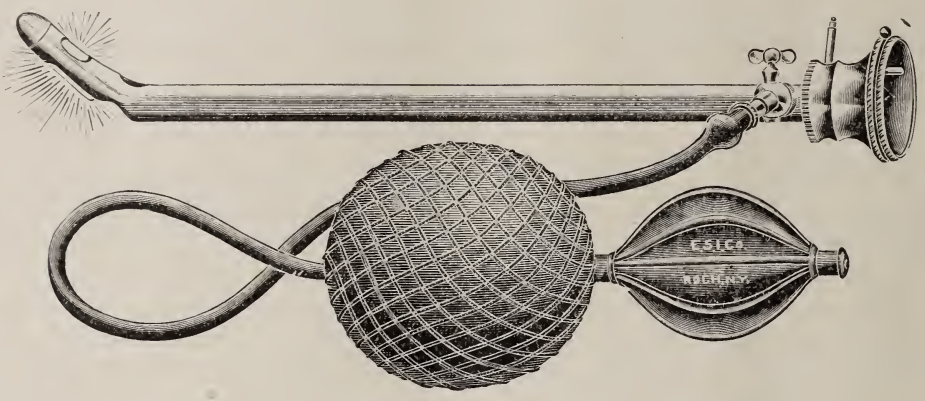
The urethroscope and cystoscope have become relatively popular instruments ever since the introduction into this field of an efficient and cool incandescent lamp. The latter did away with the very cumbersome cooling apparatus hitherto necessary. Each apparatus, especially the cystoscope, is still in the midst of a revolutionary progress, and has as yet not reached a stage of temporary perfection, like, for instance, that of the bicycle. And there are many reasons why urethroscopical and cystoscopical evolution must travel slowly. First and foremost, perhaps, we have the fact that the occasions loudly calling for the employment of these instruments are, on the whole, somewhat limited; then, the primary outlay necessary for their acquisition is not exactly small; their use calls for good judgment and experience in order to furnish satisfactory results and prevent harm to the patient. And again, it is a time-consuming process, much more so than either laryngeal or ophthalmological investigation. And worst of all, when most wanted, anatomical or pathological conditions frequently forbid their application.

The urethroscope is of use only after a urethritis has become chronic and if the meatus admits a caliber F. 24 or F. 26. A smaller calibered tube does not distend the urethral folds sufficiently for either inspection or treatment. Indeed, it is my rule to cut the meatus to F. 30 in obstinate cases requiring urethroscopical treatment. A straight urethroscopical tube introduced as far as the anterior layer of the triangular ligament and then gently and slowly withdrawn will give to the experienced eye a clearer demonstration of its physiological or pathological temper than any other device, reasoning inductive or deductive included. We simply see just how matters stand; we observe the color and luster of the mucosa, its vascularity, the presence or absence of hemorrhage or catarrhal conditions, as excess of mucous and leucocytes (pus). We notice the blanching of strictured parts; we recognize granular areas by their color and tendency to bleed; we see, if present, pin-head dilatations of Morgagni's sinuses; a papilloma could not escape our attention. In fact, in almost all cases we are enabled to make an approximately correct diagnosis. Thus we are enabled to apply equally correct treatment. We have a chance to watch the effects of treatment locally applied from time to time. While there is no particular difficulty attending the introduction of a straight urethroscopical tube into the membranous and prostatic urethra, it is always somewhat painful to the patient, and especially so in cases of posterior inflammation. A curved tube with a window on its posterior aspect seems here preferable, exposing, as it does, the caput gallinaginis, while at the same time its blunt tip prevents the es-

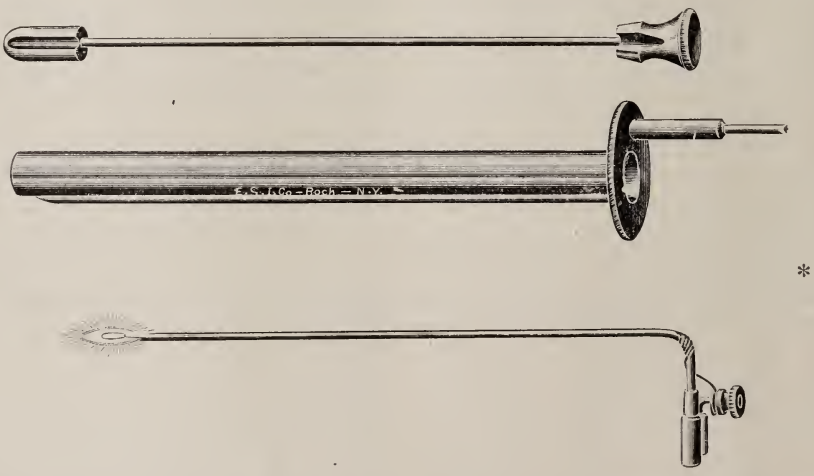
caping urine from above exposing the field and decomposing our solutions.

The main benefits, then, derived from the urethroscope, are: Dilatation, treatment localized to areas needing it, and ocular inspection of progress.

As to the cystoscope, it might be said that the water-distending one is for all purposes of examination the least painful to use; besides giving a good view of the conditions present within the bladder. In cases of hemorrhage we have recourse to



an irrigating or the Preston air-distending cystoscope. The cystoscope will show the condition of the vesical mucosa, vesical neck, the urethral openings, enlarging prostatic lobes, foreign bodies, sacculations, stones, ulcers, tumors, etc., etc. It must be added that to always correctly interpret what is seen requires experience.



After litholapaxy the cystoscope has shown the presence of fragments that the evacuator had failed to wash out.

A clinical trial will convince any one taking the trouble, what a beautiful view electrical illumination gives of the vesical interior. Nitze's Atlas and Fenwick's pictures show that the interior of the bladder can be very successfully photographed. Kutner (Berlin) has recently devised a cystoscope to which a lateral arm with proper lenses is fitted, enabling teacher and pupil to view the same spot at the same time, for didactic purposes.

In conclusion I wish to say that the main requirements for urethroscopy and

* Loaned by the Electro-Surgical Instrument Co., Rochester, N. Y.

cystoscopy are ownership of or access to the instruments, material, and the necessary energy required to approximate material and instruments.

Urethral catheterization is perhaps in more than half of the cases, at least of the bilateral, not always possible. Besides there is an added element of danger of carrying infection in close neighborhood to the kidneys. There is in many cases after catheterization of the ureters a temporary fever curve. Altogether it is clearly seen and must be admitted that while urethroscopy and cystoscopy are relatively easy of execution and of no harmful consequences to the patient, the opposite obtains in urethral catheterization, which frequently fails even when in the hands of the expert and is not altogether always a harmless procedure. In many cases, however, it has proved its value as a brilliant diagnostic measure. It has also been successfully applied for irrigating the renal pelvis. Nitze, Kolischer and others have devised operation-cystoscopes that admit of the removal of ligatures, papillomas, cauterization of ulcers, etc., an absolutely harmless procedure in skilled hands that thus frequently saves patients from the cutting operations. Cystotomy has a high mortality rate.

An interesting discussion followed, in which the following took part: Dr. Clark, Dr. Montgomery, Dr. Donaldson, Dr. Ruth M. Hall, Dr. H. P. Pratt. Remedies for abnormal conditions of the bladder and urethra were discussed at some length. It was pointed out that hemorrhagic condition of the bladder can be quickly overcome by using a sound with an insulated tip as a positive electrode within the bladder which has previously been filled with a normal salt solution. Similar treatment with the negative electrode is valuable in overcoming atropic conditions of the bladder. In each case the remaining electrode is connected with a large moist pad upon the abdomen. When pus is present, washing the bladder with one to three per cent of lysol was highly recommended.

The next regular meeting of the society will be held in September.

A mummy which Mr. John Brigg, M. P., presented last year to the Keighley Borough Museum has been examined by means of the Röntgen rays. Within the wrappings of an Egyptian mummy are frequently found scarabs or trinkets, or "passage money," which rummagers of the old tombs traffic in. In this instance the mummy, in its case, was removed into a darkened room, and the x-rays were applied from beneath. All the details of the anatomy became visible through their linen and wooden coverings, and no foreign body could be perceived. Two or three of the toes of one foot were wanting, but the rest was perfect.—*Health.*

X-Ray and its Adjunct Treatment.

DR. H. VALENTINE KNAGGS, LONDON, ENGLAND.

In the x-ray treatment of tuberculosis and malignant diseases the cure can, in my opinion, be greatly expedited by a judicious inclusion of other methods. In tuberculous lesions we find a disease produced by the action of a bacillus, so that if the raying is supplemented by further measures which have for their object the elimination of the microbe and a general purification of the tainted tissues, the progress of the case will be more rapid.

Dr. Pratt has shown that the destructive action of the rays in lupus has the effect of throwing toxins and other effete matter into the circulation, and that our treatment should be directed towards removing these impurities. In addition to the hygienic and dietetic measures now in vogue against tuberculosis, the cutaneous, renal and alvine excretions should be encouraged in every possible way. Medicinally an embrocation of guaiacol in almond oil should be rubbed into the sound skin in the vicinity of the lesion and large doses of either sulfid of calcium or guaiacol-eucalyptol-iodoform perles freely ordered.

From an electro-therapeutic point of view I believe that the x-ray treatment can be made much more effective if the high frequency brush is applied to the parts affected for ten minutes after the x-ray has been used, or the high frequency medication can be administered in any other suitable way.

These supplementary means of treatment also apply with even greater force to the more deeply seated tuberculous lesions. In a bad case of tuberculous ulceration in a boy of 13, after failure of tuberculin and other approved remedies, a complete cure was apparently brot about by means of the periodical use of the high frequency currents applied locally and generally, combined with the free use of guaiacol embrocation and the administration of 15 grains of sulfid of calcium daily.

With regard to malignant growths, I look upon cancer as a parasyphilitic disease (i. e., it is syphilitic in origin, but not in nature) and should rank it among the same category as such inveterate diseases as locomotor ataxia and general paralysis of the insane. The great spread of immorality in our large towns and the universal practice of vaccination (the lymph derived from cowpox resembles in its symptoms syphilis more than it does smallpox) would amply account for the increasing prevalence of malignant disease.

In the treatment of cancer, I have found that electrical medication, whether by x-ray or by high-frequency currents, can be made much more effective by the judicious use of skin-penetrating antiseptics such as guaiacol or eucalyptol. I have also observed that the treatment was greatly aided by the use of light-heat baths, a diet free from all salted or tainted foods, and the use of large doses of sulfid of calcium. I successfully treated one case of rodent ulcer affecting the inner canthus of the eye, solely by the use of large doses of the sulfid salt combined with Dowsing baths. I treated another case of advanced cancer of the cervix with the portable Turkish bath which the patient purchased and used at home. This was used at intervals in conjunction with sulfid of calcium, careful dieting, and plenty of fresh air. This patient was an elderly woman in reduced circumstances and of intemperate habits. The improvement at first was remarkable. She got

about again after being bed ridden, and appeared to be fast recovering. The local lesion also improved. The patient appeared to continue to progress for some months, but after a time she neglected the treatment, had a severe relapse with hemorrhage, and from this she died.

In concluding these rough notes I would like to add that I believe the high frequency currents will be found of quite as great value as the x-ray in the treatment of tuberculous and malignant lesions, and that the time will shortly come when it will be possible to decide by the symptoms and general condition of the patient as to whether the x-rays or the high frequency should be used separately or both together. I also trust my American confreres will try collateral treatment in the many cases of inveterate disease which come under their care for electrical treatment, and report their results.

National Eclectic Medical Association.

As an indication of the amount of interest now taken in electro-therapeutics, attention is called to the following list of papers upon that subject read at the 33rd annual meeting of the National Eclectic Medical Association held in Indianapolis last June:

Static Electricity in Diseases of the Eye, Z. L. Baldwin, M. D., Niles, Mich.

Electrical Treatment of Rectal Strictures, H. J. Berkinhamer, M. D., New York.

How I Use Electricity in My Office, G. R. Shafer, M. D., Peoria, Ill.

Electrical Treatment of Urethral Stricture, G. W. Boskowitz, M. D., New York.

Mercuric Kataphoresis, Wm. L. Heeve, M. D., Brooklyn, N. Y.

Electricity in Eye Diseases, Alfred W. Herzog, M. D., New York.

The Therapeutic Use and Abuse of Electricity, M. B. Pearlstine, M. D., New York.

A paper by W. J. Krausi, M. D., New York.

X-Ray Therapeutics, H. P. Pratt, M. D., Chicago.

Why Eclectic Physicians Do Not Need to Use Electricity, M. B. Morey, M. D., Gonzales, Texas.

Electricity in Strictures, N. L. Allen, M. D., Boston.

The Electrical Treatment of Functional Irregularities of the Female Generative Organs, D. M. Browder, M. D.

The Practical Application of Static Electricity, H. E. Truax, M. D., Atlanta, Georgia.

The Difference Between the Galvanic and Faradic Currents as to Origin and Use, J. R. Spencer, M. D., Cincinnati, Ohio.

Dr. Spencer's paper on The Difference Between the Galvanic and Faradic Currents, described the apparatus used in the production of each of these, and explained their physiologic and therapeutic action. He also gave a brief historic account of the discovery and development of these currents .

Ultra-Violet Ray Therapy, High Frequency Currents and Coils, and Vacuum Electrodes.

This is the subject of a brief lecture by Dr. H. C. Bennett, Lima, Ohio, published in the *Electro-Therapeutist,* April 1, 1903, describing in detail his method of producing ultra violet rays and high frequency currents.

Editorial.

Dangers of X-Rays.

X-ray treatment has been found to be useful in such an exceedingly large number of abnormal conditions that it is being applied by many physicians who know very little about its proper regulation and who are not sufficiently familiar with the practical uses of electricity to be able to foresee the probable results of their treatment. This condition has been inevitable, since until recently the subject has not been adequately provided for in medical colleges, and it has been and is difficult for the general practitioner without a very considerable expenditure of time and money to obtain practical acquaintance with x-ray therapeutics.

On the other hand, there has been a number of electricians who were unacquainted with medical science, but who found their income could be considerably increased by giving x-ray treatments. In most States this has been declared to be in contravention of the medical law, but this objection has been overcome by the electrician professing not to give treatments, but to make only fluoroscopic and radiographic examinations. The effect of the x-rays upon the body is of course uninfluenced by the presence or absence of a fluoroscope or a photographic plate, and such procedure by non-medical persons is a violation of the spirit, and in most cases of the letter also, of medical law. The law provides that medical practitioners should have a certain minimum amount of knowledge of the conditions of the human body in health and diseases, and of the effect of ordinary therapeutic agents. The fact that an electrician is familiar with the x-rays does not entitle him to use these in the treatment of human ailments, unless he is qualified by the requisite knowledge of medical science. Ignorance of general therapeutics on the part of the one giving treatment is quite as dangerous to the patient as ignorance of the nature of x-rays, and the unlicensed practitioner who gives x-ray treatment has much less at stake personally than the licensed practitioner. Tho there are exceptions in individual cases, it is generally true that the one who has only the special knowledge is much more liable to do harm than the one who has general knowledge of therapeutics without a special knowledge of x-rays. The attention of State boards should be strongly directed to this class of unlicensed medical practice.

American Electro-Medical Society.

The first annual meeting of the American Electro-Medical Society will be in conjunction with the meeting of the Illinois State Electro-Medical Society in the Masonic Temple, Chicago, about the first of November. Arrangements are being made for an excellent program by representative men, and for an exhibit of electro-therapeutical apparatus.

The Ubiquitous X-Ray.—Swallowing is no longer an effective method of hiding stolen property. At the Japanese Mint employés suspected of swallowing small coins are now placed under the x-rays and the coins have been discovered in this way in the stomachs of guilty persons.

The interior of a gold-bearing rock was inspected in an Oregon town by means of the Röntgen rays, and veins of gold were as plainly visible as if they were on the surface.—*Health.*

Electro-Physics.

The Electrolytic Rectifier.—It is well known that if an alternating current is sent through an electrolytic cell having a carbon and an aluminum electrode immersed in a solution of alum, the current in one direction is almost completely stopped, while it passes freely in the opposite direction. It is when the aluminium is the anode that the current is stopped, and from this it appears that, under these circumstances, some film is formed on the surface of the aluminum plate which prevents the negative ions from reaching the metal. It is generally believed that the obstruction is due to a film of aluminium oxide formed on the surface of the plate, but Mr. K. E. Guthe (*Phy. Rev.*, December, 1902) urges that this view is untenable, and gives good reasons for the hypothesis that the resistance to the passage of the negative ions is due to the formation of a gaseous layer of oxygen, which becomes entangled in the partial layer of oxide on the surface of the aluminium plate. He shows that a layer of hydrogen is not entangled in this way, and therefore it opposes no resistance to the ions when the aluminium plate is a kathode. A rise of temperature was found to reduce the resistance of the film of oxygen, as might be expected from theory. The composition of the electrolyte did not affect the result as long as the negative ion was oxygen, but when an electrolyte with chlorin as negative ion was used the cell lost its rectifying property. Guthe also replaced the aluminium electrode by a semi-permeable membrane of copper ferrocyanid, and found that the results corresponded closely with those obtained with the aluminium cell. It appears to follow from Guthe's experiments that the condition for the formation of an electrolytic rectifier is an electrode with a surface which will retain one of the gaseous films produced by electrolysis.—*London Electrical Review*, May 2, 1903.

The Electron Theory.

A concise summary of this theory is given editorially in the *Electrical World and Engineer*, Feb. 2, 1903. The hydrogen atom is supposed to consist of about 700 electrons. An electron may be either positive or negative; as yet we have definite knowledge of negative electrons only. All negative electrons are found to be of the same size, no matter what kind of atom they come from, consequently the number of electrons contained in any atom is found approximately by multiplying its atomic weight by 700. An atom of mercury, for example, contains 200 × 700, or 140,000 electrons. The diameter of an atom of hydrogen being about one-tenth of a bikron (one ten-millionth of a millimeter), the electrons might be supposed to be crowded, but it is calculated that they are as distant from one another relatively to their size as are the planets in the solar system. Lodge calculated that if an atom be represented by a sphere 100 feet in diameter an electron will be represented by a period mark upon this page. Chemical affinity is traced to aggregation of electrons which are unbalanced positively or negatively. Kathode rays are regarded as streams of electrons. Roentgen rays are solitary waves of radiant energy caused by the impact of negative electrons with solid matter.

Development of the Electron Idea.

W. Kaufmann traces the stages by which modern electricians have arrived at the electron theory. The authorized translation of his paper is given in full in the *Electric World and Enquirer*, April 18, 1903 to which the reader is referred for details

Electrolysis of Alkali Salt Vapors.—Wilson (*Phila. Mag.*, August) gives an account of an experimental investigation of the passage of electricity through flames containing salt vapors. Former experiments have shown conclusively that conduction thru salt-vapors is accomplished by means of ions of some kind and is, therefore, to this extent at least analogous to conductions thru solutions. The experiments described in the present paper show conclusively that above 1,300° C. there is a very close analogy between salt vapors and liquid electrolytes; Faraday's laws of electrolysis are strictly applicable to salt vapors, just as to salt solutions. He shows that a salt in a state of vapor gives rise to the same number of ions carrying the same charges as a salt in an aqueous solution. He describes in detail the arrangement of his experiments, and gives in a diagram curves showing how the current with a constant e. m. f. (840 volts) varies with the temperature when solutions of one gram in a litre are sprayed. The nearly constant value of the current above 1,300 degrees seems to represent the maximum current which the amount of salt passing thru the tube can carry, for it is affected very little by increasing either the temperature or e. m. f. This current he calls the "saturation" current for the particular salt used. The values of this maximum current are given for various salts in a table. From this table he proves that Faraday's laws of electrolysis apply also to the saturation current carried by a salt vapor. The amount of salt per second of electrochemical equivalent unity which would correspond to a current of 1 ampere is 0.0101 milligram. Now, 1 ampere-second liberates in electrolysis 0.0104 milligram of hydrogen, so that it appears that the factor of proportionality is nearly the same for salt vapors as for electrolytes.—*Electrical World and Engineer*, Sept. 13, 1902.

Electric Currents in Plants.—The results of some interesting researches on plant electricity have been reported by A. D. Waller, says the *Revue Scientifique*. He finds that whenever a plant is wounded, a positive electric current is established between the wounded part and the intact parts. This may start with an electromotive force of 0.1 volt, but it afterward diminishes. He writes further:

"Actual wounding is not necessary to obtain this manifestation; an electropositive current is set up when there is mechanical excitation, but it is much weaker (0.02 volt). And light acts like mechanical excitation with certain plants, such as the leaves of the iris, of tobacco, of the begonia, etc. From the illuminated to the darkened part flows a positive electric current that may be as strong as 0.02 volt. A similar reaction in the petals is not always observed. There is a certain correlation between the vigor of a plant and the electric reaction. The more vigorous the plant is, the stronger the current. Plants grown from fresh seeds give a more powerful current than those from old seeds. A bean a year old gave a current of 0.0170 volt; one five years old, a current of 0.0014; and the reaction is inversely and regularly proportional to the age of the seed from which the plant springs. There is observed in vegetable tissues subjected to an excitation of the same intensity at regular intervals the characteristic changes of reaction that are present in animal tissue—fatigue, recuperation, etc. Temperature plays a part in all these phenomena; below — 4° to — 6° C. [+ 22° to + 25° F.] and above 40° C. [108° F.] there is no reaction. As we see, Mr. Waller has demonstrated some interesting facts, and doubtless he will pursue and extend his investigations."—*The Literary Digest.*

Transmitting Pictures by Electricity.—Herr von St. Schneider is the originator of a new system for the electrical transmission of pictures. His system makes use of the Pollak-Virag rapid telegraph recorder and a selenium cell for effecting the necessary variations in intensity of illuminations. At each station two telephone receivers are connected to a small mirror so as to vibrate this in two directions. Corresponding telephone receivers are connected together, and within each circuit is placed a revolving contact maker. One of these contact makers makes and breaks the circuit a certain number of times for each revolution, and this, of course, sets up corresponding vibrations of the two telephone receivers in that line. The other breaker does not actually break the circuit, but introduces a gradually increasing resistance, starting at zero and rising to a maximum, and then dropping to zero again. The effect of this is to produce a comparatively slow motion of the two telephone diaphragms connected in that circuit. When these two contact makers, which are connected to the same shaft, are revolved, a beam of light, reflected from a suitable source upon a screen, will travel gradually over the entire screen: starting at one end, working its way back and forth to the other, and then jumping to the first point again. The method of transmitting is this: A beam of light from an arc lamp is allowed to fall on the mirror at the sending station. By a suitable grouping of lenses, the beam is thrown horizontally through a photographic negative, and is then focused on a selenium cell. The effect of this will be to vary the current in the circuit containing this cell, corresponding to the intensity of the light falling upon it. The circuit from this cell is carried to the receiving station, and there the current is superimposed upon the current flowing through an electric arc. One ray from this arc is thrown upon the receiving mirror. The intensity of this ray varies with that falling upon the selenium cell; and since the ray traces a path on a receiving screen similar to that which the sending ray follows, the result is a production of a copy of the photograph at the receiving station. It is, of course, necessary that the image be repeated at least ten times a second to give a constant effect upon the retina.—*Electrical Age,* April, 1903.

Ionization by Ionic Shock.—STARK—(*Ann. d. Phys.,* No. 8; abstracted in Lond. *Elec.,* August 8) gives a theoretical discussion of the work of several investigations of the current in a gas and its dependence upon the e. m. f. His theory of ionization by ionic shock maintains that, in ionized gas, the current at first increases with the e. m. f. until all the ions generated in the gas, whether by Roentgen rays, violet light or other artificial means, are used up by the current as fast as they are generated. When this is the case, an increase of e. m. f. does not produce any further increase of current. But on further increasing the e. m. f. a point is reached at which the ions, traversing their mean free path, acquire a sufficient velocity to ionize neutral molecules by their impact. The current then becomes "independent" and rises again with increased e. m. f. The curve with the e. m. f., as abscissa, and the current, as ordinate, has, therefore, an ascending branch, a horizontal portion, and another ascending branch. Such curves may be obtained from the data provided by several investigators. In some cases the curves are not complete, as the point at which the independent current sets in depends upon the pressure, temperature and imparted ionization of the gas. "The positive ionizing potential is about 240 volts in air, with an aluminum electrode, and 270 volts with a copper electrode."—*Electrical World and Engineer.* September 13, 1903.

Is Nerve Energy Electricity?

Dr. J. E. O'Brien (*Jour. A. M. A.*, March 7, 1903) urges the identity of these two forms of energy. He points out the similarity between the structures of nerves and of insulated electric conductors, and considers the estimates that have been made of the velocity of nerve impulse open to criticism. His arguments are (1) electricity is always present when nerves act: (2) electricity would do the work required with such construction as we find in the nerves; (3) electricity is the only force we know that would do this work; (4) the analogy of the central communicating and terminal mechanism of the nervous system with those of electrical systems.

Disassociation of Electrolytes.— Liebenow (*Ziet. f. Elektrochemie,* December 25) in a theoretical article discusses the reasons why Ostwald's well known formula for the electrolytic conductivity as a function of the concentration, does not agree with the facts in the case of the highly ionized solutions of ordinary inorganic salts and acids. He develops a new formula which is more general than Ostwald's, as it contains two empirical constants, while Ostwald's contains only one. In the case of potassium chlorid the formula is shown to be a good representation of the change of conductivity over a wide range of concentration.—*Electrical World and Engineer,* Feb. 21, 1903.

Abnormal Kathode Fall.— Stark (*Ber. Deut. Phys. Ges.,* November 1) gives an account of a theoretical and experimental investigation of the abnormal kathode fall in vacuum tubes. According to the ionic shock theory, the amount of ionization near the kathode depends essentially upon the number of neutral molecules in the unit of volume. This number, called the "specific number of molecules," is of importance in a number of formulas governing vacuum phenomena, and the author proposes to use it for formulating the abnormal kathode fall of the glow current. If that is done, it appears that theoretically the relation between kathode drop and current should not be linear. Since a linear relation has been, however, found by some observers, he made new measurements with platinum electrodes in a vacuum "free from fat." The uniform result is that there is no linear relation between kathode fall and current strength. The fact is that the self-heating of the kathode often simulates a linear relation. The electric work in the dark kathode space is equal to the product of the kathode fall into the total current. The work spent on the positive ions is converted into heat at the kathode. With a constant pressure, and an increasing temperature, the normal kathode fall remains constant, but the abnormal kathode fall increases while the normal current density at the kathode diminishes.—*Electrical World and Engineer.*

The Aurora Borealis.—From careful observations on the aurora borealis, Professor Paulsen has arrived at the conclusion that the spectrum of the light given is identical with the "kathodic" spectrum of nitrogen. This point is of interest in connection with the latest theory of the origin of this remarkable phenomenon, which attributes it to a stream of the Thomson corpuscles emitted from the sun. As these approach the magnetic field of the earth they are deflected toward the poles, and when they finally reach a level at which the air is of the proper density, they give rise to light phenomena similar to those obtained with cathode rays in suitable vacuum tubes.—*London Electr. Rev.*

Electro-Diagnosis.

The Anatomy of the Skull Stereoscopically Demonstrated by the X-Rays.—At the Royal Academy of Medicine in Ireland, Dr. W. S. Houghton pointed out that the difficulty of interpreting a single skiagram arose from several causes. The x-ray picture was an example of uniplanar projection of multiplanar objects. This caused superposition of shadows. Then the fact that the x-rays formed a diverging cone caused magnification and obliquity distortions. These sources of inaccuracy in the "single picture" were eliminated by the beautiful stereoscopic method of Roentgen photography of Mr. Mackenzie Davidson. By this method a reproduction of the skull could be obtained, perfect in contour and perspective. Dr. Houghton showed by diagrams how all sources of inaccuracy were eliminated in the stereoscopic method and afterwards in the reflecting stereoscope showed prints of the base of the skull and lateral views in which general points were well demonstrated, including the relations of the groove for the lateral sinus to the mastoid air cells, the mastoid emissary vein, the internal auditory meatus, the external auditory meatus, the cochlea, the semicircular canals, the canal for the internal carotid artery, and the foramina in the base of the skull.—*Jour. Am. Med. Association.* April 4, 1903.

The Prebacillary Stage of Pulmonary Tuberculosis.

Dr. J. M. Anders, Philadelphia, (*Jour. A. M. A.*, January 12, 1901) said that among the most valuable agencies for the early diagnosis of pulmonary tuberculosis are the Roentgen rays.

"No matter which of the numerous phases this common affection may assume at the onset, certain crucial tests should not be overlooked. I refer particularly to the systematic and persistent use of the clinical thermometer, the tuberculin test and the use of the Roentgen rays—one or all.

"In phthisis the radioscopic appearances are usually observed in the subapical regions, and they sometimes show the presence of tuberculosis infiltration and consolidated areas before either the physical signs are obvious or the microscopic slide demonstrates the tubercle bacilli in the sputum. It is doubtless true that reliable knowledge from the use of the Roentgen rays and fluoroscope is possible only to an expert or an experienced observer. Again, the value of this means of recognizing pulmonary tuberculosis in its first stage would be greatly increased, if the images shown by the fluoroscope could be satisfactorily photographed in all cases. Francis H. Williams states that he has discovered radioscopic evidences of consolidation before physical signs of such change were present; also that he has found indications of the existence of tuberculosis when this disease had not been suspected previously. Stubbert has also reported one or two instances in which slight haziness has been observed in spots which at the time showed no other physical signs of disease, but where they subsequently developed."

Improved Roentgen Technique.

Wiesner, of Vienna, proposes to make exposures thru a round hole in the center of a lead coated board. A metal cylinder passes thru the hole and is lowered to touch the skin. By this means he says only parallel rays are admitted and no scattering of the rays occurs. This is simply a cumbersome apparatus for replacing the well known lead box.

X-Light in Anthropometrical Signalment.—William Rollins says, in the *Boston Medical and Surgical Journal,* May 7, 1903, that any procedure which makes the measurement of criminals more exact must be valuable. Such a one is that of making x-light photographs of the bones. He estimates that this method at least doubles the accuracy with which measures of the hand can be taken, and by enabling other measures of the feet, besides the length to be taken it allows at least four times as many persons to be identified as at present, though the real number will be found to be much greater. In cases of bodies burned or decomposed before they are discovered, the method would have some advantages over any that has been proposed. In other cases when only some of the parts of the body are found, as for example, a hand or a foot, the method alone might lead to identification. The author has designed and constructed apparatus for conducting these x-light photographic anthropometric signalments.—*Medical Record.*

Radiography in Biliary Lithiasis — Dr. Gasteln and Dr. Yogue, of Madrid, had radiographed a large number of cases, subsequently submitting their finding to the control of operation or autopsy. Radiography does not permit of the differentiation between stones in the gall-bladder, and dense pericystic adhesions, and hydatid cysts. Thus it fails just where its aid is most in demand.—*Jour A. M. A., May 23, 1903.*

Development of the Radiograph.

Dr. Geo. C. Johnson, Pittsburg. Pa., discusses the development of the photographic plate after exposure to the x-ray, giving detailed instructions, for which the reader is referred to the original paper in the *Journal of the Advanced Therapeutics* for May.

Chemical Effects of Canal Rays.—G. C. Schmidt (*Ann. d. Phys.,* November 11; abstracted in Lond. *Elec.,* November 14) gives an account of an experimental investigation in which he endeavored to find whether positive ions in gases exert an oxidizing action. This might be expected, as the negative electrons in kathode rays are known to have a strong reducing effect, which has been explained by the assumption that the negative electron satisfies a positive valency of the metallic atom, so that this acquires a lower valency than before. By an argument based on analogy, it might be expected that canal rays, which are assumed to consist of positive ions associated in some way with neutral atoms, would exert an oxidizing action; the author did not, however, find any well defined oxidizing action. There is powerful decomposition, but it depends upon the nature of the gas and the compound whether the decomposition results in an oxidation or in a reduction. Solid solutions which show luminescence under kathode rays show the same under canal rays, but it decreases rapidly owing to the decomposition, which is indicated "by the spectrum of the glow becoming whitish." If the gas in the tube is oxygen, and an oxidizable body is in it, the latter is oxidized; if, on the other hand, the gas is hydrogen, the latter reduces any compound capable of reduction. The most typical reaction for canal rays is the decomposition of sodium compounds; it takes place even when only traces of sodium are present, and is revealed by the *D* line.—*Electrical World and Engineer,* Dec. 13, 1902.

The X-Ray in Determining the Limits of the Frontal Sinus.

Dr. J. H. Philip, San Francisco (*Jour. A. M. A.,* March, 1902), made use of the radiograph to determine the position and size of the frontal sinus previous to operation thereon.

Electro-Therapy.

Electrolysis of Metallic Salts in Human Tissues.—This is accomplished by the polarization current—by the monopolar arrangement of electrodes. The body is immersed in a tub of acidulated warm water, which is insulated from every possible contact. The negative pole is connected with the metallic tub, at the patient's feet, being separated from the body by the intervening mass of water; the positive electrode is held in the patient's hand. In this way weak currents are approximately as available as strong ones since the resistance is greatly attenuated.

Clausin demonstrated that the voltaic current has the power of directing the course of the movements of molecules in whatever physical form they are found.

Arrhénius followed on this step by formulating his theory of ionisation of chemical solutions and the conductibility of electrolytics, making use of the discovery of Van't Hoff for the laws of osmotic pressure.

Dutrochet subsequently described an "subosmotic action" of the voltaic current, and Du Bois Raymond and Munk described their analogous conception by the incisive term "mechanical transportation." Gautier spoke of "interstitial electrolysis."

Electrolysis of the human body may prove of vast resource, altho with all its theoretic promise there are almost insurmountable barriers that confront us.—*St. Louis Courier of Medicine, Dec., 1902.*

[Evidently the writer of note does not know anything about electricity.]

Electricity as a Therapeutic Agent.

Dr. N. G. Burnham before the State Medical Society at Pueblo, Colo., Sept. 16, 1902, gave a general review of the application of electricity to cure disease. He emphasized its value to the physician in almost all forms of disease.

Interpretation of Electro-Therapeutic Results.—(Revue Internationale d'Electro-therapie et de Radiotherapie.) At the opening of the "French Association for the Advancement of Sciences," section of Medical Electricity, M. Bordier, chairman of the section, discoursed on this subject. You know, he says, that for some of our confreres electricity acts always by suggestion, and that it is necessary to invoke suggestion for every happy effect obtained, while others hold that when cures result they are due simply to nature's resolution toward recovery. After showing how, in many cases of nervous disease, physical influences could have played but an unimportant part, he seeks for other explanation, and finds it in a study of the neurones on the one hand and in the physiological action of electricity on the other. We know that the neurones connect the one with the other by kinds of articulations which are said to be the seat of amœboid movements, and that this connection is by contiguity rather than by continuity. The cause of certain paralyses is the breaking of this connection, by contiguity, of neuron with neuron, and it is especially this absence of contiguity that causes hysterical paralysis, as well as other functional nervous conditions. In order to again establish this contiguity—that is to say, in order to cure the paralysis which is the consequence of the abolition of the physiological function of the neuron, one cannot easily see what role suggestion can play if often invoked, nor comprehend how franklinization in the form of baths, or static breeze, or simple insulation can

act effectively. But whoever knows the laws of the propagation of the galvanic current, and he who has taken the pains to study the physiological action, and in particular the variable periods of this current, the explanation of the re-establishment of the nervous contiguity, offers no difficulty. The galvanic current is, in fact, the best in its action on the irritability of the nervous substance. In order to prove this, it is only necessary to recall that the brain and the nerves of special sense, to take no other example, react to the galvanic current and above all to its make and break with a remarkable promptitude, even when the intensity of the current is hardly appreciable. By these variable periods of opening and closing, this current is capable of producing an excitation of the neuron of the first order, and it is not surprising that under the influence of these repeated rhythmical excitations the terminals of the neurons suffer such modifications as to re-establish the normal contiguity. This is the interpretation of the results obtained by electric treatment in hysterical paralysis and other forms of the functional neuroses. The intelligence of the physician is thus much better satisfied than when one invokes the aid of suggestion as an explanation.—*The Clinical Reporter, Feb., 1903.*

Electricity in the Treatment of Metatarsalgia.—F. Piccinino says that it is a mistake to incriminate tight shoes alone as the cause of this painful affection, as it is frequently found in neurasthenic or gouty individuals, after much walking, bicycling, or riding. In some cases synovitis of the fourth metatarsal bone, tuberculous osteitis, and even a new bony growth have been found. Quite recently the author had occasion to treat a patient who for seven years had suffered from acute pain in the metatarsal region of the right foot; in the beginning it was intermittent and bearable, but it had of late become continuous and extremely painful. Having decided to try the effect of galvanism, the author applied it in the following way: a large, square electrode covered with chamois skin was placed on the lower third of the right thigh, anteriorly, while the positive electrode was introduced into a wooden tub filled with tepid water, into which the patient's foot was introduced. A current of 15 ma. was turned on and allowed to flow for ten minutes. On the following day the strength was increased to 20 ma. and the time to fifteen minutes. There was improvement from the start, and after the fifth application the pain ceased altogether at night, and in the daytime was less severe and appeared only after walking. A half cubic centimeter of a 2 per cent solution of cocain was injected for two days, the electrical treatment being continued. Two months have elapsed since the treatment, and as yet the patient has had no pain in the foot, which so tormented her for seven years.—*Annali di Elettricita Medica e Terapia Fisica,* December, 1902.

The Value of Linear Electrolysis in the Treatment of Strictures of the Urethra.—Moran (*Ann. des. Mal. des. Org. Genito-Urin.,* January, 1903).—With an unprejudiced mind the author has undertaken, thru experiment, to judge of the value of linear electrolysis as a treatment for strictures of the urethra, being forcibly impressed by the marked divergence of opinion among authors as to its efficiency. If one attempts to treat all strictures by this method he will get into serious difficulties, especially with those so hard, long or tight as to demand either a considerably intense current, or much force brought to bear upon the instrument. The following technique is advised:

The urethral stricture should measure

at least No. 10 (Charriere), if not, it should be dilated to this point. Use the usual cleansing precautions of the urethra and inject 1 per cent sol. cocain. Never employ a current of an intensity more than ten milliamperes. Never prolong the electrolytic action beyond some seconds, at most three minutes. Never force the instrument to penetrate into the urtehra, but simply delicately guide it. Return the blade of the electrolyzer upon the wall opposite to that which has been electrolized as the instrument passed in, thus utilizing the electrolytic action upon both walls of the urethra, and thus increasing its favorable action. If the stricture remains resistant under these conditions, employ internal urethrotomy.

Electrolysis does not produce a radical and definite cure of the strictures, but is, indeed, a simple, easy, painless and almost bloodless method of enlarging certain strictures, but does not take the place of subsequent dilatation to prevent recontraction. We should then not promise absolute cure to the patient. With the author electrolysis has been done easily, without the least accident, without the slightest febrile reaction, even in cases with genito-urinary tuberculosis, and with infected prostatics. Its advantages over internal urethrotomy (more acceptable to the patient, absence of pain and hemorrhage, uselessness of lying in bed and of the *catheter a demeure*, absence of grave complications) will cause linear electrolysis to supplant internal urethrotomy in many circumstances.—*Interstate Med. Journal.*

Does Newman's Galvano-Sound Necessarily Cauterize?

Replying to some criticism upon the use of this sound by C. S. Neiswanger, M. D., Dr. Robt. Newman in the *Electro-Therapeutist*, January, 1903, says that he never employed the actual cautery in any part of the urethra nor in hypertrophy of the prostate. He never cauterizes nor destroys the tissue in these cases. His instrument is intended to be used with one or several electric flashes, which cause no pain and do nothing more than produce a white film similar to the effect of silver nitrate in the treatment of granular urethritis. Used in this way the cautery acts first as a tonic and next as an astringent. The electro-cautery must be used severely enough to accomplish the object and no more. A bungling operator may cause destruction and cicatrices by means of electrolysis, but that does not prove that electrolysis with a mild current in the hands of an expert would be a failure. He has described in a text nine different methods for treatment of hypertrophy of the prostate. Of these he now prefers the method of slow flashes, and is opposed to rapid methods and to deep cauterization, such as the Bottini method.

The Prostatic Electrolyzer.

Dr. John V. Shoemaker, of Philadelphia, describes in the *Jour. Adv. Ther.* a convenient device for electrolytic treatment of the prostate gland. The instrument which he has used since 1890 consists of a J-shaped insulated electrode with a rectal sponge at the curved end. This sponge is passed into the rectum by the operator, who stands behind the patient. Hinged to the middle of the curved electrode is a longer insulated handle bearing on its anterior surface a sponge so situated that when the handle is brot forward between the legs of the patient the sponge presses upon the prostate. The electrical connections are made one at the outer end of the J-shaped electrode, the other at the extremity of the long handle. The current passes between the rectal sponge and the external prostatic sponge. Either direct or alternating current may be applied by this instrument, and the patient can easily make the application himself.

Electrical Apparatus and Its Application as a Therapeutic Agent.

Dr. N. L. Allen, of Boston (*Eclectic Medical Journal*, December, 1901), gave a review of electrical treatment and its results before the Massachusetts Eclectic Medical Society, giving a summary of the knowledge and opinions upon this subject which were then held by intelligent physicians, and advocating its much more extensive use in the treatment of disease.

Treatment of Neurasthenia —Dr. Daniel R. Brower, (*Jour. A. M. A.*) says regarding treatment: "Electricity is the third indication. I have no doubt about its great value. In the absolute-rest cases, of course, general faradism is necessary, and I direct that in the beginning of the treatment it should be very gently applied and to the extremities only; later, to the whole body, using currents that can just be felt. The skin should be gently stimulated and the various groups of muscles should be made to respond to mild currents. The bed cases should also receive galvanism, first to the head, using a descending current with large electrodes of from 1 to 3 milliamperes: then to the cervical sympathetic, using from 3 to 5 milliamperes, and then to the spine and abdominal sympathetic, with a large negative electrode at the epigastrium and a smaller one over the spine and a current of from 5 to 10 milliamperes. These seances should be given daily."

Static Electricity for the Insane.— Chase finds that the neurasthenic forms of mental ailment, such as melancholia, are decidedly benefited by the static breeze and spark directed to the spine or to various parts of the viscera. He reports cases which seem to have been benefited in this way. The remedy not only does good by its direct effects, but also thru suggestion. —*Jour A. M. A.*

Electro-Magnetism as a Healing Factor.

Carl Lillenfeld, of Berlin, describes in *Die Therapie der Gegenwart* an electromagnet excited by an alternating current which changes its polarity 100 times per second. Blood exposed to this alternating magnetic field becomes dark in a short time, and shows quicker consumption of oxygen. A considerable number (177) of neuroses, both peripheral, central and organic, were treated with this apparatus. More than half showed a decided improvement and 14 per cent were cured. The anodyne effect of the treatment was very marked.

The physical and therapeutic effects of a rapidly alternating magnetic field of high intensity are similar to those of the large high frequency coils, namely, increased metabolism thruout the tissues. Very little experimental work has as yet been done with this sort of apparatus, which will probably be found advantageous where the deeper tissues are affected. Pratt, Peterson, Kennelly and Herdman have previously tried experiments along this line, with varying success.

Treatment of Menorrhalgia by Electricity.

Dr. G. B. Massey, Philadelphia (*Jour. A. M. A.*, February 9, 1901), describes his treatment of this disease by mild mercuric kataphoresis, using an amalgamated zinc anode within the uterus, after reduction of the congested condition of the uterine appendages. If there is no endometritis he uses the positive electrode in the vagina only. He does not advise dilatation of the cervix for this condition.

Many of these painful conditions are relieved by a treatment simpler than the one recommended by Dr. Massey, namely, by the use of the sinusoidal current, placing the moistened electrodes upon the abdomen external to the ovaries.

Aneurism Cured by Electrolysis with an Introduced Wire. A. Bernheim, in *Deutsche Medicinische Wochenschrift* (Leipsic), August 16, describes a case of an extensive aneurism of the aorta cured with the introduction of fine gold wire and electrolysis. It is the fifteenth instance of this treatment on record, and is distinguished by the fact that the operation was repeated three times in a few months before the cure was permanent. Four of the fifteen cases were very much improved, five were cured, and all relieved by the intervention—results which should encourage its further application. In the experience reported nearly nine feet of a spirally coiled fine gold wire were inserted, and the anode applied, with the cathode on the back. A current of 10 to 80 milliamperes was turned progressively on and off during one hour. The sac slightly contracted and the pulsation diminished even before the operation was concluded. The results of the intervention were examined with an exploratory puncture two months later and about the same amount of wire introduced again, and half this amount thirty-nine days afterward. The patient was dismissed four weeks after the last intervention and has resumed his business as a commercial traveler.—*Jour. A. M. A.*

Currents of High Frequency in Dermatology.—Regner (*Progres Med.*, May 17, 1902) gives a summary of the employment of currents of high frequency in dermatology. The peculiar property of these currents is that, without producing any appreciable effect of contraction or sensation in muscles and nerves, they modify sensibility, reducing it to anesthesia. They also modify the circulation in a manner which has been described as circulatory drainage, which is beneficial in local inflammations with capillary and venous stasis, and in cases of impaired nutrition. Pruritus, often rebellious to other forms of treatment, is frequently improved by these currents. Psoriasis gives variable results. In eczema —especially weeping eczema—the effects are more constant, the itching sometimes disappearing after the first application. Alopecia, zona, molluscum contagiosum, acne, acne rosacea, impetigo, and morphoea have been favorably influenced. Lupus erythematosus may be cured by this method, which appears to be more rapid than phototherapy. The effect in cases of tuberculous lupus is a matter of controversy. The author is of opinion that the method may be used as an adjunct to the light treatment. He states that the effect is partly due to the liberation of ozone. He concludes that high frequency currents are a valuable addition to the therapeutics of a certain number of dermatoses.—*Br. Med. Jour.*, February 7, 1903.

Rheumatoid Arthritis.

Dr. F. A. Bishop, Washington, D. C., read a paper before the American Electro-Therapeutic Association in September last year, in which he said rheumatoid arthritis would become a thing of the past if habit and diet could be corrected. The disease is curable, even in advanced stages, and electricity combined with diet is the only agent that can be relied upon for cure. When cartilage has been destroyed it can not, of course, be regenerated, but the muscles, the skin and the glands can be made to resume healthy action, and joints that have not been too far disorganized can be made to work properly. The limbs can be straightened, the pain relieved, and the patients enabled to resume their ordinary occupations. For diet he recommends beef or mutton; very little bread; milk, eggs and water in abundance. The electrical treatment advised is static sparks to the joints, nerves and the skin. For joint effusion he applies a gal-

vanic negative electrode to the boggy surface until a good sized blister is produced. This is repeated from time to time. The extensor muscles are treated by the faradic and the interrupted galvanic current, applying the hands (for example) to the negative electrode, with a large positive pad over the spine. Very little medicine is given. Some cases are described illustrating the treatment. Dr. Skinner also had found electricity extremely useful for this disease, and had found the dry hot air body treatment a valuable adjunct, tho local hot air treatment was useless.

Treatment of Urethral and Esophageal Strictures by Linear Electrolysis.—Dr. J. A. Fort, of Paris, presented an exhaustive communication on the subject, giving in extenso the history of fifty cases. These were divided into two groups: the seventeen cases in the first group were seen between 1889 and 1902 inclusive, the thirty-three in the second group were treated during the present year. In the first group were five cases of stenosis of the esophagus and twelve of urethral stricture, four of the latter being complicated by gleet; all were cured. The second group comprised twenty-three cases of simple urethral stricture, eight of urethral stricture complicated by gleet, and two of esophageal stenosis; of the latter one was cured, in the other a cancerous stricture, there was such marked improvement that it was possible for the patient again to take nourishment in the natural way. The urethral strictures were all relieved, but in some cases the patients pased from under observation before sufficient time had elapsed to warrant the assertion that a definite cure had resulted. From his experience with these and many other previously reported cases, the author felt himself justified in concluding that linear electrolysis was preferable to internal urethrotomy in the treatment of urethral stricture and to gastrotomy in that of stricture of the esophagus, provided, of course, that the latter was not absolutely impassable.—*Med. Record,* May 23, 1903.

The Use and Abuse of High-Frequency Electricity in Medicine.—H. Lewis Jones concludes from a study of Denoyé's book on the subject, that high-frequency treatment possesses an influence upon the course of a certain number of morbid states, that its influence for good is not of any particular degree of excellence, but that it can not be condemned as altogether useless. In the field of general diseases dependent upon impaired or perverted nutrition it has proved decidedly disappointing, although it was in this class of case that great things were formerly expected and predicted from the physiological effects. In diseases of the skin high-frequency applications appear at their best. Psoriasis, eczema, alopecia areata, lupus vulgaris, acne vulgaris, and impetigo all seem to be decidedly benefited by direct applications of the high-brush discharge or of sparks. Evidence of a trustworthy kind is accumulating to show that morbid growths such as sarcoma, carcinoma, etc., are favorably affected by this treatment, and also with the static-brush treatment. The method appears to be inferior to treatment by the Roentgen rays, but to be of the same essential character.—*The Practitioner,* March, 1903.

Treatment of Varicocele.

Dr. C. S. Neiswanger in the Alkaloidal *Clinic* describes at some length the treatment of varicocele by the positive electrode, galvanic current. He also states that x-ray dermatitis is caused by kathode rays and not by x-rays, and may be prevented by wrapping a black cloth around the tube; an opinion with which we can hardly agree.

Electrolysis in Skin Diseases.—Wisecup describes the methods employed by him for removal of superfluous hair and other conditions. On account of the variations of individual resistance he does not think the milliampere meter necessary, and advises the use of the smallest possible needle, not too sharp at the point; for the other electrode he allows the patient to hold his fingers in a cup of water, connected with the other pole. The rule he follows is to insert the needle about one-fourth of an inch into the average hair follicle, but a smaller distance for smaller hairs. Aim to have the needle come in contact with the hair bulb, which can be told by the slight resistance met. Leave the needle inserted until a white froth bubbles around it, but there is danger of leaving it too long and a scab or scar forming. Use preferably a straight needle, as small as possible, without a bulb. Among the diseases which he has treated are nevus, tho the common birthmark is unsatisfactory under this head; also moles, cavernous nevus, dilated vessels, cicatricial scar tissue, xanthoma and blackheads.—*Jour. A. M. A.*

Chemical Electrolysis in Hypertrichosis.—Instead of the tedious intrafollicular electrolysis, Weil applies the electricity all over the surface, first pulling out the hairs and moistening the surface with a solution of nitrate of silver or of chromic acid. Under the influence of the electricity, the kations, the silver and chromin, pass into the follicles and, combining with the chlorin of the tissues, evidently form an insoluble silver chlorid which prevents further growth of the hairs. Experiments on himself showed that the destruction of the hairs on the spots treated was complete. — *Bulletin d' Electrotherapie* (Paris), April.

Electric Treatment of Mucomembranous Enterocolitis. E. Doumer.—The writer of this communication has been very successful with the application of the continuous current in the treatment of mucomembranous enterocolitis. The obstinate constipation was conquered at first, and this was followed by the gradual healing of the anatomic lesions and subsidence of all symptoms. The current was applied commencing with 30 to 40 ma. and increasing to 50, during eight or ten minutes, reversing the current each minute. Even when the current was increased to 150 ma. the patient bore it without the slightest injury or production of an eschar. Until the stools become normal, which occurs in ten or twelve days, he repeats the treatment every day, but after this at longer intervals, and discontinues it the twentieth to the twenty-fifth day. The electrodes are covered with several thicknesses of chamois skin, moistened with water or gelatin, and placed at the lowest point of the iliac fossæ. The results in all his seven cases were completely successful.—*Nord Medical (Lille)*, May 15.

Static Electricity in the Treatment and Cure of Varicocele.

Drs. J. G. Carroll and B. T. Boyd *(Alkaloidal Clinic)* have found the positive galvanic electrode useful in most cases of varicocele. In extreme cases of long standing they found static electricity (positive electrode) very beneficial in stimulating tissue changes. The negative pole was grounded, the patient placed on the insulating stand and a spark gap of three or four inches made between the positive pole of the machine and its electrode which was in contact with the scrotum.

Radio-Therapy.

Radio-Therapy.

Dr. Wm. J. Morton read a paper on the treatment of malignant growths by the x-ray at the meeting of the Harvard Medical Society of New York City, Feb. 22, 1902, in which he gave a report of a number of cases then under treatment. A sarcoma at the elbow joint was relieved of pain by the first treatment. After two months, treatment being given three times a week, the cure seemed to be complete. A carcinoma of the breast of five years' standing, recurrent, with an enlarged gland in the axilla was perceptibly improving after four treatments. A patient having cancerous tumor of the stomach was relieved of pain by each treatment for from 6 to 48 hours. After six treatments she has remained three successive days without pain, which before treatment began was constant. A case of sarcoma of the side of the head, which began four years before, had been excised and later treated with caustic. It was somewhat relieved by the use of Dr. Coley's serum, but afterwards grew rapidly, causing intense pain which necessitated the use of one-half a grain of morphia every two or three hours. After the third treatment no morphia was required at night. In one month the tumor was nearly all gone and the patient entirely free from pain. Several other cases of marked improvement under the x-ray were described in the paper.

Dr. Morton calls particular attention to the immediate and complete relief from pain in these cases. This he considers to be due to the benumbing of the nerves of sensation by the x-ray. This innervation he thinks may cause a reduction of the activity of the growth of the part. When the new growth has an open ulcer he would use the rays with such intensity that their action would resemble that of the caustic, but where the skin is not destroyed it should be guarded carefully. A great advantage in the use of the x-ray is its power of reaching foci of disease which may be deeply situated, destroying infections in parts where the knife could not be used. "It is necessary to emphasize the great caution required to administer enough of the x-ray, without burning or injuring to the extent of gangrene the patient's tissue, and yet enough to cause retrogression of the new growth. The treatment is a hazardous journey between Scylla and Charybdis."

The Therapy of Light.

The use of light in the treatment of disease is increasing in about the same ratio as new machines are invented. The x-ray is still very much in evidence, although not carried to the same extremes as in former months. There are many advocates who believe in the efficacy of x-rays for all forms of malignant growths, and are demonstrating, to their own satisfaction at least, its curative powers.

The conservative experimenter is the man who, by clinical results, is recording his failures and triumphs. He is conservative enough to state that improvements have taken place in many cases while in others the result is still in doubt. The advantage of the x-rays over other forms of light, is its power of penetrating the body, thus reaching the deep structures and modifying bacterial toxins or changing and suspending the activity of disease stimuli. The apparent results obtained in malignant disease is still a matter for consideration and speculation, and altho many seeming recoveries are recorded, time will determine the ultimate disappearance of growth and the recovery from disease. If the rays have the power of deep penetration, and are applied to the

various portions of the body where malignancy may be transmitted, i. e., in the glandular structures, then may we seriously consider its curative power. Unfortunately, the x-rays are not infallible; shadows from a distant organ may appear on the photographed plate and deceive one as to the exact position of the lesion. One instance detailed by one of the leading surgeons of the state is an illustration of x-ray error. A patient with symptoms of renal calculus was advised to have an x-ray picture made by an expert. The plate showed very plainly a shadow in a kidney that was thought to be a stone. An operation followed, but no stone was found. Numerous instances similar in their findings have led some courts to exclude x-ray photographs from the evidence in the cases in which damages for needless operations have been sought, yet it is well known that metallic substances and fractured bones have been accurately defined by the x-ray.

The possibility of burns from prolonged or repeated exposures has led the manufacturers of apparatus to provide suitable shields to protect the body, and to compass the rays. These shields are invaluable, and should form a part of every outfit.—*Northwestern Lancet.*

Red Light Treatment for Small-Pox.

Dr. J. F. Schamberg, of Philadelphia, in the *Jour. A. M. A.*, May 2, 1903, examines critically N. R. Finsen's treatment for smallpox by exposure to red light only. He says that the treatment is not new, having been employed as early as the 14th century, and gives good reasons for doubting Finsen's theory that ordinary light affects the smallpox patient injuriously. In his own experience the red light treatment failed completely to produce any marked result. Many mild cases leave practically no scars under any reasonable treatment and if the red light happens to be used in these cases enthusiasts are liable to attribute the absence of scars to the red light.

Photo-Therapy.

Dr. F. H. Montgomery read a paper on this subject before the Chicago Medical Society, giving a tabulated report of 800 cases of lupus vulgaris treated at the Finsen Light Institute, Copenhagen. About 70 per cent of the cases are reported cured, with recurrences in about 20 per cent, due mainly to reinfection of the skin from mucous membranes. Of the remaining 30 per cent all but 2 per cent or 3 per cent have been benefited. The treatment requires the constant attention of a trained assistant and requires exposures of an hour each to a single area. Lamps with iron electrodes have remarkable bactericidal power, but the rays do not penetrate below the epidermis. The histological changes are those of simple inflammation. Dr. Montgomery thinks photo-therapy is the best treatment for all tuberculous lesions of the face, as well as in some cases of lupus erythematosus, alopecia areta, rosacea, vascular nevi, superficial epitheliomata, and indolent ulcers.

A Brief History of the Therapy of Various Forms of Light and Radiotherapy.—James M. Winfield, in the *Brooklyn Medical Journal* for April, reports briefly some of his own experience with the x-rays. He holds that the Finsen method is of undoubted value though limited in its scope, and that radiotherapy is more useful than phototherapy because of its wider range of application. It is better in lupus than the Finsen light because of its simplicity, and it is of value in almost all forms of cancer, but surgical procedure is preferable if the cancer is small and easy of access. Radiotherapy should be used in inoperable cancer and after removal by surgical means.

Medico-Legal.

Physical Examination—Privilege Extends to Skiagraph.—The malpractice case of Aspy vs. Botkins, as it is entitled in the supreme court of Indiana, was brought by the latter party to recover for alleged negligence in the treatment of an injury which she had received in and about her right knee. While the physician sued was on his case in chief, and one of his attorneys was examining a physician and surgeon called as a witness in his behalf, such attorney made the request that the witness be allowed to examine the knee in the presence of the jury, that he might testify as to the condition of the knee at that time. Objection was made to the granting of this request, and the trial court refused to so order. This leads the supreme court to say that where the ends of justice require it, it is the duty of the court, on a timely application, to grant a reasonable request to have the party suing in a personal injury case, on the penalty of a nonsuit, submit to a physical examination with reference to the injury he claims to have sustained. The right is not, however, coextensive with the power of cross-examination, and some latitude of discretion must be recognized as existing in the trial court. Each case must rest on its own foundation, and the party sued who complains, on appeal, that the trial court abused its discretion in refusing to make the order, must be able to present a case where it is plain that the request should have been granted. The supreme court is satisfied that error did not appear in the present instance, for the reason, if for no other, that it required the party suing, a woman, to make a quasi public exposure of her person. That she subsequently offered to exhibit her limb to the jury did not operate to make the prior ruling improper. Again, while the physician was introducing evidence on his own behalf, his counsel called the party suing to the stand and asked her whether a certain other physician had taken an x-ray photograph or skiagraph of her right knee. Objection was made to the question, and it was shown that whatever such other physician had done in relation to the knee had been done in treating the limb. The supreme court says that, in terms, the Indiana statute only purports to render the physician or surgeon an incompetent witness as to the matters therein specified, but it is evident that the protection would amount to nothing, in the case of an honest suitor, if the latter could be compelled to make the disclosure. It is hardly necessary to observe that, if the consultation was itself protected, a like protection would extend to the mute voucher thereof. —*Jour. A. M. A.*

Damages for X-Ray.—The Paris lower court has recently condemned a physician to 5000 francs damages and expenses on account of a severe x-ray burn that developed on a patient after three long exposures in the course of three weeks. The *Semaine Méd.* commends that physicians must bear in mind that when they apply these new physical therapeutics they step out of the domain of medicine and pass into the jurisdiction of common law. According to this French decision, a fault or negligence is not necessary—the mere application of physical measures which resulted in injury renders the physician liable to damages. The editorial concludes with the remark that justice, as practiced in the courts, is not partial to the medical corps in these days, and it behooves physicians to be wary.—*Jour A. M. A.*

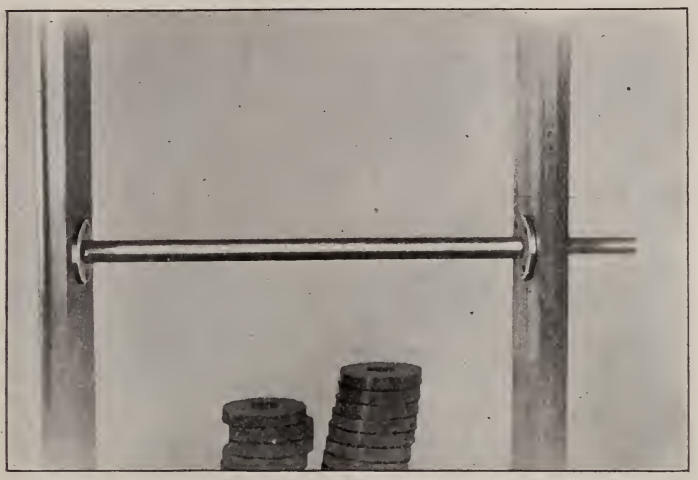
Correspondence.

BUFFALO, N. Y., July 8, 1903.

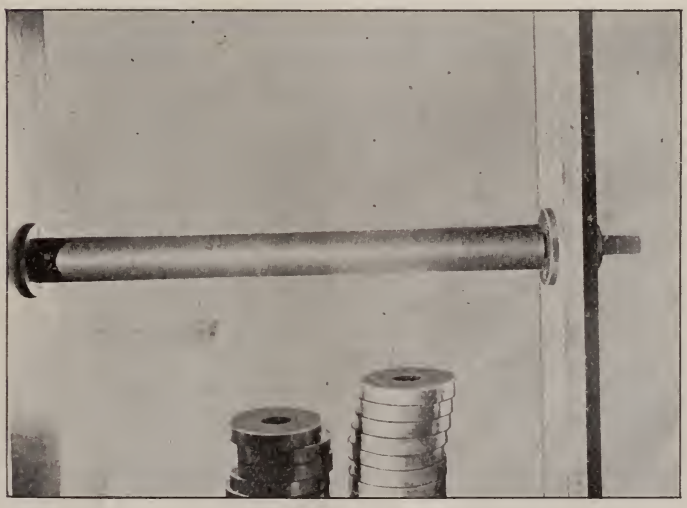
DEAR DOCTOR:

In building three new static machines for my own use to be operated in multiple relation to each other on a single low vacuum tube. the following manner of construction is being utilized:

Cut No. 1 shows naked steel axle in situ; also the flanges of its plain brass boxes and wood upright supports.



Cut No. 1.



Cut No. 2.

Cut No. 2 shows the same axle covered from flange to flange with a hard rubber sleeve half an inch thick. A fine thread runs the entire length of the sleeve to receive the hard rubber collars similiary threaded. The sleeve was shrunk firmly upon the axle at the hard rubber factory. Hard rubber collars are six inches in diameter.

Cut No. 3. The hard rubber collars, narrow and wide, are seen to alternate with each other; soft rubber packing is also shown interposed between them.

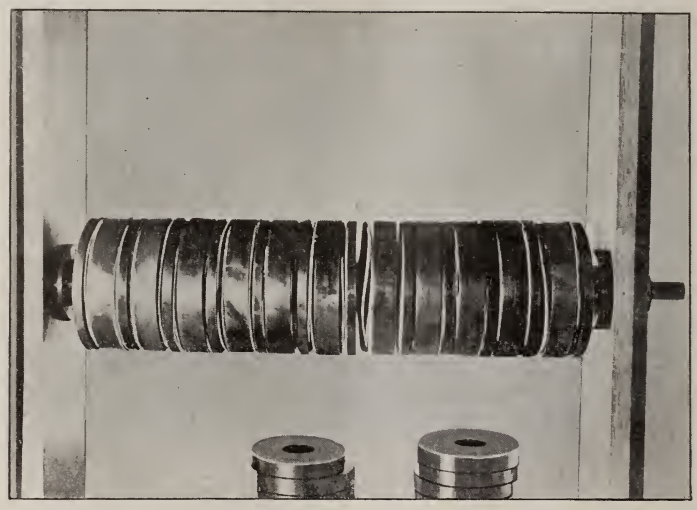
The cost of the hard rubber all made up and accurately fitted, first quality, as appears in cuts, is fifty dollars per machine.

Twenty revolving plates will be operated in each case, altho the inside measurement is but twenty-three inches.

Owing to the perfect insulation of the shaft nearly all of that portion of the glass wheels which project beyond the rubber collar can be utilized in the generation of electricity.

Collecting rods will be proportionately long, projecting well towards the axle, but made movable, so they can be withdrawn therefrom as the resistance of the x-ray tube increases. When wooden collars are employed or the shaft is not incased as shown above, the collecting combs must be shorter, and more of the area of the revolving plates remain electrically inactive. Yours sincerely,

JOHN T. PITKIN.



Cut No. 3.

LONDON, ENG.

DEAR SIR:

As you have so kindly been sending me your brightly edited journal, I take the liberty of enclosing a short article in case you think it good enough for publication. I do not think you, in America, have yet come to realize the wonderful results obtainable from the high frequency currents. They are all the rage at the present time in France, and are fast becoming fashionable here, also. In Germany, however, I am told that there is a reaction in favor of x-rays.

The great advantage of the high frequency treatment is its freedom from danger and the impossibility of producing burns and other after effects.

Yours fraternally,

H. VALENTINE KNAGGS.

[We are glad to publish the article, for we think Dr. Knaggs' ideas are worthy of study.—ED.]

DEAR DOCTOR:

I will thank you for advice as to how I can bring life into my static machine, this very wet weather. It stopped giving a current a few days ago. Connections are all right as far as I am able to see. I have placed ten pounds freshly baked clorid of calcium in the case with no result. I once tried ice with no better result. Any advice you may see fit to give me soon, I assure you will be much appreciated. Fraternally yours,

S. J.

[If the mechanical parts of your static machine are in good order, the brushes touching the knobs as they pass, and the air in the machine dry, it is probable that the surface of the plates, of the inside of the case, or of both, is for some reason a conductor. The ozone generated whenever the machine is in action forms oxids of nitrogen and these unite with any moisture that may be present to form nitrous and nitric acids which condense upon the surface of the plates

and render them conductors. When these acids are once formed they can not be removed by a drying material such as calcium chlorid. Particles of dust or of cotton may also adhere to the surface of the plates and render them partial conductors. Try washing the plates and the whole inner surface of your machine, especially the rubber insulators and supports, with a cloth wrung out of weak ammonia water; then rub lightly with a clean dry cloth. Air well and remove the remaining moisture by placing in the machine two or three pint jars filled with a freezing mixture (snow or pounded ice two parts, salt one part). In fifteen to thirty minutes the machine should be dry enough to work. Then remove the jars, putting in their place an open dish containing a pound or more of pure calcium chlorid. If the shellac is detached on any portion of the plates it is much harder to keep them clean and dry and a fresh coat should be applied.—EDITOR.]

Crystallization from an Electrolyte.—Heyl (*Phys. Rev.*, December) gives an account of an experimental investigation. Having failed to find any effect produced by electrostatic stress upon crystals formed under its influence, he investigated the effect produced upon crystals formed from an electrolyte carrying a current. The results are likewise entirely negative. Two substances were used: copper sulfate in an aqueous solution and mercuric iodid in concentrated hot hydrochloric acid. The passage of the current produces no effect comparable with that produced by the heating of the solution.—*Electrical World and Engineer*, January 10, 1903.

A Resume of Photo-Therapy.

Dr. Otto Juettner in the *Electro-Therapeutist* for May gives the substance of a class lecture upon this subject. No new facts are given.

BRADFORD, PA., July 14, 1903.

GENTLEMEN:

I wish to report an accident which occurred yesterday in my office:

About 2:30 p. m., a Crookes tube collapsed in my hand, the flying glass cutting hand terribly; particles of glass also struck me in the face and making a few cuts. A patient awaiting treatment standing a few feet off, also received a few cuts from the flying glass.

The tube was the "Monell" type, and had done excellent service for a year. A week ago it backed up a spark gap of 4 inches from a 12-plate Holz machine. The bulb was not blackened, as is often the case when a tube is "high," and has seen considerable service. Heat, or other methods employed in manipulating tubes for special purposes, had never been used on this tube. The tube was taken out of a closet where all my tubes are kept lying on cotton batting. I carefully picked it up by the handle, and as I was walking across the floor to place it in the tube holder, it collapsed. The explosion from it was as loud as a cannon cracker. The temperature of the room was 87°, with no draughts of cold air striking it. I am positive that my hand did not come in contact with it nor did the tube strike any surrounding object.

Fortunately the cuts made by the glass were not deep, tho they were many, and at this writing are such that I have left off all gauze dressings. I am not aware of any cases where any serious results followed such accidents, but I can imagine that the results might be disastrous if this occurred when raying the face if the patient were close to the tube.

Yours very truly,

J. W. KING.

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DR. CARL E. BLACK,

President Illinois State Medical Society.

THE AMERICAN
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VOL. XIII. CHICAGO, AUGUST, 1903. No. 2

Electro-Therapy.

A Course of Twenty-four Lessons under the auspices of the Chicago College of X-Ray and Electro-Therapeutics

LESSON 3.—ELECTRIC CURRENTS.

According to the vortex theory an electric current is a rotation of chains of polarized atoms. The amount of current in a given case is represented by the number of rotating chains and the velocity of each. The rotation of 10,000 chains, each turning 100 times per second represents the same amount of current as the rotation of 100 chains each turning 10,000 times per second. It is evident that if the atoms at one part of the chain are held so that they cannot rotate at all, the whole chain is held. In other words, unless the conducting circuit is complete there is no current. It is evident also that the total amount of rotation in one part of the circuit must be the same as the rotation in any other part of that circuit at the same time.

In order to measure the amount of current in any given case we should know the number of rotating chains and the velocity of each; but this is, in the present state of our knowledge, absolutely impossible. It is necessary, therefore, to assume some definite amount of current, which can be measured in some way, as the unit. This unit is called an ampere. It is defined as the amount of current which in one second deposits from a solution of silver nitrate 1.118 milligrams of silver. To the ordinary reader this statement conveys no information at all. The following facts regarding currents with which most people are familiar will assist in giving some definite idea as to the amount of current meant by one ampere. The current required for an ordinary sixteen-candle power incandescent lamp is a little over half an ampere. An ordinary office bell requires about one-third of an ampere. The ordinary 1,200-candle power street lamp requires six amperes. Arc lamps of higher candle power require proportionally larger currents. For example, a 15,000-candle power Finsen lamp requires seventy-five amperes.

For physiological and therapeutical purposes currents of very small intensity are used. A smaller unit, the milliampere, which is one-thousandth part of an ampere, is employed in their measurement. In extracting hairs by the electric needle from one-half to three milliamperes are sufficient. In destroying large tumors by the same method much larger currents, 500 or in some cases 1,000 milliamperes, may be used, but for these the patients must be under complete anesthesia and care must be taken that the current does not pass thru any vital part. Ordinarily one-tenth of an ampere, or 100 milliamperes, is as much current as can be borne without severe pain, and this amount is as much as it is safe to pass thru the chest or any other vital part of the body.

By electro-motive force is meant any

force which tends to produce an electric current. On the vortex tneory this force is of the nature of a wrench or twist applied to the chains of atoms. The first application causes the atoms to be arranged in polarized chains, connecting end to end like little magnets, and forming complete circuits. If all the atoms in the circuit are in conductors, that is to say, in such situations that they can rotate, then the chain rotates; in other words, there is a current. If some of the atoms of the chains are in non-conductors, that is to say, are in substances in which rotation is not possible, none of the atoms in the chain rotate, and there is no current, but polarization only.

The unit of electro-motive force is called a volt. It is very nearly the electro-motive force of a single "gravity cell" (copper and zinc plates, copper sulfate solution). An electro-motive force may be positive, tending to produce a right-handed rotation, or negative, tending to produce a left-handed rotation. Two cells in the same circuit may be so placed as to work together, thus doubling the electro-motive force of one, or so as to work in opposition, neutralizing each other and producing no current. Ten cells in a single circuit, placed in similar positions, give ten times the electro-motive force of a single cell. The ordinary Leclanche cell (zinc, carbon, sal-ammoniac solution) has an electro-motive force of 1½ volt. The electro-motive force of the ordinary dry cell is nearly two volts.

Electro-motive force may be thot of as the force which enables the current to break thru resistances. If two clean copper wires which are connected with the poles of a single cell are touched together and then separated, a spark will be seen at the moment of separation. This is evidence that a current was passing. If the wires are old and tarnished, they may be brot together in many cases without a spark appearing; the resistance of the thin layer of oxid on the wire being sufficient to prevent the current when the electro-motive force is only one or two volts. If, by the addition of other cells in the same circuit, the electro-motive force is increased to, say, ten volts, the tarnish on the wires will no longer be sufficient to check the current. If the electro-motive force is increased to 100 volts the spark becomes visible before the wires are actually in contact, and thin layers of dirt and grease are unable to check the current.

The electro-motive force used in the ordinary incandescent light circuits is about 110 volts. The force used on street car lines is usually about 500 volts. On arc light circuits and circuits which are used for transmitting electric power, the voltage is very much higher, 2,000, 10,000 or even 80,000 volts being sometimes employed. Still higher voltages are obtained from static machines. The electro-motive force necessary to produce an electric spark between two conductors in air depends in part upon the nature of conductors and the form of the terminals. Estimates have been made that the electro-motive force required to produce a spark across one inch of air is from 50,000 to 100,000 volts. At this rate the electro-motive force of an ordinary static machine is in the region of one million volts.

The power represented by an electric current, or, which is the same thing, the power required to maintain a given current, is proportional to the current and to the electro-motive force. In this respect the current is like a rotating shaft in a machine shop. In order to increase the power conveyed by the shaft, we may increase the speed of rotation or we may increase the pressure or force upon it. The power exerted is measured by the product of the velocity into the pressure. Sim-

ilarly in an electric current, the power is measured by the product of the current (velocity) into the electro-motive force (voltage). The power of one ampere of current, whose electro-motive force is one volt, is called a watt. There are 746 watts in one horse power. To find the horse power required for one incandescent lamp (16-candle power), we multiply the current (0.6 ampere) by the electro-motive force (110 volts). This gives 66 watts, or about 1/11 of a horse power. A kilowatt is 1,000 watts.

As already stated, an electro-motive force in a circuit may be counterbalanced by an equal and opposite electro-motive force, so that no current results. If either of these opposing electro-motive forces be removed, the remaining one will produce a current. Resistance is the name given to the property of hindering the passage of a current, without reference to its direction. If the resistance in a circuit is very great, the current which is produced by a given electro-motive force is exceedingly small; whereas when the resistance is small the same electro-motive force will produce a very great current. All conductors have some resistance. Copper, silver, brass and aluminum are the best conductors. Lead, zinc, iron and platinum have eight to twelve times as much resistance as the same amount of copper. The resistance of pure water, oils, resins, paraffin, dry wood, rubber, hard glass, quartz and a vacuum is exceedingly great. Ordinary water is a rather poor conductor. When salts are dissolved in water, its conductance is much improved, but even then it is much inferior to that of any of the metals.

The resistance of any conductor is proportional to its cross section.

The unit of resistance, the ohm, is the resistance of a column of mercury 106.3 centimeters long, whose cross section is one square millimeter, at 0° centigrade. This resistance is about the same as that of 250 feet of No. 18 copper wire, the size usually employed in office wiring, for call bells, etc. No. 40 copper wire, the size used in winding the magnet of a telephone, has a resistance of about one ohm for each foot of its length.

The human body conducts about as well as weak solutions of salt in water. Roughly speaking, those tissues which contain most water are the best conductors, while those which contain a less amount of water and the largest amount of fat or earthy matter are the poorest conductors.

The resistance of the body varies very greatly in different directions, and since a large part of the resistance is in the integument, the resistance depends very largely upon the amount of surface to which the electrodes are applied. With large conducting surfaces, completing the circuit across the abdomen, or from the abdomen to the chest or back, the resistance may be made as low as 1,000 to 1,500 ohms. With moderate contact, such as would be obtained by grasping bare wires in the hands, the resistance is in the region of 5,000 ohms; while with smaller contact areas it may be as high as 40,000 or 50,000 ohms or even more.

These three quantities, current, electro-motive force and resistance, are usually represented by the letters I (intensity of current), E (electro-motive force), R (resistance), and are related to one another by Ohm's law, which is

Electromotive force=Resistance×current,

or, $E = R\,I$,

or, Volts=Ohms×Amperes.

This may be stated in the equivalent form,

Current=Electromotive force/Resistance,

or, $I = E/R$.

By means of this law, when any two of these quantities are given, the third may

be found. For example, an electro-motive force of 110 volts produced in an incandescent lamp a current of 0.6 ampere. What is the resistance of the carbon filament in the lamp? Using the equation $E = RI$, we have $E = 110$ and $I = 0.6$, from which we find $110 = 0.6\ R$, whence $R = 183$ ohms nearly.

An electro-motive force of 30 volts applied to the human body produced a current of 20 milliamperes. What was the resistance of the body?

Twenty milliamperes is .02 ampere. From Ohm's law we have $30 = .02\ R$, whence $R = 30/.02 = 1500$ ohms.

A man accidentally received a current from a street car circuit (500 volts). Estimating the resistance of his body to be 5,000 ohms, what current did he receive? We have $I = E/R = 500/5000 = 1/10$ ampere.

It has been already stated that 1/10 ampere, or 100 milliamperes, is as large a current as it is safe for the ordinary individual to receive. If the electro-motive force were 2,000 instead of 500 volts, the man would receive four times as much current, with a probably fatal result. It must be borne in mind, however, that in a circuit which contains a transformer or a large electro-magnet the electro-motive force of the circuit is liable to be momentarily increased at the time the circuit is broken, so that a fatal shock may be obtained from a 500-volt current. On the other hand, cases are known in which a man has made accidental connection with a 5,000 volt current without fatal results.

A current whose rotation is always in the same direction is known as a direct current. Those which periodically change direction are called alternating. These two, the direct and the alternating, are the main divisions of electric currents. Other terms in common use to describe the kinds of currents are almost self explanatory. An intermittent current stops at intervals. A steady current maintains the same intensity. An irregular current changes its intensity or its direction or both irregularly. An interrupted current is the same as an intermittent current. An oscillating current is one in which each impulse is succeeded by rapidly diminishing oscillations or reversals. A high frequency current is one whose alternations are exceedingly rapid. A pulsating current is a direct current having regular pulsations.

Some other terms in common use in works on electro-therapeutics can not be defined with a very great degree of accuracy. A current of high potential has a high electro-motive force, and one of low potential a low electro-motive force. A galvanic current is a current produced from a battery. It is a direct current and usually of low potential. The current produced from a static machine has usually a very high electro-motive force and very small intensity. It is often called a static or franklinic current. The current produced from a faradic coil is called a faradic current. It is alternating, and usually the form of each wave is quite irregular. An alternating current whose wave is not irregular, but which changes its polarity smoothly, is called a sinusoidal or "wave" current.

EDITORIAL

We present as a frontispiece to this JOURNAL a half-tone of Dr. Black, who has been for years the chairman of the legislative committee of the Illinois State Medical Society. We also publish a letter from the doctor in which he takes the stand that x-ray and electro-therapeutical workers should be licensed practitioners. It is pleasing to us to think that the x-ray workers have such a friend, and the suggestion made by him to correct this evil is to have the local societies patronize the licensed practitioner, instead of encouraging this illegal practice by sending patients to the non-professional man to have x-ray pictures taken or electro-therapeutical work done. There is no field for illegitimate practice that opens the bar so wide as this of the x-ray in the hands of the non-professional electro-therapeutical expert. It has been suggested that physicians do not like to send their work to men who are licensed practitioners for fear the practitioner will steal their patients. This is no excuse at all. It is much safer for them to refer to the licensed practitioner rather than to the non-professional gentleman, because in case of malpractice proceedings their interests are protected, and no professional licensed practitioner who does this work would dare do anything but protect the interest of his brother practitioner from whom the case was referred. We sincerely hope that every society will take this up and persuade each one of its members to patronize the licensed practitioner in preference to the other.

Meeting of the Illinois State Electro-Medical Society.

The first annual meeting of this society will be held in the Masonic Temple, Chicago, December 1, 2, 3, 1903, in conjunction with the American Electro-Medical Society. Arrangements are being made so that members may secure round-trip tickets from every part of the state for one fare plus $2. An excellent program is being prepared and a large attendance is expected.

All licensed medical practitioners of every school who are in good standing are entitled to membership in the state Electro-Medical Society. Members of the state society may join the American Electro-Medical Society and receive its official organ, the *American X-Ray Journal*. The Electro-Medical Society differs from all other societies of its kind in the breadth of its aims and in the fact that it is a complete organization, national, state and local.

The advantages of state and local societies are found in the frequency of the meetings and the greater freedom of discussion. Every progressive physician will find it to his own interest as well as for the advantage of his patients to acquaint himself with the theory and practice of electro-therapeutics.

The fee for membership in the state society is $1 and for membership in the national society $3.

Application blanks may be obtained from H. Preston Pratt, M. D., Masonic Temple, Chicago.

American Electro-Medical Society.

The first annual meeting of the American Electro-Medical Society will be held in the Masonic Temple, Chicago, Decem-

ber 1, 2, 3, 1903. Round-trip tickets may be obtained from the center and West and as far east as Buffalo and Pittsburg, for one fare plus $2. The meeting will be of a representative character and a large number of valuable papers will be presented. Members of the society and others desirous of reading papers are requested to submit the title, together with a brief abstract to the chairman of the executive council, Dr. H. Preston Pratt, Masonic Temple, Chicago.

Personalities.

Discussions upon medical and surgical subjects are supposed to be carried on for the good of the public and not for the advancement of any private interests. This, while usually the case, is not always so. Advocates of new methods of treatment nearly always meet with more than the proper amount of opposition. Some physician or surgeon who is skilled in some entirely different line of work, or else entirely unskilled, tries the new method, makes a dismal failure, and forthwith considers it his duty to "squelch" the daring pioneer. Those who are specialists along the new lines see clearly the absurdity of such an attempt. The general practitioners, however, are often unable to distinguish between such tirades and the reasonable objections of careful and conservative men. All new methods, unless backed by the weight of a great name, must pass thru this ordeal before being accepted by practitioners in general. Electro-therapeutic methods have been several times thrown overboard and utterly demolished by such would-be conservators. The electrical methods of treatment are now, however, so well established and so generally recognized that they are attacked by only a small number of ignorant or prejudiced men or by those who have some personal ends to serve. All others either keep silence or add their mite to the world's progress.

American Electro-Therapeutic Association.

PRELIMINARY PROGRAM.

The thirteenth annual convention will be held at the Hotel Windsor, Atlantic City, N. J., on September 22, 23 and 24, 1903. The rate will be $3.50 per day for each person.

Trains leave New York for Atlantic City at short intervals over the Pennsylvania railroad, West Twenty-third Street Station. Price of round-trip ticket, $4.75. This ticket is good for return any time within fifteen days after date of sale.

FIRST DAY, TUESDAY, SEPTEMBER 22, 1903.

Morning Session.

Registration of Members.

9 O'Clock—Executive Session;

10 O'Clock—Scientific Session.

Reading of minutes of previous meeting; Addresses of welcome and responses; Reception of Honorary Fellows and Guests; Communications; Address of President; Report of Committee on Arrangements; Resolutions.

REPORTS OF STANDING COMMITTEES.

On Induction Coils and Alternation, by Margaret Abigail Cleaves, Chairman.

On Electric Light Apparatus for Diagnosis and Therapy, and the Roentgen Ray, by William Scheppegrell, Chairman.

On Electrodes, by R. G. Brown, Chairman.

On Meters, by Robert Reyburn, Chairman.

On Kataphoresis, by Fred Harris Morse, Chairman.

On Static Machines and Condensers, by William Benham Snow, Chairman.

On Constant Current Generators and Controllers, by William James Herdman, Chairman.

On Current Classification and Nomenclature, by William Johnson Jenks, Chairman.

On St. Louis Exposition in 1904, by William Benham Snow, Chairman.

Papers.

"Electrotherapy as a Specialty," Alfred William Bayliss, Buffalo, N. Y.

"Currents of High Frequency, Apparatus, and Therapeutic Uses," Francis Goodwin DuBose, Selma, Ala.

"The Effects of the Secondary Static Currents in Removing Albumin and Casts from the Urine," Boardman Reed, Philadelphia, Pa.

"Some Principles upon which are Based the Use of Electricity in Nervous Diseases," Alfonso David Rockwell, New York, N. Y.

"The Use of Electricity in the Treatment of Diseases of the Heart," Sigismund Cohn, New York, N. Y.

"Electricity in the Treatment of Diseases of the Stomach," Harvey Hamilton Roberts, Lexington, Ky.

AFTERNOON SESSION, FIRST DAY, 2 O'CLOCK.

Exhibition drill of the crew at the Life Saving Station.

3 O'Clock—Scientific Session.

"Electricity in the Treatment of Chronic Deafness," George Zena Goodell, Salem, Mass.

"Employment of Static Electricity in the Treatment of Nervous Diseases," William Benham Snow, New York, N. Y.

"Electrical Treatment of Trachoma and Corneal Opacity, with Illustrative Case," Margaret Abigail Cleaves, New York, N. Y.

"The Successful Treatment of Eighteen Cases of Granular Lids by the X-Ray and High Frequency Vacuum Electrodes," Albert Charles Geyser, New York, N. Y.

"A Year's Work in Electro-Therapy," Laura Viola Gustin-Mackie, Attleboro, Mass.

"The Treatment of Urethral Stricture, and Fissure of the Anus by Electrolysis, with Report of Cases," John Clark Luke, Ocilla, Ga.

SECOND DAY, WEDNESDAY, SEPTEMBER 23, 1903.

9 O'Clock—Executive Session;

10 O'Clock—Scientific Session.

Problems in Electro-Therapeutic Practice; a General Discussion. Members are invited to submit difficulties, arising in practice, on which information or advice is desired, and to offer suggestions as to the solution of such problems.

Papers.

"Treatment of Tuberculosis, with Report of Cases," Russell Herbert Boggs, Pittsburg, Pa.

"The X-Rays in the Treatment of Tuberculosis of the Throat," William Scheppegrell, New Orleans, La.

"The Roentgen Ray in the Treatment and Cure of Cancer, Lupus, Rodent Ulcer, and Eczema, with Histories of Cases Treated," Elijah Wilkinson Smith, Terre Haute, Ind.

"The Use of the X-Ray in the Treatment of Malignant Growths, with Relation of Cases," Marcus Morton Johnson, Hartford, Conn.

Twelve O'Clock—Visit to United States Signal Station.

AFTERNOON SESSION, SECOND DAY, 3 O'CLOCK.

Scientific Session.

"The Position of the Roentgen Ray and Ultra-Violet Light in the Therapeutics

of Malignant Diseases of the Uterus and Adnexa," Margaret Abigail Cleaves, New York, N. Y.

"The Type of Cell and Pathological Features of Carcinoma Which Do Not Respond to X-Ray Therapy," William Leroy Kenney, St. Joseph, Mo.

"The Present Status of X-Ray Therapy in the Management of Cancer," Clarence Edward Skinner, New Haven, Conn.

"The Use of Galvanic Electricity in the Treatment of Cancer and Kindred Diseases," William Winslow Eaton, Danvers, Mass.

9 O'Clock P. M.—Executive Session—Election of Officers.

Reception given by the medical profession of Atlantic county, N. J., and the Academy of Medicine of Atlantic City, N. J., to the members of the Association and guests at the Marine room, Hotel Windsor.

THIRD DAY, THURSDAY, SEPTEMBER 24, 1903, 9:30 O'CLOCK.

Scientific Session.

"Radio-histo-fluorescence," William James Morton, New York, N. Y.

"Kataphoresis," James C. Gill, Chicago, Ill.

"The Roentgen Ray as an Aid in Diagnosis," Herman Grad, New York, N. Y.

"Perineuritis," Almerin Webster Baer, Chicago, Ill.

"Nerve Health and Nerve Debility: the Effect of the Actinic Rays Upon Tissues," Albert E. Sternes, Indianapolis, Ind.

"Retrospect of the Second International Congress on Electro-Therapeutics at Bern," Robert Newman, New York, N. Y.

Members of the medical profession are cordially invited to be present.

The following papers were submitted too late for location in the preliminary program, but will appear in the final program:

"A Plea for Electro-Therapeutics Proper," William James Herdman, Ann Arbor, Mich.

"A Plea for an Accurate and Scientific Method of Roentgen Ray Treatment," Mihran Krikor Kassabian, Philadelphia, Pa.

"Exophthalmic Goitre and Its Rational Treatment, with Exhibition of the Broom Electrode," Francis Besant Bishop, Washington, D. C.

"Some Therapeutic Indications for the Use of the Radiant Light Bath," Thomas Davidson Crothers, Hartford, Conn.

"Some New Points in the Treatment of Tuberculosis," Wolff Freudenthal, New York, N. Y.

"Electro-Therapeutic Gleanings," Jefferson Demetrius Gibson, Birmingham, Ala.

"A Case of Asthma with Fibroids and Pelvic Adhesions, Cured by Galvanism," Charles Augustine Covell, New York, N. Y.

CLARENCE EDWARD SKINNER,
M. D., LL. D., Secretary,
New Haven, Conn.

The *New York Medical Journal* and the *Philadelphia Medical Journal* have consolidated their forces, and henceforth will be issued as one journal. This is as it should be. It is simply a waste of energy to have two national journals covering practically the same ground. We wish the combined journal every success. Why are not the two names combined also?

The Finsen Light Institute of America, of Chicago, has a full equipment for the treatment of various diseases by means of light. Its officers are Wellington G. Stewart, M. D., president; H. John Stewart, M. D., vice-president; Chas. R. Smith, secretary. Among other apparatus is a large improved Finsen lamp of 12,000 candle power, requiring a current of 70 amperes and arranged for treating four patients at one time.

Medical and Surgical Electricity, by A. D. Rockwell, A. M., M. D.

The last edition of this work has been revised by the author with the view of bringing it up to date. The first 178 pages are taken up with electro-physics and electro-physiology, giving an account of such electro-physics and electro-chemistry as is required by the physician, and a full account of experiments in electro-physiology. As a whole this part of the work is clear and accurate, but a few errors have crept in. On page 20 he says: "Electricity is now believed to be identical with the luminiferous ether. That this must be so is a necessary result of the great discovery of Maxwell that light itself is an electric phenomenon." It is true that this idea has been tentatively advanced by one or two scientists, but it is absolutely without evidence. On the same page the author states that "the current thru a telegraph wire 500 miles long meets the greater part of its resistance in the first 100 miles." This is not true: something else was probably meant.

In the explanation of chemical action the old spelling of the words and the old theories are retained. The explanations are consequently less clear than they would otherwise be. On page 26, on the other hand, the author shows himself to be in touch with modern views of electricity when he says, regarding an electric current, "There is here no progress of a material current but simply a motion."

On page 63 an explanation of the difference in "tension" (potential) between the static machine and a galvanic battery is given, based upon the difference of resistance in the two circuits—an explanation which does not explain.

Pages 181 to 525 are taken up with electro-therapeutics, including under this General Suggestions, Electro-diagnosis, Apparatus, Therapeutic Effects, and Applications of the Static, Faradic, and Galvanic currents to various classes of disease. There is lacking in this part that scientific precision to which we have become accustomed in modern methods of therapeutics, but the results of the author's own experience and of his reading are given with great fullness. The effect of electrical treatment upon nutrition is made prominent.

On pages 223-224 occur some paragraphs which might as well have been omitted, commencing, "There are individuals whom electricity always injures, the only difference in the effect on them between a mild and a severe application being that the former injures less than the latter. There are patients upon whom all electro-therapeutic skill and experience are wasted; their temperaments are not en rapport with electricity."

On page 226 the author makes this very true statement: "Some of the best successes we have gained are with patients who have 'tried electricity' and found it wanting. What should we think of a patient afflicted with a broken leg who should say that he had 'tried surgery,' and it failed to set the bone? Would we not ask, What surgeon? Was he a pretender or a man of science? And did he have a fair chance? It is possible, even if good treatment at the hands of good men failed some time ago, that the conditions may now be so altered that the same or different treatment will be successful."

Sixty-two pages are taken up with electro-surgery. Here the author, while he does not profess to be a specialist, has done good work and gives an account of such methods as he has found valuable in his own practice or has good reason to approve.

In a brief discussion of Kataphoresis, pages 588 to 590, the author adheres to the theory of the electrical transference

of fluids in the direction of the current; a common view, but one for which there is no scientific foundation.

The last fifty pages are occupied with a brief account of the Roentgen rays in diagnosis and treatment, the Finsen light, vibratory therapeutics, and high frequency currents.

The book is well printed and illustrated, and, taking it all in all, is probably the best general work on electro-therapeutics published.

Electro-Physics.

Platinum Electrodes.—Platinum is a metal which is being used to an increasing extent as electrode material in industrial electro-chemistry. On the one hand, in the form of an alloy of platinum and iridium, its resistance to attack by acids and alkalies renders it superior to all other metals or elements for this purpose; and, on the other hand, improvements in the mechanical design of electrodes formed of platinum have enabled electro-chemists to obtain a very large area of electrode surface of this metal at a moderate cost as regards capital outlay. The faith in the resistance of platinum to attack by all solvents excepting *aquaregia,* is, in fact, wide-spread, and it is somewhat startling to learn from a recent research carried out by Herr F. Glaser, in the laboratory of the Carlsruhe Technische Hochschule, that, under certain conditions, platinum loses its rank as one of the so-called "noble" metals, and sinks to the level of those base metals which decompose water in presence of alkalies.

Herr Glaser has been investigating the cause of the discrepancy noted when mercury is electro-deposited from a cyanid solution upon a platinum basin. When using a sulphate or nitrate solution, the deposition of mercury occurred in accordance with Faraday's law, and the whole of the mercury could be obtained at the kathode. With a cyanid solution, on the other hand, a deficiency in the weight of mercury obtained was always noted; and after numerous experiments Herr Glaser has proved this to be due to the solution of platinum in the cyanid solution, and to the consequent loss of weight at the kathode. The attack of potassium cyanid on platinum is found to be slow at ordinary temperatures, but it increases rapidly with rise of temperature, and the presence of potassium amalgam greatly accelerates it. The solution of the platinum in potassium cyanid occurs under exclusion of the oxygen of the air, and is allied with an evolution of hydrogen. Further details of this interesting and important research will be found in the *Zeits. f. Elektrochemie* of January 1st, 1903.

The Thallium Accumulator.

Jonas investigates the reactions taking place in a thallium cell, as they are of considerable theoretical interest, in that the battery is composed essentially of a metal and water. One electrode is metallic thallium and the other oxide of thallium, while a solution of thallium hydroxid serves as electrolyte. The author finds that the deposit obtained upon the anode by the electrolysis of thallium hydroxid is not a hydrate, but after drying at 200° corresponds approximately to thallic oxid. Reactions are calculated according to which the discharge of a storage battery consisting of thallium, thallium peroxid and dilute thallium hydrate solution, takes place, and the theoretical value of the capacity of such an element is determined as 235.2 amp.-hours per kgm. of thallic oxid, and 131.4 amp.-hours per kgm. of metallic thallium, differing from former values given by Marsh as 117 amp.-hours per kgm. of the oxid. The author also gives measurements of the potentials with a number of different solutions.—*Zeit. f. Electrochem.,* June 25.

Methods of Transforming Alternate Currents into Direct Currents.

The Electric Review, May 23, 1903, editorially refers to the different methods of transformation:

1. *Motor generators* consist of an alternating current motor, which mechanically drives a direct current dynamo. There is in this case a double transformation of energy, which involves considerable loss.

2. *Rectifiers* consist of a commutator driven by a synchronous motor. This changes the current impulses so that they are supplied to the secondary circuit always in one direction. There is difficulty in preventing sparks at the commutator, and the voltage of the secondary current is necessarily the same as that of the primary.

3. *Synchronous converters.* The alternate current is first transformed to the proper voltage, then supplied to this machine from which, by means of a commutator the direct current may be drawn. This machine is very efficient and is largely used in railroad work.

4. *Leblanc's converter* is a ring transformer, supplied by polphase currents, which set up a revolving magnetic field. Its action is similar to the last.

5. *Stationary transformers.* The electrolytic rectifier depends upon the property of certain metals of allowing a current to flow to them from a solution, but opposing a flow in the opposite direction. Thus, a cell constructed of a plate of aluminum, a solution of ammonium phosphate, and a plate of iron will allow a current to flow from the aluminum to the iron with but a slight loss, but will allow no appreciable current to flow in the opposite direction, unless the potential across the cell is forty volts or more. This apparatus may be used as an electric valve. Attempting to pass an alternating current thru it will cut out every other half wave, and transmit a series of impulses, all having the same direction. By a proper combination of four or more cells, the second half wave may also be sent thru the same circuit, and we then get a continuous current similar to that supplied by a mechanical rectifier. The apparatus is simple, cheap, noiseless, but is rather inefficient.

6. *Cooper-Hewitt vapor converter* is similar to the electrolytic rectifier, using mercury and mercuric vapor. Its efficiency is good. The apparatus is simple and inexpensive and requires no attention whatever after being started.

7. *Rectifying Arc.* If one electrode of an alternating current arc is split into two parts, insulated from each other, and the pole of a magnet be brought up to the arc, the reaction between the magnet and current will be such as to cause the positive half waves to flow through one side of the compound electrode, while the negative half waves will take the other course. This method, while interesting, is inefficient.

Reflected Cryptoscopic Cameras.

William Rollins, *Electrical Review*, May 23, 1903, describes and illustrates an instrument for viewing in a mirror the fluoroscopic shadow of the x-ray tube, enabling the operator to observe comfortably the shadowgraph of any part of the patient's body.

Radioactivity. —Elster and Geitel, in *Phy. Zeit.*, September 15, 1902, give an account of researches in which they investigated the fact that any conductor becomes radioactive when charged and exposed to air, especially when the air is contained in a closed subterranean space. To shed some light on the origin of this radioactivity, they have made experiments with air enclosed for three weeks in a

boiler, and on air sucked up out of the ground. If the activity is due to a process within the air itself, it will be evolved in the boiler, and if it is due to contact with the earth, it will be shown in the air sucked up. The results were altogether in favor of the view that the activity of the air in a cave or cellar is due to contact with the earth and to exhalation of ground air. They now claim to have traced two distinct sources of radioactivity, one of them being the action of the sun upon the higher strata of the atmosphere, and the other being the exhalation from the soil of air which has been in intimate contact with it, and which diffuses up through capilliary passages in the ground.—*Electrical World and Engineer.*

Electro-Chemical Energy vs. Oxygenation.

At the Indianapolis meeting of the National Eclectic Association Dr. A. J. Atkins, California, read a paper in which he claimed to have demonstrated that human blood is purified by electro-chemical action taking place in the lungs, outside of the blood stream, and that oxygen does not pass from the air into the blood by osmosis.

Secondary Radiation from Gases Subject to X-Rays.—Barkla (*Phil. Mag.*, June, 1903) describes in detail the apparatus used and the experiments conducted for the investigations of the above subject. He arrives at the following conclusions: 1. All gases subject to x-rays are a source of secondary radiation. 2. The absorbability of the secondary radiation is (within the limits of possible error, which was about 10 per cent.) the same as that of the primary radiation producing it. 3. For a given primary radiation the intensity of secondary radiation is proportional to the density of the gas from which it proceeds—the temperature and the pressure being practically constant. 4. The secondary radiation is not due to the recombination of the ions. As the primary and secondary radiations differ appreciably in intensity only, the author thinks that we may reasonably conclude that the radiation proceeding from gases subject to x-rays, is due to scattering of the primary radiation. As this scattering is proportional to the mass of the atom, it may be concluded that the number of scattering particles is proportional to the atomic weight. This would then give further support to the theory that the atoms of different substances are different systems of similar corpuscles, the number of which in an atom is proportional to its atomic weight.—*Electrical World and Engineer.*

Electro-Diagnosis.

X-Ray in Ophthalmology.

Dr. M. S. Mayou (*Lancet*, Feb. 28, 1903) examined sixteen cases of supposed foreign body in the eye. Thirteen were found and localized accurately, one was missed and two contained no foreign body. He also commends the use of the x-ray in trachoma. He has found no evil results to follow exposure of the eyeball to the x-rays. Recent pannus often yields readily under the x-rays: improvement sometimes begins at once.

Becquerel Ray Photographs. — Elster gives description of the simplest method of obtaining Becquerel radiographs. The radioactive substance is obtained by exposing negatively charged copper wires to the air, and rubbing off the surface layer after exposure. If cotton batting is used for rubbing it off, it should be moistened with a little hydrochloric acid; this is afterward neutralized with ammonia and eliminated by igniting the cotton; the activity of the ashes is the same as that of the cotton. The radioactivity lasts for about five hours; as its loss is greatest at first, the exposures must be made as soon as possible. To save time, it is advisable to substitute a piece of leather, moistened with ammonia, for the cotton, since it can be quickly dried in a spirit flame. The exposure is then made for about four hours, and the leather is again made radioactive. After about five such repetitions, good radiographs of lead stencils are obtained.—*Electrical World and Engineer.*

Reposition of Fractured Fragments Under X-Rays.

Dr. Carl Beck, New York *Interstate Medical Journal,* December, 1902, recommends highly the reduction of fractures and displaced bony fragments while viewed by means of the x-ray. Only in this way is it possible in many cases to make the reduction with accuracy and certainty.

Removal of a Piece of Steel from the Globe by an Electro-Magnet.

Dr. W. B. Johnson, Paterson, N. J., reported in the *Jour. A. M. A.,* the removal of a large chip of iron, which had passed thru the iris and lens into the vitreous chamber of the eye, by means of an electro-magnet.

Observations on the Mechanics of Digesting.

A study of the motions of the contents of the stomach and intestines was made by Dr. W. B. Cannon, Boston *(Jour. A. M. A.,* March 21, 1903). Pellets of bismuth subnitrate and starch, taken with food, were examined in situ by means of x-rays. The antiperistaltic waves of the colon were distinctly demonstrated and were always produced by the injected mass.

Electro-Therapy.

The Cerebral Neurons in Relation to Memory and Electricity.

Sir James Grant, Ottawa, Canada, (*Jour. A. M. A.,* February 2, 1901) discussed the relation of electrical currents to nerve action, calling attention to the fact that nerve cells are capable of so much ameboid movement as to actually alter their relation to each other, and pointing out that the application of electricity might accelerate or retard these movements and thus be a powerful therapeutic agent in nervous disorders.

Electrolysis in Stenosis of the Esophagus.

Dr. J. B. Feldovitch, in *American Medcine,* April 4, 1903, says electrolysis may be safely relied upon to produce rapid and comparatively painless dilatation. In three or four short treatments he stretched a stricture from three and one-third millimeters to thirteen millimeters. From a palliative standpoint, no method can compete with this. With weak currents and short treatments there is no danger of injury to adjacent organs.

Electrolysis for Stricture.

Dr. A. A. O'Neill, of Chicago, in the *X-Ray Era* for July, 1903, condemns the treatment of urethral and other strictures by electrolysis. He claims that it is impossible to destroy a stricture by electricity, that if the stricture were destroyed it would certainly return, and that the use of the electric current for strictures does harm only. In support of this contention seven experiments are mentioned. In these experiments scar tissue and mucous membrane were injured by the use of a few milliamperes for three to five minutes. In two cases it is stated that the postitive electrode was used. Presumably the same was true in the other cases, tho it was not so stated. The object of these experiments appears to have been to show that the positive electrode will cause an injury to scar tissue and mucous membrane. The electrode was of aluminum, a metal which is soluble in both acid and alkaline products of decomposition. The astringent effect of the positive electrode is well known, and we really can not see that anything has been gained by these experiments. Dr. O'Neill then describes nearly a dozen cases which have come under his observation in which electricity was used with either no result at all or injurious results. From these cases he infers that electricity is not applicable to the reduction of strictures. In none of the cases cited are sufficient details given to enable any one familiar with electricity to judge whether the treatment has been correctly applied or not. Dr. O'Neill expresses in very emphatic language his disapproval of such treatment. He is undoubtedly right. The cases he cites, which he says are similar to those he has himself tried, show clearly the dangers of electrical treatment in the hands of those who know little or nothing about it. Dr. O'Neill has done well to emphasize this point. But when he goes on to infer from the failure of such treatment that no cases of stricture can be cured by electrolysis, his conclusions are certainly not justified by the facts. It would be just as reasonable to condemn the use of surgery in general because in the hands of unskilled and ignorant persons the knife has done incalculable harm.

Dr. William F. Butterman confessed that his own results were equally bad, and commended the conclusions of Dr. O'Neill.

Electrolysis in Stricture.

Dr. C. S. Neiswanger, Chicago (*The Critic,* September, 1902), says: "Organic strictures located in any part of the body can be successfully absorbed by electrolysis. There is a certain technic laid down for the treatment of these cases by my friend, Dr. Robert Newman. of New York, and I find that just as long as I follow that technic just so long do I have results similar to those recorded by Newman. Just as soon as I deviate from it I do not have the same good results."

Electricity in the Treatment of Habitual Constipation.

Dr. Sigmund Cohn, New York, in the *New York Medical Journal,* September 6, 1902, describes his method of treatment. He starts with the static induced current (sinusoidal) which he administers as a "swelling current," namely, starting from zero, gradually increasing to a maximum and then gradually returning to zero. In this way alternating contraction and relaxation of the involuntary muscles of the intestines are produced. He also uses the galvanic current, using normal salt solution in the rectum in contact with the rectal electrode. The faradic current may also be employed. Of sixteen cases reported, all but three were permanently cured.

Exophthalmic Goitre.

Dr. H. M. Beaver, of Springfield, Kan., regards exophthalmic goitre as a vasomotor paralysis and recommends the galvanic current to overcome the paralysis.

The Pathogenic Action of the Emanations from Radium.—In a report to the Academy of Sciences (*Le Progrès Médicale*, February 28, 1903), M. J. Danysz says the application to the skin of a tube containing a salt of radium produces an ulcer in from eight to twenty days. One containing chloride of barium and radium is five hundred thousand times more active than metallic uranium. Congestion of the human skin follows an application of a few moments. Applied to the skin of a rabbit it destroys the epidermis. Placed under the skin the tube has only a feeble reaction on the epidermis, seeming to penetrate with difficulty the muscles. The intestines and the serous surfaces are but little affected. Introduced into the cavity of the abdomen of guinea pigs and allowed to remain for several months, it produced no lesions comparable to those of the skin.

Its action upon the nervous centers was noticed in all animals, but comparatively feeble in those whose osseous tissues protected the nervous organs. The application to the vertebral column and cranium of tubes caused paresis, ataxia, and convulsions, followed later by death. The salts of radium dissolved in distilled water emit certain emanations which prevent the development of anthrax bacilli.

Rectal Diseases.

Dr. W. H. Walling in the *Medical Times and Register*, July, 1902, advises the treatment of piles by the anode needle, with 5 to 10 ma., for 10 minutes or until blanching takes place, then dress with a soothing ointment.

For hemorrhoids he uses light touches with a small galvano cautery at a low red heat.

Torticollis he corrects by using the faradic current upon the flabby muscles and the kathode with 10 ma. to the contracted muscles. The static spark may be used to the weak side for 5 or 10 minutes. There is danger of using too much current in such cases.

Syphilitic ulcers of the rectum are treated with the zinc anode for escharotic and electrolytic effect.

A fistula he treats with a small copper kathode, insulated to within one-half inch from the end, inserted to the bottom of the tract, and treats successive portions at different times until healing extends to the outside. Ten to 20 ma. for 5 to 10 minutes is sufficient for one sitting. Or he closes the whole tract by adhesive inflammation following treatment with a copper wire anode. The polarity must be changed for a few seconds before attempting to withdraw the wire.

Annal fissures are treated by touching the whole surface with a silver probe kathode, using not more than 10 ma., repeating the operation if necessary after one or two weeks. In some cases a single treatment is sufficient.

For cancer of the rectum he recommends Massey's method of electrolysis with an amalgamated zinc electrode and heavy currents under anesthesia.

The various kinds of ulcerations are then discussed and the electric treatment suitable to each described.

Suggestions in Electro-Therapy with Report of Case of Locomotor Ataxia Treated with R-H Lymph.—A. R. Rainear, M. D., Philadelphia, Pa., in *Journal Animal Therapy Association*, gives some suggestions relating to the proper electrical applications in locomotor ataxia:

"Where the pains are general and occur frequently, nothing is more beneficial than a stabile descending galvanic current applied to the spine twice or three times a week, using fifteen or twenty ma., the seance lasting about twelve minutes. Then follow this with a large faradic brush (primary current) over the entire back, as strong as bearable, for three or four minutes.

Should this means of electrization fail to relieve the pains, you can resort to static electricity. In fact, where galvanism has been tried and failed to relieve the painful conditions, I always depend on static electricity.

If the muscles show the reaction of degeneration, the use of the static current will cause muscular contractions and assist the restoration of muscular power.

Static electricity has certain advantages in some cases where galvanism or faradism have given negative results, or have apparently lost their remedial power, after their use has been too long continued.

Where there is a marked impairment of sensation, static sparks over the anesthetic area is the remedy pre-eminent, surpassing in value galvanism or faradism.

A thorough examination and correct diagnosis of the location and extent of lesion is necessary in all cases of locomotor ataxia. In very advanced stages the prognosis must be guarded as to complete cure, and early response must not be expected in a majority of such cases.

In tabes, by far the most effective remedy known is the R.-H. Lymph-Compound. The adjuvants, hygiene, exercise, diet, and electro-therapy, are very important and must be carefully employed.

Do not inject the lymph daily, as a matter of routine, and feel that your duties are completed, but watch and study your case closely and keep concise records of your frequent examinations. To aid the cell action of the lymph, one should properly exercise the muscles and nerves, which exercise should be mechanical, mental and electrical."

Radio-Therapy.

The Electro-Chemical Action of the X-Rays in Tuberculosis.

Dr. J. Rudis-Jicinsky, Cedar Rapids, Iowa, gives (*N. Y. Med. Jour.*, March 2, 1901) the results of his experiments upon various types of bacilli in cultures. He finds that certain x-rays were similar in properties to the rays of light at the violet end of the spectrum, and that the various bacteria react differently according to the quality of the plasma and the amount of liquid they contained. In a mildly alkaline culture medium, the growth of bacillus tuberculosis is accelerated by an x-ray tube, but in acid media this bacillus is rendered inert by x-rays. The following table gives a summary of his results:

UNDER X-RAY RADIATION.

	Media.	
	Acid.	Alkaline.
Bacillus anthracis.....	Negative.	Negative.
Bacillus tuberculosis, in sputum, destroyed in..	48 minutes.	Negative.
Bacillus tuberculosis, in flask, destroyed in.....	50 minutes.	Gth. accelerated.
Spirillum choleræ, in flask, destroyed in.....	51 minutes.	55 minutes.
Bacillus diphtheriœ, in flask, destroyed in.....	46 minutes.	48 minutes.
Bacillus typhi abdominalis.....	45 minutes.	49 minutes.
Streptococcus.....	Negative.	Negative.
Staphylococcus.....	Negative.	Negative.
Micrococcus pyogenes albus.....	Negative.	40 minutes.
Micrococcus gonorrhœa.	35 minutes.	49 minutes.

Ten guinea pigs and ten rabbits were inoculated with the foregoing cultures. Beginning with the tenth day they were all exposed to the x-rays daily. Six guinea

pigs and two rabbits whose secretions were rendered alkaline died of tuberculosis. The others inoculated from the box with acid media were living and seemingly in good condition after two years. In some of these post mortem examination showed that they had been actually cured of tuberculosis. Chalky masses were found enclosed in dense connective tissue, but without giant cells and without the bacillus tuberculosis.

Out of twenty selected patients beginning with pulmonary tuberculosis who were treated by the x-rays, in addition to pure air, suitable temperature and hygienic surroundings, sixteen are doing comparatively well. He treats the patients from the back and front of the chest, alternately, the tube being fifteen to eighteen inches from the body. The time of exposure must be carefully watched. If not long enough the desired result is not obtained, if too long it may set up inflammatory action which may cause hemorrhage from the irritated lung tissue and weakened vessels, and accelerate the growth of the bacilli instead of destroying them. He finds it well to give static electricity alternately with the x-ray.

Protection Against Roentgen Ray Dermatitis.

Dr. Carl Beck in the *Medical Record*, Jan. 31, 1903, considers the idiosyncrasy of the patient an important factor in x-ray burns. Burns are worse during sultry weather. He advises a first exposure of five minutes with a soft tube and a moderate light, followed after one week by a second, and after another week by a third ten-minute exposure with the tube five inches distant. If no injurious reaction occurs after the third exposure x-ray treatment may be safely applied. When erythema appears on the outer edges of the exposed portion of the body treatment should be stopped for a few days until the erythema shows signs of abatement. In malignant growths with extensive ulceration he advises continuance of irradiation until the ulcerative area is fully exposed and the necrosed tissue is curetted. Dermatitis, while undesirable, is as yet inevitable in the successful treatment of malignant growths. He advises irradiation shortly after the removal of malignant tumors.

Protectives Against Effects of X-Rays.

Dr. W. A. Pusey, Chicago, in *Interstate Medical Journal*, December, 1902, recommends sheet lead, 1-50th to 1-32nd of an inch in thickness, for masks. These he covers on both sides with ordinary wrapping paper. Masks may be made of a paste of a bismuth or a lead salt; but vaselin, paraffin, hard rubber, etc., he considers worthless as a protection, and adds very truly, "Nothing will prevent x-ray effects upon the tissues except substances which are opaque to the rays."

Roentgen Dermatitis.—Wiesner has witnessed a case of laboratory x-ray dermatitis which ran the usual protracted, rebellious course. The patient is a healthy young man engaged in the manufacture of Roentgen tubes for years. He has been constantly exposing himself to the x-rays, but never experienced any ill effects and considered himself immune to their action. There was a round, intact patch in the center of the extensive and intense Roentgen ulceration. This with other features of the case can be explained only by a trophoneurotic origin. The x-rays penetrate into the skin and cause some chemical alteration in the molecules surrounding or in the nerve terminals. This irritates the nerve and by reflex action induces the trophoneurotic disturbance. The alterations in the skin are secondary. This hypothesis explains the protracted incubation in many cases and the universally recognized intractability of the lesion.—*Jour. A. M. A.*

Risks of the X-Ray —So many and such encouraging reports continue to fill our journals of gratifying results from the Roentgen rays in cancer, that perhaps a word of caution is really in season. First, that none of these "cures" have as yet been under observation long enough to assure us as to their permanency. Second, that it is quite possible by too enthusiastic and too frequent use of the ray to produce such a rapid and excessive breaking down of the new growth as to overwhelm the lymphatics and produce symptoms resembling ptomaine poisoning. Lastly, the most careful of the few microscopic studies of the treated growths, which have yet been made, that of Prof. S. G. Shattuck, pathologist to the Museum of the Royal College of Surgeons, London, an authority of international repute, has been most disappointing, in that it failed to reveal any traces of fatty or other degeneration of the epithelium of the cancer columns, or of the stroma of the tumor. Nor was there any cell-lysis, leucocytic invasion of the epithelium or any evidence of cessation of growth at the margins of the tumor. On the other hand, the case studied by Dr. Ellis, of Philadelphia, where the ingenious device was adopted of covering one-half of a mammary cancer with a lead shield and exposing it to the x-rays for two weeks before its removal, showed marked degenerative changes in the half exposed to the rays.—*Medical Sentinel.*

Death Due to X-Ray.

Dr. Maurice Rubel, Baltimore (*Jour. A. M. A.*, Nov. 22, 1902), reported a patient suffering from abscesses of Skene's ducts, and urethritis, with severe pains in the side and back, nausea and chills. In order to skiagraph the kidneys two exposures each lasting 20 minutes were made, the tube being six inches from the abdominal wall. Four days later papules appeared on the skin of the abdomen followed by a dry purplish-red dermatitis. Soon large blisters appeared which broke and discharged a thick yellowish material of irritating character. Ulcers formed which refused to heal. The bowels became inactive and vomiting became frequent. After several such attacks the ulcer was excised under an anesthetic. The patient improved for some days, then became weaker and died. There was no autopsy. Whether the death was due chiefly to the x-ray or to some unrecognized abdominal lesion is a matter of doubt.

The Technic of X-Ray Therapy as Applied to Diseases of the Skin.

Dr. L. E. Schmidt, Chicago, in *Jour. A. M. A.*, January 3, 1903, criticises the measurement of x-ray energy made by Freund and Schiff, Pusey and others, pointing out that data regarding the primary current in the coil gives no information about the quality or the quantity of x-rays generated. He advises measuring the x-ray output of the tube by the equivalent spark gap in parallel with the tube, together with a statement of the apparent degree of vacuum. Dr. Schmidt appears not to be aware of the fact that the equivalent spark gap may be varied from say two inches to five inches by changes in the character of the exciting currents. After discussing the vacuum of the tube and its regulation, he says that it is a waste of energy in a given tube to use a current which makes the anode red hot. He advises against the use of a "too soft" tube, because it may not produce sufficient x-rays for the treatment of skin lesions. "Suitable x-rays can only be produced in tubes of medium vacuum." The greatest intensity of x-rays is almost invariably produced in tubes of low vacuum, and skin lesions can be successfully treated with such tubes. If the lesion extends deeper, tubes of

higher vacuum must be used in order to reach the affected parts. Dr. Schmidt says it is the general opinion that the x-rays are most abundant where the angle of refraction equals the angle of incidence—a mistaken idea, as any one can see by looking at the reflected kathode stream in a low tube, or by testing the rays photographically.

X-Light.—Rollins, in the *Boston Med. and Surg. Jour.,* reports that he has by observation and correspondence with investigators learned of a number of cases where the eyes had been impaired by working in x-light. He has recently had occasion to examine a man who had been exposed to a considerable extent since 1896, and tho he is less than 40 years of age he can not read the daily papers. To enable him to see his work comfortably at a distance of 43 cm., it was necessary to provide him with double convex glasses, number 26. The necessity of having a non-radiable box enclosing the tube with only the smallest aperture sufficient to supply the rays where they are required is insisted on, and the hands holding the cryptoscope should be protected by a non-radiable covering. During the pumping and tuning of the x-ray tubes they should be kept in an oven with non-radiable walls. He has also noticed that while cancer is not considered contagious, yet several persons who have been treating the disease by the x-rays have been affected. He thinks this might have been avoided if proper precautions had been taken. He says it is, to say the least, unwise to be constantly treating cancer and other diseases by the x-light without regularly fumigating the room and keeping the cryptoscope and other appliances sterile. He advises fumigating the x-ray room with formalin vapor every night, and to have the instruments used of such material that they can be sterilized by heat.

Uses and Limitations of the X-Rays in the Treatment of Diseases.

In the Canada *Lancet* for June, 1903, Dr. John McMaster, Toronto, says that too much stress has been laid upon flouroscopic examinations for the discovery of fractures and dislocations. It is not accurate enough to be relied upon. The radiograph is reliable. X-rays have a marvelous effect upon tubercular troubles affecting the surface of the body. All of his cases of lupus except one have been completely cured. The resulting scars have been almost invisible. Large numbers of fistulæ have been cured. X-rays curtail development of a tuberculous lesion and aid in recuperation. In tubercular joints when the synovial membranes are affected the old form of treatment with emulsions of iodoform and formalin is better than x-rays. In other cases x-rays are most beneficial. He found x-rays satisfactory with rodent cancer, but much less so with epithelioma and carcinoma. A surface epithelioma of recent occurrence will respond readily to the radiance, but those that have been treated with plasters seem to have acquired resistance to the rays. Deep-seated carcinomas are helped in nearly all cases. The patient's general condition improves and he increases in weight for a time, but afterward loses ground again. Toxemia seems to develop after the use of the rays in many cases, which may lead to a fatal termination unless elimination is kept active. In malignant cases he advises to ray actively for three to five weeks, then operate, and renew raying as soon as possible afterward, continuing one to several months. His results with cases treated in this way have been up to the present all that could be desired.

Rules for the Use of the X-Ray.

Barnum, of Los Angeles, gives the following for the guidance in technic in the therapeutic use of the x-ray:

1. Seldom, if ever, is a dermatitis necessary. The effect of the ray is a tissue change which occurs without reference to inflammation of the overlying skin.

2. After an x-ray tan appears there is little or no danger of a dermatitis, even from excessive exposures. An x-ray tan should be secured in cases where deep tissue effects are desired.

3. The less the number of exposures to secure the reaction (*rayism*) without danger to the other parts, the better. By *rayism* I mean the profound effect of repeated rayings—not necessarily an acute inflammation.

4. Idiosyncrasy to the ray is very great. Conservatism is essential until the personal peculiarity is well known.

5. In primary lesions it is best to secure *rayism* as speedily as possible, consistent with safety to the surrounding parts.

6. Secondary or recurring lesions of malignant nature are much more stubborn to treatment than primary, and should be rayed much more forcefully.

7. Varying obliquity in direction of the ray as focused on the lesion is desirable, and should be especially used where the ray would enter the cranial cavity.

8. The cumulative effect of the ray is very marked, and may be noticed several months after treatment has ceased. This is especially so in cases where the treatment was with high tubes for *rayism* on deep tissues.

9. In strictly superficial epitheliomata a comparatively low tube is best—one by which good definition of bones of hand is had at two feet distance.

10. Use a varying high tube for all indurated spots of any size. Penetrability of the ray must increase in geometrical progression with the thickness of the diseased tissue.

11. Distance of tube from object should vary—perhaps between seven inches and twenty inches.

12. To cause hyperemia and induce granulation, use a medium high tube at considerable distance, excited either by a static machine or coil.

13. After a severe reaction from the ray resulting in broken down tissue, give the spot a long rest before attempting to use the ray for healing purposes.

14. Conservatism is desirable in every case only to the point of knowing particular features to be avoided. Be sure you know your tube and patient, and then *hit hard*. Break down all the affected tissue during the very first series of treatments.

15. In treating typical epitheliomas break down the induration completely so that all involved tissue may be discharged through the ulcer. Avoid too rapid absorption of breaking down diseased tissue. Get an open ulcer over a malignant growth, if at all possible—using plaster or knife if necessary.—*Canada Lancet.*

The Curative Effect of the X-Rays on Callous Sinuses of the Abdominal Wall

D. Berry Hart reports two cases of callous abdominal sinus which healed with marvelous rapidity after a few exposures to an incision in the right iliac fossa to evacuate bloody fluid of unknown origin. This sinus was five to six inches long, and ran from near the iliac spine downward and inward to the uterus. It had existed for several months. In order to see its course, an x-ray photograph was taken. This was followed by an almost magical cicatrization of the sinus after plugging with iodoform gauze for several weeks had failed. The second case was that of a sinus, which had persisted for some months in a case of operations for extra-peritoneal gestation where fetal bones had

been retained for five years. A narrow sinus into the shrunk sac remained. It would finally admit the index finger. Cure was effected after three exposures to the x-rays. The sinus has reopened a little, but there may be some bone present.—*June 21, 1902.*

Roentgen Treatment of Alopecia Areata.—G. Holzknecht, in *Wiener Klinische Rundschau,* October 13, says a patch of alopecia reacts to the Roentgen treatment with a persistent redness after four weeks, but the remaining hairs do not drop out, while the sound scalp reacts with the dropping out of the hairs after eight to fourteen days, but no redness. New hairs begin to grow on the alopetic patch in the successful cases in six weeks, while three months are required for the new growth of hair on the sound scalp. Certain cases prove refractory, but it seems to be impossible to determine beforehand this category of patients, altho Holzknecht has been making a special study of this subject for some time. He describes and illustrates one case showing a fine growth of hair six months after Roentgen treatment was instituted. The patient was a clerk of 18. He had eight bald patches on the back of his head, the disease progressively increasing for five months when treatment was commenced. In Kienboeck's successful case published last year, the patient was 26 and the alopecia had lasted for three years and had long been stationary. Holzknecht remarks that it is absurd to attribute the curative result to the bactericidal properties of the rays. A bactericidal effect is obtained only when the rays are far too powerful to be applied to the human skin. In one case he has observed, the trichophyton tonsurans cultivated readily from a Roentgen dermatitis induced on a boy with herpes tonsurans, showing that even an unusually vigorous application of the rays had no influence to check the growth of the micro-organism.—*Jour A. M. A.*

The Physics and Therapeutic Value of Kathode and Ultra-Violet Rays.

Dr. Roswell Park, in *Medical News,* May 30, 1903, gives a theoretical discussion of this subject, together with theories of light and electricity, with special reference to the treatment of cancer. He says, "It is not intended to present here directions for their use, nor to report cases, though to give it a certain 'practical' character a few conclusions are appended. It is too early yet to report cases." The electron theory is briefly outlined. The author here gets a little confused, failing to distinguish between the kathode rays, which consist of a stream of material particles, and x-rays, which are electro-magnetic waves (ether waves). "So far as photo-therapy is concerned, it must necessarily find its widest range of application when the disease is confined to a small area and is superficial."

"We thus have two therapeutic agencies (x-rays and light) affording us methods of treatment which are so new and to such an extent still on trial that we must hesitate lest enthusiasm run away with judgment in discussing their merits and their applicability.

Nevertheless, the results of extensive experience may at least be formulated in the following safe and warranted conclusions:

1. They afford methods of treatment for extremely new growths of limited area and superficial character, which, while not exactly certain, are extremely promising.

2. They not only cause no pain, but tend to relieve pain, both superficial and deep, in a most pleasing and satisfactory way.

3. They are adapted to cases which

can hardly be submitted to any other method of treatment, and they afford more hope in delayed or inoperable cases than does any other method of treatment.

4. It will be found that the odor of putrefaction may often be suppressed by their use and the putrefactic process itself checked.

5. Burns and intense dermatitis, so frequently noted when the treatment first came into vogue, may now be almost certainly avoided.

6. More than this, they afford a supplementary method of treatment after operation, by which the benefits of the same may be enhanced and enlarged.

7. It is not necessary to intermit such work as the patient may be engaged in, in order to carry out the x-ray or photo-therapeutic method of treatment.

Of course, it is not fair to expect too much of such agents, especially of those so new. One of the most comforting aspects of their use is the relief from pain which they afford even when this pain is deep seated and of uncertain origin. Even such use of the x-rays as is called for in an ordinary fluoroscopic examination has been known to relieve pain, altho by it nothing else was accomplished."

Radio-Therapy and Photo-Therapy in Carcinoma, Tuberculosis and other Diseases of the Skin.

Drs. Hyde, Montgomery and Ormsby, of Chicago, published in the *Jour. A. M. A.*, Jan. 3, 1903, an important contribution upon this subject. In their treatment of skin lesions the distance from the anti-kathode varies from 5 to 15 inches, the duration of each treatment from 3 to 10 minutes, the interruptions of the energizing current from 800 to 1,200 per minute. For superficial lesions a medium soft tube is used and for deeper lesions a moderately hard tube. Lead plates are used to protect the other parts. They find the susceptibility of individuals to vary considerably, and conclude that in the absence of exact methods of measuring the intensity and penetration of x-rays the only safe guide to treatment at present is the reaction obtained in each case. Comparing the Finsen light with the x-rays they say that with the Finsen light "reaction occurs promptly; it is always superficial; it leaves a pigmentation, which protects to a degree against the light in successive exposures; and the final results of treatment are apparent usually within a short period of time. With the x-rays the reaction is much slower in appearing, from one to two, or even three weeks; it frequently involves deeper tissue; the normal integument once the seat of distinct reaction is usually much more sensitive to subsequent exposure; and, finally, the effects of the radiation are frequently prolonged thru several months after the last exposure.

"Of fifty-five cases of carcinoma of the skin treated by us with radiotherapy, the majority were of the superficial type, known generally as epithelioma or rodent ulcer. The value of the x-rays in the removal of such growths is so generally recognized that we shall give here a summary merely of our observations, together with brief outlines of a few typical and otherwise interesting cases. In the most superficial forms of carcinoma our results have been quite uniformly successful. As a rule, after giving the lesion a few short exposures and waiting for a period of ten days or two weeks to allow for any unusual susceptibility on the part of the patient to manifest itself, from twelve to twenty-one treatments with a moderately soft tube were given on every alternate day or daily until there appeared a slight erythema, on the recognition of which treatment was suspended at least temporarily. In discharging ulcers the secretion became markedly less or disap-

peared in from four to eight days after beginning treatment, while pain or other anomalous sensations usually subsided earlier. All evidences of reaction disappeared, as a rule, in from two to four weeks after the last treatment, leaving in the majority of these cases a soft, inconspicuous scar. In a number of cases, however, in which infiltration extended somewhat deeper, it was found that while the major part of the growth had disappeared, there remained, even after several weeks, a few isolated or possibly a row of epithelial pearls or nodules, which required a second period of treatment similar to but shorter than the first. The cartilage-like border seen in some cases of superficial carcinoma does not, as a rule, yield readily to the influence of the rays, and better and more prompt results can be obtained, we believe, by removing such borders with the curet before resorting to radiotherapy."

In the treatment of surface carcinomata involving deeper tissues the results have not been quite so satisfactory, and they state: "In attacking these tumors with the x-rays so vigorously as to produce in them a marked inflammatory reaction, we believe there is distinct danger of encouraging extension of the growth in surrounding tissues and of producing metastases." In treating cutaneous tuberculosis the operators find x-rays and the Finsen light equally efficacious. In lupus erythematosus on the other hand, the Finsen treatment was found much superior to x-rays.

From four to ten treatments were usually sufficient to cause the entire disappearance of a group of lesions in psoriasis. In 50 per cent of these cases new lesions returned, but as a rule fewer treatments were required for the removal of the return lesions. For these cases they used a soft tube and made exposures at 10 or 12 inches distance.

Hairs were removed by x-rays in from sixteen to twenty treatments. In most cases there was considerabe return in from six to eight weeks. In alopecia areata the x-rays were not tried, photo-therapy was found to possess no special advantage over other methods of treatment. The x-rays were used advantageously in some cases of acne and rosacea, and were beneficial in several cases of sycosis. Keloid-like scars following burns were softened and thinned by x-rays. Chronic eczema and interigo yielded readily to x-rays, as did also two cases of cutaneous blastomycosis, one of mycosis fungoides and several hyperkeratoses.

The authors conclude that "radio-therapy and photo-therapy are superior to any other known treatment in tuberculosis of the skin and superficial carcinoma. There is no doubt that both photo-therapy and radio-therapy are valuable additions to our methods of treating certain diseases. There is also no doubt that their field of usefulness eventually will be proven much more restricted than that in which they are employed at present. Unfortunately there can be no doubt also that harm is doing and will be done by the action of the x-rays in the hands of the unskilled or the unscrupulous. No one should attempt to employ radio-therapy who has not first carefully studied the subject and followed the work of some expert."

X-Ray as a Therapeutic Agent.

Dr. W. L. Heeve, Brooklyn, N. Y., in the *Therapeutic Gazette,* Oct. 15, 1902, describes the cure of tubercular arthritis of the knee joint with enlarged condyles having uneven edges. X-rays from a high vacuum tube were given for 10 minutes at intervals of 4 or 5 days. A complete cure resulted in six weeks.

Varicose ulcers in the leg of a lady aged 57 were cleansed with hydrogen

peroxid and exposed to the x-rays from a high vacuum tube. A complete cure resulted in two months.

A tubercular ulcer of the leg involving the periosteum of the tibia was completely cured in three months by exposures to a high vacuum tube.

Tubercular swelling of the glands of the neck followed by ulceration was treated nearly three months with medium and high vacuum tubes with good success. The author recommends high vacuum tubes for sarcomata and carcinomata.

While there is no doubt that a good many failures in x-ray treatment have resulted from the use of tubes that are too low in vacuum to reach to the necessary depth with the x-rays, it is just as possible to go to the other extreme and use tubes that are too high for the case on hand. The cases reported by Dr. Heeve are such as require the use of a tube with at least a medium vacuum in order to reach all of the affected tissues. Hence his favorable results with high tubes.

Therapeutic Uses of the Roentgen Rays.

Dr. S. B. Childs, Denver, Colo., in the *Medical News,* January 24. 1903, gives the results of his x-ray treatment of some cases, chiefly of malignant lesions of the skin.

Case 1. Epithelioma of the nose cured in forty-two treatments.

Case 2. Epithelioma of the nose cured in thirty treatments.

Case 3. Lupus erythematosus of nose and lip, five years' duration, cured in less than three weeks.

Case 4. Epithelioma of cheek. Ulcer healed under treatment, but reappeared. Cured in eleven exposures within two weeks.

Case 5. Tuberculous glands of neck. After twenty-four exposures the glands are scarcely perceptible.

Case 6. Lupus erythematosus, twelve years' duration, fifty-three treatments have healed all but a few spots which have not yet been exposed.

Case 7. Secondary carcinoma of the spine, with recurrent nodules in right breast. Cachexia became well marked. After daily exposures for some weeks the patient died. X-rays enabled this patient to pass the last two months of life free from intense suffering.

Case 8. Epithelioma of cheek. After twenty-six exposures healing is almost complete.

Case 9. Pulmonary tuberculosis. After nine weeks' treatment expectoration had ceased. There has been no recurrence. Consolidation and bronchial breathing still present.

Case 10. Lupus erythematosus of nose, cheek and lip; cured in thirty-one treatments.

Case 11. Primary epithelioma of lip. After sixteen exposures there is still slight induration present, which is gradually decreasing.

Case 12. Chronic eczema of twelve years' duration. Completely cured by eight treatments.

Case 13. Hodgkins' disease. Improved.

Case 14. Epithelioma of tragus. Completely healed by sixteen exposures.

The details of the exposures and the degree of vacuum of the tubes used are not given.

X-Rays in Cancer of the Cervix.

Dr. Thos. S. Sculley, of Rome, N. Y., says that even complete hysterectomy is followed by an alarming number of recurrencies with fatal results, hence surgeons should welcome any treatment that gives promise of lessening the mortality. He employed the x-rays in a cauliflower growth of the cervix. The patient began to improve immediately and the growth gradually sloughed away, hemorrhage

ceased, and after a number of applications the woman (who was called away by the illness of her daughter) gave up treatment and now considers herself cured. In the second case the x-ray gave immediate relief from pain, the offensive discharge diminished and ceased entirely in a few weeks. After 15 treatments the cervix is practically obliterated, the patient has gained in weight, and the ulcerating parts are almost entirely healed over. He advises the use of the x-ray in most cases of cervical cancer.

Uterine Carcinoma: Its Treatment by the Combined Use of the Finsen Light and the Roentgen Ray.—George G. Hopkins declares that, from his experience, he believes that the best method of treatment of uterine carcinoma consists in the combined use of decomposed light and x-radiance. The application of the light and radiance requires much thought and skill, the deposits being differently arranged in each case. With the Finsen light the external parts only need the protection of some fabric, but with the Roentgen rays we need metallic protection and, of all metals, lead is the most satisfactory. The patient is placed on her back and the rays so arranged that they will impinge upon the diseased surface. So far as the Finsen rays are concerned, they can play upon the parts for an hour or more, but with the x-ray it is different, the time must be limited and, when hysterectomy has been performed, more caution must be used, as their penetration cannot be limited, and there is no uterus back of the vagina to intercept and partly absorb the rays.—*Medical Record,* Feb. 28, 1903.

X-Ray as Cause of Cancer—The *Medical Standard,* May, 1903, calls attention editorially to the case of a young man employed in treating carcinomas by x-rays, who had received many x-ray burns in his hands, in whose finger a carcinoma developed, on the site of a burn, which defied all but surgical treatment. The danger is a real one. Whatever theory of cancer a doctor may hold, he had better be awake to the danger of infection if his hands carry x-ray burns.

The X-Ray and the Finsen Light in the Treatment of Lupus.

Dr. A. D. Rockwell in the *Medical Record,* April, 1903, discusses the question as to which of these two is the more effective method. With the x-ray comes danger of dermatitis and pigmentation, but the cure is much more rapid than with the Finsen light. The therapeutic effects of the two methods are very much the same. They cure the same diseases. In particular cases the x-ray succeeds where the light fails; perhaps the converse will also be found true.

Increase in Cancer in Ireland.—The report of the Registrar General for Ireland on the prevalence and distribution of cancer shows that there has been a steady increase in the disease in that country. The number of deaths in Ireland in 1871 from that cause was thirty-two per 100,000 of the population; during 1891, forty-six per 100,000; and during 1901, sixty-five for the same approximate figures. In England and Wales the death rate between 1871 and 1900 rose from forty-two to eighty-three per 100,000, and in Scotland from forty-four to eighty. The returns from Bavaria, Holland, Norway, Austria and Prussia show a distinct increase in the death rate for the ten years ending in 1900. The returns from the United States tell the same story, but the percentage in that country goes up much more slowly. In Ireland the County Kerry suffers the least, the deaths being

less than thirty per 100,000. The west of Ireland, generally, comes next. The strip of country from Londonderry to Dublin averages from seventy to ninety per 100,000. The Carlow-Loughall district exceeds 160 per 100,000, as does also the Crossmaglen district in the extreme southwest. No explanation can be found for the physical features on the geography, except, possibly, the damp climate and the cold, clayey soil. The Registrar points out certain facts, which have been substantiated by the information he has collected. He says: "Cancer is spread or generated by unwholesome food in dwellings which are generally in an unsanitary condition. Wounds and injuries are sometimes provocative of disease, as irritation of the lips by excessive smoking: but cancer generally seems to be a constitutional disease. Where one member of a family has been affected by cancer, others often suffer with tuberculosis, and sometimes even with epilepsy, lunacy and idiocy. In many cases it is hereditary, and also to a certain extent infectious. It has been contracted through the lips by using the pipes of sufferers. More than one case has been observed to occur in different families living in the same house, or among those who go from one occupation to another, so I seem to be justified in concluding that the disease is to some extent contagious and infectious." Many English doctors are now convinced that the eating of pigs' flesh in different forms is greatly responsible for the increase of the disease, pointing out that it is most common among the poor, whose chief meat is that of pigs, which is also the case in Ireland, while the disease is extremely rare among the Jews.—*Medical News.*

Primary Cancer of Liver in a Girl Aged Twenty-one Years.—W. J. Thompson reports a case which is interesting from the facts of the patient's age, the absence of any family history, the painless character of the affection, and the lateness at which ascites, nodules, and jaundice appeared. The disease lasted altogether about seven months, and at four months the liver was uniformly enlarged and smooth on the surface, and free from pain, even on pressure. Six weeks later ascites appeared, and a couple of weeks after this a slight jaundice, and slight nodules. The latter soon became well marked. Before death the liver extended as far down as the umbilicus, and when removed from the body weighed 197 ounces. The temperature remained normal until ten days before death, when it fluctuated very much, sometimes going as high as 103 degrees.—*The Dublin Journal of Medical Science.*

Electrical Treatment for Cancer.—The newspaper press asserts that the report of the cancer commission, when made public, will be found to recommend the high frequency electrical treatment.

Will Shortly be Issued.—The Illustrated Review of Physiologic Therapeutics. S. H. Monell, M. D., Editor. A medical journal devoted to a review of the work of each month, placing a complete record of clinical methods and progress at the command of physicians who use therapeutic apparatus. Special rates to advance subscribers. For terms and particulars address, E. R. Pelton, 19 East 16th street, New York City.

Correspondence.

H. P. Pratt, M. D.,

Editor of The American X-Ray Journal,
Masonic Temple, Chicago, Ill.

Dear Doctor:

In reply to yours of recent date, just received, will say that I thoroly believe that in the interest of the patient electro-therapeutics and electro-diagnosis should be confined to medical men.

Only those who are competent to make a diagnosis should be permitted to administer treatement. The treatment of the sick should always be either directly by the physician, or indirectly by carrying out the direct order of a physician.

It has been exceedingly unfortunate for electro-therapeutics that its use has fallen so much into the hands of non-professional men. The application of any remedy should presuppose some qualification for determining the ailment from which the patient is suffering, as well as the patient's general condition.

Our laws should be so framed that the use of these remedies will be confined strictly to the profession. Much of the disrepute in which some very good medical men pretend to hold electro-therapeutics undoubtedly arises from the exploitation of such remedies by the untrained and non-professional.

The profession should see to it that this state of affairs is radically changed. The best and surest way of securing this end is by the profession supporting those who are giving special attention to these forms of treatment. The law should be so framed as to protect those who have spent their time and money in preparation, having first secured a general medical education as a foundation. Local medical societies, which are now organized in almost every county, can do much toward securing the desired results.

Very truly,

Carl E. Black, M. D.
President Illinois State Medical Society.

Dear Doctor:

I take the liberty to ask your advice in regard to the treatment of nevus. I have under my care a case of nevus vasculosis, quite large, situated upon the back of the neck and extending up into the hair line.

Is there any better treatment than electrolysis? If so, which is it? Am trying x-ray, which is purely experimental with me, as I have never seen any literature upon the subject. If you will kindly reply I will appreciate the same. Very cordially yours, D. V. I.

[Vascular nevi are successfully treated by x-rays; use a moderately low tube and push the treatment until there is pronounced redness of the skin. The x-ray treatment is by many preferred to electrolysis since it is painless and less liable to leave a scar. A good many of such cases treated are on record.—Ed.]

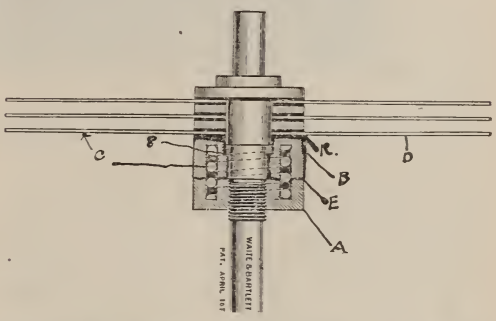

Illustration Showing Our Patent Automatic Device for Preventing Circles from Getting Loose.

A shows a hollow casting threaded on the shaft S. B shows a hollow casting which slides on to shaft S. C is a compression spring which fits in this space in two castings, A and B. R is a soft rubber washer. D is a front circle.

From the above description you can readily see that as the soft rubber washers, which are on each side of the circles, shrink, the compression spring C presses the section B in the direction of the arrow. This leaves an opening at E.

Waite & Bartlett Mfg. Co.

Editor X-Ray Journal:

I have a 16-plate static machine which I have been using since January of this year, and during that time I have had considerable trouble with the rubber insulated cords connecting the No. 11 Mueller tube. The cords

seem to perforate and several streams of blue flame will emit and the light goes out. Since January I have spoiled three sets of cords and now have none that will work satisfactory.

Can you assign the cause and suggest a remedy?

I also see that you suggest a "soft" tube in some cases and again a "hard" tube; how am I to tell whether I have a hard or soft tube? One tube I have had in use since I bought the machine and the other I hold in reserve. I receive a good deal of information through your questions and answers in the JOURNAL. E. H. A.

[To distinguish a soft from a hard tube, look at the palm of your hand by means of the fluoroscope while your tube is in action, if the x-rays are abundant and the tube soft, you will see the outline of the palm very distinctly and the bones a dead black or nearly so. If the x-rays are less abundant, you will find the bones equally black and the soft parts murky, or, possibly, you may see scarcely any light thru them. If the tube is hard (which means that it has a high vacuum), you will find the whole palm, including the bones, translucent; since the x-rays from a tube of this kind pass thru the bones almost as easily as they do thru the soft parts. If the rays are less abundant, or if you are a considerable distance from the tube, the whole hand may appear dark, but on close inspection you will find some light coming thru the thinner parts of the bones, which you do not find when the field is dim with a soft tube.

The perforation of your cords probably results from using a tube in which the vacuum has become too high. In that case, if the cords are allowed to approach each other at all, it is impossible to prevent the sparks from passing thru the rubber. Keep the cords as far apart as possible and regulate your tube to the proper vacuum and you will have no difficulty.—ED.]

EDITOR AMERICAN X-RAY JOURNAL:
Dear Sir:

Why can not I use the x-ray on the spine to cure locomotor ataxia? If the x-ray does so much good in tuberculosis of the lung, why will it not be equally useful in chronic diseases of the spinal cord? I have a case, but hesitate to use the x-ray until I have your opinion. What do you think about it?

R. M. C.

[The x-ray can be used to advantage in locomotor ataxia. If there are points on the spine at which the disease is in active progress these spots will be found tender upon pressure or to sparks from a static machine. The x-ray upon these will if used mildly allay the inflammation and assist in checking the progress of the disease. Upon those parts of the cords where the disease has become chronic the x-ray is of great use in softening and dissolving the constricting hyperplastic connective tissue which is causing nerve degeneration. This condition may also be treated by the static machine. Apply the anode breeze to the tender spots first. When the tenderness has disappeared use on the whole of the affected region of the spine a current from the kathode, which increases the nutrition of the cord and assists in dissolving the hyperplastic tissue.—ED.]

DEAR DOCTOR:

A glow lamp held in the hand of the operator with its base resting on the flesh of a patient on whom the x-rays shine will become lighted.

When the vacuum of a Crookes tube is very high and hard to operate by the usual connective conduction thru its interior, stroke its exterior with a piece of blotting paper from the positive to the negative extremity. This procedure will cause an inductive action thru the glass wall and often coax it into full functional activity. If the vacuum becomes too high for electrical excitation a piece of card board carefully balanced upon its summit will turn round and round impelled by the magnetic vortices in the atmosphere.

JOHN T. PITKIN, M. D.

Radiograph of Lungs of Andrew G. (See page 118, April No. of this Journal.)
Second patient cured by X-Ray in Dr. Pratt's Laboratory, 1896.

DEAR DOCTOR:

Male, aged 50, has epithelioma of upper lip of eight or ten years' duration.

Began treatment April first with a low vacuum tube and after about twenty treatments it began to heal and did nicely for about three weeks, now it is beginning to spread upward (would say, however, that the skin between the cancer and eye was of a purple color before I began treatment) destroying only the skin.

I had given him about fifty treatments in all, exposing purple tissue as well as the cancer, discontinuing treatment on appearance of marked redness. Have I made a mistake in treating the devitalized skin as actively as I did the growth? Please advise me in the August number of your JOURNAL.

I saw something not long since about the use of goat lymph in the treatment of these cases. Is there any virtue in it and where can I get it? Very truly, W. E. T.

[It is difficult to advise without seeing the case. If your tube is too low, the rays will not penetrate deep enuf to destroy the cancer. We suggest the use of a tube with a slightly higher vacuum, with a good x-ray illumination. Goat lymph has been found a valuable adjuvant in some cases where there seems to be defective nutrition of the tissues. It can be obtained from Dr. Forline, Masonic Temple, Chicago, Ill.—ED.]

THE AMERICAN X-RAY JOURNAL

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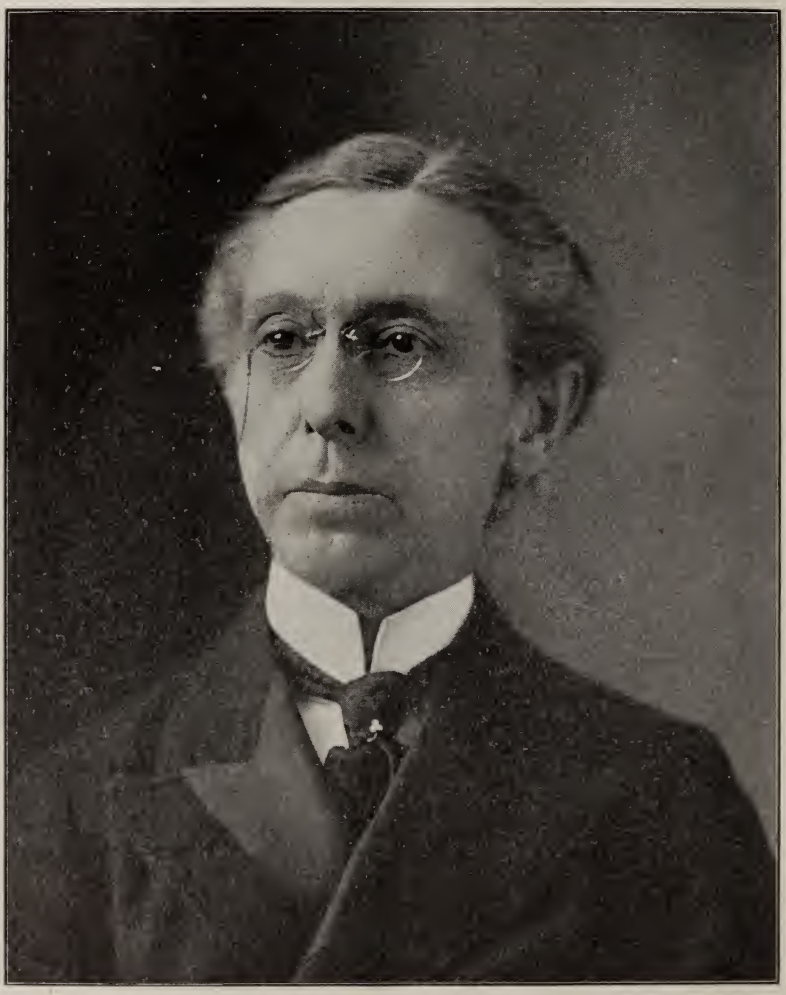


DR. A. D. ROCKWELL,
President American Electro-Therapeutic Association, 1903-4.

THE AMERICAN
X-RAY JOURNAL.
Devoted to Practical X-Ray Work and Allied Arts and Sciences.
VOL. XIII. CHICAGO, SEPTEMBER, 1903. No. 3

Electro-Therapy.

A Course of Twenty-four Lessons under the auspices of the Chicago College of X-Ray and Electro-Therapeutics

LESSON 4—PRINCIPLES OF ELECTROYSIS.

When a solution forms part of an electric circuit the passage of the current is always accompanied by decomposition of some of the salts in solution. Such a decomposition is called electrolysis (electric loosening). Metallic plates or other conductors by which the solution is connected with the source of the current are called electrodes (electric roads). According to the fluid theory of electricity the current flows from the positive (carbon) pole of the battery along the conducting wire into the solution, then down thru the solution and out at the other electrode, thence to the negative (zinc) pole of the battery, and on thru the battery fluid to the carbon. Starting in the solution in which decomposition is taking place, and going down stream, we come to the kathode (down road) which is the electrode connected with the negative pole of the battery. Going up stream in the same solution we come to the anode (up road) which is the electrode connected with the positive pole of the battery. The names positive and negative pole or positive and negative electrode are sometimes used for anode and kathode respectively.

When an electric current is passed thru a solution of common salt (NaCl) the molecules of the salt are divided into two parts which move in opposite directions. These moving parts of the molecule, which are considered to carry with them electric charges, are called ions (wanderers). The sodium ion (Na) moves down stream toward the kathode, and is called a kation (down-wanderer). The chlorin ion (Cl) moves up stream toward the anode, and is called an anion (up-wanderer). Metallic and basic ions are kations. This may be fixed in mind by recollecting that the metals are generally heavier than the other elements and the heavy parts are most liable to move down. The acid ions are anions, moving upstream toward the anode.

In a solution of common salt each molecule is composed of two atoms, consequently the division into ions can take place in only one way. In silver nitrate ($AgNO_3$) the division into ions takes place between the Ag and the NO_3. The silver ions move down stream and collect on or about the kathode. If the kathode is clean and is a fair conductor, and if the current passes steadily at a moderate rate, the silver is deposited in the form of a coherent film over the whole surface of the kathode. This process is known as electroplating. Electroplating may be carried on with silver, gold, copper, nickel and almost any of the malleable metals. If the anode is made of metallic silver the anions (NO_3) which

collect around it unite with the silver atoms to form more silver nitrate, which is in turn decomposed and deposits its silver upon the kathode. In this way the solution of silver nitrate remains of the same strength and acts as a carrier of metallic silver from the anode to the kathode.

The number of molecules decomposed by one ampere of current in one second remains constant for each compound. The amount of decomposition may therefore be used as a measure of the current. In fact, the commercial unit of current, the ampere, is defined as that current which will deposit from a solution of silver nitrate 1.118 milligrams of silver per second. Bearing in mind that the same number of any other kind of monovalent atoms are separated per second by the same current, it is easy to calculate the number of milligrams per second of any other element which are separated by one ampere. For example, the atomic weight of hydrogen is 1, the atomic weight of silver is 108, the weight of hydrogen liberated per second by one ampere is therefore $1.118/108 = .0104$ milligram. Copper in its common compounds is divalent, that is to say, is attached to the rest of the molecule by two chemical bonds, and therefore requires double the current to separate one atom. The atomic weight of copper is 63, consequently the weight of copper liberated by one ampere in a second is $.0104 \times 63/2 = .327$ milligram, or 1.18 grams per hour.

The electro-motive force required to begin the decomposition of a salt depends upon various things, the composition of the salt, the nature of the solvent and the physical conditions. There is every reason to believe that the forces exerted between the atoms in a molecule are identical with electro-motive forces. The electro-motive force necessary for the decomposition of the given salt must then be great enuf to overbalance the constant pull exerted between the units in the molecule. As soon as these conditions hold decomposition begins. In a large number of solutions dissociation of the ions takes place without an electric current. In these electrolytic decomposition begins with an exceedingly small electro-motive force. A solution of sulfuric acid in water, on the other hand, requires an electro-motive force of 1.47 volt before decomposition begins.

As already stated electrolysis is a splitting of the molecule into two ions. The splitting takes place between the basic and the acid parts of the molecule. In many cases one or both of the resulting ions is chemically unstable, and secondary changes in such ions necessarily occur. While there is no doubt that these secondary changes are of the same nature (electrolytic) as the original splitting up, it is more convenient in the present state of our knowledge to consider them as merely chemical. In the electrolysis of sodium chlorid (NaCl) the sodium ions are unstable in a water solution. Metallic sodium placed in water displaces part of the hydrogen, setting free hydrogen gas, and forming sodium hydroxid which remains in solution,

$$2H_2O + 2Na = 2NaOH + H_2.$$

Sodium ions behave in exactly the same way. Instead of finding metallic sodium at the kathode we find hydrogen gas bubbling off, while the solution around the kathode becomes alkaline.

The chlorin anion (Cl) is a little more stable in a water solution, so that if the anode is of such material that chlorin does not readily combine with it we will find some chlorin gas in the solution around the anode and some being given off. Chlorin, however, has a slight tendency to decompose water, uniting with

the hydrogen to form hydrochloric acid and setting the oxygen free.

$$2H_2O + 2Cl_2 = 4HCl + O_2$$

If there happens to be in the solution any substance with which oxygen readily unites, such as ordinary organic matter, the change indicated by this equation invariably takes place, giving us an acid (HCl) and oxygen at the anode.

In electrolyzing a solution of potassium iodid (KI) the kation (K) decomposes the water in the same way as the sodium ion, forming caustic potash (KOH) and setting hydrogen free. The iodin (anion) is unable to decompose water and appears as "metallic" iodin, unless there should be some other substance, such as a metal, starch, or cellulose, with which it may unite. The iodid of starch is a deep blue, so that a piece of paper wet with starch paste containing a solution of potassium iodid is often used as a detector to determine the direction of the current. The two ends of the wire being placed near together upon a wet piece of this starch paper, the current decomposes the KI; iodin is liberated at the anode and immediately unites with the starch to give the deep blue color. The potassium at the kathode gives no color.

Oxygen when liberated by the electric current nearly always contains a considerable portion of ozone and is chemically more active than the oxygen of the air.

When an electric current is passed thru the body the chemical effect which has just been described is produced upon the salts in solution in the tissues. The ions move toward the anode and kathode respectively, just as in the solution of common salt. The most abundant of the mineral salts in solution in the body is sodium chlorid; consequently the reactions described above may be considered as representative of the chemical changes which take place when the electric current is passed thru the body. Near the kathode we find the tissues become alkaline and deoxydized. Near the anode the tissues are found to be acid and are more fully oxydized. The effect of the alkali at the kathode is to soften and dissolve albuminoids. The effect of the acid at the anode is to coagulate and harden albuminoids. These two effects in greater or less degree are characteristic of the two electrodes, and are found in all cases in which a direct current is passed thru any part of the body. The effects upon the blood are slightly different. When a fairly strong current is passed thru fresh blood a firm, dense, coherent clot is formed around the anode, while a soft and easily friable clot is formed around the kathode.

Decomposition of a salt in contact with the surface of the body in such a manner as to convey one set of its ions thru the membrane into the body is known as kataphoresis. If a wad of absorbent cotton is wet with a solution of potassium iodid, placed on the surface of the body and connected with the kathode, the anode being placed at some other part of the body, the potassium ions resulting from the action of the current move from the body toward the kathode. The iodin ions move from the kathode toward and into the body. In this way the iodin is carried into the tissues. A solution of cocain chlorid, similarly prepared and connected with the anode, is decomposed by the current, the chlorin ions moving toward the anode, away from the body, and the cocain base moving into the tissues toward the kathode. In a similar way any desired ion of any soluble compound may be conveyed into the tissues.

There is a common idea that kataphoresis consists essentially of the conveyance of a fluid or a solution physically into the tissue in the direction of the current. This idea is entirely erroneous.

American Electro-Therapeutic Association. Thirteenth Annual Meeting.

Held in Atlantic City, N. J., September 22, 23 and 24, 1903.
Daniel R. Brower, M. D., of Chicago, President,

FIRST DAY, TUESDAY, SEPTEMBER 22.

Committee on Electrodes.—Mr. R. G. Brown, E.E., for this committee reported on several new electrodes. He stated that Dr. F. B. Bishop, of Washington, D. C., uses with the high frequency current an electrode having a bottle at one end and a piece of wire passing down into the water contained in this bottle. The same physician uses a very convenient electrode made out of a child's long-handled whisk broom, the handle being provided with a sliding metallic collar. Dr. Morris W. Brinkmann, of New York, uses electrodes made of glass tubes of different shapes, filled with plumbago or crushed carbon. He also uses thick-walled glass tubes containing mercury. Dr. William Benham Snow, of the same city, employs an electrode of white maple, into the end of which are fitted variously shaped tips. Dr. G. Betton Massey, of Philadelphia, has submitted some needle electrodes made of platinum iridium wire, insulated by a delicate coating of melted hard rubber, and fastened in a handle of hard rubber.

Penetration of Glass by the High Frequency Current—Dr. Francis B. Bishop, of Washington, D. C., was of the opinion that the following experiment demonstrated that the high frequency current can penetrate glass and transmit through the glass metallic and liquid substances. The current from a Piffard coil excited by a Toepler machine of twelve revolving plates was employed. A solution of starch was placed between two glass plates, 8 by 10 inches, and sealed by fastening paper over the plates with starch paste. A solution of iodid of potassium in glycerin was placed in the center of the upper plate, and the lower plate was placed on a metallic surface and connected with the earth. The spark was directed on the iodid solution, and in a few minutes iodid of starch was formed. Dr. Bishop then treated some cases of joint disease with the high frequency current, applying to the joint externally, and using his hollow glass electrode filled with starch solution. After using this electrode for several weeks, small particles of iodid of starch could be seen floating in the fluid.

Mr. R. G. Brown believed that the current had not traversed the plates, and that the result would have been different if the plates had been hermetically sealed.

Dr. Albert C. Geyser, of New York, suggested that the blue color obtained was not due to the formation of iodid of starch, but to ozone.

Tests of Dry Cells.—Dr. Williams J. Herdman, of Ann Arbor, presented, for the committee on constant current generators and controllers, a report of some laboratory tests upon a new dry cell.

The Effects of Secondary Static Currents in Removing Albumin and Casts from the Urin.—Dr. Boardman Reed, of called attention to the fact that in many cases of chronic gastro-intestinal disease hyaline casts and albumin may be found in the urin, and that as these cases often proved amenable to dietetic and other treatment, it was probable that the condi-

tion was one of auto-toxic nephritis arising from the action upon the kidneys of the toxines formed during abnormal digestion. Following in the footsteps of Dr. A. D. Rockwell, he had, during the past year, observed eighteen such cases. four of which he reported. In three of these cases treatment with static electricity had controlled the albuminuria. The faradic current had not proved so useful, and the wave current had seemed to him inferior to the static induced current.

Dr. W. B. Snow thot if Dr. Reed had used a sufficiently large spark gap he would have found the static wave current superior to the static induced.

Dr. G. Betton Massey spoke of a case of glycosuria in which he had succeeded for some time in controlling the quantity of sugar excreted in the urin by the application of static electricity.

X-Ray and Light in the Treatment of Tuberculosis.— Dr. Russell Herbert Boggs, of Pittsburg, presented this com-

MEMBERS AND VISITORS, AMERICAN ELECTRO-THERAPEUTICS ASSOCIATION, ATLANTIC CITY, N. J., SEPTEMBER 22, 23, 24, 1903.

Dr. A. D. Rockwell, of New York, said that there seemed to be no sharp line between inflammatory and organic disease of the kidney, and that electricity was capable of reducing congestion and improving the nutrition of the kidney. It should be remembered that this treatment, useful tho it was, was only applicable to occasional cases of mild affection of the kidney. In his own cases, treated in this manner, the treatment had extended over periods of from three to eighteen months. He did not, of course, claim to cure true Bright's disease by electricity.

munication. He firmly believed that these therapeutic agents were of very great value as an aid in the treatment of tuberculosis, no matter where situated. He warmly advocated the use of the coil, believing that x-ray treatment with the static machine was much more difficult and uncertain. The light treatment he gave on alternate days with an exposure of ten minutes.

Dr. W. B. Snow expressed the opinion that, if properly used, the static machine was capable of yielding just as good results as the coil, and he took exception to the author's statement that the fluoro-

scope afforded a better test of the quality of the tube than the spark gap.

Dr. Robert Reyburn, of Washington, D. C., advanced the theory that the x-ray produced its beneficent results, both in tuberculosis and cancer, by surrounding the morbid cells with an inflammatory product, thus preventing systemic infection.

Dr. T. A. Pease, of Norwood, N. Y., narrated a case of tuberculosis of the glands of the neck which he had cured by static electricity.

Dr. Francis B. Bishop supported the reader of the paper in his contention that, as a rule, the coil yielded better results. To equal the coil, the static machine must be very powerful, must be run at a high rate of speed, and must be employed in conjunction with a high vacuum tube. Personally, he preferred the Toepler to the Holtz machine. His own experience in the electrical treatment of tuberculosis had been most encouraging, even when the patient had only been subjected to the convective discharge from the cage.

Dr. George Z. Goodell, of Salem, Mass., reported a case of tuberculosis of the glands of the neck which he had treated electrically for three months without any apparent improvement. He employed a tube excited by a Kinraide coil and a spark gap of three inches.

Currents of High Frequency, Apparatus and Therapeutic Uses —Dr. Francis G. DuBose, of Selma, Ala., was the author of a paper with this title. In his absence it was read by Dr. Massey. The paper was devoted chiefly to the description of an apparatus used in France, which gave a current said to have several million oscillations per second. It was stated that the nerves were unable to respond to these very rapid vibrations, and that accordingly a current of this kind of 400 milliamperes could be passed without producing pain. This current had been found especially useful in the treatment of chronic rheumatic joints.

Dr. A. D. Rockwell was skeptical about this current having so great an amperage, and expressed the belief that it was probably not over four or five milliamperes.

Dr. Francis B. Bishop said he had recently seen a sixteen-candlepower lamp brought to full incandescence with a D'Arsonval coil.

Electricity in the Treatment of Chronic Deafness.—Dr. George Z. Goodell, of Salem, Mass., presented in this paper the results not only of his own experience, but of knowledge gleaned from a study of the literature and of responses received to a circular letter of inquiry that he had issued. He said that several observers said that they could relieve the tinnitus by a mild interrupted current, but better results were obtained from the continuous current with the positive pole to the ear. The value of electrolysis of the eustachian tube was still a mooted question.

Clinical Report on the Use of the X-Ray in Lesions of the Spinal Cord —Dr. Charles W. Daniels, of Savannah, Ga., was the author of this paper. Two cases of tabes were reported in which great improvement had resulted from x-ray treatment, and the author was hopeful that this method would prove beneficial in degenerative diseases of the spinal cord when begun sufficiently early.

Employment of Static Electricity in the Treatment of Nervous Diseases.—Dr. William Benham Snow, of New York, read this paper. He said that there were few diseases of the nervous system that were not associated with inflammation and impaired nutrition, and electricity was potent to relieve just such conditions. For the purpose he preferred the wave current. In acute neuritis he made use of long sparks; in chronic neuritis the sparks should be directed chiefly to the

region in which they caused the most pain.

Dr. R. J. Nunn, of Savannah, Ga., gave expression to this belief that all electrical currents presented vibrations, and that the lower vibrations were simply diluents of the higher ones.

Dr. Charles O. Files, of Portland, Me., and Dr. J. R. Stuart, of Minneapolis, spoke of the power of electricity to relieve congestion, the latter gentleman referring particularly to the high frequency current.

Electrical Treatment of Trachoma and Corneal Opacity.— Dr. Margaret A. Cleaves, of New York, presented in this paper a detailed account of a severe case of long-standing trachoma that had yielded a brilliant result from the use of zinc electrolysis. She had made thirty-seven applications during a period of three and a half months, using two and a half milliamperes of current and an indifferent electrode of eleven square inches at the nape of the neck. In ten days the sago bodies had disappeared. The young man was cured of his trachoma in June, 1896, and the next October an attempt was made to treat the corneal opacity by kathodal electrolysis, using one milliampere of current for two or three minutes three times a week. The boy had recovered and was in business.

The Successful Treatment of Eighteen Cases of Granular Lids by the X-Ray and High Frequency Vacuum Electrodes—Dr. Albert C. Geyser, of New York, read this paper. Exposures of three to five minutes were given on alternate days, the tube being kept six or eight inches away, and after two or three weeks of this treatment the high frequency current was resorted to for the purpose of improving nutrition.

SECOND DAY—WEDNESDAY, SEPTEMBER 23.

Exophthalmic Goitre and its Rational Treatment—Dr. Francis B. Bishop, of Washington, D. C., discussed the nature and cause of exophthalmic goitre, and showed a strong leaning toward the view that it was largely dependent upon the early and continued use of the corset. In addition to the electrical treatment, it was most important to see that these patients had an abundance of rest and of nitrogenous food. He had found drug medication very disappointing, and, like many others, had obtained the best results from electricity. He had, for the most part, employed the continuous current, with the positive electrode high up on the neck, and a sponge, connected with the negative pole, on either side over the pneumogastrics and thyroid. The current was gradually increased up to the point of toleration and was continued for ten or fifteen minutes on alternate days. The effect of the current on the pulse was his guide as to the strength to be employed.

Dr. T. A. Pease, of Norwood, N. Y., said that he employed adrenalin solution kataphorically to blanch the overlying skin, and then the high frequency current applied with the wooden electrode.

Dr. A. D. Rockwell was of the opinion that treatment with the galvanic current was the best method of all. He uses large moist clay electrodes, one over the cilio-spinal center and the other over the solar plexus, and does not hesitate to employ currents as high as seventy-five milliamperes.

Dr. W. W. Eaton, of Danvers, Mass., had made use of practically the same method as Dr. Rockwell, and with equally good results.

Zinc-Mercuric Kataphoresis of Tuberculous Glands—Dr. G. Betton Massey, of Philadelphia, gave an interesting demonstration of his method, exhibiting two patients so treated. He uses for the electrode a sharpened sliver of zinc amal-

gamated with mercury, the electrode, after the first application, being insulated except near the tip.

A Plea for Electro-Therapeutics Proper.—Dr. William J. Herdman, of Ann Arbor, Mich., arraigned the association for showing a tendency recently to indulge too much in border-line studies, and cited a case of osteo-sarcoma of the jaw, successfully treated by electrolysis, in support of the assertion that the constant current was still a valuable aid to the electro-therapeutist.

Radiant Light Baths in the Treatment of Neuroses.—Dr. Thomas D. Crothers, of Hartford, Conn., presented this paper, which was supplementary to his contribution of last year. He declared that increasing experience had only served to more firmly convince him of the value of this treatment. The feelings of the patient, together with the effect upon the pulse, temperature and secretions, warranted the assertion that the light bath was superior to the Turkish bath. The wide applicability of the method was evident from the fact that in so many diseased conditions one of the important therapeutic indications was to cause elimination of toxins.

The Use of the X-Ray in the Treatment of Malignant Growths.—Dr. Marcus M. Johnson, of Hartford, Conn., the author of this paper, said that, although a surgeon, he recognized the limitations of operative surgery, particularly as regards the treatment of malignant disease. He then reported a number of cases to show the better results obtained by x-ray treatment.

Radium, with a Preliminary Note as to Its Therapeutic Uses in Cancer.—Dr. Margaret A. Cleaves, of New York, presented a paper with this title. She said that radio-activity was measured by reference to that of uranium as a unit. Until recently the radium in our market came only from Germany, and had a radio-activity of 300, but now it was possible to procure the French radium, with a radio-activity of 2,000 to 3,000. Apparently, radium gives off three kinds of rays, alpha, beta and gamma rays. The first, constituting the major portion, are similar to the x-ray; the beta rays correspond to the cathode rays; the gamma rays have a still higher rate of vibration. Little had as yet been done with radium as a therapeutic agent, but she had recently studied this phase of the subject with the aid of one gram of radium having about 7,000 radio-activity, and, as a result, she had been led to believe that radium possesses important therapeutic possibilities, greatly surpassing those of the x-ray.

The Present Status of X-Ray Therapy in the Management of Cancer.—Dr. Clarence Edward Skinner, of New Haven, Conn., presented this paper. He looked upon the x-ray as one of the best means at our command for the treatment of malignant disease, because it was capable of yielding as large a proportion of cures and as small a proportion of recurrences in a given period as any other mode of treatment. The consensus of opinion at present seemed to favor the early use of the knife, following this by a thoro course of x-ray treatment, both to prevent recurrence and to relieve pain. Altho not definitely settled yet, it was probable that x-ray could not be charged with hastening metastasis. There seemed to be a difference therapeutically between the x-ray obtained from the coil and from the static machine, the ray from the former apparently having the power to penetrate the tissues more deeply. The operator who comforted himself with the thot that because his patient had been tanned by the x-ray burning would not occur would surely come to grief.

The Roentgen Ray as an Aid in Diagnosis.— Dr. Herman Grad, of New York, was the author of this paper. He urged that the Roentgen ray be employed as systematically in diagnosis as the microscope.

The Use of Galvanic Electricity in the Treatment of Cancer and Kindred Diseases—Dr. William Winslow Eaton, of Danvers, Mass., read this paper. He reported eight cases of severe and advanced cancer that he had treated, for the most part by the continuous current. Of this number, one was living at the end of a year, one at four years, one at six and two at seven years after treatment. He commonly used a current ranging up to seventy-five milliamperes, reaching the maximum strength in the course of two or three minutes, and continuing the application for fifteen minutes.

THIRD DAY—THURSDAY, SEPTEMBER 24.

Committee on Current Classification and Nomenclature.— Mr. William J. Jenks, E.E., presented a full report for his committee. He asked that the term "galvanic current" be discarded, substituting for it, so far as possible, "constant current," and that the terms "induced" or "magnetic induced current" be employed instead of "faradic current." The speaker then read the report of Prof. Samuel Sheldon on observations with the currents obtained from static machines. Mr. Jenks added that, so far as he knew, no accurate measurements had yet been made of the effect of the human body on currents of alternating character and high pressure.

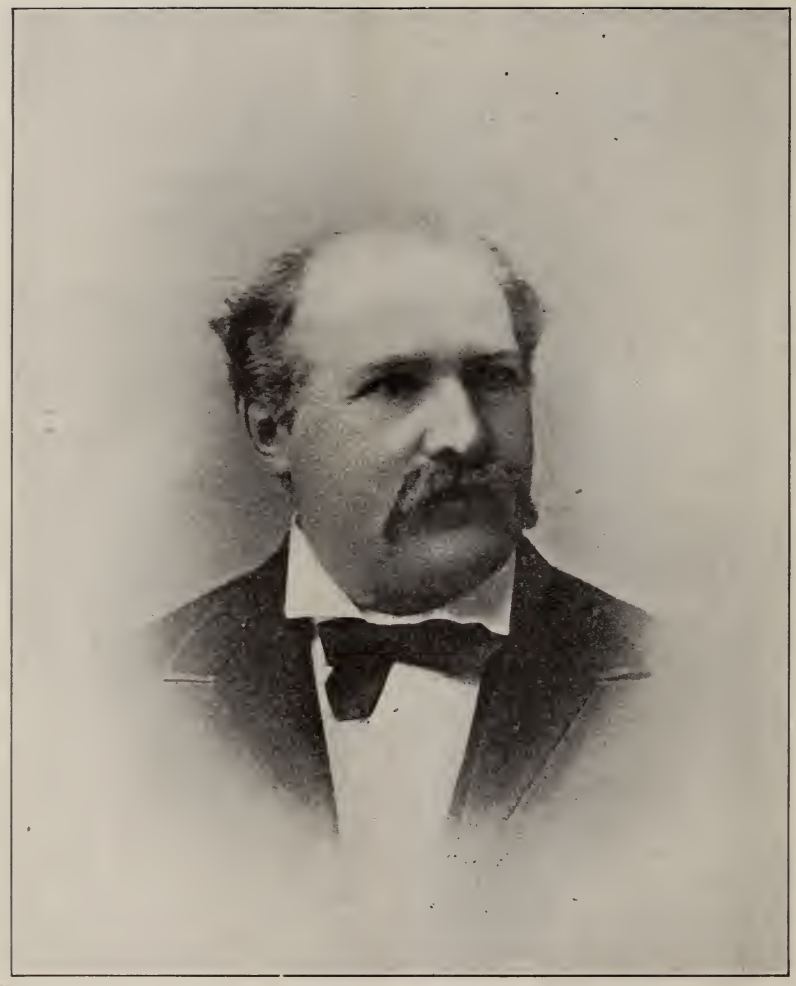
A Plea for an Accurate and Scientific Method of Roentgen Ray Treatment.— Dr. Mihran K. Kassabian, of Philadelphia, exhibited in connection with this paper ruled record blanks, intended to provide a ready means for the full and accurate recording of the patient's history, the kind of apparatus employed, the special technic selected and the diagnosis. He urged that life-size photographs of each case be taken just before and just after x-ray treatment. Dr. Kassabian took the ground that the effect of x-ray treatment on the patient was dependent rather upon the number of interruptions and the depth of penetration of the tissues than upon the duration of exposure.

Perineuritis.–Dr. A. W. Baer, of Chicago.

The Electro-Thermal Bath —Dr. Charles H. Shepard, of Brooklyn, N. Y.

Officers Elected and Place of Meeting.—The following officers were elected: *President,* Dr. A. D. Rockwell, of New York; *first vice-president,* Dr. Willis P. Spring, of Minneapolis; *second vice-president,* Dr. William Winslow Eaton, of Danvers, Mass.; *treasurer,* Dr. Richard J. Nunn, of Savannah, Ga.; *secretary,* Dr. Clarence Edward Skinner, of New Haven, Conn. The next annual meeting will be held in St. Louis on September 13, 14 and 15, 1904.

The following were present at the meeting: D. R. Brower, C. O. Files, Fred H. Morse, Francis W. Bishop, Thomas D. Crothers, Marcus M. Johnson, A. D. Rockwell, Laura V. Gustin Mackie, Russel H. Boggs, Albert C. Guyser, W. P. Spring, W. J. Herdman, Charles R. Dickson, Maurice F. Pilgrim, F. A. Pease, George Z. Goodell, G. Betton Massey, A. W. Baer, Mihran H. Kassabian, Boardman Reed, Margaret A. Cleaves, R. G. Brown, Lucy Hall Brown, W. Winslow Eaton, J. H. Stewart, A. Rainear, W. R. Lough, C. N. Bibbins, R. J. Nunn, S. V. Bayeliss, Henry H. Cook, J. M. Lieberman, W. B. Snow, Robert Reyburn, Clarence E. Skinner, Samuel G. Slaughter, W. D. Haight, J. K. Roberts, L. M. Early, C. A. Foster, H. Grad, Ogden C. Ludlow, H. Preston Pratt.



DR. ROBERT NEWMAN
Who died at his
home
Monument Beach, Mass.
August 28, 1903

EDITORIAL

The death of Dr. Robert Newman has removed from us one of the sturdy pioneers in electro-therapeutics. In him indomitable perseverance and strong convictions were united with kindly courtesy and personal affection. His bereaved family have our deep sympathy.

The American Electro Medical Society.

The first meeting of the American Electro-Medical Society will be held in conjunction with the first meeting of the Illinois State Electro-Medical Society, December 1, 2, 3, 1903, at the Masonic Temple, Chicago.

Physicians and others attending the meetings of the society may purchase tickets for the International Live Stock Exposition, which will be held in Chicago November 28 to December 3, and for which round trip tickets will be sold for single fare plus two dollars ($2.00) from points as far east as Buffalo and Pittsburg.

The preliminary program of the meeting will be published next month. Papers will be presented by Dr. John B. Murphy, Chicago; Dr. G. Betton Massey, Philadelphia; Dr. Byron Robinson, Chicago; Dr. J. Mount Bleyer, New York; Dr. C. S. Neiswanger, Chicago; Hon. John M. Smulski, city attorney for Chicago; Dr. J. Rudis-Jicinsky, Cedar Rapids, Iowa; Dr. H. Preston Pratt, Chicago; Hon. Edward B. Ellicott, city electrician for Chicago; Dr. Clarence E. Skinner, New Haven, Conn.; Dr. J. N. Scott, Kansas City, Mo.; Dr. R. S. Gregg, Chicago; Dr. Miran H. Kassabian, Philadelphia; Dr. T. Proctor Hall, Chicago; Dr. A. D. Rockwell, New York; Dr. Carl Beck, New York; Dr. Heber Robarts, St. Louis, Mo.; Dr. Herbert A. Parkyn, Chicago; Dr. J. B. Pennington, Chicago; Dr. Maurice F. Pilgrim, New York; Dr. W. B. Snow, New York; Dr. John E. Gilman, Chicago, and a number of others. In connection with the meeting, there will be an exhibit of electro-therapeutic apparatus.

The Mighty Atom.

The London Electrical Review reports an address by Professor Rutherford to the Physical Society, London, June 5, 1903. Professor Rutherford states that there are four kinds of emanation from radiant matter: (1) Alpha rays are material particles positively charged with electricity and traveling with a velocity of about 25,000 kilometers per second. They have the same size as the hydrogen atom, and carry with them a very large amount of energy. They travel usually in straight lines and are bent from their course by a strong electric or magnetic field in a direction opposite to that of kathode rays. Alpha rays pass thru .005 millimeter of aluminum before their intensity is reduced to one-half. (2) Beta rays resemble the kathode rays produced in the vacuum tube, but are more highly penetrative. They consist of negatively charged particles (electrons) whose velocity is between 200,000 and 300,000 kilometers per second. The velocity of light is 300,000 kilometers per second. Beta rays can pass thru half a millimeter of aluminum before their intensity is reduced to one-half.

(3) Gamma rays resemble x-rays. They are not deviated by a magnetic field

and pass thru eight centimeters of aluminum befor their intensity is reduced one-half.

(4) In addition to these, radio-active substances give off minute particles of matter which can be carried in a stream of air thru a tube or otherwise. These particles of matter can be condensed by very great cold (120° to 150° below zero C.). They behave like a radio-active gas with a molecular weight of about one hundred. The amount of matter involved in these emanations is so small that it would probably take hundreds of thousands of years to collect enough to be measured by a balance. It is possible to separate by a chemical process the radio-active part of uranium or thorium from the rest. But the active portions after a time lose some of their activity and the inactive portions regain it.

Professor Rutherford calculates that a grain of radium contains enuf energy to raise five hundred tons a mile high. This calculation is based upon the assumption that the radiant energy originates in the radium and is not merely transformed by it.

An X-Ray Burn.

The following case occurred about six years ago when x-ray burns were frequent, and may be attributed to an imprudent use of the x-ray.

The patient was a healthy man, aged thirty-two years, who in exhibiting an apparatus exposed his right hand to the x-rays for two or three minutes each day for a week without bad results. Again after three weeks he exposed his hand in the same way for three weeks for a period of four hours daily. He now observed that the skin of the hand became very red and puffed up, but without pain. Inflammation gradually developed and he stopped work. The exposed area became more inflamed and swollen, with aching and throbbing. There was also shooting pain extending up the ulnar side of the arm. After a week he consulted Prof Chambers, of Baltimore, who ordered hot water locally and bromides internally. In two weeks all the symptoms had improved. After three weeks the case came under the care of Prof. T. C. Gilchrist, of Johns Hopkins University. At this time the skin of the diseased area was deeply pigmented, the dorsal surface of the fingers being of a dark brown color and exfoliating in places. The skin was dry, infiltrated and wrinkled. At the lateral margins of the hand the surface of the epidermis was loosened, presenting a vesicular appearance, from contained air. The pigmented skin could be peeled off without pain, leaving a dull, dry, reddish surface beneath. The photograph which is represented here was taken at this time.

There was no increase of temperature in the hand and little or no swelling. After ten days, the epidermis being removed, the skin appeared glossy and tighter than normal over the fingers, and the palmar surface drier.

The first phalanx of the right index finger was found to be swollen and painful when pressed. This condition was found in the first and second phalanges of all the fingers but in a less degree. There was a very tender spot over the wrist joint, all the metacarpals being tender on pressure and the head of the second enlarged. The hairs were less numerous on the affected hand.

Movements of the hand were difficult and painful. When first seen voluntary movements of both hand and fingers, except the little finger, were abolished. Wrist movements were limited and painful and the thumb and finger could scarcely be opposed. The joints were very

stuff; he could not pick up a lead pencil.

Sensation was very much impaired and the sense of touch on the palmar surface was markedly decreased.

X-ray pictures were taken of the hand, showing the first phalanges thickened, particularly those of the index and second fingers. The heads of the second and third metacarpel bones appeared enlarged and their shafts slightly so. The space between the bones at the joints were found narrowed, and the outline of the bones roughened and irregular.

On microscopic examination the horny layer of the skin was found thickened and partially detached, the mucous layer pigmented; the vessels of the corium were dilated and the pigment cells of the papillæ almost as numerous as in the skin of a negro.

One year ago the patient was again examined. The roughened outline of the metacarpal bones was visible with the fluoroscope. Motor power had so far recovered that the patient could pick up a lead pencil, but not a pin. Sensation was much below normal. Outside of these conditions no unpleasant results persisted.

The prolonged exposure to the rays apparently induced dermatitis, neuritis, periostitis and probably also osteitis.

AN X-RAY BURN.

Electro-Therapy.

A Heavy Electrical Shock.

Dr. Jellinek relates a case of a workman who had been subjected to the discharge from a 5,500-volt three phase circuit for five minutes and yet suffered no permanent injury, except to his hands and forearms, which were very severely burned. Details are given in *Neues Weiner Tegblatt,* March 20, 1903.

Alternating Currents Applied to the Abdominal Sympathetic Nerves.

Dr. S. Sloan (*Lancet,* May 30, 1903) finds neuro-muscular asthenia amenable to this treatment. Visceral neuroses, sickness of reflex character, and vasomotor cases, were all treated successfully. In neurasthenia, in inflammatory pelvic conditions, in septic endometritis and in epilepsy little benefit resulted.

The Action on Bacteria of Electrical Discharges of High Potential and Rapid Frequency.—At a meeting of the Pathological Society, Mr. Alexander G. R. Foulerton and Dr. A. M. Kellas read an interesting paper on this subject, in continuance of a communication on the same subject presented to the society last year, showing that by discharging the current close to the surface of a fluid containing bacteria, held in a test tube, thru the bottom of which a platinum wire had been sealed, suspended organisms could be destroyed. The current used was one of from 2.5 to 5 amperes, the voltage varied from 35 down to 24, and the experiments were carried out in common air.—*Jour. A. M. A.*, May 30, 1903.

The Electro-Thermic Angiotribe in Varicocele.

Dr. O. Horwitz (*Proceedings Phila. Co. Med. Society,* March 31, 1903) recommends this instead of a ligature. It reduces the danger of infection and there is less pain.

Special Skiagraphy.

Dr. A. V. Robinson, Beatrice, Neb., considers it impossible for anyone who is not familiar with chemistry, anatomy and physiology to properly interpret an x-ray picture. The operator must be prepared to meet with many failures. The source of x-rays is of the highest importance. Either a coil or static machine may be employed, but a good tube is difficult to find. After finding a good tube he advises it to be kept for photographic purposes only. A negative should be developed until it is of uniform blackness before it is placed in the hypo bath. Both sides of the body should be taken wherever possible for the purpose of comparison. Skiagraphy supplements but does not displace other means of diagnosis. If it is unreliable or incompetent the fault lies in the personal equation entering into the problem.

Photo-Therapy.

Therapeutic Use of Blue Light.

Dr. Danilow (*Klin. Ther. Wochensch.*, 1902, No. 45) reports the cure of a number of cases. Pain in both shoulder joints cured in nine treatments. Neuralgia in both shoulder joints cured in four treatments. Sciatica of four years' standing, in seven treatments. Sciatica following influenza, in five treatments. Trigeminal neuralgia in which the paroxysms resembled the malarial type, was cured in a few sittings, together with quinin. Bronchial asthma of nervous origin was promptly relieved.

Photo-Therapy in Chronic Pharyngitis.

Strebal (*Archev. fuer Laryngologie und Physiologie,* B. 14, H. I.) used condensed and colored sunlight successfully in reducing catarrhal inflammation of the mucous membrane. The action of the rays is increased when pressure is made upon the exposed part. No unpleasant result accompanied or followed the treatment.

Blue Light in the Treatment of Neuralgia.

Gabriele Arienzo found excellent results in six cases *(Annali di Electricita Medica).* He used a bell-shaped reflector to converge the light from a thirty-candle-power lamp fifteen centimeters distant. Treatments were given ten to fifteen minutes. He finds that blue light penetrates to the deeper tissues and has marked anesthetic properties.

Concentrated Actinic Sunlight in the Treatment of Tuberculosis.

Dr. J. W. Kime, Fort Dodge, Iowa, has been experimenting upon tubercular patients with a reflected sunlight. In the *Medical Record,* November 1, 1902, he reports sixty cases of pulmonary tuberculosis which have been or are under treatment. In twelve the disease has been arrested; in eleven more a probable arrest has been effected, one has not improved, five have been dismissed as incurable, and thirty-one are still under treatment. Laryngeal tuberculosis has yielded most readily to this treatment. He uses a thirty-six-inch reflector, so constructed that the light is focused three feet in front of it upon a spot eight inches in diameter. The reflected light is an intense blue, rich in actinic rays. It is thrown upon the bare chest of the patient two or three hours each day when the sun shines. It does not blister the skin but produces engorgement of the parts with blood; this brings increased nutrition and repair. The light is also a destroyer of bacilli. In pulmonary tuberculosis there is for the first few days increased dyspnea, which disappears later.

Smallpox and Red Light.—The suggestion to combat smallpox with the red light treatment has been abandoned by the health authorities in Philadelphia after consideration. It is an old idea, centuries old in fact, and is said to have been put in practice by the Arabians. Prince John, a son of one of the Edwards, was treated by this system. Everything was red. He was even given mulberry wine on account of its color. The theory is that daylight, and especially the chemical rays, have an injurious effect on smallpox patients, inasmuch as the strong rays of the sun cause inflammation or sunburn in healthy persons. But experiments at the Municipal Hospital in Philadelphia did not confirm this theory. Only negative results were obtained there, as in other hospitals where the treatment has been tried. In Philadelphia the room used was painted red and had red glass windows. Red curtains obscured the doors and red globes covered the gas jets. The patients were neither harmed nor benefited. Within the last year a red light ward for the treatment of smallpox was constructed in the hospital in Indianapolis. One hundred and forty victims were put in this new ward and by way of experiment the same number of cases were placed in the ordinary word. The results showed that the red light treatment was neither baneful nor beneficial, and the treatment was abandoned. In Norway and Belgium the red light treatment for smallpox is used extensively, and they contend with success in reducing the mortality list. But it is well to remember that in those countries vaccination is the universal practice. Reason, as well as tests, disprove the theory. Diffuse rays of light are not capable of inflaming the skin. Only the strong light of the sun does that. The negro has the best possible protection in his skin against the action of the rays of the sun, and yet negroes have more occasion to dread smallpox than white people have. So, too, if the actinic rays of the sun aggravate the eruption of smallpox, then the smallpox in summer ought to be worse than the smallpox in winter. Yet smallpox is usually more severe and more abundant in winter than in summer.—*Medical News.*

Radio-Therapy.

Dispatches from Berlin, Germany, state that Dr. Lunden has succeeded in curing two cases of blindness by means of the rays emanating from radium. A Vienna physician, also, it is reported, has cured a case of rodent ulcer of the lip by the same rays. Other cures by this means are also reported.

In the Hemisphere of X-Ray Activity.

Dr. J. Rudis-Jicinsky, Cedar Rapids, Iowa, in the *New York Medical Journal*, May 21, 1903, claims that the point of most intense radiation and penetration from a Crookes tube is directly opposite the center of the antikathode, decreasing from this point in all directions toward the dark hemisphere. Protection from x-rays is best given by sheet lead.

Proper Methods in X-Ray Therapy.

C. M. Mutz, Douglas, Kansas, in the *Wichita Medical Journal*, December, 1902, describes the apparatus required for x-ray work and discusses the nature of the x-ray effect.

X-Ray in Trachoma.

Drs. Stephenson and Walsh (*Lancet*, Jan. 24, 1903) have treated two granular lids successfully by x-rays and by high frequency brush discharges. Seventeen exposures were required in one case and six in the other; the average time was ten minutes. The treatment was found equally effective with the eyelids closed as when everted. Other cases are improving rapidly.

X-Ray Treatment of Pseudo Leukemia.

Dr. Inseen (*New York Med. Jour.*, April 18, 1903) reports two cases in which very marked improvement has resulted under x-ray treatment. In each case treatment had to be suspended for a time on account of toxemia. This disease has heretofore been considered incurable.

Influence of the X-Ray in Malignant Growths.

Dr. C. D. Brockman, Ottumwa, Iowa (*Amer. Jour. of Surg. and Gynec.*, June, 1903), corresponded with about fifty of the leading American surgeons asking for results of their personal experiences in the uses of the x-ray. Most of them reported favorably, some were doubtful, and a few said it had had no place in therapeutics of malignancy. As a result of his experience and reading he advises the use of the x-ray in

1. All cases of lupus, acne, persistent eczema and intractable sycosis, using a soft tube for eight to twelve minutes.
2. All external inoperable sarcomas, and to follow all operations on superficial sarcomas.
3. All superficial epitheliomata of the face so situated that incision would leave badly disfiguring scar.
4. All inoperable superficial cases, including mammary cancer.
5. All operations on superficial cancer, following operative work.

[It is better to also precede operation by x-ray treatment.]

Value of X-Ray in Malignant Growths.

Drs. Percy and Shields, of Cincinnati (*Cincinnati Lancet Clinic*, April 11, 1903) give a description of x-rays and state a number of conclusions which do not indicate a very comprehensive knowledge of their therapeutic properties.

Dr. Percy states that deep growths are unaffected by x-rays, that x-rays are not therapeutically active, that relief from pain is due to the high tension current and not to x-rays, and that x-rays have no power to destroy bacteria.

It is too late in the day to make it worth while to combat such misstatements as these. Dr. Percy may have been unable to accomplish much with x-rays, but

a very meager acquaintance with medical literature should have taught him something of what experts have done in this direction. It is exceedingly unwise for anyone to draw sweeping conclusions from his own failures.

Dr. Shields approved of x-rays for inoperable epithelioma.

Artificial Fluorescence of Living Human Tissues.

Dr. W. J. Morton *(Electrical World and Eng.,* June 20, 1903) says: "If a solution of bisulphate of quinin or of the alkaloid quinin, of the strength of one grain to eight ounces, contained in an ordinary glass bottle, is subjected to x-radiation in the dark these solutions will be seen to glow with a fine, opalescent violet-ray fluorescence." He calculates that the blood of a person to whom twenty grains of quinin has been administered is a solution of equivalent strength, and that when such a person is exposed to x-rays the tissues are rendered fluorescent in the same manner. In this way x-ray and ultra-violet treatment of internal tissues may be combined.

X-Ray for Keloid.

Dr. B. F. Carpenter, of New York, has treated successfully a case of keloid below and behind the external ear.

Influence of Radium on Organisms.

Bohn *(Comptes Rendus,* April 29, 1903) finds, as he expected from homeopathic principles, that radium rays exert a stimulating action upon the tissues when applied in small doses. He experimented upon the larvæ of frogs and toads. When these are exposed for a few hours at an early age to radium rays, abnormal development takes place later, the effect appearing to be latent during the interval.

Paget's Disease of the Nipple Treated by X-Rays.

Edith Meeks (*Boston Med. and Surgical Journ.,* June 18, 1903) treated a colored woman, aged 32. Improvement was marked in ten days and a cure resulted in four weeks. Treatments were continued two weeks longer.

The Red Light Treatment in Smallpox.

Niels R. Finsen (*British Med. Jour.,* June 6, 1903) argues that diffused daylight is bad for smallpox and that the exclusion of chemical rays and the use of red light only is one of the best modes of treatment.

Chronic Ulceration of the Leg.

Dr. W. L. Heeve, Brooklyn, N. Y., (*American Medical Monthly*), cleanses the ulcer with green soap and salt solution, then exposes to the x-rays from a tube of medium vacuum 10 to 15 minutes, repeating this at intervals of three to seven days. After granulation tissue begins to form he treats with the brush discharge from a static machine 20 minutes daily. He prefers the high frequency current to the brush discharge. He reports twenty-four cases of chronic ulceration cured.

Roentgen Rays in the Treatment of Inoperable Cancer.

Dr. M. L. Deming, in the *Fort Wayne Medical Journal,* October, 1902, describes the treatment of eleven cases, giving microphotographs of several, with marked improvement amounting to symptomatic cure in all but one. In this one case the patient received no benefit whatever, and in one other case the treatment did not at first relieve the pain. Treatment was given with the tube quite close to the skin at first. Exposures varied from 5 to 10 minutes. After raying they were sprayed with the static breeze. Dr. Deming says he has found the best results from frequent exposures with high in-

tensity to begin with, later giving more prolonged and less frequent treatments with somewhat reduced penetration of the rays.

X-Rays in the Treatment of Superficial Cancers.

Dr. A. L. Gray, Richmond, Va., in Atlanta *Journal-Record of Medicine*, April, 1903, says the most generally accepted theory is "that the rays are composed of negatively charged corpuscles or electrons. The theory of bactericidal action of the rays has been practically abandoned." Dr. Gray has confused the x-rays with the kathode rays, which are composed of negatively charged corpuscles. The fact that the x-rays are capable of destroying bacteria is pretty well established, tho there is no reason to believe that this is the usual result of their action upon the tissues. After referring to some very unfavorable cases which have been reported cured, he says: "It is well to bear in mind that not infrequently, from too short exposures, the diseased tisues are stimulated and the progress of the malady hastened. The remedy should, therefore, be faithfully and skillfully administered, lest evil rather than good result."

Malignant Growths Treated by the X-Ray.

Dr. B. B. Grover (*Denver Medical Times*, Jan., 1903) reports cure of epithelioma of the eyelid in a man aged 67. After thirty days' treatment with the soft tube some remaining induration required fifteen more treatments for its removal. Another case aged 72 had a tumor larger than an egg near the pyloric end of the stomach, which was diagnosed malignant by three physicians. As operation had been declined the x-ray was used on alternate days with a medium high tube four inches from the body for thirty-one treatments. The tumor disappeared and the patient recovered rapidly. A case of recurrent cancer of the breast in a lady aged 66 was treated for two months with x-rays. The ulcer was reduced from eight inches to the size of a dime with no discharge,a tumor in the axilla the size of an orange disappeared and general health markedly improved. The treatment was given every second day.

Liquefied Oxygen and X-Ray Treatment of Malignant Growths.

Dr. A. C. White, New York, in the *Interstate Medical Journal*, December, 1902, says the nitrogen from ordinary liquefied air evaporates first, leaving almost pure liquefied oxygen. This may be kept in a bulb placed within a larger bulb, the space between the two being a vacuum. In this a gallon of liquid can be kept for two or three weeks. He uses liquid oxygen to freeze the surfaces of malignant tumors, with the result that hemorrhage is checked, odorous discharges from the ulcer first increase, then gradually diminish, and after some sloughing the process of healing begins. The resulting scar is very slight. In the treatment of superficial epithelioma he prefers liquefied oxygen to the x-ray. In scirrhus cancer where ulceration has not taken place, liquid oxygen is excluded; after ulceration, and particularly in case of hemorrhage, liquefied air is indicated. Where the destruction of tissue by the x-rays is not sufficiently rapid, liquefied oxygen is indicated above all other measures as a rapid and safe caustic which is without systemic effect. In sarcoma and internal malignant diseases the x-ray is indicated and liquefied oxygen excluded.

X-Ray Treatment of Cancer.

Dr. G. E. Pfahler reports in *Jour. A. M. A.*, January 3, 1903, the treatment of several cases of cancer by x-rays, and states the following conclusions:

"1. Both the coil and the static machine give good results, but the balance

of favor seems to be with the coil, as producing the quickest results.

"2. A low vacuum tube corresponding to an air gap of one and one-half inches seems to be universally accepted as the best for all superficial treatment, while for the deeper structures a higher vacuum tube corresponding to an air gap of three inches will give better and safer results, Dr. Morton recommends one as high as seven inches for this purpose.

"3. The distance of the tube from the exposed part will vary with the amount of energy and the resistance of the tissue, but seems to be safe at from twelve to three inches.

"4. The time of exposure should be from five to twenty minutes, depending on the reaction obtained, and should be repeated every second or third day, unless some contraindication should arise.

"5. The surrounding tissues are best economical method is the use of tea lead) in one or two layers, which may be covered on both sides by layers of adhesive plaster.

"6. Best results, judging from cases reported as well as my own experience, seem to follow when the skin has been brought carefully to a reddened condition and kept so, without producing ulceration. This may occur in twenty-four hours or not until several days have elapsed after the exposure producing it.

"7. I have found that dusting the open surfaces with equal parts of salicylic acid, boric acid and starch helps to keep the ulcer clean and assists in the formation of a cicatrix. Dr. Taylor recommends the use of an ointment of salicylic acid, ten grains to the ounce of vaselin.

"8. The time required to cure a superficial cancer is usually from two to six months. The deeper ones often require longer time.

"9. We can recommend the use of x-ray in all carcinomata, but especially those that are inoperable or in which operation is refused. I would recommend that all cases operated on should be followed by a course of treatment by the x-ray. This latter method, I believe, would bring about the most rapid and successful results."

Results in Radio-Therapy.

Dr. H. R. Varney, Detroit, reports his experience in tuberculosis of the glands and joints, in various skin diseases, in lupus, and in malignant tumors. Of fifty cases of cancer, thirty-eight of which were inoperable recurrent cases, ten died, five were discharged incurable, four were referred for operation, four referred to other operators, eight are improving and still under treatment, and nineteen are clinically cured. Of seventeen carcinomas five were cured. Malignant conditions of the breasts which are pathologically the same do not react the same to x-rays. The combined treatment of surgical and x-rays is commended wherever practicable. Of thirteen sarcomas none have been cured, but there was relief from pain and reduction of growth. Of thirty-seven cases of epithelioma twelve were cured. The results obtained by a combination of x-ray treatment with the curet or a mild arsenical paste far surpassed those of either treatment alone. Mild x-ray treatment of cancer cases is likely to stimulate their growth. Of twelve cases of lupus ten were discharged clinically cured. The x-ray treatment of acne is gratifying. For hypertrichosis the x-ray treatment takes too much time. Keloid was completely cured. Mild x-ray treatment for chronic eczema is very satisfactory. Sycosis is rapidly healed. The x-rays were also found to prevent pitting in smallpox when applied as soon as possible after discharge from the hospital. A case of scleroderma was cured in a few treatments. In general hospital work

the x-ray is a powerful tissue stimulant for all forms of retarded healing, for painful adhesions, etc.

Dr. Varney finds that in rapidly growing cancers the best results are obtained by powerful x-ray stimulation. In conditions requiring long x-ray treatment over-stimulation results if periods of vacation are not given. Strict attention to every detail is necessary for success.

Sarcoma Treated by Excision and Subsequent Use of the X-Ray.

Dr. T. K. Holmes, Chatham, Ont., in the *Am. Jour. of Surg. and Gynecology,* describes the removal of a recurrent sarcomatous mass 5 by 7 inches from a farmer 44 years old. The tumor was first noticed 12 years ago. Its surface was ulcerated and bleeding. Four weeks after the operation daily x-ray treatments were begun and continued for two months; for another month treatments were given two or three times a week. The patient's health has steadily improved since and there is no indication of the return of the growth.

Lupus Treated by the X-Ray.

Dr. Stewart McGuire, Richmond, Va., describes in the *Virginia Medical Semi-Monthly,* Feb. 27, 1903, the use of the x-ray for the cure of lupus, but considers the outcome of the treatment as extremely doubtful. "I bought one of the first x-ray machines sold in the south and for over six years I have used it constantly in my practice. I have done good with it and I have done harm with it, but I have never succeeded in getting as positive results as some men report who have had much less experience with it."

Cure of a Case of Alveolar Melanotic Sarcoma.

Dr. Edwin Walker, of Evansville, Ind., in the *Jour. A. M. A.,* for May 2, 1903, describes the treatment of a farmer 31 years of age who was afflicted with a black tumor just in front of the ear 1½ inches in diameter. The growth was excised but never healed. Recurrence was evident in two weeks, and the growth rapidly enlarged. A second operation was equally unsuccessful. The x-ray was then applied, at first ten minutes daily, then twenty, and later, thirty. Occasionally the reaction was so severe that treatment had to be stopped for a few days. After the third exposure improvement was apparent. After three months no evidence of the disease remained except the cicatrix. Treatments were continued once a week for another month. Up to the present there has been no indication of return. During treatments the patient steadied the lead screen with his hand in such a way that two fingers were exposed to the x-rays. These became very red and shed their nails, but are now regaining their normal condition. The diagnosis was made with the microscope by Dr. Wm. R. Davidson and confirmed by Dr. B. F. Kline.

X-Ray Treatment of Epithelioma.

Dr. Thos. A. Groover, Washington, D. C., in the *Virginia Semi-Monthly,* March 13, 1903, mentions two types of x-ray burn, one of which occurs within a few days or weeks after a severe exposure, and a second which occurs after repeated weaker exposures. The latter in some cases does not appear until a year or more after exposures have begun. It is extremely chronic, resisting all kinds of treatment. In cancer he finds that the best and quickest results are obtained by setting up a moderate degree of dermatitis. He has not found any individual idiosyncrasy regarding x-ray dermatitis and believes such cases to be rare.

He gives twelve-minute exposures with a moderately low tube, repeated on alternate days until three have been given. He then waits for complete recovery from

the reaction before renewing the treatment. Eight cases were reported, three of which are apparently cured, three more have improved so markedly that ultimate cure is hoped for. In one case nothing but relief of pain and possible inhibition of growth was hoped for, and one case of epithelioma on the inside of the lip of a man aged 73 received little or no benefit.

The Treatment of Carcinoma of the Rectum by Mercuric Kataphoresis — This is discussed by Dr. G. Betton Massey in *Journ. Adv. Ther.*, May, 1903. Malignant growths are destroyed by a current of 400 to 1000 milliamperes continued from half an hour to two hours under complete anesthesia, using zinc-mercury anodes in the tumor. The advantages of the method are (1) immediate destruction of the malignant growth without damage to adjacent parts or danger of infection, (2) bloodlessness, ease of control and direction, and (3) the patient has little dread of the first or a subsequent operation.

Dr. Massey's method is deserving of more extended trial than it has yet received.

The X-Ray and Violet Radiations in the Treatment of Cancer and Other Diseases.

Dr. W. J. Morton, of New York, says in the *Medical Brief* that the excessive anticipations of curing nearly all cases of cancer are being dispelled. There are remarkable cures and remarkable failures. The one is as unaccountable as the other, for we know neither what cancer is nor what the x-ray accomplishes. Some of the reasons for failure may appear from infection of the bone, from cancerous ulcer due to the Crookes tube, and from x-ray dermatitis. Infection can apply only to the open wound cancer. The x-ray tube, because of its electrical qualities, attracts to itself the flying particles in the air and drives these to the ulcerous surface, if the latter be not protected in some way. Morton now uses a layer of cotton over the open ulcers during treatment. A number of cases have been reported where septicemia followed the use of the x-ray upon an open wound. Referring to the remark often made that the x-ray at first did good, but afterward lost its power. Morton says that as long as the operator knew what he was about progress was favorable, and when he no longer knew what he was doing progress became unfavorable. He had seen one case in which carcinoma infected the entire dermatitis area of the arm of an x-ray exhibitor, and is confident that he has seen bone cancers produced in this manner and also secondarily infected, and thinks the operator can not be too careful. While extensive dermatitis in an open ulcer is not desirable, it is almost essential in a closed cancerous tumor in order to secure sufficiently intense x-ray action within. "With all honor to Prof. Finsen for being the originator of photo-therapy, I can not see but that the Finsen light is now entirely left in the rear by the x-ray."

Salt Cure for Cancer.—It is reported from Simla, India, that Captain Rost, of the British Army Medical Service, has announced that he has discovered what he believes to be a cure for cancer. Captain Rost has been investigating the matter for three years at the hospital Rangoon, Burmah, and states that he has found in both carcinomata and sarcomata distinct germs of saccharomycetes, which can only develop when the natural chlorine in the tissues falls below the normal quantity. Captain Rost proceeded with treatment suggested by this fact, reinforcing the chlorin of the body by special diet, enabling large quantities of common salt to be absorbed. Eight patients have been made the subjects of experiment. One is said to be completely cured, and the condi-

tion of the others improved. The experiments are being continued.—*Medical Record.*

Methods of Roentgen-Ray Treatment of Malignant Diseases of the Uterus, Rectum and Bladder, with Description of Tubes. —This is the subject of an interesting paper by Margaret A. Cleaves, M. D., in the Philadelphia *Medical Journal,* April 18, 1903. Dr. Cleaves calls attention to the difficulty of successfully treating internal tumors by the external application of x-rays; both on account of the absorption of the rays by the intervening tissues, the attenuation of the rays on account of distance, and the danger from toxic products of diseased tissue. She finds none of these difficulties when the tumor can be approached by way of accessible mucous cavities with tubes so made that the x-rays are radiated from the part of the tube within the cavity. Heat-burns are prevented by a thin water-jacket over this part of the tube.

"Whenever the disease can be removed surgically, it should be done, and the x-rays used both before operation and subsequently."

Dr. Cleaves reports complete cures in inoperable and desperate cases under this treatment.

The Treatment of Epithelioma of the Eyelids by the X-Rays.—W. M. Sweet, (*Am. Med.,* December 13, 1902).

Case I.—Squamous celled epithelioma of twelve years' duration, beginning in the skin close to the inner canthus, extending across the bridge of the nose and finally implicating the eyelids and tissues of the orbit. The conjunctival sac was obliterated by adhesions and the eyeball was atrophic. There was constant intense itching and occasional pain. Daily seances for two weeks, every other day for one month, every third or fourth day for two weeks more, resulted in the skinning over of the denuded nasal portion and the diminution in size of the palpebral and orbital disease.

Case II.—Epithelioma extending from the external canthus to the middle of the lower lid, and involving the skin of the cheek. Complete healing in four months (twenty-two treatments).

Case III.—Probable epithelioma of lower lid near internal canthus. Completely healed in five weeks (ten exposures).

Microscopic sections of the tissue after a number of exposures show intense leucocytosis and degeneration of the epithelium, while normal tissue under the same conditions shows no change. Loss of sensitiveness to touch and relief of pain are expressions of trophic changes probably due to changes of degeneration in the finer nerve filaments. The technic is as follows: The healthy tissues are protected by sheets of tin-foil or lead. A low vacuum tube is placed six to ten inches from the tissue and the seance continued five to ten minutes. Serious burns which appear (if at all) from seven to ten days after the exposure, result from too prolonged or frequent exposures or when the tube is placed too near the tissue. The newly formed tissue is more pliable and less liable to contract than scar tissue. To guard against recurrence, Sweet advocates a continuance of the treatment a short time after healing is completed.

Roentgen Rays in the Causation of Cancer. (*Medical Record.*) The death of Dr. Blacker, who cured the king of a rodent ulcer and soon afterward himself died of epithelioma, was even more tragic than in a previous letter it was described to have been. There appears to be reason to believe that the disease which caused his premature death was due to x-ray dermatitis. While manipulating the appara-

tus, he is said to have received a severe burn on one of his fingers; the dermatitis gradually spread up the arm, and in its track malignant growths developed, first near the elbow and afterward in the axilla, finally involving the whole of the shoulder.

Epithelioma Under the X-Ray: A Preliminary Report.—Dr. J. Clark Stewart, of Minneapolis, described in detail a remarkable case of extensive involvement of the hand, which lent itself very well to histologic investigations. From the numerous sections cut, he had made the following observations: Fat degeneration was marked in all sections immediately after the beginning of the treatment. This never occurred in epitheliomata when undisturbed. This deposit, as shown by osmic acid, was most marked in the nuclei and in the periphery of cells surrounding the pearls. The second important change noted was the rapid and extensive vascularization of the part which normally contained no vessels worthy of mention. This should not be confused with the formation of granulation tissue. These vessels were first filled with red-blood cells; later they were displaced and the vessel was packed by leucocytes. The final result, just prior to entire destruction, was the formation of a fine reticulum filled with polymorphonuclear leucocytes and refuse which had undergone hyaline and other degenerations. The further history of the case showed a very important thing, *i. e.* that while the growth was destroyed, where it was directly exposed to the rays, it grew with such rapidity in places where it had been protected simply by the thickness of the skin as to necessitate extensive maiming operation.—*Med. Record,* May 23, 1903.

The Constitution of Atoms.

In his Romanes lecture, recently delivered at Oxford, Sir Oliver Lodge expounded some ingenious theories on the constitution of the atom. These theories were intended to give a consistent explanation of the recent remarkable discoveries about electrons and radio-active processes. The lecturer considered that the hypothesis suggested by the observed phenomena was that the atoms of matter are actually composed of these electrons, an equal number of positive and negative charges going to form a neutral atom and a charged atom having one kind in excess. On this view a stable aggregate of about 700 electrons in violent orbital motion among themselves would constitute a hydrogen atom, sixteen times that number would constitute an oxygen atom, and about 150,000 would constitute an atom of radium. "The attractiveness of this hypothesis," says Sir Oliver, "is that it represents a unification of matter, and a reduction of all material substance to a purely electrical phenomenon. The strongest argument in its favor is that mass or inertia can certainly be accounted for electrically, and that there is no other known way of accounting for it.

This is, indeed, a very attractive theory, but it presents many difficulties which appear to be insuperable. An electric charge, it is true, obeys the same law of acceleration as a mass of matter, but we may have positive and negative charges of electricity, while all mass is of the same sign. The 350 positive units of electricity which, together with the 350 negative units of electricity, make up, according to Lodge's theory, the atom of hydrogen would exactly neutralize each other, and a hydrogen atom constituted in this way would have no mass. We must evidently go deeper than the

electric charges on the atoms to get the true explanation of inertia.

An equally attractive, and, we think, equally unsound, hypothesis was put forward by the lecturer to explain radio-active phenomena. Since the atom consists, according to his view, of an aggregate of electrons in violent orbital motion, each of these electrons is undergoing acceleration of direction, and is consequently radiating electric waves into space. It can be shown that this loss of energy will result in an increase of velocity of the revolving electron. When the speed of the electrified body reaches that of light its mass becomes infinite, and in that case a critical condition is reached in which the atom is no longer stable, but breaks up into other substances.

It is to be presumed that the masses of the positive and negative electrons which make up the atom, according to Lodge's theory, are equal, since their electric charges are equal. But no positive electron is known with a mass less than about 1,000 times that of the negative electron. The positive fragments thrown off from radium are about equal to this — *i. e.*, about equal to the mass of the hydrogen atom. The disintegration of the atom gives no proof of the existence of the positive electrons imagined by Sir Oliver Lodge.

The Romanes lecturer appears to favor the view that each atom has a definite length of life, at the end of which it breaks up, or disintegrates. This, indeed, follows from his theory that disintegration is due to the loss of energy by radiation of electric waves. He draws an analogy between the collapse of the atom and the contraction of a nebula, which at certain stages becomes unstable and throws off a planet, the residue constituting an extremely radio-active mass, or sun. But whereas the astronomical changes observed in cosmic configurations of matter occur in a time reckoned in millions of years, the changes to be expected in the more stable atoms would seem likely to require a time reckoned in millions of millions of centuries. Each atom, according to this hypothesis, has a definite lifetime, and the radio-activity of a substance would be proportional to the death rate of its atoms. With equal length of life, the death rate of atoms would be the same as their birth rate, but Rutherford has shown clearly that radio-activity decays according to a law of geometrical progression — that is, the death rate of the atoms is proportional to the number of the survivers. This does not point to a fixed lifetime for the atom, but rather to the view of J. J. Thomson, that a fixed percentage of the atoms always reaches a critical velocity, which determines their disintegration.—*Editorial in London Electrical Review.*

Electricity in the Treatment of Chronic Deafness.

BY GEO. Z. GOODELL, M. D., OF SALEM.

Chronic catarrhal otitis media was the disease considered in its various forms. The paper was a condensation of the literature on the subject, together with personal investigations by the author and interview with those who had recently used electricity in this disease.

A short summary of the anatomy, physiology and pathology of the parts involved was given.

The author found recommended for this disease, interrupted, continuous, and

Abstract of a paper read at the Thirteenth Annual Convention of the American Electro-Therapeutic Association, at Atlantic City, N. J., Sept. 22, 1903.

static electricity, high frequency currents, ozone, electrolysis, and the use of various apparatus energized by electricity. Various combinations of these have also been used.

In the use of the interrupted and also the continuous current, mild currents were used about three times a week for months at a time. Tinnitus was often relieved and deafness helped at times.

Static electricity is seldom mentioned for this disease and high frequency currents have few advocates. Ozone has been used with some success by pumping it into the middle ear.

The method advocated by Dr Robert Newman and Dr. A. B. Duel, of dilating strictures of the eustachian tube by electrolysis was enlarged upon at some length.

The various forms of pneumatic massage and the telephone-like instruments, such as Tracy's electrophone and Hutchinson's massacon, were spoken of and each with some recommendation.

Ten cases were reported occurring in the author's practice, in nine of which the interrupted current was used, with relief of the tinnitus and deafness in two cases, and no benefit in seven. In the other case (a recent one), high frequency currents were used with no results at time of reporting.

Very little of permanency in results has been accomplished in this disease by electricity. The paper closes with a list of the gentlemen who were of personal help in its preparation and a few references to literature consulted.

Some Therapeutic Uses of the X-Ray.

BY W. P. SPRING, M. D., MINNEAPOLIS.

Since I have been giving special attention to the use of the x-ray, I have had twelve cases of epithelioma about the face, nine of which have been cured. One of them was a recurrent cancer of the eyelid, in which the eye was exposed without injury. Of the remaining three, one, a very old man, was too feeble to continue treatment, and died of other causes. One that had a fungating growth in front of the ear, the size of the palm of a hand, was benefited by the rays, but the pain, instead of being relieved, seemed to be increased. He began taking morphine, lost courage, and discontinued treatment. One recurrent gland under the jaw is still under treatment.

I have had six cases of lupus vulgaris; three of them are practically cured; one, a disseminated case on the face, is greatly improved; one, with an ulcer at the inner canthus of each eye, is nearly well after a short series of treatments; and the last case has just commenced treatment.

Two cases of lupus erythematosus have both done well.

Two cases of acne rosacea, one with a very red nose, improving wonderfully.

One case of universal psorasis, almost well after a short series of treatments.

Three cases of goitre that are progressing well. In these I am using in connection with the x-ray, applications of iodine, driven in with high frequency currents by the vacuum electrodes.

I have two cases of birthmark on the face; one just commenced treatment; one with an improvement in color of about 50 per cent after four months' treatment.

One case of chronic ulceration covering the upper surface of the glans penis, following chancroids, which had resisted the ordinary forms of treatment for about a year, yielded readily to the x-ray.

For epilation, two have recently commenced treatment. Two have had the hair all removed after about thirty-five

treatments, and are receiving short series of applications as the hair recurs.

In a case of vascular warts on the chin, referred to me by Dr. Vander Horck, the ray has caused the tumors to change in color, and become almost level with the surface of the skin.

A case of recurrent fibroma of the inner angle of the lids, referred to me by Dr. C. D. Wright, is doing well.

I have had eight cases of cancer of the breast. One of these referred to me by Dr. Snow, of New York, is receiving prophylactic treatment immediately after operation. Three of them are recurrent cases. One, referred to me by Dr. F. M. Rose, of Faribault, died of metastasis. Another, referred to me by Dr. F. A. Dunsmoor, received great benefit as to nodules in scar, but, owing to her being away from home and having no proper care or nourishment, I sent her home and have heard nothing further. Another, sent to me by Dr. A. W. Abbott, had recurrence in scar and also a gland in the axilla. This case was very severely burned, and since that time the scar seems to be healing, but there are still two small glands that are quite obstinate. One primary case, referred to me by Dr. W. A. Jones, is, I think, well. One primary case, referred to me by Dr. C. A. McCollum, with an ulcerated condition, is almost healed, but, owing to indefinite symptoms about the abdomen, I am very much afraid of metastasis. Two other cases with tumors in the left breast, one the size of a goose egg and one very much smaller, are both doing well.

One case of the larynx, referred to me by Dr. Watson, expresses himself as feeling very much better. A gland the size of a hen's egg under the jaw has entirely disappeared.

One case of recurrent cancer of the vagina, referred to me by Dr. Abbott, seemed to be improving for quite a while, the patient gained in health and strength and had less pain, but it was only temporary. She has discontinued treatment, and I have just heard that the cancer has perforated the rectal and vaginal walls.

I have had six cases of sarcoma. One, a tumor in the anterior chest wall, following typhoid, referred to me by Dr. Knute Hoegh, received decided benefit during treatment, but stopped for some cause unknown. One case received prophylactic treatment, immediately after the second operation for sarcoma of the nose, and has had no recurrence as yet. One inoperable sarcoma of parotid, referred to me by Dr. F. A. Dunsmoor, died of metastasis, but the tumor of the parotid was held in check during treatment. One case of recurrence after Dr. Halsted's operation for sarcoma of the breast is progressing well. One case of osteosarcoma of the upper jaw, referred to me by Dr. A. B. Barton, after two operations had been performed, seemed to be checked for a time, but the final result was not satisfactory. One case of very large abdominal tumor, recurrent after removal of testicle, was remarkable in the fact that pain was entirely relieved, that the tumor reduced one-half in size, that a decided toxemia was caused which stopped treatment for three weeks, and yet at the end of three weeks a burn which was not in evidence before, developed, and that the tumor then increased to its former size, and the man died from exhaustion, never having suffered another moment of pain and having discontinued large doses of morphine, to which he was addicted.

Among the skin diseases treated by the x-ray, we have reports from Hyde & Ormsby[1], Snow[3], Varney[4], Campbell[2], of very successful results in acne. Campbell reports fourteen cures, and in many of them there has been no recurrence after two years.

In chronic eczema, Hyde[1], Childs[22], Varney[4], report particularly good results in infiltrated, especially in localized patches, the itching being very early relieved.

For epilation the x-ray is satisfactory, only tedious, requiring about thirty treatments for the first removal and then from one to three subsequent series of treatments to entirely destroy the hair follicles.

Cures of keloid are reported by J. F. Winfield[7], Pusey[6], and Varney[4]. The Varney case had recurred three times after operation. Cure requires very strong treatment, even to burning.

Senn[24], Pusey[4], and Childs[22] report cures of Hodgkins' disease, but Williams reports recurrence in his cases.

Dickson[25] and J. F. Schamberg[22] report cases of nevus of the face nearly cured.

Ferris[5], Pfahler[9], and Hyde[1] report thirty-six cases of psoriasis as cured.

It is early yet, however, to affirm that these cures are permanent.

Hart[37] and Murphy[30] report remarkably rapid cures in callous sinuses. I have had one case with equally good results.

Hyde[1], Rhinehart[36], and Varney[4] have all had rapid results in sycosis; and Varney[4] is using the x-ray to prevent pitting in smallpox.

Rodman reported, at the last meeting of the American Medical Association, good results in tubercular glands; and Varney[4] also reports a cure in a few weeks of a case that had had five recurrences; another case cured in six treatments; another case in ten days; and in an inoperable case the neck was reduced two-thirds and the patient discontinued treatment.

In tubercular joints, Varney[4] reports a cure of knee-joints in five months, and of a hand which had sinuses and dead bone so that the patient had fairly good motion. J. B. Murphy[30] reports three cases of recurrent results in tuberculosis of the spine.

Mayon[26] has reports of pannus and trachoma cured.

Eberhart[23] reports cure of chronic gleet with the morning drop cured from three to fifteen exposures.

J. P. Lord[15] reports a cure of sarcoma of orbit in one month.

Greenleaf[27] reports in twelve treatments relief of all symptoms in case of sarcoma of thyroid.

Kirby[28] reports a case of round selled sarcoma of neck, ulcerated, cured in fifteen treatments.

H. P. Pratt[29] reports a case of melanosarcoma of the eye cured, with no recurrence in nine and a half months.

Skinner[3] reports osteosarcoma of upper jaw; died of toxemia, pain stopped; temporary cessation in growth of tumor; second, glands in neck, recurrent, died; third, glands in neck, also abdomen; neck glands cured, but died of abdominal trouble; fourth, fibrocystic uterus, died; tumor reduced in size; fifth, osteosarcoma of the orbit, recurrent, improving; sixth, abdominal wall, recurrent, improving; seventh, sarcoma of the abdomen, tumor nearly gone; eighth, ulcerated sarcoma of neck, cured.

Gibson[3] reports a case of recurrent melanosarcoma of the mouth, symptomatically cured.

H. R. Varney[4] reports thirteen cases: seven osteosarcoma; six lymphatic sarcoma, inoperable, no cures, but life prolonged and made comfortable. .....[30] reports a case of fibrosarcoma of rib, cured, patient died of typhoid, and the pathological examination showed the cure to be complete. Richmond[31] reports a rapidly growing sarcoma of kidney cured. Dickinson[25] reports sarcoma of the right breast practically cured. H. S. Boardman[30] reports sarcoma of both sides

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THE AMERICAN
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Electro-Therapy.

A Course of Twenty-four Lessons under the auspices of the Chicago College of X-Ray and Electro-Therapeutics

LESSON 5 -SIMPLE APPLICATIONS OF ELECTROLYSIS.

Electrolysis is brought about by one of the electrodes which is placed directly in contact with the part to be treated. The other electrode is made larger and is placed on any convenient part of the body. Around the kathode (negative electrode) alkalis are formed which, when present in small quantities, soften the surrounding tissues and induce hyperemia, which results in increased nutrition in that region. When a strong current is used so that the alkalis are present in larger quantities the tissues immediately surrounding the kathode are partially dissolved and their protoplasmic material destroyed. If the surrounding tissues are vascular the use of a slight current causes a mild inflammation which soon subsides. Either a slight hyperplasia or a perfectly normal condition results. With a stronger current the effect at the kathode is to induce a greater amount of inflammation and to dissolve a certain amount of the tissue. As the inflammation subsides the part which has been destroyed is usually absorbed and the tissues in that region shrink gradually.

Around the anode are formed acids which have an astringent effect upon the tissues. These act upon the nerves and blood vessels, reducing the caliber of the latter and diminishing the blood supply to that region. With a stronger current the albuminoids around the anode are coagulated, and the parts thus hardened may remain for a long time in the form of scar tissue, which may be gradually absorbed. If a very large amount of tissue were destroyed in this way necrosis might result. It is evident that the amount of the current, or rather the current density, in any particular spot decides whether we are going to have there a modification of the nutritive process or destructive effects. Destruction may be brot about by the use of either the anode or the kathode, and the operator must use his judgment under the different conditions as to which should be used.

Apparatus.

The apparatus required is simple and not expensive. It may be purchased ready-made from any dealer in electro-medical supplies, or the elements may be purchased and the apparatus constructed by any one having a little mechanical ingenuity and a few tools. A battery is the best source of current for minor operations in electrolysis. Some arrangement is needed by which as many cells as are necessary may be thrown into the circuit one at a time. The ordinary Leclanche cells are efficient and cheap. Some forms of dry cells are still cheaper and more convenient. The electro-motive force of each Leclanche cell is about 1.6 volt when new; when old it is about 1 volt. The e. m. f. of the ordinary dry cell is nearly the same.

Ten cells in good working order are sufficient for minor work. If very large currents are required, as in the destruction of malignant tumors, the operator will require a large battery of fifty or sixty cells, or a direct current from the incandescent circuit whose voltage is usually 100 to 120.

In addition to the battery there are required some flat electrodes which may be made of sheet copper or zinc and which should vary in size from 6x8 centimeters to 15x20. Some flexible conductors (silk covered) are required for making connections with the battery. It is convenient to have two colors so that there will be no confusion between the positive and negative electrodes. The needle holder should be small and round, and light in weight. There is no advantage in having a circuit breaker on it. Unless your sight is perfect it will be necessary to have a small eyeglass or magnifying glass. A watchmaker's eyeglass answers the purpose admirably. Urethral and other electrodes which are required for special work will be described later.

Extraction of Hairs.

For this an electro-motive force of from four to ten volts is required. The lower voltage is used for smaller hairs, and the larger for large, coarse hairs in the less sensitive parts of the skin. It is not satisfactory to use say fifty volts, and to cut down the current by means of a rheostat, because the sensation produced by the current is roughly proportional to the voltage as well as to the current, and a small current with a high electro-motive force may be intensely painful, while the same current with a lower electro-motive force causes very little pain.

A steel needle may be used in all cases of electrolysis in which the needle is made the kathode, but if a steel needle is made the anode the tissues will be blackened. It is better in all cases to use a platinum needle, which should be not more than three cm. long. The needle must be very fine near the tip, not coarser than the hair which is to be extracted, and the tip should be olive shaped. If the point is too sharp there is danger of failing to follow the hair follicle down to the root of the hair, or of pushing it beyond the root.

When ready for operation connect the cells of your battery in series (carbon of one to zinc of the next), connect the electrodes, and test the circuit by taking one electrode in your moistened fingers and touching the other to the tip of your tongue. A slight sting will be felt if the current is passing. If there is no current, clean all the connections, tighten them up and try again. When the battery is in working order have the patient sit or lie in a position convenient for operation. Cleanse the surface to be operated upon with a little alcohol or ether, connect your needle holder with the negative (zinc) pole of the battery, and give the patient the positive electrode to hold in his hand, instructing him to hold it very lightly at first. (Some operators insert the wire from the positive pole into a glass of water, into which the patient puts one or more fingers to complete the circuit.) Now place your needle holder parallel to the direction of the hairs, insert the needle gently beside the hair and instruct the patient to grasp the electrode more firmly. The needle will glide gently down to the root of the hair and there will meet with slightly increased resistance. Cease pressure upon it and wait for from ten to thirty seconds until small white bubbles (of hydrogen) appear around the needle. Ask the patient to release his hold upon the electrode, withdraw the needle, and pull gently upon the hair with a small pair of forceps. If the bulb has been properly destroyed the hair is extracted with scarcely any force, minus its bulb. If force is required in the ex-

traction the electrolytic action has not been sufficient. Insert the needle again and allow the current to pass a little longer. After a little experimenting you will know how long to leave the needle before attempting extraction. The hairs vary greatly in depth, from one mm. to six or eight. If the current is started before the needle is inserted the insertion is likely to be painful. If there is much pain when the current is turned on (by the patient grasping the electrode firmly) it is probable that the needle has been pushed beyond the follicle and the current is acting upon the surrounding tissue instead of upon the hair to be removed. In that case remove the needle and do not make a second attempt to extract that hair at that sitting. If the needle is left too long, so that there is an excessive amount of electrolysis, there is some danger of producing a minute scar or pit. This danger is much increased if a number of hairs lying near together are extracted at one sitting. It is not safe to extract hairs that are as close together as the hair follicles are deep in the skin. The proper procedure is to go over the ground leaving intervals of three or four mm. and go over the same ground again in the same way at the next sitting. Twenty to fifty hairs will usually be found to be enuf work for one sitting. If the extraction is properly done the slight inflammation produced subsides in one or at most two days. No further work should be done in that region until the inflammation has subsided completely. When the operation is completed cleanse the skin again with alcohol or some mild antiseptic solution, and apply a zinc ointment. A milliampere meter is not necessary. If one is used it will be found that the necessary amount of current varies from one to five milliamperes. It is a good rule in all cases to begin with a very small amount of current, say two or three cells, and gradually increase if this should not be found sufficient.

Moles, Warts, Etc.

In the treatment of all elevated abnormal growths of the skin the platinum needle is by far the best method. If the elevation (say a mole) is soft, insert a sharp pointed needle about one mm. from the edge and on a level with the skin. Then start the current in the same way as before and push gently on the needle until it has passed clear thru the mole. If the point on emerging is too deep or not deep enuf withdraw it partly and try again. When the mole is thus transfixed lift gently upon the needle so as to form a slight neck upon the edge of the mole. Now let the current pass for one or two minutes until the part of the mole around the needle becomes a dead white in appearance. Stop the current, withdraw the needle, insert it again parallel to its original position and two or three millimeters distant. Repeat this process until the mole is completely killed. After five or six days examine again to see whether there are any parts still remaining and requiring further treatment. When removed in this way no scar is left. No scar is left in any case of electrolysis in which not more than the superficial layer of the skin has been destroyed.

If the abnormality is very hard and firm the needle must be inserted slightly below the level of the skin and the insertions must be made closer together. It is not advisable to insert the needle radially, for then there is danger of the center of the wart receiving much more treatment than the edges, in which case the result might be a slightly elevated margin with a depressed center. The negative electrode is used exclusively for these growths.

Birthmarks, or Nevus.

Birthmarks are caused by relaxation of arteries, veins or capillaries, and the object of electrolytic treatment is to occlude these vessels so as to cause their absorption. The positive electrode forms a firm coherent clot in the blood vessel. It is therefore useful for obstructing the larger vessels when they are present. The platinum needle is inserted into or thru the blood vessel and the current turned on until the vessel is occluded. The needle is then connected with the kathode for a few seconds until it is parted from the clot and can be withdrawn without difficulty. In occluding veins care must be taken not to withdraw the needle until the clot is firmly fixed, otherwise the clot may become an embolus and cause any amount of mischief. In occluding smaller veins and arteries the needle is connected with the negative pole and the current passed until the blanching extends for several mm. around the needle. In treating birthmarks begin with the larger blood vessels involved, or if these are invisible begin at one side and be guided by experience as to the amount of current required to contract the vessels. Birthmarks may be treated with an anode needle insulated with shellac to within one cm. of the tip which is inserted under the skin before the current is turned on.

Fissures and Sinuses.

Nearly all cases of chronic inflammation require some stimulating application to increase the blood supply and bring about healing. In some cases it is also necessary to use an antiseptic to destroy pathogenic germs. Fissures are readily treated with a silver probe, used as a kathode to lightly cauterize the raw surface of the fissure with three to ten ma. current. Frequently a single treatment is sufficient for a cure. The same treatment may be applied to a sinus, using preferably a copper wire insulated except one cm. at the tip, treating successive portions of the sinus from within outward at different sittings. In some cases it is preferable to use a bare copper wire, treating the whole sinus at one time, making the wire the anode, until the surrounding tissues are stained green or blue with the dissolved copper. The wire is then connected with the kathode for a few seconds until it is free from adhesions and is easily withdrawn.

Strictures.

Cicatricial strictures of the esophagus, urethra and rectum are readily relieved by the use of an olive pointed sound which is insulated except near the tip and made the kathode. The sound should be about two sizes larger than will pass the stricture. The current is turned on when the sound is pressing lightly against the stricture. No force is used. Not more than six ma. is used for the urethra and not more than twenty for the esophagus or the rectum. A meter is necessary. There should be no pain whatever during the operation. The sound, acting as a kathode, causes relaxation and softening of the scar tissue of the stricture, and the slight inflammation produced is sufficient to induce absorption. The operation is repeated in five or six days with a slightly larger sound, and this treatment is continued as long as any stricture remains. When the work is properly done there is no recurrence. The technic of this operation has been very fully described by Dr. Robert Newman (American X-Ray Journal, October, 1902).

Pustules, Boils and Carbuncles.

These are the result of local infection which frequently takes place thru the hair follicles. They may be aborted in the early stages by the use of the epilating needle. In more advanced stages also the needle may be inserted and passed gradually to the center of infection after

the current is turned on. Leave the current on long enuf to sterilize this region. The needle must in all cases be made the kathode. In acne pustulata each pustulate must be treated in this way. With an antiseptic wash to prevent re-infection, two or three treatments are frequently all that is necessary for cure.

A Plea for Accurate and Scientific Application of the Roentgen Rays in the Treatment of Diseases.

BY MIHRAN K. KASSABIAN, M. D.,
DIRECTOR OF THE ROENTGEN RAY LABORATORY, PHILADELPHIA, PA.

(Abstract of a paper read in Atlantic City before the American Electro-Therapeutic Association.)

Among new therapeutic agents the Roentgen rays are pre-eminent in bringing about cures which had seldom been effected by other agents. After the discovery of these rays scientific men began to investigate their therapeutic powers. The results were so satisfactory as to cause much commotion among the members of the medical profession, some of whom appeared to approve and others condemn the new method. Since that time x-ray therapeutics has steadily advanced. It is now regarded as the most satisfactory agent in the cure of malignant diseases, lupus vulgaris, and other dermatological abnormalities which resist other treatment. The true value of the x-ray in therapeutics has not yet been fathomed. It has wrot many cures and has stimulated many members of our profession to make extensive researches along the line of the application of the newer forms of force.

In such investigations it is of the highest importance to make accurate records of the application of this agent. In the Roentgen ray department of the Philadelphia Hospital I have had printed a record book compiled according to the needs from a careful study of two or three years; and from its use I am now convinced that it is as nearly correct as possible and fulfills the needs in all respects. This book is for recording a thousand cases, and consists of two parts, one for a complete history of the patient and the second for details of the style of apparatus used, its manipulation and the results of the x-ray treatments. By carefully keeping such a record and noting in it the various points concerning the respective cases undergoing treatment, I am of the opinion that we shall soon be able to arrive at a correct form of treatment which will bring about a cure in almost every instance. This information can only be supplied by carefully noting in the record book all the necessary details observed from time to time. I would suggest the taking of one photograph of the diseased area before treatment and another after the cure has been effected. The photograph should be life size. The plate for the negative should be isochromatic in order that the color value of the tissue may be recorded, or instead of employing such a sensitive plate a color filter may be used answering the same purpose. Previous to the exposure of the plate the seat of lesion must be thoroly cleaned of any ointment that may have been placed thereon, also of its discharge if any be present. The comparison or after photograph should

be produced in identically the same way as the "before-photograph" in all respects, and should be of the same size and density, to make the comparison of the two of value.

Today each of the various x-ray therapeutists thruout this country and abroad employs his own technic in treating the different diseases. It stands to reason that those who obtain no results or perhaps only partial results must employ a faulty technic.

It is important, therefore, that we each should record fully and give to the profession at large his technic in detail, along with the results obtained. Then each may learn from the other and the technic of all be improved.

The results of treatments depend upon the patient's general health, the nature of the disease, the location of the disease process, the length of time the treatment is continued, and lastly upon the correctness of the technic employed. I can not see that the patient's idiosyncracy has anything to do with the bringing about of good results or otherwise. To my mind a uniform, correct technic does more to bring about good results than anything else.

The color of the x-ray tube has no influence on the intensity and quality of rays produced. Crookes tubes made of borax glass fluoresce blue; those of Luringen glass, a greenish yellow hue. The temperature of the antikathode and the thickness of its platinum disk has no direct effect on the quality or quantity of rays. The kind of rays produced by the tube depends mainly upon the degree of vacuum. A low vacuum tube gives forth a greater number of rays, which have less penetrating power but stronger physiologic or therapeutic effect, and gives a well contrasted image in the fluoroscope. Keinbrok has classified tubes as follows:

a. Too hard (no light, no x-ray).

b. Hard (light, producing a bright image on the screen with but slight contrast).

c. Medium (well contracted image on the fluorescent screen).

d. Soft (large quantity of x-rays slightly penetrative).

e. Too soft (no x-rays, electric energy is converted into heat).

The distance of the tube from the screen must be stated in explaining the appearance of the image.

The dosage in treatment is estimated by means of two instruments, the radio chromometer and the spintometer. The first consists of a transparent scale of layers of aluminum, increasing in thickness. The steps of the scale are compared with a thin silver plate, from which conclusions are drawn as to penetrability of the rays. The spintometer, arranged parallel to the Crookes tube, measures the length of the spark, from which is inferred the resistance of the tube.

The Holzknecht chromoradiometer consists of a fluorescent salt whose tint is compared with a standard color scale. This instrument is not very delicate.

The method used by Freund and Schiff, namely to measure the current and voltage in the primary of the induction coil used, is condemned by some authorities, but I claim that it is far more scientific than any other method thus far advanced. The number of current or ray impulses per second depends upon the type of interrupter employed, and the total amount of radiation produced in a given time is dependent upon its rate. In the absence of definite and scientific methods of measuring the x-ray I suggest that in each case the operator should specify the size of coil, source of current, type of interrupter, number of breaks per minute, primary current when producing the full spark, spark length at this speed of in-

terruption, primary current registered during exposure, duration of exposure, parallel spark length of the tube, distance between patient and anti-kathode of tube. In employing static machines state the type, number of plates, number of revolutions per minute and length of spark produced during exposure, diameter of the plates, character of the tube, as well as the history of the patient.

The whole practice of x-ray therapeutics is at the present moment in its infancy; patient work and tabulation of working conditions and results by each member of this Association will widen its sphere of usefulness.

American Electro-Medical Society.

First Annual Meeting, Masonic Temple, Chicago, December 1, 2, 3, 1903.

Outline Program.

Monday, November 30: 2 p. m., meeting of Executive Council.

Tuesday, December 1: 2-5 p. m., papers and discussion.

Wednesday, December, 2: 9 a. m., business session.

Wednesday, December 2: 9:30 a. m.-1 p. m., papers and discussion.

Wednesday, December 2: 2 p. m., business session of Illinois State Society.

Wednesday, December 2: 3 p. m., Executive Council meeting.

Thursday, December 3: 9 a. m.-1 p. m., papers and discussion.

Thursday, December 3: 2 p. m., demonstrations and clinics.

Physicians and others attending the meetings of the society may purchase tickets for the International Live Stock Exposition, which will be held in Chicago November 28 to December 5, and for which round trip tickets will be sold for single fare plus two dollars ($2.00) from points as far east as Buffalo and Pittsburg.

Papers will be presented by Dr. John B. Murphy, Chicago; Dr. G. Betton Massey, Philadelphia; Dr. Byron Robinson, Chicago; Dr. J. Mount Bleyer, New York; Dr. C. S. Neiswanger, Chicago; Hon. John M. Smulski, city attorney for Chicago; Dr. J. Rudis-Jicinsky, Cedar Rapids, Iowa; Dr. H. Preston Pratt, Chicago; Hon. Edward B. Elliott, city electrician for Chicago; Dr. Clarence E. Skinner, New Haven, Conn.; Dr. J. N. Scott, Kansas City, Mo.; Dr. R. S. Gregg, Chicago; Dr. Mihran K. Kassabian, Philadelphia; Dr. T. Proctor Hall, Chicago; Dr. A. D. Rockwell, New York; Dr. Carl Beck, New York; Dr. Heber Robarts, St. Louis, Mo.; Dr. J. B. Pennington, Chicago; Dr. John E. Gilman, Chicago; Dr. Chas. G. Davis, Chicago; Dr. P. C. Clemensen, Chicago; Dr. J. P. Hetherington, Logansport, Ind.; Dr. O. W. McMichael, Chicago; Dr. O. S. Barnum, Los Angeles, Cal.; Dr. Elmore S. Pettyjohn, Chicago; Dr. Geo. F. Hawley, Chicago; Dr. John E. Harper, Chicago; Dr. J. Lloyd Hammond, Chicago; Dr. F. A. Leusman, Chicago; Dr. C. D. Collins, Chicago; Dr. Hamilton Forline, Chicago; Dr. R. H. Bartlett, Chicago; Dr. H. P. Fitzpatrick, Chicago.

In connection with the meeting there will be an exhibit of electro-therapeutical apparatus.

Some Therapeutic Uses of the X-Ray.

BY W. P. SPRING, M. D., MINNEAPOLIS.

(Continued from page 282.)

mary improved but stopped treatment; three, primary, no result except pain stopped. Coley[12] reports one case of cervix cured; three cases, no benefit. J. Rudis-Jicinski[18] reports primary cancer of cervix cured in four months.

SUMMARY.

In cases in or about the uterus, the reports show no results in seven cases, seven cases improved, four cured symptomatically, nine dead. Here, also, we must wait for future reports.

CANCER OF THE BREAST.

Pfahler[9] reports one recurrent on left side, and primary on the right side, and glands in both axillæ, and both practically cured in six months. Second. primary, five exposures, nearly cured, and patient died of uremia. Third, recurrent in both breasts and no results. Three cases of recurrent improving. C. W. Allen[10] reports six recurrent cases and three primary. Of these, one died, three stopped treatment and five are under treatment and improving. H. P. Moseley[11] reports one primary, inoperable, ulcerating; died. Two, recurrent; nodules improved but patient died of metastasis. Three, case much improved. J. Rudis-Jicinsky[13] reports case of ulcer of right breast with gland in axilla; treated four weeks, then operated, then treated nine weeks; no recurrence as yet. Grubbe[14], first, three recurrences of small nodules, four months' treatment and practically cured; second, recurrence of nodules, cured in five months; third, primary, ulcerated, cured in three months; fourth, primary scirrhus, cured in five months. J. P. Lord[15] reports, first, the fourth recurrence and patient died of metastasis with cure of local disease; second, scirrhus, no results; third, recurrent in scar and axilla, cured. Hopkins[16], first, primary, cured in three months; two, recurrent cured with x-ray and Finsen light. Skinner[3] reports one case of recurrence, ulcerated, with temporary arrest, and pain stopped, patient died; second, scirrhus and glands, discharge stopped and symptoms better; third, primary, ulceration and glands, ulcer cured and patient much better; fourth, primary, one-half gone; fifth, recurrent, nearly cured; sixth, primary, improved. H. R. Varney[4] reports thirteen cases of breast, all recurrent but one; three inoperable; three cured with the rays alone; two with the rays and knife; five partial cures; and three, no results. J. F. Winfield[27] reports six cases, two primary and four recurrent; first, primary, stopped growing after four exposures; two with three exposures; two with three exposures and one-half smaller. Of the recurrent, one died after a few treatments and then operated on, no recurrence as yet. Pusey[6] reports one recurrent cure in five months; second, recurrent, cured in three months; third, recurrent, cured in two months; three cases with no results. Coley[12] reports twenty-one cases; in three cases the nodules were gone in a few weeks, but recurred. The x-ray did not prevent recurrence in two cases that were treated right after operation. Dr. Morton, in a very valuable paper which will be found in the *Medical Record* of May 30, 1903, and which everyone should read, reports a series of twelve breast cases, as follows: First, breast case, tumor, primary, cured with seventy-four treatments, six months; second, breast ulcerated, nearly cured in ninety-three treatments, seven months; third, primary, scirrhus, size of a goose

egg, with glands, after forty-six treatments, very nearly gone; fourth, primary, reduced from six inches to two inches, perfectly movable, then operated; fifth, cure of primary breast cancer and lymphatics, nine treatments; sixth, cure of tumor, ten weeks, thirty-three treatments; seventh, tumor cured from November 18 to January; eighth, tumor cured from December to April; ninth, scirrhus, very much better after four months; tenth, recurrent on one side, primary on the other; cured symptomatically five months, sixty-five treatments; eleventh, recurrent nodule, cured in seven treatments, twenty-four days; twelfth, recurrent, breast and axilla cured from August 27 to December 28.

SUMMARY: CANCER OF THE BREAST.

Four stopped treatment, then died; five nearly cured; twenty-three cured; eleven, no results; seventeen improved; eleven cured with use of x-ray and knife. It seems to me that Dr. Morton, in his last paper, to which I have just referred, has made a step in advance that will give us better results in deep cancers. In the future we should not hear so much of operators who do not produce a burn, and it will be better understood that the man who is afraid to crowd the treatment, even though he sometimes produces a burn, is the man who is getting poor results and is perhaps stimulating growth instead of destroying it. The x-ray dosage is similar to any powerful drug. Small doses produce stimulation and growth; larger doses, destruction of abnormal tissues; and still larger, of tissues of low vitality, such as the hair and nails; and if still further crowded, any tissue can be destroyed.

Through the kindness of some of the prominent operators throughout the country, I am permitted to read to you a few of their experiences and their opinions of the results in deep cancer.

CORRESPONDENCE.

Dr. Margaret Cleaves, of New York, writes: I have had only the most desperate of inoperable cases that have been a forlorn hope from the beginning. From my experience with them, I believe that in all inoperable cases the x-ray should be used; second, that by its use, pain and hemorrhage are controlled, discharge lessened, odor modified or controlled entirely, fistulous openings sometimes healed, and the utter loathsomeness of the disease done away with; third, in the cases that improve, nutrition is markedly improved and functions likewise; fourth, for those cases absolutely without hope, x-ray treatment makes the last days of the patients much more tolerable to themselves and to others than would otherwise be possible; fifth, if perchance a case improves, that improvement is only to be maintained by remaining, so to speak, in an x-ray and ultraviolet environment—in other words, in touch with x-ray treatment. As to curing those cases, I am absolutely without hope, in the present state of our knowledge; sixth, I believe the treatment worth while, no matter how desperate the case.

We have much to learn about the x-ray, and the best method of using it. With greater knowledge we may do more and better.

Were a member of my family suffering from an inoperable cancer, I would use the x-ray, no matter how far advanced the case.

Dr. Russell H. Boggs, of Pittsburg, Pa., writes: In deep carcinoma I have had some results, every case has shown improvement, and some more than others, but each sufficient to show that each case of carcinoma, no matter where located or how hopeless the outlook, should be treated by the x-ray.

The greatest drawback to the treatment, and this would apply more particularly

to deep-seated carcinomas, is that physicians and friends of the patient are continually discouraging them by saying that it is useless to attempt treatment of such cases by the x-ray. * * * * * As an illustration: Mrs. A., aged thirty-eight, had the uterus and appendages removed a year and a half ago, for carcinoma, which recurred six months afterward. Two of our best gynecologists were called and both pronounced the case inoperable on account of the large mass and number of adhesions. The x-ray treatment consisted of ten minutes every day for ten weeks, with a medium low tube, but with sufficient spark gap to give penetration. At the end of this time the tumor was reduced one-half and all discharge checked. Then some friends and a friendly physician said that there was nothing in x-ray treatment. They kept discouraging the patient, and she stopped treatment.

Dr. William J. Morton, of New York, writes: I should be very happy to write you a few special words, but it will be utterly impossible just at present. But my opinion is fully expressed in an article by me in the *New York Medical Record* of May 30, 1903. The article is entitled "Primary and Mammary Carcinoma Treated by the X-Ray." I think you will see in reading those cases that I believe that mammary carcinoma, although internal, can be successfully treated by the x-ray .

Dr. Robert Newman, of New York, writes: My observation is that the x-rays do better in cancer than any other treatment. In all cases, even in far advanced ones, it will arrest all pains; next, it will lessen and finally arrest the suppuration; then it may clear the ground of the suppurative field, changing it to a healthy appearance, filling up the wound with good granulations, diminishing the sore, and, in many cases, healing up and covering it with a new cutaneous surface. This process takes place in favorable cases, if they present themselves early, when the disease is local, but if the cases are advanced or operations have taken place, the chances for complete recovery lessen. However, in far advanced, unfavorable cases, much good will follow the treatment by the x-ray, as always it will alleviate pain; and procure thereby rest and sleep, which makes the patient comfortable even to a fatal end. Under all circumstances, the x-ray ought to be used, as doing a great deal of good and allaying many painful and unpleasant symptoms.

Dr. William B. Coley, of New York, says: I have used the x-ray in about one hundred cases of malignant disease, and my present opinion of its value does not differ materially from that already expressed in the paper I sent you. I am more and more convinced that in order to obtain permanent success, one must continue the treatment, not only for weeks and months, but for years. I have one patient with inoperable sarcoma of the femur, whom I have been treating with the x-rays since a year ago in February. The original disease seems to have been destroyed and the metastatic growths in the pectoral and lumbar regions are now slowly yielding to the combined x-ray and toxin treatment. My most satisfactory results in sarcoma have been obtained in cases where the toxins were used in combination with the x-ray. I am strongly opposed to the x-ray in any but inoperable growths.

Dr. Clarence E. Skinner, of New Haven, Conn., writes: I have not changed my views since I read my paper at Chicago last December. Of course, we do not get the same quick and satisfactory results in deep cancers as in superficial cancers, but it has been proved, not only by my own experience, but by that of half a dozen other men, that cancer, the most deeply seated, is curable by the

x-ray in a certain proportion of cases, and it is imperative that the agent be given a trial in all cases. This is the only way we can find out which will respond and which will not. There is nothing else that will do any good, and, as I have said, this will do some of them good.

The men who are constantly reporting failures are the ones who are using the coil and low tube. Those who are successful are using the static machine and high tube.

Do not be discouraged because you have failed in a few cases, but keep it up, doctor, thoroughly and accurately, and you will some time accomplish a cure that will astonish you.

Dr. G. W. G. Hopkins, of Brooklyn, writes: I am still using the x-ray in treatment of all forms of cancer with increasing satisfaction. In uterine cancer I am having excellent results in combination with the Finsen light.

Dr. G. E. Pfahler, of Philadelphia, writes: In answer to your inquiry concerning the use of the x-ray in deep cancers, I believe that it is still in the experimental stage, and that no accurate or positive conclusions should yet be drawn. That it is of value is proven by the cases that have been cured. In nearly every instance they were inoperable, either because of the extent of the growth, its location, the condition of the patient, or the absolute refusal of operation by the patient. It surely means just that many lives saved. That it is not a sure cure is proven by our failures. Besides the usual anemia present in advanced cases, we almost always have to deal with a septicemia resulting from the degeneration of the cancer as a result of the treatment. As to the permanency, we dare not yet say.

As a whole I believe it is a good thing, and that it should be recommended in all cases where operation is contra-indicated or refused, and should follow all operations for malignant growths. I am supported in this view by the fact that I have two cases of recurrent carcinoma, involving both breasts and the axillary regions, which I believe are well; also two cases of advanced and inoperable carcinoma of the uterus which are apparently cured, besides a number of other cases still improving under treatment.

Dr. M. F. Wheatland, of Newport, R. I., says: I would say that my case of cancer of the stomach (reported in the American X-Ray Journal for March), in which the surgeon thought it was necessary to perform pylorectomy, has not had any treatment since January, and is today apparently in excellent health. The case of cancer of the breast died of cardiac asthma. A recent case of cancer (male, age 70) starting in epulis about the right molar and extending to the cheek and soft palate, involving the lymphatic glands on that side, and producing great distortion of the face and neck; after a few treatments the mass softened, and an opening was made at the angle of the jaw and pus evacuated. In the course of two months the wound healed, and, to external appearance, became normal. Treatments are now particularly directed to the condition of the soft palate, which does not improve very rapidly, owing to the timidity of the old gentleman and the inability to properly direct treatment to that part. He has, however, gained ten pounds in the last two months. * * *

My favorable results warrant me in believing that with the amount of work being done at this time, there will be evolved a technique capable in the future of influencing for good the larger number of cases.

Dr. C. W. Allen, of New York, writes: I believe that the ray is capable of doing valuable work in deep-seated breast can-

cer. Till now results are not brilliant; still, life may be prolonged, and an occasional cure of an otherwise hopeless case may be effected, which is something. Great care must be exercised or fatal termination will be hastened.

J. Rudis-Jicinsky writes: In superficial cases of malignant growths, though the recurrence is possible, radiotherapy should, as a rule, be tried first, especially in epithelioma, rodent ulcer, etc.; in carcinoma of the breast, operate and use the rays both. In deep-seated carcinoma surgery should be the first resort. Evidence not sufficient yet in regard to rays; open to doubt. My results were negative. In some cases slight reaction, but death followed; in others, auto-intoxication manifested variously by fever, diarrhea, and general symptoms of sepsis. In inoperable cases, ray always, and control the pain at least. In glandular sarcoma, operate and use the x-ray also. In inoperable cases the rays may be worth trying. Influence upon pain marvelous in some cases; in superficial cases, as far as yet, no recurrence in my cases, and I had very many. In tubercular glands x-ray may be tried. We get some results, but if there is not an invasion of the lungs, we may get recurrence in about six months. In tubercular joints the results are good. In lupus there is no doubt as to favorable action of the raying. In tubercular laryngitis, we use the ray as a prophylactic measure only. In all chronic skin disease, where epilation is desired, we get satisfactory results, especially if we use the Finsen light too.

The pain is controlled in nearly all cases soon, due, perhaps, to the high tension, and not the ray alone.

Dr. G. G. Burdick, Chicago, Ill., writes: In reply to your letter will state briefly that in tuberculosis I am getting very satisfactory results, probably averaging 70 per cent symptomatic cures. Of course I do not depend upon the ray alone. For internal cancer the ray treatment is very promising, but not conclusive. I have had a large number that are symptomatically well, and have been for many months. To say they are cured would be rather premature.

My good results are increasing as my knowledge of the ray increases, and we expect in the near future to have better equipment for handling internal diseases.

Dr. G. B. Massey, of Philadelphia, writes: I must express my continued astonishment that the profession is so ready to investigate x-rays in cancer while so slow in taking up massive cataphoresis of mercury and zinc. I can demonstrate any day that the latter should supersede the knife almost entirely in operable cases, and that it is often preferable in inoperable cases. While speaking positively in this way, I do not mean to under-rate the value of the x-ray as a last resort in many inoperable cases and in very extensive surface infections, malignant and otherwise, in which the best results have been obtained with the rays. I regard the minor zinc-mercury method under cocaine as generally better because it is not only easier of application, but absolutely free from the risk of burns that still attend radiation.

Of the value of the x-ray in strictly internal growths, I have had no experience, but have been called upon to use cataphoresis in case of cancer of the mouth, vagina and rectum, after they had failed to be of benefit.

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Radio-Therapy.

Bactericidal Action of the Radium Rays.

R. Pfeiffer and E. Freidberger (*Berliner klinische Wochenschrift,* July 11, 1903) experimented with typhoid and cholera bacilli in cultures, which were killed or markedly inhibited when exposed to radium at one cm. distance for forty-eight hours.

Histological Changes in Epithelioma Under X-Rays.

Dr. J. Clark Stewart (*Journal A. M. A.,* July 18, 1903) made careful examination of epithelioma of the wrist giving micro photographs. He found fatty degeneration marked in all the sections. In the earliest slides many new blood vessels were seen, which are at first filled with red blood cells but later are packed with polymorphonuclear leucocytes. In some of the earliest slides mitosis is well marked but later is rarely seen. The nuclei undergo gradual destruction and there is at the same time fusion of the cell bodies and loss of cell outline as in coagulation necrosis. The final form resembles sterile pus.

These results are quite different from those obtained by Ellis.

In discussion Dr. H. A. Christian, of Boston, reported a case in which a portion of a carcinomatous growth was protected from the x-ray by a lead shield, and in this part none of the degenerative changes which appeared in the exposed part were found. No polymorphonuclear leucocytes were found in this case.

Carcinoma of the Breast.

Mikulicz and Fitting (*Beitr. Z. Klin. Chir.,* B. 37, H. 3) reports a case in which the lymphatics of both axillæ were first removed, then the cancer treated by x-rays. After four weeks the microscope showed no cancer particles in the tissues. The mass was ulcerated to begin with.

X-Ray in Pulmonary Diseases.

Dally (*Lancet,* June 27, 1903) finds that unilateral limitation of the motion of the diaphragm is the earliest indication of pulmonary tuberculosis. At a later stage the lung may appear mottled. Consolidation throws a shadow of moderate density. Caseation gives a dark shadow. Cavities are transradiant, but if full of pus they may not be noticeable. Acute

dry pleurisy cast no shadow. A purulent effusion casts a darker shadow than a serofibrinous effusion. Emphysema is indicated by brightness. Pneumonia by a light shadow which becomes denser. Pulmonary gangrene gives a well defined opacity. Bronchitis can not be diagnosticated by x-rays.

Cases Cured by X-Ray.

Dr. W. J. Morton, of New York, in the *Medical Record,* July 25, 1903, gives illustrations and report of sixteen cases, including facial cancer, carbuncle, keloid, acne, alopecia areata, sychosis, fibroid tumor, psoriasis and lupus. Most of these have been almost or entirely cured. One case of epithelioma of the cheek improved for some time then steadily extended in spite of anything that could be done with the x-ray and violet ray. This was a deep epithelioma with everted edges and pearly nests. This patient is now improving under caustic treatment.

A carbuncle softened under one treatment of eight minutes, and all pain was relieved.

A fibroid tumor of the uterus after thirty-nine treatments is reduced at least one-third in size and a symptomatic cure is obtained.

The best results with lupus were obtained by giving strong treatment until severe dermatitis was produced on the adjacent normal skin. Treatment was then stopped and the lupus healed by itself in two or three weeks.

X-Ray Tissue Changes.—A study of cases by Ellis shows: 1. Necrosis of cells and trabeculæ of varying degree, and in one also marked fatty degeneration. 2. Increase of elastic tissue in the three cases examined, both before and after exposure. 3. Fewer areas of lymphocytic infiltration in one case after exposure, about equal numbers in others. 4. A tendency to occlusion of vessels by deposits on their inner surfaces, marked in some instances, not so prominent in others. 5. Practically entire absence of infiltration by polymorphonuclear leucocytes. While these results do not warrant conclusions, especially as further studies are being made as regards the nerve and blood changes, he offers the following suggestions:

1. Beck and others lay great stress on blood vessel changes as the cause of necrosis. While endarteritis is probably induced by the x-ray, the accompanying tissue necrosis seems out of proportion to the vessel changes, suggesting the possibility of these being *pari passu* results of the same influence, instead of cause and effect.

2. The presence of immense numbers of cocci and bacilli in the tissues of Case 3, after twenty exposures to the x-ray, would argue against the possession by that agent of bactericidal power. It should be said that the pathogenicity of these micro-organisms was not proven.

3. The unsatisfactory clinical results as well as the slight microscopic changes in Case 3, can probably be safely attributed to the presence of the exceedingly numer- out keratinized areas or pearls. This emphasizes the importance of curetting or cutting away diseased tissue, whenever feasible, before instituting treatment by the x-ray.—*Jour. A. M. A.* February 7, 1903.

Radio-Therapy in Colitis.

Tousey (*New York Medical Journal,* July 11), uses the x-ray for chronic conditions with mucous and bloody discharges which have not yielded to intestinal antiseptics. He uses also the high frequency current from a vacuum electrode in contact with the abdomen. His cases under treatment show improvement.

Therapeutic Value of the X-Ray.

Dr. W. F. Campbell, Brooklyn, N. Y., in the *International Journal of Surgery,* October, 1903, reports two cases of lupus cured and one improving; tuberculosis of the lips, cured; cervical adenitis, much improved; carcinoma of the breast, two cases, recurrent, nearly cured; epithelioma of face, three cases, much improved; carcinoma of rectum, inoperable, general improvement but no diminution in the size of the growth; tuberculosis of the tarsus, nearly cured.

Recurrent Sarcoma Cured by X-Rays.

Dr. F. M. Jeffries (*Denver Med. Times,* July, 1903) reports a spindle-cell sarcoma in front of the right eye of a canary bird cured in five months' treatment.

X-Rays in the Treatment of Malignant Growths.

Dr. Marcus F. Carsom, Griffin, Ga., in the *Atlanta Record of Medicine* for July, finds x-rays of great value and reports four cases. The action of the x-ray is three-fold: first stimulating, second alterative, and third destructive, and it must be applied with judgment.

X-Ray and its Relation to Malignant Diseases.

Dr. J. Ritchey Horner, of Cleveland, Ohio (*Cleveland Med. and Surg. Reporter,* July, 1903) says the x-ray "has been used for its therapeutic properties only during the past two years or perhaps a little more. During the first half decade of its use it was utilized entirely for diagnostic purposes." We presume Dr. Horner refers to Cleveland only, as the x-rays have been used for therapeutic purposes since April, 1896, in Chicago, and in many other places nearly as long. He states also of the x-ray "in sarcomatous growths nothing very definite has been accomplished." Exactly the reverse is true. The author is evidently little versed in the literature of x-rays.

X-Ray Treatment of Acne.

Dr. H. R. Slack, La Grange, Ga. (*Atlanta Journal-Record,* July) reports four cases cured with only slight hyperemia and pigmentation of the skin. He reports also cures in three epitheliomas and three carcinomas of the breast, two of them inoperable; and two cases of tuberculosis.

Cure of Lupus Erythematosis.

Dr. W. S. Gottheil, of New York, in *International Journal of Surgery,* October, 1903, reports four cases. Treatments were given for ten to twenty minutes three times a week. After from nine to twenty-two treatments three of the cases were cured. The fourth case was of sixteen years' standing and had had severe treatments of various kinds. There was much cicatricial tissue, and x-rays produced very slight improvement.

Reports upon Radiotherapy.

Dr. Martin F. Engman (*Inter-State Medical Journal,* July, 1903) reports (1) a cure of epithelioma of the tongue about the size of a dime by exposures with a moderately hard tube at a distance of three to six inches given every other day for twelve days, then after a week's interval, daily. The exposures were at first five minutes, later ten and finally fifteen minutes. The abnormal tissues after two weeks sluffed off and the burn quickly healed. There has been no recurrence for a year.

Dr. Engman attributed his success to the fact that treatments were begun early and the lesion was easily accessible. An-

other factor in the treatment which is worthy of note is its severity. Treatment of cancer of the tongue has been in most cases a failure due probably to the radiotherapist being afraid to induce strong reaction.

(2) Hyperidrosis of both axillae was treated in a similar way except that exposures were stopped as soon as itching or redness appeared. After three months' treatment an improvement of fifty to seventy per cent was found, which appears to be permanent.

(3) A dressing which Dr. Engman has found serviceable for itching and burns of minor degree produced by x-rays is applied on absorbent gauze, laid over the surface and covered with a sheet of guttapercha.

The following is the composition:

℞	Acidi borici	ʒxii
	Zinci oxidi	
	Amyli	
	Bismuth subnit .....*aa*	ʒi
	Ol. olivæ	ʒi
	Liq. calcis	ʒiii
	Lanolini	ʒiii
	Aquæ Rosæ	ʒxii

M.

The powder should be well rubbed up in a mortar and the lanoline added. The olive oil and liq. calcis are well mixed, then this mixture slowly added to the powder and lanoline, constantly stirring. When this is thoroughly mixed the rose water is added and the whole beaten up in the mortar into a light creamy paste. If there is much pruritus, 1 per cent or 2 per cent of Calvert's carbolic acid can be added to the whole.

Observations in X-Ray Work.

Dr. G. P. Edwards, of Nashville, Tenn., summarizes the results of his last three years' work in x-ray therapy as follows:

Nineteen cases of eczema, fourteen cured; one vesicular eczema of hands and feet under treatment, not improved. Two of chronic eczema rubra senilis, failed. One of eczema intertrigo, failed. One of so-called tuberculous eczema of nurslings, failed.

Three cases of tinea barbæ—all cured.

Two cases of tinea circinata—cured.

One case of tinea versicolor—cured.

One case of lichen ruber—cured.

Five cases of psoriasis—three cured.

Sixteen cases of acne vulgaris—fifteen cured—one quit.

Four cases of seborrhea oleosa—all cured.

Three cases of hyperhidrosis of hands and feet—two cured and one quit.

One case of keratosis pilaris—cured.

Three cases of keloid—all cured.

Eight cases of lupus vulgaris—seven cured, one quit almost well.

Four cases of lupus erythematosus—three cured, one quit.

Twenty cases of carcinoma cutis—sixteen cured, four quit.

Five cases of cancer of the lip—one cured, three quit, and one under treatment, unimproved. One case of cancer of the tongue failed.

Three cases of cancer of the breast—one cured, one failure and one under treatment.

Four cases of cancer of the uterus, two cured, one failed and one under treatment.

Treatment of Cancer by X-Ray.

The International Journal of Surgery for October, 1903, is devoted to electro and radio therapeutics. The first paper on treatment of cancer is by W. J. Morton, of New York. He advises early x-ray treatment in every case, and before and after surgical operations. For cancer of the breast in the early stages he considers x-ray treatment more likely to be successful than surgery. For rodent ulcers he claims 100 per cent cures with

the x-rays. Ulcerated cancers are more difficult to handle than those in which the skin remains unbroken. Open ulcers are liable to infection during treatment, and should be covered with a layer of absorption cotton. In deep seated carcinomas treatment may be carried on until there is severe dermatitis of the overlying skin, but if the skin is involved in carcinoma or sarcoma lying directly beneath it severe dermatitis is dangerous, often causing rapid extension of the disease. Dr. Martin favors the view that mild leucocytosis is established by x-ray treatment and is the principal factor in recovery. He has found no difference between daily treatments of short duration and three or four times weekly with longer duration. By giving as nearly as possible the same intensity of treatment at the same distance he has never been surprised with an unexpected burn. He uses no shield except for the hair and eyes, believing that the surrounding regions should have the benefit of the x-rays, since one can never say how extensive a cancer infiltration has become. Dr. Morton describes also his combination of quinin with the x-ray, and some experiments with radium in the treatment of cancer.

Dangers of the X-Ray.

Recent widespread publications of Mr. Edison's experiences with the x-ray and similar contributions are calculated to bring the public mind into a state of uncertainty concerning the dangers of this valuable therapeutic modality. We can not believe that this will affect its employment in the hands of recognized authorities. It will act as a timely warning, however, against the employment of the x-ray by charlatans and those of limited experience in its use, and thereby induce a more favorable impression by preventing the accidents which must occur in the hands of those who do not understand it and by leading those who are not familiar with its actions to investigate more thoroly before they undertake its employment. With these two classes of operators there is a danger which the public should appreciate. In the hands, however, of the skilled physician who both knows how to take care of himself and patient there need be no concern as to unfavorable results from the use of the Roentgen ray.—*Advanced Therapeutics.*

Sunshine and Fresh Air in the Treatment of Tuberculosis of Bones and Joints—Dr. De Forest Willard, of Philadelphia, said that all these new agents which had sprung into prominence within the last few years could as yet be regarded only in the light of therapeutic assistance to the classic treatment of tuberculosis by rest and extension. He believed that all hospitals should be fitted with commodious solaria where the patients should be exposed in a condition of virtual nudity to the direct rays of the sun. It might be well to cover the affected parts with blue glass so as better to permit the passage of the actinic rays. Inasmuch as air was as necessary as light, open air life was as much indicated for these patients with tuberculosis of the hard parts as for those whose soft tissues were involved. He concluded that the actinic and the x-rays were at best only supplemental assistants to the mechanical and general therapeutic measures usually employed.—*Jour. A. M. A.*, July 18, 1903.

Electro-Therapy.

Struck by Lightning.

Four men were struck. One was killed, two slightly injured, and the fourth rendered unconscious. There was a wound on the back of his head around which the hair was burned off, and two scratches on the right thigh. He soon revived, with intense pain on the left side, which was relieved by morphia. Hot baths and a liquid diet resulted in perfect restoration in one month.—*Lyon Medical,* June, 1903.

Extraction of a Foreign Body from Bladder with a Magnet.

An iron peg, five cm. long by six mm. wide, was inserted in the urethra by a young man and slipped into his bladder, where it could be seen by radioscopy. It was extracted by means of a Hirschberg portable magnet, the short tip used in ophthalmology being replaced by a long one, shaped something like a catheter.—*Beitraege, Klin. z. Chir., Tubingen.*

Static Electricity for Women and Children.

Dr. M. G. M'Ginnis (*Med. Brief,* August, 1903) considers static electricity peculiarly suited to women and children because it has "no chemical or electrical properties," meaning, we suppose, that these properties are less prominent than some others. He says oxidation is promoted, nutrition improved and the excretion of urea and uric acid hastened. Some general instructions are then given for treatment and seven cases are reported.

A Simple Method of Producing Anesthesia.

A very simple method for producing local anesthesia, and one that will commend itself in the performance of minor operations, has recently been described by a writer in the *Lancet.* The method outlined is as follows: A solution consisting of adrenalin chloride two drachms, cocain five grains, and water one-half ounce is prepared. Lint is folded into a pad of four layers, soaked in the solution, and placed under a positive electrode. A large negative electrode is applied elsewhere, and a current of from fifteen to thirty milliamperes is slowly induced and run for the space of from five to fifteen minutes. The surface may then be washed with ether, and superficial operations performed painlessly and without loss of blood.—*Medical Age.*

Value of the Static Machine as a Therapeutic Agent.

Dr. H. M. Chapman, of St. Louis (*Courier of Medicine*), says the static machine gives a potential of 500,000 volts or more, and gives not a standing charge but an electric current. The first physiological effects are deeper respiration and a marked tendency to perspire. There is increase in the pulse rate, arterial tension and temperature. Elimination of urea is increased. Digestion is accelerated and the appetite is improved. The breeze and the spray act upon the vaso motor nerves, contracting the capillaries and reducing the temperature of the skin. Large quantities of ozone are developed. The percussive spark induces muscular contraction and contraction of the capillaries at the point of discharge, which is followed in a few minutes by dilatation. These sparks relieve chronic pain and stiffened joints, and causes the absorption of old exudations. There is no more suggestive therapeutics about static electricity when properly handled than there is about any reputable treatment of medicine or surgery.

Ocular Injuries Due to Electricity. (*Le Progres Medical,* December 6, 1902).—In the past two years Terrien has observed forty-five cases of ocular injury of electrical origin, all of which were due to an electrical discharge—short circuit—in the immediate vicinity of the victim. Cases are classified as (1) benign, (2) moderately severe, (3) severe.

Symptoms.—Redness and swelling of the skin, or, in severer cases, a superficial burn of the skin with singeing of eyelashes and eyebrows. Conjunctival hyperemia is constantly present. Circumcorneal injection, chemosis and edema of the lids are rare. Within a few days a scanty mucopurulent secretion appears which consists microscopically of fibrin enmeshing leucocytes and epithelium. In about one-third of the cases a transient ciliary injection denotes hyperemia of the iris and uveal tract. Ophthalmoscopically the retina is hazy, the papilla and large vessels are blurred. The writer has never observed lenticular changes. The patient complains of itching, prickling and a sensation as if a foreign body were beneath the lid.

Factional Disturbances.—Immediately following the injury there is an intense dazzling, which is succeeded in a few minutes by an equally transient erythropsia. Central vision is always impaired and the field is contracted. Fixation is difficult or impossible on account of the quivering of objects. In severe cases the foggy vision may be due to a true central scotoma. This difficulty of fixation and the contraction of the visual field are the last two symptoms to disappear.

Nervous Disturbances.—An early symptom is photophobia. Later, headache of a neuralgic character, pain in and around the eyeballs and a sensation as if a band were compressing the head. Pain is evoked by pressure on the globe, on the ciliary region and at the points of emergence of the supra and infraorbital nerves. The severity of the pain thus evoked is directly proportional to the intensity of the trouble. There is occasional hyperesthesia of the skin and conjunctiva.

Motor Disturbances.—There is usually blepharospasm and occasionally a true contraction of the orbicularis palpebrarum which may persist several months. As a rule pupillary reaction is normal. If the pupils contract and immediately dilate under continued light stimulation, or if the pupils are dilated and do not react to light, the prognosis should be guarded.

Secretory Disturbances.—Secretion of tears is often excessive and is increased on exposure to light. Some cases exhibit lachrymal crises.

The ophthalmoscopic findings, diminished visual acuity, and consistently contracted field (as determined by repeated observations), taken in conjunction with the symptom group, will exclude malingerers. It is sometimes very difficult to differentiate the immediate effects of the accident from neurotic conditions resulting remotely therefrom. From the medico-legal standpoint this matters little, as the physician need concern himself only with the degree of incapacity for work. Recurrent hyperemia of the conjunctiva, marked and persistent photophobia, inverse action of the pupil, widely dilated pupils, severe neuralgic pain with pain on pressure on the globe and on the points of emergence of the supra and infraorbital nerves, are of grave prognostic import.

Thiosinamin and Electrolysis in the Treatment of Tubal Obstruction.—Dr. J. C. Beck, Chicago, after treating fourteen cases, concludes that without mechanical treatment the injections of thiosinamin do not materially improve the condition; but, after use in conjunction with electrolysis, a simple bougie could

be passed with greater ease and inflation was more free and all the cases treated improved in all respects, as regards hearing, tinnitus aurium, general condition, etc. He also says that before using thiosinamin careful inquiry should be made for possible contra-indications to its use, such as existing chronic tuberculosis, malignant tumors and scars which support the abdominal organs in the abdominal wall, such as are found after laparotomy. The drug may be used with just as good results —tho it is not as rapid in its action— by mouth administration as hypodermically.—*Jour. A. M. A.*

The Bactericidal Properties of the Blood.—Halliburton, in his remarks before the British Association for the Advancement of Science, said: "The power of the blood to destroy bacteria was first discovered when an effort was made to grow various kinds of bacteria in it; the blood was believed to be a suitable soil for this purpose, but it was found to have the opposite effect in many instances. The chemical characters of the substances which kill the bacteria are not fully known. Evidence appears to favor the leucocytes as the origin of this bactericidal substance. These substances are called alexins, but the more usual name now applied to them is that of bacteriolysins. The bactericidal power of the blood is closely related to its alkalinity. Increase of alkalinity means increase of bactericidal power. Alkalinity is probably beneficial, because it favors those oxidative processes in the cells of the body which are so essential for the maintenance of healthy life. Normal blood possesses a certain amount of substances which are inimical to the life of bacteria. When a person gets run down, there is a diminution in the bactericidal power of his blood. However, a perfectly healthy person has not an unlimited supply of bacterio-lysin, and if the bacteria are sufficiently numerous he will fall a victim to the disease which they produce. In the struggle he will form more and more bacterio-lysin, and if he gets well it means that the bacteria are vanquished, and his blood remains rich in the particular bacterio-lysin he has produced, and so will render him immune to further attacks from that particular species of bacterium. Every bacterium seems to cause the development of a specific bacterio-lysin. Immunity can more conveniently be produced gradually in animals, and this applies, not only to the bacteria, but also to the toxins they form."—*Internat. Med. Mag.,* May, 1903.

Chicago Electro-Medical Society.

The next regular meeting will be held at 1208 Masonic Temple on Tuesday, Oct. 27, at 8 p. m. Several papers will be presented.

Electro-Diagnosis.

Os Trigonum Detected by X-Rays.

H. P. Mosly found what was at first supposed to be a fracture of the astragalus but which proved to be an os trigonum, an abnormal tarsal bone described by Berdeleben in 1883 (*Annals of Surgery*).

How to Secure the Best Skiagrams.

Dr. W. M. Brickner (*International Journal of Surgery,* October, 1903) says the most important point is in the management of the vacuum tubes. Penetration and definition are quite different properties, and the penetration is not al-

together dependent upon the degree of vacuum. Generally, high vacuum means poor definition. Low vacuum means dark shadows and clear outlines. For skiagrams a low vacuum should always be employed, and the length of exposure is varied to allow for difference in density.

Tubes with a good focus upon the anti-kathode should be reserved for skiagraphy. Radio-therapy does not require a good definition. A number of points are given for judging the vacuum of a tube and for changing it. Nothing is said about the use of lead screens.

Operations under X-Rays.

VANCOUVER, B. C., Oct. 5, 1903.

Dear Doctor—During the past month I have had two interesting cases, in which the x-ray did signal service. It might be of interest to the readers of your journal to have them reported therein.

The first was that of a little girl four years old, who swallowed a twenty-five cent piece, twenty-four hours before being brought to my office. The x-ray was applied and coin was clearly discernible lying in the esophagus in front of the first dorsal vertebra. Chloroform was given and a long curved forceps introduced into the throat. The forceps would not reach within a half-inch of the coin, altho pressed in with considerable force. The anesthetic was diminished when the presence of the forceps caused the child to gag, bringing the coin up within reach, when it was easily grasped and removed.

The second case was that of a boy twelve years old who was shot in the back of the neck with a twenty-two caliber rifle. The ball entered the neck two inches behind and one inch below the lobe of the right ear, passing under the skull and lodging in the upper part of the mantle at the junction of hard palate and alveolar process. The bullet was located by the aid of x-rays and removed thru the mouth. No damage was done beyond a slight fracture of the hard palate and the boy is making good recovery. Yours fraternally, ROBERT TELFORD, M. D.

St. Barnabas Hospital, of Minneapolis, is putting in a complete electrical outfit, with a coil for x-ray work. Dr. W. P. Spring has been appointed consultant in electro-therapeutics, and will have general charge of this department.

We regret to learn that Dr. Maurice F. Pilgrim, of New York City, died of pneumonia on Sunday, October 18.

Electro-Physics.

Experiments on the Loss of Weight of Radium.

Experiments were conducted by Prof. Dorn to settle the question as to the loss of weight sustained by radium in the course of time. As determined by Heydweiller, there is an appreciable loss even in comparatively short time. His results are directly contradictory of what had been found by Becquerel. Dorn operated on about thirty grams of very active radium bromid and his results do not agree with those of Heydweiller, in as much as he finds that the loss is certainly not more than 0.001 mgm. in three months and perhaps not that much. The radio-activity of the substance used by Dorn was at least ten times greater than that of Heydweiller.—*Phys. Zeit.*, July 1.

Devonport Tram Cars.

The line is very hilly and the grades as high as one in ten. Each car is now provided with two Brush motors. In going down hill the motors are thrown into operation and the energy of the car, instead of being wasted in the brakes, is converted into electric currents, giving a regeneration current of forty to fifty amperes. Brakes are not used except to hold the car still on the grade. The saving of energy is about 30 per cent, and the maximum demand on the line is reduced from one hundred and forty am. to eighty am. per car.—*London Electrical Review,* July 24, 1902.

Rotation of Liquids Under the Action of a Magnetic Field.

A contribution of Prof. Nernst to the discussion repeatedly mentioned in the *Digest,* between the author and Prof. Drude, as to whether a magnetic field could produce rotation in an electrolyte. The author referred the question to Nernst, and the latter now finds that the rotation actually takes place under the right condition of experiment. The sense of rotation of the liquid is reversed, when the magnetic field is commuted.—*Urbasch in Zeitsch. f. Electrochem.,* June 25.

The Nerst Lamp.

This lamp is now coming into actual service. Instead of the carbon filament of the ordinary incandescent lamp there is a "glower" which is a short strip made of a mixture of oxides of magnesium, yttrium, zirconium, thorium and cerium. This glower at ordinary temperatures is a non-conductor, but at a high temperature is a fairly good conductor. Being noncombustible it is not necessary to inclose it in a vacuum. Each glower is about one inch in length and one mm. in diameter. Several glowers are placed in parallel side by side. The first is heated by a coil of fine platinum wire, which is thrown out of the circuit by an armature as soon as the glower becomes a conductor. The first glower heats the next, and so on. The glower deteriorates rapidly on a direct circuit because of electrolytic action. With an alternating current the only deterioration is that resulting from the intense heat. The life of a glower is from four to eight hundred hours.

Lamps are made with one, two, three, six or thirty glowers, giving an illumination of from twenty-five to 2,000 candle power and requiring from one and one-half to two watts per candle power.—*Electricity,* July 31, 1903.

Radium Rays.

London (*Berliner Klinische Wochenschrift*) used thirty mgms. of radium bromid inclosed in a box. He found that a piece of sealing wax which has been electrified by rubbing with flannel has its discharge scattered by being passed over the radium box.

Some mice were placed in glass cages. On top of one of the cages the radium box was placed. On the third day the mice in this box became sick. The box was then removed but the mice died on the fourth and fifth days. The first indications of sickness were redness of the ears, blinking, sleepiness, loss of appetite muscular irritability. Then followed hard breathing, coma and death.

The sensitiveness to light of some partially blind persons was very much increased when the radium box was placed near their eyes.

Radiation from Caoutchouc.

Van Aubel recently showed that after caoutchouc has been exposed to dry ozone for some minutes it acts upon selenium like a feeble illuminant, causing its resist-

ance to fall seven per cent in fifteen minutes. This is simply another illustration of the existence of the unnoticed radiations which exist everywhere.

Radioactive Gas from Metallic Mercury.

Strutt gives the results of a series of experiments from which he draws the following conclusions: 1. A radioactive gas or emanation can be obtained by drawing air over hot copper or by bubbling it thru hot or cold mercury. 2. By repeated circulation thru mercury very considerable activity can be obtained, activity of quite a different order from that of metals as ordinarily observed. 3. The mercury emanation deposits radioactive matter on the walls of the vessel containing it. This deposit remains after blowing out the gas, and possesses at first perhaps one-sixth of the activity of the latter. This induced activity falls to half its value in twenty minutes. 4. The emanation itself decays in activity according to an exponential law, falling to half value in 3.18 days of twenty-four hours each.—*Phil. Mag.*, July.

A Remarkable Phenomenon with Radium.

Prof. Dorn opened a glass tube into which about thirty milligrams of the strongest radium bromid had been introduced six months before, and which had then been closed by fusion. At the instant when the three-cornered file had hardly scratched the surface of the glass, the glass was pierced by an electric spark with audible noise. The spark was distinctly visible, altho the occurrence took place near the window on a bright afternoon. The author thinks that the negative electrons have passed thru the glass wall and gone off, while the positive ones remained in the interior of the tube. On the outer wall of the tube there has been positive electricity accumulated by surface conduction, or from the air, which was ionized thru the radiation of the radium. As the tube was held in the left hand and the metal of the file in the right, a discharge was possible, but it remains remarkable that the difference of potential could reach a value sufficient to pierce at least 0.2 millimeter of glass.—*Phys. Zeit.*, June 15.

Radio-Activity and the Age of the Sun.

Prof. G. H. Darwin suggests in *Nature* that previous estimates of the sun's age will have to be modified as the result of the discovery of a new source of energy in the disintegration of the atoms of radio-active substances. Lord Kelvin's well known estimate of 100,000,000 years was arrived at on the assumption that the energy emitted by the sun was derived from gravitation by the concentration of its mass. Prof. Darwin estimates that the energy derivable from this source is 2.7×10^7 m calories. If the sun were made of a radio-active material of the same strength as radium, it would be capable of emitting 10^9 m calories without reference to gravitation. This energy is nearly forty times as much as the gravitational energy. He sees no reason for doubting the possibility of augmenting the estimate of solar heat as derived from the theory of gravitation by some such factor as ten or twenty. The geologist's estimate of the age of the earth has always been so much greater than that of the physicist, that they have generally been looked upon as irreconcilable. The multiplication of the physical estimate by twenty would bring it into very close agreement with the geological estimate. The presence of helium in the sun points to the existence of radium in its mass, so that there is much to be said in favor of Prof. Darwin's hypothesis.—*London Electrical Review*, October 2, 1903.

Role of the Earth in Wireless Telegraphy.

Koepel (*Dingler's Polytechnical Journal,* June 20, 1903) investigates mathematically the relation which is borne by the electro-static capacity of the earth to the electric oscillations used in wireless telegraphy. The electro-static capacity of the earth is only about seven hundred micro-farads. The resonance in an oscillating circuit depends upon the product of the capacity and self induction of each resonance wire.

A piece cut off from one of these wires can be replaced by a globe of certain capacity, and the greater the wave length the greater will be the radius of the globe which replaces a certain part of the wire. By increasing the wave length a globe as large as the earth may be required to complete the resonance of one of the wires. He finds that with a wave length of 10,000 meters an oscillator, at one side of which a resonance wire of 2,500 meters length is carried vertically upward, and other side of which is earthed thru a wire of 100 cm. self induction, is electrically balanced. The maximum current required for this would be fifteen am. In this way signals may be conveyed to any part of the earth's surface. Koepel thinks Marconi with his installation for ocean telegraphy may have obtained partial earth resonance.

Humidity and the Static Machine.

It is appreciated by all who employ the static machine that during periods of humidity the machine either generates no current or the current which is generated is available to a degree relative to the humidity. This applies to all sorts of static machines, and especially to those which are most used, on acount of the constant discharges of ozone, nitrous acid, and water within the case. The problem to solve has been how to promote the absorption of the deleterious products of the electrical discharges and at the same time get rid of the moisture which is certain to creep into the case during periods when the air is saturated with moisture.

No agent so well meets these requirements as the commercial quicklime. It should be placed in a wooden box having lath sides placed one-quarter of an inch apart, and covered on all sides with two thicknesses of good muslin. From twenty to forty pounds of fresh hard lime should be put in this box at least once monthly during the summer. This will absorb much of the noxious gases as well as the water, and the machines which were in fair condition when the lime was put in the case will rarely discharge when used daily. Chlorid of calcium, which is in such common use, is positively deleterious in the long run to the interior of the machine. The only condition to be obviated in the use of lime is the dust which will settle upon all parts of the machine if not tightly closed in with muslin, as suggested. —*Journal Adv. Therapeutics.*

Radium at the British Association.

An interesting discussion on radium at the British Association developed into an attempt to determine whether radio-active substances derive their energy from an external source or from the liberation of energy stored up in the atom. In a paper contributed by Lord Kelvin the former view was upheld. Radium was compared to a piece of black cloth enclosed in a glass tube immersed in water and exposed to sunlight. Such a piece of cloth would absorb more heat from the sun's rays than a piece of white cloth in the same position, and would therefore maintain the surrounding water at a slightly higher temperature in the former case than in the latter. The form in which the eternal energy reached the radium was not specified, but he suggested that interesting results might be obtained by surrounding

the radium by different kinds of screens, and determining whether the amount of the radiation was thereby affected. Prof. Dewar explained an experiment which he had carried out for M. Curie, and which appeared to correspond with that suggested by Lord Kelvin. Liquid hydrogen was placed in a bottle with double sides coated with silver or mercury, and enclosing a vacuum, an arrangement which has been shown to be a practically perfect screen for preventing the passage of heat either by conduction or radiation. To still further increase the insulating properties of this bottle it was immersed in liquid air. Under ordinary conditions there was no evolution of hydrogen gas from the liquid in the bottle, but when a particle of radium was dropped into the liquid there was a continuous evolution of hydrogen gas. This gas when collected and measured gave a measure of the radio-active energy of the radium. The energy emitted by the radium appeared to be rather greater at the temperature of liquid hydrogen than at higher temperatures.

These experiments of Prof. Dewar give great support to the theory of Rutherford and Soddy, that the energy of radium is derived from energy stored up in the atom. Sir Oliver Lodge gave a provisional support to this theory, and pointed out that the instability of the atom had already been foreshadowed in the theoretical work of Larmor, who had shown that atoms ought to be unstable because they were continually radiating energy into space. Prof. Schuster said he always looked with suspicion on statements as to the theoretical foreshadowing of novel experimental discoveries. In his opinion, the complicated phenomena observed by Rutherford and Soddy had not yet been accounted for by any theoretical system of electrical attractions and repulsions.

Prof. Schuster considered that all substances were probably radio-active to an extent which, tho not measurable on small masses, might be very considerable on large aggregates. The known radio-active bodies would in that case be distinguished from other bodies—like iron in the case of magnetism—by the enormously exaggerated form in which they possessed the property. The earth was charged with negative electricity. But this charge must be continually leaking away, for Elster and Geitel had recently shown that the normal conductivity of the air was such that a body lost 1½ per cent. of its charge per minute. If the air in the immediate neighborhood of the ground had this conductivity, the earth would lose half its charge in about an hour. The discharge of this large amount of negative electricity through the atmosphere pointed to the existence of radio-active substances on the earth's surface. The radio-activity of the air arising out of the ground, or of water drawn out of wells, might be due to emanations produced by the terrestial radiation of electrons.

Prof. Lamar stated that most physicists were agreed in seeing an explanation of radio-active phenomena in an electric theory. The divergence arose on questions of detail. Everything depended on the dimensions and configurations of the electrons. Hitherto they had been looked upon as points, but if they were of definite size they were capable of explaining all the properties of the molecule. The experiments of Prof. Dewar had shown that radium could excite, in surrounding nitrogen, a bright line spectrum. This pointed to violent chemical disruption of a much more severe character than the collisions assumed in the kinetic theory of gases. He favored Prof. Rutherford's theory as to the origin of the kinetic energy of radium, etc., his supposition being that it existed within the atom in the form of rotational motion.—*London Electrical Review.*

The Failure of Medical Colleges to Give Advanced Therapeutic Measures a Dignified place in Their Curriculum.

The continued failure of the great medical colleges of the country to recognize in their courses of study measures which have already proved themselves invaluable in the treatment of diseased conditions call, at this season of the year, for more than passing notice.

That these measures are justly termed *advanced therapeutic* measures is evidenced from the fact that the members of the profession who are above prejudice, and are broad-minded enough to investigate them, are employing them today. This is not stated in a spirit of censure, but of fairness, with an earnest hope that, instead of inciting prejudice, it may attract the attention of those who fail to recognize their value and at the same time call attention to a continued failure to adopt them in the regular medical teaching.

With those who, from long experience, are familiar with the shortcomings of exclusive and generally empirical drug medication, there is always a growing disposition to diminish the number of drugs prescribed, and a tendency with conscientious physicians, who observe and study results, to give less and less of medical treatment. The members of the profession who employ in their later years, with the enthusiasm of their youth, the extensive list of remedies now accorded a place in the pharmacopœia, are those who fail to realize how valueless the majority of such remedies are. Furthermore, the disposition of the leading medical minds to make little use of the bulk of such remedies, and their inclination to rely less on medical measures, in the fullness of their experience, is sufficient argument that that sacred volume be renovated, and the useless drugs be stricken out, or at least relegated to their proper place.

How wrong it is to educate the rising physician to believe that which in later years and experience he is certain to abandon! Failure to succeed in cases that, from their nature, should be cured with the measures taught in their college course, leads the mature physician to look out for more scientific and rational means than empirical drug medication with which to cure his patients.

Such physicians and surgeons are led either to adopt surgical measures which, on account of their certainty of action, are more positive in their results, or physical agents which may be studied in their effects from a more rational standpoint. When the medical man, however, comes to investigate the employment of electricity, hydrotherapy, dry hot air, light, mechanical vibration, or the Roentgen ray, he requires a technical knowledge of the application of these agencies in order to obtain the most satisfactory results from their employment. We find many leading minds in the profession seeking with eagerness information in these departments of medical science. It is not the pharmacopile or the *hit-or-miss* doctor who fails to discern the inefficiency of the ancient measures that seeks this information, but the progressive, up-to-date physician. The earnestness and eagerness with which he takes up and uses the measures above referred to, and the success which follows the introduction into his armamentarium of the means, are a guarantee of the certainty of their action.

We repeat again, *"opposition is the sign of ignorance."* The man or teacher who opposes or stands in the way of the introduction of these measures into general use by the medical profession does so because he is unwilling to take the time to investigate it himself, and wishing, at the same time, to be considered in the van, would stigmatize the methods and cloak his own ignorance. False teaching or hypocrisy in matters affecting public health and the

welfare of the community are inexcusable in an enlightened age, and deplorable when involving a learned profesion.

The employment of electricity in therapeutics has grown apace with the better knowledge of the physical properties of the agent. When we look about us and see the growth and employment of this form of energy in the commercial pursuits, and recall its use half a century ago, the progress is amazing. When we say that the employment of this same agent in therapeutics has advanced, in the hands of those who are familiar with it, to an equal extent, our veracity is questioned, and yet, *it is the truth.* In the treatment of nervous diseases, electricity has made strides still unrecognized by many who are looked upon as and consider themselves authorities. The success attending the treatment of neuritis, tabes, and anterior poliomyelitis in its early stages, when scientifically managed, are examples of the wonderful efficacy of the high potential currents. Local stasis, hyperemia, congestion, and pain of acute and chronic inflammatory conditions are relieved by electricity, where the remedies of the pharmacopile have proved absolutely useless. Functional neuroses and debilitated states receive an impetus from the intelligent employment of this energizing force where drugs have absolutely failed.

The employment of electrolysis by the methods of Newman, Massey, Gautier and others has wrought successful results where surgical interference would have been recognized as a therapeutic measure.

Hydrotherapy has been recognized as a therapeutic measure since the earliest times, and yet few physicians today have a fair conception of its indications and the technique of its employment. In what medical college has hydrotherapy been recognized? Probably no agency will, to the same extent, increase the physical resistance of the patient against climatic influences, and at the same time stimulate a healthy metabolism, as the scientific employment of water, one of the most common means at the command of physician and patient. The physician should ever be trained to intelligently advise his patient in the employment of hot and cold water baths, douches, wet packs, shower baths, sitz baths, and every other use of this valuable therapeutic agent.

The value of dry hot air, or heat generally, in the treatment of disease has been acknowledged since early times, and yet what school teaches the method of employment in a thoroughly technical manner. The Turkish bath has been employed generally under the supervision of laymen often unscientifically, and always fraught with elements of danger and discomfort. The body hot air treatment in skilled hands should supplant the Turkish bath, especially in the treatment of rheumatic and gouty affections. The use of dry hot air in a properly constructed body apparatus, with the head of the patient not exposed to the heat, permits the employment of temperatures which promote profuse diaphoresis and active elimination to an extent not approached by the Turkish bath. This treatment, however, is not complete except when systematically employed in conjunction with hydrotherapy.

Mechanical vibration, employed in the form of massage, and under the title of osteopathy by a cult who have sought to make out of the employment of one measure a cure-all; performed manually in the past, has received a great impetus during recent years from the adoption of properly constructed apparatus. The great value of mechanical vibration as a therapeutic measure has been demonstrated clinically. It is applicable to inflammatory conditions, removing local stasis, infiltration and congestions, stimulating nu-

trition, and improving local metabolism and secretion to a large degree which was not possible to accomplish with manual methods. Few medical schools in the country have given it a place in their curriculum.

The latest of the physical measures to receive recognition, and apparently the ones accorded a fairer treatment than those above referred to are *light,* and the *Roentgen ray.* The rays of different degrees of refraction having been accorded special recognition already, owing to the labors of many advanced workers, receiving attention from all schools of medicine, but few, we believe, have added anything more than a passing consideration in the curriculum of the teaching of the medical colleges. It is probable that if the suggestions of many of the older masters regarding the value of light as a therapeutic agent had been more generally recognized and employed, its adoption now would not be ranked as an advance in therapeutics.

The subject of *dietetics* has received indifferent consideration for years in the medical schools. Too few physicians today, from the medical training in their *alma mater,* are able intelligently to prescribe the diet indicated in the various conditions for which they are called upon to prescribe. If the same attention were given this all-important subject that is accorded the remedies of the pharmacopeia in the treatment of disease, there would be less call for the use of such remedies.

Physical therapeutic exercise, invaluable for the correction and prevention of deformities, for the induction of normal healthy metabolism, and the restoration to health of the indolent and inactive, is a subject which calls for most thorough attention in the medical colleges at this time, and what chair in the medical schools of the country devotes attention to this most valuable method of treatment? The ancient Greeks and Romans recognized its value, and the laymen today have adopted its use, in defiance, as it were, of a slow profession. The tendency, without medical advice, to a better observance of the laws of health, physical exercise, and diet, is a well-merited reproach upon the intelligence and progress of the learned.

Already we hear much of *suggestion,* and much for and against hypnotism in the medical press, but what medical school in the country today is giving a scientific course in *psychiatry?* That it is important that such instruction should be given there is little doubt, when all medical men recognize the value of suggestion, and employ placeboes in treatment of disease. Placeboes are dishonest. The rational intelligent employment of a cultivated personality in the physician, and its exercise for the benefit and well-being of the patient, in connection with the employment of physical agents, which act as a *vis a tergo,* will supplant in the future the placebo of the pharmacopile.—*Editorial, Jour. Adv. Ther.,* October, 1903.

Production of Helium from Radium.—Ramsay and Soddy presented a paper before the Royal Society, England. The authors conveyed the maximum amount of the emanation obtained from 50 mgms. of radium bromid by means of oxygen into a U tube cooled in liquid air, and the latter was then extracted by the pump. It was then washed out with a little fresh oxygen, which was again pumped off. The vacuum tube sealed onto the U tube, after removing the liquid air, showed no trace of helium. After standing for four days the helium spectrum appeared and the characteristic lines were observed identical in position with those of a helium tube thrown into the field of vision at the same time.—*El. World and Eng.*

Action of the Earth in the Propagation of Electric Waves.—Voller gives the result of experiments with a small Braun and Siemens-Halske apparatus, which was operated in four ways: 1, in the ordinary manner, with both air wires, without any earth connection; 2, without both air wires and with connecting wires to earth plates; 3, with replacement of sender or receiver wire respectively by earth connection; 4, without air wires or earth connections. He concludes that a variable electrification, communicated to the surface of the earth, is propagated by conduction in the latter in the same way as in a dielectric by progressive polarization, and that, therefore, a sort of wave telegraphy through the surface of the earth is possible.—*Phys. Zeit.,* October 1.

Method of Showing Penetrating Powers of Radium Rays.—Black describes a simple method for showing the great penetrating powers of certain radium rays. His arrangement consisted of two large Leyden jars, which had their interior coating joined to the two sides of a Wimshurst machine, while their exterior coatings were joined to two small exactly similar spark-gaps arranged in parallel, to form alternative paths for the secondary discharge when the primary discharge took place on the machine. The secondary discharge will then pass at the gap which is exposed to the radioactive substance. The author has shown by this arrangement that 1 cgm. of radium bromid sends some rays thru 8.5 cm. of lead. The presence of 1 cgm. of radium bromid, even at a distance of two meters, may be detected definitely. To obtain these results the terminals at the spark-gaps ought to be small spheres about 1 to 2 cm. diameter, the gaps should be small and carefully shielded from all discharge of the machine. Thick lead shields, about 25 cm. thick, should be arranged to hinder any action of the radium on the gap which is not exposed to the radiation, and the Leyden jars should be of considerable capacity. He gives a table containing the results of some experiments, and shows that the radioactivity, induced by radium, produces some penetrating rays. After the radium bromid had been in the ebonite box for eighteen hours, when the empty box was put on a sheet of zinc 0.5 mm. thick, which was placed over one of the gaps, the sparks passed readily thru that gap.—*Lond. Elec.,* August 21.

Radioactivity of Metals in General.—Voller discusses the results obtained by McLennan and Burton. These experiments found that metals like lead, aluminum, zinc, tin and copper send out spontaneously positive ions and retain, therefore, negative charges. They found negative potentials of 0.216 to 0.073 volts. The author calls attention to the fact that in electro-meter measurements of such potentials, which are of the order of the Volta contact potentials, it is necessary to consider all electro-motive forces which appear between the single metallic parts of the electrometer or the whole electrometer system, when they touch each other. In such cases the metals to be investigated and the metals of which the electrometer is composed have to be of the same nature. If, however, the electrometer quadrants were of brass there was always the voltaic electromotive force of brass against lead, aluminum, etc., acting in the system. These forces generate potentials, the value of which is equal to or greater than those measured by the first-named experimenters. If the above influence of the voltaic potentials has not been excluded, there is no necessity to assume a general and spontaneous electronic emanation of all metallic surfaces.—*Phys. Zeit.,* October 1.

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THE AMERICAN
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Electro-Therapy.

A Course of Twenty-four Lessons under the auspices of the Chicago College of X-Ray and Electro-Therapeutics

LESSON 6—FORESIS.

The migration of ions during electrolysis has already been discussed. When the electrolytic process is carried on in such a manner that medicaments are carried by it into the body the process is known as foresis. When the arrangements are such that the kations which are carried down stream (electrically) are carried into the body, the process is called kataforesis. The name anaforesis, on the other hand, is applied to the passage of the anions as they pass up stream toward the anode and into the body. In using foresis for therapeutic purposes careful note must be made of the therapeutic effect of the various set of ions. At this point the average physician is at a loss. It is only during the last few years that scientific investigations have been made into the physiologic and therapeutic effects of ions, distinguishing these from the molecular or salt effect of compounds. A good deal has still to be learned in this direction. Probably the simplest way to consider the matter for the present is to regard the ions which are carried into the body during foresis as replacing the corresponding ions which previously existed in the salts in the tissues; for example, during foresis potassium iodid (K I) placed on the surface of the body under the anode (positive electrode) is decomposed, the anions (I) move toward the electrode close at hand and the kations (K) are carried into the body, replacing there the sodium in such compounds as sodium chlorid (NaCl) and forming potassium chlorid (KCl). From the known effects of these compounds something of the effects of anaforesis and kataforesis may be inferred. The effect of foresis in all cases is to modify the chemical composition of the tissues. This modification is most pronounced near the surface or where the electrodes are applied, and where the current density is greatest.

The metals, the alkaloids and all other bases are kations. The elements of the chlorin and sulfur groups, and all acid radicals, are anions.

Foresis can be most satisfactorily induced by the direct current. The direct current may be steady, irregular, interrupted, or of any other quality so long as it is direct. In some cases the diffusion of ions is facilitated by using the alternating current, resulting in a scattering rather than a migration of the ions.

The velocities with which the different ions travel vary greatly. Not much data of therapeutic value to the physician has as yet been accumulated on this point. In foresis the physician must therefore be guided by the clinical results of himself and others as to the amount of current and length of time required for a given mode of treatment. The choice of

electrodes is important. The indifferent electrode must be large, so as to distribute the current as much as possible. Each may be made of tin, porous earth or clay or of almost any metal. If made of sheet copper, zinc or lead some absorbent cotton or porous paper must be placed in layers beneath the electrode and wet with water, which may contain salt in solution. This indifferent electrode must be placed on some part of the body that is only slightly sensitive to the current, and as close as possible, in a direct line thru the tissue to be treated, to the active electrode. Wherever the conditions are such as to permit it the indifferent electrode may conveniently be made a basin of water or a bath tub.

The electromotive force necessary depends entirely upon the amount of current required and upon resistance of tissue to be treated. A milliampere meter is required in nearly all cases and a rheostat is necessary to control the current. In all cases the current is turned on very gradually at first. After some minutes a certain amount of tolerance is established and the current can be increased without injury.

Probably the earliest practicable application of foresis in medical treatment consisted in attempts to produce local anesthesia by conveying medicaments thru the skin. Kataforesis was the action first recognized, and experiments made with compounds whose kations were analgesic were more or less successful, while a few cases in which attempts were made to introduce into the body anions by kataforesis (the operator being ignorant of anaforesis) were a failure. Diseased conditions at or near the surface are easily treated locally by this means. Painful tumors and ulcers in teeth or bone are successfully treated. Many experimenters, however, having nothing to guide them and having little knowledge of the chemical and physiological action of the current, have used the wrong pole, and have made such mistakes in the dosage as either to accomplish nothing or to completely destroy where they attempted to cure. In all work of this kind a milliammeter is almost a necessity.

Foresis has been found of great value in treatment of diseases of the prostate and in the destruction of malignant tumors, both on the surface and deep seated. For the latter purpose salts of mercury are generally used. Dr. Massey has elaborated the technic of the destruction of malignant tumors. He uses for the anode spicules or needles of amalgamated zinc, thru which a relatively strong current is passed under general anesthesia until such time as the hardened tissues become soft. It is found that malignant tissues thus treated are completely killed, and that the tissues immediately surrounding them are sterilized to a depth of half an inch or more by the salts of mercury and zinc. After several days the necrosed tissue comes away, leaving a clean, healthy sore, which soon heals.

The brush discharge from a static machine may also be used for carrying various sets of ions more deeply into the tissues. Tuberculous glands and tuberculosis of any form can be reached to some extent in this way. Recent experiments have shown that high frequency currents of high tension exert a considerable scattering effect upon the ions, distributing them thruout the tissues. The same effect may be produced by x-rays.

In all foric treatment the electrolytic effects of the current which occur at the same time must not be lost sight of. In some cases foresis has received credit to which it was not entitled, for effects due entirely to electrolysis.

American Electro-Medical Society and Illinois State Electro-Medical Society.

First Annual Meeting, Masonic Temple, Chicago, December 1, 2, 3, 1903.

Monday, November 30: 2 p. m., meeting of Executive Council.

Tuesday, December 1: 2-5 p. m., papers and discussion.

Wednesday, December 2: 9 a. m., business session.

Wednesday, December 2: 9:30 a. m.-1 p. m., papers and discussion.

Wednesday, December 2: 2 p. m., business session of Illinois State Society.

Wednesday, December 2: 3 p. m., Executive Council meeting.

Thursday, December 3: 9 a. m.-1 p. m., papers and discussion.

Thursday, December 3: 2 p. m., demonstrations and clinics.

Physicians and others attending the meetings of the society may purchase tickets for the International Live Stock Exposition, which will be held in Chicago November 28 to December 5, and for which round trip tickets will be sold for single fare plus two dollars ($2.00) from points as far east as Buffalo and Pittsburg.

Papers will be presented by Dr. John B. Murphy, Chicago; Dr. G. Betton Massay, Philadelphia; Dr. Byron Robinson, Chicago; Dr. J. Mount Bleyer, New York; Dr. C. S. Neiswanger, Chicago; Hon. John F. Smulski, city attorney for Chicago; Dr. J. Rudis-Jicinsky, Cedar Rapids, Iowa; Dr. H. Preston Pratt, Chicago; Hon. Edward B. Elliott, city electrician for Chicago; Dr. Clarence E. Skinner, New Haven, Conn.; Dr. J. N. Scott, Kansas City, Mo.; Dr. R. S. Gregg, Chicago; Dr. Mihran K. Kassabian, Philadelphia; Dr. T. Proctor Hall, Chicago; Dr. A. D. Rockwell, New York; Dr. Carl Beck, New York; Dr. Heber Robarts, St. Louis, Mo.; Dr. J. B. Pennington, Chicago; Dr. John E. Gilman, Chicago; Dr. Chas. G. Davis, Chicago; Dr. P. C. Clemensen, Chicago; Dr. J. P. Hetherington, Logansport, Ind.; Dr. O. W. McMichael, Chicago; Dr. O. S. Barnum, Los Angeles, Cal.; Dr. Elmore S. Pettyjohn, Chicago; Dr. Geo. F. Hawley, Chicago; Dr. John E. Harper, Chicago; Dr. J. Lloyd Hammond, Chicago; Dr. F. A. Leusman, Chicago; Dr. C. D. Collins, Chicago; Dr. Hamilton Forline, Chicago; Dr. R. H. Bartlett, Chicago; Dr. H. P. Fitzpatrick, Chicago; Dr. S. V. Clevenger, Chicago.

In connection with the meeting there will be an exhibit of electro-therapeutical apparatus.

The following are the members of the Local Committee: Dr. W. K. Harrison, Dr. Chas. P. Donaldson, Dr. Hamilton Forline, Dr. John E. Gilman, Dr. C. D. Collins, Dr. F. A. Leusman, Dr. E. S. Pettyjohn.

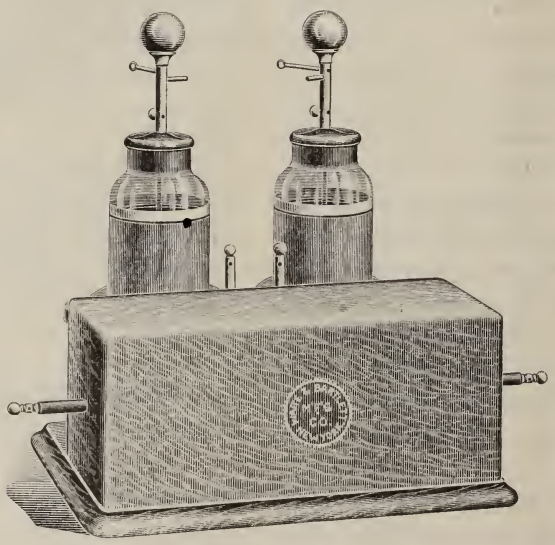
Chicago Electro Medical Society.

At the October meeting of this society Dr. T. P. Hall gave an explanation of the structure and operation of the three kinds of apparatus in common use for obtaining high frequency currents.

A discharge from a Leyden jar, or the discharge between the outer coatings of two Leyden jars when the inner coats are connected to the poles of a static machine or an induction coil, is oscillatory. These oscillations are exceedingly rapid, amounting to tens of thousands and hundreds of thousands per second. The rapidity of oscillation is dependent upon the capacity of the jars and the inductance of the circuit. The oscillations occur after each impulse from the machine, and decrease rapidly in amplitude. This decrease becomes more rapid as greater resistance is put into the circuit, until the

oscillations cease entirely. For this reason the oscillating current from the jars can not be applied directly to the body.

When the connection between the outside coatings of the Leyden jars is made by a heavy copper wire which forms a helix, and this helix is the primary wire of a coreless inductorium, the small resistance of the primary interferes very little with the amplitude of the oscillations, and each oscillation induces a corresponding oscillation in the secondary circuit which may be applied to the body as required. This apparatus is known as



HYPERSTATIC MACHINE.

Piffard's hyperstatic. It was illustrated with a machine kindly loaned by Dr. H. Preston Pratt.

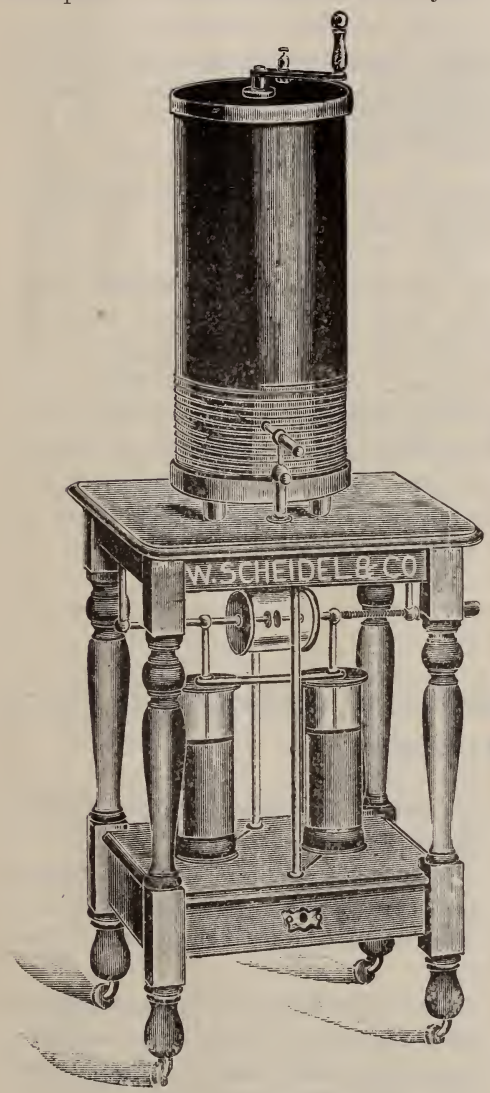
A second device for creating oscillations of very great amplitude is known as the Oudin resonator. In the resonator the primary current from the outer coating of the Leyden jar is conducted thru the lower portion of a coil of heavy copper wire. This starts up oscillations in the large coil and when these are properly attuned to the coil they are much amplified at the free end. This was illustrated by a coil kindly loaned for the purpose by Mr. Scheidel. An arm at the upper end of the coil carries a distributing disk. When two coils are used and the patient placed between these disks a strong oscillating glow passes from the disks to the patient. This form of resonator is exceedingly powerful and is used with good effect in all cases in which hyperstatic currents are indicated.

The third form of apparatus for high frequency currents is the D'Arsonval coil. It consists of a spiral coil which is made a part of the primary circuit from the Leyden jars. The electrodes are attached at each end of this coil. The oscillations obtained thru the electrodes are of much lower potential than those from either the hyperstatic or the Oudin resonator, but in spite of this the current is considerable when the resistance of the electrode-circuit is small. This was also illustrated by a coil from Dr. Pratt's laboratory.

Dr. H. P. Pratt then gave a very full explanation of the physiologic and therapeutic action of high frequency currents, showing wherein they were similar to the alternating and more particularly to the sinusoidal current. Metabolic changes in the tissues are hastened and oxidation

and elimination are both stimulated. Therapeutically these currents have been found very advantageous in most forms of tuberculosis, in skin lesions, and in disturbances of the nervous system.

Several other members of the society took part in the discussion. Dr. Byron



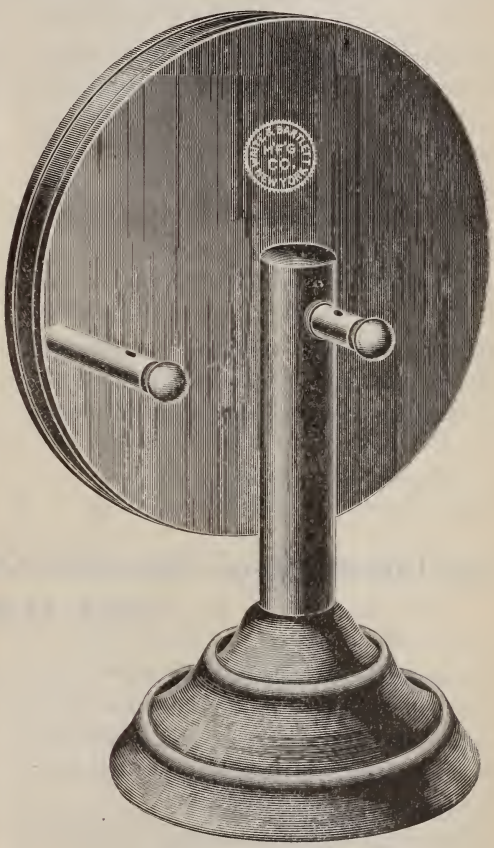
OUDIN RESONATOR.

Robinson then read a paper of which the following is an abstract:

Diagnosis of Ureteral Calculi.

The x-ray has made a new era in the diagnosis of ureteral calculi. Previous to the x-ray there was no pathognomonic symptom. The old classic symptoms of pain or ureteral colic hematuria and the expulsion of a calculus is a medical rarity. The final court of diagnosis of a ureteral calculus is an x-ray. At first the x-ray was uncertain in this diagnosis, but with the improvement of the method it is now a last resort. The x-ray is the sovereign method to detect a ureteral calculus.

There are at present two classes of phy-



D'ARSONVAL SPIRAL.

sicians. The one class claims that a shadow is positive evidence that a calculus is present and that a negative result indicates that a calculus is absent. The second class claims that a negative result does not exclude a calculus.

Dr. Robert S. Gregg and I have proved in Dr. Harry Pratt's laboratory that all isolated crystalized urinary salts when

exposed to the x-ray will cast a shadow of definite contour, density and dimensions. We also demonstrated by exposing some thirty-five urinary calculi expelled by the patient himself, and some twenty ureteral calculi removed surgically, that a shadow of definite contour and dimension was cast in every case. From over five years of painstaking x-ray work we have come to the opinion that every ureteral calculus should cast a shadow. The patient should be on the dorsum with legs flexed on a double adjustable inclined plane, head flexed with sand bags, tractus intestinalis completely evacuated and one-eighth gr. of morphia sulphas administered immediately before the exposure. If this general exposure indicates a shadow it should be confirmed by a special method in which the subject is protected by lead screens, giving concentrations of x-rays for contrast. Experimental labors in the x-ray on ureteral calculus by the above method indicates that every ureteral calculus should cast a shadow. Experiments also demonstrate that the shadow of a ureteral calculus ought to be cast regardless of location, density, composition or condition of the patient. The wonderful progress in the perfection of x-ray technique has enabled the physician to make confident statements to the patients who are becoming more and more relieved from painful condition attending ureteral calculi. During the past five years I have diagnosed ureteral calculi on a definite side in five consecutive patients, had them x-rayed in Dr. Harry Pratt's laboratory and secured shadows, and I removed ureteral calculi from every one. This is an indication of what the x-ray may do. At other times I have diagnosed ureteral calculi but the x-ray did not confirm it. The x-ray has a magnificent future in the field of ureteral calculus. What is now needed is the perfection of the technique and ability to interpret the shadow.

The International Electrical Congress of September 12 to 17, 1904, at St. Louis.

The following appointments have been made by Professor Elihu Thomson, president of the Committee of Organization of the St. Louis International Electrical Congress:

Section A—General theory, mathematical, experimental. Professor E. L. Nichols, chairman, Cornell University; Professor H. T. Barnes, secretary, McGill University.

Section B—General applications. Dr. C. P. Steinmetz, chairman, Schenectady, N. Y.; Professor Samuel Sheldon, secretary, Polytechnic Institute, Brooklyn.

Section C—Electrochemistry. Professor H. S. Carhart, chairman, University of Michigan; Mr. Carl Hering, secretary, Philadelphia.

Section D—Electric power transmission. Mr. Charles F. Scott, chairman, Pittsburg; Dr. Louis Bell, secretary, Boston.

Section E—Electric light and distribution. Mr. J. W. Lieb, Jr., chairman, New York; Mr. Gano S. Dunn, secretary, Ampere, N. J.

Section F—Electric transportation. Dr. Louis Duncan, chairman, Massachusetts Institute of Technology; Mr. A. H. Armstrong, secretary, Schenectady.

Section G—Electric communication. Mr. F. W. Jones, chairman, New York;

Mr. A. B. Gherardi, Jr., secretary, New York.

Section H—Electrotherapeutics. Dr W. J. Morton, chairman, New York; Mr, W. J. Jenks, secretary, New York.

Communications concerning the congress should be addressed to the general secretary, Dr. A. E. Kennelly, Cambridge, Mass.

Fourth Annual Meeting of the American Roentgen Ray Society, to be held at the University of Pennsylvania, Philadelphia, Dec. 9 and 10, 1903.

ARTHUR W. GOODSPEED, PH. D., PRESIDENT. JAMES B. BULLITT, M. D., SECRETARY, 205 WEST BROADWAY, LOUISVILLE, KY.

PRELIMINARY PROGRAM.

1. President's Address, by Prof. Arthur W. Goodspeed, Ph. D., Philadelphia, Pa.
2. Pathologic Changes in Tissue Under the Influence of the X-Ray, by William S. Newcomet, M. D. Philadelphia, Pa.
   Discussion to be opened by Seabury W. Allen, M. D., Boston, Mass.
3. The Results of the Roentgen Method in the Diagnosis of Renal Calculus, by Charles Lester Leonard. M. D., Philadelphia, Pa.
   Discussion to be opened by James B. Bullitt, M. D., Louisville, Ky.
4. Two Cases of Severe X-Ray Necrosis, Presenting Some Unusual Features, by Clarence Edward Skinner, M. D., New Haven, Conn.
   Discussion to be opened by J. N Scott, M. D., Kansas City, Mo.
5. Skiagraphy of the Chest, by Henry Hulst, M. D., Grand Rapids, Mich.
6. How to Obtain an Instantaneous Skiagraph of the Thorax, by Mihran K. Kassabian, M.D., Philadelphia, Pa.
   Discussion upon the above two papers to be opened by Gordon G. Burdick, M. D., Chicago, Ill.
7. The Development of the Skeleton, Radiographically Considered (Lantern Slides), by Preston M. Hickey, M. D., Detroit, Mich.
   Discussion to be opened by G. P. Girdwood, M. D., Montreal Canada.
8. The Therapeutic Effects of the X-Ray, as Shown From the Results of Treatment of One Hundred Cases, by Henry K. Pancost, M. D., Harvey Bartle, M. D., and Mr. Henry C. Welker, Philadelphia, Pa.
   Discussion to be opened by Emil H. Grubbé, M. D., Chicago, Ill.
9. The Roentgen Ray Diagnosis of Obscure Diseases, by Russell H. Boggs, M. D., Pittsburg, Pa.
   Discussion to be opened by J. D Gibson, M. D., Birmingham, Ala
10. Dangers of the X-Ray Operator, by John T. Pitkin, M. D., Buffalo, N. Y.
    Discussion to be opened by Weston A. Price, D. D. S., Cleveland, Ohio.
11. Developers, by Gordon G. Burdick M. D., Chicago, Ill.
    Discussion to be opened by Mihran K. Kassabian, M. D., Philadelphia, Pa.
12. A Comparative Study of Fractures

of the Extremities, by Martin I. Wilbert, Philadelphia, Pa.

Discussion to be opened by Russell H. Boggs, M. D., Pittsburg, Pa.

13. Technique for Making Good Dental Skiagraphs, by Weston A. Price, D. D. S., Cleveland, Ohio.

Discussion to be opened by Levitt E. Custer, D. D. S., Dayton, Ohio.

14. Care and Use of the Static Machine, by Henry E. Waite, M. D., New York, N. Y.

Discussion to be opened by Walter W. Johnson, M. D., Rochester, N. Y.

15. The Stereoscope in Radiography, by E. W. Caldwell, New York, N. Y.

16. The Influence of the Roentgen Ray Upon the Blood of Normal Individuals (An Experimental Study), by William Krauss, M. D., Memphis, Tenn.

17. Exploding Tubes, by Henry K. Pancoast, Philadelphia, Pa.

18. Treatment of Lupus and Epithelioma by the Combined Use of the X-Ray and Ultra-Violet Light, by J. N. Scott, M. D., Kansas City, Mo.

The sessions will be held in the audience room of Houston Hall of the Houston Club of the University of Pennsylvania. The exhibition of apparatus will be down stairs, in the reading room of the Houston Club.

Under the chairmanship of Dr. P. M. Hickey, of Detroit, Mich., an exhibition of prints is being arranged for, which promises to be a most interesting and instructive display.

A lantern with competent operator will be on hand and ready for use at any time. Those who desire to illustrate remarks need only to bring along the slides.

Arrangements are being perfected for securing from the railroads a fare of one and one-third on the certificate plan. All persons attending the meeting are requested to demand a proper certificate on purchasing ticket, and to turn this certificate over to the secretary at the place of meeting. A fee of twenty-five cents will be charged by the special agent of the railroad for validating the certificate, whereupon the certificate will be good for a return ticket at one-third of the regular fare. This arrangement will obtain only in case there are as many as one hundred tickets bought in this way.

The Normandie Hotel has been designated as official headquarters. It is situated at Thirty-sixth and Chestnut streets, about three blocks from the place of meeting. Hotel rates are, on the European plan, one dollar per day and up; on the American plan, two dollars and fifty cents per day and up.

The exhibition of apparatus will be especially important and interesting, giving the members an opportunity to inspect and familiarize themselves with the improvements and advancements of the past year.

The Diasolenic Bath.

BY OTTO JUETTNER, M. D , M. E., PH. D.

Professor of Principles and Practice of Physiological Therapeutics at the Cincinnati Post-Graduate School of Physiological Therapeutics.

I beg to submit to the readers of the AMERICAN X-RAY JOURNAL and to the electro-therapeutic fraternity at large a preliminary report concerning the technical construction and the therapeutic uses of a novel attachment to the static machine which has recently been extensively used at our school and seems to have much to recommend it. The apparatus consists of a platform, two feet wide and six feet long, and a huge cylinder five feet long and three feet in diameter, which is suspended from a suitable wooden stand and hangs horizontally. The stand also holds the platform which is placed inside of and thru the cylinder which hangs around it without touching it. The platform rests on rollers and can easily be moved in and out. The outside of the cylinder is covered with many hundred feet of thick insulated copper wire. The platform is likewise strung with a dense network of wire. Both cylinder and platform are covered with leather, the whole apparatus presenting a neat and attractive appearance. The free ends of the wire, both on the cylinder and the platform are attached to binding-posts. The appearance of the apparatus is not unlike that of the body-apparatus used for thermo-therapeutic applications.

The current needed for this huge electrical machine is furnished by the Leyden jars of the static machine. The cords are attached to the bases of the jars. The sliding rods are separated sufficiently to give a four or five inch spark-gap. One cord connects the base of one Leyden jar with the binding-post on the platform, the other cord being attached to the base of the other jar and the binding-post on the cylinder. The patient, fully dressed, rests on the platform, the head being comfortably supported by a pillow.

The moment the current is turned on the patient experiences a mild, agreeable thrill which merges into a sense of lightness and buoyancy if the application is continued for ten or fifteen minutes. There is no breeze, no spark, no shock. The only disagreeable feature, if such it may be called, is the noisy discharge between the sliding-rods. The application has superseded many of the static treatments on the insulated platform, and is meeting with increased favor both among the students and the patients at the school. It is, to all intents and purposes, the diasolenic bath, so popular with the French electro-therapeutists. The apparatus is simple in construction and easily manipulated. The greatest point in its favor is the fact that it is an attachment to the static machine and requires no street-current or complicated and expensive generating source.

A visible proof of the electric energy with which the interior of the cylinder is charged, is furnished by a vacuum-electrode held inside of the cylinder by the hand of the operator without any contact or connection with the platform or the sides of the cylinder. The moment the current is turned on, the electrode lights up. The same phenomenon takes place when the electrode is laid upon the patient while the current is passing.

Therapeutically the diasolenic bath represents a stimulant of great virtue. It promotes metabolism, which is shown by the slight diaphoresis usually following the application and by the increase in

appetite and digestive power almost invariably observed in the patients who are subjected to this form of electric treatment. It possesses all the virtue usually attributed to "high frequency" currents. Increased function of the kidneys and bowels has been noticed too frequently to be purely in the nature of a coincidence. It certainly acts favorably upon nerve-function. Its antispasmodic action has been shown by the relief of dyspnea seen in a number of asthmatic and emphysematous cases treated in this way.

The careful record which is kept of these cases will enable me to supplement this preliminary report at some future time.

Vibratory Therapeutics.

BY H. FULLER, M. D.

The effects of vibratory treatment are found to be both local and systemic: the action set up in the constituent tissues of the parts operated upon serves to elevate the temperature. The vessels dilate, an increased quantity of blood enters them, and the blood current is accelerated. The immediate effect of these changes is to promote the nutritive energy of the tissues subjected to vibration. A general rise of temperature of about one degree has been observed to take place quite uniformly. The body increases in weight; all the organic functions are performed with more energy, and power is gained in every way.

In its several forms, vibration exercises peculiar effects on the nervous system. An inflamed part which can be manipulated only with the lightest movement at first, owing to the pain, becomes rapidly anesthetized until it can be handled with some roughness without arousing painful sensations. When the local condition is that of pain merely, it is remarkable how the acutest suffering is alleviated by persistent oscillations of the lighter kind. Again, the state of spasm of a muscle is relieved and relaxation induced by vibrating the affected muscle. Results such as these are explicable on the theory that the rapid vibration of the cutaneous branches of the nerves has so far lowered their irritability that they cease to receive and transmit painful impressions.

Obstinate wakefulness and nocturnal restlessness are quickly relieved by vibration, especially by short and rapid vibration of the lower extremities. Simple headache, even severe paroxysms of neuralgia, and the spasms of tic douloureaux are often most surprisingly relieved by, at first, exceedingly delicate vibrations of the end-organs of the fifth nerve—the skin of the face, forehead, neck and scalp—and subsequently stronger vibrations of the same parts and upper extremities. This same method has been effective in hemicrania, migraine and spinal pain due to simple anemia of the cord; also in infantile paralysis and other wasting palsies after the acute symptoms have subsided. In hemiplegia and other forms of paralysis due to intra-cranial lesions, the indications for the treatment by vibration are a lowered state of the nutrition of the paralyzed parts, coldness and blueness of the skin, wasting and contracted muscles, ulcerations, etc. In progressive muscular atrophy the treatment should be begun early, and the first indications—pain, fibrillary trembling, weakness, etc.—require vibration without waiting for obvious wasting. The efficacy of this treat-

ment in chronic joint affections, synovitis, contractions and deformities, and thickening from inflammatory deposits, has been repeatedly verified.

Before using the vibration it is often well to localize the patient's painful centers. For this purpose the patient's back is bared, and a high tension faradic coil is brot into use. Before applying this current the coil should be tested with a four to six inch Geissler tube. If the coil is capable of illuminating the tube, then it possesses the proper amount of penetrative power to be useful for our purpose.

One pole of the battery—it matters not which one—is attached to a six by six inch moist electrode and applied in front over the epigastric plexus, the other or smaller electrode, two by two inches, well moistened, is passed lightly over the patient's spinal column, with a current strength sufficient to be agreeably susceptible. Pass this current up and down the entire length of the spinal column with ordinary pressure, eight or ten times, then remove the electrodes, when to our agreeable surprise we have boldly outlined upon a white background vivid red spots. These spots for some few minutes after the current is removed tend to become even more prominent, and more sharply circumscribed. If we now make digital pressure upon any of these indicated points we will find sensitive or painful areas, while no pain will be complained of in the intermediate regions.

These pictures in a short time become practically pathognomonic, so that the pratician can almost make a diagnosis from the reflex centers involved. If we remember the nerve connections just prior to the entrance to or exit from the spinal canal, and bear in mind the effect of irritation upon any tissue, we then have a clear conception of why the sympathetic nervous system responds so readily to our irritation, and also why the more irritated centers (from other causes) should respond before even the normal tissue appreciated the irritation produced by the current.

Having located the reflex centers, we then find whether the distal tissue or organ involved is in a hyperemic or anemic condition. Should we find that somewhere in the body an organ or tissue is swollen and in a state of chronic congestion, our course would be to so influence the sympathetic center by vibration or otherwise that the vascular supply would be limited.

Some idea of the scope of vibratory therapeutics may be gathered by the following summary, quoted from various authorities on the subject of massage in general. Certainly the only reason why physicians have neglected such an important agency in the past must be due not to ignorance or unwillingness, but rather because there has been no adequate instrument, until recently, by which active or passive massage could be administered in the same dignified and scientific manner as one gives electricity.

In diabetes glycosuria is diminished as a result of muscular activity in many cases. There is an undoubted improvement in the circulation, intestinal peristalsis, and self-reliance of the patient. In mild forms the most extensive use of muscular exercise should be made; the severer forms require passive gymnastics and massage.—Carl H. Van Noorden, formerly Professor of Therapeutics, University of Berlin.

Methodical muscular exertion is hardly secondary in importance to the regulation of the diet.—Albe.

Sugar circulating in the blood is destroyed when the muscles are working.

In gout, exercise promotes oxidation and improves excretion. Massage is very useful to counteract the development of

rigidity.—Henry M. Lyman, Professor Medicine, Rush Medical College.

A fit of gout is due to stasis in the capillaries in the affected joint. A threatened attack may be warded off by massage and exercise.—Geo. Balfour.

At the beginning of the century Wm. Balfour, of Edinburgh, had a great reputation for the treatment of rheumatic affections by massage. Occasionally he attacked more acute ailments with a boldness and success which were remarkable. —*Lancet,* Aug. 13, 1899.

In every feasible way joint movement should be maintained by active and passive movements.—*Park's Surgery.*

Nephritis.—In the acute, productive form, daily massage and compression by leg bandages is of real value ofttimes.—Francis Delafield, Professor Medicine, Columbia.

Obesity.—Exercise and massage are correctives by improving the oxygenation of the tissues.—Campbell.

Muscles should be stimulated by exercise in proportion to the existing power. If atheroma has developed, in no case should exercise be altogether dispensed with.—Max J. Oertel, Professor Medicine, University of Munich.

Anemia.—Moderate exercise is an advantage in the treatment which can not be neglected.—Stengel.

Chlorosis.—After the blood begins to improve give massage and passive exercise, then, later, general exercise.—Stengel.

Hypertrophy and Dilatation of the Heart.—Chronic degenerations are best overcome and muscular tissue best developed by systematic exercise. Too much rest favors the processes of degeneration. —James T. Whittaker, Professor Medicine, Ohio Medical College.

Mitral Stenosis.—Systematically develop by cautiously graded exercise.—Whittaker.

Aortic Stenosis.—Excessive rest favors degenerative changes, so give regulated exercises.—Whittaker.

Relieving Disturbances of the Heart.—Exercise must be ensured in order to assist the processes of tissue change. In those unable to rise, massage must be employed along with passive movements of the limbs. In those who are able to go about, active exercise is of the greatest importance, and a progressive increase may be safely recommended.—Geo. A. Gibson, F. R. C. P., Edinburgh.

The exercises and baths of the Schott treatment accomplish the same end, that of drawing the blood from the congested heart, thus giving it time for rest and recuperation.

Massage and passive exercises produce a reflex, calming effect upon the central nervous system, and quicker exchanges and more rapid neutralization of toxins take place in cases where the etiology shows infectious disease.—*Indiana Med. Record.*

Neurasthenia.—Physical exercise is of enormous value. Massage is grateful and helpful to women.—Dana.

The physical influence of rest and massage is often useful on account of the complete repose to the motor nervous system.—Gowers.

Insomnia.—Massage by drawing the blood to the surface of the body, thus tending to render the brain and cord anemic, is often of great value.—Brown.

Locomotor Ataxia.—Gymnastics have a special value as a remedy for the ataxia. Frankel's plan of exercise for the education of the coördinating centers, guarding against the patient's overdoing, is particularly to be recommended. Erb, Raymond, Hirschberg, Goldscheider, Dana, and others follow the principles set forth by Frankel in his method of exercise treatment and report cases of cure.—Möbius.

Frankel reports a case which had been

bed-ridden for several years, walking, with no signs of ataxia, as a result of pursuing his method of treatment.

Cerebral Exercise.—Frankel recommends treating certain motor disturbances, such as paralysis agitans, Sydenham's chorea, convulsive tic, and aphasia, by subjecting the muscles affected to a process of reëducation by means of a series of graduated systematic exercises. —*British Medical Journal.*

Emphysema.—Exercises will help in restoring mobility of the upper part of the chest and in restoring the lost elasticity of the lung.—Kingscote.

Diseases of Women.—Pelvic massage is a rational therapeutic agent, and it is applicable for the relief of many conditions for which there is no other equally good remedy. In the pelvis, as in other regions, it quickens the circulation, prevents stasis in the lymph channels, furthers resorption and retrogressive metamorphosis, gives tone to the muscles, excites muscular activity and so improves the nutrition. Indications are the removal of inflammatory exudates, breaking up and stretching of adhesions, restoration of function to contracted or overstretched ligaments and the reposition of displaced organs under proper precautions.—E. C. Dudley, Professor Gynecology, Northwestern University.

Eye Diseases.—Sueginrew reported favorable results from massage in maculae, keratitis, parenchymatosa, follicular and phlyctenular conjunctivitis, hypopyon, iridocyclitis, traumatic cataract and absolute glaucoma. Katsaura writes that massage reduced intraocular tension even in glaucomatous eyes, and produced especially favorable results in episcleritis

Convalescence.—Celsus advised massage of the whole body when an invalid required his system to be replenished; thus improving and facilitating the nutritive, eliminative and circulatory exchanges so that the system would be restored to a normal condition in much less time than would otherwise be possible. At the same time the increase of the physical tone would lessen the liability to sequelæ or relapses.

Electro Physics.

The Static Machine.

Dr. F. R. Boyd, St. Louis, Mo. (*Med. Brief*, September), describes the care required by a static machine in order to produce the best results in x-ray and electro-therapeutic work. The insulated stand must have legs at least one foot long. Everything about the machine must be kept dry and clean. For drying purposes calcium chlorid is good if pure, but it must never be put in the case until it has had ample time to cool after baking, otherwise the metal parts of the machine will be corroded. Those who fail to obtain good results from the static machine will surely find that the fault lies in defective technic.

A Novel Electrolyte for the Wehnelt Interruptor.—In a note recently read by D. E. Hauser before the Spanish Physical and Chemical Society, the drawbacks to the use of sulphuric solution in connection with the Wehnelt interruptor were pointed out—viz., first, the necessity of relatively high voltages, and, second, the comparatively high currents traversing the primary of the Ruhmkorff coil according to the great value of the voltage. The process suggested by the author con-

sists in using an electrolyte which, under otherwise equal conditions, gives rise to an increase in the number of interruptions of the current traversing the primary coil, and hence to an increase in the inductive resistance, this increase resulting in the intensity of the current in the primary being diminished without inefficient absorption of energy. The electrolyte that best fulfils this condition is a half-saturated solution of magnesium sulphate, slightly acidulated with sulphuric acid; this electrolyte, though exhibiting a considerable conductivity, is not corrosive, and allows of starting the operation at a much lower voltage, altho it works perfectly well as far as 118 volts.—*Electricity.*

Electric Filtration.—J. W. Frazier, of Alleghany, Pa., is the patentee of a system of filtration in which strong electric currents are used to precipitate the impurities in the water. He says that in this way all organic matter and disease germs in the water supply of cities can be removed, and that if it is admitted that filtration by the sand or by the mechanical method destroys a large proportion of the impurities and thus reduces the death rate from typhoid fever, a complete purification of the water will accomplish much better results. Mr. Frazier says: "My process is based upon the principles that electricity, and ozone which is set free by the electric current, burn all organic matter in the water, including bacteria and their vital products. Electricity and ozone oxidizes not only the bacteria, but all organic matter. The water is rendered colorless, sparkling and odorless."—*Electricity.*

Aluminum Conductors for Electric Transmission Lines.

Mr. Alton D. Adams discusses briefly the relative advantages of the two metals, aluminum and copper. Comparing wires of equal sizes and lengths, the aluminum has only sixty per cent of the conductivity of copper. Therefore, to secure an equal conductance aluminum wire must have a diameter twenty-eight per cent greater than that of copper. Since copper is 3.33 times as heavy as aluminum, for equal weights the latter has 3.33 times the bulk of the former and a conductance twice as great. The tensile strength of both copper and aluminum wire is about 33,000 pounds per square inch of section, so that for wires of equal length and resistance, the aluminum is sixty-six per cent stronger. Medium hard-drawn copper has a tensile strength of about 45,000 pounds per square inch, so that for equal resistance the aluminum wire still has the advantage. This alone would allow the poles, cross-arms and pins of the transmission line to be lighter or to be spaced further apart, but, on the other hand, the strain due to the wind would be greater with the large aluminum wire. As the surface of the wire may be no greater than that of the poles, the increased wind strain may not be as great as the increased surface of the wire. Aluminum has a greater coefficient of expansion, and for this reason must be strung with a greater sag, but this greater sag avoids much of the vibration of the wires which is produced by the wind if they are more tightly strung. Aluminum expands between 32 and 212 degrees F. about 0.0022 per cent; copper, under the same conditions, 0.0016 per cent. The larger diameter of the aluminum wire over an equivalent of copper has an additional advantage in that the inductance varies inversely to the diameter of the conductor employed, and the silent discharge from wire to wire is also less with larger wires.—*Electr. Rev.*

Powerful Electromagnets.

New forms of electromagnets have been devised by MM. Camacho and de Mare, and are here described by M. E. Guarini. Camacho's magnet consists of a number of separately wound iron cylinders which slide one into the other. The different windings may be connected up in a variety of ways. When assembled, the various tubes of the electromagnet have the same polarity at corresponding ends. Similar in conception, but of greater power, is the magnet invented by M. de Mare. In this the poles are slotted and concentric coils wound in the various slots. Figures obtained by means of iron filings with an ordinary electromagnet and that of de Mare show a much more even distribution of magnetic lines with the latter, and a table of comparative data is given, showing that with an ordinary wound magnet and one constructed by de Mare, each weighing about one kilogram and containing equal weights of equal copper wire, for the same amount of electrical energy consumed, the carrying capacity, as measured by the author, was one kilogram for the ordinary magnet and nine and six-tenths kilograms for the de Mare.—*Electr. Rev.*

Asymmetry of a Mercury Break.

In making some experiments to determine the law governing the capacity of the shunted condenser necessary to stop the sparking at the break of an inductive circuit, Mr. James Edward Ives discovered that the necessary capacity varied according to the direction of the current. This phenomenon was so marked that he undertook further experiments to confirm it. The interrupter used when the action was noticed was an ordinary mercury break covered with acidulated water, contact being made with the mercury by means of an amalgamated copper wire. It was found that the action was not due to the acidulated water, nor to the metal of the contact wire, as the reaction took place with and without the water and with iron and platinum wires. It was also found that the effect was not due to the fact that in the ordinary mercury break the spark passes between a point and a plane, for by making a contact between a wire and a thread of mercury in a capillary tube, the same action resulted. It is suggested that the asymmetry may be due to some selective action of the mercury vapor generated when the spark passes, of the same nature as the Cooper Hewitt effect, or it may be due to some capacity effect such as is found in the Wehnelt interrupter.—*Electr. Rev.*

Magnetic Rocks.

Note is made in the English papers of the discovery of a considerable stretch of magnetic rocks off the coast of Alaska, where compasses have been inclined to go wrong. It is remarked, however, that Alaska has no monopoly in magnetic rocks that distress the mariner and surveyor. Not long ago a party of Russian explorers found their needle swing round 180 degrees. Parry, in his second voyage in the Fury and Hecla, observed a considerable local deviation of the compass when off the shore of Igloolik. At Bluff Harbor, South Island, New Zealand, there is a focus of magnetism on the summit of the bluff; and during the survey of South Island the officers of H. M. S. Acheron had to abandon the use of compass bearings. A similar disturbance was observed by Captain Creak when surveying near Port Walcott, Northwest Australia. He came across a submerged square mile of rock, which made the needle of his compass hop about fifty degrees and more from where it should have been. Upon the Norwegian coast in the Joedern province is a magnetic mountain, about a

thousand yards long, but of no great height. Its influence is such that vessels venturing too near the coast lose their bearings, and some are wrecked.—*El. World and Eng.*

Contact Voltages.

A recent issue of *L'Eclairage Electrique* contains an article giving the results of an investigation upon the influence which the degrees of polish and the superficial densities of bodies have on the difference of electrical potential produced by their contact. The following conclusions are given: Of two surfaces of a particular metal, that which is most polished always becomes positive. When two different dielectrics are brought into contact, the hardest one ordinarily becomes positive. The contrary takes place with metals When a hard material presents, on account of its structure, few points where contact is possible, it behaves like a soft substance. Glass wool becomes negative in contact with cloth, porcelain and glass. Hygroscopic surfaces, when poorly dried, behave like water. A body which easily crumbles into dust, or a glue-like body which leaves traces on the surface with which it is in contact, becomes negative. Thus, ebonite becomes negative when in contact with emery paper, but it is positive when it is rubbed with a paper in order to polish it. Two pieces of quartz, sugar or pyrite, which give a phosphorescent light when knocked together, are both positively electrified. The particles produced by knocking are, on the contrary, negatively charged.—*El. Rev.*

The Effect of Radium on the Conductivity of Liquids.—An interesting, and what may prove to be an important scientific announcement, was made recently by Professor Friedrich Kohlrausch, in regard to the action of radium rays in increasing the electrical conductivity of water. Experiments were carried out with rays which were emitted by bromid of radium and barium, and which, after passing through an aluminum screen, were sent through a layer of water. After an exposure of some time, it was observed that the conductivity of the water increased.—*Electric Rev.*

Radium and Radial Energy.

The *Eclectic Med. Jour.* for September, comments editorially (*J. U. L.*) upon the absurdity of attributing to atomic explosions the energy from radium, and points out that the simplest explanation of the phenomena lies in the assumption that radium transforms invisible ether waves into visible forms of energy. The same position was taken not long ago by Lord Kelvin, and is undoubtedly correct.

Measurements of Radioactivity.

A paper read by Mr. Hammer in April before the American Institute of Electrical Engineers and the American Electrochemical Society, which in part treated of radium, this explanation appears:

To measure radioactivity, Prof. and Mme. Curie measure the electric conductivity which a radioactive substance imparts to air, and take as unit the radioactivity of uranium. The radioactive substance is placed on one of two condenser plates, which are charged to a high potential. The air between the condenser plates is rendered a conductor of electricity by the presence of the radioactive substance, and in a certain time a certain quantity of electricity will pass from this condenser plate to the other plate. This quantity of electricity passing over in a certain time is determined and serves as a measurement of radioactivity. If the quantity of electricity passing from one plate to the other in a certain time is x times the quantity which would pass in the same time if uranium was substituted

for the tested radioactive substance, it is said that the latter has the radioactivity x. The problem is, therefore, to measure the quantity of electricity passing from the one condenser plate to the other in a certain time. This may be done in two essentially different ways. Either by an electrometer method the quantity of electricity may be measured which during a given time passes over to the previously uncharged condenser plate. Or the time may be measured in which this plate when connected to an original charged gold-leaf electroscope discharges it. For these latter measurements the gold-leaf electroscope may be observed by means of a telescope provided with a micrometer scale and the time taken for the discharge of the electroscope is taken by the means of a chronometer. By such methods, the Curies say, according to Mr. Hammer, that they can detect the presence of a radioactive substance by the means of such a minute quantity that it would require 5,000 times this amount to show at all in the spectroscope. And it is stated that this method of electrical analysis is thousands of times more sensitive than spectrum analysis and millions of times more sensitive than chemical analysis.—*El. World and Eng.*

New Form of Photo-Telegraph.

Professor Korn, of Munich, Germany, has devised a new system of photographing by telegraph. This system depends on the property of selenium, which has the characteristic of being a poor conductor in the dark, but becoming a good conductor when exposed to the light, the degree of resistance varying according to the amount of illumination to which the selenium is subjected. The apparatus at the sending station consists of a hollow glass cylinder which turns on its axis while moving parallel to the direction of this axis. On this transparent cylinder a photographic negative film is fastened The rays of light emitted by the source are condensed by a lens on the point of the negative which they traverse and then strike the selenium battery placed in the interior of the cylinder. An electric current passing thru the selenium, whose conductivity changes at each instant under the action of the more or less intense light that it receives, passes over the line to the receiving station. At this point the current passes thru a D'Arsonval galvanometer with a light aluminum needle to a vacuum tube similar to the Geissler tube, entirely blackened save at the lower extremity, where there is a little aperture situated close above a revolving cylinder covered with a sensitive photographic film. When the galvanometer needle moves under the action of the current transmitted by the line, the curved ends of the needle approach to or recede from a metallic piece which causes currents of high frequency to illumine the interior of the vacuum tube. The light rays escape through the orifice, and the photograph is thus reproduced, point by point, as a positive image.—*Electr. Rev.*

Nomenclature.

In his presidential address at the meeting of the American Electro-Therapeutic Association in September Dr. Brower said the time has come to drop the terms galvanism, faradism and franklinism, and to replace them by scientific terms which are acceptable to electricians generally. The suggestion is a good one.

Finsen Treatment.

The *St. Louis Med. Era* for October, 1903, gives editorially a description of this treatment and states some of its advantages.

Electro-Therapy.

Electric Shock.

In a paper read before the Verein Deutscher Revisionsingenieure, Dr. Kath treated of the conditions of the safety of the men driving electrical plants. Direct current, he pointed out, will, as a rule, become really dangerous only in the case of several unlucky circumstances being present at the same time, as its tension seldom exceeds 500 volts. Direct-current machines should be enclosed tightly, so that sparking, liable to endanger the surrounding medium, is prevented. As regards the properties of the human body, the author draws attention to the fact that an electric shock will essentially act on the nervous system, as the nervous substance is a conductor of electricity surrounded by less conductive fat and muscle substance. The paths most frequently followed by the current in the case of accidents will afford an evidence as to which nerve strings are most likely to be struck, which functions most liable to be paralyzed, as being controlled by the nerves. In the case of the shock entering by a hand or the head and leaving by the other hand or a foot, the nerve descending from the neck and leading to the lungs and heart—the so-called *nervus vagus*—will be struck, and as the latter regulates both the respiration and the action of the heart, respiration will first be stopped, and the action of the heart will eventually cease in the graver cases. A shock entering by the points of the fingers and leaving by the upper arm, however, will, as a rule, not be attended by fatal results, the above nerve not lying on its way. The best assistance in the case of an accident will be rendered in the way of producing artificial respiration, enforcing the heart action and diminishing the pressure of blood, the latter being obtained by injecting one to three drops of amyl nitrate. The dangers of electric currents will, moreover, vary to a high degree according to personal predisposition, persons subject to alcoholism, as well as those easily frightened, suffering much more from the effect of electric shock than normal people. The limit of danger is considered as coinciding with 0.1 ampere.—*Electr. Rev.*

The Faradic Current in the Treatment of Alopecia Areata.—Ehrmann at a session of the Vienna Dermatological Society, exhibited a young man suffering from complete alopecia lasting from his fourteenth to his twentieth year, who had been treated with the faradic current. The treatment was carried out by the patient himself, and at the end of six months there was complete restoration of the hair. Ehrmann has frequently seen areas which had been purposely left untreated, remain hairless, while those to which the current had been applied showed growth of hair. He regards this as conclusively demonstrating the curative influence of this method of treatment.—*Am. Med.*

A New Treatment for Wry Neck.

Dr. L. K. Hishberg, Baltimore (*Md. Med. Jour.*, October, 1903), claims remarkable success in the treatment of wry neck by stimulation of the corresponding muscles on the unaffected side. In many cases the torticollis seems to originate in weakness of the opposing muscles. The stimulation is brought about by placing one electrode at the wrist or other indifferent part, and moving the other electrode over the muscles of the unaffected side, with a faradic current. Treatments are given five minutes daily for from three weeks to several months.

Hyperchlorhydria Treated by High Frequency Currents.

Dr. Geo. Kerschill, London, England (*Int. Med. Mag.,* June), gives a detailed description of his high frequency apparatus and the various electrodes used in connection with it. For this disorder he applies the electrodes (1) one upon the tongue and one upon the epigastrium, in order to get as great action as possible in the stomach; (2) one upon the rectum and one upon the epigastrium, thus confining the current as much as possible to the intestines; (3) one within the rectum and one upon the tongue, for passing the current thru the whole intestinal tract. The electrode must be placed in position before the machinery is started, otherwise there will be painful shocks. The same precaution must be observed upon their removal.

Those cases in which the disorder is due to acute glandular gastritis are aggravated by a high frequency current.

Chronic Catarrhal Deafness.

Dr. Hopkins (*Med. News,* August 22) says: "If the tubal obstruction be of long standing it may be necessary to resort to mechanical dilation, many employing Eustachian bougies having their tips covered with cotton for this purpose. A far better method, in skilled hands, consists of electrolysis. Dench's gold electrode, properly applied, rapidly removes tubal obstruction of long standing, but its skillful employment requires a thoro knowledge of electrotherapeutic principles. Indeed, a very excellent aurist may make a miserable failure of the operation if his training in electrotherapeutics be deficient, while on the other hand a very ordinary aurist who is skillful in the use of electricity will secure results which can not be obtained in any other known way. To such a one the operation is reasonably simple, safe and certain. Several precautions must be observed in its employment, *i. e.*, (*a*) Neither heavy nor uncertain currents should ever be employed; (*b*) perfect current control (preferably by a shunt circuit rheostat) is absolutely imperative; (*c*) the current employed should not be of less electromotive force than thirty or more than thirty-five volts; (*d*) the current strength should never exceed one and a half milliamperes at the beginning or five milliamperes at the end of a treatment, and the latter amperage should be very slowly approached. Many cases require no more than four milliamperes; (*e*) treatment should never be given less than three days apart; (*f*) force should never be employed; (*g*) reliance should be placed upon a number of light treatments rather than upon a few heavy ones; (*h*) polarity of current should never be in doubt.

These points, carefully observed, remove every element of danger from the operation and leave the opponents of the the operation without any ground upon which to base their opposition. Skilled operators have obtained brilliant results in a large number of these cases, and such operators will continue to get such results regardless of any criticism which may come from those who are less skilled in applying this particular form of treatment.

If the treatment be employed with reasonable skill and with due observance of the precautions mentioned the several cases of failure will be eliminated. There can not be much pain if the voltage and current strength are properly controlled and all necessary changes of current-strength slowly and carefully made. There can be no reformation of stricture as a result of treatment unless the current be excessive, of wrong polarity or applied too frequently. There can be no formation of a fistula unless the operator forgets

the anatomy of the parts, and only then, ordinarily, by the employment of excessive current or undue force. Properly employed, this treatment causes the stricture to fairly melt away beneath the slowly advancing electrode until the tip of the electrode is felt slipping into the space beyond the stricture. This method is probably the best one ever devised for such cases of catarrhal deafness as are entirely due to occlusion of the eustachian tube.

A nice modification of this treatment consists of using a kataforic electrode at the anode or indifferent pole, saturating it with a suitable iodin or ichthyol solution (iodin vasogen or ichthyol vasogen being sometimes preferred), and holding it against the membrani tympani during each electrolytic operation.

During the past few months experiments have been conducted by the writer with a kind of "electric douche" which has been applied to the entire intratympanic cavity, and while it is rather early to report results, yet there is already much evidence to indicate that possibly, when fairly perfect appliances have been secured and a better technic acquired, katelectrolysis may be made to act as faforably upon old organized inflammatory deposits in the ear as it does upon similar deposits elsewhere, softening them and stimulating their absorption, in which event it will perhaps equal in importance the superheated air method, though it will doubtless require some years of work and experience to bring it to the same degree of perfection.

The promptness with which relief follows this electrolytic-kataforic application is sometimes remarkable.

Iodin kataforesis is a valuable adjuvant in certain selected cases, the auditory canal being filled with iodin solution and a kataforic electrode applied, anode direct, to the tympanum."

High Frequency Currents.

Dr. Henry G. Piffard, of New York, in the *Med. Record,* October 31, has an excellent paper upon this subject. He defines a high frequency current as one which alternates or oscillates at the rate of a million times or more per second, tho he would prefer to restrict the term to the currents produced by modifications of Tesla apparatus. Under high frequency currents he includes Morton's "wave current," which is obtained directly from the outer coating of the Leyden jars, tho he admits some doubt as to the propriety of this classification. Dr. Piffard is well known as the designer of the hyperstatic machine in which the high frequency oscillations are induced in a coil of fine wire which is separated by glass insulation from a few turns of coarse wire whose extremities are in direct communication with the outer coats of the Leyden jars. The current from a hyperstatic has high voltage and less amperage, he states, when excited by a static machine than when excited by a coil. D'Arsonval's condenser is briefly described, and also (which the author considers much more valuable) his larger solenoid. The latter is thirty inches in diameter and six feet high. Its terminals are connected (1) with the terminals of a small solenoid like that in a hyperstatic, or else either (1) the whole or (2) a relatively small part of the large solenoid is put into the direct circuit between the outer coatings of the jars. In the first cases the oscillations of the Leyden jar circuit are simply extended thru the large solenoid. In the second place a part of the solenoid receives these oscillations directly, and if properly tuned as to length, capacity and inductance, the remainder of the solenoid contains greatly amplified electric oscillations—becoming in effect a large Oudin resonator. Dr. Piffard has designed a small spiral for use with the

static machine, from which an oscillating current of low voltage is obtained. The details of its construction are not given.

Dr. Piffard recognizes a marked difference in the effects of the high frequency current and Morton's "wave current," as indeed we should expect from the difference in their character. The magnitude of the high frequency current obtained in the large solenoid is shown by the fact that when the inner terminal of the filament in an incandescent lamp is placed in contact with the coil, and the outer terminal held in the hand of a patient who is within the excited coil, the filament of the lamp is brot to a red or even white heat.

In discussion Dr. A. D. Rockwell said he was somewhat perplexed at the excessive amperage claimed for these high frequency currents and was inclined to think that it is insignificant instead of being 100 or 200 ma., as is sometimes claimed. Prof. Sheldon, of the Brooklyn Polytechnic, said he had measured the high frequency currents passing thru his body with an ammeter of the Stanley type and had obtained a reading as high as 300 ma. Personally he was unable to stand twenty ma. of an ordinary current. Dr. C. E. Skinner, New Haven, approved Dr. Piffard's opinions as to the therapeutic uses of these currents. Dr. W. J. Herdman, of Ann Arbor, said that fully 80 per cent of what could be accomplished by drug medicine could be equally well accomplished by electric treatment. The best eliminant is a high-frequency, high-tension current. These increase the output of uric acid and carbon dioxid and increase the tonicity of the blood vessels. It is unfortunate that physicians are so little acquainted with this wonderful agent. Dr. Jos. Collins regretted that his experience with electricity of various forms, both high and low potential, had been very unsatisfactory. He had not found it as valuable as, for example, massage, and he declared that with a fairly extensive knowledge of electricity he was justified in stating that it is not of signal value in therapeutics.

The Treatment of Cancer by Electric Osmose.

An interesting article by Mr. Wright, F. R. C. S., on the treatment of cancer and other forms of malignant disease appears in the *Lancet*, September 12. Drugs were introduced into the tissues of the diseased part by electric osmose produced by a high frequency alternating current. Leduc has proved by means of colored ions—a solution of permanganate of potash—that the medicaments introduced by electric osmose do not merely pass into the subcutaneous areolar tissue, but directly penetrate into glandular organs and other structures more deeply situated. Frankenhaüser has shown that the amount of medicament absorbed and the depth to which it penetrates have a constant relation, the former to the quantity and the latter to the intensity of the current employed. This process is evidently a very effective means of bringing drugs directly into contact with diseased parts not too deeply seated. In 22 per cent of the cases of cancer treated by Mr. Wright the treatment was successful. He has personally come to the conclusion that "a radio-active salt of strontium introduced into the tissues by kataphoresis by high frequency, will prove the desired panacea of all forms of malignant disease." —*London Elec. Rev.*

Electrolytic Treatment of Ozena.

Dr. L. Rethi (*Allgemein Weiner med. Zeitung*, No. 27, July 6, 1903) has obtained good results by the use of the galvanic current. A copper needle anode is thrust into the middle turbinal. The ka-

thode which is sheathed with platinum is applied to the lower and anterior part of the septum on the same side, and a current of five to ten ma. is turned on for as many minutes. In some cases two or three treatments are sufficient. Disease of the sinuses when present requires especial treatment.

The Faradic Current for Herpes Zoster.

Dr. E. M. Shaw, Cameron, Tex. (*Texas Med. News,* August), reports the cure of a number of cases by the faradic current. Apply one pole over the origin of the affected nerves along the spine, and move the other around and on all sides of the vesical patches and directly over the vesical tissues. Relief from pain is immediate and a complete cure results after a few treatments. Equally satisfactory results are obtained in herpes facialis or fever blisters.

Aneurism of the Left Subelavian Artery Treated by Wiring.

Dr. Judson Dallard, of Philadelphia, reported this case at the Medical Society of Pennsylvania, September 23. Twenty feet of gold and platinum wire were introduced and the current passed thru for some time. The patient died twenty days afterward. Autopsy showed a clot which had formed about the wire, but this had not prevented increase in the size of the sack.

High Frequency Currents for Constipation.

Dr. W. H. Dieffenbach, of New York (*N. Amer. Jour. Homeopathy,* October, 1903), treats the patient with a glass vacuum electrode for the rectum, extending past the sphincter. The electrode is then connected with a hyperstatic machine. Treatment is given for fifteen minutes daily at first; later tri-weekly or bi-weekly. Ordinary medical treatment was given as indicated except in the first case in which no medicine whatever was employed and which was cured in ten treatments. This case was of thirty years' standing, with history of constant drugging. The grooved electrode is preferred. Hemorrhoids if present become reduced in size and gradually disappear.

Dr. Dieffenbach tabulates the various agents entering into the treatment as follows:

(1) Suggestion: While the current is passing and the patient is resting quietly the operator gives instruction regarding regularity of habits, drinking abundantly of water, use of laxative fruits, physical exercise, bath and other points; and the daily repetition of these suggestions create firmly fixed thots in the patient which are not easily forgotten.

(2) Stimulation of the regular circulation.

(3) Dilation of the anus, rectum and the sphincters. This process is gradual and absolutely painless, as the current is analgesic; over-dilatation must be avoided.

(4) Removal of the primary cause; hepatic disturbances, hemorrhoids, atony of the intestines, etc.

(5) Regulation of habits.

One hundred per cent of cures is claimed. Treatment must not be given too near the menstrual period, as the stimulation will bring on premature flow. This treatment is therefore valuable in delayed menstruation.

Roentgen and Finsen Lights, Electrolysis, Etc.

Dr. Sinclair Tousey, of New York (*Medical Record,* October 24), describes a practicable office outfit for the general surgeon, commencing with the wires from the street and ending with the apparatus for ultra violet rays.

Extraction of Needle by the Giant Magnet.

Drs. H. G. Wetherhill and Cuthbert Powell, of Denver, Colo. (*Amer. Jour. Surg. and Gyn.,* October), extracted with the giant magnet two needles, which were first located by the x-rays by Dr. G. Stevens. The core of the magnet is four inches in diameter, the coil ten, the weight 108 pounds, the attractive force 150 pounds per square inch of contact. Attempts had been made to extract the needles by incision but without success. One was in the foot, three-fourths of an inch below the surface. It was exposed to the magnet forty-five minutes the foot being moved slightly in different directions during this time. Then a slight bulging was noticed in the skin. This was incised and the needle immediately jumped thru the opening.

The second case was similar but required an hour's exposure to the magnet.

Prostatectomy and Bottini's Operation.

Dr. Willy Meyer, New York (*Maryland Recorder,* October 24), discusses at length the relative value of the two operations. Concludes that they are supplementary modes of treating enlarged prostate, and not competitive. The operation to be chosen in any case must depend upon the individual and social conditions.

X-Ray Diagnosis.

X-Ray Photographs of Renal and Biliary Stones —All stones of the kidney and ureter give good x-ray pictures, no matter what their composition. Treplin (Meeting of German Surgical Society, Berlin) has not, however, had the same success with gall-stones on account of their softness and their unfavorable position. Stones in the gall-bladder are especially unsuited, since the bile itself will throw a shadow. Stones in the cysticus and choledochus may give good pictures if the patient is not too stout.—*Med. News.*

X-Rays in Spinal Cord Lesions.

In an inspiring article by E. von Leyden and E. Grumach (*Archiv für Psychiatrie und Nervenkrankheiten,* 37. Bd. 1. Heft) the authors describe their use of x-rays for the diagnosing of diseases of the spinal column and of the cord.

By the series of illustrations appended to the article it is particularly noteworthy how comparatively transparent the cord is. The authors refer to thirty cases in which the Roentgen rays were used for diagnosis. In twelve the rays confirmed the previous diagnosis but for the other eighteen patients a new or at least a larger picture was presented to view. In ten of these patients the disorder of the spinal cord was secondary to an affection of the bony column. In one of these there was found compression of the spinal cord in the dorsal region by a tuberculous bony process.

As a diagnosis of myelitis of syphilitic origin had been made in this case and the antisyphilitic treatment begun the change in treatment brought about by the change in diagnosis was both instructive to the physician and beneficial to the patient. The history of this case is of interest and was briefly as follows: A twenty-six year old woman, married, in previous good health, began to suffer a year and a half previously with tingling and increasing weakness in both legs. Six months later there developed twitching and clonic spasms of both legs and at times incontinence of urine. The physi-

cal examination showed total spastic paralysis in both legs in a well-nourished woman; at times clonic contractions in the hip and knee-joint on both sides. The sensibility was undisturbed. On both sides knee and foot clonus was present and Babinski was positive. Incontinence of urine also present. At no place on the spinal column was there pain either subjectively or on firm pressure. The absence of pain on pressure over the vertical axis led to an error in diagnosis, as the Roentgen rays showed a curious disturbance of bone with attempts at callous formation.

In another case there was compression of the dorsal cord. The diagnosis had been made of tuberculous spondylosis with subsequent compression of the cord. Two cases were diagnosed as spondylosis ossificans, or spondylosis rhizomelique, as some prefer to call it. Two cases were tumors; one a carcinoma, the other a sarcoma. Two others were myelitis of the cervical region from fracture, and the last of the series was one in which a diagnosis of bulbar paralysis had been made and a depression localized to the third and fourth cervical spinal process could be made out, but the application of the Roentgen rays showed clearly a disturbance of the third and fourth cervical vertebra. A glance at the eight cases in which affections of the nervous structure was primary shows seven diagnosed as osteoporosis by the Roentgen rays and one as osteoarthropathy. Proper treatment was at once begun in all of these cases and later exposure to the rays showed reduction of the bony formation and a consequent gain in health on the part of the patient.

We are perhaps not looking too far afield when we say the time has almost come when the neurologist will not be satisfied with his examination of the spinal column unless there be added Roentgen ray pictures of the part in all its details.—*Ed. Medical News.*

Radio-Therapy.

Radium.

Dr. Margaret A. Cleaves, of New York, in a paper read at the meeting of American Electro Therapeutic Association and published in the *Advanced Therapeutics* for November, reviews the discovery of the radio activity of metals and discusses the different kinds of rays (alpha, beta and gamma rays) which are obtained from them. The theory of electrons is briefly stated. The physiological effects of radium are also stated. Prof. Hammer placed six tubes of radium on the back of an electric torpedo (fish) for twenty minutes, and temporarily destroyed its power to give shocks. Prof. Curie found that a few milligrams of radium placed under the skin of a mouse over the vertebral column caused death by paralysis in a few hours, and similar effects were produced upon a guinea pig after several hours by tubes of radium in contact with the back of the neck.

Dermatitis follows a brief application of a radium tube to the skin of man and animals and ulceration follows lengthened exposure; but the intestines and serous surfaces are but little affected by it. Salts of radium dissolved in water emit rays which prevent the development of anthrax bacilli.

Germs of micrococcus prodigiosus were killed by exposure to radium rays for three hours. The sensation of light is noticed when a radium tube is held close to the eye or the temple. Prof. Curie

says he would not dare to enter a room containing a kilogram of pure radium, as it would burn the eyes, destroy the eyesight, and probably kill him.

A number of therapeutic results have been reported, one case of lupus exposed to radium thirty-six hours, cured. A case of melanosarcoma, cured. A recurrent epithelioma which x-rays failed to cure was exposed to radium four times, fifteen minutes each, at intervals of a few days. In three weeks healing was established, and with two additional applications a cure was completed in six weeks.

Dr. Cleaves has treated a sarcoma of the cheek and jaw and an inoperable pelvic case of epithelioma, and in both these cases there has been marked improvement. The value of the radium tube used in these cases is about $200.

Roentgen Rays as a Palliative in Cancer.

Dr. C. L. Leonard (*Med. Soc. of Pa.*) in operable cases removes all diseased tissue then uses x-rays. In all inoperable cases x-rays are advised, and the maximum dose which can be borne by the surrounding tissue must be given at once.

Report of the Cancer Committee of the British Medical Association.

One of the most important parts of the report is that dealing with therapeutics, the results of the Finsen light treatment, high-frequency currents and x-rays—methods somewhat oddly grouped together under the head of electro-therapeutics—have been the subjects of inquiries directed to those in charge of special departments at hospitals. Reports of some 400 cases have been submitted for the consideration of the Cancer Research Committee. The results of the treatment of rodent ulcer by means of x-rays are confirmatory of previous experiences. It is said that recurrence occurs in from 20 to 40 per cent of the cases, but are as a rule as amenable to treatment as the primary disease. Complete healing was obtained in 141 out of 216 cases, of which detailed reports were sent to the committee. This gives a proportion of 65 per cent of successes It is pointed out that as the majority of cases were inoperable or had already been treated by the knife and had recurred, this high percentage is very satisfactory. Of the remaining cases, improvement was recorded in forty-three, no benefit resulted in sixteen, while in three instances the disease was aggravated. With regard to other forms of malignant growth, the committee state categorically: "The results so far brought to our notice do not establish the efficiency of any of these measures as curative measures in sarcoma and carcinoma."—*Med. News,* August.

X-Ray in Malignant Disease.

Dr. G. G. Burdick (*Medical Brief,* November) calls attention to the unreasonable opposition to x-ray treatment on the part of many surgeons who know little or nothing of this matter. He knows of about 200 cases of internal and breast cancers which have remained cured by x-ray treatment for more than two years. In numberless other cases a complete cure can not be claimed but the improvement in the condition of the patient has been so marked that the ordinary affairs of life can be attended to with comfort and pleasure. In advanced cancer involving the intestines, it is dangerous to push the treatment so far as to destroy all cancerous tissues. If this is done perforation usually follows. For skin cancers of all kinds the x-ray is specific. About 80 per cent of cancers within one inch of the surface can be easily cured. Even when far advanced a cancerous growth within the body can be checked and held indefinitely.

Radio-Therapy in Rectal Disease.

Dr. Sinclair Tousey (*Medical Brief,* November) says that ulcers of the rectum which do not respond to ordinary treatment can be cured by the use of the high frequency current. He uses a rectal vacuum tube connected directly with one terminal of the secondary circuit of an x-ray coil keeping the discharges about four inches apart. The patient must be insulated during this treatment to avoid unpleasant shocks.

Rectal ulcers which have been operated upon by dilating the sphincters and using the cautery heal very slowly. These Dr. Tousey treats with a copper kathode placed in the rectum and a sponge held in the patient's hand, or against the abdomen. Fifteen or twenty ma. are passed for from ten to twenty minutes, daily.

Pruritis ani, along with its accompanying headaches and neuralgias is relieved by the vacuum electrode treatment. Anal fissures and atonic conditions of the rectum and sigmoid flexure yield readily to the application of the vacuum electrodes.

Roentgen Rays in Therapeutics,

Dr. Mihran K. Kassabian, of Philadelphia, at the Medical Society of Pennsylvania, compared the results of operative and x-ray treatment in various types of cases and emphasized the need of co-operation between physician and surgeon in this work. Failure is generally due to lack of knowledge on the part of the operator, instead of the inability of the rays to produce the desired results.

X-Ray Treatment In Malignant Diseases.

Dr. F. R. Cook, New York City (*Int. Journal Surgery,* October, 1903) discusses methods of procedure and effects of x-ray treatment. He recommends the use of the rays in all cases whether operable or not. X-ray treatment should follow operations for an indefinite period of time.

X-Ray in Diseases of the Skin.

Dr. S. H. Hellar, of Lancaster (*Medical Society of Penn.,* October, 1903), has found least response to x-rays in sarcoma. In two cases the growth was stimulated. Good results were obtained in lupus, acne and ivy poisoning. Recurrences are rare. [Dr. Hellar would probably find better results in sarcoma by using more powerful radiations.]

Therapeutic Uses of the X-Ray.

Dr. J. T. Dunn, Louisville, Ky. (*Int. Journal of Surg.,* October, 1903), says "there is no doubt that x-rays will destroy the hair, sebaceous and sweat follicles when properly applied, permitting the permanent removal of the hair or simply temporary removal." Angioma can be removed by x-ray, but it is questionable if the resulting scar is not worse than the original mark. Treatment of skin diseases should be given with a soft tube. The follicles are affected after eighteen or twenty exposures and the reaction will continue two or three weeks. When it begins to subside treatment should be given two or three times per week for six or eight weeks, after which no recurrence need be feared. No scar results and frequently the complexion is improved.

A number of cases are reported, including hyperhidrosis, eczema, lupus, epithelioma, tubercular glands, carcinoma of the stomach, carcinoma of the bladder and uterus, and sarcoma involving the base of the bladder in all of which the results were extremely satisfactory. In one case of carcinoma of the breast x-ray treatment was given until softening had well begun. After the reaction had disappeared the carcinoma was removed with the knife. Forty-eight hours afterward sloughing appeared the entire length of the incision,

from one to two inches wide. The wound is now healing by granulation. Probably the integument is so devitalized by such x-ray exposures that plastic work is not advisable.

A case of psuedo leukemia (Hodgkin's disease) was exposed fifteen days before the reaction was obtained. After ten days more he was much stronger and had gained sixteen pounds. He was again given fifteen exposures then allowed to go home for eight days. Eight more exposures followed. The glands in the neck entirely disappeared and after one year there was no recurrence.

X-Ray for Tuberculosis.

Doctors Boido and Boido, of Tucson, Ariz. (*Chicago Clinic*), have found the x-rays beneficial in cases of incipient tuberculosis among Mexicans. Out of fourteen cases eleven are living after two years, tho the majority of Mexicans die within one year after infection.

Tumors Benefited by X-Rays.

Dr. W. J. Eddy, Shelbyville, Ill., reports in *Ill. Med. Jour.*, August, 1903, a tumor involving half of the tibia in which the leg was nearly double its natural size. Six months later it had involved two-thirds of the tibia and was painful. Amputation being refused x-ray treatment was tried. A soft tube was used on alternate days. Dermatitis necessitated a week's vacation after the eighth treatment. After the next treatment the entire leg became edematous and the temperature rose to 103°. This condition lasted one week. Two weeks later inflammation had subsided and by free incision one and one-half pints of clear yellow serum was evacuated. The anterior half of the tibia was destroyed for one-third of its length. This was dressed in the usual way and soon healed.

Another case had a hard, immovable mass filling the axillary space. This was rapidly enlarging and giving much pain. After twelve x-ray treatments on alternate days a six to ten days' vacation was necessary. Treatment was resumed once or twice a week, as could be borne. The mass shrunk steadily, discharging a few drops of serum each day. The man has now a useful limb and is doing regular work.

Use of the X-Ray in Therapeutics.

Dr. F. H. Williams, Boston (*Med. News*, October 3, 1903), says all varieties of eczema yield to the x-ray without causing the patient any inconvenience. Psoriasis also responds very readily, as does acne, sycosis, favus, lupus, etc. Tuberculous glands, especially those in the neck, and tuberculous sinuses, yield readily. Some cases of conjunctivitis of long standing have yielded to x-rays. Painful affections of all kinds from causes known and unknown are frequently relieved, and a general tonic effect is often noted. In new growths if the glands are involved the x-rays seem to be of less avail. In other cases the new growths disappear in from two to twenty or more treatments.

The dangers of x-ray treatment consist in setting up a severe dermititis and in pushing the treatment too rapidly, causing serious toxemia. For internal diseases proper and powerful apparatus is required, otherwise the patient may grow worse instead of better.

Tuberculosis of the Conjunctiva Cured by X-Rays.—Sydney Stephenson reports the case of a child of four years who came for treatment of tuberculosis of the conjunctiva. The affected part was treated by exposure to the x-rays at a distance of 6 to 10 inches from the focus tube for an average period of ten minutes at each sitting. The only other treatment con-

sisted in bathing the eye three times with 1 in 5,000 sublimate lotion, and cod-liver oil and steel wine internally. The diagnosis of the case could not be questioned, as the bacilli were proved to be present. There is no visible cicatrization from the treatment, and the cure is complete. The treatment by x-rays is simple, painless, and free from danger, and it is likely in the future to displace the other methods of treating tuberculosis of the conjunctiva.—*British Medical Journal,* June 6, 1903.

New Treatment of Cicatrices.

Dr. H. R. Varney, Detroit (*Int. Journal of Surg.*, October, 1903) says mild applications of the x-ray stimulate cellular action almost exclusively. Elastic tissue, muscles and cartilages are affected only when the rays are used to an intense degree. Degenerative changes of the cells take place with inflammatory symptoms which increase the vitality and reproductive powers of the least differentiated tissues and produce degeneration in the more highly specialized structures such as hair and nails. The epithelial cells show the most energetic reaction both in diseased and normal tissues. Application of the rays after smallpox before the inflammation in the skin has subsided thus resulting in filling up the pit of the scar. The irradiations must begin very mildly, increasing in strength daily until inflammatory reaction appears. Treatment is then diminished until the pits are filled above the surrounding skin. No bad results follow except loss of hair which afterward returns. In the case of old scars the tissues are first scarified and then the rays applied.

Roentgen Rays In Medicine.

At a recent meeting of the Medical Society of New York State an afternoon was devoted to this subject. Dr. A. D. Bevan, of Chicago, said that while x-rays are of the greatest service in superficial cancers they have so far been without success in deep seated cancers. [This opinion is not borne out by the facts.—Ed.] X-rays cause dissociation of potassium iodid, and Dr. Bevan considers that x-ray treatment combined with iodin or arsenic opens a promising field.

Dr. C. L. Leonard, Philadelphia, said the value of the x-rays in diagnosis depends more on the expertness of the operator than upon any other factor. In more than 300 cases of examinations for calculi the aggregate error of positive and negative diagnosis as to calculus was less than 2 per cent.

Dr. Coley had seen a large number of recurrences after treatment by x-rays, especially in sarcomas. He reported a severe case of Hodgkin's disease in which there was marked improvement but after several months the liver became much enlarged and the patient died. Dr. Coley considers that there is a danger of disseminating the malignant process or of stimulating its growth by x-rays.

Dr. Hopkins, of Brooklyn, had found the combination of x-rays and Finsen light very useful, principally in surface cancer.

Dr. Ford, of Utica, considered the knife preferable to x-rays in all operable cases "The x-rays do not cure cancers." [Dr. Ford is evidently behind the age.]

Dr. N. Vandevere, of Albany, considers relief from pain to be a most valuable result of x-ray treatment. "The danger of the present use of the x-ray is that it may delay the use of more helpful measures."

Dr. Lee, of Brooklyn, called attention to the danger of general infection following the too rapid destruction of abnormal tissue under the x-ray.

The Influence of the Roentgen Ray on Epithelial Tissues.—M. Perthes gives the results of experiments made to determine the effect of the Roentgen ray on epithelial cells. After noticing the disappearance from his own hand of a wart following a slight Roentgen dermatitis, the writer treated similar growths on eighteen patients by covering one-half of the wart with a lead shield and exposing the other half to the Roentgen ray. In sixteen cases the exposed part of the wart became hard and then scaled, leaving an epidermal bed which healed after a few days; in two cases the reaction was more intense, giving rise to vesiculation. Two cases recurred. From a study of portions of tissue removed during the treatment, M. Perthes states that the effects of the Roentgen rays is exerted principally on epithelial cells. This conclusion was also reached by the results obtained by treating a recurrent rodent ulcer, which was entirely cured. The experiments were carried further by wounding equally both ears of a rabbit and exposing one ear to the Roentgen ray while the other was protected. Healing was greatly retarded in the exposed wound. M. Perthes concludes that the Roentgen ray exerts its influence principally on young epithelial cells, normal or cancerous.—*Am. Med.*

Forensic Importance of the Roentgen Rays.—Every physician who is liable to testify in court should make a special study of Roentgen diagnosis and should be thoroughly conversant with the structure of the epiphyses of the various bones and of the appearance of abnormal bones. D. Troeger (Friedreich's Bl. f. gericht. Med., Vol. 54, No. 4) believes that an x-ray photograph discloses better than anything else the presence of fractures and dislocations and their effect upon the bony skeleton with exception of the head and vertebral column, where the pictures frequently are not as clear as desired. Foreign bodies, if sufficiently large and of proper material, can be well located. For internal disease, the old methods frequently are more reliable, and absolutely no information can be obtained as to whether a newly born child had breathed during or after birth, or if pregnancy is present. The examiner must have experience extending over several years before his opinion can be accepted as conclusive.—*Med. News.*

Correspondence.

Dear Doctor—Will you kindly give me your opinion of the efficacy of electro-therapeutics in the treatment of a chronic tenosynovitis of the wrist and hand? In other words, what can you promise, in general, in such a case?
Respectfully, O. O. Force, M. D.,
Pardeeville, Wis.

Chronic tenosynovitis most commonly results from a tubercular process, and tuberculosis in all its forms is amenable to electric and x-ray treatment. We suggest the use of the high frequency current in this case, alternating with x-rays from a tube of medium vacuum. Begin with five minutes' treatment on alternate days, the x-ray tube being ten to twelve inches from the wrist, and gradually extend the length of treatment as may be found necessary.

Dear Doctor—I notice in the October number of The X-Ray Journal that you discuss the value of quick lime and chlorid of calcium for keeping the static machine dry and in working order. I tried the chlorid of calcium and found that it destroyed the brushes quickly and got my machine in a terrible condition in a few days. I tried putting in ice and salt in a three-gallon tin can every day, setting the tall can upon a dish to catch the water condensed on the outside of can. This was a great deal of work and became tiresome. Now for the past year I have had no trouble whatever. No matter how moist the air may be, I put one quart of commercial sulfuric acid into two deep dishes, set one dish in each end of the case and screwed the doors up tight.

I also set the four legs of the static machine on four plates of double strength glass six inches square to insulate the case.

The dishes must be only half full, for they will absorb the water as fast as it enters the case. When the acid becomes too diluted, throw it away and put in fresh. One-half gallon of sulfuric acid has kept my machine in splendid working order for over a year and it is not expensive. I have not changed my brushes for a year, and the machine generates at all times, and under all circumstances. I would not want a better remedy against moisture.

M. H. SPRAGUE, M. D.
Ottumwa, Iowa.

LONGMONT, COLO., Oct. 23, 1903.

Dear Editor—I see an inquiry in the September X-RAY JOURNAL from Dr. G. D. P., of Caracas, Venezuela, in regard to what is the Crotte treatment for pulmonary tuberculosis. I will do the best I can to enlighten the x-ray readers in regard to the Crotte treatment.

Prof. Crotte, of Paris, France, was the originator of this treatment and has been using it and trying to introduce it to the medical profession for the past five or six years.

It has not been used in this country until the last six months. The first place it was used in was Colorado Springs. A woman claiming to be Madam Rade, of Paris, France, put in an institute at Colorado Springs, bringing the apparatus with her from Paris.

The treatment is a static kataphoresis; there are two medicine tanks put on the static machine, one on the negative terminal and one on the positive. The large brass balls are removed from the machine and nickel steel tanks four inches in diameter, reaching to the top of the static machine case, are fitted to the place where the brass balls are screwed on, by leaving a bolt projection long enough to fit in the hole where the ball is screwed on. The tanks are closed at both ends, but the lower ends are filled with sponges, and a tap with cap much like a bicycle valve, is fitted into the tanks so that one can medicate the sponges when needed. There is also an air tank fitting at the lower end of the tanks for putting on flexible, metal, cloth-covered tubes five feet long which are to conduct the medical vapors and current to the patients from the tanks. The positive tube is connected with the insulated platform and the negative with a long handled brush.

The tanks are charged with a 40 per cent formalin solution by keeping the sponges in the tanks wet with it.

The patient has the chest bared and painted with a solution of iodin crystals in alcohol, just strong enough to color the skin light yellow; then the patient sits on the platform chair and the machine running at a moderate speed the whole chest is sprayed with the brush electrode for from five to fifteen minutes.

The formalin solution is put into the tanks with an ordinary oil can.

I have the tanks on my machine and am using the treatment and will be able to tell what it will do in a few months.

One wishing to use this treatment who has a static machine can get the tanks and outfit all ready to attach to his machine for about $50 from the Cahn Electric Supply Company, Denver, Colo.

ROBERT A. BILLINGS, M. D.

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VOL. XIII. CHICAGO, DECEMBER, 1903. No. 6

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Pierre Petit
A mon confrère et ami Dr Pinus
Dr Apostoli
27·29·31·Place Cadet, PARIS

THE AMERICAN
X-RAY JOURNAL.
Devoted to Practical X-Ray Work and Allied Arts and Sciences.
VOL. XIII. CHICAGO, DECEMBER, 1903. No. 6

A New Electro-Medicamental Treatment for Uterine Fibroids.

BY SAMUEL H. LINN, M. D.,
University of Pennsylvania, Class of 1877; Academy of Natural Sciences, Philadelphia, Pa; Monroe County Medical Society; Medical and Surgical College, St Petersburg, Russia, Etc.

In presenting this article I may, perhaps, be pardoned a digression in stating that for thirty-five years I have practiced surgery and must still firmly believe that the skillful surgeon can never be supplanted, as there are diseased conditions so hopeless and deplorable that any surgical interference is justifiable which offers even the hope of amelioration. On the other hand, what course should be pursued by a physician or surgeon who is in the vanguard of progress, after diagnosing a uterine fibroid, for instance, when the patient positively declares that she will not submit to a surgical operation? Would it be right to assert that surgery offers the only relief and to ignore a harmless and now well known treatment by which many serious diseases are averted, cured, or at least materially benefited? I do not recommend the routine use of any one agent or procedure to the exclusion of other rational remedies. I am fully aware that the remarkable advance made in medicine during the last decade is in a measure due to physical agencies, and I have now made the treatment of disease by electricity an essential and most important part of my practice, and desire to do justice to that science which, united with tenderness and sincerity, is truly achieving a mastery over the blind forces of nature.

Notwithstanding inflammations, indurations and abnormal growths in any part of the body may be treated by my method, I shall confine this paper to uterine fibroids, for which this new treatment is especially adapted. Indeed, I believe that it is the most reliable non-surgical treatment, as there is absolutely no danger of systemic infection which sometimes occurs from the use of electro-chemical cauterization.

Far be it from me to undervalue the merit of such a man as my esteemed friend, the late Dr. Apostoli, whose name is indissolubly linked with gynecology and electro-therapeutics. I would not unjustly criticise the apostolic method of treating fibroids, but—*sans peur et sans reproche*—I wish to cite two cases, simply to show that the first duty of the electro-therapeutist, as well as the surgeon, is *"ne pas nuire,"* do no harm. Electro-therapeutics is an art, altho some have made it a trade, and requires skill and manipulative ability, as well as a thoro anatomical, electrical and clinical knowledge.

CASE No. 1.—In June, 1897, Dr. W. called me in consultation regarding Mrs. A., about fifty years of age, who was suffering from general impairment of health, due principally to a uterine affection. She had an offensive leucorrhea, and the

pelvis and lower third of the abdominal cavity was partly filled with an irregular mass, which was diagnosed as a multiple fibro-myoma. The patient refused surgical interference, but consented to internal and intra-uterine medication and packing, from which treatment she improved somewhat, but the mass remained the same. I recommended a change of climate and advised Europe—Paris—also that she place herself under the care of Dr. Apostoli. I was asked to accompany her, and, having other business abroad, I consented.

As soon as we arrived in Paris, she commenced treatment with Dr. A. and his assistant, Dr. Planet; after the second treatment she was unable to go to Dr. Apostoli's office, and the treatments were continued at her hotel. They consisted of the regular Apostolic treatment, application of a clay electrode to the abdomen and a blunt carbon point to the cervix (intra-cervical, not intra-uterine). After three seances she was unable to sit up or continue the treatments; a phlebitis developed, and I called in consultation my brother, Dr. Thomas Linn, of Nice, formerly of Paris, France. He immediately remarked that the phlebitis was caused by the treatment, thereby confirming my opinion.

Case No. 2.—Mrs. H., nullipara, aged forty-eight, past the menopause, consulted me three years ago regarding a purulent, sanguinous discharge, backache and a sense of weight in pelvis. There was absolutely no sign of a tumor. Blunt curettage, packing and intra-cervical treatment gave comparative relief until about a year ago, when she again came under observation. I found cervical endometritis, catarrh, granular erosion and subinvolution. She was put upon a course of internal and local medication, without much improvement, when a consultation was held, resulting in the diagnosis of a fibroid tumor. On account of the low vitality of the patient and the fear of extensive adhesions, etc., surgical interference was proscribed, the patient also absolutely refusing to submit to an operation. Owing to the urgency of the case, the apostolic method was recommended. After two seances, using a current of not more than forty milliamperes, this patient was unable to continue treatment. Ascites immediately developed, filling the entire abdominal cavity, undoubtedly the result of the galvano-chemical cauterization. In my experience, these complications are not amenable to electricity alone, but require hydragogues, diuretics, etc., exhibited internally and by electrical diffusion to assist the emunctories in absorbing and eliminating the abnormal secretions; therefore, in resuming treatment, I employed, together with internal medication, electro-medicamental diffusion, which perhaps had a double effect, as it reduced the fibroid and at the same time favored the elimination of the peritoneal effusion. This case shows marked improvement with every indication of a cure. As an additional adjuvant, high tension faradism is being employed.

The unfortunate complications arising from the treatment of these cases led to careful investigation and to the conclusion that the apostolic method is not always harmless and antiseptic. As it is essentially a galvano-chemical cauterization, which tends to irritate and necrose, it also produces a sero-purulent discharge and inflammation often extending to the peri-uterine tissues, the vitality of which, having been previously reduced by pathological changes, constitute a "locus minoris resistentiæ" for the growth and multiplication of pus microbes, producing phlebitis and other inflammatory complications.

But is there not good in everything? Our failures often lead to successes along similar lines, so all honor to Dr. George Apostoli, to whose valuable contributions I am perhaps indebted for the inspiration which led to perfecting a method of treatment which is not the hasty product of a day, but the well ripened fruit of sage delay. I have no wish to claim more than rightly belongs to this method of cure, but I am fully convinced that in electro-medicamental diffusion we have a valuable addition to our armamentarium. It is a mild and effective treatment for all small growths, both benign and malignant, inflammations, etc., and should be used where time will admit and the tumor is not too large, when, of course, more strenuous measures are indicated.

The disagreement of eminent electrotherapeutists as to whether the positive or negative pole should be used for the diffusion of certain solutions has proved a great detriment to this method of medication. After numerous experiments, I became convinced that the surest way to obtain effective results in electro-medicamental diffusion was to rapidly alternate the galvanic current by means of an automatic pole changer, *which has a double advantage; first, it produces protoplasmic massage and stimulation, thereby overcoming the vis inertia of the tissues and preparing them to absorb the medicament while in an active condition, also equalizing the distribution of acids and salts; second, we obtain the effect of an entire compound instead of one element of a solution, to say nothing of "the surprising chemical affinity of alternating currents."*

As an adjuvant I employ true high tension faradism, which goes beyond the range of muscular contractility and is much more penetrating than ordinary

Fig. 1.

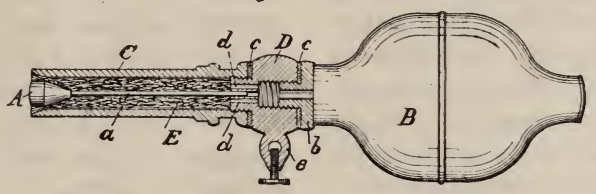

FIG. 1. LONGITUDINAL SECTION, SHOWING AIR BULB ATTACHED AND IN FULL SIDE VIEW.
A, aluminum contact surface.
a, aluminum stem rigidly secured to coupling D.
B, air bulb.
b, hard rubber coupling.
C, hard rubber sheath.
c, c, washers.
D, metallic coupling
d, threaded end of coupling
E, asbestos cord.
e, binding post.

Fig. 2.

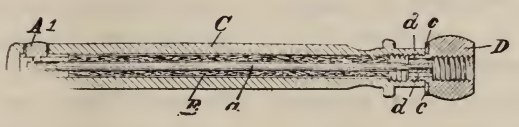

FIG. 2. LONGITUDINAL SECTION, SHOWING CLOSED SHEATH WITH OPENING AT SIDE.
A^1, aluminum contact surface.
A^2, aluminum block.
a, aluminum stem rigidly secured to coupling D.
C, hard rubber sheath.
c, c, washers.
D, metallic coupling
d, threaded end of coupling
E, asbestos cord.

DR. LINN'S ELECTRODE.

faradism, therefore positively reinforces functional activity; altho it does not seem as strong, yet the power of the current is increased in proportion to the added number of lines of force.

Before giving my modus operandi, I wish to state that while I am not the manufacturer of the electrical apparatus and special electrode which bear my name, they owe their existence to the fact that notwithstanding the numerous electrical appliances on the market, I was unable to find a battery and electrode adapted to my method of employing electro-medicamental diffusion so suggested. Besides the electrode, a portable combination battery, embodying the novel features used in my work, such as the automatic pole changer and high tension faradic coil, the straight galvanic and a novel sinusoidal current.

In order to obtain effective results in electro-medicamental diffusion, I was convinced that we must maintain a constant regulable supply of the electrolyte to the tissues, preferably forced en nappe over the contact surface of the electrode, which should be of small diameter in order to concentrate the current. The rapidity of its action doubtless is due to the thin film of electrolyte supplied and to the metallic surface of the electrode being as near the tissues as possible, thereby lessening the resistance and permitting the use of a current of low potential. There is no possible clogging of this electrode, as it can be easily cleansed and sterilized.

MODUS OPERANDI.

The first step is to wind the metallic stem of the electrode with specially prepared asbestos cord, as, owing to its pure incombustible nature, there is no danger of the medicament becoming contaminated. The parts of the electrode are then put together and the asbestos saturated with the medicament through the small holes in the coupling. The supply of electrolyte is regulated by means of the air bulb, and, when constantly maintained, there is no danger of burning the tissues.

The abdominal electrode may be of almost any variety of the flat electrodes. The usual antiseptic rules are strictly followed in this work.

Perhaps some of the younger members of this Association may be interested in the method which I employ for lowering the uterus without volsella or tenaculum, or more strictly speaking, of bringing the vaginal cul-de-sacs within easy reach. It is done by inserting a double Ferguson speculum, so to speak, which consists of two hard rubber cylinders, the inner one being metal lined and twice the length of the outer one (see cut). They are inserted as a single instrument and when the desired point is exposed to view pressure is made upon the rim of the shorter one and the other allowed to slip from the vagina. By this means the anterior, posterior or lateral cul-de-sacs are readily brought within touch of the index finger. I have never seen a description of this painless and antiseptic method for gaining easy access to these parts, although it was taught me in Vienna some twenty-five years ago. As the majority of our fibroid cases are subserous I am sure this simple method of reaching the desired points for treatment will be appreciated.

With regard to current I usually begin with two or three milliamperes, regulating the increase during the first seance according to the sensitiveness of the patient, whom I ask for continual information regarding the possibility of pain. Very effective electro-medicamental diffusion can be produced by the use of five to seven milliamperes and is usually well borne, altho in some cases I use nine mil-

liamperes. I am in the habit of treating my patients twice a week, each seance lasting from ten to fifteen minutes.

In conclusion I shall cite two of the many satisfactory cures made by my method of using medicamental diffusion.

Case 3.—Mrs. —, multipara, age thirty-eight, enlarged uterus, colitis and excessive nervousness. Consultation confirmed diagnosis of a multiple, nodular fibromyoma; immediate operation was advised; the patient positively refused surgical interference. The uterus was more than four times its normal size. After three months' treatment as described, two seances a week, the nodules disappeared and the uterus was restored to almost its normal condition.

In treating this case I applied the contact surface of my special electrode at two or three different points high up in the anterior vaginal cul-de-sac, and an ordinary flat electrode on the abdomen. As already mentioned the majority of uterine fibroids being of a subserous origin are easily reached through the mucous membrane of the anterior cul-de-sac, the absorbent power of which is well known. In this case I use three to five milliamperes the first month, five to seven the second month and seven to nine the third month, regulating the increase according to the sensitiveness of the patient.

With this patient I also used high tension faradism over the uterus for half an hour daily, and general static electrization.

Case 4.—Mrs. M., age thirty-six, consulted me regarding urinary incontinence following occasional attacks of retention occurring about her menstrual periods, which were regular and normal. She is stout and plethoric in appearance and did not complain of any other well marked pressure symptoms except pain and weight in the pelvis. I found a congested cervix and surrounding tissues of the ecchymotic hue characteristic of fibroids, a profuse, tenacious mucous discharge from the cervical canal; a rather large subserous fibroid was readily diagnosed by ballottement.

The treatment was identical with that followed in Case 3, with the exception that static electricity was not employed. She was treated for three months, two seances a week; her condition is now almost normal.

As my experience with this method of treating fibroids has been confined to small tumors of the subserous variety, I am unable to say anything regarding its efficacy in very large tumors and cases accompanied by severe hemorrhage.

243 Alexander St., Rochester, N. Y.

Electro Therapy.

A Course of Twenty-four Lessons under the auspices of the Chicago College of X-Ray and Electro Therapeutics.

LESSON 7—INDUCTION.

When there is a steady electric current in a wire the rotation of the innumerable chains of atoms, all in the same direction, carries with it to some extent the elastic ether about the wire. That portion of ether lying close to the wire is strained to some little distance in the direction of the rotation; just as the portions of jelly near a stick that is rotated in it are carried a little way in the direction of its rotation. The parts of ether lying further from the wire are displaced to a smaller degree, and this displacement becomes less and less as we go further from the wire. When the current stops, the ether is relieved of its stress and returns to its normal position. An atom lying in the ether adjacent to the wire before the current begins is, when the current starts, moved bodily to a slight extent in the direction of the rotation; but the side of the atom nearest the wire is moved further than the other side; consequently the atom is rotated thru a small angle in a direction opposite to the rotation in the wire. Thus when a positive current, whose rotation we assume is right handed, is started in the wire it causes, in all the atoms lying near, a slight left handed rotation, which is, according to the Vortex theory, a slight negative current. The intensity of this induced current at any moment depends upon the force which is conveyed to the atoms at that moment by the moving ether and upon the resistance (according to Ohm's law) of the conducting circuit in which these atoms happen to lie; but the total quantity of current (the time integral of the current) generated in a secondary circuit by starting a current in the primary wire, depends only upon the intensity of the primary current and its position in reference to the secondary, in the absence of any other electromotive force; because this is represented by the angular rotation given to the atoms in the secondary circuit. When the positive current in the primary stops, the atoms return to their original condition and in so doing make a slight right handed rotation which is a slight positive current. The total quantity of the induced current of starting (the "make" current), is necessarily the same as that of the induced current of stopping (the "break" current). If the resistance in a secondary circuit is exceedingly small and if the conditions are such that the extent of displacement of ether is great, then the velocity of the ether in returning to its normal position on the sudden stopping of the primary current may be so great as to carry it past the point of equilibrium and produce a strain in the opposite direction, and it may oscillate across the neutral line a number of times before finally coming to rest. This will cause a similar oscillation in the atoms of the secondary circuit, giving rise to an induced oscillatory current.

The electro motive force of the secondary is increased by every condition which increases, from a mechanical standpoint, the effect of the primary current upon the atoms of the secondary. These conditions are (1) nearness to the primary, (2) length of the secondary exposed to the influence of the primary, (3) velocity of change in the primary current, (4) magnetic conditions which affect the amount of rotation of the surrounding ether as distinguished from its linear displacement. The amount of current in

the secondary depends upon (1) the magnitude of its electro motive force, (2) the length of time during which its electro motor force is maintained, which depends upon the total amount of rotation induced in the atoms of the secondary, (3) the resistance of the secondary circuit.

It is evident that all the induced currents produced by any stationary apparatus are alternating, and it is to currents of this class that we shall confine our attention during this lesson. The action of a dynamo in producing induced currents is upon this same principle. If instead of starting and stopping the primary current, we should maintain it steadily, so as to keep a field of ether strain about the wire, and the secondary wire be then suddenly brot near the primary, the same effect is produced upon the secondary wire as was produced upon it when the current was started. When the secondary wire is moved suddenly away from the primary the effect is the same as when the current in the primary was stopped. So that if a wire or a coil be made to rotate into and out of a field of ether strain such as surrounds electric currents and magnets, alternating currents are induced in the rotating coil. If a direct current is desired from such an apparatus a mechanical contrivance called a commutator is used to change the connection of the coil with the rest of the circuit at each half revolution. The outer part of the circuit then receives pulsating currents which are always in the same direction.

Until recently almost the only apparatus which was used therapeutically for the production of alternating currents was a small inductorium, consisting of a wire helix connected with a galvanic battery and constituting the primary circuit, around which was a secondary coil consisting of a large number of turns of finer insulated wire, close to but insulated from the primary helix. A mechanical arrangement for automatically making and breaking the primary circuit is attached. Inside of the primary helix a soft iron core may be inserted. This insertion increases the inductive effect of the primary upon the secondary. Sometimes the coils are made movable with reference to each other, so as to increase or diminish the induced current. Sometimes a metal shell is inserted between the two coils so as to reduce the secondary current. Sometimes a rheostat having a high resistance is used in the secondary circuit for controlling the current.

In recent years various devices for producing alternate currents have been employed, some of which are much superior to the old "Faradic battery" which has just been described. Some of these will be considered later, but since the faradic coil is in the hands of a great many physicians, some of whom are more or less completely ignorant of its value and use, and since it is so small as to be easily portable, something more may be said in reference to it. The current produced by the faradic coil is alternate but is exceedingly irregular in form. The irregular variations in the direction and intensity of the current causes a relatively large amount of muscular and sensory disturbance which limits the usefulness of the machine.

The physiological effects of the alternate currents are (1) motor (2) sensory, (3) chemical. The motor and sensory effects depend mainly upon the velocity of increase or diminution of the current; the chemical to the total amount of current and to the number of changes per second. Of these the chemical effect is by far the most important therapeutically. It consists in a general shaking up of chemical constituents of the tissues and

a consequent acceleration of the normal tissue changes. Of the three principal organic processes by which life is carried on, namely, nutrition, metabolism and elimination, the alternating current affects the first and last scarcely at all and the second very strongly. In order to secure the best therapeutic results, therefore, the processes of nutrition and elimination must be looked after by the physician at the same time by other means while using these currents.

Alternating currents are applicable to such a large number of disease conditions that the enthusiast is in danger of forgetting they are not in any sense a cure-all, but have certain physiologic and therapeutic properties which are clearly defined. In view of this property of accelerating metabolism the faradic currents are applicable in nearly all cases of chronic diseases and in these cases should be used to the limit that can be readily borne by the patient. With other forms of apparatus giving a smoother current the amount of current must be limited by the judgment of the operating physician and not by the sensations of the patient. As examples of chronic conditions which may be benefited by this treatment we may mention non-malignant tumors of deeper parts of the body, ulcerations both external and internal, chronic neuritis of nearly every form, myalgia, neuralgia. In acute and subacute bronchitis and some other similar conditions of the chest the use of the faradic current on the muscles of the chest and shoulders is advantageous in clearing up the conditions of these tissues, increasing the depths of breathing and permitting a rapid reduction of the internal inflammation.

In treating deep seated conditions of this sort large flat electrodes should be applied externally, with one or more layers of damp blotting paper between the metal and the skin, in such a position with the greatest possible amount of current passes thru the part to be treated.

The motor effects of the faradic current are valuable in cases of paralysis in order to maintain the condition of the muscles during the time of nerve regeneration. They are of much greater general value, however, in atonic conditions of the involuntary muscular fibers in various parts of the body, particularly the skin, stomach, intestines, uterus and uterine ligaments.

The sensory effects of the faradic current have been little investigated. A stimulating effect upon the whole nervous system is produced by strong sensation, as in all other cases, and this combined with the motor and chemical effects renders the faradic current invaluable as a general tonic. In cases of acute inflammation the current may be applied in an exceedingly mild way to cause gradual constriction of the dilated blood vessels thru the sensory reflexes, but if not used with almost imperceptible mildness this result will not be obtained. And this method of reducing inflammation is inferior to several other kinds of treatment. Very rapid alternations in a faradic current are much less irritating to the nerves than slower alternations.

The static machine has the disadvantage of being too large to be conveniently portable, but for office use the alternate current which is obtained by placing the patient in the circuit connecting the outer coatings of two Leyden jars whose brass balls are in contact with the prime conductors of the machine, is much superior to any that can be obtained from a faradic coil. When the discharging rods of the machine are about half an inch apart, each spark is accompanied by an alternate discharge in the Leyden jar circuit, and

if the balls on the ends of the rods are small so that the succession of sparks is very rapid the alternate current in the Leyden jar circuit is very nearly sinusoidal, and has all of the chemical effects of the faradic current with a very small portion of its sensory and motor effects. The latter can be obtained in sufficient quantity even here by increasing the distance between the discharging rods. Almost all of the conditions in which the faradic current is useful can be treated more successfully with the sinusoidal current from the static machine. A small convenient portable apparatus of some sort giving sinusoidal currents similar to these would be a boon to the practician.

EDITORIAL

We are in receipt of the 1904 Antikamnia Calendar, an attractive souvenir, presented by the Antikamnia Company of St. Louis.

The Bario Vacuum Company, of New York, have introduced a new water-cooled tube which will stand a very heavy current and is easily repaired if punctured.

Dr. Heber Robarts, of St. Louis, has sufficiently recovered from his recent illness to be about to take a trip to Europe. While there he will visit a number of laboratories and other electrical and radio-therapeutic institutes. We wish for his early return with greatly improved health and strength.

Dr. Carrie O. Heald, of Oceola, Neb., who was an enthusiastic x-ray worker and highly esteemed by every one who knew her, died at her home November 18, 1903, of typhoid fever. She graduated from the North Western Medical College in 1897. Her bereaved family have our deepest sympathy.

POUGHKEEPSIE, N. Y., Dec. 9, 1903.

EDITOR X-RAY JOURNAL:

Dear Sir—In your November number, page 325, is an article on "Vibratory Therapeutics," written by H. Fuller, in which there is very evident plagiarism. Beginning with the words "For this purpose," page 326, first column, line seven from top, and ending with the word "limited," at the close of second paragraph of next column. This is taken almost word for word from an article by Albert C. Geyser, M. D., in the October number *Journal of Advanced Therapeutics*, pages 614-15.

We trust this matter will not be allowed to pass without public notice in your journal. Yours very truly, H. W. BARNUM.

The title of this JOURNAL expresses its principal feature, but as all of our readers are aware the columns of the JOURNAL are not confined to discussions of the x-ray alone. The present editors have aimed to cover as completely as possible the field of x-ray and electro therapeutics, with such other items as are of especial interest in connection with these lines. With the next number of the JOURNAL we propose to widen our range so as to include all progressive lines of therapeutics. The least attention will be given to drug ther-

apy, as this part of the ground is well covered by existing journals. We are led to take this step because experience has shown that when the physician's attention is confined closely to any single method in therapeutics he is unable to derive from the study the same advantage as when each method is shown in its proper relation to the rest. X-ray and electro therapeutists are often charged with therapeutical narrowness. This charge is sometimes true. This JOURNAL is devoted to therapeutic science and art, and not to any particular theories or methods. Its field is progressive therapeutics—the application of the forces of nature to the cure of disorders and the upbuilding of the race.

The American Electro Medical Society.

The first annual meeting of this Society was held December 1 and 2 in room 412 Masonic Temple, Chicago. The visiting members were welcomed by Dr. Elmore S. Pettyjohn, president of the Illinois State Society. He congratulated those present upon the scientific program that was before them. Organization is necessary for efficiency in any department of work. Physicians especially are in danger of becoming self centered and dictatorial. Both broadness and culture are secured by wider association, and by the same means medical science is advanced and knowledge disseminated. The advantages and the necessity of organization are shown by the recent advances in the line of electro therapeutics, and the epoch making discovery of the Roentgen ray, which has become invaluable to surgeons as a diagnostic agent, and which has excited such remarkable interest as a therapeutic agent in diseases of the skin, tuberculosis, and cancer. It is the single aim of this society to advance science and art in relation to therapeutics. There is a world before us of knowledge which is to be opened up in the application of various physical agents to medicine. This is our aim and in this we will unquestionably succeed.

Dr. H. Preston Pratt, president of the American Electro Medical Society, stated that altho the Society had been organized but a short time it is meeting with remarkable success, having already more than one hundred and fifty members enrolled. He requested Dr. Pettyjohn, as vice-president, to occupy the chair during this session.

1. The Roentgen Ray and Surgery.

Dr. O. Shepard Barnum, of Los Angeles, Cal., president of the Southern California Electro Medical Society, was unable to be present. His paper, which was read by the secretary, called attention to the very large per cent of recurrence in all kinds of cancers after removal by the knife, and justified the eagerness with which physicians had searched for some better treatment, particularly since cancer is increasing in all parts of the country. The x-ray is no longer an experiment. We know what it can do, its dangers and its virtues. It is (1) stimulating, (2) inhibitive, (3) destructive. The destructive action is chiefly to be considered in regard to the treatment of cancers. It is not a fair substitute for the knife in operable cases. In the majority of cases the surgeon's aid should be enlisted, (1) to expedite the work, (2) for the comfort

of the patient, (3) to prevent septic conditions, (4) to insure against too extensive necrosis. The combination of the x-ray and the knife is better than either alone. In cancer of the breast, for instance, the knife may entirely remove the ulcer and contiguous indurations, leaving the pectoral muscles, glands and tissues of the neck, and possibly of the axilla, for the action of the ray. The ray should be used conservatively before operation in malignant conditions, and should invariably follow the knife as a prophylactic.

Dr. S. D. Greenwood, of Neenah, Wis., inquired as to the extent of the raying to be used after an operation; to which the Secretary responded that no screen should be used at all except to protect the face and hair.

Dr. H. P Pratt approved of the paper, especially of the advice to use the ray both before and after an operation. The ray causes a rapid increase in connective tissues and so chokes up the channels of infection.

Dr. Pettyjohn inquired what effect the x-ray had upon the healing process.

Dr. Pratt replied that it was not so good as the positive static breeze. The x-ray is liable to dry the tissues too rapidly.

The Secretary called attention to the dangers of using the rays too strongly either immediately before or immediately after operation, as sloughing might occur.

2. X-Ray Burns.

Dr. R. S. Gregg, of Chicago, attributed x-ray dermatitis to the chemical properties of the x-ray, corresponding to a sun burn.

If x-ray treatment be excessive the anabolic process of the tissues is unable to meet the katabolic process which has been accelerated by the rays. In deciding upon the susceptibility of the patient, idiosyncracies are not to be considered. The condition of the tissues is the all important fact. It is thoroly practicable to expose healthy tissue along with diseased. By close watching the operator can stop short of the destruction of the healthy tissue, since the diseased tissue is destroyed first. The treatment for an x-ray burn is, omit intense raying, increase the visceral elimination and apply mild antiseptics, etc., locally. It is not advisable to produce an x-ray burn in order to bring about a cure, especially in an ulcerated area, because a very rapid metastasis invades the adjacent inflamed area, the disorder spreads and the patient may die of sepsis. Parts exposed should be protected against the particles of dust thrown off from the surface of the tube.

Dr. Hamilton Forline said that while he knew little of the x-ray practically the slowness of the healing of an x-ray burn emphasized the necessity for keeping the tone of the tissues as high as possible.

Dr. Pratt stated that Dr. Gregg had had an experience of several years in this work and his conclusions are especially valuable.

Dr. Pettyjohn approved heartily of the advice to drain the patient—not his pocketbook. Specialists are apt to forget the man behind the disease. Good rich blood is, after all, the best healer.

3. Cell Tonic Adjuvants in X-Ray Treatment of Malignant Neoplasms.

Dr. Hamilton Forline, of Chicago, gave a number of cases in which cell tonics had been used with remarkable success in chronic cases. He referred particularly to cases of tuberculosis, chronic arthritis and cancer. While the x-ray breaks down abnormal tissues the cell tonics are a great aid in rebuilding the normal tissues, both hypodermically and by mouth.

Dr. Pratt stated that Dr. Forline was using lymph injections in his laboratory

on some cancer cases. As a tissue builder it's just what we want.

Dr. Replogle inquired if this lymph was anything like the Roberts-Hawley compound, and whether anti-syphilitic treatment had been used in the tabetic cases.

Dr. Forline replied that he had used the Roberts-Hawley solution, whose formula he gave, and that it contained eliminants. He had found mercury and the iodids of very little use in tabetic cases of long standing, tho he had used them occasionally to reduce pain. Pain is stopped by lumbar puncture and withdrawal of cerebro-spinal fluid up to one ounce at a time. If lymph is injected without previous withdrawal, pain is temporarily increased. The lymph increases the elimination of urea, carbon dioxid, etc., in 95 per cent of the cases in which it is used.

4. The Medico Legal Value of Roentgen Rays.

On account of lack of time Dr. Mihran K. Kassabian's paper was read by title. It will appear in the JOURNAL.

5. Electrolysis in Relation to Public Health.

The Hon. Edward B. Ellicott, city electrician for Chicago, was suddenly called to St. Louis on business connected with the World's Fair and was consequently unable to be present. His paper was read by title and will be published.

6. Applications of the X-Ray.

Dr. Heber Robarts has been seriously ill and was unable to prepare his paper in time for the meeting.

7. Galvanic Electrolysis for Stricture of the Urethra.

This paper, by Dr. J. C. Luke, of Oscilla, Ga., was read by the secretary. His method is the same as was perfected by the late Dr. Newman, except that he gives treatments a little more frequently, taking care, however, to wait until the inflammation from the previous treatment has entirely subsided. Some cases were given in detail to illustrate his technic. The secretary called attention briefly to the history of this method of treatment and to its recognized value in cases of urethral stricture.

Dr. Pettyjohn related a case of stricture which he had treated by electrolysis before the present methods were perfected, and had succeeded in perforating the perineum. In spite of this accident the stricture was finally overcome and the patient made a good recovery.

8. X-Ray and Electro Therapeutical Practice.

The Hon. John E. Kehoe, former trial attorney for Chicago, read this paper. He related several cases in his experience in which electrical diagnosis had enabled him to detect fraud in defending the city against damage suits. In one case a boy was terrorized by threats, and his guardian pretended that he had been dumb since a fall occasioned by a defective sidewalk. When a faradic current was applied the boy screamed and begged for mercy. He is believed not to have spoken before for a full year. Mr. Kehoe expressed his gratification that the x-ray and electricity was now able to throw so much light upon cases of personal injury that the genuine can be distinguished from the fraudulent with a great degree of certainty.

Dr. Hall expressed the opinion that it would not be difficult for the x-ray expert to deceive a court and jury, if so inclined and if not watched by an expert on the other side. Such diagnosis must always rest ultimately upon the reliability of the expert as well as the accuracy of his methods.

Dr. Pratt remarked that the agents of certain corporations that are interested in pushing fraudulent claims for damages

were anxious to stop this kind of diagnosis on the part of the city. This paper is exceedingly good and deserves wide publication.

9. A Study of Light—Ultra Violet Rays.

A very extensive explanation of the properties of ultra violet light were given by Dr. J. Mount Bleyer, New York. His paper was partly read and partly summarized by the Secretary. Dr. Bleyer has made some new and powerful ultra violet tubes, which are simply ordinary vacuum tubes exhausted to a degree just below that required for x-rays. When the tube is electrically excited ultra violet rays of great intensity, which have the power of passing thru glass and many opaque substances, are given off. Dr. Bleyer contrasted the properties of these rays with the statements usually made by physicists regarding the penetrative power of ultra violet rays. The same rays had been observed by others coming from Geissler tube.

Dr. H. B. Forline inquired whether ultra violet rays were produced in any considerable quantity from an arc light in which the carbon contains some copper sulfate. He had seen good results obtained by the use of such a lamp in the treatment of lupus.

The Secretary replied that while he had not seen such a lamp tested it would not be surprising if ultra violet rays were given off in large quantities from it. He doubted whether, after all, the rays from Dr. Bleyer's tube were identical with the ultra violet rays. The differences in their power to pass thru glass were suggestive of a marked difference in their nature. Dr. Bleyer's investigations in this direction are of the greatest value.

10. X-Ray Diagnosis of Ureteral Calculi.

This paper, by Drs. Byron Robinson and R. S. Gregg, gave a full report of the methods by which ureteral calculi can be accurately diagnosed by the x-ray. In reading the paper Dr. Robinson stated that the x-ray is capable of detecting the calculi, because every ureteral calculus, whatever its nature, gives a distinct x-ray shadow; and failures to detect a calculus when present are due to faulty technic or an inability of the operator to interpret the shadow. The essential things in taking a photograph are to empty the alimentary canal and to get a good photographic plate close to the patient.

The paper dealt with these matters very fully and gave details of work done in Dr. Pratt's laboratory.

11. Electrical Diagnosis.

Dr. S. V. Clevenger, the reader of this paper, said that the old writers on electro therapeutics were so obscure as to be in many cases unintelligible. They made everything as complex as possible. Their formulas for electro diagnosis shared this general muddiness. Many years ago he had suggested a simplification of this nomenclature by leaving out the last letter of the formulas C C C (Kathodal Closing Contraction), etc., and replacing it with a number giving the milliamperes necessary for contraction. The formulas C O C and A O C are practically useless. We have then the following simplification; for the arm C C 3, A C 5, normally, which in degenerative conditions becomes C C 5, A C 3. For the leg we have normally C C 7 and A C 10, which in degenerative conditions becomes C C 10, A C 7. This nomenclature has been adopted by many electro therapeutists and often without acknoledgment.

12. Cutaneous Hypertrophies; Their Treatment by Electrolysis.

Dr. H. Perkins Fitzpatrick, Chicago, apologized for turning the attention of the Society away from the more serious subjects to the consideration of minor diffi-

culties involving the cosmetic rather than the physical condition of the patient. He then gave a brief synopsis of the relation found practically between facial blemishes and various nervous disorders, to emphasize the value of facial treatment as a means of relief for even these more serious conditions. He then described in detail the electrical processes which he was in the habit of using for the removal of facial blemishes. This kind of work must always remain to a considerable extent in the hands of the specialist, since success depends not only upon knowing what to do and how to do it but also upon a steady hand, a clear eye and an experienced judgment.

Dr. Clevenger inquired whether the negative electrode was used in all cases.

Dr. Fitzpatrick said yes, except in angioma. The negative electrode is used for everything but plexuses. A steel needle may be used as a negative electrode but a platinum needle is more satisfactory in all cases. If the needle is not fine enough, grind it finer. Reduce inflammation when necessary by the use of hot water and the application of zinc ointment.

Dr. Pettyjohn expressed his satisfaction that we have among us a medical man who is a specialist in this department of work. He heartily approved of the paper.

13. Suggestion in its Relation to Electrical Applications.

Dr. Charles Gilbert Davis began by stating that force and consciousness are the only essential existences. Thru the senses, which are the windows of consciousness, man gets impressions, and these are suggestions. Faith, hope, expectancy and belief are agents producing physical effects. He gave a report of a case in which one grain of calomel acted as an excellent hypnotic when coupled with suggestion; but suggestion must always be made along the lines of scientific truth. This is important. Introspection is liable to create disease. Faith, like electricity, must have a conductor by which it can be conveyed thru the senses.

Dr. Lewis said there are two distinct kinds of mind, the conscious and the subconscious. These two phases of consciousness belong separately to the two nervous systems. The subconscious kind receives its stimulus only from the cells of the body, including the brain. The cerebro spinal system, the organ of conscious mind, relates mainly to outside affairs; and excessive stimulus from without acting upon the brain disturbs the subconscious system and produces in consequence all kinds of physical disorders. Therapeutic effects are produced in a similar way.

Dr. Pettyjohn related a case in which a small dose of calomel had enabled a patient troubled with insomnia to obtain sleep for three nights. Every physician must be a psychologist. Every cure is a faith cure, and every remedy is a faith remedy acting along physiological lines. Physicians should know this and not leave suggestive therapeutics to quacks.

Dr. Forline thot that if it was possible to demonstrate fully the power there is in suggestive methods our power would be almost unlimited. Suggestive minds control almost all the organs of the body. We all use suggestion. Personality, the ability to inspire confidence, is most important.

Dr. Greenwood said the use of suggestive therapeutics is not elective with the physician. Suggestive effects are produced whether the doctor wishes it or not, and the only sensible thing for him to do is to make himself familiar with the laws of suggestion and apply them scientifically.

Dr. Sayer said he had watched Dr. Pilgrim's clinics until convinced there was no fake about them. Nervous troubles are most readily overcome by this means. He had seen a woman, crazed by the loss of her children, cured by this means in a week or ten days. He was in the habit of referring obstinate cases of constipation to Dr. Pilgrim for cure.

Dr. Pratt said the human body resembles a magnet in that the forces in it affect another body. Telepathic impulses reach even to the other side of the world. The impulse, thru the senses, whether conscious or unconscious, produces a current to the brain and makes an explosive disturbance among the molecules there.

Dr. Davis in closing said the subject was too broad to explore fully at present. His paper was merely suggestive. Back of all untruths in popular superstitions lies the truth in suggestion. A few years ago he had read a paper before Chicago Medical Society upon this subject which had acted like a red flag before a herd of bulls. He was glad to know that many of those same physicians had since then expressed a change of view regarding suggestion. He emphasized again his statement that suggestion must follow lines of truth. Mere placebos are not good. Give medicines as needed and make them a conduit for true suggestion.

14. The Distribution of X-Rays from a Crookes Tube.

Dr. T. Proctor Hall described some experiments made to obtain the relative intensity of the x-ray from the various parts of the illuminated hemisphere of the Crookes tube. Curved strips of sensitized film were exposed to tubes of various degrees of vacuum. The results were illustrated by diagrams and showed that the zone of greatest intensity varied in position according to the vacuum of the tube.

15. First Principles in Electro Therapeutics.

This paper, by Dr. H. Preston Pratt, discussed the facts of electricity and x-rays in the light of the electron theory, and attempted an explanation of the changes produced in the tissue by means of movements of electrons which result in dissociation of the ions. He enlarged also upon the concept of each atom being composed of a large number of electrons whose motions are in harmonic ratio to each other. As soon as this rate of oscillation is disturbed some of the electrons break away from the atomic system. Electricity he considers to be the same as the force between atoms. Lodge says that the electrons are units of electricity. Gravity also, in Dr. Pratt's view, is an electrical phenomenon.

Dr. Hall stated that the concept that each atomic group consists of a moving system whose parts have harmonic relation to each other was announced by the chemist Mendeleef many years ago, who at the same time pointed out that a stable molecule must consist of atoms whose oscillations are harmonious, and that a discordant rate of vibration meant molecular decomposition. There is no doubt that this view will be much more fully developed in time. Dr. Lodge tries very earnestly to explain matter in terms of electricity, or electricity in terms of matter, but all such attempts are absolutely worthless, for to anyone except an idealist matter and energy are entirely distinct concepts. There is no probability at present that electricity and gravitation will be more closely identified than is expressed in the statement that they are both forms of ether strain.

Dr. Rufus H. Bartlett congratulated the Society upon the new facts and theories which were being brot to their attention thru this meeting. In a few

years' time there will no doubt be a multitude of discoveries in the realm of molecular physics and in the applications of electrical science to medicine and the arts.

For want of time the following papers were read by title:

16. Clinical Observations of the X-Rays, by John E. Gilman, M. D., Chicago.

17. Causes and Forms of Treatment in Chronic Prostatitis, by F. A. Leusman, M. D., Chicago.

18. Recent Advances in X-Ray and Electro Therapeutics, by Elmore S. Pettyjohn, M. D., Chicago.

19. Combined X-Ray and Chemical Treatment of Cancer, by O. W. McMichael, M. D., Chicago.

20. X-Rays in Malignant Tumors of the Eye, by John E. Harper, M. D., Chicago.

21. Electricity in Cataracts, by J. Lloyd Hammond, B. S., M. D., Chicago.

22. Electricity in Drug Habits, by R. H. Bartlett, M. D., Chicago.

23. Electricity in Gynecology, by Gustavus M. Blech, M. D., Chicago.

24. Clinical Notes on the X-Ray in Diseases of the Skin, by C. D. Collins, M. D., Chicago.

25. The Vortex Theory of Electricity and Magnetism, by T. Proctor Hall, A. M., Ph. D., M. D., Chicago.

The attendance at the meeting was small, owing partly to insufficient advertisement and partly to the fact that it was an especially busy season for those locally interested. The sessions planned for December 2 and 3 were both held on December 2, to accommodate a number of members who were unable to remain longer. It turned out, however, that a considerably larger number, who were unable to be present until the last day, were disappointed by this change.

At the meeting of the National Executive Council the following officers were elected for the ensuing year:

President—O. Shepard Barnum, M. D., Los Angeles, Cal.

Vice-Presidents—T. Proctor Hall, Ph. D., M. D., Chicago, Ill.; Heber Robarts, M. D., St. Louis, Mo.; Mihran K. Kassabian, M. D., Philadelphia, Pa.; H. C. Bennett, M. D., M. E., Lima, Ohio; S. D. Greenwood, M. D., Neenah, Wis.; J. Mount Bleyer, M. D., New York, N. Y.

Secretary—T. Proctor Hall, Ph. D., M. D., Chicago.

Treasurer—O. W. McMichael, B. A., M. D., Chicago, Ill.

The vice-presidents are, under the constitution, the presidents of various state Electro Medical Societies.

Dr. H. Preston Pratt was re-elected chairman of the Executive Council.

At the session of the Illinois State Medical Society the following officers were elected:

President—T. P. Hall, Ph. D., M. D.

Secretary—Hamilton Forline, M. D.

Treasurer—P. S. Replogle, M. D.

American Roentgen Ray Society.

The fourth annual meeting of the American Roentgen Ray Society was held in the auditorium of the Houston Club, University of Pennsylvania, Philadelphia, December 9 and 10, 1903, under the presidency of Professor Arthur W. Goodspeed. The meeting was a very satisfactory and gratifying one, showing great progress in the field of the x-ray worker. The papers, numbering nineteen, were both interesting and scientific and contained an invaluable fund of information. The attendance was good, beyond expectation, many of the members participating actively in the discussions of the papers. From the point of view of work accomplished this was the most successful meeting of the association, even more so than the Chicago meeting. The reports of the secretary and treasurer were exceedingly gratifying showing the association to be in a very prosperous and flourishing condition. The membership at present is about 400.

The first paper on the program was read by Dr. William S. Newcomet, of Philadelphia, entitled

Pathologic Changes in Tissue Under the Influence of the X-Ray.

The author considered the macroscopic and microscopic findings in tissue that has been subjected to the action of the x-ray, summing up with the statement that the degenerative changes are by no means peculiar to the ray, nor characteristic. Slight burns resemble a sunburn. Severe burns are peculiar and may run through an incubation period of some months. When the ulcerative process does not extend deeper than the superficial structures no scar is formed, but when the ulceration extends into the deeper structures scarring is inevitable. The important early changes seen in the tissues so exposed are, first, fatty degeneration with vascularization of the epithelial pearls: second, leucocytic infiltration of a varying degree, which completes the destruction. Bodies which can not be distinguished from Plimmer's bodies are found in the tissues. In fact, these are changes characteristic of epithelioma, which, as we know, yields to the action of the x-ray. The degenerative process is dependent upon the tissue exposed and the method of application of the x-ray. It appears that the hair follicles are more susceptible to the action of the ray than other tissue, altho the reason for this has not yet been determined. The growth of some tissues is stimulated by the x-ray.

The discussion of this paper was opened by Dr. Gordon G. Burdick, of Chicago, who did not agree with the essayist in his conclusions. He has failed to note that the growth of tissues was stimulated by the ray, altho that result may have been due to the fact that the author uses a very penetrating ray which possesses stimulating qualities. Personally, he prefers a tube with just sufficient penetration to reach the tissue to be affected thereby, because the result is a much more gratifying one and there is less likelihood of burning. He finds that the epithelial tissue suffers at the expense of the connective, but whether the epithelial tissue is choked by the connective tissue, or whether the epithelial tissue is killed and the connective tissue simply takes its place, has not yet been proven.

Dr. Clark, of Olean, N. Y., has found that the longer the history of the case the surer the result, and the more acute the case the surer the irritation; and these latter cases are best submitted to the caustic treatment.

Dr. Weston A. Price, of Cleveland,

Ohio, raised the question whether it is possible that all tubes have in them a great variety of penetration, from high to low; because in low tubes you still have some rays having a high penetration, and in a high tube we have rays of low penetration. Therefore it is impossible to select tubes having rays of only a certain penetration.

Dr. Henry Hulst, of Grand Rapids, Mich., said that a tube having a high resistance is not necessarily a high tube. It is, in his opinion, useless to attempt to measure the penerating power of the x-ray, because the reaction is the same. Regarding the stimulating effect of the x-ray, it is the universal opinion that the first effect of the ray is that of stimulation, and that this is followed by depression, and then dissolution. This action is just as true of the x-ray as it is of certain drugs. The effect of the ray is dependent to a large extent on the quantity absorbed or taken up by the tissues. The rays from a penetrating tube pass thro the body without affecting the tissues very much; therefore the effect is the same as that produced by a small amount of radiance emanating from a soft tube.

Dr. Burdick stated that all his therapeutic tubes were reduced below the line where any ray is given off, and that he could control the degree of penetration of the ray by the speed with which he drives the cathode stream, and this is controlled by the electro-motive force of the apparatus. He described at some length his methods and apparatuses and the differences between fluoroscopic and photographic images caused by static machines and the coil in this connection, which are well known to all radiographers.

Dr. Newcomet, in closing, called attention to the fact that the discussion had drifted away from his paper. What he said was that slow-growing deep or superficial growths always do well under this treatment, but that rapid-growing growths do not, because they soon cause metastases.

Dr. Charles Lester Leonard, of Philadelphia, followed with a paper entitled:

The Results of the Roentgen Method in the Diagnosis of Renal Calculus.

The x-ray affords a more steady differentiation of calculous conditions in the kidney and surrounding organs than any other one method. It is precise, comprehensive and free from danger. It facilitates operation by giving size, number and location of the calculi. It eliminates the possibility of operating on the wrong kidney; reduces operative trauma and shock, and renders exploratory operations unnecessary. A positive diagnosis can be made with an error of less than 3 per cent; but it will not be used universally as a diagnostic agent until its use is demanded by the general practitioner. It is also useful in differentiating between various lesions of the kidney; between ureteral calculus, appendicitis and oophoritis. The negative diagnosis is as absolute as the positive, a calculus being found in only one case out of eighty-nine in which the skiagraph did not show any shadow of stone. If the operator fails to find a stone when it is shown by the skiagraph, the probability is that the former is an error. A more careful search usually will reveal the calculus. The author also exhibited a number of skiagraphs and lantern slides illustrating calculi in the kidney and ureter, and pointed out some of the errors that are made in interpreting the shadows.

Dr. James B. Bullitt, of Louisville, Ky., in opening the discussion, said, that the value of this method is incontrovertible, but that success in its application is dependent upon several factors—experi-

ence, good apparatus, and especially skill in interpreting the plate and in detecting shadows, because some stones are very small, and some possess little density, especially those composed of uric acid. The surgeon in particular appreciates this method of differentiation because it possesses all the advantages claimed for it by Dr. Leonard. He cited a case in point. A diagnosis of renal calculi was made without the use of the x-ray, and because the kidney tissue was destroyed in large part a nephrectomy was done. On opening the kidney two stones were found in the pelvis. For experimental purposes the kidney was rayed, and to the astonishment of the operator another stone was discovered high up in a calyx. Without the x-ray it would have been impossible to find this stone, and if the kidney had been in such condition that its removal would have been unnecessary, the operator would have removed the two stones in the pelvis and the third stone would have remained in situ, thus invalidating the operation and making another operation necessary. Many similar cases have been reported by others, and that is the most conclusive evidence in favor of using the x-ray as a routine method of diagnosing calculous disease of the kidney. The tube should be of such a character that shadows of less density than the stone are demonstrable. When viewing a microscopic slide we find that many objects can be brot into view only by reducing the light considerably, because of their slight density.

Dr. Henry Hulst, of Grand Rapids, Mich., finds that much better work can be done in this particular field by cutting out the secondary rays by means of compression of the body, thus lessening the distance between the anode and the plate. Another method which has been advocated is inflation of the colon with air. It is especially useful in large subjects and it obviates the necessity of having a tube possessing a particular penetration. He exposes for two minutes, using a tube that will penetrate through six openings in the Walter skiameter. For small subjects a penetration through five openings is sufficient.

Dr. Leonard in closing said that his technique was the very simplest. He does not use compression or inflation, nor does he make use of any apparatus except that necessary to make the skiagraph. He places his patient on the back, elevating the head and hips so that the lumbar region will be in close contact with the plate. He uses a tube having a resistance of from one and a half to two inches parallel spark on the apparatus he uses (this factor varying considerably on the individual apparatus), places this at a distance of eighteen inches from the body and makes a very short exposure. If the patient is inclined to be fleshy he increases the vacuum to two and a half inches with a parallel spark gap, and elevates the tube.

Dr. Clarence Edward Skinner, of New Haven, Conn., presented a paper entitled:

Two Cases of Severe X-Ray Necrosis, Presenting Some Unusual Features.

The noticeable features of the first case were: (1) The depth to which to the necrotic process extended. (2) The tanning and excessive proliferation in spots of the epithelium of the new skin that was exposed had been browned directly by the ray, which new epithelium had not been exposed to the ray and was apparently normal in color and structure when it first developed. (3) The cessation of pain as soon as the necrotic tissue had completely separated. (4) The favorable effect of the galvanic current in hastening the healing process after the

necrotic tissue had sloughed off. (5) The appearance of the area of necrosis five months after the last x-ray application in a region which had previously exhibited no evidence that such an injury had been inflicted. (6) The happy effect of the anesthesene and talc mixture in relieving the pain of the last mentioned ulceration.

The noticeable features of the second case were: (1) The sudden appearance of a subcutaneous effusion of blood in areas which subequently became necrotic. (2) The spontaneous development of profuse erythema and structural modification in the newly formed skin exposed by the exfoliation of that which had been browned by the direct agency of the rays. (3) The cessation of the pain as soon as the necrotic tissue had separated completely. (4) The apparent failure of the direct electric current to accelerate the separation of the necrotic tissue, and its gratifying effect upon the reparative process after this tissue had sloughed. (5) The appearance of an area of necrosis six months after the last x-ray application in a region which had previously exhibited no evidence that such injury had been inflicted. (6) The aggravation of the pain produced by the anesthesene and talc mixture. These two cases are a warning against exposing a patient to the x-rays with even a moderate degree of frequency thro long periods of time, no matter how well they seem to bear them at first.

Dr. Skinner also reported a case of cervical adenitis treated successfully with the x-ray, in which there followed a marked growth of hair over those parts of the face and neck that were exposed to the ray. Similar instances were reported by Drs. Newcomet, Pancoast, Allen, Girdwood, Bullitt and others.

Dr. Henry Hulst, of Grand Rapids, Mich., contributed a paper entitled:

Skiagraphy of the Chest.

This very excellent paper considered the value and technique of skiagraphy of the chest, and was supplemented by skiagrams and lantern slides. The author arrived at the following conclusions: Skiagraphy of the chest is a valuable supplementary method of physical diagnosis, and especially so when it is desired to obtain pathologic detail. The subject must be at rest and the respiration suspended for a second, one second exposure sufficing to give a good skiagram. To skiagraph limited portions of the chest, diaphragms should be used. To secure contrast the plates may be sandwiched between calcium tungstate screens. The induction coil is better than the static machine for this work. The tube must be able to keep its vacuum. The lowest tube that will do the work is the best for this purpose.

Dr. Mihran K. Kassabian, of Philadelphia, followed with a paper entitled:

How to Obtain an Instantaneous Skiagraph of the Thorax.

He said that the coil is the most important part of the x-ray equipment; it will excite a tube more effectively than will the static machine. The best coil should be of twenty inches spark-producing capacity. Of equal importance is the interrupter. In thoracic skiagraphy the electrolytic interrupter is the best. A rapid make and break, from 8,000 to 16,000 vibrations per minute is very satisfactory. The mechanic interrupter is unsuited, because the vibrations are not sufficiently rapid for quick exposure. A tube with a high vacuum and high penetration is highly essential in rapid skiagraphy of moving tissues. The degree of penetrability is best measured with the fluorescent screen. Intensifying screens should be used only when the condition of the patient demands the shortest possible ex-

posure. The plate must be a highly sensitized one.

Dr. Kassabian also exhibited a specially constructed table of his invention for taking skiagrams. It is so arranged that the patient can with comfort and convenience assume any position that may be necessary for taking a good skiagram. An adjustable plate holder and diaphragm forms a part of this apparatus. It simplifies the work very much and makes it much more accurate than when done in the usual way.

The discussion on the papers by Dr. Hulst and Dr. Kassabian was opened by Dr. Gordon G. Burdick, of Chicago, who said that he was of the opinion that better results are obtained from prolonged exposures, fifteen or thirty seconds. Another item is the great loss of tubes in this instantaneous work. Successful instantaneous skiagraphy is largely dependent on a good developer. Amidol, rodinol and metol are the best and preferable to the hydrochinon, which altho the most contrasty developer is also the most contrary and the slowest; it is unsuited for this instantaneous work.

Dr. Preston M. Hickey, of Detroit, Mich., was of the opinion that sufficient attention is not given to a complete interpretation of all the shadows shown in an instantaneous skiagram. The shadows of the bloodvessels and bronchi are very apt to be mistaken for areas of consolidation unless both sides of the chest are compared very carefully.

Dr. William E. Sweet, of Philadelphia, contributed a paper on

Localization of Foreign Bodies by the Roentgen Rays.

The author considered the subject with the view of locating accurately any foreign body. In this connection he exhibited two apparatuses, one for locating foreign bodies in the head, and the other for the whole body, especially the extremities. The principle of his method is to take two skiagrams at such angles that the exact location of the foreign body can be determined by a very simple calculation, yet an accurate one.

Dr. Henry E. Waite, of New York City, followed with a paper on the

Care of the Static Machine.

He said that the arch enemy of the static machine is vapor, which should be kept out of the machine by judicious cleaning, or by building the machine air-tight. He fills two or three fruit jars with a mixture of two parts of ice and one part of rock salt; places these jars inside of the apparatus for fifteen minutes, then removes the accumulated water, replaces the jars again for a short time. Calcium chloride is then put into the machine. This must be baked thoroly first, and as soon as it crumbles it should be removed and replaced. The case can also be dried out by placing on the inside a lighted Bunsen burner, the plates revolving slowly all the time; but care must be taken that the burner does not smoke. If the machine refuses to charge it is an indication that there is too much vapor. But after following the procedure above outlined, it will be found that the machine can be made to charge inside of half an hour. Whenever the atmosphere is cold and dry it is advisable to take out both doors of the machine and allow the plates to revolve slowly for half an hour.

The plates should be cleaned with kerosene oil, followed by vaselin. This loosens the dirt and also rubs it off. The brushes should be boiled in caustic potash; then hot water, and dried thoroly. All the buttons and sectors should be cleansed with the kerosene oil. The operator should not neglect to clean the glass legs of the platform. By keeping the machine free from

vapor and dirt good results can be obtained in all kinds of work.

Dr. W. W. Johnson, of Rochester, N. Y., after saying a few words in defense of the Wimshurst and Toepler-Holtz machines, said that he had tried a number of methods for drying out his machines and he finds that the best of them all is the use of calcium chlorid. He bakes the calcium chlorid, stirring it all the time, until he has a mass resembling maple sugar. This mass is very porous and will soak up water faster than any other substance. He keeps some of this mass in the machine all the time, replacing it with a fresh lot whenever it is necessary. The machine is dried out completely in from fifteen to thirty minutes. If the brass plates were lacquered instead of being plated, the machine could be kept clean more easily.

Dr. John C. Pitkin, of Buffalo, combats the vapor in his machine by placing into a chamber that he has built into the machine half a bushel of common quicklime. The lime cannot scatter through the apparatus; in fact, this need never be opened when the lime is put into the chamber. There is sufficient air circulation so that the machine is ready for use in a very few minutes. It is important not to let the lime come in contact with any part of the machine.

Dr. Wetherell, of Philadelphia, determines the amount of moisture in his machine by placing in the apparatus a piece of paper moistened with a solution of chlorid of cobalt.

Dr. Gordon G. Burdick, of Chicago, did not approve of putting a chemical drier inside of the static machine, except calcium chlorid, as used by Dr. Johnson. The best as well as the cheapest hygrometer is a gingerbread cookie placed inside of the machine. If you can bend the cookie without breaking it there is too much moisture in the apparatus. The Wimshurst machines are the least susceptible to moisture short of deluging them with water. He has provided his apparatus with an inlet and an outlet valve, and by means of an electric pump he exhausts the air from the apparatus, passing it thru calcium chlorid, thus making it moisture-free.

Dr. G. P. Girdwood, of Montreal, Canada, has used a Wimshurst machine for two years without having to dry it out. In using chlorid of calcium it is necessary to be sure that you get the right thing. He cited an instance where the druggist sent a man some carbid of calcium instead, and, of course, the machine would not dry out.

Dr. Johnson, of Pittsburg, referred to a similar instance, the carbid exploding and causing considerable damage.

On the evening of the first day, the president, Prof. Arthur W. Goodspeed, delivered his address. He choose for his subject

The Trend of Modern Thought Upon the Subatomic Structure of Matter.

The paper was exceedingly interesting and the author discussed his subject in full from the standpoint of physics. It is impossible to give an abstract of the paper because each part was so closely connected with what followed, and we must refer the reader to the complete article.

The program of the second day was opened by Dr. Preston M. Hickey, of Detroit, Mich. He considered

The Development of the Skeleton, Radiographically Considered.

This excellent paper was very freely illustrated by means of lantern slides and showed that the author had given the subject considerable thot and time. He exhibited radiographs showing the ossification of all the bones in the body; the time

when it begins; time of completion; order of occurrence in the various bones and the time of occurrence. The work is valuable not only from an embryological and anatomic standpoint, but also clinically. He arrived at the following conclusions:

1. The radiograph offers a simple means for studying the formation of the bones of the body.

2. To the anatomist it offers a simple means for studying the formation and conformation of the epiphyses of the bones.

3. The statements in the anatomies concerning bone development should be revised according to the knowledge gained by the radiograph.

4. Reproductions of radiographs of fetuses at different ages should be inserted in our anatomies in order to elucidate a phase of the subject that is at the present time neglected somewhat, nor is it perfectly understood.

5. For diagnostic purposes radiographs of an injured joint should always be compared with the radiograph of the normal uninjured joint. It is the only positive means of making a correct diagnosis.

Dr. G. P. Girdwood, of Montreal, commented on the importance of having these studies made. It gives us correct information as to the time of bone information; the normal appearance of children's bones and joints, and possibly may serve to give us a clue as to the probable age of a child, a very important matter from the medicolegal standpoint. The speaker exhibited several skiagrams of monstrosities, showing the nature of the maldevelopment.

Dr. Charles L. Leonard, of Philadelphia, showed two slides, one of a normal fetus at term, in which he had injected the bloodvessels very carefully; the other a cretin, showing all the malformations of the bony skeleton.

Dr. James B. Bullitt, of Louisville, Ky., said that a complete radiographic history of the growing skeleton was a matter of the greatest importance clinically in the study of fractures of the bones, and every anatomist should make a detailed study of this subject, so that it can be presented in proper form to the medical student.

The next paper was contributed by Dr. Kennon Dunham, of Cincinnati, Ohio, who considered

The Effects of X-Rays on Lower Animal Life.

The author used in his experiments a number of animals, which he subjected to various experiments in order to determine the effect of the x-ray on tissue. He believes that living tissue is stimulated when subjected to properly attenuated projective force. Those who claim that the kathode rays and not the x-rays are essential to the destruction of epithelium are probably wrong. In his experiments he found that the animals used possessed varying resistance to the rays. Some were not affected by it, while others were killed outright. The closer the tube to the object the more destructive the ray. Low tubes excited by small currents are not so destructive as low tubes excited by heavier currents. Very high tubes have very little effect. For the destruction of epithelioma and sarcoma cells a low tube, excited by a heavy current, is the best.

Dr. Wm. H. Dieffenbach, of New York City, called attention to the work done by a German scientist in this connection. Instead of using animals, he experimented on spermatozoa, using the rabbit for that purpose. He found that those rabbits that were exposed to the ray lost all sexual power and that their spermatozoa were dead, a point that should not be lost sight of by the x-ray operator, so as to avoid unnecessary exposure.

Dr. Henry E. Waite, of New York City, criticized the indiscriminate use of the terms high tube, low tube, soft tube and hard tube. The amount of gas in a tube is responsible for these terms, and it amounts to nothing. It is the penetration of the tube that is significant, and it is really the only thing that can be determined.

Technique for Making Good Dental Skiagraphs.

was the title of a paper read by Dr. Weston A. Price, of Cleveland, Ohio. The essentials are a relatively high penetration and a large volume. The former gives the contrast between dense substances, such as tooth substance, bone and root fillings. The large volume is essential for short exposures, which are necessary to secure the best definition. This requires a very powerful generator. He prefers a large coil and Wehnelt interrupter. A tube is required that will make quite transparent and white the bones of the hand. For locating abscesses use a tube of lower penetration than you would use for locating root fillings. The author uses a specially prepared film of very flexible celluloid, which is covered with a waterproof and lightproof container (unvulcanized black dental rubber calendered thin). This film can not be either bent, broken or scratched. The technique followed is given at length, but with the exception of the points mentioned does not differ from that usually pursued.

Dr. L. E. Custer, of Dayton, O., in discussing the paper, took exception to the Wehnelt interrupter being the best to use with the coil. Personally, he favors a porcelain diaphragm, with a hole thru it. It is simple and easily controlled and very efficient. It consists of a porcelain cup, having an inside capacity of two inches by six. Near the bottom is a hole, at an angle of forty-five degrees. The cup is poised in such a manner that it can be tilted to one side or the other. The volume of current is in direct proportion to the size of the opening, and the frequency of interruption is proportionate to the period of time that each bubble of gas is displaced, and the circuit is again established. The thickness of the wall and the depth of the solution also modifies the frequency of interruption. He cautioned against using too high a tube, but advised a tube having a fixed vacuum. The protection of the film as advised by the author is unnecessary. He places two films face to face inside of two separate coverings of black waterproof paper, thus answering every purpose as to precaution, and also giving him two films with every exposure, each of which can be developed in a different manner.

Lantern slides of deformities of the teeth were exhibited by Drs. Cryer, Goodspeed, Pancoast, Leonard, Cook and Kassabian. Dr. Kassabian places the film on the outside and sends the ray into the mouth thru the partly separated teeth. While a longer exposure is required, yet the relation of the other is shown better because it obviates the necessity of using a small film, as is the case in the intraoral method as described by Dr. Price. Dr. Price, in his closing discussion, said, in reply to Dr. Cryer, that in order to locate exactly an impacted tooth he invariably took two pictures at different angles, and that gives not only the location of the tooth, but also the direction of its roots, so that proper extraction can be done.

Dr. Gordon G. Burdick, of Chicago, discussed

Developers.

In his opinion, pyrogallic acid is the best for all purposes, but is not used in large cities, where there is so much or-

ganic matter. It injures the hands very severely, in one instance necessitating amputation of the arm. Eikonogen is very slow, unless used in concentrated solution, and then it reduces the silver not polarized by light, causing confusing shadows. Hydrochinon is most contrasty developer, but it is very slow. It builds up the high lights at the expense of the shadows. It does not fog or veil the plate. The negatives have only two tones: high lights and shadows. It requires three hours to reduce polarized silver. Metol works very rapidly and gives a wealth of detail. Negatives are soft, but finer tones show beautifully by transmitted light. It is the best developer for stereoscopic photography. Amidol is very rapid and is the best developer for instantaneous skiagraphy. The negative is very fine and transparent, so that good positives can not be made without intensifying the negative. Combination developers give better satisfaction, because you can take the good qualities of each developer, submerging the less desirable. He uses a mixture of ortol and metol. It gives the best negatives, but is not suited to instantaneous work. The solutions are as follows:

Sol. A.—Metol.
Ortol, 15 grams each.
Pot. Metabisulf., 8 grams.
Pot. Brom., 1 gram.
Distilled water, 1,000 grams.

Sol. B.—Sod. Sulfite, dry, 40 per cent., and Sod. Carb., dry, 60 per cent., in water, 1,000 grams.

Use thirty cc. of each and dilute with water according to the effect desired. The less water the more contrast, or by diluting the softer the negative. Ortol imparts a brown color, which gives the greatest possible contrast. It will not fog or veil, no matter how long the plate is left in the solution. Metol brings in a wealth of detail and does not fog the plate. Sodium sulfite imparts a black stain to the silver molecule. The metabisulfite of potassium preserves the developer and prevents the action of the oxygen in the air on the solution. The sodium carbonate is a time saver. It is not required usually and is harmful. If used in too great strength there is a loss of the sharpness of the lines. The gelatin becomes soft, changes its position on the plate and relation is lost. Temperature is accountable for most failures to get good results. It should be neither too cold nor too warm.

In discussing this paper, Dr. Mihran K. Kassabian, of Philadelphia, said that the trouble is that operators do not learn how to use a developer. They change too often instead of adhering to one developer and learning its good qualities and its bad qualities and then modifying them to suit the case in hand. The developers are all good if they are used properly, and it is best to select one and then learn how to use it. Good plates are dependent upon the time of exposure, the dilution of the developer, its reaction, the temperature of both the developer and the room, the particular effect desired, and each is correlated to the other. It is best to go slow, beginning with a weak solution, which you can then modify to suit. Of course, much depends upon what you are after, because in the case of calculi you can develop as you please, but where soft details are desired, the development must be carried on very carefully. Metol has one objection; it irritates the skin, and especially the skin of the x-ray worker.

Dr. Wm. H. Dieffenbach, of New York City, called attention to edinol, which he has found very efficient in the development of plates made of fractures, bone tuberculosis and aneurisms.

Professor Goodspeed confessed to using all the developers. After using one he threw it into a slop jar, and finally he

obtained a mixture of a large number of developers. Whenever he desired to get a particularly good plate he used the slop jar mixture, with good result.

Dr. J. P. Hetherington, of Logansport, Ind., said that he had had the same experience.

Dr. Henry K. Pancoast, of Philadelphia, contributed a paper entitled:

The Therapeutic Effect of the X-Rays, as Shown from the Results of Treatment of One Hundred Cases.

The author considered the value of the x-ray as a therapeutic agent and expressed himself as being very much disappointed with it. He has treated a large number of cases both in hospital and private practice, the latter being the more satisfactory. Most of the cases were epitheliomata and sarcomata, and not more than 10 per cent of these were cured. In the cases of skin disease the result was more satisfactory. Of course, it is very difficult to get hospital or outpatients to submit to proper treatment, because they will come when they please and as long as they please. Then, too, the cases referred to the x-ray man at the hospital are those that are considered hopeless by the surgeon, and nothing much is expected to accrue from the use of the x-ray. This may account, he thot, for his results not coming up to his expectations and for the small percentage of cures in the cases of malignant disease. He showed lantern slides of a number of cases of tumor, and especially keloid, in which the treatment with the x-ray was not satisfactory, but largely because of the intractability of the patients, most of whom were colored. He does not consider it safe practice to expose to the x-ray lupus or any other malignant process that involves more than one kind of tissue. The treatment of all the cases was considered in detail and at length, and the reader is referred to the original paper for a complete report.

Dr. Clarence E. Skinner, of New Haven, Conn., agreed with the author in the main. In the case of tumors involving more than one tissue, the procedure of election is primary operation followed by the x-ray. Malignant diseases involving the ear are not favorable cases. He has never seen a case of cancer of the bone cured by the x-ray. Sarcomata do not respond as well as epitheliomata. He cited a case in point.

Dr. Johnson, of Pittsburg, thot that Dr. Pancoast's unsatisfactory results were due largely to the fact that he had too much material at his command and could not therefore study each case by itself as he would his private cases. When we have failures there is always some reason for it. We have not yet learned all about the x-ray, and when we do we will be better pleased with it, because our results will be more gratifying. It is the failures that make the x-ray worker enthusiastic, not his successes.

Dr. Holding, of New York City, said that the conditions that determined the outcome of a case were the same in x-ray work as in general surgery. In the case of a tumor we must consider the size, duration and location of the growth. The smaller the tumor the better the prognosis. Tumors of slow growth offer a better prognosis than the rapidly-growing tumor. Superficial tumors are more amenable to treatment than deeply situated tumors. These three factors must be considered together, because sometimes a large tumor is a slow-growing tumor. Much better results are obtained from the x-ray if the patient is saturated with potassium iodid. Furthermore, all these cases should be divided into three classes, so that we can get more definite data: First, cases that are operable but refuse

operation. Second, those that are inoperable. Third, those that are absolutely hopeless.

Dr. Deforest Willard, of Philadelphia, is in favor of a primary operation, followed by x-ray treatment. The x-ray is very good in selected cases and it should be used in connection with surgical measures whenever possible. Even if the patients can not be cured, we can furnish them with a great deal of relief, giving them comfort and perhaps prolonging life. For that reason if for no other the x-ray is a very valuable therapeutic agent.

Dr. Pfahler, of Philadelphia, agreed with the previous speakers, but emphasized the fact that our successes simply mean that the proper technique has been employed.

Dr. Igelhoff, of Chicago, reported very good results in the treatment of sarcomata and extensive carcinomata.

Dr. H. Russell Boggs, of Pittsburg, reported a case of keloid of the cheek about the size of a dollar that he cured in one year. In regard to cancer of the breast, he has found that those cases that are treated with the x-ray after a primary operation do best from which the axillary glands have not been removed. In his experience sarcomata have been retarded in their growth but not cured.

Dr. Wm. H. Dieffenbach, of New York City, said that his experience tallied with that of Dr. Pancoast. Of a very large number of cases treated at the Flower Hospital only about 10 per cent were cured. Most of the cases that presented themselves for treatment were inoperable. He emphasized the importance of giving constitutional treatment in all these cases. The results will be better. He reported cures in cases of lupus vulgaris, lupus exodens and even lupus erythematosus, a disease that is considered incurable. The diseases most amenable to treatment are epithelioma proper, discoid epithelioma and primary scirrhus carcinoma of the breast. He does not agree in having a primary operation in all cases, because it induces the patient's vitality too much and interferes with the action of the x-ray. The least amenable is sarcoma, a number of cases dying of toxemia.

Dr. C. W. Leonard, of Philadelphia, stated emphatically that he not only believed in the value of the x-ray as a therapeutic agent, but also that he favored primary operation followed by x-ray treatment whenever such a course is possible. The x-ray is also a palliative in inoperable cases.

Dr. C. W. Allen, of New York City, said that he combined everything in the treatment that could be of the least value to the patient and his results have been excellent. Of ninety-five cases of cancer treated with the x-ray he has a percentage of thirty-three or thirty-four cures, including those still under treatment. If absolutely hopeless cases are excluded the percentage of cures runs up over 50 per cent. He prefers the use of the caustic paste to the knife.

Dr. Weston A. Price, of Cleveland, has used the ray with success in the treatment of pyorrhoea alveolaris.

Dr. George J. Hopkins, of Brooklyn, spoke of the value of the Finsen light and light therapy in general. He is using radium in the treatment of many conditions in which the x-ray has hitherto been used exclusively.

Mr. Martin I. Wilbert, of Philadelphia, read a paper on

A Comparative Study of Fractures of the Extremities.

He called attention to the fact that many cases of fractures in or near a joint are overlooked entirely, or they are diagnosed as sprains. The only positive means

of making a correct diagnosis in these cases of injuries about a joint is the x-ray, but he advised that two exposures be made so as to show the joint from two sides; otherwise the fracture might not show. Furthermore, in cases of fracture of an extremity it is advisable to include in the skiagram the nearest joint. Joint skiagrams should always be compared with the normal picture.

Dr. Russell H. Boggs, of Pittsburg, said that fractures should be examined not only for the purpose of making a diagnosis but also to give us the clue as to the proper treatment to be instituted. A fluoroscopic examination is worse than useless because it is unreliable. A skiagraph should always be made.

Dr. James B. Bullitt, of Louisville, dwelt on the importance of deferring a diagnosis of sprain until a skiagram has been made. He complimented the work of Mr. Wilbert very highly.

Dr. Boggs discussed

Accuracy in X-Ray Diagnosis,

considering in his paper all those things that are necessary to the making of a good skiagram. He laid especial stress on the choice of a good developer. He uses the following:

Edinol, 1 dram.
Sod. Sulph., 10 drams.
Sod. Carb., 2 drams.
Water, 10 ounces.

Dr. Pfahler, of Philadelphia, said that he had succeeded in diagnosing a gumma of the brain, two and a half inches in diameter, and also softening of the brain, locating the lesion in each instance accurately.

Dr. Kassabian, of Philadelphia, cautioned that in taking skiagraphs of the skull the head be shaved carefully because the hair may throw a very confusing shadow. He cited a case in point. In skiagraphing the skull care must be taken in the subsequent interpretation of the shadows to allow for the difference in the thickness of the skull, especially in the occipital region.

Collapsing Tubes.

Dr. Henry K. Pancoast, of Philadelphia, related three instances of collapsing tubes. In two of these there was no evident reason for the collapse. In the third it followed a blow. In the first case the tube was a new one that had been used but a few times and it exploded in the hands of the writer. He insisted on the importance of wearing protecting glasses while handling these tubes because serious injury of the eyes might otherwise result.

Several of the members reported similar instances of collapsing tubes and in most of the cases the tubes were of the same make. The belief was expressed that this was due to the fact that these tubes were not annealed before they are put on the market. The same tubes that have been in use for a number of years are giving satisfaction, probably because the repeated heating to which they are subjected has annealed the tube and there is less likelihood of its collapsing.

The last paper on the program was read by Dr. John C. Pitkin, of Buffalo, entitled

Dangers to the X-Ray Operator.

The author considered the dangers to which the x-ray operator is exposed, describing very vividly the x-ray burn and its attendant symptoms. He offered the following conclusions:

Never allow the use of any part of the body for others to look thru. Never change the adjustment of the tube or the position of the patient while the apparatus is in operation. Never to get in front of the fluoroscope as an x-radiometer. Never allow strong destructive rays in the center of the field to join be-

yond the body. Wear silk or rubber gloves or safety x-ray gloves. Wear glasses as a protection for the eyes. Wear an office coat with extra long sleeves that come well over the hands, into which the hands can be withdrawn; the entire garment to be lined with tin foil or lead foil. Remain behind the target of the static machine. If obliged to enter the field remain as far away from the excited tube as possible and work in the outer confines of the field. Screen yourself as much as possible.

Dr. Weston A. Price, of Cleveland, exhibited a flexible rubber cloth prepared according to his instructions, that possesses all the qualities that render it useful as a foil against the x-ray. It is opaque to the rays; flexible, firm, easily cleaned and handled and will not break. He suggested that the increasing tendency to burn on the part of the operator might at some future time lead to very disastrous consequences. It is also possible that the x-ray has a cumulative action which later in life may culminate. The possibilities of the future for the x-ray worker are not very bright. He also devised a tube holder made of hard vulcanized rubber containing an opaque material. It is very light and efficient. He uses it especially for treatment work. It is an absolute nonconductor.

Dr. James A. Marsh, of Troy, N. Y., called attention to the fact that from having his feet under the table within the x-ray field he was suffering very severely with sore feet.

Dr. W. W. Johnson mentioned a case of burn of the knee on the side opposite to the one treated.

Professor Goodspeed gave it as his opinion that these effects were secondary. That the whole room and its contents are rendered negatively active during the action of the tube.

Dr. C. L. Leonard, of Philadelphia, has suffered severely from burns of the hands and also feet. He now protects his tube in such a way that the rays are not carried out into the room. This eliminates the danger from the direct radiance of the tube and also the danger from the secondary action mentioned by Goodspeed. He places his tube in a paper box partly surrounded by tin foil so arranged as to give the necessary protection and yet not interfere with the efficiency of the ray. Of the remedial agents he has found resorcin soap and lanolin inunctions of value. Under that treatment the ulcers have healed. Boric acid solution is also useful.

Dr. Kassabian keeps his coil near the ceiling and the tube in his apparatus described earlier in the session, this saving himself and his patient from burns. The important feature in this connection is not how to prevent the burn, but how to cure it.

Dr. Louis A. Dahring, of Philadelphia, said that the x-ray burn was peculiar to itself and so far as he knew there is no one remedy that will cure. Different operators have been cured by different remedies and there is no way in which to account for the action of a drug in any one case. He considered the differential diagnosis of various skin lesions that simulate, in a way, the x-ray dermatitis.

Dr. Fairfax Irwin, of the U. S. P. H. & M. H. S., was able to heal two very severe and intractable x-ray burns by excluding both air and light, especially the latter, from the ulcers. No other form of treatment had availed in these cases. He placed the affected part in a box.

The following officers were elected for the ensuing year:

President—Dr. James B. Bullitt, Louisville, Ky.

Secretary—Dr. Russell H. Boggs, Pittsburg, Pa.

Treasurer—Dr. Weston A. Price, Cleveland, Ohio.

Vice-Presidents—Dr. J. B. Murphy, Chicago, Ill.; Dr. Barnes, Buffalo, N. Y.; Dr. E. A. King, Toronto, Can.

Executive Committee—Dr. W. W. Johnson, Pittsburg, Pa.; Dr. Preston M. Hickey, Detroit, Mich.; Dr. Kennon Dunham, Cincinnati, Ohio.

The place of meeting of the next annual session was not decided upon. St. Louis and Cincinnati were two cities in the list of those considered, with the latter in favor.

Electro-Physics.

Light Telegraphy.

The system of transmitting telephone messages by means of the rays of an arc lamp, which was developed by Herr Ernst Ruhmer, has been extended to the transmission of telegraph messages, in which work it is thought that it will compete with the heliograph. In the telephone system devised by Ruhmer, the sound waves of the voice are changed into electrical waves by means of the microphone, and these waves are used to vary the intensity of the current passing through an electric arc. Variation of the current caused a corresponding variation in the intensity in a ray of light which was projected to the receiving station, where it was received upon a suitable reflector, and thrown upon a selenium cell. The variations in the light received changed the resistance of the selenium cell correspondingly, and thus were made to reproduce the original sounds in a telephone receiver. In the present system the action is practically the same, except that the variations in current are caused by means of a telegraph key, instead of a telephone transmitter. In this way the Morse signals are sent out, and are received in practically the same way as in the telephone systems. It is thought that this system will be particularly useful for military purposes, where secrecy is desired, as the variations in light can not be followed by the eye or with a telescope, but can only be detected with a proper telephone receiver.—*Electrical Review.*

Effect of Electricity on Plant Growth.

One of the methods of testing the effect of electricity on the growth of plants, and which seems to be most readily accomplished, consists in burying plates of zinc and copper on either side of the plant to be experimented upon, and connecting these plates by means of wires placed above ground. The current generated passes through the earth and roots and thus, it is alleged, promotes a more healthy growth.

Static electricity has been utilized for the same results. Professor Lemström, a Russian, has carefully experimented for the purpose of finding the exact nature of the action of electricity in producing these results, and assumes that electricity "produces an augmentation of the energy to which is due the circulation of the sap," and that the "more fertile the soil and the more vigorous the growth, the more satisfactory are the results obtained from electrical treatment."

For example, he cites results obtained by the treatment of beets and potatoes, which showed an increase in harvest of 107.2 per cent in the former and 76.2 per cent in the latter case.—*El. Rev.*