The tumor is unquestionably a scirrhus carcinoma. It is probably primary in the vermiform appendix. The reason for such an assumption is based upon the following:

1. This tumor belongs to the slow growing type, which is most often found in the vermiform appendices of comparatively young persons, and has in several cases been proved to be primary there.

2. Clinically there is no evidence of carcinoma elsewhere in the body.

3. Primary carcinoma is more common than metastatic carcinoma of the appendix.

4. Seven months after the operation there is no evidence of recurrence or of a tumor elsewhere in the body.

ELECTRO-THERAPEUTICS IN THE TREATMENT OF TUBERCULOSIS.*

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IN the treatment of consumption those agents should be selected which will restore the nutritive function of the body, including digestion, absorption, secretion, excretion, respiration and circulation. Remedies that react upon these subsidiary processes are of the greatest value in treating the disease. Electro-therapeutics plays an important rôle in stimulating to activity the disordered physiological conditions accompanying tuberculosis. It is my purpose in this lecture to treat only upon those forms of electrical energy that are of therapeutic value in this disease.

Electricity has been known since the time of Thales, 600 B. C. The Greeks knew that amber excited by friction possessed power of attracting lighter objects; they called this fossil resin, "electron." Dr. Gilbert called this principle, "electric," giving us our word "electricity." The most important discovery is credited to Volta, in 1800, when he produced his battery composed of glass in which were immersed the dissimilar metals, zinc and copper, the former the negative, and the latter the positive, pole. This form of electricity is known as the galvanic current, named after the philosopher and anatomist, Galvani. The two poles of the battery have distinct differences physically and therapeutically; therefore the choice of the pole is of the utmost importance. The positive pole will check hemorrhage, and the negative accelerates it. The positive has an affinity for acid and the negative for alkalis. Pain is relieved by the positive and increased by the negative pole. The positive pole constricts the blood vessels, the negative dilates them. Pus, being alkaline, can be withdrawn from an abscess by placing the negative electrode over the abscess and the positive applied at some distant part.

"Cataphoresis," "Electric Endosmose" and

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"Voltaic Narcotism" are some of the titles applied to the chemic property of the galvanic current. The first attempt to introduce medicines into the system by this method was made by Fabé-Palaprat, who in 1863 applied a compress of iodine on the left arm connected with the negative pole of the battery, and on the right arm was a compress saturated with a solution of starch water. He succeeded in producing an iodine reaction on the starch compress. Dr. Klenke and Dr. Hassenstein, in 1847, introduced iodide of potassium and mercury by this process. Dr. Richardson, in 1895, succeeded with aconite and chloroform, producing anesthesia. De Renzi has successfully treated tuberculosis by applying a 10% solution of bicarbonate soda on a positive electrode of zinc and a 5% solution of potassium tartrate on the negative pole. Tuberculous sinuses have been cured by introducing a copper electrode connected to the negative pole; the electrolytic action of the current dissolves the copper and drives it into the tissues.

Static electricity is a frictional current generated from a static machine by a number of stationary and revolving plates. This form of current has no special value in tuberculosis except in stimulating respiration and aiding metabolism. When the current from a static machine is passed through condensers or Leyden jar, an oscillating current having a very rapid rate of interruptions, with very high electro-motive force, is produced. This is known as the high-frequency current and it has proved of considerable value in treating tuberculosis. By studying the physiological action of the high-frequency current, we can at once appreciate its therapeutic value; there is increased arterial tension through the medium of the vasomotor nerves and nerve centers. The elimination of excrement is greatly increased, excess of urates and uric acid are reduced to normal, the amount of urea thrown off is from 11 to 40 gm., the elimination of carbonic acid is doubled. The urine is increased, there is marked increased oxygenation of the blood and decided increase in the nutrition of the body. Caffarena claims a decided increase in the gastric and intestinal peristalsis in case of atony. The sedative action on the nerves relieves neuralgia. The high-frequency current has proved to have decided bactericidal properties. D'Arsonval, in his investigation on guinea pigs, demonstrated a retarding influence on the growth of bacillus tuberculosis. "Grumbaum found that toxoids are capable of producing immunity and that the modification brought about by this current is one from toxin to toxoid. That the virulence of the toxins is attenuated is stated also by Reviere; repeated applications decrease the reproductive power of the bacilli." (Allen.) Dr. Chisholm Williams has given the results in 43 cases of tuberculous patients. Thirty-two cases had so much improved that none had required treatment for thirteen months, and of the 43 cases, 3 died. He considers the guidance of the treatment is the temperature. His principal method of treatment was auto-condensation. X-ray has

been tried and was hoped at one time to be valuable in the treatment of tuberculosis, but the most favorable reports have only shown certain relief of the symptom, but never arrested the disease. The greatest value of the Röntgen ray has been utilized in radiography and is of the utmost importance in diagnosis. Phototherapy is that branch of electro-therapeutics which treats of the therapeutic action of light excluding the rays of Röntgen. That the animal and the vegetable kingdom owed their existence to the light of the sun was known to the ancient Greeks and Romans. Although they did not understand the chemical nature of these rays, and their relation to physiology, they had then, as we have now, ample proof that life was dependent upon light. The writings of Cicero and Pliny speak of exposing the naked body to the action of the sun as a factor in maintaining and restoring health. We also read of sun seats and sunning places on the roofs and gardens. A solarium was essential to every patrician of Rome. The untutored savages were not ignorant of the power of the sun's rays. For centuries we have been attributing the benefit obtained from our recreation in the open air—our vacation to the mountain and seaside—as a result of inhaling pure air or ozone; not considering the fact that the atmosphere owes its purity to the sun, as we do our health and vigor to the physiological action of light. We are indebted to Professor Finsen, of Denmark, for his practicable application of the sun's rays and artificial light in the treatment of disease. He proved that the sun burn was not produced by the heat of the sun, but by the actinic rays; that all of the rays of light had certain therapeutic properties, but the most valuable were the ultra-violet or chemical rays. The red rays he undoubtedly proved of great aid in the treatment of smallpox. The sun bath, as advised by Finsen, consists in a promenade naked in a sunlit yard, the patient exposing his body to the chemical rays, and to avoid the thermal effect the ground was sprinkled with water. For a tonic effect a short exposure was required; to react upon elimination a prolonged exposure was necessary, not interfering with the thermal energy; and for nutritive effect a greater time was required, with shower baths to minimize the temperature. This form of treatment combines the results of the action of light and air. These sunbaths are of decided physiological action, improving nutrition, stimulating the heart and respiration, thereby aiding assimilation and elimination.

Kellogg finds an increased production of carbonic acid indicative of an increased consumption of hydrocarbon and carbohydrates. The prolonged effect of the light upon the circulation of the skin depletes the congested abdominal organs, at the same time stimulating the oxygen-storing capacity of the red corpuscle. In a short exposure the whole blood stream will become completely oxygenated. This is possible if only a portion of the body is exposed to the light. According to Kellogg, the collateral rela-

tion of the circulation of the lungs and pleura to the skin covering the chest, arm and back are associated through the internal, intercostals, subclavian, bronchial, nutrient, and the internal iliac arteries. From this intimate relation between the skin, the lungs and pleura we can readily appreciate the therapeutic value of the application of light to the chest in tuberculosis. This form of treatment is of equal importance in treating tuberculosis of the throat, glands and joints. Willard, in his article in the *Journal of the American Medical Association*, July 18, 1903, speaking of sunshine in the treatment of tuberculosis, says: "In my own hospital wards I have always considered the sun porch the most important of all the means of cure." "Every tuberculosis joint confined to bed, either with horizontal extension or with fixation or traction of joint, spends the entire day at all seasons lying directly in the sunshine, his eyes and head being protected by a green shade attached to the head of the bed. The effect on health, appetite and cell resistance is simply marvelous." McKenzie and Galloway speak very highly of this form of treatment. The chemical action of light not only aids in the arrest of the disease by the increased hemoglobin-carrying power of the red corpuscles, the destruction of pus, the suspension of the growth of the bacilli, the elimination of toxins, and its stimulating action on all the nutritive functions, but has a decided physical influence upon the ingestion of foods and the internal administration of drugs. Busck, in studying the action of quinine in the treatment of malaria, concludes that it is not the toxic effect on the malarial plasmodium alone, but the fluorescent property of quinine preparations; and in accordance with his deduction he advises sun or electric-light baths to be given while administering the drugs. The fluorescent property of quinine in dilute solution is evident when exposed to sunlight or light of the arc lamp. Believing that this property of the alkaloid would be of advantage in the treatment of tuberculosis, I have made it a rule to administer quinine to all my patients before exposure to action of the light, and from the rapid improvement in my patients I consider it of great value in treating the disease. Dr. Mount Bleyer has studied the physiological influence of the sun and the arc rays upon the tuberculous patient. After the administration of the iron preparations he found the iron salts were taken up more rapidly, and more beneficial results followed. The light from the electric arc lamp and the sun have similar qualities; they both possess the same luminous and chemical rays, but the electric light has the advantage of being always available and more constant in its radiations; also the ultra-violet frequencies which have the greatest therapeutic value are brought to focus near the source of illumination. These, coming from the sun, are largely absorbed by the atmosphere in their passage from the sun to the earth. Freudenthal, in his experience in treating tuberculosis of the lungs, claims the light of the arc lamp of great value in improving

nutrition, aiding in the elimination of exudate, increasing metabolism, relieving pain and greatly facilitating expectoration. He has treated with success tuberculosis of the larynx, relieving some of the annoying symptoms in a very short time.

Margaret Cleaves reports a chronic tuberculous ulcer of the larynx being healed in two weeks after having only five exposures to the electric arc. The arc lamp, though rich in actinic rays, has not the penetrating power of the incandescent lamp, but the depth of absorption is largely aided by the other colors of the spectrum. Although the incandescent light loses much of the ultra-violet or chemical rays by the absorbing power of the bulb, yet its penetrating power is greater. In my experience I find them of equal value in treating tuberculosis. My incandescent lamp is of 500 candle-power; lamps under 100 candle-power I find of little value. In reviewing the methods of treatment of tuberculosis by advocates of electro-therapeutics, I find every physician has a favorite method in treating the disease. Some prefer one form of energy while others adopt a combination of forms. My usual method is: Administer the electric light for fifteen to thirty minutes, — the time of exposure varies according to the action of the light upon the temperature and pulse of the patient. This is followed by five to ten minutes' application of the high-frequency current. The patient reclines upon an auto-condensation couch, while the chest is massaged with a surface vacuum tube. This method of applying the current has the advantage of an electric current of high voltage with a perceptible amount of vibration, the tube becomes illuminated with beautiful violet radiations and during the applications ozone is generated and absorbed by the tissues. Dr. Stern, of Indianapolis, has proved the absorption of ozone by this method, having found its presence in the body by chemical reaction. Before concluding this lecture I will review the most important forms of medical electricity previously mentioned in the treatment of tuberculosis.

In studying the physiological and therapeutic action of these methods, we find that they all possess properties in common; they all stimulate the nutritive functions, but the chemical action of the rays of the sun or the light of the high-power electric lamp and the high-frequency current alone stimulate all these functions, including digestion, absorption, secretion, excretion, respiration and circulation of the blood. We also learn that pathological processes are arrested, pain is relieved, expectoration is facilitated, bacteria are destroyed, toxins are eliminated; the absorption of oxygen, the elimination of carbonic acid, sleep and rest produced; appetite increased and nervous symptoms so distressing to the patient greatly benefited. We are taught that the arrest and cure of this dreaded disease can be accomplished by those factors that aid in the production of immunity against the tubercle bacillus and its toxins and that this depends upon cell nutrition. Therefore, what better remedy have we to accomplish

this phenomenon than the action of light and electricity? It is not a panacea for this disease, nor can health be restored without nutritious diet, moderate amount of exercise, proper rest and living in the open air. Nor can all those patients recover who are in the advanced stages of consumption. Nevertheless, I have seen great improvement in seemingly hopeless cases; if their life cannot be saved, it can be prolonged, their comfort can be assured and their end made less distressing. It may seem from a careful digest of this lecture that my claims for this mode of treatment are somewhat extravagant, yet my experience has been corroborated by such conservative authorities as D'Arsonval, Oudin, Piffard, Chisholm Williams, Kellogg, Freudenthal, Pinsen, Margaret Cleaves, Loeb and others. I regret the time is too short to describe in detail the manner of administering these forms of treatment.

ON CERTAIN EVIL TENDENCIES IN MEDICINE AND SURGERY.

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(Continued from No. 22, p. 716.)

It would seem from these two cases that, in the event of a mistaken clinical diagnosis, there may be also a mistaken operative diagnosis and that the patient may be subjected to an unnecessary and fatal operation, even when the greatest care has been taken, both before and during operation, to determine the exact lesion.

The knowledge of having taken great care in the diagnosis before operation cannot but lessen the responsibilities of such unfortunate occurrences, for it is easy to imagine the effect upon the man of conscience of a fatal and useless operation.

Another experience, a very recent one, illustrates my views upon this subject. A man who had not yet reached the cancer age had been on several occasions in the hands of a very conservative physician, a man of international reputation. The symptoms were those of pyloric stenosis of mild degree, caused by a gastric ulcer. After two or three years the patient, who was comparatively comfortable under medical treatment, but never well, was sent into the surgical wards of the Massachusetts General Hospital for mechanical relief. I observed the patient a week and finally consented to explore on the ground of the failure of cure after prolonged palliation. I found a moderately dilated and thickened stomach, with a distinct tumor of the pylorus. The pylorus was deeply placed and could not be brought up into view, but it was easily felt. I was of the opinion that this tumor was an old gastric or duodenal ulcer, but I was not able to demonstrate it beyond a doubt. A mechanical obstruction existed, for which I made a posterior gastro-enterostomy. With my fingers in the stomach, I could feel no evidence of cancer.