THE

MEDICAL USE OF ELECTRICITY,

IN THE FORM OF GENERAL ELECTRIZATION.

BEING A PAPER READ BEFORE THE NEW YORK ACADEMY OF MEDICINE,
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BY

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THE MEDICAL USE OF ELECTRICITY.

Dr. Geo. M. Beard, by invitation, said:

Mr. President: — The attitude in which the profession of America now stand in regard to electro-therapeutics is, to say the least, unfavorable. While there are very few who have practised "localized electrization" with something of the zeal that it is now being investigated in Europe, the vast majority of our educated and reliable physicians have resigned this department entirely to the tender mercies of ignorant and oftentimes unprincipled outsiders. By this I do not mean that very many in the profession have not essayed and do not occasionally recommend the employment of electricity. There are indeed very few who have not at one time or another had opportunities for testing the power of some form of electricity in the treatment of disease. But if such were asked what kind of apparatus they had recommended, or seen used, they would point to some rusty magneto-electric machine, where the electricity is generated by turning a crank (the ends of a wire being successively and rapidly brought near the poles of a magnet), or to some inconvenient and uncertain electro-magnetic apparatus.

If they were asked in what kind of diseases they regarded electricity as indicated, and for which they had advised its use, they would mention, first of all, long-standing paralysis that had proved rebellious both to time and to all internal medication, and the worst stages of constitutional rheumatism.

If, again, they were asked to describe their method of using electricity, they would confess that in the majority of instances the applications were left to the patients themselves, or more likely to some friend or servant who happened to be nearest; nay more, that the patients were often allowed to hold the positive pole in one hand and the negative in the other, without regard to the locality of the disease.

And finally, if they were asked to give the course and results of this treatment, they would probably reply that after a few applications, made with a weak and uncertain current in the manner above described, the apparatus was laid aside, and as the patient was not cured, or in any way benefited, electricity was afterward declared a humbug by all the parties concerned. You will, I think, agree that this picture of the experience of the majority of those among us who have used electricity is not overdrawn.

There are, it is true, a limited number to whom these criticisms will not apply, at least in their entirety, who have used electricity in some form or other, with a measure of skill and perseverance, though probably not with the success they desired and perhaps hoped for. But in what I say to-night, I shall go upon the supposition that none of you have given this subject any systematic attention, and accordingly, so far as the limited time will permit, I shall enter into the explanations that to an expert would appear very elementary; and inasmuch as the method of *general electrization with the Faradaic current*, that is to be the leading idea in this presentation, was, so far as I know, first formally introduced to the profession of this city by my associate, Dr. Rockwell, and myself, my remarks will necessarily be more or less personal.

BRIEF SKETCH OF THE HISTORY OF ELECTRO-THERAPEUTICS.

The first recorded experiments with electricity on the human body date back over a century. In 1745 a Mr. Von Kleest first received a shock through the system from a Leyden jar. In 1748 a small treatise on the "Effects of Electricity on the Living Human Body" was published by Mr. Jallabert.

The physiological and therapeutical uses of electricity were subsequently investigated by Abbé Sans, Galvani, Grapengiesser, Alexander Von Humboldt, Aldini, Volta, Magendie, Marianini, Matteucci, Du Bois Reymond, Sarlandiere, and Golding Bird. The discovery of the induction current by the great Faraday in 1831 gave a new impulse to investigations in this department, and in 1855 Duchenne, of Boulogne, published a work on "*Electrisation localisée.*" Duchenne may be justly regarded as the father of the modern school in electro-therapeutics, for it was by his writings that the late lamented Remak, of Berlin, was inspired to give this subject special attention. In regard to the currents employed, Duchenne and Remak were diametrically opposed — the former advocating the almost exclusive use of Faradaization, while the latter contended for the use of the galvanic or primary stream from a large number of batteries.

The contention waxed warm between them, and they became the leaders of opposite schools. Moreover, Remak and his followers made their applications chiefly over the motor nerves, at the border points where they entered the muscles, while Duchenne placed the electrodes over the bellies of the muscles in which he desired to produce contraction.

Within the past ten years the cause of electro-therapeutics has enlisted the services of some of the ablest minds in Europe, among whom may be mentioned Becquerel, Rosenthal, Benedict Meyer, Althaus, and Ziemssen, and it also received the very hearty coöperation of the late Prof. Trousseau. In Germany especially, electro-therapeutics has elicited very general attention, and has been made the subject of a variety of publications.

MY OWN EXPERIENCE.

About ten years ago, while pursuing my studies, I began to experiment with the Faradaic current, at first on my own person, and afterward on my acquaintances. The electro-magnetic machine that I employed was to the last degree uncertain and inconvenient. The electricity was generated in an ordinary zinc and copper battery, but the current was at one time quite powerful, at another very weak, and sometimes it would not run at all. My method, as subsequently ascertained, was very similar to that practised by Duchenne and the other European electricians, namely, "localized electrization," the electrodes being placed near to each other, over the parts desired to be affected. During my college course, and afterward while serving as acting medical cadet in the military hospital in New Haven, I continued to experiment with my apparatus in the same irregular manner in cases of indigestion, nervousness, and rheumatism. Sometimes I placed the negative pole at the tip of the coccyx, and applied the positive over the stomach and liver. The results were pleasing, but not entirely satisfactory. Thus applied, the Faradaic current had a temporarily soothing and strengthening effect, but no very decided or permanent tonic influence.

Rheumatism of the sub-acute and chronic variety, when treated with a mild current through the affected joints, was temporarily benefited, but relapsed so early that there was little encouragement to persevere.

In 1866, Dr. A. D. Rockwell and myself associated ourselves together for the purpose of giving special attention to electro-therapeutics, and we soon began to meet with results which before neither of us had even anticipated, for the reason that we used better instruments and a different mode of application.

In the first place we secured a neat, convenient, and reliable electro-magnetic machine, such as I now show you. It is manufactured by Jerome Kidder, and is decidedly superior for medical use to any other form of electro-magnetic apparatus that I have ever seen. For office use it leaves nothing to be desired. It is run by the ordinary Smee's battery (zinc and platina), or by Farmer's thermo-electric battery, and has a powerful helix, as well as a readily-adjusted armature.

In the brief space allowed me to-night there would not be time to enter into detailed explanation of the various parts of this beautiful machine, but I shall confine my remarks, as far as possible, to what is of direct practical import.

In the treatises devoted to this subject you will read of "Galvanization" and "Faradaization," "quantity" and "intensity," "direct" and "inverse" currents, and other equally arbitrary terms that can but bewilder those who have not given the subject particular attention.

EXPLANATION OF TERMS.*

It should be remarked that among medical writers in general, much confusion still continues to exist in the use of these terms. "Battery" and "electro-magnetic machine," "Galvanism" and "Faradaization," "primary" and "secondary," are often confounded, even by those who in nearly every other department of medical science are well informed.

GALVANIC BATTERY — ELECTRO-MAGNETIC MACHINE.

A *galvanic battery* is usually formed of three substances, two of which are metal, and the other some dilute acid that generates electricity by its action on one of the metals. It is also called an "element" or "cell."

The *compound galvanic battery* consists of a number of simple batteries connected in a series. Thus we have the voltaic pile, and Grove's, Bunsen's, or Smee's compound battery, composed of more or less simple batteries of their respective varieties.

Farmer's thermo-electric battery, composed of bars of German silver, and an alloy of zinc and antimony, arranged in a V shape, so as to be heated (by gas or an alcohol lamp) at their point of union, has recently come into use.

An *electro-magnetic machine* is composed of a helix and vibrating armature, connected with some form of battery. It may be used with Bunsen's, Smee's, or Grove's battery, or with any modification of them, or with Farmer's thermo-electric battery.

In *magneto-electric machines* a soft iron armature is made to pass rapidly the poles of a magnet by turning a crank. They are very inconvenient, and must soon give way to electro-magnetic machines.

QUANTITY — INTENSITY, OR TENSION.

The *quantity* of electricity generated by any apparatus is proportioned to the amount of chemical action that takes place in the battery. Intensity is that power that enables it to overcome resistances that may impede the progress of the current.

The electricity of an ordinary thunder-storm is great in intensity, but exceedingly small in quantity. On the other hand, that which is generated by any ordinary form of battery has comparatively a great deal of quantity, but little intensity. The *quantity* supplied by any battery may be increased by increasing the chemical action that takes place in it, either by making it larger, or by strengthening the acid solution.

In a *compound battery* the *intensity* is increased in proportion to the number of batteries, but, as they are ordinarily united, the quantity is no greater than in the single battery of which it is composed.

* This Explanation of Terms is mainly taken from our recently published work on the Medical Use of Electricity.

The relative meaning of these terms may be best understood by an illustration. A gallon of water heated to 100° has a much greater quantity of heat than a pint heated to 500°; but the heat of the latter is much more intense.

GALVANIZATION — FARADAIZATION.*

The current that proceeds from any simple or compound battery is called the "primary current," sometimes also the "continuous," "constant," or "uninterrupted" stream. Its use in medicine is called *galvanization*, from Galvani.

When the current from any simple or compound battery passes through a helix and induces another current that is interrupted by a vibrating armature, such a current is called the "induced," "secondary," "interrupted," or "faradaic," from Faraday, and the entire apparatus is called an electro-magnetic machine; its use in medicine is called faradaization. This is the current that we usually employ in *general electrization*. In Germany, the current from a voltaic pile is called "continuous," that from all other batteries "constant;" with us this distinction is not ordinarily observed.

ASCENDING — DESCENDING.

The course of an electric current is always from the positive to the negative pole. When, therefore, the current runs from the periphery toward the centre, against the course of the nerves, or of any single nerve, it is called ascending, or "reverse;" when it runs from the centre toward the periphery, with the course of the nerves, or of any single nerve, it is called the descending or "direct" current.

The ascending current in its immediate effects is painful and irritating; the descending is calmative and exhilarating.

In general electrization we use mainly the descending current; in localized electrization either the ascending or descending may be used, according as exciting or soothing effects are indicated.

GENERAL ELECTRIZATION — LOCALIZED ELECTRIZATION.

In *general electrization one of the electrodes is placed at the feet, while the other is applied over the entire surface of the body, and the whole system is affected by the current.*

In *localized electrization* the electrodes are applied near to each other, and the effects of the current are supposed to be mainly confined to the tissues lying between them.

The method of applying electricity which we have chiefly

* We have adopted the orthography *faradaization* in preference to *faradisation*, introduced by Duchenne, for the reason that, while both are equally legitimate, the former has the additional advantage of more directly suggesting the name *Faraday*, from whom it was derived.

adopted I have denominated *general electrization*, in distinction from the localized electrization of Duchenne.

The *modus operandi* of general electrization is as follows: Male patients remove their stockings, and all their outer and under clothing from the upper part of the body, and place their feet on the piece of copper to which the negative pole is attached, while the operator applies the positive, either a wet sponge or the moistened hand (when the current passes through his own person), down the spine and over the vital organs. Ladies remove their dress and loosen their under garments, and throw over their shoulders a shawl, or sheet, to prevent exposure. The most thorough form of application demands that *the entire surface of the body* should be gone over, with some regard to order.

It is manifest that when electricity is applied in this manner, the currents must traverse the whole system, and consequently all the vital organs as well as the various muscles and nerves of the extremities are directly acted upon. *From the astonishing results of this method of treatment also it would seem that the great sympathetic were powerfully affected.*

The *immediate* effects of general electrization, when carefully, skilfully, and thoroughly applied, are a feeling of exhilaration, very much as is experienced after taking a bath, or after a brisk walk in the open air. If there be any distress in the head, or neuralgia or rheumatism in any part of the body, or severe pain from any form of inflammation, acute, sub-acute, or chronic, it is not unfrequently entirely dissipated, and sometimes there may be a grateful somnolence. The *secondary effects*, that do not usually appear until the following day, vary in different individuals, and in different states of the system, and also according to the condition of the atmosphere. At the outset of a course of treatment, patients sometimes complain of a feeling of depression, and of soreness in the muscles, especially if the applications have been too powerful, or too long continued. But these unpleasant sensations are exceptional, rather than the rule, and the *permanent constitutional tonic* effects begin to manifest themselves, progressing sometimes with wonderful rapidity, and in other cases with slow and steady improvement. The capricious appetite becomes keener and stronger, the constipated bowels grow more regular, and the sleep is easier and more refreshing. The muscles increase in size and hardness, and there is greater capacity of endurance. The spirits rise as always with the general condition, and the hypochondriac forgets his imagined woes. As would be expected, various special diseases, that depend on, or are associated with constitutional debility, are very often relieved, and in many cases are approximately or absolutely cured by continuous treatment. We have employed general electrization in cases of neuralgia, the various forms and complications of indigestion, rheumatism of the acute, sub-acute, and chronic types, paralysis of the functional, rheumatic, traumatic, hysterical varieties, and in many

other cases not dependent on a persistent, active, and incurable central lesion, chorea, hysteria, anæmia, dysmenorrhœa, amenorrhœa, and, indeed, in nearly every shape of disease associated with constitutional feebleness, except pulmonary tuberculosis.

I lay especial stress on the use of the hand as an electrode, because I was long since abundantly satisfied that it was more easily controlled, more effective, and far more agreeable to the patient, than any metal, or even the softest sponge. Applications to the head, or over any particularly sensitive organ, should always be made with the hand. Those who attempt to apply electricity in this way will find it necessary to practise extensively, in order that they may get so accustomed to the passage of a powerful current through their own persons, that they can manipulate without difficulty all the parts desired to be affected.

The question at once arises, what effects must the operator experience who thus allows a strong current to pass through his own body to the patient? To this interrogatory only experience can reply. Theoretically it would seem that an agent which we have proved to be so powerful to cure and to save, must also, when used in excess, be equally mighty to destroy.

Duchenne nor Remak did not advise this method, although they suggested its possibility; nor have any of their disciples, at least those who are numbered in the ranks of the profession. Garratt earnestly advises against it, declaring that it could but be injurious. But dismissing theories, let us consult the facts. Wm. Miller of this city, known to many of you as a man of large experience in the application of electricity, and whose practical suggestions have been to us of immense service during all our investigations on the subject of general electrization, has thus allowed an induced current of electricity to pass through his person, on the average, several hours a day for thirty-six years, and has suffered from no affection that could be in any way referred to this cause. When he commenced this practice he was slender and feeble; but under this mighty stimulus he has become quite firm and sturdy, and he can now operate with perfect ease, while there is rushing through him a current that would temporarily paralyze any one not equally accustomed to it.

My own general health has improved since I began to make applications through my own person; indeed it was the calming and invigorating effects experienced by myself that first called my attention to the tonic powers of electricity. My associate, Dr. Rockwell, has also grown somewhat stronger under the same influence, and there has been a very perceptible increase in the size of the muscles of the arms of both of us.

In order to illustrate more specifically the indications for, and the results of general electrization, I will sketch a few cases in as much detail as the time will allow.

Case I.—*Neuralgia, Menorrhagia, with Anæmia.*—Mrs. S., a married lady, aged thirty-five, had for several years suffered

from periodical attacks of severe pain in the stomach and head, attended with great prostration. The paroxysms occurred regularly every month during the catamenial flow, and sometimes at intervening periods, though with less severity. To the other distressing symptoms was sometimes added obstinate and persistent vomiting. The stomach was so weak that at times she was obliged to keep her clothing loosened, and the slightest pressure over the epigastric region caused excessive pain. Her menstrual flow was usually quite protracted—from five to seven days in duration—and the quantity of flow lost was very great. Immediately after her courses she would present, for a number of days, a strikingly anæmic appearance. The opinion of her previous medical adviser, that the menorrhagia was a consequence of general debility rather than of any organic uterine disease, was confirmed by our own examination, and accordingly we decided to employ general applications of the Faradaic current. She had been using internal medication so long, and with such unsatisfactory results, that we yielded to her express desire and gave her no drugs whatever.

The treatment by electrization was commenced December first, 1866, and continued two or three times a week, for two months, with the most unexpected and pleasing results.

She was of a frail, delicate build, and in all parts of the body so susceptible to electrical influence that only the mildest current could be used, and, what is contrary to our usual experience, she could bear no more at the close than at the outset of the treatment.

The first *séance* was followed the next day by considerable nervousness and by soreness of the muscles that very soon passed away.

After two weeks of treatment her courses came on, and were as long continued and attended with as much loss of blood as before. One night, while she was suffering from a paroxysm of neuralgia in the stomach of unusual severity, we applied a mild current over her head and vital organs for about ten minutes, with the effect of entirely relieving her pain, and she soon passed into a quiet and refreshing sleep. On the following day the pain returned, but with much less severity.

Four weeks from that date her courses again appeared, but they were attended with comparatively little pain. Their duration was but four days, and but a little more than the normal quantity of blood was discharged.

The improvement in her general condition during the entire progress of the treatment was very decided; her appetite became keener, her digestion easier, her sleep more refreshing, and her spirits more buoyant. After twenty-four applications, distributed over a period of two months, all her distressing symptoms, the neuralgic attacks in the head and stomach, the menorrhagia, and consequent anæmia, entirely disappeared, and from that time to the

present (for we see her frequently) her health has been excellent.

Case II.—*Neuralgia, Leucorrhœa, Chronic Diarrhœa with General Debility.*—Mrs. P., a married lady, thirty-five years of age, of a tall, spare form, first applied to us for electrization in May, 1867. She stated that a protracted and fearful labor, three years before, had so reduced her that she had never been able to regain her strength. She complained of general weakness, poor appetite, and inability to make any exertion. She suffered almost constantly from pain in the back, and from acute neuralgic attacks in the top of the head.

There was a continual bearing down sensation, and a frequent desire to pass water. She had all along suffered more or less from a leucorrhœal discharge, and for about six months before we saw her, she had been growing weaker and weaker from a persistent diarrhœa. On examination per vaginam, we found an indurated os, the result of chronic inflammation, and slight prolapsus. She was, in a word, a typical case of special and constitutional weakness that we so often meet with among ladies in the better walks of society.

In this, as in the previous case, internal medication in the shape of iron, quinine, strychnine, had been tried by her skilful medical adviser so frequently, and so uselessly, that we resolved to discontinue it altogether.

Even at the first sitting she was able to bear a good strength of the current, except on the top of the head, and over the transverse colon. There were no unpleasant secondary symptoms, and she slowly but steadily improved in her general condition and in her special symptoms. The diarrhœa was checked, and the stools gradually assumed a more healthy appearance; and with this improvement in the condition of the bowels, the tender spots over the transverse colon became less sensitive to the current. On account of the diarrhœa she had been forced to be very scrupulous in her diet, but she could now eat all the ordinary articles of food with impunity. She could sleep freer and longer than before, and had gained very perceptibly in strength and color. Her headaches were the last symptoms to yield, but they diminished in their violence and frequency. The treatment was extended over a period of two months.

Case III.—*Neuralgia, Dysmenorrhœa, and Functional Paralysis.*—Mrs. M., a married lady of twenty-seven years of age, reported that in January, 1867, she was prostrated with an attack of intermittent fever that left her in a very weak, anæmic, and neuralgic condition, from which no combination of internal tonics seemed to enable her to rally. Her symptoms were intense neuralgic pain in the fore and back part of the head, over the ribs, on both sides, and in the left arm. As she complained of some leucorrhœa, and had suffered in times previous from prolapsus, we examined her with the speculum. There was congestion of the

cervix, but the uterus was in its normal position. She was thin and very pale, and was unable to attend to her daily tasks. Whole nights she had passed without sleep, and, as a natural and inevitable consequence, her appetite was very weak and capricious, and her bowels were irregular. Her left arm was not only exceedingly painful, but it was also so much affected with functional or reflex paralysis that she could not raise it from her side.

She experienced temporary relief immediately after the first *séance*, but the pain returned on the following day. After the fifth application there began to be evidences of improvement in her general condition, although her neuralgic symptoms were but temporarily abated, and her left arm seemed to be more powerless than before. After she had been under treatment about three weeks, she was attacked in the night with such severe paroxysms of neuralgia in the uterus that her friends became greatly alarmed. Treatment by general electrization was resumed, and her improvement was very rapid. Her appetite became almost ravenous, and her rest at night was very comfortable, and sometimes unbroken. Her face was fuller, and she increased in weight. There was more expression in her countenance, and her spirits, that had so long been depressed, were again buoyant. *The paralyzed arm was entirely restored.* The treatment was extended over a period of seven weeks. Her menses appeared twice during that time, and were comparatively painless.

In regard to the above and a number of very similar cases treated by general electrization, it should be remarked:

1. The special symptoms, neuralgia, headache, constipation, etc., were dependent on general feebleness.

2. These special symptoms did not ameliorate or depart until the general system began to be strengthened. In a word, the affections were cured by the *tonic* effects of *general electrization.*

3. The temporary relief of severe neuralgia and inflammatory pain, effected by general electrization (and also, when the symptom is confined to a single part, by localized electrization), is oftentimes as speedy and even more absolute than that produced by hypodermic injections. More than that, the former is a permanent tonic, while the latter method is apt to be followed by a depressing reaction, and when too often repeated, may work injuriously on the constitution.

RHEUMATISM.

This disease in all its stages is treated by general electrization, and almost uniformly with more or less permanent benefit.

Mr. H., aged forty-five, was sent to us by Dr. Austin Flint, to be treated for intercostal rheumatism on both sides, that had annoyed him for many months. He had been under Dr. Flint's observation for about a year, during which time he had been taking the iodide and bromide of potassium, with very slow but quite

perceptible improvement for his general rheumatic affection, but the difficulty in the side was not disposed to yield.

He was at no time free from a considerable sense of annoyance, and the constant aching often rendered his nights sleepless.

Mr. H. was a stalwart, hearty man, but had suffered at times from rheumatism all his life, and when he came to us seemed to be almost discouraged for fear lest he might be obliged to give up his business. He received general applications with considerable regularity, two or three times a week, for two months, with the result of entirely removing the intercostal soreness, stiffness, and pain. The disease is, of course, still in his system, manifesting itself chiefly in the hips; but general electrization seems to have done more than internal medication. A peculiarity of his case is that he has usually suffered most in warm weather; his improvement under general electrization took place as the summer was coming on.

I cite the above because it is typical of one of the most obstinate cases of rheumatism that we have met with. In a great number of cases that we have treated during the past year, permanent benefit or absolute dissipation of the symptoms has resulted from a short course of treatment, without the aid of internal remedies. A few of these have already been reported in our work on the Medical Use of Electricity.

DYSPEPSIA.

This malady, with its various symptoms and complications, receives from general electrization a benefit proportioned to the severity of the disease and the perseverance of the treatment. Most of the dyspeptics consult us for other and more directly fearful or alarming affections, but often the dyspepsia must first be remedied, before the accompanying maladies show any evidence of yielding.

Where emaciation has resulted from long standing dyspepsia, general electrization may cause the patient to increase in flesh, sometimes quite rapidly, though more commonly after the treatment has been somewhat protracted, or has been suspended.

If general electrization were only useful in cases of neuralgia, rheumatism, and dyspepsia, it would be worthy of the most careful study on the part of all who desire to do the best possible for their suffering patients.

But there are a number of other affections in which general electrization will succeed when internal medication fails, though the results are not as brilliant nor as uniform as in the diseases of which I have just spoken. I refer to *paralysis*, *chorea*, *and amenorrhœa.*

The cases of paralysis that are sent to us for treatment may be arranged under three classes.

1. Those that are absolutely incurable.

2. Those that can be greatly or appreciably relieved.
3. Those that can be entirely cured.

The fact of the existence of a central lesion is no ground for discouragement, if it be neither persistent nor progressive. It is oftentimes impossible to determine in regard to the curability of any case of paralysis without actual trial. We are often disappointed, both favorably and the reverse. As a rule, the improvement, even in the fortunate cases, is far from being rapid. The movement cure and general electrization may be advantageously combined in the treatment of the various forms of paralysis in children and in adults. Our experience with paralysis is more fully detailed in our series of articles on the subject in the *Medical Record.*

In *infantile paralysis* we have achieved pleasing results. Indeed I am quite confident that in *this, as in various other paralytic affections, general electrization with the Faradaic current will accomplish much that has been claimed for localized electrization with the primary current.* My reasons for this opinion are based on our experience on the history of cases that have already been published, and to these I refer.

Chorea, as is well known, will often recover of itself, or under the administration of iron. But sometimes a case defies all internal medication, and even time itself. We have cured a few such, but only after very protracted treatment.

In *amenorrhœa* the effects of general electrization are as uncertain as the causes are vague. The menses are sometimes brought on after a single application, more frequently after a course of treatment. In the case of a married lady who has been under our care for a number of weeks, the courses have just reappeared at the eleventh hour, after more than a year's absence.

Amenorrhœa, chorea, and paralysis are usually associated with general debility, and they do not ordinarily yield to general electrization until the system is first invigorated in all its functions. In local palsies occurring in those otherwise healthy, I use only local applications, and usually with the ascending current.

But although general electrization is a tonic, and fulfils a large variety of indications, it is very far from being a cure-all. It is subject to limitations, as are all other tonic influences, but in many phases of disease it is far more speedily and permanently beneficial than any system of internal medication. The truth of this some what bold statement is forced upon us in our daily experience. To tone it down would be to misrepresent.

But in epilepsy, taking the cases as we find them, in very obstinate life-long rheumatism in the aged, in paralysis dependent on persistent central lesions, and in pulmonary tuberculosis, general electrization is generally as powerless as are all the tinctures and powders of the shops.

But these (excepting phthisis) are the very diseases for which electricity is ordinarily advised.

In obscure cases we sometimes feel justified in using electricity empirically, since we are confident that in practised hands it can rarely be harmful, even though it does no good.

In the case of a gentleman affected with facial paralysis, and absolute deafness, brought to us by Dr. Corkroft, we employed local and general electrization for over a month without any benefit. The question whether the affected nerves were yet alive seemed to be answered in the negative, and the treatment was suspended.

By suggestion of Dr. George T. Elliot, I tested the power of general electrization on a young woman in Bellevue Hospital, who had long been suffering from menstrual epilepsy. For a time she seemed to be slightly improved, but after eighteen applications she was not enough better to encourage me to continue the treatment. It should be stated that, before I saw her, she had been previously treated in various ways, and even by electrization through the uterus.

In the employment of general electrization, as in all other mechanical procedures, there are certain rules and various minor details, on the observance of which the success of the treatment very materially depends.

1. Instead of the ordinary metallic electrodes that accompany Kidder's machine, we always use a hollow brass ball covered with sponge. This sponge should always be wet, and the hand making the application should be repeatedly moistened.

2. In the case of very aged, or very weakly patients, the first application should be very mild and of short duration, in order that there may be no unpleasant secondary effects. A very old and infirm lady, sent to us by my friend Dr. Roosa, expressively summed up her experience, after the first application, by declaring that "she felt all the horrors of the damned."

3. The amount of electricity one can bear depends on the age, health, temperament, habits, and even on the state of the atmosphere. After we have, by experience, ascertained the degree of susceptibility of any patient, we should make the applications as strong as they can well be borne.

4. The duration of the applications should be from five to twenty-five minutes, according to the constitution of the patient, and the nature of the disease; and they should not be repeated oftener than every other day, or two or three times a week. Very old and nervous patients demand longer intervals in the treatment.

5. The applications should be so thorough that every part of the body is traversed by the current. Special pains should be taken to avoid the bony prominences, or, when they are touched, to carefully graduate the current according to their sensitiveness. Careless or slipshod applications will bring uncertain results.

In the majority of chronic affections the treatment should be persistent. Certain acute attacks may be sometimes dispelled by one application, but long-standing cases of any form of disease, demand perseverance with general electrization as with any other

form of treatment. The cures are achieved by *general* electrization *co-operating with nature and time.*

Considered even as a sketch of the medical uses of electricity, this presentation to-night has been exceedingly imperfect. Of the Voltaic pile and the various compound batteries for the primary current, or of Farmer's neat and convenient thermo-electric apparatus, I shall not have time to speak. Nor can I allude to very many special types and phases of disease in which electrization is found to be of service, either alone, or as an adjuvant to other remedies.

But my object will have been gained if I have succeeded in calling your attention to what I regard as the corner-stone of electro-therapeutics, viz.: that *general electrization with the Faradaic current, as I have described it, is a* TONIC *oftentimes more rapidly and surely effective than any internal medication, and therefore indicated in a large variety of diseases;* that it is to be used prior to, or in conjunction with, quinine, strychnine, iron, exercise, bathing, and all other tonic influences whatsoever.

It is too much to expect that the stone that has so long been rejected will at once become the head of the corner; but without regard to the special method of application that has been the subject of this paper to-night, I think that any one who considers with attention the history of the medical use of electricity in Europe for the past ten years, will become convinced that the cause of electro-therapeutics is too rich in promise for the future to be any longer resigned to the hands of the Philistines, who have thus far snatched from it whatever of glory or of dignity it ought long since to have acquired under the patronage of our leaders in science.