Electricity in the Treatment of Disease.

Electricity has from time to time, been prominently thought before the Medical profession, and has as often sunk into the background; the reason of this I take it to be that the various promoters of this line of treatment have been led away into too lavish a praise of its virtues, at the same time employing it indiscriminately, and have worn the general body of the profession, into the belief, that it may be regarded as a panacea for all ills, that human flesh is heir to; with the consequence that discredit has fallen upon it, and the belief in it shaken; these two states of Scenic Candalism on the one hand, and unmerited Abstention on the other, may be taken as the swing of the pendulum, which will ultimately assume the mid-way of Rest.

That it is, and will be recognised as a most powerful therapeutic agent, I have no doubt whatever in my own mind; nor is this to be wondered at, when we consider, that an important part, if not the whole, in the atmosphere which surrounds us, and in the working of our organism, there hangs any visible change or action from without, without the development of Electricity. It is not easy, since Dr. Lander and Burton pointed out, that some knowledge of its therapeutical action of day might be gained from studying their Molecular Constitution, in fact, every might indicate their therapeutical value, and it may possibly be found, in going further, that their action may...
be due, to a certain amount, and quality of electricity produced
by the splitting up of the various molecular combinations.
Be this as it may, electricity in its present forms, of application
is of immense importance in the treatment of disease.
It has of late received a great stimulus from the writings of
Dr. Apolloni of Paris, Dr. Starkeon of London, Dr. Newman of
New York, and several other; with the consequence that
several advances have been made, in its application to
indicating cases which are suitable, healed by the
different forms, in which it can be applied, and also by
defining with pretty considerable accuracy its dosage.
The latter is arrived at by the use of properly constructed
salamanders, which not only gauge the current, but also
the resistance offered by the figures of each patient's body, to
the flow of the electrical current, and this is far from being a
fixed quantity, as those who are engaged in its practical working
know varies considerably. The old method of noting the current
by the number of cells employed, was both fallacious and uncertain,
doing to the varying state and different internal resistance of
each cell; and the condition of their connections; as well as
the above mentioned constitution, in different patients, as
regard their own conducting power.
Another advantage which we now possess, is the large dose that
can be administered, by the use of large electrodes, such as the
clay, as introduced by Apolloni, and by increasing the current gradually.
The leads under which I shall consider electricity are:

I. Galvanic Current
II. Faradic Current
III. Static Electricity
IV. Electrolysis
V. Galvan. cautery
VI. Electric light
VII. Electro. magnet.

I. Galvanic or Continuous Current.

In this form there is a constant flow of electricity, when the circuit is closed, and this flow is always in one direction viz: from the positive to the negative pole, in its therapeutic application, the part of the body to be acted upon, is made to complete the circuit.

This form has a wide field of action, being used especially in electro-diagnosis, in the removal of inflammatory indurations, neuralgia, rhumatic deposits, and a whole host of others.

This current is the basis of the Faradic, Galvan. cautery, electro.-magnet, electric light, and electrolysis is simply an intensifier, and concentrates continuous current.

It is applied in various ways, such as, the stabile, mobile, and intermittent.

The stabile method consists in keeping both electrodes fixed and gradually increasing the current up to the desired strength.
Then as gradually shutting it off; in this way a very much larger amount can be taken than by using other methods.

The needle, in this form one electrode (usually the positive) is fixed, and the negative sponged over the part, in this way the current varies in strength, as indicated by movements of the galvanometer.

The influence of this large amount of current is actually broken, and is chiefly used in reducing muscular contractility in paralytic cases. I have used the needle form of this current with marked benefit, in a case of enlarged thyroid gland, reducing very considerably the size of the tumour, and relieving the pressure symptoms on the trachea, which this body was causing (vii. Case 18). In the case of an inflammatory thickening of the perineal cord, the result of injury; in stimulating the healing process in chronic ulcers of the leg, in which the skin and subcutaneous tissues were regularly made down to the bone, by long standing inflammation, as these the thickening was apparently absorbed, and in consequence, the skin became more movable, and pliable. In a case of very chronic eczema I used it, and was very much pleased when I found that in two days the skin had lost a great deal of infiltration, and did not look so angry. I tried it a second time with a beneficial result, and thought I was going to cure the eczema, but in this I was disappointed, for after the inflammatory thickening had been reduced,
and the skin brought more to its natural thickness, the
electrical current seemed to have lost its virtue, and though
I tried it repeatedly afterwards, it did no good, but seemed
caller to add fuel to the fire, by exciting the eczematous
condition. In this case it appeared to have a very powerful
effect, in removing the adjacent inflammatory tendons in which
the eczema caused, but to have no beneficial effect on the
eczema itself. I believe the great action of the constant
current is to cause absorption of inflammatory deposit;
whether it be in an early stage, when it is chiefly cellular in
constitution, or in a later stage when it is principally fibrous,
In some cases proving only a heat current, in the
latter one of such strength as to electrolyze, at the site of
application; in the former class, fall structures of the ulcers
and other mucous canals, and various fibrous contractions.
The manner in which I am inclined to think it acts is
as follows: All inflammations act through a nervous
mechanism; an irritant is applied to a part of the body,
this causes a reflex dilatation of blood vessels supplying
it, and an increased vitality of the tissues, as indicated by
proliferation of the cellular constituents, at the same time,
circulatory migrate, in large quantities from the capillary
vessels, and fibrinous material forces, in turn there is
excessive deposit, and deficient removal; in consequence of
which, an adventitious tissue, becomes organised, and this,
is ultimately, mixed with the normal structures of the part. E.g. Skin, mucous membrane &c. The vital inflammatory action has ceased, nature tries to right itself, by producing absorption of the foreign body, here destroying the protein and having removal in excess of deposit, which may be more or less complete corresponding with the amount of organisation, which has taken place, if it is fibrous in character, this can only go on to a certain extent, and this fibrous tissue then contracts, causing different effects, according to its situation. If in muscle, gland, &c. it affects more or less complete, of the normal and essential tissue of the part. Should this atrophy be complete, electricity would be of little or no good, as regard restoring lost function, except that it might believe fibrous contraction, and this indeed it does, for it possesses a most potent effect, on inflammatory deposits, by causing their absorption, and at the same time helping to restore the normal condition of parts, partly by removing the inflammatory material, and so allowing healthy nutrition taking place; if the atrophy is not complete then in addition to this, a direct stimulation of the atrophied structures. This action is taken advantage of, in healing fibrinous infection of internal organs, such as the spinal cord, and this particular use might be extended; I see no reason why it should not remove the fibrous deposit, in a cicatricial liver, as well as in fibrosi in other, provided the current is so placed, as to include the affected area, in the circuit.
Such conditions as these, which are only partly aided or by medicines, and are not amenable to treatment with the
knife, in these, electricity in the form of the constant current may be found to stop in and fill the breach.
Electricity may be very conveniently applied to deep seated organs by the electric bath, the body being a better conductor than water,
the current flowing readily through, but if salts or acids are added to the water, it would become a better conductor than the
body, and would avoid it.
In this way either a local, or a general action may be obtained,
by having small electrodes inserted in the water of the bath with
the part to be acid or situated between them, in the first case,
and large electrodes, with the whole body between them in
the latter.
It has been found very useful in healing chronic rheumatic
arthritics, gonorrhoeal affections, lead poisoning, delirium,
and various other chronic affections of internal organs.
From the foregoing remarks, it will be at once evident, that
a widespread action, this agent possesses, one which no
single drug, can ever lay claim to.
Read, in this form we cannot, as in the Galvanic &c.
II Faradic Current.

Strictly speaking this is not a current but a series of currents, following each other with great rapidity, and each current flowing in the opposite direction to its predecessor. Its strength varies, with the amount of electricity flowing from the galvanic cells supplying it; the length of the cables, and the distance the cables primary and secondary are from each other. This is perhaps the most commonly used in general practice, at the present time, though I believe the constant current will replace it, in many instances, where it is at present employed; still it will maintain its proper place, and as the science of electro-therapeutics, becomes more thoroughly understood, we shall have a line of sharpe distinction between those cases which are best suited for treatment by the galvanic current, and those to which the Faradie is the most applicable.

In this form of the galvanic, we cannot judge the amount of current flowing through the tissues. By galvanometers, we have to trust to the amount of contraction caused in the muscles, and the sensations of our patient.

It is now a recognised fact, that the most beneficial result is gained by using a current, that will just do the work and no more. Some authors believe damage to be done by using more powerful currents. Years ago and even now, as strong currents as the patient could bear, were thought to be beneficial
and the time the patient could endure, the sooner was the case
resolved. But experience has shown that this doctrine was not
sound. I think strong galvanic currents may with advantage be
employed (and I have frequently used them) in that variety
of hysteric, which is characterized, by a lethargic condition,
where the patient, is usually of a lethargic disposition; has the
notable hystericus, languor, no acute pain, ailingment, no
menstrual irregularity, or any ovarian lesion, the main condition
being mental torpidity, with hysterical symptoms superadded,
and contrast to the highly strung nervous system of so many
of our hysterical patients. In such cases as the foregoing a strong
galvanic current is of the greatest benefit. I have met with
these cases frequently in Newark and District, and have
attributed it partly to the relaying climate of these parts, which
are situated low down, in the valley of the Trent.

Apply it particularly down the spine, and over the body generally.
The skin of these individuals, seems particularly liable to
heathings, after the application of the current, much more so
than in the patients.

In hysterical patients who suffer very quickly and in a
shallow manner, this form of electricity is very useful, and in
the case of a girl with violent hysterical fits, who complained
that every time she lifted her left arm up, a very loud sighing
noise occurred in the abdomen, on applying a strong Faradical
current over the abdomen, immense quantities of feces were
pulled up, in consequence of which the general noise ceased, the breathing became steadier, the feet left her, and she entirely recovered. The fluid in my opinion consists chiefly of swallowed air, and the cæcum, caused the diaphragm and abdominal muscles to contract and expel the air.

In a case of hysterical aphonia, I found this Faradic current to act like a charm, bringing back the voice directly. An electrode was placed on each side of the larynx and the lumen burst through.

It is very useful also in melancholia, mania, infantile paralysis, incontinence of urine, etc. I have also used it with benefit, in a peculiar condition of varicosity of the small veins of the calf of the leg, the peculiarities of the veins lies in the fact that the large veins of the leg are not at all affected, but from the lower border of the popliteal space, to the heel, all the small veins visible in the skin are pretty dilated, causing a dark purple condition of the integument.

The symptoms are peculiar, after the patient has walked for about 150 yards, a kind of cramp comes on, which compels his standing still to rest, and after he has rested for a minute or two, the pain subsides, to be again followed, when he has walked the same distance, by the same feeling of cramp which compels him to rest again, and so his cycle of events goes on, making his profession very slow. Besides the uncomfortable sensation above referred to, supplied a moderately strong Faradic current and
This caused the limbs to contract, as evidenced by the skin becoming much paler in colour, the experiences being for the rest of the day, and can walk about without the cramps coming on. Lastly the benefit has become more lasting.

It probably acts as a stimulant, giving tone to the vessels, and causing them to contract; thereby alleviating the enjoyment and feeling of cramps. Most likely in this case, the small viscous twigs of the muscles, are also exercised (though none of the large veins on the front or back of the leg which are usually the seat of this condition are affected), and that these really cause the crampy feeling, and are benefited by the current in the same way, that the viscous twigs of the skin are.

I have also used this form of current, in a large number of cases of muscular pains.

I cannot agree with the view taught in Bridöwe: "Theory and Practice of Medicine", 1834, page 773 viz: that it acts as a sedative, through causing fatigue of the muscles; to me this appears unphysiological, on the ground that fatigue of any tissue, would not produce a feeling of rest, but may produce a desire for rest, but that is different: my view of the case is: "that it gives a healthy stimulation to those parts, and instead of wearing the muscles, it invigorates them, acting if one may use the expression, as an "electric tonic". Bridöwe recommends the constant current for this purpose on the ground that it produces a more lasting effect, and I have
No doubt this is so in many cases, but not all; for in a large number the Faradic is all we require, and is very often more convenient; moreover its action is not so fleeting as the above writer would have me to believe, and this in itself is another argument against the "fatigue theory".

### Statical Electricity

This is the form in which electricity was first used in medicine, and is therefore interesting from an historical point of view. It has been devised by Charcot of Paris, and it doubt if like other forms of electricity, has its proper sphere of application, which will be accorded to it, when the working of it is better understood, and the machinery for its production rendered more compact and less expensive. The positive charge has been found useful in the debility of old age, and during convalescence, in many cases of mental depression, such as insomnia, melancholia, &c. and in bronchial asthma. In this branch I have no practical experience, but in the latter case it seems to me, that it would act by giving tone to the bronchial tubes, in those cases where owing to a lax condition of their walls, the latter instead of remaining patent collapse. For his convalescent D. de Watteville recommended Galvanic Faradisation; that is the simultaneous passage of the galvanic and faradic currents.
The method of giving a positive charge is first of all to insulate the patient in a very dry room, by placing him in a chair with feet up, the negative electrode in contact with the floor, and thus the negative electricity is run off to the earth; the patient grasps the positive electrode, and he then becomes charged with positive electricity; sparks may be drawn from him, or presenting a touch to his skin, and in this way an electrification can be obtained at his part. If the atmosphere of the room be moist, the air becomes a better conducting medium and it is then impossible to charge the patient, because the electricity escapes, as fast as it is introduced.

S. Stewartson of Newcastle-on-Tyne wrote on this subject in 1778. In a book reprinted by Churchill in 1804, Electricity and its Manner of working in the Treatment of Disease. Care must be taken to see that the Positive, and not the Negative charge is administered, because the latter has induced an attack of disease.

Tibbitts in his book “How to use a Galvanic Battery” records some very good results by using this form of electricity in asthma, neuralgia, facial spasm, and general debility of old age.
IV. Electrolysis.

In this form we use a galvanic current of such a strength, that it is capable of splitting up the chemical compounds, which build up our tissues, into their constituent elements. And some idea of its powerful action may be gained from the writings of D. Alkane, as quoted by D. Woodham Webbe. British Medical Journal, July 16, 1887, pg 116. Here he says: "No animal tissue, whatever can resist the disintegrating effect of the negative pole, and the force and rapidity with which this disintegration is brought about, are directly proportional to the electric motive force which is employed, and to the stiffness and vascularity of the structures acted upon. D. Price Jones of London recommends this, for dissolving or splitting up vesical calculi, but it never came into much use in practice. D. John Duncan of Edinburgh used it, on account of its decomposing and vaporizing properties, in the treatment of certain vascular tumors. E.g. Deep seated aneurisms, such as those of the Thoracic and Abdominal aorta, and various forms of Mebi. It has not made so much headway, in the treatment, of large internal aneurisms, as it was once thought it would do; chiefly owing to the fact, that the disease is one of such intense severity, that a panacea, rather than an active form of treatment is required. No doubt it will be found useful in some particular cases, and retain at any rate, an honourable reputation in surgery.
D. V. Pope has recommended it for the removal of pury and hematomat deposits.

Of most promising use would appear to be, in the treatment of various forms of ulcer, and periarticular inflammation, hi fibrinous ulcers of the ulcers, and ulcers of the different mucous passages, and the removal of scars and bands of fibrous tissue.

Electrology in uterine fibroid, and congestive disorders of the uterus and ammena, has within the last eighteen months, attracted a great deal of attention, chiefly, owing to the writing of Aprotus, Leavenson and others.

As regard fibrinous ulcers I have no practical experience; but from reading Aprotus's monograph, his doubts seem to justify the fact that an extended trial of his method ought to be made. In hemorhoracic forms, he uses the positive pole as the intra-uterine electrode, and a large negative electrode of potter's clay, over the abdomen, to diffuse the current, so that it can be borne on the skin, any raw places, or abrasions that may be present, are protected by a small bit of sticking plaster, or collodion. In the case of non-hemorrhagic forms, he uses the negative pole, as the intra-uterine electrode. The positive pole produces coagulation, and forms a clot; the negative rays appear to cause first of all hyperemia, and following on this an abscessive process. Fibrinous ulcers as is well known, come on chiefly at a time when the organs concerned in
Menstruation, are in their full vigour from 30 to 45; and also are connected with disarrangement in function of these organs, such as sterility and menstrual disorders; and when we come to consider the widespread action which Electricity possesses, it can be seen that this agent, not only may act locally on the tumours, but also influence the disordered state of the nervous system in general, thus getting at the cause of the growth or disease, which is brought to be, the chief aim in practical medicine.

That Electricity can produce profound effects on the nervous system is certain, and it may not be out of place to quote some very interesting facts from the cases of two women, who were struck by lightning, and the effect which had on the menstrual secretion as recorded by D. Grevin in his Clinical Lectures published by the Sydenham Society Vol II. page 354 &c. 354.

A woman at 29 struck by lightning, while standing about five feet from the foot of a tree, was insensible for a time, and gradually recovered consciousness. The skin of the right shoulder was abraded, for a space as large as a dollar. Her clothes went into threads; on the right side of the body, the skin was blistered and marked with discoloured streaks, which extended anteriorly on the lower part of the abdomen, towards the pubis. Pain in stomach and bowels, for three weeks. She has been married for several years, but has never been pregnant. Her menstruation was perfectly regular, prior to the exception
of the shock, since which it has been very irregular. Sometimes having two periods, in a month, and then escaping two months. The flow has also been diminished in quantity. Her health has not been very good since she was struck, manifestly resulting from her menstrual irregularity, as a species bleeding gave her relief. Her reproductive functions appear to continue dormant.

Sarah at least 70 was standing immediately beside the last, gradually recovering consciousness. Marks of dislocation on skin of right side, and other joint, pain in Region of stomach and bowels, for about two or three weeks after, as in the last.

Burning sensation was experienced in palms of hands and soles of her feet, and in the course of two or three weeks a swelling appeared under the right foot, ultimately resulting in the Ostipation of a portion of the thigh indurated epidermis of that part, about an inch and a half in diameter.

The uterine discharge which had in the course of nature ceased, for more than twenty years, was completely and thus far permanently re-established. At least a discharge from the genital organs, having all the characters of the catamenia, and attended with rigorous and backache, its peculiar law of periodicity, has been established, and continues to bear, with the utmost regularity, after the lapse of more than a year, when this account was taken. She has not missed a single period since being struck; and to use her own language "her menses then as regularly as when she was a young woman."
The flow comes on with the usual premenstrual symptoms, and
the menses have undergone, and obvious enlargement. She
has but one child, to which she gave birth soon after reaching
womanhood. Menstruation was regular up to the menopause
which took place between forty-five and fifty. Subsequently to
which she has refused, all the appearances ordinarily attending
the gradual approach of the state of involution in a woman. With
the electrical shock likewise relieved her of a very troublesome
stomach, which had existed for four or five years, she has had
a slight exacerbation of it, in a milder form. Her health remains
good, there being not the slightest indication of the development
of organic disease of the uterus.

These two cases show in rough and ready way, the powerful
action that electricity possesses over the menstrual function,
in the one disordering a healthy function, as in the case of disease
having been induced artificially by a repulsive charge; in the
other, giving a fresh lease of life, to a function which had
naturally ceased, in the same way that the positive charge
is useful in the debility of old age, and it may be in the case of
uterine disorders, that a powerful galvanic current may act
somewhat after the same manner.

D. Apostoli records a case of small ovarian tumours, which
disappeared after treatment by Ectodysia. (British Medical
Journal, July 16, 1887, page 116)

I have tried Ectodysia in two cases of Endometritis, with the
Result: that the discharge rapidly diminished, the uterine cavity came down to its normal size, the pain in the back disappeared, and the patient expressed themselves as "feeling lighter," the heavy feeling of congestion, so common in his disease, having been removed. My method of application was as follows, a double having been administered, a Sims speculum was passed (with the patient in the dorsal position) and the uterine cavity was washed out with warm iodine solution, through a Bogerian's Jetum catheter; (in want of a proper instrument) the wire from the negative pole was attached to the catheter, this not being sufficient.

The canal of the cervix was also acted on, a pad connected with the positive pole, was placed on the skin of the abdomen, and a current of 10-12 milliamperes passed through for 10 minutes, a slight tingling sensation was experienced, with no pain. The discharge on the next two days was quite free, and not so thick in character, on the third day, another application was made, and at the end of about 10 days the discharge had entirely ceased, and the uterine cavity thick at the commencement of treatment measured over three inches had now become he was two and a half. The next menstruation which occurred was about normal, whereas prior to this treatment, it had been excessive; whether this last result was simply due to the subsidence of the endometrial inflammation, or to a direction of the electric current, or the same concerned in the menstrual function, I cannot say, but my opinion is that both causes were
In a case of prolapse, in which there was enormous hypertrophy and the cavity of the uterus extended to over 4½ inches, two applications, had a decided beneficial result; but unfortunately the patient left hospital, so that I was unable to continue with the case.

In strictures of the various mucous passages, a wide field of treatment opens out to Electroplax, the rapidity of action, the absence of pain, and its lasting effect, render it the agent "par excellence" for healing these affections; the convenience of the operation is a great consideration.

In strictures of the urethra, I have had some very pleasing results by using this method. The mode of treatment which I adopted was as follows, the positive pole, being connected with a broad pad (which was previously moistened in salt and water) was placed either on the back, in the lumbar region, on the abdomen, or upper part of the thigh, and gently moved from time to time, without feeling the current, to prevent the skin becoming too, or inflamed. A galvanometer had been previously introduced in the positive side of the circuit. One of Blondelet's electo-tongues (manufactured by Covell), attached to the negative pole was passed down the urethra, until it encountered a stricture, on which it was allowed to lie gently. A current of from 0.9 milliamperes was applied, and in from five to six minutes, the tongue slides through the stricture, quite painless, and without pain, and circumstances anaes-
Narrower lower down, there was also a larger amount of inflammatory thickening in the penis, which was rided with fistulae, and on one account had a most profound effect, causing rapid absorption of the inflammatory exudation, and a closing up of the fistulous tracts. (Ref. Case II.)

Great care must be taken to see that the negative pole is connected with the electo-gongè, otherwise damage to the urethra may be done; as if the positive pole is attached, coagulation takes place, in the same way that it does, when an acid caustic is applied, and the mucous membrane, adheres to the point of the electro-gongè. Mr. Bruce Clarke (of St. Bartholomew's Hospital) states he one, with strips of mucous membrane attached, with the positive pole had been used by mistake.

The easy passage through the stricture and held most favorably with the old plan of dilatation by gongè, or hole splitting method, there being no pain, no false passages made or any risk of their being formed, no loss of blood, no flesh cut, made as in external or internal urethrotomy, which would simply be the formation for true abdominal band, and in consequence a narrowing stenosis of the canal, unless kept continually dilated by the use of gongè.

On withdrawing the gongè electrode, some whiskers from the transverse visible on the end, and indicate that electro-chemical action has been going on with the evolution of gases, in the same way as in the electrolysis of solutions and metals. The effect on the inflammatory exudation was not less striking, though not so immediate, for
In two or three days, it was noticed that the penis was not so swollen or hard, and in a week the discharge from the several fistulae had very much decreased, and then, while not to slightest I intend to state that on the day of the first operation, the penis was increased instead of decreased in size, appeared slightly inflamed, but had subsided then. I saw the patient on the following day; this bears out the statement of Aristotle:

"That the negative pole first of all sets up a hyperemia of the parts, and that this is followed by an increased action, which is in him followed by an absorptive process."

Now I think, by this behavior, that the process of absorption, must be distinctly definable to changes produced through the inflammation of the tissues acting upon, and not by any electrochemical action, so that to this part of the process, electrolysis hardly applies, but as much as the current which produces the electrolytic action, to the cause of it, I do not think it out of place to mention it here.

In the inflammatory condition there is a disordered state of the trophic nerves, whereby an increased or deficient removal, or both, of lymph occurs in the extremities of the figure, that the constant current which flows through the parts, from deposit of electrolysis (negative pole) to the skin electrode (positive); stimulates these trophic nerves or cells, to an increased vital action, which tend to restore the normal balance of deposit and removal. As to what the structure itself electrolysis affects
To me, it is applicable, that in the fleshes, the statures, is split up into its various compounds, in such a way that disintegration takes place, and I think this for the following reasons.

First, on account of the rapidity, with which it acts, showing that some disintegrating action has taken place locally.

Secondly, because the negative pole (corrosive) persists on its withdrawal a whitish scum on the end, indicative of the evolution of some gases consequent on Electro-Chemical action.

Third, because by experience it is known, that the tissues of the body can be split up by the Electrical current, through a series of complex Electro-Chemical changes, whereby the acids appear at the positive pole, and the alkalis at the negative.

The greatest amount of action taking place at the negative pole.

Some would have us believe, that this process only acts as a carotic. If this is true, it is a very convoluted way of applying one, on account of our being able to duplicate its result of action to a nitre; however, I do not think that this is the correct explanation, because if it acts as a carotic only, we should reject following the destruction of the structure, a contraction and this in my experience is certainly not the case.

In Electro-Chemical as well as in their forms of structure; there is not only Electro-Chemical action going on at the site of the structure in the canal, but the whole area through which the electrical current passes, has a most profound injury made upon it, whereby the absorption, of inflammatory secretion.
and induration is stimulated.

There is a better explanation I know not, but it is the only one whereby I can at present harmonize facts.

I have tried it at present in five cases, and in all I have been satisfied with the result. One was a recent case with tenet, which healed, the others were chronic, and having been in existence for forty years. Two will be recorded at the end of this paper.

Dr. Skarron and Mr. Joseph of St. Bartholomew's Hospital have used this method in the treatment of catarpalsal affection, and it seems to act there, in a similar manner, to structure of the iris, and the results would appear to be much the same. A probe instead of an electro-sonie is connected with the negative pole, and passed down the canale; and a flat electrode connected with the positive pole placed in the back of the neck: a current of 2-4 millampere is quite sufficient as the film becomes forming the structure is not very dense, and because strong currents about the face, and especially, are very dangerous, so much so that the great French singer Depuy (Houdon) one of his patients. Mr. Joseph has found a current of the above strength, applied for thirty seconds sufficient to overcome the structure. And since, the one of electricity not only varies according to the strength of the current, but also to the length of time employed, a weaker current extended over a longer period would do the same work.

I tried electrolyzing a large probe, by puncturing with the
Neglect to resect, with the result of getting, in the first place an
enlargement, and congestion of the tumour, followed by a
marked diminution in the size of the growth. The patient at
present will not allow me to puncture again, although I acknowledge the benefit, which she derived from it last time.
Judging from Toffetti's "How to use a Galvanic battery," A case
of cancer was treated by reflex of New York. Here a
malignant tumour of the breast, as was proved by microscopic
examination, was treated and remission took place. This was
dispersed by Electrophysia, and the patient died of some other disease
three years later with no return of the cancer. In this
connection it would be interesting and important to know the other
cases of malignant growth which are treated in the Galvanico-
functionary. Bear with the same rapidity, as more is removed with
the knife.

If this non-tumour really is a fact, the sooner we begin to
Electrolyse Cancerous growths the better; it seems almost too
good to be true, while it is well worth a trial, on account of the
extreme rarity of the disease.

In the removal of hair growing in abnormal places, in the case
of post-nasal marks, and the destruction of neuvi Electrophysia
another application.

In removing hair each must be treated separately, a large
positive electrode is moistened, and placed on the skin a few
inches from the root of the hair, which are to be treated, a needlec
Connected with the negative pole is a fine hair along side the hair until it reaches the bulb, amount of from one to three millimeters in now known. The hair bulb is destroyed and the shaft loses its feelers. Each hair requires to be heated in a similar manner.

In heating an aneurysm, Dr. Julian Alvarez (British Medical Journal, July 9, 1887, page 78) plunged the positive pole into the tumour, and sponged over its surface with the negative electrode. If the positive pole is used for incision, it should be made of platinum, as it is corroded by the acids which are liberated at this pole during the electrosis.

From its extensive range of action, the convenience of its application and its limitation of action, electrosis is destined to become a widely used medical agent.
Galvano-Cautery.

We now pass on to consider a still more intensified form of applying the electric current, one which produces its action by burning the parts, whether it produces other effects I cannot say, though it seems to me quite possible, that an influence is exerted on the parts outside the area of total destruction by a radiation of the current. As I mentioned before, under the heading of electriphysi, some are of the opinion that electricition disperses cancer and it would be extremely interesting to know the length of time that elapses before removal after Eisenstein takes place, by the Galvano-Cautery, on the one hand, and by the knife on the other. Whether radiation of electricity takes place in any appreciable amount from the Galvano-Cautery, I cannot say.

The principle on which this acts, is that there is introduced into the circuit of the constant current, a substance which offers high resistance to its passage, the friction thus caused produces a heat, which may vary from slight warmth, up to the most intense white heat, capable of melting platinum, according to the quantity of electricity employed. For surgical purposes, a dull red heat is the one best suited, this acts as a styptic, and forms an ulcer which heals, or even prevents any septic absorption. The advantages in using this method, apart from any of the secondary ones above mentioned, are that it can be introduced or withdrawn from any cavity, quite cool, its action...
diminished, or intensified at will, it can be adjusted round any growth before its action is felt. Dr. Sharman states that there is often a singular freedom from pain following its employment. Another use has been made of this agent in a somewhat novel manner by Dr. W. W. of New York (British Medical Journal Oct. 1st 1887, p. 798) "The Galvano-Cautery Bond and its Application especially in Hypertrophied Prostate."

In these cases he uses that he calls an instantaneous flash. A galvano-cautery bond is passed down the urethra, to the prostate, then by touching a button, an instantaneous flash occurs, which may be kept on for an instant or a few seconds. The operation is described as painless, it has been followed by a diminution of the gland to its normal size, in several cases reported by him. Dr. W. W. argues from the similarity in structure between the prostate and the tonsil, contends that the same treatment might be beneficial in the treatment of hypertrophy of these glands; and accordingly he tried it, with the result that the tonsils were diminished and a cure resulted.

These cases were in children and the operation was painless; a great advance on the tonsil guillotine.

Whether this acts by superficial irritation, per se, following an electric current, or whether there is diffusion of electricity; one cannot certainly say, but my own view is, that both are concerned in the result.
Dr. Newcomen has also used this form of treatment, in impotence, spermatorrhea, vesical palpitation, damaged surfaces and ulcers. For these latter, he uses the endoscope, to localize the application.

There is also the rapid method of healing hypertrophic prostates, with the Galvano-Canthury wound, by which a passage is burned through the enlarged gland; it is recommended by Professor Dithri of Paris; but as Dr. Newcomen remarks, it is a very severe operation, being followed by shock, great pain, inflammation, and with an uncertain result, the channel thus formed is liable to close up again.

Dr. Newcomen also recommends a Galvano-Canthury for use in cases requiring prostatectomy; he operates through a suprapubic incision.
Electric light.

This promises to be of great use, in exploring the various cavities of the human body, on account of the small space, it can be made to occupy, the brilliant light, continuous amount of heat generated, not influenced by draughts, and requiring no oxygen for its mainenance, its reflection squared, and also being to burn when immersed in fluids; all of the above mentioned are points of extreme value, and render it peculiarly applicable to surgical uses. The eye of course acquire Educating to the appearance presented. E.g. the colour of parts will appear slightly different when illuminated by the brilliant think blue electric light, from the same parts when lit up by candle, lamps, or gas. Lately there have been improved methods brought out in connection with illuminating the bladder, of which Leibisch of Vienna would appear to be the best, this is described in the British Medical Journal for February 4 1838, page 240, by Dr. E. King-Heardwick, the principle being, a small incandescent Phosgene lamp, introduced into a catheter with a window protected by a prism of rock salt, and another window with a prism of rock crystal, to bend the ray so that the eye may see round the bend of the catheter.
The Electro-Magnet.

A piece of pointed steel, is wound round with a coiled of wire, and through this coil, a current of electricity is passed from one or two galvanic cells. The longer the wire forming the coil, the stronger is the magnet; this is used for drawing small pieces of steel or iron from the eye, and various parts of the body.

A magnetised needle may be used as an indicator, by suspending it from its middle by a piece of cotton. It is moved slowly over the suspected part, and then near the embedded portion of metal it dips, thus giving an indication of its position.

In this connection it may not be out of place, to mention another indicator, of hidden metal, that is to say, by using a paste which consists of two indelible pieces of metal with their points exposed; when this touches the hidden metal, it completes the circuit, and a small cell in connection with it makes, this has been found of great use in military surgery.
The form of battery to be employed varies with the requirements of the case. The one which I prefer to that recommended by the majority of those who have written on this subject, viz. Leclanché elements of large size, and from what I have observed patients can bear more easily a large number of milliamperes when the current is furnished by these cells than when it is produced by certain other forms of cells. That there is a difference is proved by the following fact: A Dale's saline battery of six large cells, gave the paper through the neck of a porous patient 12 milliamperes, but the patient complained about it being sharp and burning, a great deal. This battery gave a splendid light with a small incandescent lamp of 5 candle power. With a Leclanché battery of eight large cells a current of 15 milliamperes was passed through the neck of the same patient at the same points of, and she bore this more readily than the 12 milliamperes from the Dale's battery, and although it gave 3 more degrees when passed through the patient's neck, yet when applied to the above mentioned lamp, it only gave a dull red light, as compared with one of dazzling brightness with the former. The Dale is a very prodigious battery for working a cell, electric light, a galvano-metre, while the Leclanché is preferable for passing through a patient's body.

The construction of a Dale's saline battery is as follows. The inner cell or porous pot contains a liquid chloride of zinc made by dissolving zinc in pure hydrochloric acid, into this cell, three zinc plates (negative plates) are immersed.
The only cell is filled with crushed carbon, in which is embedded a carbon plate (Positive pole) and this is joined to the cell is filled a mixture consisting of equal parts of pure hydrochloric acid, and a saturated solution of dichromate of potash. The disadvantages of this form are, the conducive nature of the liquids, that fumes are given off, which rust any steel articles, anywhere within reach, this latter can be obviated by having the battery fixed elsewhere, and the electricity conducted by wires. It suits a very poor and constant amount of its kind.

The Leclanche is well known as not to require description. I use Cottet's modification which consists of the so-called silver carbon blocks enclosed in a bag of coarse sack, or flannel (the Positive pole) large zinc plates (Negative pole). These are both immersed in the same cell containing a saturated solution of chloride of Ammonium; the sacking acts as the porous pot.

The resistance offered to the flow of Electricity varies in the different tissues. The skin as is well known possesses the greatest resistance, this I think is mainly owing to the comparative dryness, and the nearly condition of the Epidermic Laver. For if the Epidermic is made sodden, the difference between the passage through it and the raw surface of an ulcer is very slight. I would say that the softer a tissue the more readily does the electric current penetrate it.
Case 7. Stricture of urethra, and urinary penile, scrotal and perineal fistula.

P.G.: Shoe maker at 46, had always been healthy, until June 1886, when he had an attack of arthritis, for which he was treated; in a short time abscesses appeared in the scrotum, penis, and perineum. He was admitted as an in-patient to the Newark Hospital. On September 2, 1886 and was treated with "fistula of catheter," and "washing out the bladder" with warm boracic lotion. Discharged September 10, 1886 feeling much better.

He was readmitted on October 12, suffering from a large penile abscess, which was opened on the 13. "Fistula of catheter," and "washing out the bladder" as before. Discharged November 4, 1886.

He came at intervals as an out-patient, to have the bladder washed out, and the catheter cleaned, until the latter end of November, when he found that he could not pass the catheter, and that he urinated, instead of coming down the urethra, escaped in three places viz: Scrotum, penis, and perineum, at the site of the abscesses above referred to; a catheter was passed after some difficulty, and fixed in the bladder.

On January 6, 1887 he was again admitted into the hospital with five fistula, one on either side of the penis, two in the raphe of the scrotum, and one in the perineum. He improved slightly under "catheterism," and "washing out of the bladder." Discharged on March 15, 1887, with the penis and scrotum fully recovered.
much lubricated, owing to the balloons state of the fistula, and
the patient expressed himself as feeling "made together."

In April 18th, 1887, I commenced Electrosis, longie electrode
No. 7, attached to the negative pole, was passed down the
wound for about three inches, when a Skirving (skirving)
was attached to the positive pole, was applied to the inner side
of the thigh, and abdomen, being moved from time to time;
to prevent the skin getting sore. No pressure was used, the
longie simply resting on the Skirving, after five or six minutes,
it passed through the constricthing band, no pain was noted.

Another Skirving in the balloons portion was inserted, but
further treatment was discontinued for this day. The strength
of the current employed was from 5-9 million a.mperes.

April 21st. The Electrog longie passed early down to the balloons
portion of the wound, where the last mentioned Skirving was
felt. After five or six minutes application, the longie passed
into the bladder, and was at once withdrawn.

April 23rd. Longie again passed into the bladder.
April 25th. I examined him again, and found that the discharge
from the fistula had lessened very much and that a
hard substance, about the size of an almond, in the site of the
fistula, had rapidly decreased in size, since the Electrosis had
been applied (this was an inflamed granuloma the remains
of an old abscess track). The patient said he felt much
colder. Encouraged by this absorptive action set up, I
continued to pass the sponge, with the idea of diminishing the induration, in the penis and perineum. By passing the Electroshock down the urethra, attached to the negative pole, and applying a sponge, connected with the positive pole, to the external orifices of the glandule; thus passed the current, from one end of the penis to the other, this had a most striking effect, causing the discharge, to cease very considerably, and at the same time diminishing a great deal of the induration.

April 28. Electroshock again applied.

April 29. He again presented himself. A current of 12 milliamperes was employed, which however proved too strong, as it set up slight inflammation at the root of the penis, and perineum, which however subsided expeditiously, on the application of evaporating spirit.

May 5. was the next application, and in a few days the induration had completely subsided, and scarcely any induration remained.

For a few weeks he was of his usual state, with a soft catheter. He now passes it in the usual way. It is now passing on for a year since he passed an instrument. The patient again, in his palate, pass the same as easily, and in quite as large a stream, as he ever did in his life, and his health which was previously poor, through the constant pain, and woe of his ailment, is now very good. He has gained in flesh, and is able to feel as well as he ever did in his life. This case has recorded in the British
Case II. Stricture of over 40 years standing, of the bladder.

A S, aged 74, came to consult me as a private patient. Has suffered from stricture upward of 40 years. Four years ago had lateral lithotomy performed for stone in the bladder by Mr. T. Wright of Nottingham. Since this operation his urine has passed through his bowel and passed by the rectum, in addition to that passing per urethram. About three weeks after the operation, his water would not pass by the proper channel, so that he was obliged to use a bongie, and catheter No. 7, and he has done so ever since. He also suffers from a left inguinal hernia, which was made worse five years ago through draining its pass water, when suffering from stone in the bladder.

March 20th. On passing a No. 7 bongie electrode, a stricture was encountered, at 2 inches from the meatus, very dense in character. A current of 6 milliamperes was passed through for five minutes, when the bongie passed through, and was arrested at four inches, by a hard and unyielded stricture; the bongie was allowed to rest on his and in four minutes, it passed through into the bladder, on setting the bladder, the current rose up to 11 milliamperes. I then withdrew the instrument, and let the instrument remain on the stricture part, for a few seconds, it could be moved up and down, quite easily. No pain, patient could just feel the current passing.
Slightly.

March 31st. Current of 7 milliamperes for 6 minutes; the tongue passed through the stricture very freely.

April 2nd. Current of 10 milliamperes for 8 minutes; the tongue travelled slowly through and back again.

April 5th. Patient reports that the passing through the stricture had nearly stopped. Current of 9 milliamperes for 11 minutes, the anterior stricture about 1/2 inch wide; the tongue passing as freely as through a normal archura.

April 7th. Passing through archura almost stopped, current of 10 milliamperes for 6 minutes.

Patient can now pass water without using a catheter and the stream is much larger; the passing through archura nearly quite stopped, and he is not troubled so much in the right side up as formerly.

Case III. Goitre.


Patient has always been fairly healthy, and family history pretty good. Father 67, mother 66, both living, one son suffers from bronchitis, 2 daughters are strong and healthy. Complains of irregular menstruation, enlarged throat. None at menstrual periods. Difficulty of breathing, especially in lying down; had palpitation some little time ago, but has not
This now. Tumours in the eyes though there is not the slightest appearance of Pothshalmos, and von Graefe's symptom about, has suffered from irregular menstruation, ever since its commencement at 15; if so she has a good show the tumours diminishes in size, if the flow is steady, it increases. Has had eight children, all living all fairly healthy. During the last six months, has had anaemia, and the tumour has increased in size. Pressure symptoms on the baches have manifested themselves, so much so, that for some weeks, she dare not lie down in bed all night, voice faint, and husky.

On examination a firm elastic tumour is found occupying the position of the thyroid gland, lobulated, and larger on the right side than the left; reaching on the former nearly up to the mastoid process, 9 inches across in the widest part.

March 12th. Constant current of 5 milliamperes, passed through for five minutes.

March 13th. Patient says she has felt much better, and the relief was apparent. By 5 p.m. on the previous day, began her credit much better, and has not felt so comfortable for lying down for five months, she walked here this morning (the distance of about a mile) comfortably, whereas yesterday the same walk made her very short of breath. The voice is better and stronger. Current of 5 milliamperes for eight minutes.

March 18th. Still feels much better, and tumour distinctly smaller, can bathe her face over it quite easily.
which she has not been able to do for months. Current of 8 milliamperes for five minutes.

March 23: Improvement in general condition, though tension not much decreased in spite of last application.

Current of 5 milliamperes for fifteen minutes.

March 26: Still feels better. Current of 5 milliamperes for twelve minutes. Patient has not presented herself for treatment again.

This case seems to me, to be one of the sort described by the late Dr. Graves in his "Clinical Medicine." Where there is turgescence of the thyroid gland, associated with palpitation, and which, he thinks in many cases, may explain the gloomy hysterics, and that this having gone on for years led to a chronic enlargement of the gland, and was relieved together with its concomitant symptoms by the all-searching influence of the constant current, probably by jarring the, to the nervous supply.

Case IV. Catatonic Contracture.

F.S., aged 56, has been found, when a child, extensively on the left side of his face, body, arm and leg (right side) a catatonic band passing from the anterior part of the abdomen, a little external to the inner attachment of Poplar's ligament, to the anterior and inner part of the thigh, which prevented his straight swing, the right leg. This was divided by the knife in September 1837, giving him relief, but he again
presumed himself, saying the contraction was as bad as ever.
March 5. 1888. A current of 5 milliamperes passed through
for ten minutes.
March 6. Patient says he feels much easier, the actinic does not
say so much and he can move about better. A current
of 5 milliamperes was passed for ten minutes.
March 10. Current of 5 milliamperes was passed for ten minutes.
March 13. 2
March 17. 3
March 21. 2
March 22. 5-6
March 24. 6
On the 22nd I could not get the current beyond 2 milliamperes
on account of the battery requiring fresh fluid.
The patient was very much relieved, being able to straighten
the limb very much better, than he could before. The electrical
treatment was begun. He could walk with comparative
freedom, when I last saw him.

Case V.  Inconvenience of urine.
Father died at 39 from nephritis. Mother at 42 alive and
healthy. One brother living and healthy. Four sisters alive and
healthy. Two brothers dead, one died at 16 and a half years from
convulsions, and had also a discharge from the ears (probably
meningitis). The other died from convulsions when eleven days old.
Three died one at eleven days, one five weeks, and another at six months, all from convulsions.

As worked the boy ever since he was a baby, he also suffers from fits. I prescribed Bromide of Potassium and Belladonna, but this had no effect. I then tried a long course of treatment with Ver and Quinine, this also was a failure.

March 21st - Faradic current applied, one electrode on abdomen, in hypogastrium, one in the penis, one over spine in lumbar region for ten minutes.

March 24th - Not the bed on the right of the 21st, the battery was applied, but not twice. The fits have continued since Faradic current in the same way.

March 28th - Not the bed on the right of the 24th, the battery was applied, but not twice. Faradic current in the same way.

March 31st - Not the bed twice. Faradic current in the same way.

April 4th - Not the bed on April 2nd, not twice. Faradic in the same way, with directions to come back, site to rest with the bed; has not come back twice.

The result was in this case very satisfactory, having been in convulsions for at least twelve years. The condition had become chronic, and medicines had apparently no effect upon. By applying the electrodes in the above manner, both the nervous mechanism concerned in micturition, and the muscular coats of the...
Kadder, were brought under the influence of the Paradie current.

Case II. Mysterious Aphonia.

E.G. Female, aged 19. Admitted April 15th, 1889, as an out patient, suffering from complete loss of voice, which came on at the evening of the 15th. She had had this condition about a year ago, for four or five days. Has been subject to fits for several years. Menstruation regular, has been married two months. The patient's appearance, was strongly suggestive of hysteria. When spoken to, she answered, by various nods and shakes of the head.

A strong Paradie current applied, an electrode being placed one on either side of the larynx. Her voice returned in a few minutes, it was rather faint; but on the next day was as strong as ever. I also applied the Paradie current in the cervical and dorsal region of the spine.

The above cases, are a few of the many I have treated with electricity; and I think the results speak for themselves, and I think it behoves the profession, to make more extended trial of this powerful nerve-stimulating agent.

Etoni Mabod, M.B., C.M.
April 1889.