

Electricity vs. Tait, or the use of electricity in inflammation as found in gynecology / by Geo. T. Hulbert.

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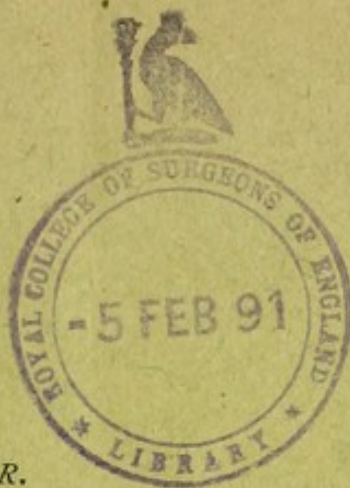
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OR THE
USE OF ELECTRICITY

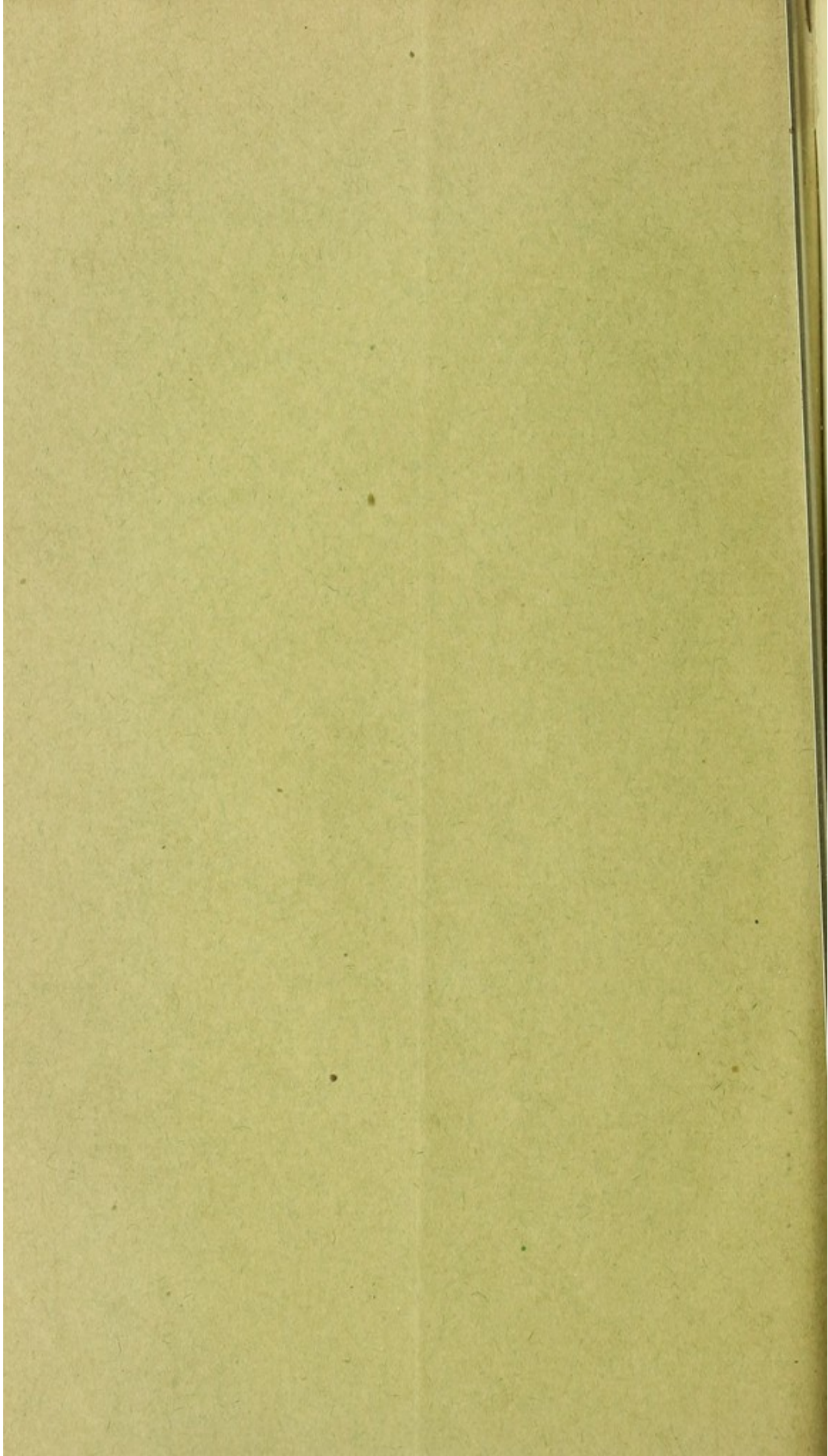
IN INFLAMMATION

—* AS FOUND IN GYNECOLOGY. *—

By GEO. ~~H~~ HULBERT, M. D.,
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Read in Abstract before the St. Louis Obstetrical and Gynecological Society,
June 21, 1888.

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ELECTRICITY *vs.* TAIT, OR THE USE OF ELECTRICITY IN INFLAMMATION AS FOUND IN GYNECOLOGY.

BY GEO. T. HULBERT, M. D., *late Superintendent Female Hospital, St. Louis.*

[*Read in abstract before the St. Louis Obstetrical and Gynecological Society, June 21, 1888.*]

THE era in progress, which the work of Lawson Tait has marked in gynecology cannot but be a source of pleasure and satisfaction to the fair and just minded, and the inestimable benefits that have accrued to suffering woman are not to be gainsaid.

It is not with any purpose to criticize Tait or Tait's work, for of him and his work I have a profound admiration and approval, and trust that he may be spared many years to the profession and to the work before him, that I speak at this time. But my purpose is to present to this society a few thoughts on diseases of the uterine appendages, and to place on record work done possibly within the field of conservatism, when compared with the more radical methods of Tait, but work done with the same object in view, namely, the recovery of the health of the patient. I furthermore desire to enter an emphatic protest, and this is

he more especial purpose, against the reckless, unnecessary, criminal fashion of removing the uterine appendages from every woman who complains of those distressing and persistent symptoms which show she has disease connected with these organs. I say criminal, for the reason that it is unnecessary, and the example set by those who do so, possibly with uniformly good results, to the less experienced or inexperienced leads to disaster and sacrifice of life. It is very evident from the "signs of the times," and "he who runs can read" that the conservatives are about to have their influence felt, and that operation from which so much good has come in the hands of Lawson Tait, and so much death in the hands of the imitator and tyro, will find its proper scope and application. Instead of being *the thing* to do for our patient, it will be the *only* thing to do. This is no new idea but has from the first and at all times been repeatedly insisted upon by Mr. Tait.

In my estimate of Mr. Tait and his work, if I read aright, it is evident that at no time has he sacrificed his consciousness of right for the purposn of operating. His early work was absolutely confined to that desperate class of cases for which nothing but ineffective palliation had been possible. With enlarged experience and brilliant success, the field was enlarged so that to-day it seems possible for *Mr. Tait* to do almost any operation in the abdominal cavity with almost no risk of life and almost perfect results. To Mr. Tait are we indebted for a mass of knowledge relating to the pathological conditions in diseases of the uterine appendages which makes it now possible to make the attempt, and see if in these distressing troubles there are no other effective means that may be employed to accomplish as good or like results, and avoid the ever present, fatal danger, and it is a mere assumption to conclude otherwise, of operations in the abdominal cavity for salpingitis, etc.

Our experience with the use of electricity in the treatment of diseases of the uterine appendages has emboldened us to place on record an attempt in this direction of conservatism in which the results have so far been satisfactory. The use of electricity in this class of cases has extended over a period of three years,

and among a class of patients in which these conditions are frequently found.

The cases selected have been as follows: ovaritis, salpingitis, hydro-salpinx, pyo-salpinx, pelvic peritonitis, acute and chronic.

In naming these conditions I do not wish it understood that they have occurred as distinctive or separate conditions, but that either one, two or all have been present, and with the exception of the first class, they have most generally been complicated cases.

I am fully aware of the fact that the question of diagnosis can be raised against me, and am free to say that outside of the history and clinical picture and my examination of the patients, I have nothing to offer, no diseased tubes or ovaries, etc., because my patients surreptitiously carried them away, and I shall not be able to show them to the gentlemen present.

En passant, I wish to make another observation, and that is this: In presenting the claims for recognition regarding the use of electricity, I do not wish it understood that all my patients have recovered "without a bad symptom," for such is not the case. I have had a very rich experience in the use of this remedy, powerful for good or bad, and my patients have at times suffered as a result of my ignorance or carelessness, but fortunately I have not as yet recorded a death, and have had some cases, a considerable number, which did not seem able to receive the application of the remedy. We must conclude, therefore, that electricity properly used will not relieve all cases, so that our chances as laparotomists must still be assumed. But this I do say, that laparotomy in any case in which the uterine appendages are diseased, should not be done until electricity has had a fair and intelligent trial. This being done the necessity for Tait's operation will be positively and decidedly limited. Electricity when properly understood will stand in the same position toward these conditions as it does toward fibroid tumors of the uterus, with this advantage, that the recovery will be more frequent and perfect.

From our knowledge of diseases of the uterine appendages which we are considering, it is plain that the causative factor finds expression in that condition which we term inflammation;

that inflammation and its results in this locality is the enemy to be overcome. If we can subdue the inflammation, remove the results of that inflammation and abolish the causative factor, our problem is solved.

In studying the etiology of diseases of the uterine appendages it is apparent from the testimony presented that the hosts of mycology are considered as the *fons et origo* of most of this inflammation, and that the gonococcus and bacteria of sepsis are the virulent agents at work. Traumatism, cold, etc., as heretofore understood, are not of such import.

Be these questions determined as they may, it matters not for our purpose which they are: it only serves to establish the base of operations, so to speak, or gives the key to proper and rational therapeutical measures. It establishes a principle in gynecology. This principle is as follows: Given a perfect set of uterine appendages, maintained in perfect order in a perfect organism, or woman, and all the hosts of mycology and temperature must fall and perish in their attack. The natural normal organism in nature knows no disease; it is only when violation of established law and order steps in that disease prevails.

That this natural, normal, perfect organism does not exist is only too well known, and my purpose in bringing forward this line of thought is to emphasize and punctuate the fundamental principle in the method of treatment we are advocating, without a full recognition and application of which disappointment and disaster must follow.

In the use of electricity men have run wild and vied with each other as to which should make the most noise, startle the largest number in the medical world, report the most brilliant results, etc. This is not the work by which we wish to be directed. These startling, brilliant results are hard to understand by the finite mind; they are mysterious, they are vicious, and the less we strive after such results the better. Let every man work so that his results are in accordance with the known possibilities in things natural, and with a positive determination of doing that which he desires in a natural way, and he will be encouraged by caution, patience and success. Hence we conclude that our application of electricity must be so regulated that ev-

ery indication possible in nature be met. Having conceded the fact that a perfect organism is not what we are called upon to deal with, but an imperfect one of all grades, from fair to absolutely bad, and accepting the fundamental doctrine of mycology namely, that a *soil* must exist for the life and development of its numerous and varied hosts, we are better prepared to understand the rationale of diseases affecting the uterine appendages and their treatment by electricity. We are also led to conclude from the foregoing that in dealing with these conditions, we are dealing with that complex phenomenon termed nutrition or processes of growth and repair. Nutrition not being a single entity but a complex phenomenon in which all parts of the organism are more or less concerned, the Creator has placed in woman a connecting link or system, through and by which this process or phenomenon of which we speak is accomplished. I refer to the nervous system, and especially to the sympathetic. Diseases of the uterine appendages or any diseases of the genitalia in women in my estimation are no more local diseases than is tuberculosis.

I cannot accept the opinion that because the gonococcus finds lodgment in a Fallopian tube and the result is a salpingitis, that therefore the salpingitis is due to the gonococcus, and that alone, any more than I can accept the doctrine that because the bacillus of tuberculosis finds lodgment in the lungs, therefore a phthisis is the result. I am prepared to admit without hesitation that in the microbe we do find the seemingly active and exciting cause; that in the absence of the microbe the active expression of the disease would not have occurred, and that every lodgement of the microbe will cause the trouble, if the conditions are the same, but this is not my conception of the disease. The disease resides back of that, and is a matter which has been developing from the time that law and order in the perfect organism from which it sprung was violated, and in proportion to the violation will be the development of the disease. This conception of disease will place the gynecological mind in a broad gauge and prevent it from seeing in every local condition the sum and substance of its therapeutics. Be it understood by all that in placing myself in this position I do

not ignore and will not see to the uttermost the local condition, for such is not the case, but I consider the local the secondary; the organism, the constitution, the susceptibility, the vulnerability or the woman, the disease.

The rationale of our therapeutics comes from this conception. In the conditions of which we speak, there is always a history many times unwritten, but generally found after search, of violated law and order of things natural, which is sufficient to account for the difference in effect from the same agent, and which also places beyond all reasonable doubt the correctness of my position regarding diseases of women.

It is nothing new to call attention, for example to the varied effects of a gonorrhœa in several different patients. In one the local expression is only a urethritis; in another, the same and a vaginitis, in another endometritis is added; in another endometritis and salpingitis are added; another in addition to all of these develops ovaritis or peritonitis; another is affected from the vulva to a pelvic, even to a general, peritonitis, all of these shades have we seen. Does this pathological picture mean that the disease was local and the differences due to the quantity of the dose? No; it means that these different patients were in different states of disease before they received the gonococcus, and that the penalty was in direct proportion to the violation accomplished.

There was a better soil prepared in one than in the other. Time and space will not permit any further extension of this line of thought; and this will suffice to make intelligible the application of electricity in the conditions considered.

Electricity as a therapeutical agent is possessed of powers as yet but fairly understood; increasing experience with it and its application only serves to convince me of this, but also serves to make me more cautious and feel the need of greater knowledge of it. I am far from that delectable state of mind which some seem to occupy, that they know all they desire about it, and have searched the limit of its application.

We know that as a therapeutical means it can be more scientifically and exactly applied, more positively controlled and produce a more profound local or general influence for good or bad than any we have yet used.

We know furthermore that its use in diseases of woman has wrested from the hands of the surgeons many cases that heretofore were legitimately theirs. We know that with it patients get well who heretofore were considered incurable, that comfort, health and ability to maintain their position in society and against poverty and invalidism has been given to many that before were in the depths of suffering and despair.

The most encouraging feature in its use is the renewed vigor and vitality it imparts, and that too, blessed with a permanency not known in the use of other remedies.

The field of usefulness of electricity, as will be seen from the foregoing, is, in the conditions considered in this paper, that which covers more especially the process of repair. I do not wish it understood that by electricity we are going to remove the effete products of the local process, such as pus, blood, etc. To some extent this is possible; but it is not necessary, and is taxing the patient and remedy more than I wish to advocate. In its use we strive to subdue the local inflammation; promote absorption of hyperplasia and hypertrophy, establish the general health, and produce proper innervation. The effete products, such as pus, blood and serum, we remove by surgical method. Now if all this can be accomplished, and I believe it can, and know that in those cases which have persisted in the treatment it has been done, I fail to see the necessity for the removal of the tubes or ovaries. It may be claimed that we have no assurance that the result will be a permanent one. The answer is that, considering the slight risk to the patient incurred by this method, this objection can have no weight, when there is offered as a substitute a permanent result with the added risk of a laparotomy, or Tait's operation. The slight risk demands a trial of this method before a justification exists for a laparotomy. All we can say is that so far the results have been permanent. There are questions of expediency that might to some compel a resort to a laparotomy.

The method I practised, as may have been inferred from what precedes is not the use of electricity alone. For over a year I gave electricity a fair trial alone in the treatment of inflammatory troubles: and while the results were far better than

by the use of any other single remedy, they are not and cannot from the very nature of things be as uniformly good as when other means are used to assist in the sense of protection from septic influences, and the prevention of accidents, the result of a want of maintaining the benefit accomplished by such application. To make my meaning plain, take for example a simple case of subinvolution of the uterus consequent upon an abortion or delivery at term. Here electricity has, if properly used, a positive effect. The effect is permanent absolutely if the general tone of the patient is sufficiently good to maintain the advantage gained. The repair accomplished is in persistence and rapidity in direct proportion to the general condition. Hence it is that we see patients where one, two or three applications accomplish all that is needed.

When this is the case, we have a patient whose general condition is undoubtedly good, the local difficulty being the only visible deviation from the healthy. But take for instance the same local condition in a debilitated, anemic neurasthenic, and the picture becomes anything but brilliant. While it is true that electricity in this class of patients is a sovereign remedy, it is not true that in all cases it will work effectively and rapidly alone, nor as effectively and rapidly as when securing legitimate assistance. Here the application, while at once possibly but not always, it will produce a decided impression, is not lasting, and in some instances is positively bad.

The explanation is palpable and easy.

The reserve vitality or energy has been by the application in the latter case absolutely consumed, and a reaction comes which the power of the patient cannot resist. The real difficulty here is often not so much in the electricity as in the manner in which it has been dosed. How often do we see this class of patients real heroines in courage and endurance; they are morbidly courageous, and this coupled with fascinating possibilities that they conceive lie in the use of electricity, lead them to tax their power to take a dose which they measure in the expression "All I can stand." This state of affairs, coupled with a spirit of accommodation and impatience to do all possible on the part of the physician, will most generally account for the badness of

the result. The moral of all this is, therefore, caution. The dose is comfort and freedom from suffering.

From this extreme state of neurasthenia to the slight deviation from the normal, we find all grades, and the natural result is that in the use of electricity we must meet with many variations in the effects accomplished, so that the time in which the work is done and the quality will vary in proportional degree.

In order, therefore, to obtain a more speedy and effective result, electricity must and should receive assistance directed to the end that the benefit each application gives be maintained.

Hence, in congestions, inflammations and septic conditions we resort to the supporting tampon and antiseptic precautions. In extreme cases we medicate in the direction of promoting and supplying better nutrition, rest and a regular condition of the bowels.

For the purpose of a fuller appreciation of my faith and claim for electricity in the conditions considered in this paper I desire to call attention to the subject of electrolysis, and the position it must occupy in the method adopted and proposed.

The idea prevails to a large extent, that in the use of electricity unless we can obtain a decomposition, destruction, and disappearance of morbid material, through this especial effect (electrolysis) of the galvanic force, we cannot hope much benefit from its use. In fact electrolysis has very largely become electricity. In my conception of the treatment of the inflammatory conditions herein mentioned the electrolytic effects have been left to themselves, so to speak; other effects have been sought for mainly, and electrolysis has followed in a secondary way.

In allaying irritation, producing better enervation, improving nutrition, accelerating and increasing the power for absorption, excretion, osmosis, etc., electrolysis can not be the governing principle, but must follow to the extent and degree possible under the conditions present. If the desire was to obliterate a fibroid than it should be supreme.

I have many times had patients to treat who were capable of receiving a strong dose of electricity without any special reaction following. In these, when there was any special indication,

such as large inflammatory deposits, or hyperplasia of a large degree, I have worked with the especial object of electrolysis, but such has not been the rule in practice. In my early work, electrolysis being the dominant idea, I soon found that it would not do, but was the cause of much trouble. I conclude, therefore, that electrolysis must take a secondary position and only under especial circumstances can become the governing principle in treatment. In my judgment the cardinal principle to govern in the application should be the more general and complex effects, such as electrotonic and catalytic.

Beyond all reasonable doubt electrotonus is a phenomenon connected with the nervous system. Catalysis is the sum and substance of effects upon nutrition, local as well as general. Evidently here also the nervous system, especially the sympathetic is the great factor.

There is no dispute regarding the influence of the sympathetic in diseases affecting the uterus and appendages, and experience in the application of electricity in these conditions will serve to convince the most sceptical as to this influence and demonstrate the importance of recognizing and taking advantage of it in gynecological therapeutics. To this intimate relationship must we look for the explanation of endometrial development, seen in the presence of fibroids, tubal gestation, and ovarian irritation.

In reverse order may we justly expect to get positive remedial effects in diseases affecting the ovaries, fallopian tubes, pelvic peritoneum etc., in electrical applications to the endometrium.

Having given the more general considerations we now turn to the special.

First. The preparation of the patient for the operation, for we must consider our electrical force, as the knife in our armamentarium, and shall demand for it the same consideration. This consists in regulation of the bowels, insuring rest, and employment of a liberal diet for a few days previous to the first application; in other words, doing for our patient the same things as we would if our operation was with the knife. In doing this with electricity we have an advantage which the knife does not afford, that is, we can use our remedy as a means

in preparation and can with advantage use it for a greater or less period until we get our patient into a much better condition for the radical steps of the method.

Inflammation being, as before remarked, the local expression in our problem, and there being always an area more or less general of congestion, edema, etc., in the preparation, this should be first removed and in the faradic electricity do we find our power, be the inflammation acute, sub-acute or chronic. Ignore, for the time being all organic deposits, accumulations, etc., that may be present. Where there is acute inflammation present there need be no hesitation or fear, but exceeding caution. Here the faradic electricity with the long fine wire, vagino-abdominal, as general as possible, with the positive as the internal or active pole, is indicated.

1. Start from zero and steadily and slowly increase until you have reached the point of tolerance without any pain. Sedation is the goal.

2. Use the large vaginal and abdominal electrodes.

3. Continue the application until the patient of her own accord declares she feels perfectly easy.

4. Repeat the application as soon as there is any return of the original suffering; in short, maintain sedation.

5. If at the first or later complaint is made that the pains are aggravated, stop at once, and see if every thing is as predetermined; if it is found no mistake has been made, change to the bi-polar vaginal form with the same precautions. If this aggravates the pain, abandon the use of the remedy.

6. Continue the treatment until the pain and tenderness have been removed, and we can, by examination, determine that the congestion, edema and active processes have been controlled. Where these complications do not exist, only a few days preparation is necessary, simply for improving the local and general tone.

Where inflammation is not active but we have only the results, and passive congestion is present, we can use the thick, short wire coil for its more prominent mechanical effects. This preparation is, as a rule, applicable to all the varied complicated conditions found in the class of cases we are considering.

Having accomplished the above we are prepared to operate, so to speak. We will take for better understanding and illustration a prepared case of pyo-salpinx. Conditions present, general pelvic adhesions, uterus firmly fixed, sausage-shaped tumor of left side, extending from cornua, outwards, downwards and inwards to Douglas' cul-de-sac fluctuating, free muco-purulent leucorrhœa from cavity of uterus, ovary not found, right side adhesions not so extensive, ovary found.

One of two things can now be done; at once empty the tube or let it alone for a time. I have tried both ways, and prefer the latter. If there was any evidence of periodical leakage into the peritoneal cavity I should empty it before proceeding. This accident I believe to be the rare exception, consequently it will be rarely necessary to at once empty the tube.

We now operate by resorting to positive galvanocaustic applications to the endometrium, being controlled not by the leucorrhœa but by the fact that we get the anelectrotonic effect with this pole and greater safety, and also that on the disappearance of this phenomenon we insure the presence for a time of catelectrotonic phenomena, and the ultimate stimulant effect is more beneficial because prolonged.

At this point do we find an explanation of many accidents and much disappointment. In the use of the knife we take every precaution to prevent unfavorable reactions. Why do we not the same in the use of electricity? There is a reaction after an application of electricity, and this may occur at once or be delayed for hours or days.

In surgical operations we find increased irritability and shock develop. So do we in using electricity, and in both cases these are manifested through the nervous system. It is the play of force upon force. Now apply the electric force on a weak, debilitated organism, as most of these are, in the conditions we are considering, and it is not strange that the reaction should be often disastrous, (and the wonder is it is not so more frequently) when we fail to take proper precautions. Hence when we use the positive pole as indicated, we should bear in mind what sooner or later follows and take the right advantage of it. We therefore insure support and rest as well as antiseptic conditions

by following the application with the use of the aseptic supporting tampon and quietude of the patient.

This form of application is persisted in until improved nutrition is manifest by cessation of the leucorrhœa, absorption of neoplasm and the improved general condition of the patient. Applications repeated every three to seven days. We then change to the negative pole, being guided by the menstrual periods and quantity of the flow. In the more desperate cases we alternate the galvanic operation with general faradization of the sympathetic, accomplished by one electrode in the vagina, usually the positive, and at first, the other electrode over the lumbar region, then at the cervical sympathetic over the anterior triangle and sterno-mastoid muscle. Having removed a greater part or all the surrounding neoplasm, the tube is emptied, carefully and repeatedly washed out by means of the aspirator needle and trocar, introduced through the vaginal wall, with antiseptic solution (sat. sol. boric acid) and the trocar utilized for the electrode. This produces a sinus whose walls are closed to the surrounding tissue by the galvanic cauterization and for a time in the future will act as a drain if any thing is formed in the tube. Negative galvano-caustic applications are then applied to the endometrium, if any neoplasm remains. If not, galvanism only is used through the cotten covered sound or applicator; the tampon and antiseptics following each application until all discharge, pain and evidence of neoplasm is obliterated. As a rule after aspiration we alternate galvanism with faradization of the sympathetic as before described. The utilization of the trocar enables us to complete the entire proceeding without removing it after its first introduction.

In the above case we have had in combination all the conditions practically save ovaritis, peri-ovaritis and hydro-salpinx. For the latter, if necessary, the contents of the tube can be evacuated in the same manner, although I am satisfied that, as a rule, the contents will become absorbed by the time the conditions are such as to allow its evacuation.

In ovarian troubles when there is an accumulation of pus or fluid on the surface of the ovary the aspirator can be used as before. In those cases where the hyperplasia is great and

progress is not manifest, electro-puncture can be resorted to, using the insulated needles by introducing them into the enlarged ovary through the vaginal walls at the most dependent or available point.

In the uncomplicated cases of ovaritis the application of galvanism¹ is more directly made by placing the ball end electrode against the ovary through the vagina or rectum. The pronounced benefits from faradization of the sympathetic, in the manner indicated above, will be best seen in this class of cases.

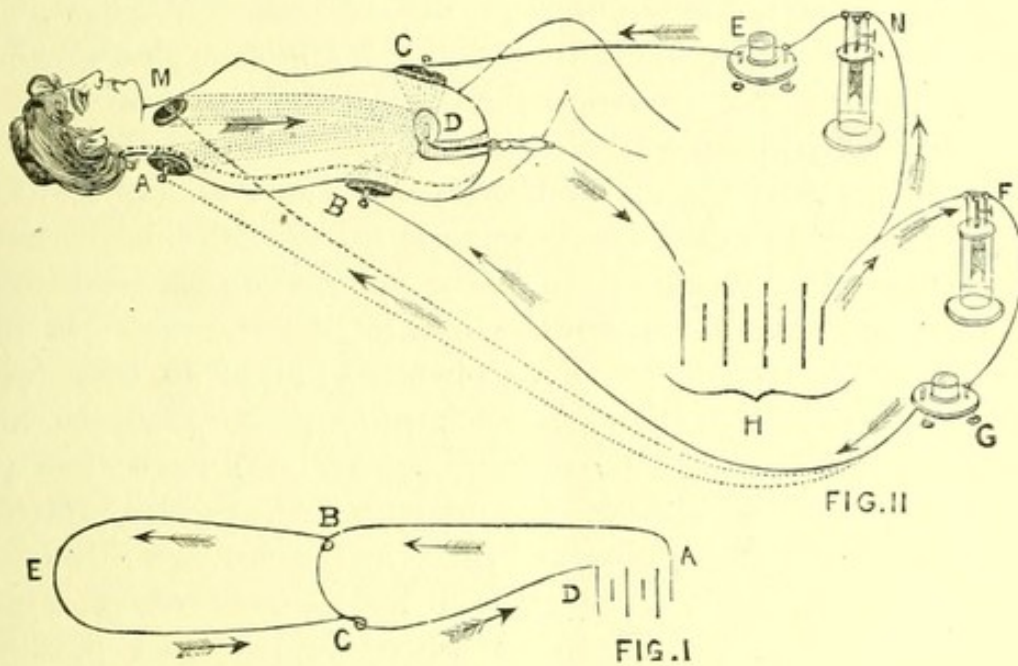
Electro-puncture applied directly to the ovary is rarely called for, and I have only used it in two cases; while formidable in appearance practice did not prove such to be the case, the patients bearing the operation with much less suffering than anticipated, and the reaction, every precaution being used, was limited to an aching throbbing pain, lasting for a few hours. I have no hesitation in admitting that this procedure is an heroic one; the experience is limited and I do not recommend any one to resort to it unless he is experienced in the use of the remedy and has full and complete control over his patient. It should be restricted to that class of patients in which the ovary is adherent and which have resisted all other available methods of applying the remedy; a *derniér ressort* before the knife, using chloroform where fear or sensitiveness on the part of the patient is aggravated, limiting the dose to 30-40 milliampères; in all cases using the positive pole, and not repeating the operation more frequently than once every week to ten days; between séances using local galvanism, and more general faradization of the sympathetic, alternately with the view of continued catalysis and sedation.

Where the element of stubbornness is so pronounced that the ordinary measures for the relief of any or all the conditions herein considered do not effect out object we have a further and still more powerful and general means at our command, and that is general galvanization of the spinal and sympathetic nervous systems.

This can be applied in conjunction and simultaneously with

¹By galvaniam we mean galvanic electricity applied with the active pole covered with absorbent cotton or chamois.

the local application by taking advantage of the phenomena and laws of divided currents. An example being the most direct way of illustrating, suppose we take a case of salpingitis, complicated with chronic pelvic peritonitis, which has resisted more than improvement to the degree of relief of the symptoms, symptomatically well but in which there is still left thickened tube and pelvic adhesions. A study of the accompanying illustration will assist in understanding the application.



FIGURES I. and II.

A.B.C.D. the primitive current B. C. points of derivation or division, B. E. D. and B. C. D. derived or partial currents.

H. Battery. N. Water rheostat. E. Milliampèremeter. D. Intra-uterine pole (active). C. Abdominal pole (dispersing) of the primary circuit. K. Point where circuit branches, F. Water rhéostat. G. Milliampèremeter, B and A. Lumbar and spinal pole, can be placed over cervical sympathetic as at M. D. Intra-uterine pole. D. point of return to primary circuit. of the derived current.

The manner of proceeding is as follows: The abdominal electrode C being placed in position, the electrode for the less or more general galvanization is put in position. If for lumbar at B, for spinal at A; for general sympathetic at M on both sides

of the neck, simultaneously or alternately. The cervical spinal and sympathetic can be held in position by the patient herself. The active or intravaginal or uterine electrode is now introduced. Both circuits being open by the carbons or connecting rods being out of the water in each rheostat, the primary circuit is first closed, sufficient to give the desired dose, by immersing the carbons in the rheostat N, registering on the milliamperemètre E. This accomplished, the derived current is utilized, by immersing the carbons in the rheostat F, registering on the milliamperemètre G, until the desired dose is obtained. In breaking the circuits the reverse order is followed, first opening the derived circuit; afterward the primary. The dose for the derived current need not be more than from 5 to 15 milliamperes, certainly no more than is comfortable. Séance should last five minutes after the dose for the general galvanization is obtained. With the ordinarily intelligent patient no assistant is needed and no disrobing save loosening the clothing at the neck. In this manner of electrization we have a means brought to bear upon nutrition local and general of such pronounced influence that the result is all that could be desired. By it I have been enabled to carry the class of cases instanced above over the apparent limit of repair; observed thickened tubes and adhesions of long standing disappear which had resisted every means used to overcome them. In that worst form of cases in which neurasthenia was so pronounced that every local application was of questionable value, I have seen the general conditions at once improve, neurasthenia replaced by strength and the patient started on the road to a complete recovery.

In those cases where the neoplasm or hyperplasia is of such extent as to demand more radical means than those above, electro-puncture can be resorted to. For the uterus the procedure can be confined to the cervix, the needles being introduced in the line of position of the organ to a depth of from 1 to 5 cm., 1 to 2 cm. usually being sufficient. For neoplasm about the uterus, where the above fails to effect our purpose, the needles can be placed in through the vaginal walls. This is not often necessary, and these punctures should be as much as possible confined to the safety point; in Douglas' cul de sac or the immediate region about the cervix.

Another form of electricity, which has been of great value in the treatment of inflammations found in these cases, is what may be termed the mixed current. My experience with this has been satisfactory. For some time I was unable to understand why I did not get the typical effects from what I supposed was the primary induced current in the coil I had, and why I had so much trouble following the use of the so-called secondary induced current. In the nomenclature to which I had access the primary was considered the short thick wire coil, and I expected mechanical effects. The secondary was considered the long fine wire coil, and from this I expected to get sedation and relief of pain, but such was not the case. The primary acted as should the secondary with the addition of galvano-caustic and electrolytic effects to a degree not possessed by the faradic current. The only explanation I could find was, that the so-called primary was only a galvanic current plus the inductive influence of the individual turns of wire in the coil that carried the galvanic current; that I had in reality a mixed current, galvanic and induced. Fortunately the size of wire used in the construction of the primary coil was of small enough diameter to give inductive effects, which combined with the galvanic produced a very happy result, giving not only sedative but pronounced catalytic effects. I believe this form of electricity is of considerable advantage, and will find its especial application in subacute and chronic inflammations. With this form the positive pole is indicated where anodyne effects are desired with stonger mechanical effects than are found in the fine wire coil, and weaker than with the coarse wire coil; the negative where stimulation, with moderate mechanical effects are desired. In using it we can work in two directions in one, getting stronger inductive influence more especially, by uncovering the iron core; or in the other way leaving the core covered, and increasing our electro-motive force get stronger galvanic effect retaining the original proportional inductive influence. In practice its value and application will be appreciated and found to be something different from the pure galvanic or faradic forms of electricity.

This only serves to make emphatic the oft repeated opinion of Duchenne and Dubois-Raymond that we should know the

character, size and length of wire in each coil of a faradic machine, in order to intelligently make a proper application of faradic electricity.

The following instruments we have found necessary and most useful:

1. A good aspirator with a trocar needle attachment, the trocar being of platina.

2. Platina electrodes, four sizes; of respectively the following metal or active surface, 1, 2, 4 and 5 sq. cm. Figs. II to V.

3. Abdominal electrode, covered with punk or absorbent cotton and chamois skin; of a size so that the diffusion will be as 1 to 100, as follows. Abdominal electrodes having a surface of

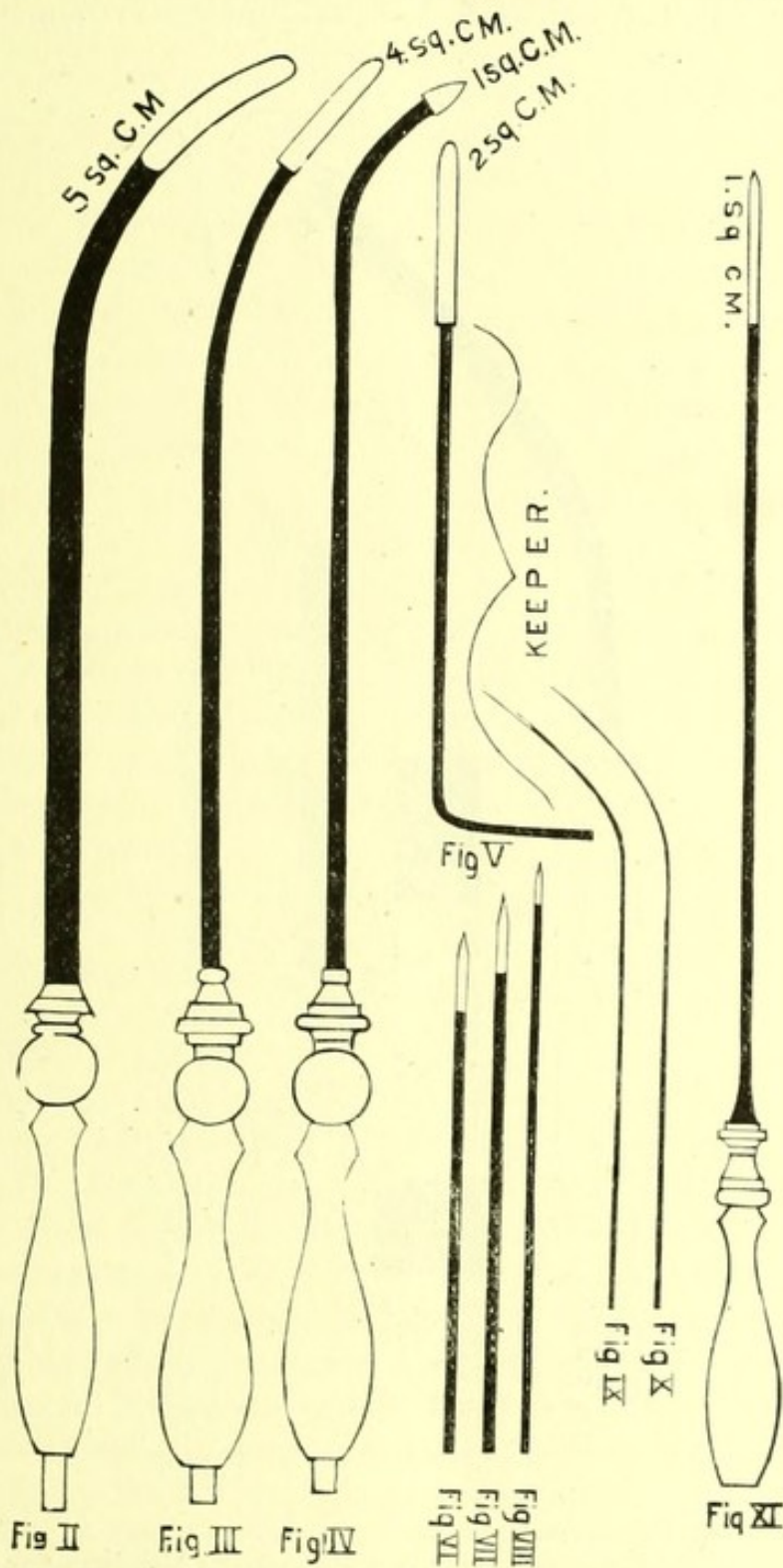
sq. cm.		m. am.		sq. cm.
100	will diffuse a dose of.....	25	given with an active surface of.....	1
200	" " " "	50	" " " "	2
300	" " " "	75	" " " "	3
400	" " " "	100	" " " "	4
500	" " " "	125	" " " "	5
600	" " " "	150	" " " "	6

The above will serve the purpose without any further sensation, than of a moderately strong mustard plaster, provided each and every part of the surface of the abdominal electrode is in contact with the skin. It must be borne in mind that these estimates are for inflammatory troubles.¹ All of the above sizes are not needed and were only used in determining the ratio, between the active and indifferent surface. I am of the opinion, though, that a near relation should be maintained in order to get the best results. The 2d, 3d and 4th sizes are the most practical ones. For the 100, 200 and 300 sq. cm. electrodes, sheet lead five millimètres thick, has proved very serviceable, being weighty and by this quality coming well in contact with the skin. For the larger size thin flexible sheet lead is demanded; punk and absorbent cotton are excellent coverings.

4. Vaginal electrodes; the ball-shape, fig. XII, for galvanization

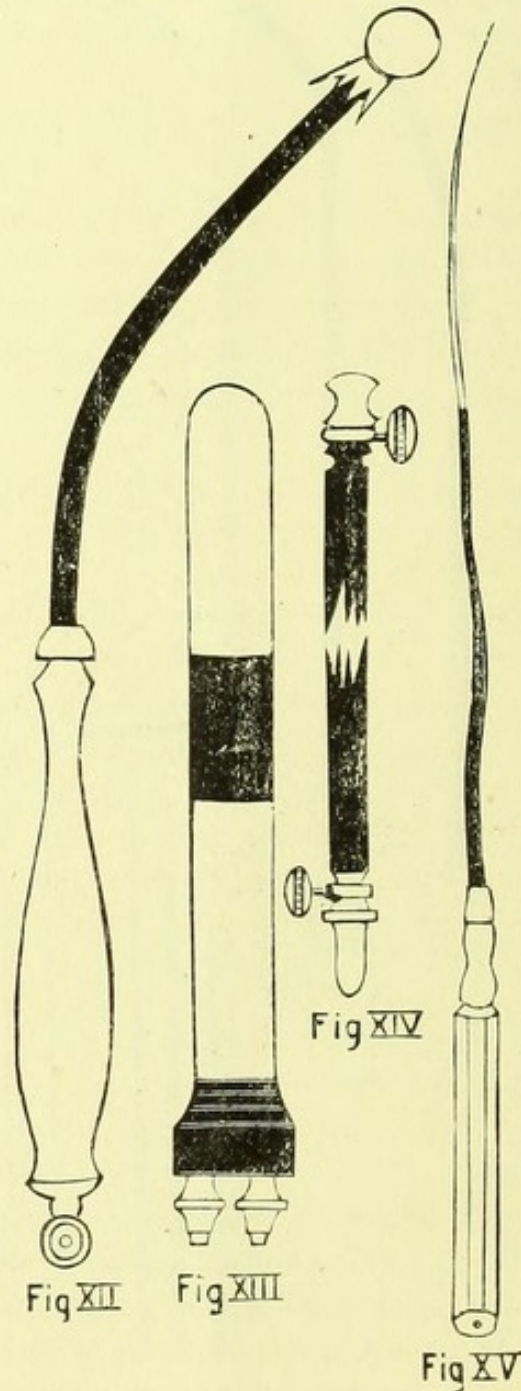
¹I have in preparation a paper in which the subject of the dose of electricity is to be discussed with the actually observed facts in nearly 10,000 applications of electricity made in my practice. The above while subject to some variation as we get higher up, will answer for safe effective dosage.

and the bipolar, fig. XIII, for faradization. The latter can be used as a unipolar electrode for galvanic or faradic applications.



5. Uterine applicator, platina, for intra-uterine galvanism.
Fig. XV.

6. Needles for electrolysis, platina tipped, insulated to within 1 cm. from tip, three sizes; $\frac{2}{3}$, 1, $1\frac{1}{3}$ millimètres in diameter. Figs.



VI to X; a larger one for pelvic neoplasms (Martin's), 2 millimètres in diameter, Fig. XI. Fig. XIV, needle holder. With this a celluloid speculum is very valuable, as it prevents the accident of

shock, by the metal thumb screws coming in contact with the metal speculum.

7. Two water rheostats for turning on and off the current. The Bailey being an excellent one.

8. A battery having an electro-motor force of 200 milliamperes when working through resistance of 300 ohms.

9. Two galvanometers registering 250 milliamperes each. They should be tested and compared.

Platina for metal surfaces of active electrodes is necessary on account of the frequent demand for positive pole.

The following case records will serve to briefly illustrate the results:

N. W., æt. 21, single, servant, American, high strung nervous temperament, came under my care Oct., 1886, suffering from effects of an abortion, accomplished by an abortionist, at the fifth month. Patient exhausted and anemic from her sufferings and loss of blood during the last month, examination revealed a metritis, pelvic peritonitis, with thickening of both broad ligaments, very sensitive, on examination. Treatment by long fine wire coil, later by short large wire coil; dose, comfort; séance, five minutes. After the acute character of the affection subsided, positive galvano-caustic applications to endometrium; dose, 25-40 milliamperes. Under this the inflammation and neoplasm disappeared, when the left ovary was found enlarged and low down, and sensitive; rest was advised, there being very little suffering. After the lapse of a month treatment again applied; local direct galvanization, alternated with faradization of the sympathetic; in three weeks all evidences of diseased action was gone and patient discharged; time under treatment, two months.

L. Z., æt. 22, single, prostitute, American; phlegmatic temp., came under my care May, 1886; miscarried in Oct. 1885, at the eighth month; menses always free and with clots, made a fair recovery; examination reveals uterus retroverted into Douglas' cul-de sac, firmly fixed, very tender; broad ligaments very much thickened, very tender; deposit about cervix marked and pits on pressure, excessive uterine leucorrhœa; large laceration of cervix; local faradization; long fine wire coil; dose, comfort; séance, five minutes. Later electrolysis, needles in cervix only. All inflammation and neo-

plasm disappeared, save the adhesions which held the uterus firmly in retroversion. Emmett's operation for laceration at this stage; union excellent. After recovery from this, the uterus being still firmly fixed in its abdominal position, local massage by elevation and faradization; large short wire coil was employed; mobility steadily improved when in Sept. 1886, soon after her menstrual flow, the adhesions gave way and the uterus was brought into position, the vagina packed with a supporting tampon. Faradization was continued for a week or ten days, when nothing being found wrong she was discharged well. Time of treatment, nine months and three weeks. The exciting cause of the last illness in this case seemed to be a gonorrhoea which preceded the attack about ten days.

K. R., æt. 25, widow, servant, German, nervous temperament; came under my care July, 1886; has been sick and under treatment for the last four years; sometimes better and again worse; some pain in pelvis and back; not able to work or be about on account of her sufferings. For several months has had severe menorrhagia. Examination reveals complete retroversion, thickening of both ligaments, very sensitive; prolapse of both ovaries; pelvic peritonitis; mobility of uterus, nil; examination causes nausea; profuse leucorrhoea; laceration of cervix and hyperplasia of uterus; vagina short, cervix up and back of symphysis pubis. Treatment by local faradization with long fine wire coil; dose, comfort; séance five minutes. This soon relieved the active process and relieved the bogginess and congestion. When the left tube was distinctly outlined, distended and fluctuating. Short, thick wire coil was used, until all tenderness was greatly relieved. The uterus was now found firmly fixed in its position; positive galvano-caustic applications to endometrium were then used; improvement steadily progressed; the discharges and menstrual irregularities ceased, neoplasm was being surely absorbed. The mobility impressed save at the fundus. Changed to negative galvano-caustic applications. On Dec. 27, 1886, the uterus was readily replaced with pretty severe pain and the adhesions were distinctly felt to give away. Supported by cotton tampon. Local faradization was now employed, short thick wire coil. Improvement had now permitted the operation for the laceration, which was done with excellent result. The seventh day after the operation the patient, who was blessed with a large amount of cussedness, got into a fight with her neighbor, and the result was a re-

currence of her pelvic peritonitis. This was relieved, when on Mar. 2, 1887, she was discharged for insubordination in the following condition: Hyperplasia, pelvic peritonitis, exudates and distended tube entirely relieved. The uterus was drawn slightly over to the left side and backward, to the site of the last inflammation, which was not caused by a rupture of the tube, as this disappeared a considerable time before the operation for the laceration. Entirely relieved of all pain and tenderness, and with the above exception the contents of the pelvis were in a normal condition: general health excellent, having gained fifteen pounds in weight. Time under treatment, seven months and one week.

S. B., æt. 35, widow, housekeeper, American, lymphatic temperament, came under my care Jan. 29, 1886, suffering since Aug. 1885. In June, 1885, she had a gonorrhœa, since which time she had had a profuse and constant leucorrhœa and dysmenorrhœa, abdominal bloating and chilly sensations, throbbing, aching sensations in inguinal regions, with shooting pain into the hip and down inner side of thigh; between menses she has a fluttering sensation in left side; constant backache so that she has been able to be up and about but very little. Examination reveals very great and general tenderness in pelvis, a large mass in right broad ligament, attached to uterus at its upper right portion, extending posteriorly into Douglas' cul de sac, where it joins the thickening in left ligament, which is not so large nor tender; mobility limited; free purulent leucorrhœa, uterus not enlarged but tender at fundus. In Nov., 1885, after exertion she had an illness of ten days' duration, accompanied by fever, severe throbbing pain in left inguinal region. The three menstrual periods following were very painful. Just at the close of the third period, during which her pain had been very severe in left side, something seemed to give away, her pain ceased and shortly afterward she passed pus from the bowel, and ever since has had much less pain in left side.

TREATMENT.—Local galvanism at first (Feb. 23, 1886), March 2, 1885, electrolysis by needle in cervix. Four séances after this manner with marked relief from pains and quantity of neoplasm. March 25, 1886, positive galvano caustic applications to endometrium continued to April 13, 1886. A month's intermission followed waiting reconstruction of battery. May 25, 1886, all neoplasm and symptoms having been relieved, save the distended right tube it was determined to empty this, wash out and follow by pos-

itive galvano-caustic applications; 30 cc. of pus were drawn out, the tube collapsing, washed out with sat. sol. of boric acid, and until it came away perfectly clear: the trocar was then attached to battery, and a dose of 60 ma. for 10 min. was given. Strong drawing pains were felt in right side, soon followed by the same kind in left side. These continued through the night: next day she was comfortable, and was up on May 28, 1886. The ovary was now found enlarged and tender to strong pressure. Galvanism was now used, there being a moderate purulent discharge through fistulous tract, with decided improvement and no evidence of tube refilling. The ovary not improving so rapidly, electro-puncture was applied to it, three séances, positive pole, 30 ma. five minutes each. Galvanism was alternated with electro-puncture. Her condition steadily improved, all evidences of local trouble disappeared under continued and alternated local galvanism and faradization of the sympathetic. Condition at discharge: All evidences of inflammation and neoplasm gone, right ovary atrophied.

Time under treatment, seven months.

This was evidently a case of double pyo-salpinx, the left one opening into the rectum at the time pus was passed by the bowel in Feb. '86.

The other case of ovarian electro-puncture was a case of peri-ovaritis with an abscess on surface of ovary, which was emptied by the aspirator, washed out and electricity applied as above. This was followed by five electro-punctures into the enlarged ovary, which resulted in a pronounced atrophy of the same.

The length of this paper prevents the presentation of any further case records. In brief, I will state that so far I have had under treatment ten other cases in which the same generally diseased conditions existed, in four of which there probably existed hydro-salpinx. Five other cases have been brought to a symptomatic recovery which evidently had pyo-salpinx but feeling so well refused further treatment, not wanting the tube emptied. Three additional cases of pyo-salpinx have been entirely relieved.

In giving the credit to electricity for the result in the class of cases herein considered, I do so for the reason that I believe it

is justly entitled to it. Certain it is we have not been able heretofore to accomplish like results; and I have not as yet seen the testimony of any one who claims that complete recovery is accomplished by the generally accepted methods of treatment, unless a resort to the knife has been made. I believe the result due to electricity because we are enabled to bring to bear a positive, efficient means of establishing a high grade of nutrition, so strong and effective that the organism is enabled to pass what has hitherto been the limit of repair and, by its profound influence through the nervous system, bring about such changes that the local expression of the disease is abolished. I offer the following conclusions :

1. That the cases in which Tait's operation is indicated are purely those in which inflammation, septic or specific is the active agent.

2. That the removal of this inflammation and its results with restoration of local and general tone is the problem to be solved.

3. That this accomplished, the functional activity remaining is no valid reason why the tubes and ovaries should be removed

4. That in electricity we find the power of restoring such a high grade of nutrition that a recovery from the local expression of the disease is possible.

5. That the removal of the dead effete products, such as pus, is not possible and must be done by surgical methods (aspiration), but that neoplasm in any form will become absorbed and recovery ensue.

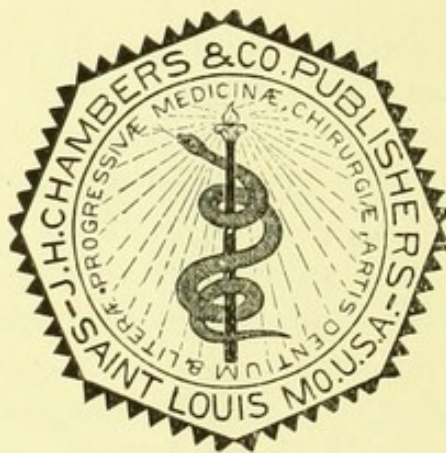
6. That electricity will not work alone but must receive legitimate assistance in the direction of maintaining the benefits of each application.

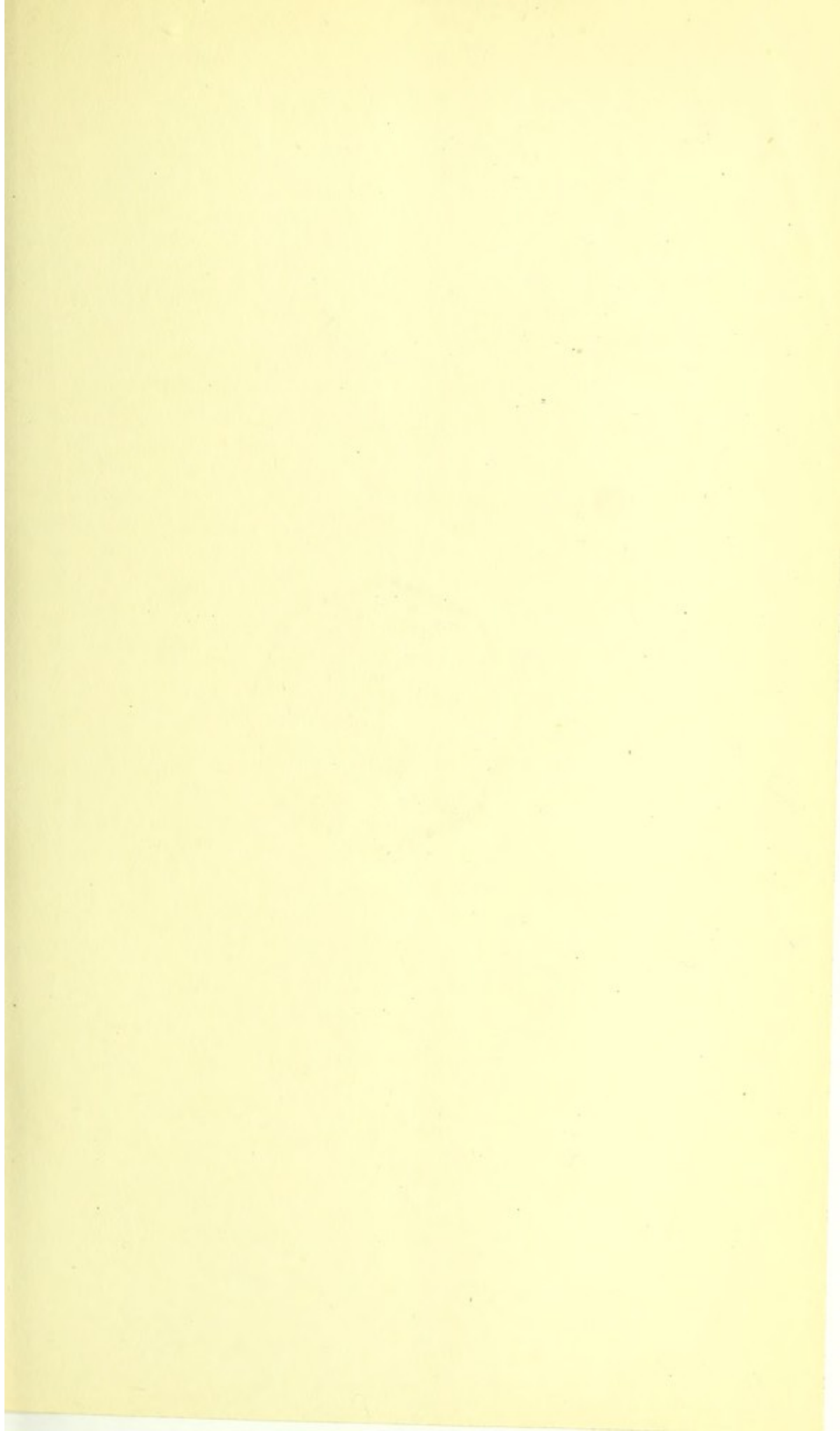
7. That the dominant idea in the treatment should be first the general effects of the remedy, catalysis, the polar effects, electrotonus. Second the polar effect, electrolysis.

8. That electricity should have a fair and intelligent trial before a resort to the knife be had.

9. That Tait's operation is justifiable only in those cases which electricity will not *completely* relieve.

3026 Pine Street.





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