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Chronic Metritis

By Dr. Georges Apostoli,

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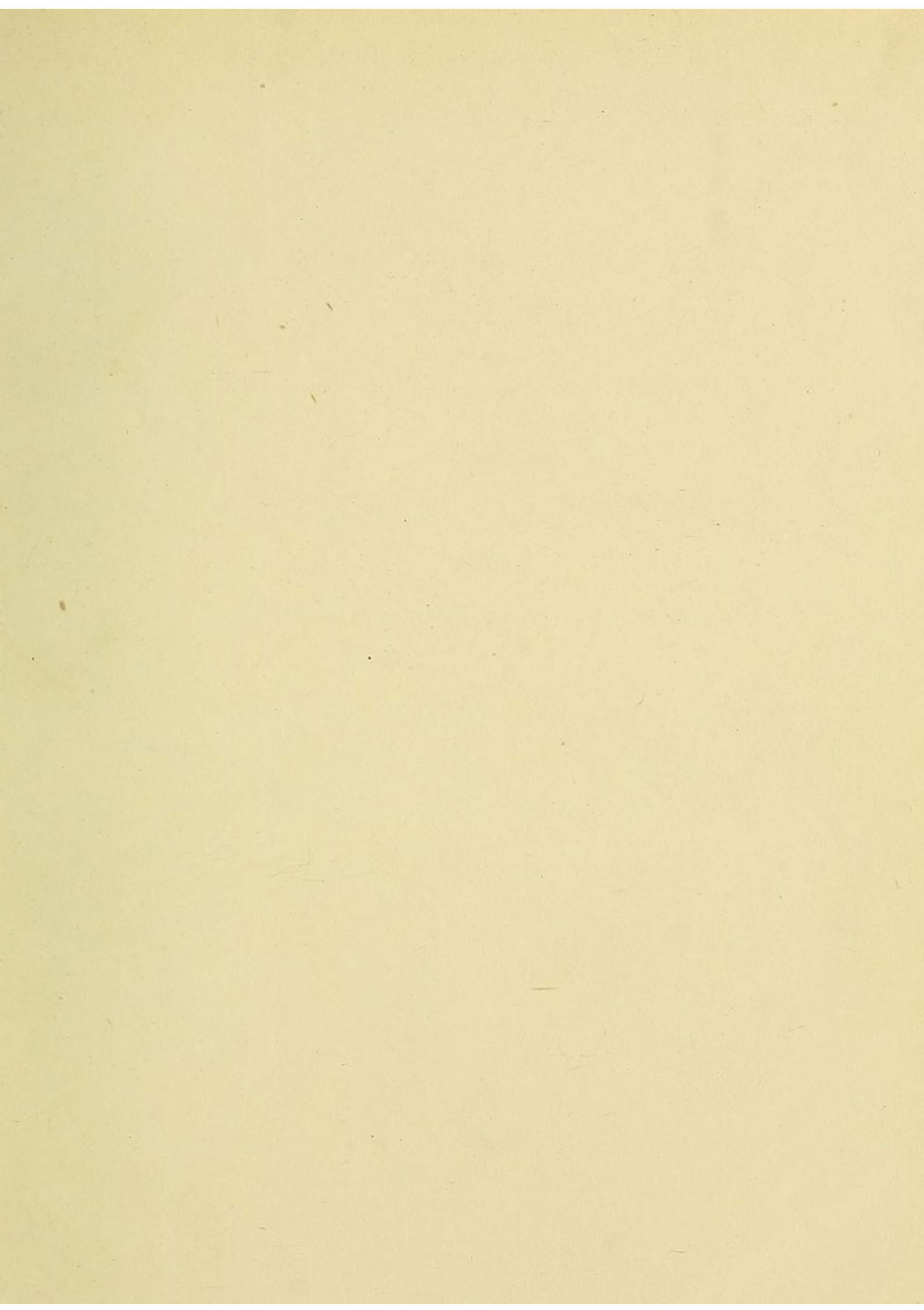
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ON A NEW TREATMENT
OF
CHRONIC METRITIS

AND ESPECIALLY OF ENDOMETRITIS,

WITH

Intra-Uterine Chemical Galvano-Cauterizations.

BY

DR. GEORGES APOSTOLI,

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WITH NINE FIGURES IN THE TEXT.

TRANSLATED BY

A. LAPHORN SMITH, B. A., M. D.,

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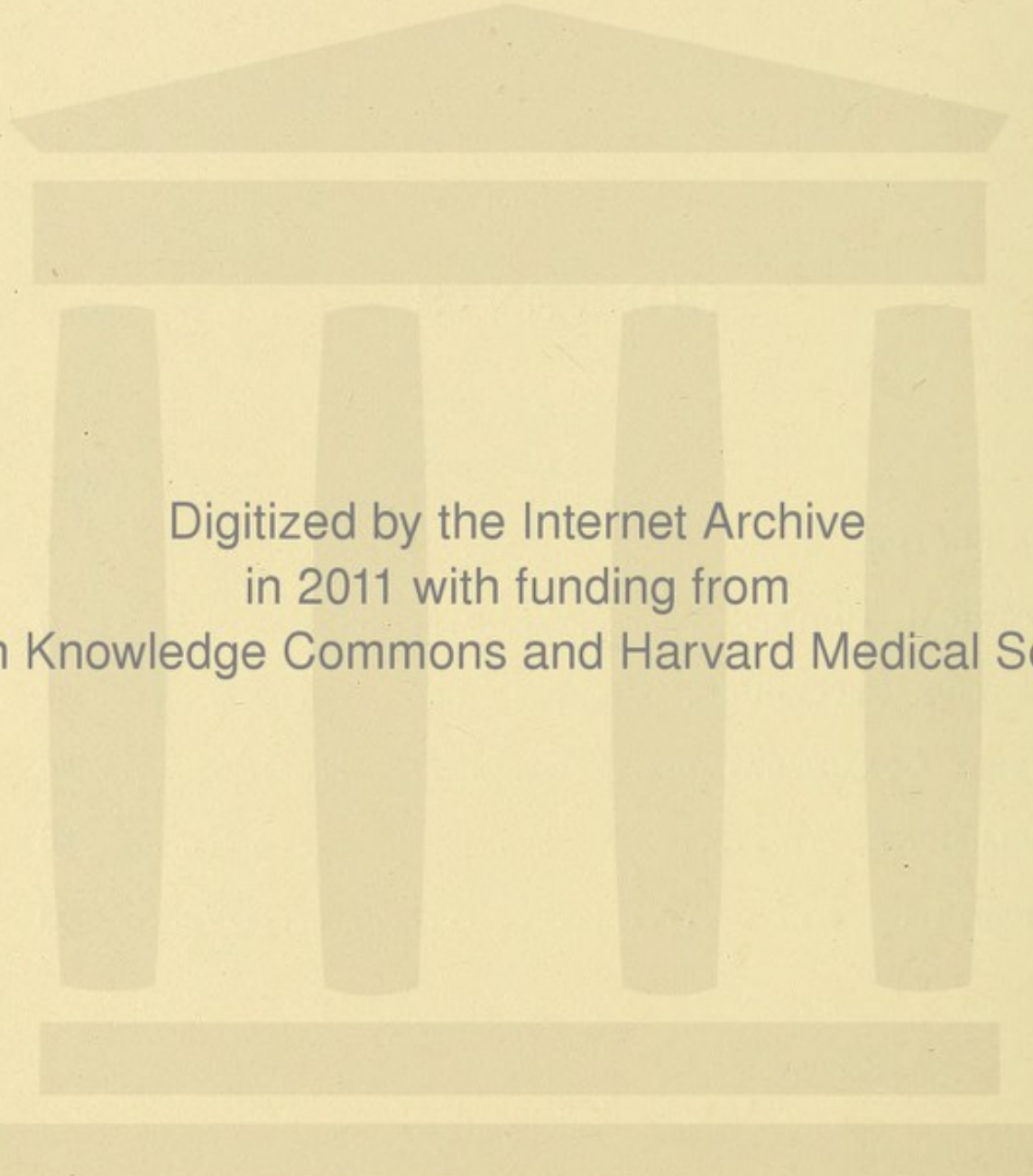
1888.

GEORGE S. DAVIS,
DETROIT, MICH.

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INTRODUCTION.

The name of Apostoli is so well known that any introduction is hardly necessary. When I read Mundé's description of his method of employing electricity in gynecology, I felt that this was an agent which might prove of the greatest possible use, for after ten years experience in treating diseases of women, I had come to the conclusion, to which many others have come, that in many cases the result was far from satisfactory. I believed that there was too great a tendency to use the knife, and that the cutting away of an important organ merely because its nutrition or the vital action in it had become weakened and below par, was not a scientific method of remedying the defect. On the other hand, it was easy to see that the pessary was being over-used, and that in many cases, in which it was being employed it was clearly counter-indicated. On the one hand was the aggressive school, whose only treatment for a sick organ was to remove it; on the other hand was the too timid and conservative school who did nothing. As usual, the proper course lays between these two, and happily it is followed by a large number of successful gynecologists. It was, therefore, with the greatest pleasure that I learned of this new and valuable aid to those who, while desiring to do something real and affective for their patients, did not feel justified in always falling back upon the knife.

I therefore lost no time in starting for Paris and placing myself under Apostoli's instruction. Every day I remained with him I became more convinced of the value of his method. I saw results which were slow in coming and difficult to obtain with other methods, follow with almost mathematical certainty from his treatment. While other cases, which were being

treated successfully, it is true, but with great risk and danger, and sometimes with a high death rate, by the means of the knife and curette, were equally amenable to Apostoli's gentle, harmless, and nearly always painless proceedings.

I came away thoroughly satisfied, and brought with me a duplicate of his apparatus, which I have now had working for several months, and with results which are daily improving as I become more and more familiar with its details.

The interest evinced in my paper read before the Gynecological section of the 9th International Congress, and the number of inquiries, both in person and by letter form, which I have received since then, from practitioners from all parts of Canada and the United States, and even from England, lead me to believe that this translation of Apostoli's book, hurried and therefore imperfect as it had to be, will prove acceptable to the thousands of my professional brethren who have need of just such a method as this, but who cannot spare the time to go to Paris, or who cannot speak the French language.

It may be of interest to add that Apostoli is now engaged on the preparation of another and complete work, which will embrace the whole field of electricity as a therapeutic agent, and which I hope in due time to place at the disposal of the English-speaking members of the profession.

TRANSLATOR.

Montreal, 8 Oct., 1887.

ON A NEW TREATMENT
OF
CHRONIC METRITIS.

When my master and friend, A. Tripier, addressed in August, 1859, his memoir to the Academy of Science at Paris, entitled: "Conjunctive Hyperplasias of the Contractile Organs; of Faradization in the Treatment of Engorgements and Displacements of the Uterus and of Prostatic Hypertrophy," he opened the door to a great revolution in therapeutics, which was doomed unfortunately to undergo the fate of a great many things which are new—to be honored with indifference by his contemporaries, or to be forgotten by them. Many other writings since then, and especially his "Clinical Lessons on Diseases of Women," which appeared in 1883, go to confirm his first views which have a double object: First to clear up the question of pathogenesis and to show the predominating influence which circulatory troubles produce in the nutrition of contractile organs; and to indicate the different processes in the pathological history of local circulation, and to bring to bear a new exciter of

smooth muscular fibre, which nature herself creates without ceasing in an uncontrolled form, but which science and especially medical science utilizes in a form which is doseable, localizeable, and controllable: I speak of electricity.

Tripier, guided by a perfectly justifiable induction, has thus traced in a masterly manner the path to a new intra-urine therapy, which enjoys at once the best qualities of a preventive and a cure.

We no longer ignore to-day that the great majority of uterine inflammations, probably of septic origin, are due most often to an arrest of the retrograde metamorphosis of the uterus after confinement or abortion, that they are created entirely by uterine subinvolution, and that the circulatory troubles, characterized by congestion and stasis, preside over their initial evolution. If the physician interferes then by removing obstruction and sepsis at the same time, producing a passing hyperæmia, a sort of circulatory drainage, if he combats the primary inertia of this organ, the slowness of the circulation of which gives rise to all the subsequent inflammation, he puts in force an excellent treatment which prevents and cures at the same time. Such is the role of faradization which, applied in the uterus in the proper manner, preceded and followed by an antiseptic injection, produces a sort of interstitial massage, provokes the contraction of all the smooth muscular fibres, excites and hurries the circulation, accelerates

absorption of exudations, and so corrects a languid or perverted nutrition.

Tripier and I (1) were able to say that, being given a woman who had just been confined or aborted, who, for various reasons found herself in the presence of threatened subinvolution, with all its inflammatory cortege, we could, if we wished, be masters of the situation, and be able to remove the disease in preventing and putting away the greater number of the local causes which might provoke it; such is the true preventive treatment really useful and efficacious, thanks to faradization. But supposing, as is usually the case in the ordinary practice of gynecology, that the disease was constituted by a process which had already lasted a greater or less time, and which has been quietly left to itself, three principal cases may present themselves:

1. The process starts most often by the mucous membrane, which may be simply hypertrophied or dotted over either with granulations or fungoid growths or vegetations, the embryonic elements of new formation appear equally in the parenchyma and acquire considerable importance, to the detriment of the muscular stroma, whose functions are not slow to be more or less destroyed. Sometimes the embryonic elements degenerate and are eliminated *en masse* as on the surface of an exposed wound which produces a more or less abundant muco-purulent discharge. Sometimes, on the contrary, frequent hemorrhages

bear witness to the presence of fungoid growths composed almost entirely of vessels of new formation. Sometimes, also, the hypertrophy of the dilated glands produces a characteristic mucous discharge.

We find ourselves, in these three forms which all start from the same source, in the presence of internal metritis, also called endometritis, or acute or chronic metritis of the mucous membrane, characterized, as we have just seen, by various lesions of the mucous membrane, which may co-exist in the same uterus, and by a consecutive parenchymatous hypertrophy due to the formation of a veritable embryonic stroma, made by the heaping up of little round cells scattered about the muscular bundles.

2. In the second case the uterine inflammation is still young and more or less in the neighborhood of where it began; it is characterized by a more or less slight inflammation of the mucous membrane and by a preponderating process of congestion and infiltration of the parenchyma, with a more or less considerable circumvascular hyperplasia of the conjunctive tissue which either retards or stops, in some places, the return circulation. We have then to do with what is called parenchymatous metritis in its first stage.

3. Finally, in the third place, the inflammation is of a later date and the pathological process is more advanced; it is characterized by hardness and resistance of the uterine parenchyma, which reminds one of cicatricial tissue, and the circulation of which, here

and there, is either null or very weak. The conjunctive tissue, young and succulent, then becomes hard and fibrous, and the uterus, on section, is pale, indurated and devoid of blood ; that is chronic metritis which has reached the second period, or period of induration.

What can we do against these three different pathological conditions, which in most cases cannot be distinguished as separate morbid entities, but appear as a hierarchy of negative morbid processes, running more or less the one into the other, the first stage of which is simple and recent subinvolution, and the last, either chronic indurated metritis, or fungoid or hemorrhagic metritis. Tripier, who in gynecology only sees one inflammatory process—engorgement—only believes in one uniform medication—the one which as we have just seen is a regular triumph of preventive medicine, namely, faradization. But this is where he makes a mistake: the induced current, which is a sovereign remedy after a confinement or an abortion, in the very young and congestive forms of engorgement or metritis, begins to lose its claim in the other stages, either hyperplasic, retrogressive or supplementary, of uterine inflammation ; and here clinical experience is in perfect accord with pathological anatomy.

In showing us that when the uterus begins to be invaded by vessels and tissues almost entirely formed of embryonic elements, as in metritis of the mucous

membrane, or endo-metritis, or when the muscular stroma begins to atrophy and disappears as in parenchymatous metritis in its second stage ; then I say the direct exciters of the smooth muscular fibres, separated from all chemical action, no longer find a sufficient substratum for their activity.

Tripier made the mistake of not seeing that where ergot, which is nothing else than a general but uncertain faradizer, failed, there the interrupted or induced current ought to fail in doing that which, under other circumstances, was so judiciously assigned to it. Here, then, is the moment we differ from the therapeutics of Tripier, and if we cast an eye around us we would only see more or less hardy attempts destined to perfect the doctrinal ideas of Tripier, and to render more efficacious and more complete the intra-uterine therapeutics which he had so happily inaugurated. He wished to leave the mucous membrane alone, but we have just seen that it is it, which is most often found diseased, and which contains even—especially at the beginning, a greater or less fraction of the pathological condition; moreover a tendency of the modern school of gynecology is to destroy it, in order to renew it. From all sides new methods of medication are proposed, which may be divided into two great classes. On one side the endless list of caustics, either liquid or solid, destined to destroy chemically the mucous membrane and to make intra-uterine counter-irritation. On the other side we address our-

selves to the cutting instruments, in order to perform the excision of the diseased mucous membrane, or the scraping of this same mucous membrane, which we wish to suppress in order to permit the uterus to constitute for itself a new one, with all its normal attributes; we have addressed ourselves equally to the red hot iron and the thermic galvano cautery, in order to act with greater speed and energy.

I ought to declare here that this intra-uterine tendency of contemporary gynecological therapeutics constitutes a real and important progress, which will only bear all its fruits when it shall have been sufficiently systematized to be safe from all danger, and to be submitted to the rigorous control of an exact posology; but the general reproach which may be made against all intra-uterine therapeutics adopted so far might be summarily formulated as follows:

First. It is brutal, blind, and may be dangerous in inexperienced hands.

Second. Its dosage is wanting.

Third. It is difficult to localize.

Fourth. It has a more or less instantaneous action, which ceases generally after its application.

Fifth. It is sometimes sterile, inefficacious, or fanciful.

Sixth. It treats the mucous membrane, but is wanting in direct action upon the parenchyma.

Four years ago I was struck with all these objections, when (using the new galvano-chemical intra-

uterine medication for the cure of fibroids), I commenced attempts at similar applications for the cure of chronic metritis.

The thesis of Dr. Lucien Carlet (2), which contains my memoir on the new treatment of uterine fibroids, with more than a hundred observations in support of it, mentions also, in the form of conclusion, that parallel researches made by me in chronic metritis will receive a therapeutic consecration shortly (page 250) (3). Since then I have had many opportunities of justifying my first treatment of four years ago, and my present memoir has for its object to-day to make a complete exposition of my new method of treatment. It may be resumed in the following formula:

To apply to the uterus the constant current of the battery of a sufficient strength to destroy the mucous membrane and to produce a healthy derivation.

I.

ELECTRICAL TOOLS.

To perform well the new operation which I propose, you must first be provided with a good electrical outfit, of which you must well understand the working and the necessary qualities. You must know now that electricity has undergone the common lot of all good things, which have not yet become generalized, and which have been the objects of extreme adulation, or have been abandoned without reflection, according to the hand which has employed them, or, rather, according to the experience of the operator. So it has been with water and hydrotherapy, so it will be with all natural forces, blind and brutal by themselves, but only requiring, in order to become docile and consequently benevolent, to be transported and distributed by the aid of suitable intermediaries. Our century has had the good fortune to witness the chemical birth of the electrical current, which has permitted us to create it at will, and to shut it up, if we so desire, in the narrow limits of a bottle, as small as we like. It is thus that it has been condensed and bottled, so to speak, in a receptacle called a cell; it was necessary then to let it out like material liquid, in the desired and, especially, in a measured quantity, and, moreover, it was important to circumscribe its effects, to limit its action, to localize its influence, in order to react on such or such an organ of the economy.

This is the triumph of these last few years, which succeed a deplorable period of therapeutic empiricism, which still reigned in the therapeutic application of electricity.

Until these last years, in fact, we were applying electricity in an almost fluid manner, and we were very happy to say that in such and such a case it had done wonders, and in another that it had completely failed. We had employed electricity and that was all, and we were surprised to see inconstancy and apparent variation in its effects, according to the time, or place. Sovereign at Berlin for instance, it became dangerous or worthless at Paris, in a given case, and yet it was the same agent which had been employed. Why this anomaly which worked against the treatment itself? Why this therapeutical caprice? Why these vague and contradictory responses in the employment of a natural force which does not know how to lie?

The reply is easy to get, and one word throws light on this question, so long the subject of controversy: the want of the means of dosing it, and the ignorance of the physical effects of electricity led to this vague method of treatment, uncertain and often contradictory.

All electrical treatment should therefore, have an obligatory physical introduction in order not to fall into the errors of the past; so that I find myself obliged, in the form of a preamble to resume very

briefly all the technical questions concerning the electrical tools, and to give here a minimum of what a medical man ought to know about these things, but which unfortunately he most often completely ignores.

The instruments which he must possess and fully understand, are five in number. Here they are rapidly explained :

A.—Above all a Good Galvanometer.

I say above all, because this instrument surpasses all the others in importance; there may, in fact, exist many defects in the others, without rendering null the operation which you are about to make, but the absence of a good galvanometer in the physician's hands submits him to the caprice of hazard, and places him in the dilemma of making the operation, either so weak as to be useless, or too strong, without his having the means of controlling it (unless at all events he introduces into the circuit some other measure of the current, such as the voltametre, which is, however, much less practical); besides the galvanometer, on account of its influence, must be good, that is to say, be well graduated. Now, what is a galvanometer? It is an instrument which is to the electrical current what a pair of scales is to chemistry. It serves first of all to recognize the passage of the current and to show its slightest variations of intensity; it fulfills then, first of all, the office of the galvanoscope, but its functions are more important still; it

gives equally the exact measure of the electric outflow; that is to say, it plays the role of a real balance or counter—it doses and weighs so to speak the electric current. All the electric fluid which emerges from the battery and passes through the circuit, and consequently the portion of the body interposed, will be revealed by the galvanometer, as far as quantity is concerned ; we will therefore have the exact measure of everything that goes on, or, to materialize, the phenomenon of what passes in the unity of time, and consequently the exact measure of all that has been consumed during the operation. Now, are all galvanometers equally adapted to this use? No, certainly not ! All the old ones, or even many of those which are actually in use, are graduated in degrees of a circle, and consequently in divisions which differ with each maker, and cannot therefore give an exact and comparable value of the electric dosage. The true and only galvanometer which I would advise you to employ is that which is divided in fractions of the electrical unity of outflow or expenditure, which is actually, since 1881 (4), adopted throughout the entire world. I mean the Ampere, or rather the Milliampere (for in medicine we only employ the thousandths of the unity). Being given a standard of measurement, recognized and accepted by all doctors and physicists, the galvanometer will be to the electric current that which the gramme is to weight; the second is to time; the metre to length; a good gal-

vanometer of intensity will permit you to make a true and natural posology of the continuous current of the battery, which we only obtained formerly in a vague and empiric manner by the designation of the number of cells which have been put in service. I am wrong to say formerly, for unfortunately still, if you open any of the so-called classical books of pathology, and even a great number of special works on electrotherapy, you will only find one uniform way of specifying the electric current; they only speak of the number of cells employed, and they have forgotten that the greater number of existing cells differ considerably as to their output. They forget, moreover, that the same cell has a very different action according to whether it is fresh or worn out, varying from nothing up to the very largest quantity. They forget besides, that even if these variations did not exist, and if we took, for instance, two or three patients who are electrified, the one after the other, by the same battery and the same number of cells, the therapeutical action might be quite different from one patient to another, and this is the reason why: Each patient has a particular thickness of skin, or resistance, which allows the current to penetrate more or less well; besides the epidermis is more or less moist according to the state of the electrodes, when it necessarily follows that, in order to render all the operations which we wish to perform for the same object identical, with a uniform electrical outflow, you must use, for instance,

ten couples on one patient, twenty or thirty on another, or perhaps fifteen, etc., etc.

The introduction of the galvanometer of intensity has therefore produced a regular therapeutic revolution by substituting mathematical precision for the vagueness of empiricism, in fixing definitely the value of the treatment in such or such a given case, by rendering capable of comparison all the observations of the same kind, which will in future have one common measure of dosage, by permitting any physician to treat such and such a disease under identical circumstances, and that by keeping account of the two most important factors, namely: 1st, the outflow in milliamperes, and, 2d, the duration of the application.

What is the average graduation that the galvanometer should have, and within what limit should it oscillate? This, you will understand, depends altogether upon the disease which you have to treat; one case will always require small doses, another medium doses, and others intense doses; for the case before us, the new method of treatment which I wish to introduce can only be sovereign on condition that it is made with a high dose, and to extract from the current the greatest bearable strength of its chemical and trophic effects; all the interest of my communication rests on this formula.

Up to the year 1882, the maximum dose used in medicine was fifty milliamperes, as is proved by the former compasses of Gaiffe (5), the graduation of

which did not pass this figure. I have since then, by means of a process which I shall shortly describe, rendered tolerable very high doses, and consequently I had new galvanometers constructed by Gaiffe, the increasing graduation of which has been carried successively to 200 and even 250 milliamperes.

B.—The Battery.

Being armed with a good galvanometer you must next look to the battery you are going to use. Here the same exactness is not necessary and all kinds of cells may be of service with certain premises understood, however, which I must make you acquainted with in a very summary manner. I shall not describe all the forms of battery which exist, for a volume would hardly suffice; it is enough to say that the best is the one which gives us the least trouble, which, while giving a great outflow, lasts the longest possible time, without having to be recharged; which is the one that realizes this desideratum? Perfection does not exist yet, but the one which comes nearest it is, without contradiction, Leclanche's chlorhydrate of ammonia cell.

A great deal of discussion has taken place as to whether the form of cell having been adopted it was better to employ large or small elements.

Without wishing to enter into all the technical and mathematical details which govern these questions, it is sufficient for me to say that the same thing

takes place for the electric fluid, imponderable though it be, as for material or ponderable fluids, such as gas and water; with an equal outflow a large reservoir will last longer than a small one, and will use itself up more slowly. There is every reason, therefore, if we do not wish to be continually refilling the cells and precipitating thereby their exhaustion, to make use of large cells, the largest possible, so as to do for a long time, and only become moderately weakened after many successive applications; moreover, the number being equal, they give a greater outflow than small elements; this is due to their interior resistance being less, the current circulates better in large couples (6) and furnishes consequently a greater intensity than small ones. You require, on an average, about twenty or thirty large Leclanché elements to furnish, in the operation I propose, an intensity of from 150 to 250 milliamperes during a considerable time, from thirty to sixty minutes if necessary, if you wish to perform several successive operations.

So much for the battery mounted in the office, and fixed; but as for the one to be used in attending patients at their homes, and which, therefore, should be transportable; we are far from having reached the ideal; while waiting for something better, we must content ourselves with the bad, for we find ourselves in the presence of conditions equally difficult to realize, and which appear paradoxical; to have a battery which is very transportable, very small, and yet

which gives a large outflow. In my first communication on fibroids, inserted in the thesis of Carlet (p. 53), I said that the transportable chloride of silver battery of Gaiffe, was strong enough and advantageous (although its price was rather high) being almost dry, rendering its handling very convenient and its transport easy. I must today, however, make an important restriction; this battery cannot furnish a greater intensity than 100 milliampères; it can only reach even this figure at the beginning of its activity, subsiding afterwards rapidly by its very rapid exhaustion; although useful when we wish to obtain only feeble or medium doses, it becomes altogether insufficient in the case under discussion. At present only liquid batteries can fill the requirements, and the best up to the present, or at least the least faulty, of the transportable batteries which I employ, is that which unites to elements of small size, though having a great outflow, immersion, at will, of the zinc and carbon of the active fluid, which permits of our suspending the working of the element when it is not required; this is the bisulphate of mercury battery. The semi-portable battery of Gaiffe (constructed with small Leclanché elements, modified by the substitution of chloride of zinc for chlorhydrate of ammonia) is powerless, no matter how many elements are employed, to furnish a greater intensity than 60 or 80 milliamperes; we must therefore reject it for the present purpose.

C.—Intra-uterine Exciter.

Next to the battery the doctor ought to have at his disposal a sound, whose duty it is to convey the current into the interior of the uterine cavity. Any metal would suffice for this purpose, provided we employed the negative pole which does not attack them; but the positive pole corrodes all metals except platinum, gold, and aluminium; two objections result: first, the metal is attacked and the polish of its surface disappears to be replaced by a roughness which may injure the uterine mucous membrane; besides, and this is very important, if the metal is thus attacked by the current, the action of the latter is expended in pure waste on the electrode, to the detriment of the mucous membrane of the uterus, which in the case under discussion should be the object of our principal preoccupation. We would make, therefore, an erroneous calculation, if in using the positive pole, and the electrode being of copper, for instance, or steel, or iron, we concluded that all the electric action was brought to bear on the uterus—it will only have absorbed a small part and the other part will have been spent in pure waste. It is therefore necessary to remedy this defect every time that we use the positive intra-uterine pole, by employing only inattackable sounds, the best of which is platinum. It should have the size and shape of an ordinary sound, (7) which would be big enough for most cases; it should be long enough to penetrate the whole length of the uterine

cavity; it is held by a long handle into the centre of which it should glide (for further details see thesis of Carlet) it must be furnished with a sheath, made of some good non-conductor, about 10 centimeters in length, so as to protect the sensitive vagina from contact with the electrode; it may be made of glass or rubber, but the best material is assuredly celluloid, which has the double advantage of being a good isolator and at the same time aseptic, and does not, like rubber, permit infecting liquids to penetrate it, preserving its polished surface even when dipped in the strongest carbolic solutions, and being easily washed, like glass, after each operation; it has only one slight disadvantage, that of burning in a flame, but bears very well being plunged into boiling water for a few seconds if necessary. (I believe I was the first to suggest celluloid as a good non-conductor of electricity for medical purposes.) Its diameter should be such that it will slide easily over the sound, so as to expose as little or much of the latter as the operator may desire.

D.—Cutaneous Electrode of Clay.

In the fourth place the question of the cutaneous electrode occupies an important place in this method of treatment. The current is created and emerges from the battery, whence it is carried by the platinum sound into the uterus; from there it goes through the organ to reach the skin in order to get back to the battery, and thus constitute a complete circuit. Of

what should the cutaneous electrode consist? It should possess the qualities necessary to permit of the current being very intense without becoming unbearable by the patient. The whole operative skill consists in rendering this pole as bearable as possible without altering the qualities of the current; but this problem only permits of the one solution which the laws of physics imposes upon us; namely to render the skin as little resisting as possible, for it is the skin alone which often offers the only impediment to the use of a high intensity. In fact, the uterus and its mucous membrane are in general but slightly sensible to the application of even an energetic current, provided the latter be constant; but the moment that it is suddenly interrupted the galvanic current acquires *ipso facto* the contractile properties of the induced or faradic current, and brings them to bear in a more or less painful manner in proportion to the energy expended. Pain is, here, the expression of muscular shock or contractions, and it becomes easier, or may even disappear more or less completely, whenever the current becomes continuous again; exceptionally the uterus itself is sensible to the continued current, and you must note in what cases this occurs in order to be on the lookout for them in practice; namely, whenever the uterine periphery is inflamed, or when there is perimetritis, more or less generalized, high degrees of strength will be borne with difficulty; it will be the same with certain uteri, said to be irritable, without

there being any inflammatory action, but owing to the simple fact that they most often belong to very hysterical women.

The pathogenesis of the irritable uterus still remains to be studied, and it deserves the attention of gynæcologists; what we should remember in the meantime is that certain uteri, few in number it is true, are rather sensitive, electrically speaking, and support with difficulty even a medium intensity. But besides these rare exceptions, here is the rule: *generally it is the skin only of which women complain and of which they should complain if the operation is well executed without wounding the interior of the uterus*: the reason is very simple: the point of contact with the skin with the cutaneous electrode becomes hot, and, in proportion to its intensity, we cause the development of a veritable vesication, the painfulness of which is easy to understand. This is the physical explanation of these facts, stripped of all mathematical formulæ and placed within the comprehension of all physicians.

When the current is carried in a uniform circuit, that is to say, by a wire, which is everywhere of the same resistance, its action is identical, both in arriving and departing, and, to materialize the phenomenon, you have only to take a current of water, which circulates in a bed, which has everywhere the same inclination; the current of water and consequently its outflow as well as its mechanical work, if we look for

such, will be everywhere the same throughout its whole extent; but imagine that a flood gate is interposed at any point in the current, which will thus interfere with its regular progress, then the bed of the river will be subject to lateral thrusts above the level of the obstacle, and the water will tend to break from the bed, to spread out and submerge the land on its banks. The same thing takes place in the flow of the electric current. When an obstacle is placed in the midst of an electric circuit, or even instead of supposing the circuit to be simple, as we did just now, and constituted by a single homogeneous substance, of the same resistance, let us imagine, which is the case in electrotherapy, that the circuit is formed by different fragments of unequal resistance, adjacent one to the other, and joined end to end, through which the current circulates. Taking up again the comparison which we have just made, we shall see that every time the current traverses a greater resistance, that is to say, passes through a conductor less resistant to one more resistant, it will have a tendency, like water, to press outward; that is to say, it will transform itself into a movement which will develop heat. If the heat is sufficiently great, and the wire sufficiently resistant, it may even become light, and it is on this principle that the electric light was founded.

Let us apply these premises reduced to their simplest expression, to electrotherapy, and we shall see that whenever a current leaves the metallic conductor,

which is a good conductor, to enter the skin, which is a bad conductor, there is a real development of heat and consequently of sensibility, which may vary all the way from a slight heat to intense burning. It was a question then how to render large doses of continuous current tolerable. To do this it was necessary to diminish the resistance of the epidermis, in order to render the passage of the electric current as easy as possible. Until that time only one way was known and that was to employ some soft body, such as chamois skin, lining the metallic conductor in the form of a plate, and which was thoroughly soaked in water. As a matter of fact the skin allowed the current to pass through better, but the resistance was far from being completely overcome, to such a point as to permit of the passage of a high current with impunity; the epidermis, in fact, covered with a fatty coating, allowed this to be penetrated with difficulty. It was then that I was the first to originate the idea, in 1882 (8), of substituting for the ordinary classical pole, which I have just described, another electrode, formed by a soft body, a good conductor, and enjoying above all the faculty of adhering, or being plastic, and capable consequently of sticking to the epidermis, at the same time that it softened the latter, better and more deeply; this body is clay, modellers' clay or sculptors' clay, which may be had anywhere, and which, provided we keep it moist, preserves indefinitely the property of sticking and imbibing moisture, which is its essential quality.

The therapeutical and operative consequences which follow from this fact are easy to divine. Whilst formerly it was necessary to be very timid and reserved in its application, on pain of making the patient suffer to such an extent as to render the operation intolerable, I have been able, little by little, to double, triple, and even quadruple the maximum classical doses without any difficulty. It is for this purpose that I have had the new galvanometer constructed, which I have just described to you, and it is thus, to the great surprise of all those who have been present at my clinic, I have been able to make very powerful galvano-chemical cauterizations without, as a rule, causing the woman any appreciable pain, and a thing worthy of remark, bring an intense operation to an end, and yet be able afterwards to find, on applying the hand to the belly, that the skin on which I had laid the clay not only was not burning, but actually lower in temperature (9) than that of the neighboring regions.

The suppression of scars may be understood at a glance; the clay multiplies the points of contact with the skin, and so increases the real extent of the surface of the electrode, by reason of its plasticity, which causes it to adhere uniformly throughout, while on the contrary the old metallic electrodes had many less points of contact and consequently a much less large real surface, and this is why: the pure water only moistened the epidermis at the points where sweat

glands emerged, and only softened it very imperfectly in the neighboring regions; the result was a crop of points, unequally resisting, which were witnessed to by the scars which resulted, and which, as a rule, appeared in the form of isolated islands, becoming afterwards more or less confluent. With clay, on the contrary, sufficiently moistened, there is no danger of scar, because the surface of the electrode being larger, as I have just said, although of an actual surface supposed to be equal with the classical electrode, the current is less dense, because it extends itself much more widely, and consequently its physical and chemical effects are proportionately diminished. To take up again the comparison of water, I may say that, with the same outflow of water of two rivers with the same fall, the one with the wide bed will be less in danger of overflowing and of so doing damage.

A few words more about clay, in order to enumerate the properties which it is absolutely necessary for it to possess.

First.—It should be as plastic as possible; you must know, indeed, that there are several different kinds of clay, of which the stickiness is variable, and that it is easy to choose one exempt from all mixture of sand, which is as rich as possible, and which possesses this quality in the highest degree.

Second.—It should be always very soft, in order to mould itself exactly to the skin, and to impregnate itself as deeply as possible; for this, you must, when

not using it, preserve its humidity by enveloping it in an impervious cloth of rubber or oil silk, for instance, as sculptors do. The most convenient degree of softness is one which permits the finger to penetrate it, by simple application, without any effort. As it is not always possible to preserve the exact medium, and as the earth which we have just moistened is sometimes too soft, in order to avoid its dropping on the belly and clothing you must take the precaution of enveloping it in a layer of coarse tarlatane, through the meshes of which it can easily transude, and which thus preserves the clay in the form which we have first given it, by preventing it from breaking up and scattering.

Third.—It ought to have a uniform and convenient thickness; if it is too thick it will offer a useless and injurious resistance to the passage of the current, and will be of too great a weight on the belly; too thin, it would have the disadvantage of spreading too easily, and especially the metallic electrode which terminates in it would run the risk of appearing through it and coming in contact with the skin, which will lead as an immediate consequence to pain, and possibly a scar. Of two conductors in fact, unequally resistant, the electric current will go through the least resistant, or the best conductors first, absolutely the same as a current of water which divides into two parts, for instance, each with a different fall, will follow, all things being equal, the one with the greatest

fall, and leave the other; and if this new bed is narrower than its first bed before dividing, we will see the dynamic effects of the current increasing proportionately, a principle which is especially used in commerce. In the same way electricity (and here comes in the law of currents of derivation) in the presence of all bifurcations of the reophore, the current will accumulate on the best conducting circuit, in proportion to its conductability, and to the detriment of the other and more resisting wire. The consequence of this new and unequal distribution of the electric current will be, in the case under discussion, that the metallic circuit of small surface (for it can only have here one point of contact with the skin), will find a large quantity of the electric current accumulating on its course, which is translated in the language of physics, by saying that the density of the current increases to this level, with all the proportionate physical and chemical effects which result from it. There is no longer any doubt as to the cause of the production of heat, redness and scaring at the point of contact of the metallic electrode with the current, which shows how much an operative detail, however small, may be of sufficient great consequence to compromise the success of the operation.

In order to give the clay a uniform and desired thickness, there is a very simple way, that is the way in which brickmakers make their bricks. You only require for this a rectangular frame of wood or metal

about the height of one-third or one-half of an inch on the sides; lay on it a piece of tarletan previously moistened; throw the clay into it, after it is sufficiently moistened, and with any kind of an instrument having a smooth surface, press the clay down to the level of the frame; you then lift the tarletan, when the frame will become detached from the clay, which will have exactly the form of the frame.

Fourth.—The clay must have a sufficiently large surface to cover the whole belly, and so lessen as much as possible the danger of scaring, by the proportionate diminution of the density of the current. A square cake 10 or 12 inches long by 6 or 8 wide generally suffices.

Fifth.—Before applying the clay you must be certain first, that it is very moist and that it transudes uniformly through the tarlatan, you must press on the surface, which should be in contact with the skin, with a little friction of the hand or first finger, so that the clay emerges at once from the meshes of the tarletan, which thus penetrates it and is uniformly impregnated. (10).

Sixth.—The connection of the battery with the clay, or rather its contact with the reophore which goes to the battery, will be made thus: you must have a large metallic plate soldered on the reophore, about three or four inches square, which you place on the superior surface of the clay by means of a slight pressure, in order to bury it a little so that it will be everywhere in contact.

E.—The Reophores.

We have only now to speak of the reophores, or the cords which serve to carry the current, the one from the battery to the uterine sound, and the other from the battery to the clay. These cords are generally formed of several metallic wires placed together and covered with silk or rubber, and should be sufficiently supple to be easily moved, and sufficiently resisting, on the other hand, not to be easily broken. It is their breaking, in fact, which is the most common accident, and generally happens when least expected, and against which I must put you on your guard. It passes unnoticed because it is concealed by the silk or rubber covering which surrounds it. It is necessary therefore to know at what point it most often happens; it generally happens at the point of contact of the wire with the piece of metal in which it terminates, either at the metallic plate on the clay, or at the hysterometer; it is at this level where the wire is twisted and subjected to pressure and dragging that it finishes by breaking, generally bringing with it accidents which may sometimes be serious. Supposing, for instance, that the break takes place in the midst of a sitting, while the electric outflow is at its greatest, there will be a severe shock causing great pain to the patient, who will not only complain, but may even make a sudden movement, and thus be injured by the uterine sound. You must, therefore, know how to avoid any operative mistakes, and you should always

examine the wires before commencing an operation; the best way to assure yourself that they are conducting well, is to close the current on itself with a single couple successively with each wire; if the current passes well that proves that the wire is intact, if not, you must replace it.

II.

OPERATIVE PROCEDURE.

After this physical, instrumental, but absolutely necessary introduction, which constitutes, so to speak, although very briefly, the *materia medica* of this new treatment, it is necessary now to describe very minutely the operative process. The operation will only bear all its fruit on the condition of being rigorously executed, as I shall recommend, without deviating for a single instant from the rules which I shall lay down. The whole success depends upon it.

We shall follow the operation in the chronological order of the manœuvres of which it is composed.

A.—Preparatory Precautions.

Firstly, you must above all things, and this is of the very greatest importance, carry out a good and thorough antiseptis. That is, the operator should carefully wash his hands with an antiseptical solution, either carbolized or sublimated, and he should only operate in a favorable and perfectly aseptic locality.

Secondly, he must then rapidly examine all the couples of the battery, in order to see that they work well, and thus to avoid any interruption during the course of the sitting. It suffices for that to close the circuit on itself, and to make each of the couples enter successively into it, one by one; the deviation of the

compass which serves as a galvanoscope will reveal immediately the passage of the current, and consequently the total integrity of the battery which is being used. On the contrary, if there is no deviation you must search for the one at fault, in proceeding from the periphery to the centre, and we shall soon recognize the seat of the interruption, which may depend either upon the breaking of one of the reophores, or some remediable defect of the collector (such as a loosened screw, or the handle not pressing sufficiently on the brass points, which collect the current, or these latter may be too much oxidized to allow the current to pass freely), or perhaps it is one of the wires which join the batteries together that is broken or disconnected, or it may depend upon some infirmity of the battery itself—such as its being used up, wanting water, or the zinc being in a bad condition.

This being done, we must cure on the spot, if possible, the cause of the interruption, (11) and we shall then place the two handles of the collector at zero, to be ready to start—I say handles, in the plural, because I suppose as is usually the case, that you have a battery provided with a double collector, which permits of your taking the elements one by one at the beginning, at the middle or at the end of the battery. To explain myself, you must be able to take the elements one by one in order to render the operation as bearable as possible, for if you have a battery mounted two by two or four by four you can under-

stand how sharp and sudden the transition from one number to another would be, and what consequences might result. There is a first principle which you should always have before your mind, and which ought to be engraved in the thoughts of all gynæcologists, and that is that the uterus will bear anything on two conditions, first that you obtain a good antiseptis, and second that you do nothing roughly to it.

Thus it will support a current which is fearfully intense, provided that you inflict upon it only a progressively iincreasing dose without shock or jerk.

The only way not to violate this rule is to possess a collector which will permit of your giving it the current cell by cell.

You may at all events, even with a collector of two by two or four by four, avoid the difficulty and arrive at the same insensibility of the operation by employing a medical reostat which you introduce into the circuit. This additional resistance has for its object the offering of a first barrier, varying in amount to the passage of the current, and, consequently, to render more tolerable and less sudden the transitions which would be too great without it.

Thus with the collector divided, one by one, the patient easily supports the difference between one cell and the next; there is always a slight shock, it is true, but it is reduced to a minimum; if, on the contrary, the collector is divided two by two, three by three, or even four by four, the shock becomes greater

with this transition and the patient finds herself in the position of one who ascends or descends easily a flight of stairs, step by step, but who when she goes up two or three steps at a time, finds it much more difficult.

The introduction of the reostat smoothes these transitions and takes the place, so to speak, of an inclined plane which renders the fall less sudden and easier; instead of having a vertical and violent shock, we get down by a longer descent which diminishes the sudden force of the fall.

The only inconvenience of the reostat is that it requires a greater number of cells, for if before the introduction of this additional resistance, twenty elements for instance were sufficient without it, you would require an additional number, varying in proportion to the number of unities of resistance (called ohms) interposed—as a rule 200 to 500 ohms of resistance are quite enough to deaden the shock. Two railroad wagons can only touch, after overcoming the resistance of the buffers which soften the force of the collision; in the same way the current which has to go through 500 ohms before arriving at the skin will have its energy diminished, and to make up for this deficiency you must add a greater number of cells.

The double collector has the further advantage of permitting us to employ any fraction of the battery to the exclusion of the rest.

If the first cells were used up, for instance, or if there were some interruption to the current which we

could not correct at the moment, we might then utilize the middle or the end, and to do this, instead of placing the two handles at zero, we would place them at the figure higher up than the last couple which we do not wish to or cannot use.

3. The galvanometer will also be an object of special attention. You must make sure that the needle oscillates in every direction without striking and that it is perfectly suspended. There are two ways of fixing the galvanometer, either on the cabinet which contains the battery, or it is independent and introduced into any point on the circuit at the will of the operator.

4. The battery, collector and galvanometer having been tested, we place them near the operating bed or sofa, so that, without moving, you can on one side stretch out the hand and easily move the handles of the collector, and on the other hand be able to see and follow easily during the whole operation the oscillations of the galvanometer. You adjust the needle, or rather you turn the multiplying scale until the zero on the compass corresponds exactly with the needle.

5. You pass the hysterometer through the flame and then you plunge it, handle and all, into a strong carbolic solution, in order to make sure of its being perfectly aseptic.

You arrange the length of the intra-uterine sound, in drawing it out from the handle, according to the previously determined or the probable length of the

uterus. You then cover the sound with an insulating sheath of celluloid.

6. You attach the reophores, or better still, one reophore first, to the metallic plate which lies upon the clay.

7. See if the clay is in the proper condition for humidity, and especially if it thoroughly moistens the tarlatan.

B.—Preliminaries.

1. *The woman.* Before beginning, you must in a brief and paternal manner explain to her what is necessary for the success of the treatment; you will prevent all emotion, especially if the woman is nervous, by assuring her that the operation is harmless and perfectly bearable. It is necessary never to begin, especially the first time, before obtaining her complete acquiescence, in order that she may relax all her muscles, and avoid all movements that might be hurtful or dangerous. You will make her take off her corsets and untie her petticoats, in order that her breathing may be free and easy, and that the belly may be completely exposed.

If you operate in your office she should get upon the table. If you attend her at her own home she should lie across her bed, the feet resting on two chairs, taking good care, however, in both cases, that the buttocks project completely beyond the edge in order to give perfect freedom to the hand which introduces and holds the intra-uterine sound.

Once placed in position the woman must remain absolutely immovable, and you must remind her that no matter what happens she must not move, but that on the slightest sign, if she desires, you will stop the operation; she will thus be more satisfied, she will breathe easier and will aid any manœuvre required for the introduction of the sound.

It would be well, and even useful, to make, before examining her and operating, an antiseptic vaginal infection of sublimate, 1 in 1000 or 2 in 1000; it will exercise a preventive and curative action, in cases where we might have reason to fear the carrying of septic products from the vagina into the uterus.

2. *The clay.* You quickly place the clay on the belly, above the pubis, and away from the hairs, after having warned the patient that it is always cold, but that this disagreeable feeling will soon disappear. You must cover it with a dry cloth, such as a folded towel, for instance, on which the woman is to place her two open hands (12) side by side so that she may exercise a slight pressure on the clay in order to render it more uniformly and completely applied to the skin.

We never apply the clay to the skin without having first determined that the epidermis is healthy, and there are no pimples or abrasions, nor any wounds of any kind, no matter how small. It is at such points as these, in fact, if you do not take care, that the current, finding the door more open, will

enter more easily, and then in virtue of the law I have laid down, when speaking of the contact of the metallic electrodes, it will be dense at all points where the epidermis is removed, and it will, therefore, accumulate there its peculiar action (of heat and even burning). If you find an erosion, no matter how small, you must close it, either by means of collodion or with paper, in a word, with some non-conducting body in order to prevent the current from passing through this abrasion to the epidermis.

3. *The Sound.* Its introduction into the uterus is the most important stage and exacts the greatest care and practice.

A great part of the operative success depends on its good execution.

I cannot now enter into all the details which should regulate the use of the hysterometer, referring the reader to special works, and especially to the one which I am preparing for this purpose. I must content myself at present with summing up the maneuvers, by saying, and by repeating, that extreme gentleness should always preside over its execution. Never should the introduction of the sound, for this is merely an introduction of the sound for therapeutical purposes, be made with the slightest possible force. On the slightest resistance, however small, you must stop, go back, if necessary, and begin again; the uterine cavity should show its road, so to speak, to the operator, who should allow himself to be led into it.

I reject the employment of the speculum in making a proper hysterometry, and for making sure that it is complete. I will only give one reason which seems to me to be beyond question. If in writing we always hold the pen-handle as near as possible to the point, it is in order to give the writing as much assurance and firmness as possible; it is in order that the hand which holds the pen, may be nearer to the paper, or to the resistance over which the pen has to travel. Now compare two specimens of writing, the one which was written while the pen was held near the end of the handle and the other near the point and the comparison will be altogether in favor of the latter.

The same thing applies to the introduction and the fixing of the sound; the search which you must make, the resistances which are to be conquered, the road you must follow, all these things will be better executed when the conducting hand is as near as possible to the point of the instrument.

With a speculum the hand is obliged to hold the instrument by the handle end. Without the speculum the conducting hand doubles itself, so to speak, or better still, we can invoke the aid of the two hands. The left hand, for instance, holds and fixes the handle, at the same time giving it a slight movement forward. The other hand with its index finger in the vagina and adjacent to the posterior lip, following it, and guiding it when necessary, in all its movements laterally and forward, straightening and correcting its course when it goes wrong.

Now, this vaginal finger, as near as possible to the point of the sound, is really the most useful one in the practice of hysterometry; it is it which makes us for the most part perceive, what it is difficult to do without it, that the sound has arrived at the end of its course, and that it is striking exactly against the bottom of the uterus. Well, I ask, the same as in writing, can we discuss the merits of the two methods? The reply leaves no doubt, and hysterometry performed without a speculum is much more sure, more complete, and more harmless.

It will sometimes be necessary to precede the hysterometry by preliminary intra-uterine antiseptic injection, the same as the vaginal injection, which, apart from the topical action, will have the double advantage of clearing the uterine cavity of the products of secretion, or the mortification coming from previous operations, and thus to permit the current to act more uniformly and more energetically upon the underlying mucous membrane.

4th. Once the sound is well introduced into the whole extent of the uterus, you must take care that the vagina is well protected by the isolating covering of celluloid, and for that it ought to touch at one end the neck of the uterus, and at the other project from the vulva. During the operation we should not cease to be careful of this, for if it should become all at once and suddenly painful, you will generally find that it is for want of watching the handle, which has

slid forward, and which no longer protects the vagina in its entirety.

5th. You will then attach the reophore to the intra-uterine exciter, taking care to do so sufficiently firmly that it may not become detached during the seance, and thus cause a shock which would result from the interruption of the current. The fixing of the wire should be accomplished by means of a slight twist of the peg (which is at the end of the conducting wire) into the hole which is prepared for it in the handle of the sound. You must not bring too much force to bear upon it, as you might displace the instrument in the uterus and wound it by pressing on it.

C.—The Operation, Properly Speaking.

Everything being ready to commence, the operation may be divided into three stages. These are: the initial stage, the middle, and the end.

1st. *The initial stage.*—(A) You must not begin to turn on the current until all pain or sensibility resulting from the passage of the sound shall have totally disappeared. A few seconds of waiting are sometimes necessary for this purpose.

(B) This done, the hand which holds the sound steady will move no more; in order to give it more security it is better to leave the conducting finger in the vagina, where, if we are sufficiently sure of ourselves, we hold the sound by the handle; the dorsal

surface of the handle will rest against the internal surface of the corresponding thigh of the patient.

(C) You will now turn your eye towards the compass to see how it answers to the passage of the current, and at the same time you must not lose from your sight the countenance of the patient, which will warn you of all the sensations she feels.

(D) The hand which remains free should be placed on that handle of the collector which corresponds to the positive pole, as the operator desires it; for the characteristic of the positive pole is that it always belongs to the handle which is in motion or which is at the highest figure, while the handle which remains stationary, or is at zero, or at a figure lower than that of the handle which moves belongs to the negative pole, according to the method of construction of Gaiffe.

(E) You will then commence slowly, very slowly, to turn on the cells, especially if it is the first operation you have undertaken, or if you are not acquainted with the patient; at first you will go to twenty or thirty milliamperes. Then proceed to fifty; by this time you will have gained, what it is very important to do, the confidence of the patient, who will soon find out of her own accord that electricity does not cause much pain; you will then reach 70, 80 or 100 milliamperes, and it is better for the first time not to go beyond this figure.

(*F*) IT IS THEREFORE IMPORTANT NEVER TO MAKE THE PATIENT SUFFER TOO MUCH AND NEVER TO INFLICT MORE PAIN THAN IS BEARABLE. THIS IS THE TRUE CRITERION WHICH SHOULD FIX THE LIMIT OF THE DOSE. It will of course vary with each patient and each disease, but for me it is impossible to doubt that the success of the operation depends on the execution of this formula. A uterus which has been made to suffer too great pain, is in danger, indeed, of having its pre-existing inflammation increased, especially if there is any inflammation of its periphery; that is why I strongly recommend only to apply the current at the beginning slowly and progressively in fractional doses, so to speak, and then to wisely interpret the replies of the patients in order to be enlightened as to the intensity which they are capable of supporting.

2d. *The middle-stage.*—(*A*) Generally a few seconds suffice to apply to the uterus in an ordinary operation the maximum dose desired, but with very nervous or very hysterical women, and especially when we operate for the first time, we must take care to wait one, or if necessary two minutes, to arrive at the maximum dose which they can bear.

(*B*) The point that we can reach will generally be 100 milliamperes at the first sitting; during the others we may try to raise it to 150 and even 200. We can if necessary, when a serious case requires it, reach 250. The maximum figure, once obtained, which

differs I repeat according to the patient, we will keep it at the same level during a period of between five and ten minutes, but on an average of five minutes.

(*C*) The variations which should take place in the dose and the duration of the operation are justified by this fact, namely: that in the first place all women do not support electricity equally well, and besides they each require a different intensity according to the gravity and previous duration of the disease; thus it is advisable in a difficult case of severe hemorrhage with marked fungous endo-metritis, to prolong the application to the maximum possible point of toleration, which might be as much as ten minutes; with other persons on the contrary, very hysterical and nervous, and easily enervated by the slightest pain, a sitting of three or four minutes will be as much as they can bear.

(*D*) There is an important precaution which you must take during the sitting, and which concerns the method of holding the sound; it is necessary to hold all the intra uterine portion always applied against the uterine wall and as far as possible to put it successively in contact with each of them, anterior, posterior and lateral, in order to disseminate and equalize, in this manner, its caustic action, and to render it as efficacious as possible.

(*E*) One thing which it is important to know and that is to understand the oscillations which take place in the needle during this period while the number of cells in use remains the same.

In certain patients who have a very resisting skin, we must not be surprised to see the deviation of the needle become greater, which bears witness to the increasing electric intensity or outflow which increases because the current passes better through the epidermis, which has taken a certain time to become softened and to allow itself to be penetrated. Once having reached the summit of its course, the needle generally becomes stationary, or moves at least but slightly, and thus proves, by its greater or less fixation, that the current once having been well established circulates in an almost continuous and identical manner.

3d. *The end.*—(A) The same precautions which I have just advised for the application of the current should be always rigourously applied in order to suspend it. *You must stop gradually couple by couple, and never suddenly, in order to avoid a shock and painful contraction of the uterus or abdominal wall which would follow.*

(B) When must you finish the sitting? I have just said that two factors should enter into serious consideration. *The object to be obtained and the sensibility of the subject.*

What then shall be the criterion which shall guide the physician? If the woman tolerates it well and bears the current without complaining, the duration, according to the therapeutical object in view, should be from 5 to 8 minutes, and even 10 minutes. If she does not tolerate it, but complains loudly,

threatens to move and becomes agitated, you must know that you should stop. The whole tact of the doctor consists in not listening to childish complaints, and on the other hand not turning a deaf ear to them when they are real. To continue an operation when it is too painful would be to expose oneself to serious mistakes, and I therefore beg of you to diminish the dose, enough to render it tolerable, and if even after being considerably reduced, she still complains, you must suspend it. There is every reason to believe that the next sitting will be better borne, either because the emotion of the first beginning will be less, or because the uterus itself will not be so irritable.

(C) If the same intolerance were manifested at the following sitting, you would have reason to suspect a *peri-uterine cellulitis*, which had been overlooked and in the presence of which you must stop, or it may be an extraordinary uterine susceptibility, as I have seen in certain cases of hysteria, rare it is true, which have compelled me to stop my interference at a dose of 30 or 50 milliamperes.

(D) Once the handle of the collect or has been brought back to zero, we mark the parallel return of the needle, which also having reached zero will now pass a little in the contrary sense, a thing which might surprise at first sight the doctor who is not acquainted with the physical effects of electricity.

This is the reason: every application of the continuous current creates at the point of contact of the

electrodes with the surface attacked or electrified, an electric polarity or what is called a secondary battery, the current of which is in inverse sense to the primary current which has just stopped. It follows, then, that when we terminate an operation, when the two handles have returned to zero, the figure which precedes the button marked *repose*, and while there is not, consequently any couple in the circuit which, however still remains closed, the secondary battery, created by the passage of the current at the level of the point of contact of the electrodes with the body, enters in turn into action, and gives rise to a new deviation of the needle in the opposite direction to what it was at first; a deviation which is slight, it is true, and of little intensity, but sufficient, however, to provoke a new and peculiar sensation in the woman, different from that of the beginning or middle of the operation, but sufficient to make her say sometimes to the doctor who has just told her he has finished: “Are you beginning again?”

(*E*) You will remove very delicately the intra-uterine sound, steadily and very slowly (13), then you take off the clay and clean the belly of the patient, which has been soiled.

(*F*) You then wash out the vagina again with the same antiseptic solution and you leave in there a tampon of iodoform gauze the use of which has a double object: first, to continue the antiseptic during the interval between the sittings, and secondly, to put

a certain amount of impediment in the way of coition, which is very important.

D—After The Operation.

The instructions which you should give to the patient who has just been treated are of the very greatest importance, for on their being well executed the whole success of the operation depends.

(A) If we desire that the treatment should bear its full fruits it is absolutely necessary that the patient should lie down at full length during a time varying from one to several hours.

If the operation has been performed in the doctor's office, the patient should only go home as late as possible after the colics which follow the cauterization shall have partly disappeared. She should avoid all fatigue and rapid movements and you must repeat to her that the forgetting of these instructions may expose her to a serious inflammation (such as perimetritis) with all its accompanying miseries.

(B) You should always warn the patient of the uterine colics which are generally in proportion to the intensity of the operation which she has undergone. Frequently the post-operative period is even more painful than the operation itself. The woman should not be subjected to any surprises; and therefore it is better to tell her beforehand what she may expect.

(C) You will tell her that a sanguineous discharge may appear in the course of the evening as a

result of what she has just gone through, a discharge which is not severe and which is generally stopped of its own accord, by rest, without any treatment.

(*D*) The following days she may also have a sero-purulent discharge which depends upon the same cause, and which only requires antiseptic vaginal injections every night and morning.

(*E*) You must formally forbid all sexual intercourse that night and the following one; it would be even good to suspend all conjugal relations during the whole course of the treatment in order to avoid pregnancy, which, if it came on prior to the operation might result in an almost fatal abortion.

(*F*) All the discomforts whatsoever, which may be felt, are generally tolerable and rest is, without exception, the best way of diminishing them; they disappear of themselves the same evening or perhaps the following day. In cases, however, where the pain is too great you may order the application of a large emollient poultice on the belly, which will diminish to a certain extent the pain following the application.

III.

GENERAL CONSIDERATIONS.

The operation having been thus placed within the scope of any gynecologist, it is necessary to follow with a few general considerations, which have also their importance:

A.—Justification of my Method and of Its Intra-uterine Field.

It might be asked *à priori*, as it has before been done *apropos* of fibroids, if it is really useful to penetrate into the uterine cavity in order to obtain the maximum therapeutic effect, and whether the intervention would not be quite as efficacious without attacking directly the uterine mucous membrane; the method would gain thereby in popularity and security, for it would be much easier and totally devoid of danger. Yes, certainly, that would be the ideal; to introduce one pole into the vagina, to fix it against the neck, for instance, close the circuit upon the belly or elsewhere, and make a very weak current, almost homœopathic in quantity, so to speak, pass through it, the curative effect of which to be quite as favorable. Some doctors have tried this medication in fibroids, guided either by a too prudent caution or insufficient experience. I have myself examined the results thus obtained, and I soon perceived that, the same as in

fibroids (14), intra-uterine electric intervention is obligatory for the following reasons, which may be resumed in these formulæ:

1st. To treat the intra-uterine mucous membrane which is always diseased.

2d. Obtain a good intra-uterine antiseptis.

3d. Establish an intra-uterine derivation issue which would aid rapidly in the absorption of exudations.

4th. To permit the utilization of the inherent properties of each pole by applying the positive pole in the hemorrhagic or ulcerated forms, and the negative pole in the others.

5th. Take advantage of the local (galvano-chemical) and general action (trophic) of the current.

6th. Permit the current to pass with certainty through the whole uterus.

I must now justify these propositions. The most judicious classification that has so far been made of metritis or inflammation of the uterus is the one which is based on the varying preponderance of the lesions of the parenchyma or the mucous membrane, whence the names on the one hand of internal, mucous or catarrhal metritis, or of endometritis, and on the other hand of parenchymatous or interstitial metritis.

(a) In the first case the lesions of the mucous membrane are crying ones; they justly absorb the attention of the clinician and fix the eye of the pathological anatomist. Nothing more natural, in this first

category, than to act directly upon this mucous membrane affected with different inflammatory processes. Nothing more absolutely necessary than to establish in the intra-uterine cavity a perfect antiseptis which will be curative and preventive at the same time. Nothing more legitimate than to destroy it more or less rapidly, creating at the same time in the midst of the uterine cavity an issue, so to speak, and a focus of salutary derivation. Indeed, on all sides, and with good reason, gynæcological intra-uterine therapeutics is becoming more and more established, being substituted almost entirely for the old external application on the uterine neck, which was handed down to us by the school of 1840, and the numerous successes obtained by it are a sufficient plea which requires no commentary.

It is to systematize it and to submit it to rules that I proposed the intra-uterine galvano-chemical cauterization, which has always given, in my hands, rapid and constant results, and which, in opposition to the surgical treatment at present in vogue, such as the curette or liquid injections, offers the following advantages; which I recommend to the attention of all observers:

1. An easy method which any gynæcologist can execute alone and without help.

2. A method which is mathematically doseable, which cauterizes much or little, according to the wish of the operator, and which is marvelously subject to a simple and precise graduation.

3. Progressive cauterization, which is never instantaneous and which may be administered in fractional doses which accumulate at the will of the physician.

4. An active cauterization which may, if we desire it, go beyond the limits of the mucous membrane and of which we can easily graduate the extent and the depth.

5. It unites to the galvano chemical action contemporary with the passage of the current, and similar, according to the active pole, to that of acids or of bases, an after trophic (15) action followed by a process of retrogression and certain disintegration, a proof of which is its similar action on fibroids.

6. A rapid method which offers every facility, according to the intensity of the cauterization, which is whatever we desire it to be, to act with variable quickness according to the case.

7. Absolute harmlessness of the medication, and made without any brutality and according to the anti-septic fashion, and with an absence of instantaneousness which is, on the contrary, characteristic of the surgical method now in vogue.

8. Possibility of localization in a case where we do not wish to effect more than a limited extent of the uterine mucous membrane.

9. A weapon with a double edge, which, according to the pole in action, is able to give different effects, which may be resumed in a local action which is either hemostatic or congestioning.

10. Cauterization which is antiseptic above all things on account of the energy of the chemical current (16) employed.

11. The operation is little or not at all painful, and it, as a rule, does not require chloroform. (17).

All these conditions are sufficient, it seems to me, to give an ample weight to my treatment in rendering legitimate its greater efficacy.

We have, moreover, every interest in localizing it entirely in the uterus in order to insure to the current its maximum effect, to have the physical certainty that the whole organ is treated, since it is wholly affected, a thing which certainly would not be the case if we limited ourselves to a simple application to the outside of the uterine neck.

In this manner nothing is lost, none of the electricity strays away in tempestuous deviations which might close the circuit (if the active pole were placed otherwise, and far from the uterine cavity), by side roads distant from the body of the uterus.

It is for this same intra-uterine object that we create in the uterus, in the very centre of the diseased organ, a focus of derivation (analogous to what is done by a blister or a cautery) which is not extinguished by the cessation of the current, but which survives it, on the contrary, during a more or less long time, transforming into a slow and continuous action the temporary shocks which the passage of the current has transmitted to the uterus.

(*B*) There remains the question of interstitial or chronic parenchymatous metritis, which is also suitable, in my opinion, for the same treatment.

Here, in fact, is what pathological anatomy teaches us. "We admit two (18) periods in the development of chronic parenchymatous metritis: the first period a period of infiltration, and the second phase a phase of infiltration. The first is characterized by the congestion and hypertrophy of the whole organ. The uterine tissue is soft, gorged with juices, red, and allows a considerable quantity of blood to flow when cut. The mucous membrane is thickened and sometimes wears the same appearance as in internal metritis; in fact, we have never seen the two forms, parenchymatous and mucous, absolutely isolated the one from each other."

The therapeutical indications of this first period, or period of congestion, will therefore remain identical with those of mucous metritis, properly speaking, with the exception of the modifications of the pole, or the intensity, on which we shall insist later on.

We now come to the second period in which the tissues (19) of new formation are retracted and transformed into cicatricial tissue; the vessels are destroyed and the young and succulent conjunctive tissue becomes hard and fibrous; the uterus thus becomes smaller, and when we make a section of the organ we find that the tissue is hard, almost cartilaginous, crackling under the knife, pale, indurated and anæmic. It

is in this condition that we can say with Carl Schröder (page 101) that chronic metritis always becomes a disease of long duration, which absolutely tries to the very last the patience of the patient and the physician; if it is not mortal by itself, it hastens at least a fatal issue by the disorders of nutrition, to which it gives rise. It may happen even that it becomes dangerous, and even fatal, by the hemorrhages which it causes, or by the extension of the inflammation to the peritoneum. Although it is rarely mortal, this disease none the less, poisons one's existence. It never goes away of itself, at least not before a very advanced age. It resists all methods of treatment. Scanzoni says that he has never cured it. And, in fact, the complete return of the organ to its primitive state is never seen.

If, by the side of this testimony of such competent authorities, which is reflected in every classical work, we examine now the tide of methods of treatment which have been advised, one by one, praised and then abandoned, we see that they add a new weight to the gravity of the prognosis. All, or nearly all, the methods which have been tried have been external ones; some times they have been local bleeding, sometimes irrigation with hot or cold water; sometimes massage has been advised, hydrotherapy; on the one hand general treatment reigns supreme, and on the other local derivation, from cauterization of the neck performed in a thousand different ways, to its amputation,

and in spite of all that the prognosis remains grave, the treatment uncertain, very often null, as both the patients and their medical adviser can bear witness.

Well, here again I can give a remedy which has rarely deceived my hopes. I always advise the same medication destined to hasten the nutritious changes, to precipitate the absorption of old exudations, in appealing to the supplementary circulation; the same treatment which just now triumphed over vascular congestion during the early periods of the disease, is destined now (thanks to a change of the pole, of which I shall speak later on) to set up vascular hyperæmia, to combat anæmia and to favor the formation of new vessels destined to perform a new irrigation of the blood.

All this proves, once for all, that we may in vain invoke in gynæcology the influence of the general condition or diathesis; it is possible that it requires another and additional treatment, but the *gist* of the cure will always be a local treatment, intra-uterine or interstitial, of a truly local lesion, which will not be cured or relieved except on this condition, and then all the more quickly and in a more perfect manner, when the treatment is energetic and thorough.

The intra-uterine therapeutics, once justified, I must now consider, in order to complete my plea, how to legitimize the whole extent of its application. In gynæcology, you may tell me, there have been more or less exact classifications, which separate metritis

into metritis of the neck, and metritis of the body of the uterus, which are characterized, both the one and the other, by special symptoms.

Why, you may add, should we cauterize in this case the whole mucous membrane without having regard to the possible localization of the inflammation which may remain for a long time encamped at the entrance to the uterus, or which may penetrate deeper and deeper? Theoretically, that may sometimes be true, and we may, in recent cases especially, conceive an invading march of the affection, whose first halting place is the neck. How greatly clinical experience differs generally from these cases, which the weakness of our minds conceives and applies everywhere! How greatly the disease, as we see it, differs from the books, showing us that irregular forms are most often the rule! "When the uterus is affected with metritis, De Sinety says with good reason (20), the most often the whole organ is diseased, the mucous membrane as well as the tissues which it covers, the body as well as the neck, often even the peritoneal covering. Nevertheless, there is no doubt that these lesions may in certain cases, without being limited, in the precise sense of the word, to the mucous membrane or to the parenchyma, to the cavity of the body or the neck, predominate at one of these points, and according to these predominancies, the clinical symptoms differ."

We can, therefore, in some rare cases, but very

rare, limit ourselves to treating the neck alone, when it alone is supposed to be diseased, without touching the body, and with this object in view we only introduce the sound as far as the level of the internal os. But how deceptive is this criterion, which should thus limit our intervention, which all the classical works establish according to the nature and consistency of the discharge between metritis of the neck and metritis of the body. Who can say that the internal os sets up an impassable barrier between these two cavities? Who can say that they have an autonomy of their own and distinct, and that their circulation and innervation, common to both, do not create bonds of physiological and pathological union? When in doubt, is it not better, as in a fire, to go beyond the limits of the evil, act upon the whole mucous membrane which is supposed (very often erroneously) to be healthy, in order to be more sure of the therapeutic result and to exercise a preventive action against the invasion of the inflammation, which, sooner, or later, will not hesitate to gain the cavity of the body, if it does not do so at once, as many good authorities think, and with whom I quite agree?

Thus my whole intra-uterine therapeutics is justified, for it is very often, if not always, demanded by the diffusion of the inflammation at the very beginning; it is destined also to exercise a very favorable preventive action in cases where its curative action would not be always anatomically justified.

To resume, owing to the perfect harmlessness of my operation, I leave to the timid and dogmatic the cauterization of the neck alone, in order to claim the double title of curative and preventive, only for that treatment which addresses itself to the whole uterus, and to the whole of its mucous membrane. In exceptional cases, when we are unable to introduce the sound completely without great difficulty, I recommend the cauterization of the neck alone, with this absolute reserve, that if it is not followed by a rapid success, the double intervention which is alone curative in most cases, will be absolutely necessary very soon, or as soon as possible.

B—Nature of the Operation.

My operation is destined to put in action the chemical and trophic effects of electricity raised to its greatest medical expression.

I make a chemical galvano cauterization or a chemical cautery as Tripier very properly calls it, and which is commonly but erroneously called electrolysis. (21) I pass a current of a sufficient dose to produce an energetic cauterization at the points of entrance and exit of the current from the system. I utilize the intra-uterine scar alone and I bring to bear all my care, as I said when speaking of the clay, to avoid the other eschar, by spreading the current over a large extent, by diminishing its density and consequently by reducing to a minimum, its local effects upon the skin.

We have thus in our hands a weapon, cutting differently with each of its edges, whose general action has a certain resemblance, but whose local action differs according to the pole which is employed.

On one hand, it is the positive pole, directly coagulating or hemostatic, on which the acids accumulate.

On the other hand, it is the negative pole, diffluent on the contrary where the bases precipitate, and which enjoys all the chemical properties of caustic potash for example:

1st. The positive pole will be the remedy indicated in all forms of ulceration and hemorrhage, and will derive its effects from a twofold action: the first, contemporary with the passage of the current, having a manifest hemostatic power in proportion to the intensity of the current. The second, more distinct and coming after the passage of the current, which, thanks to the retractibility of the positive cicatrices and to the greater or less atresia which follows it, assures a lasting future to the treatment, because it saves the woman from a return of the hemorrhages later on.

The positive pole has, therefore, an immediate action at the spot itself against an existing hemorrhage, which it may and should arrest with but slight delay; and here, for instance, is an experimental proof, which will render living and undeniable the influence which we can have, on the other hand, on the uterine mucous membrane:

Take a large fungous, ulcerated, and easily bleeding cervix; expose it at the end of the speculum, perform a local bleeding by means of a pin or knife. You can stop this hemorrhage in a very short time; you have only to use my bi-polar chemical galvano cautery (22) (which I have employed for several years for the cauterization of the ulcers of the cervix) which is composed of a conical ball made of carbon or platinum mounted on a handle, in which the two poles terminate, and which are separated the one from the other by an isolating layer of gutta-percha; the two poles with the same surface, separated thus by a distance of only a few millimetres, may accumulate their action within a limited radius and we can then study the value and the nature of their respective scars.

A cauterization practised under these conditions on a very hemorrhagic surface, with an intensity of 200 milliamperes and lasting, on an average, from two to three minutes, produces the following results:

The two scars differ the one from the other.

(A) The *positive* will be *white*, more or less like *mother-of-pearl*, and all the more bloodless if the application has been made for a longer time or at a higher dose.

(B) The negative scars will on the contrary be *violet*, soft and diffused, with rather a deep coloration, and the bleeding will be little or not at all arrested at this place.

But apart from this powerful action which is certain because it is physical, there is a more distant action, which is preventive and curative at the same time, which is the result of a loss of substance and subsequent cicatrix, which, anatomically speaking, resembles the cicatrices produced by a powerful acid, and thus exercises a final action on the calibre of the vessels, which will be opposed to further hemorrhages.

The positive pole is therefore, in my hands, the immediate and indirect treatment of congestive and hemorrhagic forms of metritis or endo-metritis, which it will arrest, as we have just seen to be the case with artificial hemorrhages of the cervix.

In saying *immediate* I should always mention some restrictions, it may happen in fact that this action may not always be so marked and rapid as in the experimental example which I have just cited; this may depend on several reasons; either on the current being too feeble, or not lasting long enough, or on account of the return of the hemorrhage as the result of walking, of fatigue, and especially of connection.

I operate in fact on patients who do not remain in bed, and who walk about shortly after having been operated upon.

I am moreover obliged to make a certain reserve in the treatment, having regard to the social position of outdoor patients at the clinic, for instance, who are obliged to work; I act in this case more slowly and with more circumspection; I take three to five

sittings on an average to obtain an effect, which one single operation at a high dose, and long continued, would have given me, if I did not have my hands tied by such considerations; my duty, in fact, is already laid down.

On the one hand, I must not make my patients suffer too much, and on the other, I must limit myself, while I am treating them, to not condemn them to bed, and to permit to the great majority of them to continue their daily life of working women, which they could not do if the reaction were too painful owing to the influence of too strong a dose.

I should add, moreover, in order to put you on your guard against certain clinical and premature answers, which might lead you into error, that the definite arrest of the hemorrhages by the positive pole may not only sometimes be somewhat delayed, but in some cases which are however rare, it resembles the negative pole, by seeming, at the commencement, to increase the hemorrhages; and these are the mechanical reasons.

(A) The passing of the sound, performed more or less well, may provoke the return of a former hemorrhage, by causing an intra-uterine traumatism at the moment of entering or removing the sound.

(B) The coming away of the first sloughs, while the cicatricial tissue has not become sufficiently resistant, also favors the return of the hemorrhage. You must take care not to be discouraged and especially

not to form a too hasty judgment as to the final effect; you should persevere all the same, and before long you will obtain the success which I have always observed.

If the cure is sometimes still further delayed, it depends on the intolerance of certain patients who, without meaning it, defeat our intervention: diathetic intolerance, if I might dare to so express myself, such as occurs with certain cases of hysteria, who only tolerate medium doses, which are insufficient to produce and obtain a rapid effect. Inflammatory intolerance, united with the fact that the uterine periphery is diseased, owing to perimetritis or any plegmonous inflammation, preventing in a more decided manner still, especially in acute forms, all energetic intervention.

I can assert that outside of all these particular cases, which are rare enough, and excluding all those women who have of their own accord stopped all treatment because they felt, for the time, better, of the other patients, where the number and the intensities of the operations were sufficient, the hemorrhages have always been arrested.

Supported by the same clinical indications, I employ the positive pole for the treatment of another disagreeable symptom, namely, rebellious leucorrhœa. But here I should say the disease answers less readily to the treatment than hemorrhage does; often at the beginning and sometimes during the course of the treatment, a sero-purulent discharge resulting from

the intra-uterine scarification, increases the preexisting leucorrhœa and transforms it, during a few days, into a regular hydrorrhœa. But this effect is altogether temporary and produced by the treatment itself, especially at the beginning; once it is suspended, everything returns to the normal condition, the cicatrix modifying advantageously the uterine mucous membrane, so much as to diminish, or sometimes even suppress the serous or catarrhal exudations of some patients.

2d. The negative pole will be more used in the non-hemorrhagic forms, and I therefore give to it, on account of its scar, the name of fluidifying pole; it is especially adapted for the treatment of chronic metritis in its second stage and of certain forms of endo-metritis. It will constitute a true intra-uterine blister, which will resemble this remedy by its stimulating and derivative action at the same time. It will bring on very often at the beginning of its application, in dysmenorrhœa and in certain forms of amenorrhœa, either a more or less abundant return of menstruation, easier and less painful, or the appearance of slight supplementary hemorrhages, not generally very intense, which will prove one of the most salutary forms of derivation; for if one woman suffers because she loses too much another suffers just as much because she loses too little.

To sum up, if I had to qualify each pole by its tangible and principal action, I would say: if the two

poles hasten the retrogression and the denutrition of uterine hypertrophies, united to endometritis, and congestive parenchymatous metritis, side by side, with this general action may be placed indications special to each of them.

The positive pole, acid, decongestioning, hæmostatic in the highest degree, is especially useful in the hemorrhagic, congestive or ulcerative forms; it combats and prevents the tendency to excessive vascularization and by the same process becomes an indirect treatment for rebellious leucorrhœa.

The negative pole, basic, diffluent, little or not at all hæmostatic, is, on the contrary, destined to excite the languid or perverted circulation and old, atrophic, or indurated forms of chronic metritis, by a strong appeal to the intrauterine circulation. This is the remedy par excellence for indurated chronic metritis, whether complicated with amenorrhœa or dysmenorrhœa, and it may be used, with equal success, in other inflammatory processes in which hæmorrhage does not predominate.

C.—Intensity of the Operation.

Persuaded that the action which the continuous current exercises on a given part is, in general, in proportion to the intensity given out and the rapidity with which it is given. Having, on the other hand, the avowed object of producing an intra-uterine scar, and varying in energy according to the gravity of the

disease to be combated, and the receptivity of the subject, I determined to raise the electric outflow to the maximum which it was possible to reach, medically speaking, and all my concentrated efforts in this direction have been devoted to rendering it tolerable. I am, moreover, convinced (and I intend before long to give you the proof) that the antiseptic action of the current of the battery increases with the intensity, and that this same current, the vehicle of the chemical and trophic action, should exercise, at a high dose, a curative or preventive antiseptis, according to the cases.

In the same manner for fibromas, my theoretical views concerning the influence of the electrical intensity utilized have been fully verified by clinical experience. I began at first with small doses which were, however, the maximum of the current medical practice then in vogue; I employed at first, five years ago, a current of 40 or 50 milliamperes, and I was not long in being convinced that generally the therapeutical effect increased with the height of the electric outflow. I have thus successively and progressively been able to reach 100, 150, 200, and even 250 milliamperes.

This high intensity, which at first sight seems colossal, and which the skin would certainly not have tolerated with the forms of metallic electrodes, covered with chamois skin soaked in water I have shown a new means of making tolerable to the epidermis with full success. There only remains now

the uterus (if my technical method is scrupulously observed) of which we have to take account, but generally and very fortunately, its tolerance surpasses our anticipations, and if the intervention remains aseptic and without traumatism, we can, without danger boldly apply to it very high intensities; this is the clinical response nearly always constant which I have observed (in 90 or 95 cases out of a hundred). There remain however some exceptions which are these: To resume whenever the uterine periphery is inflamed (whether it is perimetritis, parametritis, pelvi-peritonitis or salpingitis) a relative intolerance is manifested, which will increase on the one hand with the height of the current, and on the other with the acuteness of the circum-uterine inflammation. Moreover, in the (23) sub-acute stages we are forced to satisfy ourselves with small doses; we must be circumspect and even parsimonious, on penalty of missing the object in view and of seeing the pre-existing inflammation becoming greater. But once the acute stage is ameliorated, the tolerance of the patient will augment and increase in proportion.

Side by side with this counter-indication against high doses, there is another category of patients who must be treated with the same reserve; these are certain cases of hysteria, where tolerance or rather intolerance, varies greatly, without our knowing as yet, exactly why. Certain women, in fact, most often manifestly hysterical, bear an intense current badly,

from the very start;—in some this intolerance is transitory and disappears with subsequent sittings;—in others it is constant and is not even diminished by a long course of treatment, as I have sometimes observed.

Any practitioner who forgets the recommendation which I here make, to respect this *modus vivendi* and not to offend it, would run the risk of compromising the operation, which might become dangerous on account of the unconscious sudden movements made by the patient. He might even bring on an hysterical crisis, the consequences of which in the case in point it is needless to emphasize, when we know that there is a sound in the uterus. I expressly recommend therefore, that care, gentleness and slowness be redoubled, especially at the first application of electricity.

But what rule should the practitioner follow, in view of the variations coming from these few exceptions which I have just mentioned?

The evidence of the patient will be our safest and most reliable guide; every operation must be tolerable for the uterus, and no severe pain must be felt in the womb; if it is otherwise you must lower and lower still more the intensity, until tolerance is attained, and then you can raise it again; you must have sufficient clinical perception to distinguish between genuine uterine pain and the mere fears of a too timid woman. I purposely employ the word uterine pain,

in order to differentiate it well—as indeed most of the patients generally do—from that which may be felt at the other pole on the skin, oftenest at the epigastrium, which should remain indifferent as far as possible,—or from intestinal colic.

To make all things agree, and not to embarrass the physician in the labyrinth of diverse indications, which may seem contradictory, this is the manner in which I proceed: If I am operating on a woman for the first time, I test her susceptibility at first slowly and carefully, especially if I have to do with an avowed hysterical case, or a patient affected with periuterine phlegmasia; I warn her beforehand, that no matter what happens, she must communicate all her impressions, that she should on no account endure a too painful current, and that I will stop instantly if she wishes it; that done, I go on to the first halting place, somewhere about 50 milliamperes—either it is well borne or it provokes pain; if it provokes pain, I wait a moment to see if it is calmed spontaneously, and to make myself quite certain that it is not the cutaneous pole which is the cause. If in spite of this waiting, a keen sensibility persists, if the woman complains of suffering from the sound, a sensation which she often locates at the root of the greater lips, we should diminish lower and lower, until absolute tolerance is reached. If, on the contrary, tolerance is manifested from the very beginning, the dose will have no other limit, as I have already said, than the

attainment of the object in view, which varies according to the case and the disease.

The physician thus warned that he must keep a scrupulous account of all too severe, nervous or painful reaction, will not be long in regulating with judgement his operative procedure; his boldness will increase with the number of sittings, feeling certain on the one hand of the harmlessness of the proceeding, and having the assurance on the other that the soil is suitable for high intensities.

Besides this question as to the proper quantity to administer, there is another, that of necessity; for although it is important not to act roughly, it is quite as necessary sometimes to cure quickly; and as the therapeutic effect is in proportion to the intensity given out, you must proportion, as I have said, this latter to the object to be obtained, to the gravity of the disease, and to its long duration. Hemorrhage is the most frequent symptom which generally calls for the most active and rapid intervention, and we must not forget that we must cauterize, for everything depends on this most important effect.

If it is easy to obtain this cauterization on a shallow uterus, where the active pole is necessarily limited, and consequently where the electrical intensity flowing out onto a small surface, has a pretty strong intensity, on the other hand in a large uterus, with a very deep cavity, we are obliged to multiply the intensity in proportion, in order to obtain the

same effect; for here the electrical density diminishes with the length of the sound engaged. If, indeed, the total quantity of electric fluid, which flows from the surface of a pole is independent of the size of the pole, we must not forget, however, that the more this pole is limited, the greater will be the activity, the more dense will be the current crowded or concentrated on a small surface; the larger it is, on the contrary, the less will be the cauterization, on account of the lessened density of the current, rarefied so to speak or spread out over a larger surface. To make up for this deficiency, we should give an intensity of current, other things being equal, proportionate to the length of the uterus.

D.—Duration of the Operation.

The fourth factor which enters into the application of this treatment is the duration of each operation. Here, as for the intensity, the reply will not always be the same; there is a minimum and a maximum. An application of from one to two minutes with a medium dose will often be insufficient, and in order that it might be effective, a very high dose would be required, which would be either dangerous or intolerable; on the other hand a maximum of 15 to 20 minutes might be followed by accidents coming from a too deep scar, and would be sometimes, moreover, little or not at all borne by the patients.

After a great many attempts I came to establish

an average varying from 5 to 10 minutes, according to the gravity of the disease and the tolerance of the patient.

In general, as I most often have to treat women who return to their homes one or two hours after having been treated, I have adopted an average of five minutes, which is suitable for the greatest number of patients; I must, however, reserve an important point, it is that the practitioner may know that he can pass that limit when the clinical indications require it (a serious hemorrhage, for instance, or a rebellious fungous endometritis), and that on the other hand, in certain very irritable uteri, by themselves or on account of peripheral inflammation, we should know that we must arrest and suspend the operation prematurely, especially if it is the first one, on the slightest manifestation of serious intolerance on the part of the patient.

But here is an objection which naturally presents itself to our minds which demands an answer; since the total action is the result of the intensity and duration of the current, and is equal to their product, could we not, in order to render the operation still more harmless, if possible, and at any rate extinguish all operative sensibility, could we not, I say, diminish the dose, lower the intensity to 30 or 40 milliampères, for instance, and increase in proportion the duration of the application, in order to render always the same sum of the electric outflow, and consequently to

equalize the therapeutical effects? Yes, doubtless, physically speaking, a current of 30 milliampères during 20 minutes is equal to a current of 200 milliampères during a period of 3 minutes, but the physiological and therapeutical action of these two amounts cannot be compared on account of the varying energy of each current. In the same way a body heated to 50 degrees centigrade and applied to the skin for 20 seconds, will never produce the same effect as a body heated to 200 degrees, and applied to the skin during five seconds. In the same way a rebellious intermittent or pernicious fever, which is cut short by a strong dose of sulphate of quinine, 15 grains for instance (1 gramme) taken in 24 hours, would not be affected so advantageously by (20 centigrammes) 3 grains taken daily during five days. This amounts to saying that in considering any physical or physiological action, we must take into consideration not only the force called into play, but also the speed and energy of its application.

E.—Number of Operations.

Just as much as the indications are clear and precise when it is a question of regulating the electrical dosage (intensity and duration) which is required for each case, and which is measured, I repeat, by the tolerance of the patient and the gravity of the disease, just so much is it difficult to give an exact rule for our guidance when we come to the question

of the number of the sittings. I shall endeavor at any rate to clear up equivocations by giving the average of my practice.

Since the circle in which these affections move is immense, changing with each patient, with the age, and with the duration of the disease—since we find ourselves, so to speak, in the presence of a regular pathological Proteus, which assumes many different forms, with a movable scale of acuteness, of localization, etc., we shall have to exercise our clinical perception in order to divine what is needed and all that is needed for each individual uterus. It is here that the therapeutic force which I recommend becomes wonderful by reason of the facility with which it submits to all our wishes and all our needs. We possess in the application of it a whole gamut of intensity, and two poles with a different action, which permit us to vary our powers of producing results, to dose them, and to proportion them to the object to be attained, to do nothing roughly with one woman, and to act quickly and energetically with another. Here the superiority of electricity is especially manifested, for (thanks to our modern instruments of precision) it passes, so to speak, over the pan of the scales before being localized in the uterus. Now, we can dispose of this controllable force at our pleasure, as often as circumstances require, and here again is one of its most precious attributes. We can repeat its application as long as may be necessary.

In one case, fresh and easily curable, from three to five sittings will be sufficient;

In another, older and more rebellious, ten to fifteen will be necessary;

A third, exceptionally, may require twenty to thirty applications.

It is the old, chronic, indurated form of metritis with slow and perverted circulation which especially demands a long and laborious treatment. A chronic disease requires a chronic treatment, and we will be only too happy to see, in a disease reputed incurable, our efforts often (I do not say always) crowned with success.

What criterion as to the number of sittings should guide our practice? We must on the one hand know how to interpret the clinical responses which the patient offers us, and on the other, extract from the local examination information sufficient to enlighten us.

The treatment should not stop until on the one hand all hemorrhage pain and other disorders have ceased, and the patient declares herself symptomatically cured; menstruation will have regained its regular and easy rhythm; walking will be easy; all the functions will be well performed. On the other hand we must obtain the anatomical confirmation of this clinical condition of which the patient is the best judge; we must by touch, aided by the other means of exploration, establish the disappearance, or at least the

diminution of all previous disorders; for if the disease is symptomatically curable, we must sometimes declare ourselves satisfied with only a partial anatomical retrogression; I do not wish to conceal from myself the fact that great difficulties may come in the way of establishing the nature of the improvement or cure; there is one means of verifying it, however, excellent in such cases, and which is often, I do not say always, without appeal, and it is this: “If any displacing of the uterus, if any light pressure on the uterine walls does not awaken any appreciable sensibility, there is every chance that the organ is well and that the woman is cured.”

The testimony of the woman, it must be admitted, will have considerable weight with us, for how many uteri do we not see, of which the women complain but slightly, and yet which seem to us very diseased—and on the other hand how many times an anatomical lesion, trivial in appearance, brings in its train the most acute and gravest symptoms.

The patient, moreover, will have everything to gain in not allowing the treatment to be suspended before she and her doctor have had reason to be satisfied with the result; it will be advantageous therefore to complete the cure by several supplementary sittings, destined to bring it to a close and to give it a condition of stability.

F.—Time for the Operation.

It is now time to ask what will be the favorable moment for the operation, and how near should the sittings approach each other. It is difficult to reply categorically to this question; it depends entirely on the patient and the disease; one case of metritis with torpid reaction, without great pain, without hemorrhage, will not require us to make haste, we can choose our own time, by preference half-way between the menstrual epochs; another one, the opposite in form, rapidly progressing, even sometimes causing danger, will require prompt and speedy action, and must be treated, even in the midst of the hemorrhage, with a view to arresting it.

What interval should we interpose between each sitting? After having tried everything in turn, both very short and very long intervals, I may thus formulate the rule which guides me in practice; two factors should be taken into consideration: the social position of the woman and the degree to which she is affected.

If the woman can rest after each operation and keep her bed, if necessary, that evening, the subsequent reaction is less acute, less painful and the treatment is more efficacious the oftener it is renewed, two or three times a week on an average.

If the woman, on the contrary, belongs to the working class, as do those at my clinic, and if in con-

sequence, complete rest is impossible for her, the repetition of the sittings at short intervals is more difficult and painful, for the reaction from the preceding one may often not have subsided by the second day after; we cannot therefore, as a rule, treat them oftener than *once or twice a week*.

On the other hand, the most important consideration depends upon the state of the disease; it should be our principal guide: sometimes we have to deal with a serious case, such as hemorrhage, which requires for its arrest an immediate and repeated intervention, every day if necessary, until the result is produced.

Sometimes, on the contrary, it is best to allow the uterus to be restored gradually and surely by a gentle, progressive, and not too frequent stimulation: such is the case when the uterine periphery is affected and we have reason to fear that the former inflammation would be lighted up, if the treatment were too energetic or hurried; in that case we would act surely, prudently and effectively, to make an application every week or ten days.

Sometimes the endometritis or metritis is simple, with complete uterine tolerance, as it is in the majority of cases, which then require treatment two or three times a week.

As a corollary to these general indications, I may add: given, a uterine disease which at the beginning required a daily or tri-weekly treatment, will

it be necessary to continue them so often until they are cured? I do not think so; the sittings, close together at the beginning, should as the case improves, be progressively spaced out, until at the end they will take place only every week or two.

G.—Reply to Objections.

In creating this new and bold treatment, I must not conceal from myself that it will naturally give rise to many more or less specious objections, which I shall answer in advance in order to clear the ground, reassure the timid, and encourage those who would like to try it.

In order to give more clearness to my argument, I shall formulate in the shape of propositions, each of the principal objections which I can foresee, and follow it with the reply it requires.

1. *The operation is difficult of execution.*—My treatment being only a kind of therapeutical passing of the sound, since it only consists in passing the sound, and leaving it there for a certain time, in order to serve as a vehicle for the current, the objector addresses itself entirely to this operative manœuvre. Now, without wishing to deny the difficulties inherent to certain cases, I can say, that as a rule, and with a little practice, hystero-metry is easy enough, and that moreover, it forms a necessary prelude to all gynæcological practice, the diagnosis in fact, being based on

preliminary touch, followed most often by passing the sound.

As to the technical details of the electricity itself, I think that the minute explanations into which I have entered, will render this operation accessible to all, and will clear up any difficulties belonging to the electrical apparatus or the method of operating.

2. *The operation is ultimately a cause of sterility.*
—This objection, even if it were true, would, in my opinion, only have a relative importance which is hardly worth mentioning; for, indeed, admitting that the disease which I propose to combat itself often causes sterility, admitting also that we have to deal with an affection which often literally poisons the life of the patient, and seeing the frequent failure of all ordinary treatment, my method would even then be justifiable. Happily, these fears of sterility are in every way exaggerated, for two reasons: I have actual proof that it does not necessarily follow, since I have now numerous examples of pregnancy having occurred after a series of intra-uterine galvano-chemical cauterizations. I have, besides, the testimony of all the gynæcologists who perform curetting, and who affirm that it is compatible with the subsequent pregnancy. Now, what do I do but a molecular galvano-chemical curetting, less brutal and more progressive than surgical scraping, and which leads as it does to the exfoliation and regeneration of the mucous membrane.

3. *The operation may provoke uterine atresia, followed by dysmenorrhœa.*—It is possible; it is even common enough to see a more or less complete atresia, and extending more or less along the utero-cervical canal, coming on after numerous applications; at the beginning I myself shared with A. Tripier, the apprehensions which he formulated on this subject, in his "Clinical Lessons on Diseases of Women," page 222; but the observations of a large number of patients soon convinced me that dysmenorrhœa was far from being caused by artresia of the canal, and that it was most often a nervous phenomenon, reflex and ovarian in origin. I intend soon to demonstrate the clinical truth of this fact by numerous examples, which will be all the more confirmatory because I have set up in a great number of my patients, operated for metritis or fibroids, artificial artresias, which have in no case been followed by any painful disorder of menstruation whatever.

4. *The operation is dangerous.*—This objection, the principle one of all, is the reflexion of our contemporary, and especially French gynæcological customs; all our treatment in fact has been up to the present, in Paris, to a great extent external and directed against the neck of the uterus. It was in France, at any rate, that curetting the uterus was first practiced; it was a Frenchman (Recamier) who was the first to formulate it scientifically, and it is in our country, full of new and original ideas, which timidity,

to say nothing else, soon so often strangles, that it is actually practised the least. Now, if my operation were dangerous, so *à priori* would curetting be, which is more brutal and more instantaneous. Well! here is what is said about it by one who, among many other gynæcologists, is recognized as an authority by all (Carl Schroeder, page 131 of his treatise): “Executed with minute antiseptic precautions, this operative procedure is without danger. I have performed curetting and irrigation thousands of times in cases of chronic endometritis.” One of my patients died from infection before the introduction of antiseptic precautions. I have observed sometimes exacerbations of existing perimetritis, but I have never, so to speak, seen this operative proceeding give rise to new manifestations. Besides, you must remember that curetting is a surgical operation generally badly borne, and which, adds Schroeder, “produces such severe pain that we would do well to administer chloroform to women who do not possess a specially strong will.”

In presence of such testimony (which agrees moreover with that of all foreign gynecologists) in favor of a process more painful than mine, for I have never been obliged to anæsthetise a single one of my patients with metritis, what value may now be placed upon objections concerning the dangers of my method? None or scarcely any—what weight indeed could a purely theoretical objection, in the presence

of four thousand intra-uterine galvano cauteries, spread over more than two hundred and fifty patients, which I have performed during the last five years, both for the cure of metritis and fibroids, and that with perfect harmlessness—if there have been accidents (24), which at any rate I hastened to publish, I alone have been to blame and not my method; they depend upon unavoidable inexperience at the beginning, which placed me under the necessity of discovering everything for myself in cutting out a new road. Here is a summary of the balance sheet of the rare dangers connected with intra-uterine galvano cauterization, which are identical with those of catheterism itself, *à propos* of which De Sinety (page 32 *loc. cit.*) expresses himself in these terms: “Many authors reproach uterine catheterism with numerous accidents which we think should rather be blamed on the operator than on the instrument; this method of examination in our hands, has never led to any evil results, and in many cases, it has furnished us with very useful information.”

Here are the accidents to be feared formulated very briefly:

A.—Unrecognized pregnancy and abortion.

This should in no wise incriminate the methods, but the physician, for if there is a fault anywhere, it is most often he who is to blame—it only proves that we should double our circumspection, and that we cannot take too many precautions, the principal of which are the following:

Forbid all conjugal relations during the whole course of the treatment.

Begin the first operation as soon as possible after a menstrual period.

Make careful and detailed examination before commencing.

B.—Rekindling an existing perimetritis.

This may happen and depend on several causes, (25) in which the patient, the operator and the method have each their share of responsibility.

On the part of the method, the too strong or too frequent employment of the galvano-cautery.

On the part of the operator, want of sufficient antiseptic precautions—roughness in introducing or holding the sound.

On the part of the patient, walking too soon after an operation, excessive fatigue, repeated coitus with too deep insertion of the penis.

C.—Acute attacks of peritonitis.

In hysterical women with a pre-existing ovarian pain it may happen that an operation, even where small doses are employed, will provoke an attack of acute pains in the belly which might seem to any one who has not had a large experience, like an attack of real peritonitis; happily it is as a rule nothing of the kind; the more sudden and violent the storm, the more readily does it disappear either spontaneously or under the influence of small means and it is here especially that the method triumphs which I have

recommended (26) of uterine or if necessary [vaginal faradization, with the current of tension, in small doses, continued for a long time until all acute pain has subsided.

IV.

CONCLUSIONS.

Having come to the end of this study, I am well aware of all that there is wanting in it to make it complete and decisive; first of all it would need the consecration to it of more years of experience; five years, you will tell me, are but a short time for judging this question of uterine inflammation which has been the subject of so much discussion;—yes, no doubt, but what I have seen over and over again has been so clear and satisfactory to me, that I look forward to its future with perfect confidence.

What remains for me to complete, is the following, and it will be, I hope, the subject of another memoir.

I shall give the complete statistics of my treatment.

I shall prepare a detailed history of my principal patients; I shall publish especially the final, lasting and permanent results, which survive the treatment.

I shall sketch, within the limits of the possible, the *modus faciendi* of the electric current, in establishing the respective parts played by its caustic and trophic action, the one contemporary and the other after the passage of the current.

I shall formulate the electrical therapeutics of the frequent complications of metritis and especially of

the head and stomach troubles (27) which are so commonly dependent upon it.

I will treat of some rather rare cases, (localized hypertrophy of the neck) which may require negative chemical galvano punctures, as I announced it in a recent communication on vaginal chemical galvano punctures in gynecology (28) and as I had foretold it in a preceding note on the electrical treatment of peri-uterine hemocele. (29)

I shall go more fully into the question of indications and counter indications, and I trust that this supplementary study will throw a new light on this serious and difficult question of intra-uterine electrical treatment.

In the presence of a metritis of an anatomical form only slightly characteristic, when we are in doubt, and when there is reason to ask ourselves the question whether the case is suitable for faradisation or chemical galvano-cauterization, this is the practical and clinical means of deciding the question: we should first try faradisation; if it is well borne, from the beginning, on an average after the third or fourth application, we should have obtained—either marked relief, which would induce us to continue the same treatment—or a failure, in which case intra-uterine galvano cauterization would be required. On the other hand an improvement, even very marked at the outset, may wear itself out very soon, as it frequently does, and there again faradisation must be replaced by galvano-cauterizations.

At present, to resume and to conclude, it suffices for me to say that I have systematised the electrical treatment of metritis and endo-metritis in the following propositions:

1. In establishing the therapeutical limits of the induced or faradic current applied according to my double or bi-polar method (30); it is an excellent and sometimes sovereign remedy in certain cases (recent subinvolution—chronic metritis in the first stage) inefficacious, or at least very insufficient in others (such as chronic metritis in its later stages) and endo-metritis in any form.

2. In founding intra-uterine galvano-chemical treatment on a logical and clinical basis.

3. In giving the proof of this preponderating influence of high intensities, antiseptic and curative at the same time, and in providing a new method of operating which renders them bearable.

4. In fixing in the case in point the varying indications for the positive and negative scar.

5. In endowing intra-uterine therapeutics with one more arm, which is precise, mathematical, dosable and localisable, which may be administered in the smallest doses and which may be increased without danger and at the wish of the operator.

6. By applying to the uterus a sort of molecular, galvano-chemical curetting which does not condemn the woman to any forced rest in bed, and does not require any other treatment.

7. By assuring to my method advantages over other surgical proceedings (such as curetting—use of the applicator—pasty or liquid injection—cauterizations with the potential or actual cautery) which are often more difficult of execution and always less efficacious.

8. By creating, in a word, a new chapter of gynecological therapeutics, destined to combat victoriously, one or many diseases, among the most difficult of all, and even until now, often considered incurable, and by associating thus the therapeutics of metritis and endo-metritis with that which I have already laid down for fibroids. (31)

APPENDIX.

(1) On a new application of electricity after confinements. Communication made to the Academy of Medicine of Paris, the 19th April, 1881, by Dr. George Apostoli. In *Annals of Gynecology*, May, 1881, and paper read before the International Medical Congress at London, August, 1881. In reports of the Congress, Section of Obstetrics, page 356.

I have given the following formula to my treatment, after A. Tripier: Being given a woman who has just been delivered at term or sooner, I apply at once, and on the spot, to the uterus, during about three to five minutes each time, a faradic or induced current, engendered by the bobbin with short, thick wire, and progressively increasing in intensity. I repeat this operation eight or ten times during the next six days on an average, after a normal confinement at term; fifteen to twenty times on an average during ten to fifteen days, after a miscarriage or tedious labor. My object is to help and to hasten uterine involution, to shorten convalescence, and to prevent the complications which result from its stoppage or slowness.

The following are the principal conclusions at the close of my paper, which I reproduce here briefly:

1. The faradization of the uterus, although sometimes more or less painful, is always perfectly harmless, and is never followed by any inflammatory reaction.

2. Faradization is generally followed by a manifest sedation after the sitting.

3. Faradization shortens considerably the period of convalescence, by hastening involution of the uterus, which, after the eighth or tenth day, as a rule, can no longer be felt by deep palpation above the pubis.

4. Faradization hastens the return and regular exercise of all functions.

5. Faradization preserves the woman, as a rule, from all uterine complications resulting from the confinement.

6. Faradization constitutes an excellent preventive treatment for uterine displacements, such as retroversion and retroflexion, coming on after confinements, and often due to the dorsal decubitus.

7. Faradization seems to diminish the total duration of the lochial discharge.

8. Being given the same dose of faradization, the contractility of the uterus is variable, and in inverse proportion to its inertia.

9. The action of faradization, as compared with that of ergot, is manifestly more prompt and energetic.

To resume, I have come to the conclusion that faradization, well applied to the uterus after confinement, is a marvellous method on account of its simple application, its easy dosage, and its rapid and energetic action, which we can interrupt and renew at will.

I have employed this uniform process with an object which has always been fulfilled, and which is directly and indirectly useful; directly for hastening involution, shortening convalescence, and restoring the woman as quickly as possible, which would have an important bearing among the working classes; indirectly to prevent all uterine complications, thus raising the method to the level of a prophylaxis against metritis or further engorgement, and being, moreover, theoretically convinced that it may be able to prevent one of the most common causes of sterility.

N. B.—I have now only a word to add to what I wrote in 1881, and which I strictly adhere to:

Do I mean to say that all women require the treatment I recommend? Certainly not; neither is every woman who is confined, or has a miscarriage, condemned to have some trouble of the womb; but their number is unfortunately so large, and it is so difficult to foretell what is in store for any woman's

womb, that in acting as I have advised, we employ a curative treatment sometimes, and a preventive one often.

I must add a very important recommendation, to take at the same time every antiseptic precaution (irrigation with Van Swieten's solution, and excessive care in the cleaning of the intra-uterine exciter). It should be washed in boiling water, dipped in a strong solution of carbolic acid, and greased before its introduction (which should always be preceded by a vaginal injection), with carbolized vaseline 1.50.

(2) "On the Electrical Treatment of Fibroids of the Uterus, by the Method of Dr. Apostoli," by Dr. Lucien Carlet, Paris. Octave Doin, publisher. 1884.

I have filed a memoir on this subject at the Academy of Medicine at Paris, the 29th of July, 1884, and I read two papers, one at the Academy of Sciences, session of the 28th of July, 1884, and the other at the International Medical Congress at Copenhagen, August, 1884. (See report of the Section on Obstetrics and Gynæcology, page 19.)

The following are the exact conclusions of the latter:

To the former methods of treating fibroids of the uterus by electricity characterized: 1st, by the employment of very feeble intensities, wanting in dosage and administered in a variable and empirical manner; 2d, by the position of the active pole, which was often vaginal, always outside of the uterine cavity—I opposed a method always more active because it reaches heights of intensity hitherto unknown in medicine, and 2d, always intra-uterine.

This method has for its characteristics the following propositions:

1st. It consists essentially in the application to the uterus of the continuous and constant battery current without any interruption during the sitting.

2d. The seat of application, by means of an inattackable platinum sound, is always intra-uterine and should touch

the whole extent of the mucous membrane of the utero-cervical canal.

3d. If the passing of the sound by the natural channel is impossible, we should perform a preliminary puncture, followed by a negative galvano cauterization, in order to create an artificial channel.

4th. The active intra-uterine pole should always be positive in all hemorrhagic fibroids, or in those which are accompanied by persistent leucorrhœa—it should be negative in all other cases, and especially when there is severe dysmenorrhœa or a perimetritis which has reached the chronic stage and all acute symptoms have subsided; this latter pole seems to hasten uterine retrogression more rapidly than the former. It brings on often, at the beginning of its application, salutary hemorrhages which can be afterwards arrested by the positive pole, if they are prolonged too much.

5th. The intensity should be as strong as possible, and should after one or two seances reach an average of 100 milliamperes, especially when the uterus is very deep, the therapeutical action will generally be in proportion to the intensity expended.

6th. On an average, five or six minutes is sufficient to assure to a cauterization its whole intensity and efficacy.

7th. The number of sittings, variable as the disease itself, should be on an average twenty or thirty, to assure the uterus a sufficient retrogression and to restore the patient completely to health.

8th. The treatment should comprise one or two operations a week, made in the midst of the hemorrhage if there is any urgency.

9th. To render the cutaneous pole indifferent and to suppress at that part both the pain and the scar, we must employ an electrode of potter's clay, which I proposed for the first time in 1882, with the object of increasing at will the surface of application and to diminish the resistance of the skin.

10th. The whole operative procedure may be summed up in a good hysterometry, the operation itself being nothing more than a therapeutical passing of the sound where all traumatic action (except in the case of puncture) should disappear in order to give place to the highest degree of electro-chemical action.

11th. Intrauterine galvano-cauterizations rapidly bring about the retrogression of fibroids, especially when they are interstitial, but never their complete disappearance; they cure the woman symptomatically, suppress the hemorrhages and assure to the patient a rapid and durable well-being.

I have systematized the therapeutics of fibroids thus:

(a) By localizing a scar in the uterus by the natural or by an artificial passage.

(b) By giving the precise and different indications for the positive and negative scar.

(c) By dosing, simplifying and rendering tolerable the operative procedure.

If, in a word, I wished to synthetize my thoughts, I would say that the future of gynecology will be found in intra-uterine therapeutics wisely administered.

I have collected up till now (1884) numerous and precise documents (more than a hundred observations) concerning the retrogression of fibroids, and especially the restoration of health of the patients affected. I hope (thanks to the proofs I already possess) to be able soon to extend the problem to chronic metritis by an analogous treatment, as well as to sub-acute peripheral inflammation of the uterus. (In fact at the same session of the Congress at Copenhagen, I made a communication on a New Treatment of Perimetritis by Electricity. See reports page 141.)

(3) In the discussion which followed this thesis, a single but not very serious argument was invoked against it; it was that it contained several observations which belonged rather to

chronic metritis than to fibroids. Since the treatment of these two diseases is now in my opinion analogous, I am quite proud of this involuntary clinical confession, which at any rate I did not commit, but if I had would have led me to the same therapeutical result.

(4) The International Congress of Electricians which met at Paris in 1881, fixed definitely the value of the electrical unities.

(5) He was the first in France to construct galvano-meters of intensity.

(6) In all the questions of natural philosophy raised in this book, I have purposely refrained from invoking the mathematical formulæ, which might not have been understood by many medical men; I refer the reader for that to the reading of special works, and notably to the one which I am preparing and which will appear soon.

(7) The above (Fig. 1) is the instrument which I have had made by Collin for this purpose.

A. Ordinary hystrometer capable of being inserted at will into a hollow handle.

F. Notch marking the normal depth of the uterus.

C. Celluloid sheath for isolating the vagina.

E. Electrode.

D. Screw for tightening and fixing the sound at the desired length.

(8) On the new use of clay in electrical therapeutics. Paper read before the Academy of Paris 10th Oct., 1882, by Dr. George Apostoli. See *Bulletin General de Therapeutique* of the 30th Dec., 1883.

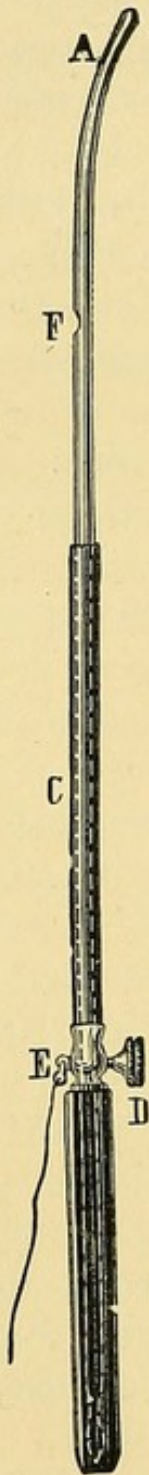


FIG. 1.

In proposing clay for the first time as a medical electrode I formulated the following propositions the justification for which I have given in my memoir:

1. It facilitates and permits of rendering more efficacious and more complete certain applications of chemical galvano cauterizations, which I recommend for the treatment of ill natured and refractory ulcers and wounds. In virtue of its qualities of softness and plasticity, it can mould itself, in fact, on an uneven surface (which we have previously surrounded with some adherent bad conducting body such as a layer of elastic collodion, in order to protect the healthy periphery), and it assures the complete penetration of the current as well as an equable and more complete cauterization.

2. It assures a greater constancy of the current by diminishing the causes of variation in the external resistance in the circuit, on account of its exact and uniform application to the skin, which it moistens more completely, and by the slowness with which it dries.

3. It facilitates applications of long duration, on account of the property it possesses of never completely losing its conductivity, even when dry, and by the faculty it possesses of remaining indefinitely moist and a good conductor if we cover it with a damp cloth covered with a piece of impervious linen.

4. It is destined to render the practice of electro-therapy universal by completing and improving the tools for the electrodes; it is a substance which is easily softened, can be found anywhere, does not wear out, takes any shape and size, and moulds itself to any surface on which it is applied.

5. It serves to limit and localize as much as possible the principal action of the current, by reducing to the minimum, under certain conditions, the injurious effects of its diffusion and displacement; we can in fact, by its help, close the circuit more easily and more surely on itself by surrounding the ac-

tive pole with a circular concentric disc of clay, which the other pole will touch. This is the method which I advise in the electrical treatment of aortic aneurisms, hydatid cysts of the liver for instance, and in strong galvanizations of the head (cauterization of sebaceous cysts, ect.); in every case where we have an object in rendering an operation more energetic, more sure and more tolerable.

6. It diminishes the pain of the applications of chemical galvano-cauterization at the inactive or indifferent pole, and removes all danger of burning at that point; it is its plasticity, in fact, which permits it to impregnate better and more deeply the epidermis, which justifies especially this master proposition; it is this quality of adhesiveness which reduces to the minimum, by the diminution of resistance, the caloric, chemical and caustic effects of an intense current at the level of the skin, which assures to this electrode a legitimate supremacy over all others, however moist they may be.

7. Its use permits of one increasing without any difficulty the doses, mistakenly called maximum, employed up till now. If, thanks to it, perfect tolerance has been acquired and all danger of burning has been removed, that which before my time would have been foolhardy and even impossible, has now become not only natural but even obligatory, for the employment of high intensities is destined to play an important part in electro-therapeutics of the future.

(9) I give the physical reason for this fact in my memoir. See *Bulletin General de Therapeutique*, 30th Dec., 1883.

(10) We can easily understand the reasons why tarletan, which dries quickly and is of itself a bad conductor, should always be saturated with very moist clay; it is to avoid the addition of unnecessary resistance, the disadvantages of which I have made sufficiently clear.

(11) Instead of having an interruption in the battery, which will be shown by the immobility of the needle, we may

have merely a weakness of its derivation, which shows that the corresponding couple or couples, are weak and are on the point of being worn out; they work badly and give out only a weak current; we must in that case, correct this defect at once if we can, by replacing the bad elements with new ones; if we are in a hurry, we may content ourselves for the moment, without repairing it, by using only the strong portions of the battery either in front of or behind the weak cell.

(12) I describe here the operative procedure in which no assistance is required and in which the physician, with the cooperation of the patient herself, can do all.

(13) If the battery we use is a portable bisulphate of mercury one, Chardin's model, we must not forget at the end of the operation to unload the apparatus; that is to say, to separate the active liquid from the zinc and carbon (in order to prevent it from wasting its strength), a manœuvre which is executed by turning a screw, thus permitting a rod which supports the tray bearing the cells to sink down and consequently to cut short all chemical action.

(14) The application of the current to the inside of the uterus, which acts upon the mucous membrane is not, however, obligatory in the treatment of fibroids, and it is sometimes advantageous to substitute for it, galvano puncture, which localizes the caustic and denutritive action in the parenchyma itself, as I have shown in a recent communication made to the Medical Society of Paris, session of November 13, 1886. Note read on vaginal, negative, chemical, galvano-puncture in certain uterine fibroids.

(15) It is the trophic action, which is dimly perceived, but not yet defined by all electro-therapeuticians, which constitutes the special indispensibility of this medication, and which will assure to it a supremacy which will go on increasing proportionately as the current is employed, as I was the first to advise it, in very high doses. The cauterization, properly speaking, is

in fact absolutely similar to that produced by acids or alkalies, and would in no wise justify of itself the employment of an apparatus which requires special knowledge and instruction. This cauterization is, we may say, the first act in a chain of therapeutical proceedings of which the last act is the most important and the most decisive. In all applications of the battery current we have in fact to consider two things, the poles and the interpolar circuit.

It is at the poles or at the points of entrance and exit of the current from the economy that the current manifests its immediate visible and measurable effects; if it cauterizes it is there, in fact where the poles touched that we find the scar, which differs for each pole, differing according to the total electrical intensity given out, and differing also (nul or maximum) according to the artifices we employ for increasing or diminishing the surface, or rather the density of this or that electrode.

Is this cauterization or galvano-chemical action all, and does the portion of the body interposed or intermediary between the points of entrance and exit of the current remain indifferent and protected from all supplementary action? No, certainly, and it is there especially that the master influence of the battery current takes effect. Whatever hypothesis may be adopted (on which I have nothing to say just now) it is in the interpolar current that are manifested certain effects which the eye cannot immediately detect, as for the poles, but the remote effects of which can soon be perceived. It is to these effects that the word trophic is especially applicable, because the current has the property of correcting to a certain extent every perversion of nutrition, whether by excess or by default; whether it is a question of atrophy or hypertrophy, the current will be in experienced hands, by varying the dosage and polar action, a stimulant of the first order which will tend to re-establish the equilibrium wherever it is upset; whether it is a

case of ganglionic hypertrophy, of muscular atrophy, or of localized congestion (of which orchitis is a good example).

Amidst all these facts, which we might multiply indefinitely, we shall find in the continued current an auxilliary of the best kind, in which diseases of the nerves will obtain the most real and efficacious treatment.

(16) I intend soon to give the experimental proof of this fact based on my researches, which I have been pursuing for several years, on the like action which the continuous current exercises on certain nerves.

(17) The physician has, in fact, the power and it is his duty to render this operation always bearable by proportioning the dose to the individual or morbid susceptibility of each patient. I have never been obliged to have recourse to anæsthetics, except in certain cases of uterine or peri-uterine galvano-punctures which were made with an entirely different object. (On Chemical Galvano-puncture in Gynecology, first memoir read before the Medical Society of Paris, the 9th of October, 1886). See *Union Medicale* of 16th and 19th of October, 1886.

On Vaginal Negative Chemical Galvano-puncture in certain uterine fibroids, first variety, operation of necessity; (second memoir read before the same society the 13th November, 1886.)

(18) See *Practical Treatise on Gynecology*, by M. de Sinety; second edition by Octave Doin, Paris; 1884, pages 413 and 415.

(19) Carl Schröder: *Diseases of the Genital Organs of Woman*, sixth edition translated into French; Paris; G. Carré, 1886, p. 97.

(20) *Loco citato*, v. 371.

(21) It is important to well distinguish electrolysis from chemical galvano cauterization. Electrolysis is inseparable from every application of the continuous current to the human

body, which contains substances especially capable of being decomposed (and called electrolytes in the language of physics). It consists in the decomposition of water, salt, etc.; it is the every day experiment in the course of lectures on physics, of decomposing water in a voltametre, and of making oxygen and hydrogen gas separate each into a different tube. But as the decomposition of salts set free acids on one side and bases on the other (acids at the positive pole and bases at the negative), beside this first action, inseparable from the employment of the continued current, and rightly called electrolytic, we have a second action which will be due to the setting free of the acids and bases and to the respective cauterizations which they produce upon the tissues in presence of which they may be; we shall have, in fact, a chemical galvano-cauterization, either positive or negative. The effect of electrolysis is therefore entirely analytical, and prepares for the subsequent caustic action, which is rather synthetical. While the word electrolysis does not in any way prejudice the final effect produced, the word chemical galvano-cauterization, followed by the adjective positive or negative, expresses admirably the object carried out and attained; it is therefore the only rational term in this case.

It is important also to distinguish well between chemical galvano-cauterization and thermic galvano-cauterization. This latter makes use of the thermic effect of an intense current which brings to a red heat a platinum wire or knife (on account of their greater resistance to the current than the rest of the circuit. This heat developed on a limited point (platinum or carbon) is identical with that of an ordinary cautery iron at a red heat and only differs in that it has slightly less radiation; it possesses the advantage that we can at pleasure light up or extinguish the electrical cautery, and consequently we can apply it cold, place it carefully in the cavity and then render it burning hot. The portion of the

body subjected to the cautery and burned, undergoes, it is true, a similar process as that treated with what is called the actual cautery at the same temperature, and the electrical current is only useful here as a special and convenient means of producing heat. It is important to know that the current is closed on the cautery itself and that the tissues in the neighborhood of the burned point are in no way affected by the current.

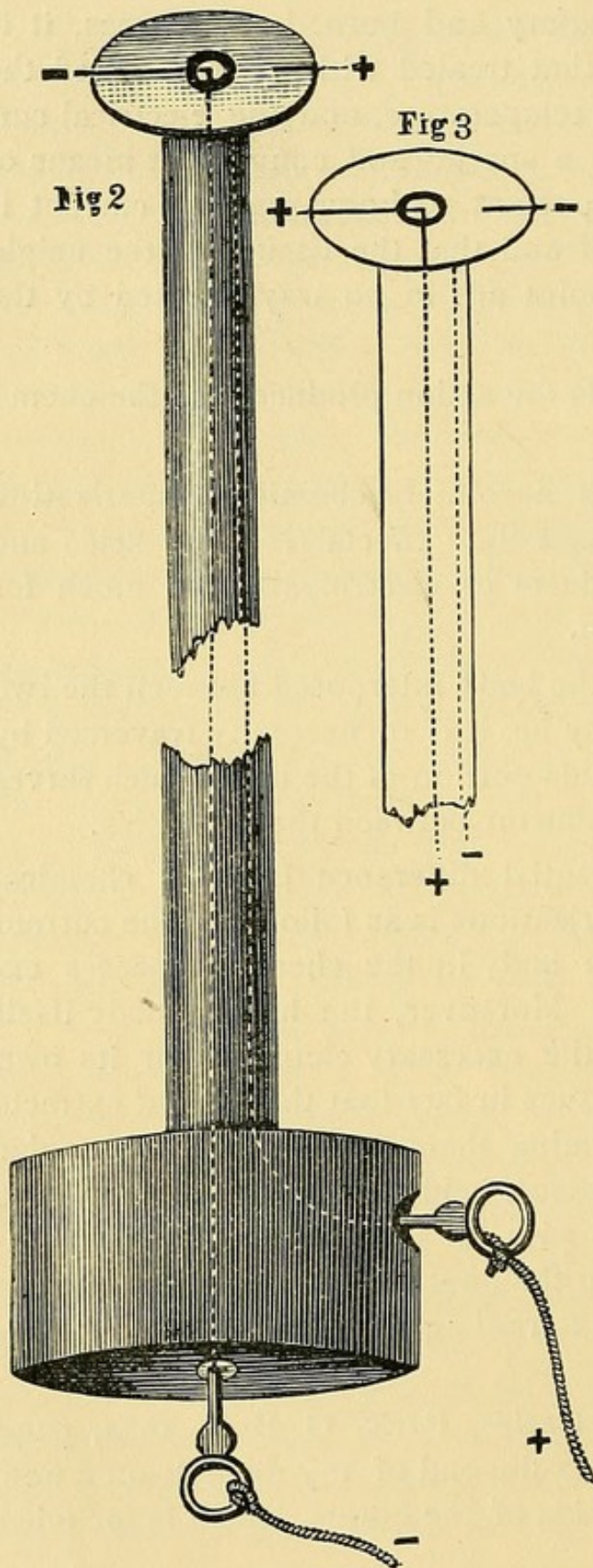
Altogether different is the action produced by the chemical galvano-cautery.

It is, first of all, an absolutely chemical cauterization which only borrows its immediate effects from the acids and alkalies which are the products of electrolysis. So much for the terminal or polar action.

As to the portion of the body interposed between the two poles, however small it may be, it is of necessity traversed by the current, because it is this portion of the body which serves as point of contact and conductor between the two poles.

To sum up, the essential difference between chemical and thermic galvano-cauterizations is as follows: The current which traverses the human body in the chemical, passes exterior to it in the thermic. Moreover, the human body itself furnishes in the chemical the necessary elements for its own cauterization; it is in its tissues in fact that the current extracts the acids and bases, in arming them, so to speak, for polar cauterization; they were latent, held in combination and the current brings them forth, with all their physical and therapeutical consequences. On the one hand the human body is cauterized by heat, by an external agent, on the other it cauterizes itself chemically.

(22) See thesis of L. Carlet, Paris, O. Doin, 1884, page 71, I mention there simply at the end of my memoir on a new electrical treatment of fibroids of the uterus, which is included



FIGS. 2 AND 3.

in it, and in the following terms, the new operative procedure executed (since 1882), with a first model of an instrument, which is represented in figures 2 and 3 respectively, according as the central pole is positive or negative.

“I should, by anticipation, to enlighten the reader, give some summary details on some other additional methods of electrical treatment, different from that which is the object of this memoir, and applied to some of the patients mentioned in the following observations:

1. Uterine faradization, called double or bipolar, etc.

2. Rapid chemical galvanocauterizations localized on the neck of the uterus. This method, which I believe I was the first to have applied, consists in cauterizing deep ulcerations by an electrochemical action, largely positive or negative, at a very high dose, 150 to

200 milliamperes, and for a very short space of time, 2 to 10 seconds on an average. We may, in fact, modify the instrument with concentric poles, proposed by our learned confrère, Dr. Boudet, of Paris, by making it of platinum, in order to render it inattackable. We can, moreover, give to each pole an unequal surface, the central one very small, the outside one rather large, so as to make peripheral cauterization predominate as to surface, which, according to the wish of the operator, will be positive or negative. It is thus that I have been able, since two years, to cauterize with advantage deep ulcerations of the cervix, and that I intend, in an early paper on this subject, to extend the problem, looked at from every side, to revulsive and curative cauterizations, applied to the skin or to ulcerated surfaces, and showing at the same time the different modifications which the instrument should take according to the necessities of the case." (Memoir to the Academy of Medicine of Paris, 29th July, 1884).

I have since then modified this first model of instrument, and I now employ constantly the model represented in Fig. 4,

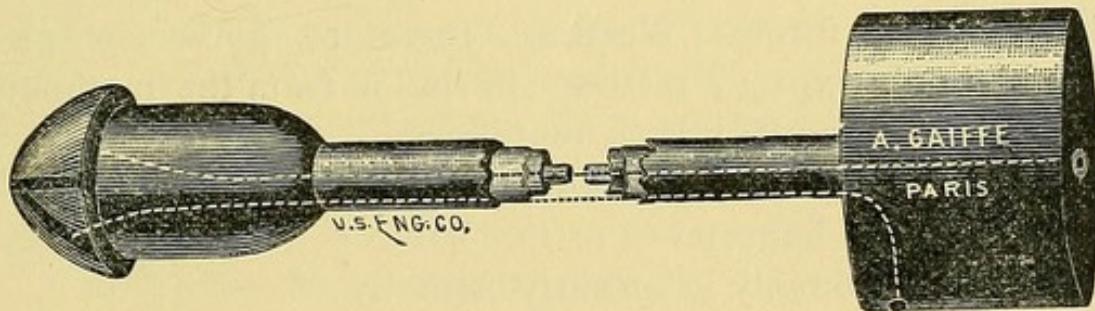


FIG. 4.

and which I have just had presented to the Academy of Medicine, session of 18th January, 1887 (see Gazette des Hôpitaux du 20 Janvier, 1877), by Dr. Dujardin-Beaumetz, with the following explanatory note:

On a new bi-polar excitor. This instrument is composed essentially:

1. Of a slightly conical ball of gas retort carbon (it would do equally well in platinum), in which terminate the two poles which pass through a long handle, in which they are separated from each other by an isolating layer of gutta-percha.

2. The two poles have the same surface, and are only separated from each other by a distance of a few millimetres.

This instrument has for its object:

(a) To permit of limiting the action of the current, whether continuous or interrupted, to a given part of the skin or mucous membrane.

(b) To utilize the whole of the current which circulates between the two poles having an inattackable surface.

(c) To render the practice of localized and rapid chemical galvano-cauterizations more general (by modifying according to circumstances the extent and surface of the poles), applied either to the treatment of rebellious ulcers (uterine, cutaneous, or others), or to produce more or less rapid counter-irritation (according to the current or intensity employed).

(23) It would, I believe, be inopportune, often dangerous even, to interfere with the continuous current in the decidedly acute forms. We must, therefore, know enough to wait and only expect a relative alleviation from the methodical application of the faradic current.

(24) See *Union Medicale* of the 16th and 19th Oct., 1886.

(25) The importance of the subject will oblige me to discuss it thoroughly in an early memoir.

(26) See *Bulletin Generale de Therapeutique*, 15 June, 1885, and *Archives de Tocologie* June, 1885. On a New Electrical Treatment of Ovarian Pain in Hysterical Patients, by Dr. G. Apostoli. Communication made to the French Association for the advancement of science, Aug. 1883. Congress at Rouen.

Here is a brief summary:

A. Tripier, in creating uterine faradization, adopted exclusively an almost uniform process of uterine excitation, that

which was given forth from the bobbin with the short thick wire, which furnishes a current, called, of *quantity*, and destined especially to provoke muscular contractility. As to the other bobbin, with which all the chariot induction apparatus are furnished, having a long, fine wire, and giving out a current of tension, which is the direct and preponderating excitor of sensibility, it has nearly always been destined in his hands, as his writings and his practice testify, to provoke cutaneous counter-irritation outside of the uterus. Since 1881, I had the idea of utilizing this same current of tension with the well defined object of calming a very rebellious and very frequent peri uterine pain, ovarian pain, which constitutes, so to speak, the accompaniment of hysteria, and these are the reasons which guided me in this choice:

1. Alone the current of tension is very well borne by almost all uteri, and in particular by that of hysterical patients; whilst the current of quantity, even in weak doses, is felt more or less painfully by all women, and is most often unbearable by hysterical ones.

2. Alone, the current of tension, with a very great tolerability, and a much greater power of radiation than that of quantity, enjoys the remarkable quality of rapidly calming all peri-uterine pain, and that too, all the better, and in a manner all the more permanent, when it is employed in cases of neuralgia of an hysterical nature.

Such were the general conclusions of my memoir of 1883, and since then I have extended the question, but with less generalization, to cases of inflammatory perimetritis, and especially to acute attacks of peritonism.

See on this subject a paper read before the International Medical Congress at Copenhagen—Section of Obstetrics and Gynecology, Aug. 1884. Reports, page 141

N. B.—I am now of the opinion, and I propose soon to demonstrate it by numerous clinical facts in support of it, that

in all neuralgias of the pelvis, whatever may be their origin, the nature, or severity, the element of pain can, and always should be treated, most often successfully, by the faradic current and always by the current of tension alone. The latter alone, in the present case, is always harmless, and often, very often, efficacious, if we conform ourselves to the operative procedure which I have laid down and which I condense in the following propositions:

1. Never make the patient suffer and never apply a stronger intensity than she can bear.

2. Make the operations last long and continue them, no matter how long, until the appearance of a manifest sedative.

3. Make by means of my bipolar excitor, an intra-uterine application whenever possible, or a vaginal one in other cases.

(27) On the application of electricity to affections of the Stomach. Communication made before the International Medical Congress, at Copenhagen, August, 1884. Section of medicine, see page 154 of the reports.

Here are the general conclusions of my memoir:

I have just completed the note which I read before the Medical Society of the Paris Hospital, August 11, 1882 (see Bulletin General de Therapeutique, November 15, 1882). On a new electrical treatment of epigastric pain and the gastric disorders of hysteria (vomiting and gastralgia). I there developed the favorable influence which galvanization with the positive pole on one of the two pneumogastric nerves exercises at a distance on the stomach, to calm and cure the gastric troubles of hysteria. Since then I have extended the problem to the reflex gastric troubles connected with uterine diseases, with pregnancy, with phthisis—all forms of dyspepsia, all purely nervous or reflex vomiting seems to me to call for the same treatment. I even believe that this remedy may render the greatest service in other gastric disorders connected with simple organic diseases of the stomach (non cancerous).

To render the operation more active and to assure to it a greater efficacy, I propose the following new improvements, and operative details:

1st. I recommended the simultaneous galvanization of the two pneumogastrics at the neck by a double or bipolar application; this method is, without contradiction, more rapidly active and sovereign, in rebellious cases, than cauterization of only one nerve (called positive monopolar which I had recommended at the beginning).

2d. The electrical intensity should be proportioned to the tolerance of the subject and the resistance of the disease we have to combat, the dose will vary from 5 to 10 milliampères and should be raised if necessary during a few seconds to 15, if vomiting for instance were imminent.

3d. Every galvanization should triumph over the trouble for which it is employed. And thus we should continue the application until the effect is produced, until the sedation is so great that the patient declares that she is very well; the duration will vary between 5 and 30 minutes, according to the case.

4th. To assure to the treatment a greater efficacy it is preferable to make the application during digestion. We should therefore apply it after a meal, and the current will then have the property of either making digestion better, or stopping a threatened vomiting.

5th. The sittings should be as near to each other as possible at the beginning (once or twice a day), to become more and more distant from each other as the case improves.

6th. Every operation should be bearable, and never be followed by burning of the skin. We should therefore, for this reason, carefully cover the electrodes with moistened chamois skin, under which again we may place one or two layers of amadou equally well moistened.

7th. To resume, the continuous galvanic current, well

measured out and well localized on the two vagus nerves is par excellence the remedy for a symptom, whether it be dyspepsia, gastralgia or vomiting. If it is purely nervous and reflex it will exercise an action which is immediate and most often permanent. In all other cases which depend on organic affections, without wishing to supplant the classical treatment, electricity is destined to serve as an active auxiliary.

In fine, I affirm that bi-polar galvanization is all powerful in disorders of the digestive system, and I hope to be able before long to extend the problem, under given restrictions, to certain disorders of the respiratory and circulatory apparatus.

(28) See *Union Medicale* of 16 and 19 Oct., 1886.

I read a paper before the Medical Society of Paris (session of the 9th Oct., 1886), which may be resumed as follows:

The uterus and its annexes may be tributaries of galvano-puncture for many causes, which will be the object of separate notes, and of which the following will be the nomenclature:

1. Certain uterine fibroids.
2. Certain forms of chronic metritis (localized hypertrophy).
3. Certain intra-uterine polypi.
4. Unilocular cysts of the ovary at the beginning.
5. Chronic phlegmons of the broad ligament.
6. Subacute and chronic posterior peri-metritis.
7. Peri-uterine blood cysts (hematocele).
8. Extra uterine fetation.

The principal general precautions which are required for vaginal galvano-puncture are the following:

1. As far as possible the peritoneum must not be included in the puncture, whether we address ourselves to the uterine parenchyma or to the peri-uterine cellular tissue.
2. We must always render possible the elimination of a focus of suppuration which may form later on, in order to

avoid infection and to favor the application of a local antiseptic treatment.

3. Shallow punctures of 1 or 2 centimeters will always be better than deeper ones.

4. We must always, previously, sound and explore the bladder in every direction, in order to avoid including it directly in a puncture, or later on, at the moment when the too deep scar comes away.

5. In all cases of lateral or posterior puncture we should explore the region attentively with the finger, to detect any arterial pulsation and to avoid perforating any large vessels.

6. An obligatory repose in bed of one or several days should be exacted from all patients who have undergone a galvano-puncture.

7. We should make, before and after every puncture, an antiseptic vaginal injection; we should leave in the vagina, until the orifice of the puncture has completely healed up, a tampon of iodoform gauze, which should be renewed as often as necessary.

8. We must forbid all sexual relations until there is a complete cure

(29) See Archives of Tocology, Nov., 1885.

Communication made to the French Association for the advancement of sciences. Congress of Grenobles, Aug., 1885.

This communication which I made in the name of Doloris and myself may be resumed as follows:

1. Hematocele is destined to find in this valuable and safe method of negative vaginal galvano-puncture, a precious means of bringing it to a speedy cure, and at the same time diminish the ordinary gravity of the prognosis.

2. In a general way, negative galvano-puncture or the tubular cauterization of Tripier acts by means of a double mechanism: the first surgical eschar and consequent loss of

substance), and the second medical in great part posthumous to the passage of the current (dynamic or trophic process followed by rapid disintegration and retrogression).

This method is destined to triumph in the following cases, by utilizing the formation of a larger or smaller fistula, either solid exudations (chronic phlegmons, cellulitis and peri-uterine phlegmasia. Or neoplasms (interstitial fibro-myomas, localized hypertrophy). Or uterine or peri-uterine cysts (hematomas, extra-uterine fetation, etc.)

(30) On the 20th Feb. 1883, I presented to the Academy of Medicine of Paris, a double or bi-polar intra-uterine exciter (see fig. 5) with an explanatory note (see *Gazette des Hopitaux* 3rd March, 1883).

To legitimize the use of this new uterine excitor, I made to the medical society of Paris the 28th April, 1883, and 23rd of Feb. 1884, two communications on double and bi-polar uterine faradization (See *Union Medicale* of 28th Oct. and 1st Nov. 1884, and the *American Journal of Obstetrics*, Sept., 1884).

A. Tripier, by creating this method of uterine faradization, has formulated an almost uniform and constant treatment of simple metritis; this is the uni-polar, or utero super-pubien method, in which a simple exciter (see fig. 6) is introduced into the uterus, and the circuit is closed on the belly, above the pubis (see fig. 7), by two large tampons of gas retort carbon, covered with wet chamois skin, which tampons terminate in the other forked pole



FIG. 5.



FIG. 6.

and are held by an assistant or most often by the patient herself.

I have proposed to replace this inconvenient and more

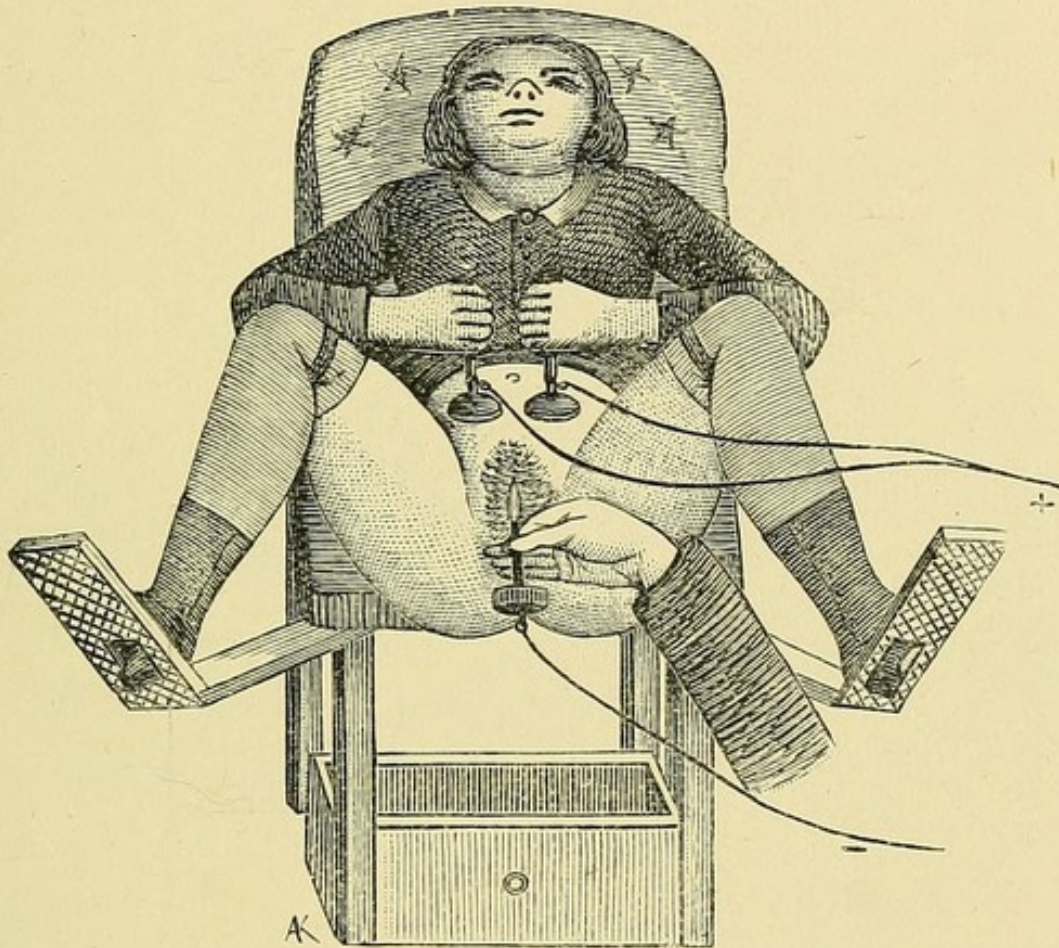


FIG. 7.

or less painful method by one (see fig. 8 and 9) which concentrates the two poles in the uterus and combines the following advantages:

1. Doing away with the cutaneous pole.
2. Concentrating in the uterus the whole of the electrical action.
3. The operation is easier, and does not require the assistance of the patient nor anyone else to hold the tampons.

4. The operation is less painful, on account of the current not passing through the skin.

5. The operation is stronger and more effective, on

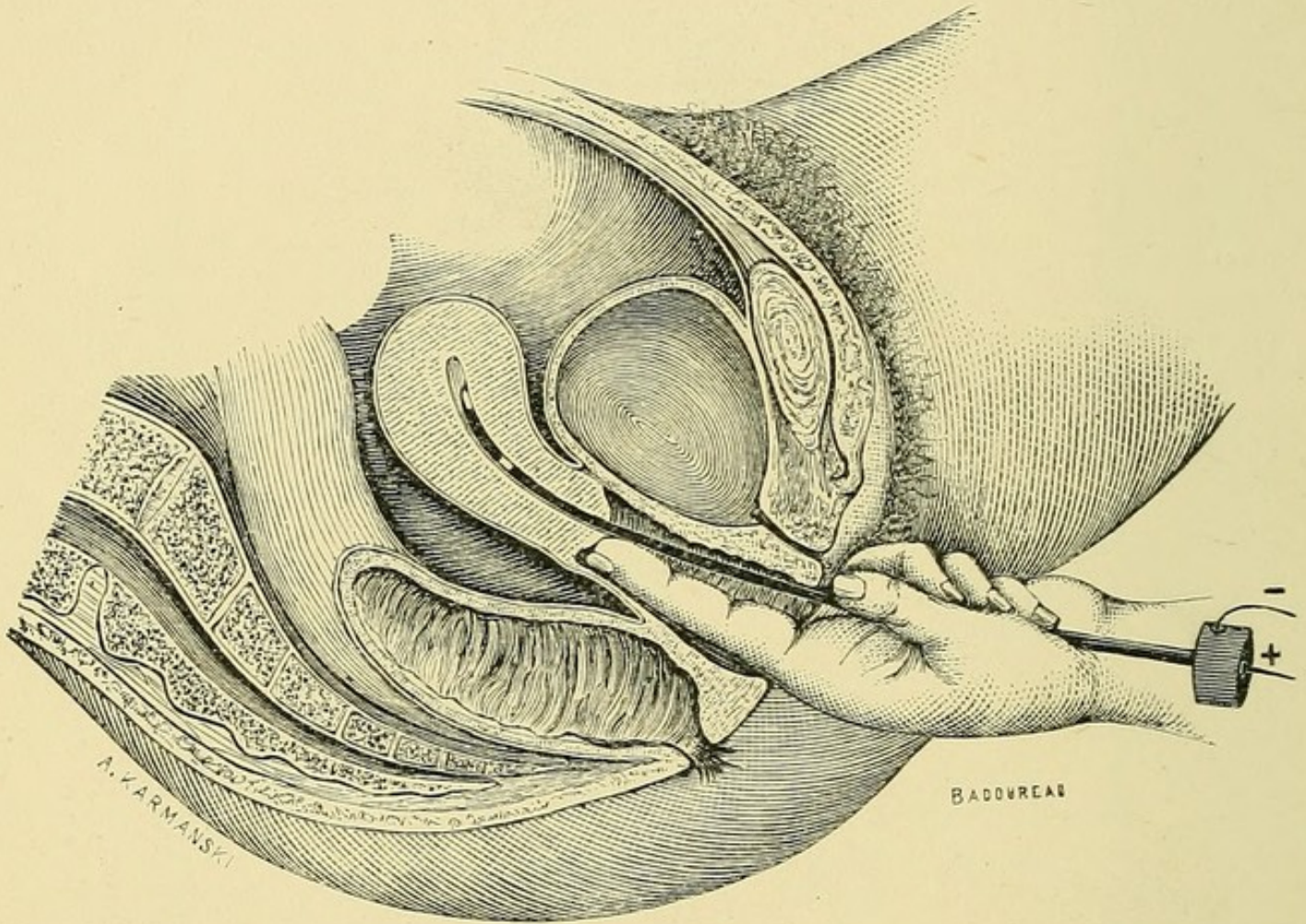


FIG. 8.

account of the possible increase of the uterine contractility, the facility being given by employing, although with less pain, a much stronger current, with the result that it is more curative. N. B.—It is well understood that when we speak of the faradic current, as applied to the treatment of metritis, we mean that which is given off by the bobbin with the short, thick wire (contrary to the bobbin with the long fine wire)—through which thick wire circulates a current called of *quan-*

tity, and destined to set up muscular contractions (while the current of the other bobbin called of *tension*, is especially the direct excitant of sensibility and is not indicated in these cases.)

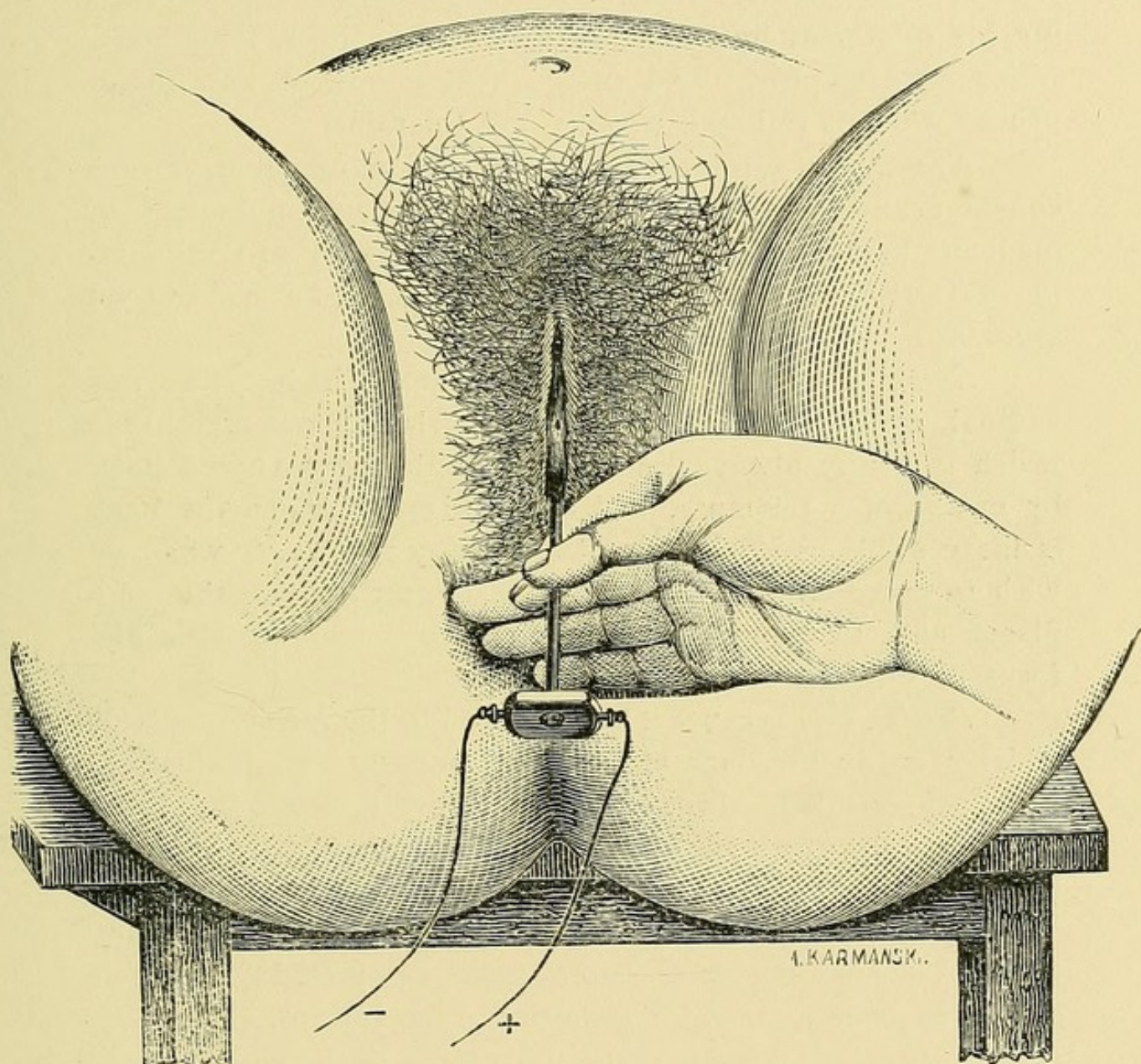


FIG. 9.

(31) In the month of October, 1886, I read a paper before the Second French Congress of Surgery on "My New Electrical Treatment of Uterine Fibroids," in the form of a supplementary note, which the *Gazette des Hopitaux* (Oct. 26) has briefly resumed in the following terms:

Dr. Apostoli has just completed the first memoir which he published in 1884 on the electrical treatment of uterine fibroids (see thesis of Carlet), and has confirmed the clinical results, which are the fruit of a riper experience. By creating his treatment he has substituted for the former methods, which were empirical and often inefficacious, a new therapeutics which is rational, precise and tolerable.

New by the application of the continuous current, always constant and progressively intense, in doses unknown in medicine before his time, varying from 100 to 250 milliamperes (in 1884, at the time of his first memoirs, he had not yet gone beyond 100 milliamperes).

Rational, by localizing the treatment, which before was vaginal, or entirely external, either on the mucous membrane which is nearly always diseased, or in the parenchyma itself by means of a puncture, which is obligatory when the neck is inaccessible or impervious, but used by preference when we wish to accelerate more rapidly the denutrition of the neoplasm and by thus creating in the two cases an issue and focus of salutary derivation.

Precise, first because it has opposed to the former methods which were in the dark and without measure or graduation, an exact posology always comparable with itself, thanks to the new galvanometers of intensity, and then by producing an intra-uterine eschar which joins to its chemical action, varying according as to whether it is positive (bleeding fibroids) or negative (in the other case) a very evident atrophic action, in proportion to the intensity of the current.

Tolerable, by cauterizing the uterus in progressive and fractional doses and by rendering it possible for the patient to bear easily, and without any danger of burning the skin, a current which would otherwise be unbearable, thanks to the clay electrode, which he was the first to employ in electrotherapeutics, and which render the cutaneous pole indifferent.

In presence of the powerlessness of purely medical therapeutics and of the mortality of abdominal hysterectomy, which is always considerable (40 to 50 per cent.), as well as the dangers and difficulties connected with surgical interference of every kind, Dr. Apostoli proposes a method which is simple, inoffensive and most often sovereign: 1st. The treatment is, in fact, easy, and is summed up in a good therapeutical hysterometry which is within the reach of all physicians who are supplied with an apparatus for measuring the current (a good galvanometer of intensity), any kind of a battery, provided it gives out a large quantity of current, an inattackable platinum electrode, and a sufficiently moist cake of clay. 2d. This operation performed with every antiseptic precaution and followed by proper rest, is harmless, for in more than 3,000 intra uterine galvano-cauterizations, divided among two hundred patients who underwent a more or less complete treatment, he has had only a very few accidents, which should be laid to the blame of the inexperience inseparable from starting, and to operative mistakes which were corrected by practice. 3d. Well applied and continued sufficiently long (from three to nine months on an average), this method is most often sovereign and leads ninety-five times out of a hundred to the following results: Anatomical retrogression of the fibroid, varying from one-fifth to one-third and sometimes even one-half, but never to the total disappearance of it; rapid and permanent arrest of the hemorrhage; disappearance of the phenomena of compression, and the restoration of the patient symptomatically.

The rare cases of non-success, three to five per cent., observed, are nearly all found to be ones of ascitic fibroid. The treatment loses also a part of its influence in fibro-cystic tumors, and when the complications of peripheral inflammation or severe hysterical diathesis render difficult and prevent the employment of high intensities. Intra-uterine galvano-chemical cauterization is compatible with a subsequent pregnancy.

