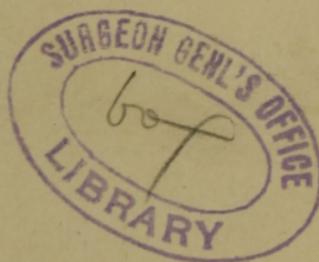


Cleveland (C. H.)

Galvanism + + +



Cleveland (C.H.)
GALVANISM;

ITS APPLICATION

AS A

REMEDIAL AGENT.

BY ✓

C. H. CLEAVELAND, M. D.

"It is this practising without intellect that constitutes Empericism; it is blindly adopting, in this way, a power without a principle, to guide it, that I abhor above all things."—*Abernethy.*

"It has long been my belief, that the Electric influence is the great principle by which the Almighty *puts together*, and *separates*; and that it might be called, metaphorically speaking, *the right arm of God.*"—*Crosse.*

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P R E F A C E.

IN presenting this little Hand-book to the profession, it may not be improper, that I should, in a very few words, explain to the profession the motives that have led to its compilation.

During the past ten years the writer has been actively engaged in the practice of his profession in the country ; and being so situated that all classes of cases fell under his notice and professional care, he was early led to form the opinion that the only reason why more than three-fourths of his patients (except during the prevalence of an epidemic,) were females, must be owing to the influence the female organs of reproduction exert upon the health of that class of persons. This opinion induced him to review all that he had read on the subject, and to feel an *especial* interest in those cases of disease which were obviously *caused*, or *modified* by derangements of the uterine functions, or disease of the uterus and appendages ; and, perhaps also, led to his seeing more than the proportion of such cases which usually come under the care of a country physician.

At the time he entered the practice of medicine, the power of *Galvanism*, as a curative agent, was attracting a large share of the attention of the profession in Europe, and as he examined the Periodical Medical literature of the Old World, he became convinced that *if we could apply this agent in the proper manner*, it would prove a very valuable auxiliary to the ordinary methods of treatment.

Electrical and Electro-Magnetic, and Galvano-Magnetic Apparatuses, in various forms and modifications were tried, with sometimes satisfactory, but more frequently with very

unsatisfactory, results; and after a persevering trial of them had been made; as far as the *practice* was concerned, the matter was allowed to rest. Not so, however, in regard to reading and investigation. The pubic organs, either from their being *without* the usual course or direct influence from medicines, or because the diseases from which they suffered had in a measure *paralyzed* them,—through the sluggish manner in which the blood circulated through their vessels, or because the *congestion* and hypertrophy induced so much pressure upon the few nerves which are distributed through that region,—and thus interfered with the due passage of the nervous influence along those nerves, it was found that in those cases when the powers of the general system was most impaired and least capable of enduring the effects of large doses of medicine, that the greatest amount of general medication was demanded, ere the pelvic organs would appear to be influenced by such remedies.

Hence, doubtless, one great cause of the intractable character of such diseases, and the great need that some *local* means should be devised by which these organs could be roused from their inactive condition without producing derangement or disease in other parts of the system; and hence, also, the great advantage that many practitioners have derived from local counter-irritation in conjunction with their general treatment.

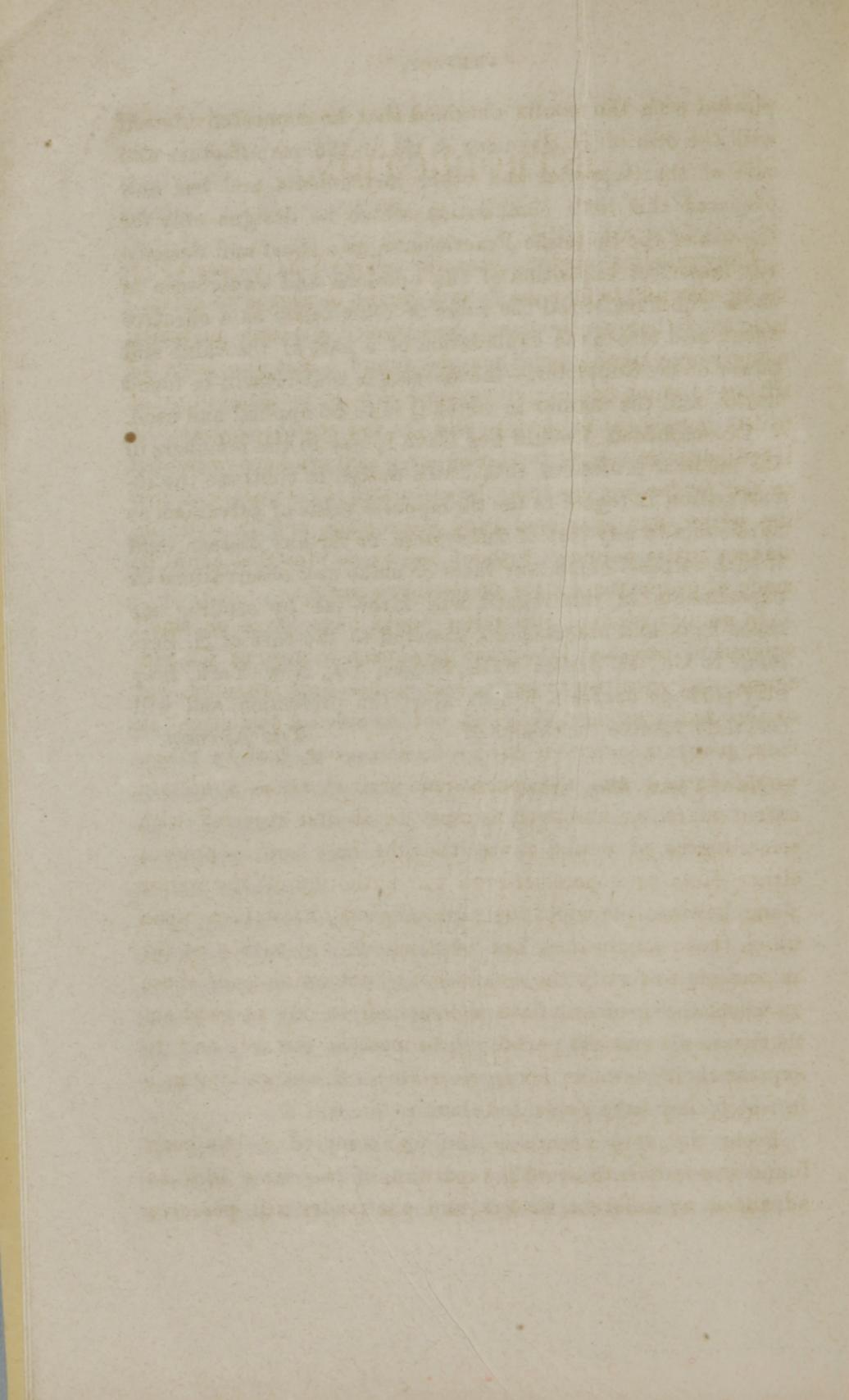
As galvanism had proved the most powerful and efficient agent in rousing palsied limbs and muscles and nerves in other parts of the system, it was, even while not used, still looked to as the proper agent to produce the desired effect; and when, a few months since, the writer was shown *Seymour's Galvanic Abdominal Supporter*, he was fully satisfied that a new and valuable method of generating and applying this vivifying element had been devised, and he at once determined to make a trial of it. After a short but very satisfactory trial of the Supporter, the writer became so much

pleased with the results obtained that he connected himself with the firm of H. Seymour & Co. in the manufacture and sale of the Supporter and other instruments, and has now prepared this little compilation, which he designs only for the use of the Scientific Practitioner, as a short and necessarily imperfect exposition of the opinions and experience of those who have tested the value of *Galvanism* as a curative agent, and also as an explanation of a part of the value and power of the Supporter,—the diseases in which it will be found useful, and the manner in which it is to be applied and used.

In conclusion, I would beg leave to say to the members of the medical profession, that I still design to continue the investigation in regard to the therapeutic value of galvanism as applicable to any part of the system, or for any disease; and if such as shall obtain any facts or make any observations or experiments in this regard, will favor me by sending me those facts and observations, directed to the care of H. Seymour & Co., at Seneca Falls, Seneca Co., New York, they may perhaps confer a benefit upon the profession, and will certainly receive the thanks of

THE AUTHOR.

NEW YORK, *May*, 1853.



INTRODUCTION.

THE periodical medical literature which I have been obliged to examine to find the facts I sought in regard to galvanism, as a therapeutic agent, has proved a placer in which many very valuable gems may be found. Yet the labor of sifting so much earth, rich as the soil is, in material of great utility in medical science, to find the few scattered grains of intelligence in regard to this agent, which are here presented to the profession, can only be estimated by those, who, like the writer, has examined page after page, and in some instances entire volumes, without finding an idea that could be made of use in the matter under investigation.

In many instances the writer could have saved no small amount of time and labor, had he chosen to present the reasoning and conclusions arrived at in his own language, but as this was a subject that had not received much attention from many members of the profession,—one, that to many, would be new, and the conclusions arrived at, to a certain extent startling, and such as must be at first received with some degree of doubt, it was thought best not to present either facts or conclusions on the authority of the writer alone, however plausible the reasoning may have been upon which those conclusions had been based; but rather as far as possible to fortify the conclusion by the opinions of those on whom the profession are accustomed to rely as good authority in all matters pertaining to medical science, and to express their views as far as possible in the exact language in which they have presented them to the world.

From the very nature of the plan adopted, it has been found impossible to avoid a repetition of the same idea as advanced by different writers, and the reader will perceive

that in some instances the views of an author are repeated as they have been advanced by him at different times, and after he had had opportunities of testing his former conclusions by additional cases in practice.

Again there may be found a want of unity or of connection between different parts of this little work. But it is hoped that the reader will excuse that also, as an inevitable result of the plan adopted. The influence of the agent under consideration, upon a sprained ankle, or a paralyzed auditory nerve, may appear to have no very near connection with a disease of the organs of the pelvic-region, but inasmuch as it is supposed that the same tissue or structure would be acted upon by galvanism, in a similar manner without regard to the region of the body, in which that tissue was located ; and inasmuch as experiments had been tried more upon other parts of the system, and the results there produced were more readily perceived by the observer ; it has been supposed that a presentation of such facts and such observations, must be much more satisfactory than any course of simple reasoning however plausible, unsupported by actual experiments.

In regard to the literary merit of these pages, the writer is prepared in advance to admit that they are a fair subject for criticism. Neither the time allotted for preparing the sheets for the press, the amount of uninterrupted attention that the writer could bestow upon it, or his qualifications as a writer, have been such, as to warrant him in the hope that he can have done more than to offer to the profession an imperfect compilation of what others have written on the subject, with such observations as he has felt called upon to make, couched in language sometimes strong, but designedly plain and simple ; he having a much stronger desire to attract the attention of the profession to the subject under consideration, than to the person who has been the self-selected medium of presenting it to them.

It is true, that within the last few years, many have ap-

plied Electricity, or Magnetism, or Galvanism, or some combination of these elements, or different forms of the same element as the case may be; and those who have either made the application of this agent, for the cure of disease, their special business, or have been engaged in the manufacture of apparatus for that purpose, have published some works on this subject. Yet as these have been of a popular character, and designed not for the profession, but for those not physicians, they have been found of but little, if any value, either as additions to our knowledge on the subject, or as guides in the application of either the machines, or the agent they develop in the treatment of disease.

They, as a general thing, give no direction in regard to the kind of galvanism, whether *potential*, *positive*, or *negative*, which should be used; the *direction* in which the current should be made to traverse the organ, or the amount, or quantity of the *dose*, so to speak, that should be applied, or even the length of time which the organ or system should be kept under its influence.

These are each matters of great importance when separately considered, and in the aggregate are all-important to a judicious and scientific application of the agent.

In the following pages, I shall, as far as I am able, endeavor to supply the proper rules for guidance on all these points. Rules, not the result of theory alone, or of the observation of one individual; but rules and laws properly deduced from the observation of all whose writings have fallen under my notice.

It will be perceived in the following pages, that quotations have been freely made from various European authors who have written on the subjects under consideration, while from American writers but little has been extracted on the subject of galvanism: simply, because but little has been found that was considered of sufficient value to quote.

Dr. Dewees of this city, appears to have more thoroughly

investigated this matter than any other American writer, and his writings have been quoted at considerable length, as being exceedingly satisfactory, plain, and explicit. As the writer has not enjoyed the privilege of a personal acquaintance with Dr. Dewees, it is hoped the reader will understand that *personal* feelings cannot have, in any way, led to an undue regard for the opinions that accomplished writer has published.

Dr. Channing of Boston, sometime since, published a small but valuable volume on Medical Electricity, but it was not procured until these sheets were nearly ready for the press, and it was too late to incorporate his views with the text, except to a very limited extent.

In the following pages, the value of galvanism, as a therapeutic agent, will be proved by a somewhat disconnected quotation from various writers, and its power to overcome diseases on various organs and structures, either alone, or in connection with other remedies, will be established.

The frequency of derangements in various parts of the system, resulting from disorders of the pelvic organs, will next be considered, and the power of galvanism to overcome those derangements, and cure the disease induced by them, and the proper rules for its application, will be presented, and the volume will be concluded by a short description of Seymore's Galvanic Supporter, and other apparatus, designed for the purpose of passing galvanic currents through different parts of the system.

GALVANISM :

ITS ACTION, EFFECTS, AND MODE OF APPLICATION.

IN the following pages, the opinions of many eminent in the profession, who have applied this agent in its various forms, and for the cure of a large variety of diseases, are presented, by means of short extracts from their writings, and in a manner that has precluded the arrangement which was desirable, but like the mode in which cases are managed in the law courts, the testimony is introduced, and the summing up is reserved for after consideration.

Becquerel says: "Currents which have not great intensity, vary accordingly as they travel in the direction of the nervous ramifications, or in the opposite direction. In the first case *contraction* ensues; in the second *pain*. Practitioners should keep this distinction in view, if they employ currents of little energy."

Ritter observed: "That the *positive* pole *augments* the vital forces, whilst the negative, diminishes them."

Richerand remarks: "When the object is to exalt enfeebled irritability, that the silver and zinc plates should be so placed that the *silver* shall be nearest the *origin* of the nerves, and the zinc over the muscles of which we wish to rouse the dulled, or totally suspended energy. In this case, the negative current travels in the direction opposite to the nervous ramifications, and excitement, or increase of action is the result."

Dr. Becquerel, however, says, that "in general, the current when it has a certain intensity, appears to act as an excitant whatever may be its direction; nevertheless, *positive electricity* when it ascends to the origin of the nerve, *always*

produces more pain than when it travels in a contrary course."

Dr. Quesnel, of Stockholm, has found "that the parts to which galvanism was applied, became much warmer, and that the perspiration of the part was considerably increased." He also observed that the zinc pole, more than the other, drew blood to the part to which it was applied.

Dr. Bardsley expressed the opinion that there was a difference between electricity and magnetism, and he prefers Galvanism for most cases of paralysis; but does not decide upon the mode of application.

Prof. Marianini says that, "muscles will not contract *sympathetically*, or through the agency of the *nerves*, when magnetism is applied, unless the positive current is transmitted *down* the nerves, or from the origin to the extremity."

Dr. H. Letherby, Lecturer on Chemistry, at the London Hospital, says: "Another principle to be kept in view, is, to pass the current in the route of the *vis nervosa*, that is, from the centre to the periphery, in *motor paralysis*, but *from the extremities* to the centre, when the *sensitive* nerves are affected."

"If this important principle be not borne in mind, we cannot expect ever to do much good in the application of electricity or galvanism; indeed, there is much reason for believing that the uncertainty of their therapeutic powers may have arisen from a want of observance of this principle."

Med. Gazette, Nov. 13, 1846.

Golding Bird, in the *Med. Gazette*, for the 21st of May, 1847, says: "The effect of an electrical current upon the nerves, and consequently upon the muscles it supplies, *remarkably* differ, according to the direction it presents.

This observation is of the greatest interest and importance, and in repeating it, the only precaution necessary to observe all the phenomena I am about to describe, *is that of using as weak a current as possible.*

“Muscular contractions are developed in the most perfect manner, *when the positive current travels the limit in the presumed direction of the vis nervosa.*”

E. W. Tuson, Esq., F.R.S., in the *Medical Times*, for March 10, 1849, remarks as follows: “Electro-galvanism may be considered as a stimulant to the nervous system, a stimulant to the most delicate nervous texture, to the most minute fibrillae, and likewise to the neurilema or sheath.”

“We have, then, an agent in Electro-galvanism to act upon the nervous system, to excite its action, to *restore* it to a proper degree of energy, so as to accomplish a cure.”

“Electro-galvanism is an agent which produces absorption quicker than any medical means that we are acquainted with; and this can be proved by its application to indolent tumors, as it very frequently causes them to be absorbed most readily.”

“After other means have failed, Electro-galvanism will completely cure some indolent tumors. Many tumors have been dispersed by this agent.” “In glandular swellings, experience has proved to me that it may be of the greatest service.”

Mr. Abernethy, in his Lectures, after lauding this agent highly in a great variety of diseases, was accustomed to say: “Electricity is a part of surgical practice that may be considered *unique*. All other means operate on the surface; but electricity will pervade the very centre of the body.”

“In cases of obstructions to the performance of *any natural function*, Electro-galvanism will be most servicable in stimulating the nervous action, and thus restoring the organ to a state of health.” “Medicinal agents will do much in the treatment of disease, but Electro-galvanism will do more, and produce a more decided result, and a much more *permanent* advantage may be looked forward to from its proper application.”—*Med. Times*, March 10, 1849.

M. Matteucci, as translated by *Dr. Pereira*, in the *Edinburgh Medical and Surgical Journal*, January, 1850, makes the following observations: "Electricity is the *only* irritant which can excite at one time, sensation, and at another, contraction, according to the direction in which it traverses a nerve."

"The electric current alone can modify the excitability of a nerve, and even destroy it, when the current circulates in a certain direction; and preserve, or augment, the excitability, when passing in the opposite direction."

"Of all irritating agents, the electric current is the only one which possesses, for a long space of time, the power of exciting the excitability of the nerves when it has become very much enfeebled in respect to other stimulants."

Dr. Tracy E. Weller, in the *Medical Times*, for August 12th, 1848, says: "In that common, and most distressing complaint, *prolapsus uteri*, galvanism, will be a highly useful remedy."

Dr. Golding Bird, in *Guy's Hospital Reports*, for 1840, says: "Electricity and galvanism are but different names for the same agent."

"In electricity, we obtain the agent in small quantities, but in a state of 'high tension or elasticity.' Whilst in that of the galvanic battery we obtain it in enormous quantities, but in a state of low tension.

"When a person is placed on a stool with glass or other non-conducting legs, and connected with the prime conductor of an electrifying machine in action, his whole surface becomes by induction, powerfully electro-positive, and combination, by silent discharge, is constantly occurring by absorption of negative electricity from the air; this may be seen to take place luminously in the dark, especially about the hair, eye-lashes, fingers, &c. During this luminous discharge, heat is evolved, the circulation becomes quickened, the secretion generally becomes more active, and perspiration breaks out.

The evolution of heat during this silent discharge, is sufficient to demonstrate the mode which in the psychological effects alluded to are produced."

In the *Medical Gazette*, for May 7th, 1847, *Dr. Bird* again called the attention of the profession to the subject of electricity, and after having shown from incontrovertable evidence, that *free* electricity is always to be found in the bodies of living animals, he continues the subject as follows:

"Having demonstrated the existence of electricity in the animal frame,—what is its origin? Whence is it derived?—if we for a moment animadvert upon the facts already recounted, we find evidence of the existence of electricity under two distinct forms; one, in which this agent is in a neutral and static condition, that is, in a state of rest, capable of being resolved into its two component elements, by various mechanical and chemical processes. This form of electricity is possessed by the living fabric, in accordance, apparently, with the general laws of the universal diffusion of this agent throughout all matter, whether dead and inert, or quick and animated with the flame of life. It was this that I decomposed by drawing a comb through my hair, and the existence of one of whose elements, in a free state, I demonstrated with the electrometre. We have no means in the present state of our knowledge, of explaining the origin of this electricity of the body, save by referring it to the fiat of omniscience. There is, however, another state in which electricity exists—a dynamic condition—electricity in motion, or in a state of current.

This evidently is not anything superadded to the body, but merely the electricity normally existing in a state of rest, and neutral condition, decomposed by some cause, or series of causes, by which its positive and negative elements are separated, their attempts at reunion to constitute the neutral electricity, giving rise to the phenomena we have been investigating.

Let us now review some of the processes going on in the body, which, from their nature, appear capable of disturbing the electric equilibrium which would, without their influence, exist alike in the living form, as well as in inert matter.

It is now an incontrovertable fact, that *no chemical change can possibly occur without a disturbance of electric equilibrium*. Let us then ask what processes of this character are going on in the body. The first in point of importance that demands our attention, is the union of carbon with oxygen, to form carbonic acid. We know that in the respiratory process, this acid, in the form of gas, is, with aqueous vapor, evolved from the lungs, in addition to a considerable quantity which exhales with the perspired vapors of the surface."

The same is equally true of the oxidation of any other substance in the course of any of the vital processes, as, that of *hydrogen*, of *phosphorus*, in the nervous structures, and of *sulphur*, as well as of the *iron* of the blood in the lungs, or of the effete matter in the capillary vessels. *Dr. Bird* continues:

"But a more important influence disturbing electric equilibrium is found in the series of decompositions which, in the physiological condition of the body, are always in action. *It is impossible that any two elements can be rent asunder without setting free a current of electricity*, which, insignificant as it might theoretically appear, is nevertheless competent to the production of most important phenomena. As one among many examples, I would cite the case of common salt, which plays so important a part as an article of food, and for which, perhaps, alone, of all condiments, an universal appetite exists. In addition to the proportion of this substance which enters the blood unchanged, and becomes an element of all the secretions, a part is decomposed, and one element in union with hydrogen, appears as hydrochloric acid in the stomach; another in union with oxygen, constitutes, as soda, an important constituent as bile."

The researches of *Dr. Bird*, of *Becquerel*, and of *Faraday*, have proved that the amount of electricity set free by these decompositions are far from being of small amount. *Faraday* has demonstrated, and now it is generally admitted by all chemists, that the amount of electricity set free by the decomposition of ten drops of water is actually greater in amount than exists in the most vivid flash of lightning.

Dr. Bird continues the subject as follows: "Under the influence of a weak current, salts can be resolved into their elements. In this way, a compound can be resolved into its constituent acid and base. Now, it is a remarkable fact, that if an acid and alkaline solution be so placed that their union be affected through parieties of an animal membrane, or indeed through any porous diaphragm, a current of electricity is evolved. This fact was first noticed by *Becquerel*, and has since been found to be true, not only with nitric acid and potass, during whose combination we observed this disturbance of electric equilibrium, but with all other acids and soluble bases. Now, with the exception of the stomach and the coecum, the whole extent of the mucus membrane is bathed with an alkaline mucous fluid, and the external covering of the body, the skin, is as as constantly exhaling an acid fluid, except in the axillary, and, perhaps, pubic regions. The mass of the animal frame is thus placed between two great envelopes, the one alkaline, and the other acid, meeting only at the mouth, nostrils, and anus.

Within the last few months, the results of some researches of *Leibig*, have rendered it very probable that a large proportion of the electricity of muscular structures is owing to the natural reaction of an acid and an alkaline fluid. Every one is aware that the blood, in a healthy state, exerts a decided and well-marked *alkaline* action on test-papers; now it is remarkable that although a piece of muscular flesh contains so large a proportion of alkaline blood, still when chopped up, and digested in water, the infusion, thus obtained

is actually *acid* to litmus paper. This curious circumstance is explained by the fact announced by *Leibig*, that although the blood in the vessels of the muscle is alkaline, from the tribasic phosphate of soda, yet the proper fluids or *secretions* of the tissues exterior to the capillaries is *acid* from the presence of free phosphoric and lactic acids. Thus in every mass of muscle we have myriads of electric currents arising from the mutual reaction of an acid fluid exterior to the vessels on their alkaline contents. Whatever may be the ultimate destination of this large quantity of electricity, it is at least remarkable that a muscle should be really an electro-genic apparatus. This view of *Leibig* on the condition of the fluid of muscles curiously helps in explaining the presence of electricity in them, announced by *Matteucci*. We have thus two sources of the electricity of muscles,—the effects of metamorphosis of effete fibres on the one hand, and on the other the natural reaction of the two fluids in different chemical conditions. It is certainly curious thus to find a muscle, an organ long regarded as the motor apparatus of the levers of our frames, invested with new properties. Its agency in generating electricity can no longer be denied, and I hope by and by to render it probable that the seat of the generation of animal heat is in the muscles.

In the course of twenty-four hours a considerable quantity of watery vapor exhales from the surface of the body. This has been variously estimated, and in all probability is liable to great variation; but from thirty to forty-eight ounces of water may thus be got rid of from the system.

The evaporation of this amount of fluid is sufficient to disturb the electric equilibrium of the body, and to evolve electricity of much higher tension than that set free by chemical action.

In summing up the foregoing facts we are, I think, justified in concluding that a mass of evidence has been adduced demonstrative of the actual existence of electricity in three states in the body:

1st. In a state of equilibrium, common to all forms of ponderable matter.

2nd. In a state of tension capable of acting on the electrometre, giving to the whole body a generally positive condition, and arising in all probability from the disturbance of the normal electric equilibrium by the processes of evaporation and respiration.

3rd. In a state of current, a dynamic condition, arising from the disturbance of the equilibrium by the union of carbon with oxygen in the capillary system, and from other chemical processes going on in the body; such currents, although *suspected* to be everywhere existing, having been actually detected between the skin and mucus membrane, the stomach and liver, and the interior and exterior of muscular structures."

Dr. Bird then proceeds to make the inquiry as to *what purpose* or *purposes* these currents subserve in the animal economy, but as the conclusions, although such as would naturally be arrived at by most reasoners, are not absolutely *demonstrable* beyond dispute or denial, it is not thought best to present them here.

In *Prof. Matteucci's* Lectures on the Physical Phenomena of Living Bodies, as published in the *Lancet* for July 31st, 1847, we find the following remarks on the *muscular electrical current*.

"Here is a very simple and easily executed experiment, which proves the existence of an electric current produced by uniting, by means of a conducting body, two different points of the same muscular mass, either of a living body or of one recently dead.

"A frog is prepared in the ordinary method of *Galvani*; I divide its pelvis in the centre, carefully detach the muscular part of the thigh, and divide one of the lumbar plexuses at its exit from the vertebral column. We have, in this way, the leg of a frog united to its long nervous trunk, composed of

the lumbar plexus and its prolongation in the thigh—that is to say, the cruval nerve. A frog so prepared I have termed the *Galvanoscopic* frog, which is extremely useful in researches upon the electric current. For this purpose it is only necessary to put the foot of the frog into a glass tube covered with isolating varnish, take hold of the tube with the hands, and afterwards bring any two points of the body whose electric condition is to be examined into contact with two different, and sufficiently distant points of the nervous trunk of the Galvanoscopic frog. If care be taken never to touch the body with any portion of the muscle of the leg, and if this be well isolated from the hand, we may be sure that the contraction produced in the Galvanoscopic frog is owing to a current engendered in the body touched, and that the nerve only conducts it and makes it evident by the contraction of its muscle.

“Having a frog thus prepared, I take some living animal, a pigeon, for example, and make a small incision into its pectoral muscle, and after carefully removing the integuments, I introduce the nerve of the Galvanoscopic frog into the wound.

“You see the contractions of the frog; if you consider its position you will be convinced that it is absolutely necessary to touch two distinct parts of the pectoral muscle of the pigeon with two distinct points of the nervous trunk. If I place the extremity of the nerve of the frog at the bottom of the wound, and another point in contact with the edges of the incision, or the external surface of the muscle, *the frog invariably* contracts. This experiment plainly shows the presence of an electric current which circulates in the nerve, since it is necessary to form a circle in which it may be included. If you have any doubt as to whether these contractions of the frog are really excited by a current due to the different parts of the muscle of the animal, you will soon be convinced of it by observing that no contractions are produced when the two points of the nerve are touched with a liquid, or with a per-

fectly homogeneous conducting substance. Do not suppose that blood is more suitable than any other conducting liquid to excite contractions in the muscle of the Galvanoscopic frog. If I place a drop of the blood of the same pigeon upon a plate of glass, and put two distinct points of this drop in contact with the nerve of the frog there is no indication of a current.

“The phenomenon you have just witnessed in this pigeon takes place quite as well as in every other animal, whether warm or cold blooded. I have lately proved that the Galvanoscopic frog gives the same signs when tried upon a wound in a human muscle. The contractions are also perceived when the nerve is placed in contact with a muscle removed from the animal. From all that has been said, it follows that the existence of a muscular electrical current is clearly shown, and that its principal laws are established.”

This current takes its origin in the electrical states produced by the chemical action developed during the nutrition of muscle. The blood charged with oxygen, and the muscular fibre undergoing changes by contact with this liquid form the elements of a pile; they are equivalent to the liquid acid and the zinc.

“From a knowledge of these facts, (which I have lately established by a great number of experiments,) I think it possible to give a very simple theory of the action of electric currents upon the nerves, and of the phenomena which it produces in animals.

“All experiments show that the current excites muscular contraction during its passage through the nerves. I am desirous to inform you of some rules which I deem of importance in the application of the current for the cure of palsies. *We should always begin by employing a feeble current*; this precaution seems to me now the more important as I believe I have seen a paralytic thrown into true tetanic convulsions under the action of a current furnished by a single element only.”

In the *Lancet* for Sept. 4th, 1847, *Prof. Matteucci* advances the idea that the nervous force is in nearly every respect identical with electricity, and to prove that it acts upon the nerves in a manner *different* from a mechanical or chemical stimulant, the Professor states these facts in the following form :

1st. "Electricity is the only irritant which has the power of exciting at one time sensation, and at another contraction, according to the directions in which it traverses a nerve.

2nd. "The electric current alone, when passing transversely through a nerve, does not produce any of the phenomena due to the excitability of the nerve.

3d. "The electric current does not produce any effects upon the *nerves*, or rather it occasions neither contraction nor sensation when its action upon a nerve is prolonged.

4th. "The electric current alone has the property of modifying the excitability of a nerve, even of destroying it rapidly, if it circulate in a certain direction ; and it preserves or augments it, on the contrary, if it circulates in an opposite direction.

6th. "Lastly, the electrical current alone has the power of awakening the excitability of the nerve when much enfeebled, after a longer interval of time than any other stimulant.

"These differences between the action which the electric current produces upon the nerves, and that peculiar to the other irritants, clearly prove that the first is more simple than all the others, and hence results the analogy between the nervous force and the electric current, noticed by the first observers of galvanism.

"But from this analogy should we conclude that the nervous force is nothing more than the electric current? We should guard ourselves against admitting this conclusion, *which has too often been considered as one of the experimental truths most clearly made out.*"

"But what relation exists between them? To answer this

question, I will here recapitulate, in a few words, the only *positive* conclusion that my extensive researches upon the electro-physiological phenomena of animals have enabled me to arrive at. There exists, certainly, an analogy between electricity and the nervous force, which, if it be not equally manifest, is, however, of the same kind as those which we know exist between caloric, light and electricity. When speaking of the phenomena presented by the electrical fishes, we see that the faculty which they possess of producing electricity is directly dependant upon the nervous system."

Prof. Thomas Watson, in the *Third American Edition* of his Lectures, page 228, is reported as having made the following remarks. When speaking of the constant *vibration* of the brain, or the continual variation in the *compressing* force exerted by the circulation of the blood, he says:

"It is not improbable that this continual variation of the compressing force *may be essential to the performance* of the cerebral functions. May not the brain be thus incessantly *charged*, if indeed it be, (as has been suggested by no less a philosopher than *Sir John Henschel*,) an electric pile, constantly in action, discharging itself by the nerves at brief intervals, when the tension of the electricity developed reaches a certain point?"

Wilson Philip says, in his remarks on the *vital functions*: "We have seen that galvanism is capable of performing all the functions of the nervous power properly so called."

In the *Prov. Med. and Surg. Journal* Nov. 15th, 1848, *William Davis, M. D.*, Physician to the Bath United Hospital, published a case of Articular Rheumatism, and, after detailing the circumstances of the case and the favorable result, he presents a short resumé of the then present knowledge of electricity possessed by the profession, as a remedial agent, and in its relation to living beings, he says:

"*Professor Matteucci*, of *Pisa*, to whom we are indebted

for nearly all the precise knowledge we possess on this subject, has shown that there is a constant current of free electricity traversing the muscles of all animals, even of man himself;—that the course of the current is from within outwards;—that the higher the animal is in the scale of being, the greater is the amount of electricity developed;—that any cause which has the effect of reducing the vital power of an animal, and impairing its due nourishment, diminishes, proportionally, to the extent of the change, the intensity of the muscular current;—that immersion of an animal in sulphurated hydrogen gas destroys the current altogether, and on the other hand, that anything which tends to increase the development of muscular power, increases also the electric current in those muscles.

It has been observed by *Pfaff*, and *Ahrens*, and also by *Humbolt*, as will appear from the following quotation from *Müllers Physiology*, that in rheumatic affections the electricity of the body is at zero. They say, “During the continuance of rheumatic affections, the electricity of the body seems to be reduced to zero, and to become manifest again as the disease subsides. It appears to *Humbolt* also, that rheumatic patients had an isolating action on the feeble current produced by a simple galvanic circle.”

Davy and *Faraday*, among their numerous additions to physical science, have proved this:—that whenever chemical action takes place, free electricity is produced; in fact, that chemical affinity and electricity are identical powers.

Now, from what has been said, it has been shown—

1st. That there is in all muscles a constant current of free electricity.

2nd. That the intensity of the muscular current bears a direct ratio to the vigor of the animal, and the degree of development of the muscular system.

3d. That immersion of an animal in sulphurated hydrogen gas destroys the current altogether.

4th. That in rheumatic affections, the electricity of the body is at zero, but becomes manifest again as the disease subsides.

5th. That a constant supply of arterial blood is essential to the contractile power of muscles.

6th. That wherever there is chemical action, free electricity is developed.

7th. That the conditions of free chemical action exists in muscles, by means of the alkaline fluid within and the acid fluids without the vessels.

“ Now if we keep before us the various facts I have adduced, and venture on an attempt at their estimation, the following may, perhaps, appear not altogether unreasonable.

“ 1st. We have the fact of a constant Electric current in the muscles of all animals. What are the conditions which diminish this current? 1.—A low position in the scale of beings. 2.—Imperfect developement of the muscular structure, with depressed vital powers. 3.—Immersion of an animal in sulphurated hydrogen gas. 4.—A rheumatic condition of the system. All, (it will be observed,) circumstances in which free action between the arterial blood, and the muscular fibre, is either interfered with, or destroyed, and all circumstances which impair the contractile power of muscles.

“ 2nd. What are the conditions which increase this current? Everything that is the opposite of the above; high vital powers, full developement of the muscular structure, in fact, everything that promotes the free action between arterial blood and the muscular fibres, everything that is essential to powerful muscular contractions.

“ These facts seem to point to a very close relation between muscular contractility and electricity, if they do not go far enough to show, that *the one stands to the other in the relation of cause and effect*; and they furnish very strong theoretical reasons, anterior to all experimental evidence, in favor of elec-

tricity as a medical agent, in certain forms of impaired muscular contractility."

In connection with the above, it may be well to record that at a meeting of the Academy of Science of Paris, held in 1849, *M. Arago*, read the following notes from *Humbolt*, which proves that he still is engaged investigating this matter, as one in his opinion of the deepest importance to the welfare of humanity.

"Neither the jeers of certain editors on German credulity, nor the negative results obtained by two of our first natural philosophers, have changed my conviction regarding the influence of muscular action on the movement and direction of the galvanic needle. We have recently repeated our experiments at *M. Reymond's*, and I invited *M. Mitscherlich* to attend, knowing his great dexterity in the management of delicate instruments. On giving tension to the muscles of the left arm, the needle was instantly made to move by *M. Mitscherlich*, and that in the direction predicted by *M. Reymond*, viz:—one indicating a current from the hand to the shoulder of the arm which was in action. On stiffening his right arm, *M. Mitscherlich*, made the needle move in an opposite direction, and traverse a small number of degrees, this arises from the fact, that the energy of muscular contraction is not always the same in both arms. Occupied as I have been, for more than half a century with physiological researches of this kind, the discovery of *M. Reymond*, has deeply interested me. *It is a vital phenomena* rendered sensible by an instrument of physics."

"In connection with the same subject, I may mention the result of some curious experiments recently made by *M. Ducros*. The conductors of a galvanometer were applied, one to the forehead, and the other to the neck. The needle remained steady, and marked forty degrees. The patient's thigh was now strongly pinched, and under the influence of the pain, the needle passed to eighty degrees, with great ra-

pidity. The experiment frequently repeated, gave the same results, and *M. Ducros*, hence concludes 'that all causes which increase vital activity, re-act upon the galvanic needle at a distance from the point of their immediate action.'"—*Medical Times*, July 14, 1849.

E. W. Tuson, Esq., F. R. S., in the *Medical Times* March 10, 1849, uses the following language:

"Electro-galvanism may be considered as a stimulant to the nervous system, a stimulant to the most minute fibrillæ, to the most delicate nervous texture, and likewise to the neurilema, or sheath of the nerves; *promoting speedy absorption*, so that, should the sheath, or even investing membrane of any nervous fibre, be thickened or enlarged by extravasation, or any other means;—by stimulating the nerves, by promoting absorption, and removing the obstruction, the part will assume a healthy action.

"Sometimes chronic inflammation, or even disease becomes established through a want of nervous energy to restore a healthy function, so as to bring the different tissues, comprising membranes, or even other portions of the frame, to a normal state, and to a proper degree of healthy action. Such may be the condition of the parts after a *sprain*; the ligaments have been lacerated, the synovial membrane injured, the tendons and their sheaths more or less bruised, the cellular tissue distended by extravasation; and it requires a large, or an increased action of the nervous power to restore these several parts to their former condition; but should the joints so sprained, be previously in a weakened state, a larger quantity of the nervous power still, will be required to bring about a cure."

"Electro-galvanism is an agent which produces absorption quicker than any medical means that we are acquainted with; and this can be proved by its application to indolent tumors, as it very frequently causes them to be absorbed most readily."

“We have then, an agent in Electro-galvanism, to act upon the nervous system, to excite its action, to restore it to a proper degree of energy, so as to accomplish a cure.”

M. Raciborski, having seen galvanism applied by *M. Bouillaud*, speaks very highly of it as an agent to promote absorption in any part of the system that is preternaturally thickened or congested;—*Gazette Med. Chirurg.*, as mentioned in the *Med. Chirurg. Review* for April, 1846.

“Since our notes were taken,” says he, “we have had other opportunities of applying galvanism in analogous cases, and always with the same success; but as at present, we merely desire to draw attention to this mode of treatment, we need not cite the particulars.

“Nevertheless, we cannot refrain from signalising the admirable affects which galvanism produces in the treatment of *sprains*. Every one knows that a sprain, often exacts much time for its cure. When it implicates the ankle or knee, it is not uncommon to see patients deprived of the use of their limbs during several months. It is the violent pain felt upon the slightest motion of the parts, (we are speaking of simple uncomplicated sprains,) which retards the cure. The other symptoms are of little consequence. The other symptoms are speedily dissipated. Now, just as we have seen in *lumbago*, so in sprains, *galvanism relieves the pain instantly*, and allows the patient to walk without lameness.”

Mr. Abernethy, in his lectures, used to make the following observations, which may be here quoted, as being peculiarly applicable to this subject. “Electricity,” said he, “is a part of surgical practice, that may be considered as *unique*. All other means operate on the *surface*; but electricity will pervade the very centre of the body. It may be so managed as to be made to pervade a tumor even in the centre of the abdomen. It is a species of *stimulation*, and may be applied in various degrees of force. You must modify it according to the tenderness of the part; if you stimulate the part too

much, you will produce inflammation, and the tumor will increase. This is the worst thing that can be done; it is this practicing without intellect that constitutes empiricism; it is blindly adopting, in this way, a power without a principle to guide it, that I abhor above all things.

“It becomes an agent of great practical utility in judicious hands, and under a variety of circumstances, can be employed with the utmost benefit.”

As a further elucidation of the *principle* on which we apply electricity for the removal of hypertrophy, or of congestion in any part, I will here quote from the editorial comments in the *New York Journal of Medicine*, and the *Collateral Sciences*, vol. 9, new series, page 394. In a review of *Simon's Pathology*, the writer says:—“It is a positive absurdity to speak of the reflex-relaxation of the arteries in hypertrophy, and of their reflex-contraction in atrophy. There is no necessity for this special and anomalous endowment of the nervous system to explain the phenomena of inflammation or hypertrophy. *It has been proved beyond a query, that the muscular coats of arteries is supplied with nerves; that they regulate the calibre of the vessels in their physiological and pathological state; that the primary effects of stimulation, is contraction of the artery, and the secondary, delitiation. Weber witnessed this contraction in the use of galvanism, by Wharton Jones, on the application of a solution of common salt to the web of a frog's foot, (Guy's Hospital Reports, vol. 7.) M. Simon has repeatedly seen the same. Weber, also observed, that when the galvanic current was too powerful, or too long continued, the artery lost its power of contraction for a time, and yielding to the pressure of the circulation, presenting an aneurismal bulging.*”

In the *New York Journal of Medicine*, for May, 1847, Dr. Dewees, in a paper “On the Use of Galvanism, in the treatment of certain nervous diseases,” makes use of the following remarks:

“ Owing to the difficulty attending its administration in the early period of its discovery, the trials of its efficacy were greatly limited; and even at this day, there has been but little advance made towards its *rational* therapeutical exhibition, based on physiological principles, or the observation of its effects over certain pathological states.

The *machine* is now restricted in my practice to its power as an *exercising* agent, limiting the duration of its application as may be required by the necessity of the case.

The aim of all the mechanics in the construction of their different patents, has been to increase the number of successive shocks in a given time, which in a therapeutical exhibition, for their purpose of exercising power, should be the very contrary; as any one familiar with their use must have observed, that so far from the muscles receiving the alternate state of contraction and relaxation, they are thrown into a state of great rigidity, the alternation *not* taking place, as observed in the natural exercise of the parts. In all this, however, we have but the piecemeal exhibition of the galvanic current, as regards its chief remedial value, as the changes which ensue are owing to the *electric causation*, and not to the *shock*, which, as above observed, should only be employed when exercise, or a *sudden* stimulus is required.

Unfortunately, there exists in the minds of most men, the idea, that whatever is *powerful*, must be more beneficial than anything that is not so strongly manifested to the senses. The experience of trial is only necessary to decide the contest.

I therefore prefer and use the *continued galvanic current*, dispensing with the magnet entirely; although by a very simple manipulation, the current can be interrupted at pleasure, so that, if requisite, the spasmodic rigidity or alternate actions of the muscles can be readily obtained.

To any person using galvanism, I would again observe,

that the degree of benefit must not be thought commensurate with the muscular tension; and this physiological fact should be strongly impressed, that *the organic force is always exhausted by the over-exercise of the functions.*

When the muscles are to be solely acted upon, their *exercise* being the desired object, quantity is requisite, but where the organic forces or nutrition of the part are required to be stimulated, intensity is necessary.

The passage of the current upward or downward, makes every difference. In the paralysis resulting apparently from lesion of organic nerves, or where conjoined with loss of power, the arm or leg dwindles, the *negative pole* should be rubbed over the surface, whilst the positive is attached to the receiver.

On the other hand, in *muscular* paralysis (in contradistinction to the other, which I termed *organic* paralysis), the passage of the current is reversed. The investigations of *Matteucci* showed there were two currents in the body, and from my observations in practice, I am persuaded of the truth of the assertion. One being the muscular, and the other the organic current. The results of treatment consort with this, as I find in 'organic paralysis' the benefit from the passage of the *positive* current *upward*. Whilst in muscular paralysis, a contrary direction is to be preferred. This has been satisfactorily shown to many of the medical gentlemen who have visited me to witness the truth of the statement. The sensation is perfectly distinct also. My usual mode of making this evident, is to place the hand of the person in a copper receiver containing salt water, and having the positive pole attached. By rubbing the exposed back of the hand or arm with the opposite pole, a smart tingling or burning sensation is produced, increasing according to the number forming the series, and frequently producing a small papular or pustular eruption. By reversing the poles, the

burning is scarcely perceptible, but the muscular contractions of the fingers are stronger."

It may be doubted if *Dr. Dewees*, has clearly explained the cause of the phenomena in the above experiment. There can be no doubt that the *negative* pole attracted the *positive* electricity from the hand or arm to which it was applied, but that all, or the greater portion of this positive electricity was absorbed by the hand which was immersed in the copper receiver filled with salt water, does not appear consistent with the fact, that the burning sensation and the eruption "increased in proportion to the number forming the series." The negative pole applied to an individual, or an organ, acts by its attraction for the positive electricity, to abstract that from the organ or the person, in the same manner that a cake of ice applied to a part, tends to abstract caloric from that part, and to produce an equilibrium between the two substances. So far the analogy is perfect, but as electricity is of a more subtle nature, it is abstracted much more readily, and also much more readily rushes in from any other body in contact with the one that has parted with a portion, and thus the equilibrium between the entire series is more readily maintained. The larger the number of the individuals in the series or circuit, the greater the amount of positive electricity that could be abstracted by the application of the negative conductor, and *thus*, the more intense the phenomena produced.

As the nerves are the best conductors of the electric fluid, it, of course, traverses them more freely than any other structure, and when following in the natural course *toward* the nervous extremity, there would be no interruption to its free transit through the muscles, and no muscular contraction or other noticable phenomena, until it arrived near the extremity of the nerves, when, as the conductors are nearly or quite broken, or terminate under the cuticle,—the usual

phenomenon of an interrupted current of electricity would be presented,—heat, burning, and decomposition of whatever may be between the extremity of the conductor, and the negative poles,—or in those cases where the amount of electricity was sufficiently large, small papular and pustular eruptions.”

Dr. Dewees continues: “By reversing the poles the burning is scarcely perceptible, but the muscular contractions of the fingers are stronger.”

“We may then say, that the nervous nutritive function ensues more rapidly from the capillary expansions on the surface of the various organs, the tide, being as it were, from the peripheries upward; whilst muscular propogations take place from centres downward. When the ulner nerve is struck, the propagation of its influence is downward to the extremities of the fingers, but in epilepsy, the *aura* always travels upwards.

“I will now proceed to ‘Medical Galvanism,’ and point out in a few words, as far as my experience goes, in what cases, and under what intentions it should be used.

“Nature constantly indicates the mode for curative actions, and the more closely we imitate and interpret her proceedings, having a careful regard to the discrimination between the sanative efforts, and the diseased actions, the more certainty will be gained in the result of treatment.

“We will take a case of paralysis affecting the arm, in which the muscles become flabby and apparently lengthened from their inherent contractility being impaired, whilst the circulation through the tissues is lessened, owing to the *impoverished nervous supply*, all *voluntary* motion being lost.

“Friction and strong liniments are applied as vivifying stimuli, in order to accelerate the affinities (vital or chemical), by which the due composition of the tissues is maintained. In this manner the organic force is increased, and the influence so given, is steadily generated. After a time the muscles become more firm, by the addition of real con-

tractile particles, and the arm begins to recover its lost power, nature carefully regulating its action to the improving condition of the tissues. For in those cases, where recovery takes place, we do not see those violent muscular contractions and spasms ensue, as in simple 'muscular paralysis,' but the muscular changes and additions are quietly induced, the movement in the arm being at first very slight. In the *continued galvanic* current, we have a representation of this reparative force; or in other words, by it, the combinations essential to the nutrition of the affected parts are produced and sustained, real muscular and other component parts being added.

"To the vital stimulus of electricity, must be attributed the healthful organic changes; but as these are not affected very rapidly, the aim should not be, to consume the now enfeebled organic force, by any *over exercise of the functions*. And this must ever happen, when the *machines* are called into use, before these very changes take place.

"On the other hand, much benefit has been, and will be derived, from the *interrupted* current in those cases where the muscles remain solid, their nutrition not being interfered with, but apparently increased. Here the functional exercise of the limb is called for, *as a waste of organic force is demanded in proportion to the supply*. The objective signs, therefore, are of much importance in the treatment, as in some cases of hemiplegia we have the two states existing at one time—the arm being flacid and dwindled, whilst the leg is firm, and even sometimes larger than the sound side. The *local* treatment in these cases, by the galvanic current, must be adapted to their relative states. The arm must not be shocked, but a *gentle uninterrupted current* should be made to traverse it, the negative pole being applied over the spine and arm—whilst the positive is to be attached to the receiver in which the hand is placed. The leg can be *exercised* by reversing the current, as above explained.

“I prefer *pure galvanism*, if it can be obtained, to the exclusion of the magnet. In cases of exceeding prostration, when the pulse was extinct, I have witnessed a return of impulse take place in a few minutes, and the sense of weakness fully as well overcome, as by the administration of brandy or wine.

“The most sensibly striking phenomena, resulting from the application of the *continued galvanic current*, are the *increased activity of the secretions*, and the reduction of engorged parts. In all cases of congestion, with infiltrative plasma, the normal nutrition of the part is interfered with, and if chronic, the parts are said, in common language, to be hypertrofied, although no real nutrition takes place, but an interstitial deposit ensues, increasing the *bulk* of the organ, but not adding anything to its structural composition.

“In the most frightful cases of *tonic spasm* from *uterospinal* causes, the *continued current* has, in my hands, proved a perfect charm, as witnessed by our distinguished townsmen *Drs. Mott and F. U. Johnston*. In this extraordinary case the *interrupted current* proved highly injurious, causing convulsive actions, whilst by the simple galvanic current the spasms would be immediately broken.

“In *chronic constipation* from enteric inactivity, the result of the application can be readily made out by reflecting on what has been said of its stimulant power.

“In many cases it has succeeded, unaided by other treatment. There is in most all cases of chronic constipation excessive dryness, not only of the fæces, but of the mucus surface of the intestines. This state is speedily remedied by the *current*, the secretion of the bowels being announced in a few days.”

In regard to paralysis of the bowels, and the means proper to be used to overcome the constipation that results therefrom; the views of *MM. Emery, Cloquit and Dubois*, as embodied in their report to the French Academy in 1826, as

far as the *power* of galvanism to produce the desired effect, accord so closely with those advanced by *Dr. Dewees* that it may not be improper to include them here.

They state that by passing the current from the mouth to the anus, by means of a powerful battery, there was produced a sensation of heat at both ends, and motion, through the whole extent of the alimentary canal, which motion continued after the cessation of the current, followed quickly by a foecal evacuation. In one instance the evacuation took place immediately after the contact of the poles.

MM. Magendie, Aldini, Achard, of Berlin, *Mr. Clark*, of Dublin, and others have produced similar results.

In these cases the *negative* pole should be placed at the lower extremity of the intestinal canal, and the positive placed in the mouth or upon the back of the neck.

In cases of obstinate paralysis from injury to the head or the spine, or from inaction of the intestine, it may be well to keep up a feeble, but continuous current, by placing a silver plate, or a piece of money in the mouth, and a zinc plate over, or a conductor of zinc, within the rectum; the two to be connected by means of a wire covered with silk. By this means the *positive* current will be spread upon the mucus lining of the canal, and pass downward, while the *negative* will return through the insulated wire. There can be no doubt that galvanism, induced in this manner, will be found more effectual, and less liable to objections, than electricity or magnetism from machines.

Dr. Dewees continues: "That the increase of the secretion ensues can be readily proved by placing the plates on the opposite cheeks, when the saliva, with its peculiar acidulous taste, (like that from slight decomposition,) will be found to flow copiously into the mouth. By reflecting on this, and what has been above said, we can deduce this *general principle*, and its application:

"That by *nervo-stimulation* the secretion of a glandular

organ may be excited, and that when an organ is inflamed, or has an undue nervous supply, its secretions being locked up, that stimulation will prove injurious by addition to the exciting cause, and hence the treatment must be depletory or directly sedative."

Wilson Philips says: "I cannot help regarding it as almost ascertained, that in those diseases in which derangement is in the nervous power alone, where the sensorial functions are entire, and the vessels healthy, and merely the *power of secretion*, which seems immediately to depend upon the nervous system, is at fault, galvanism will often prove a valuable means of relief." *Vital Functions*, 2d ed. p. 331.

Dr. Dewees says: "To sum up, I will add wherein I have derived advantage from the employment of galvanism.

In congestions of the mucus membrane of the throat and fauces.

In the earlier stages of tonsillar enlargement.

In chronic laryngitis.

In deafness, arising from chronic congestion of the mucous lining of the Eustachian tube, etc., from deficiency of nervous energy.

In some of the kidney and bladder diseases from the same cause.

In some cases of rheumatic facial neuralgia, otalgia, etc.

In chronic erysipelatous inflammation, or congestion of the face.

In headache.

In dyspepsia, owing to imperfect nervous action.

A singular effect is produced after an over-hearty meal, by applying the positive pole over the cervical region of the pneumo-gastric, and the negative over the stomach, when relief is almost immediately afforded.

In several cases where adhesions from periostitis had taken place, I have succeeded in breaking them up; the principle consisted in stimulating the part by which the capillaries and

lymphatics should deposit, while the veins and absorbants should carry away old matter.

In some cases of amaurosis I have witnessed benefit from it, when other remedies entirely failed.

As regards the question whether the nervous power and galvanism be identical, it may *set at rest, as far as remedial application goes.*

I do not consider them *essentially* the same, but attribute to the electric passage, through certain disordered nerves, those nutritive changes necessary to the generation of nervous power. It seems to invite a return of nervous action in the nerves, as it causes the iron to become magnetic, although free from it previous to its passage.

After the foregoing remarks, *Dr. Dewees* considered those cases of nervous diseases, that have their seat in the cerebral, and spinal nervous centres, and considers the value of the various modes of treatment that have obtained for their relief. Although these considerations and remarks are of great value, space cannot be allowed for their quotation here.

Then follows remarks on diseases resulting from derangement of the great sympathetic nerve and its branches, *constipation, diarrhœa, hepatic* derangement, and in short, diseases of any or all of the abdominal or pelvic organs, and also irritations of the mucus membrane at a distance from the abdomen. He says:

“Intestinal, uterine, or vesicular paralysis, frequently ensue from concussion or other spinal injury, giving rise to some of the most indomitable forms of functional disorder. The most remarkable, and severe case coming under my notice, resulted from a sudden fall across the arm of a rocking chair. The concussion on the spine was so great, that insensibility with trismus ensued instantly, followed by violent muscular spasms and convulsions resembling those in hydrophobia. The result of this accident was paralysis of

the bowels, bladder, and the lower extremities, with *tetanic spasms*. She was perfectly restored under the treatment employed, consisting in the free use of internal and external stimulants, and the application of the *continued galvanic current*. The vesicular inertia was overcome by passing a galvanic stream from the rectum and spine to the super-pubic region, and through the urethra by a silver catheter, the positive pole being placed upon the spine.

I was led to employ galvanism in vesicular paralysis, from the result of some of my experiments on animals with the currents. By passing a *strong stream* (interrupting it at pleasure), through the lower lumbar and sacral nerves of animal (dogs), I have caused the bladder so to contract, that on *post mortem* examination it seemed more like a hypertrophied uterus. In these instances, the urine was jetted with force, or oozed steadily out.

In some of the journals I had seen it proposed to employ galvanism as an antidotal means to the effects of strychnine. According to my knowledge and experience in the action of both antidote and poison, I considered the proposition dangerous, not only on account of the apparent similarity of convulsive action produced by each, but chiefly on account of the rapid *absorption*, that might ensue from the galvanic influence. I subjected it to proof by obtaining a cat, and placing five grains of strychnine within its mouth. Sneezing was the only effect produced for nearly an hour. I then secured the animal, and having placed a metallic tube in the rectum, in connection with the battery, I touched the tongue with the other pole. Instantly the peculiar spasmodic action of the strychnine resulted, and continued with great violence till death ensued in about two minutes.

By carefully reflecting upon these results, the rational application and *modus operandi* of those remedies, having control over certain vesicular and uterine affections resulting from some known cause, can be readily made out; and hence

it is by the employment of a remedy of known physiological action, as is to be found in a galvanic *current of proper intensity and quantity*, that the specific influence of many articles in the materia medica can be discovered, and I need not say that by so doing, many changes will be forced upon the mind for recognition. In other words, by selecting those cases cured by the administration of a certain remedy or remedies, and finding like cases cured by the application of a galvanic current, the curative action of the medicine can be learned, and the remedy, styled sedative will be found stimulant, and the counter-irritant become a nervo-stimulant.

I do not propose galvanism to the exclusion, or even as superior to other means, but I hold it preferable not to punish by internal drugging, a man's stomach for his bodily infirmities, if an outward application of a current will answer the same purpose. Galvanism is no panacea, but has been and will be found a most valuable remedy in certain cases.

In conclusion, I will concisely state, that in the employment of galvanism in the various forms of paralysis, the diagnoses between 'organic' and 'muscular' paralysis must be well established, in order to obtain satisfactory results. In the former, the positive current must be passed from the extremity to the spine; in the latter, from the spine to the extremities. In all cases a mild current is to be preferred at first, and its continuance must be subjected to the capacity of the patient at the time, and the susceptibility of the part affected. I should advise in chronic cases, the *long continuance of a feeble stream*, say from one to six hours—in preference to the more powerful action of an increased current for a shorter period. In passing it through the head, great care must be exercised, and a *light power should be used, and only for a short time*, constantly withdrawing one of the sponges from the surface. By means of the galvanic current, I have been enabled to form a surer diagnosis as regards the loss of power, &c., being owing to organic

difficulty, or functional disturbance. I have shown this particularly in those cases where the tongue has been affected, the words being completely or almost inarticulate. In some, after a minute's application, the power to pronounce the word distinctly for a time has returned, and by daily administration has been permanently improved. It will be found particularly servicable also when deglutition and laryngeal expectoration, and the power to free the mouth of the saliva, are deficient."

In proof that *Dr. Dewees* is correct in his views on the analogy between the action of strychnine and galvanism, when administered in over doses, the following facts are presented.

In the *London Lancet* for April 13, 1844, we find a notice of a series of experiments performed by *M. Declos*, on dogs, rabbits, and guinea pigs. He poisoned these animals by administering to them *strychnine* and *brucine*, and then electrified them. He found that the application of *negative* electricity—or the *abstraction* of electricity from them, by means of an electrifying machine, that the symptoms of poisoning subsided, and the life of the animals was saved. The *positive* electricity, on the other hand, by adding to that already generated by the action of the poison upon the tissues, increased the muscular contractions produced by the poison, and *hastened* the death of the animals.

In *Dr. Horatio Adams'* Report to the American Medical Association, on the action of water on lead pipes, and the diseases proceeding from it, is the case of *J. S. Copley Green*, who was poisoned by the use of water impregnated with lead, which produced paralysis of both legs, from the body to the toes. He says:—

"The treatment was chiefly the use of strychnine and electro-magnetism. With the last I began early in July, applying it to the whole limb, from the buttocks to the foot, putting on the metallic slipper. *The effect was not good, for it*

increased the spasmodic action of the limbs, and especially the foot. But afterwards, on applying the wires to the extremities of the weakened muscles, and under the influence of strychnine, I found a happy result, for it stimulated them into action, without affecting the healthy muscles.

Early in August, I read *Dr. Dana's* translation of *Tanquerel's* invaluable work, and proposed to you, to try the effect of strychnine, and with your approval I began, I believe, on the 2nd or 3rd day of August, first with a pill of one sixth of a grain, the next day, a pill morning and evening, of one-sixth grain each, and on the 6th, one-third of a grain in the morning, and one-sixth at night.

The effect of the first dose which I took, was *very similar* to that of electro-magnetism, particularly the feeling in the foot, it was like the rapid succession of little electric shocks in the foot, with a sort of creeping sensation through the limbs. The larger dose on the 6th, I took at 10 A. M.; at noon the muscles about the mouth twitched spasmodically; at half-past two, P. M., there were very strong contractions of the muscles of the lower limbs, till three o'clock. Twitchings about the mouth continued till between four and five, whenever I attempted to speak."

It is evident from the above, that the application of the electro-magnetism was not applied with any special regard to the results of the experiment of *M. Declos*—neither are we told *in which direction* the current was made to travel when it was applied.

Another very close point of resemblance between the action of positive electricity, and strychnine upon the living organism, is the fact that, each acts more powerfully upon such parts of the system as is endowed with the smallest amount of vital activity.

The reason for this, as far as electricity is concerned, is perfectly apparent from the very nature of that agent. It invariably tends to an *equilibrium*, either in vitalized or non-

vitalized structures, and therefore, when artificially applied to the system, it will tend to those organs that possess least of this, or of the vital principle, which, in so many respects, this is analogous to. Should it be established that strychnine acts upon the system, by producing a *change* in the structure or atoms of the parts, and chemically generates free electricity, it will be seen, that the action of the two agents, not only bears a close resemblance, but are identical in their nature, and therefore *must* be governed by the same laws. In the present state of our knowledge, we can only record the *facts*, and leave for future researches to determine the *reason* or law, on which these facts are based.

Recently in an article published in the *New York Medical Gazette*, for March 1853, *Dr. Dewees* repeats his confirmed opinion of the power and value of the galvanic current, and among other remarks highly in its favor, he says:—

“In suppression of the menses, galvanism is certainly the most effectual emenagogue, especially when circumstances permit of its direct application to the uterus.

“In Prolapsus Uteri, I have experienced essential benefit from the cautious employment of the galvanic current, from the tonicity given to the vaginal tissues; and when attended by enlargement of the uterus, the power of producing a gradual lessening of the weight, by absorption, has served to render the use of the current of double advantage. It is unnecessary to continue the application over six or eight minutes at a time, as a longer action might be too stimulant to uterine and ovarian tissues, producing the catamenia at too early periods. When sleeplessness attends, the application will be better at night, as it causes, in most instances, a calm and quiet slumber.

“Rheumatic dysmenorrhoea has, in my hands, yielded to the faithful application of the currents, which should be employed during the intervals. During the attack, my treatment consists in the outward employment of the saturated

Tinct. Belladoni, above the pubes, and on the sacral spine, the parts being first well reddened by mustard, or absorption being quickened by the action of the battery.”

KIND OF GALVANISM, NECESSARY TO CURE DISEASE.

It will be perceived by the reader who has perused the preceding pages that *very many* of the practitioners who have made use of galvanism in the treatment of diseases, have earnestly cautioned the profession against making use of it in a state of too great *intensity*.

Like many other agents of great power, more harm may be done by its injudicious application than is apparent to the beholder; and there can be no doubt left on the mind, after perusing the reports of cases in which the *machines* have been used, that in too many instances where death has followed its application, instead of restoration to health, that the unfortunate result, *might* have been produced by carrying the application of the machine too far, or by applying magnetism of too great intensity, and with too much rapidity, when, had its application ceased at the proper period, the patient would have been preserved through this agency.

There can be no doubt that a moderate application of galvanism, will greatly increase the vigor and growth of a plant, yet no one would suppose the lightning discharges of this element from the atmosphere during a storm upon the devoted monarch of the forest, could increase *its* vital powers.

Although, as above remarked, the evils resulting from the application of too powerful shocks, or those of too long continuance, have been mentioned, and cautions given, by the most of those who have given their views to the public, yet

these cautions have failed to produce the proper impressions ; for the strife still continues among mechanicians, who manufacture the instruments, to make machines that shall exceed in the power and the frequency of the shocks, all those that have been made ; and among the ignorant quacks who are accustomed to use these machines without any rules or principles of application, and for the cure of all kinds of disease, it may well be said that their practice is *shockingly* barbarous and hurtful.

Dr. Golding Bird, in *Guy's Hospital Reports*, endeavored to impress the necessity of caution in the use of galvanism, and it is probable that his teachings led to the invention of various methods of applying this agent without the aid of the machines, or by means of simple friction ; among which, what was styled the *Electric Cloth*, at one time possessed considerable repute.

This was described in the *Medical Gazette*, for February 18, 1848, as being made by taking either cotton or linen, and steeping in a mixture of 5 parts mono-hydrated *sulphuric acid*, and 3 parts mono-hydrated *nitric acid*. After the cloth has lain in the mixture for an hour, it is thoroughly washed in water, and then soaked in weak ammonia, and again washed. It is afterwards plunged in water slightly acidulated with nitric acid. The fabric when prepared is inflammable, and explosive, like *gun cotton*, and carelessness in its use might lead to serious accidents.

M. Meynier, who has used this *electric cloth*, has been able by means of friction with it, to generate large amounts of electricity of a low degree of tension ; and he, and others have derived great apparent benefit from *local* friction with it, in various disorders.

That friction with this, and other cloths, like dry flannel or silk, will generate electricity sufficient to greatly increase the healthy action of a part, or of the whole system, will be apparent to those who consider that if a person be placed upon

a stool, with glass legs, or otherwise isolated, so that the body may be charged with electricity or galvanism, that the organs of sense, as of sight, hearing, taste, or smell, become remarkably acute,—that the circulation becomes quickened—that the mental faculties are exalted, and that the secretion from the skin, the kidneys, and in short, of all the secreting organs, becomes much more active than natural.

If there be from any cause, a low degree of vital activity in the system, while the integrity of the vital organs remain, we may so apply galvanism or electricity as to supply the place of the *vis nervosa*, until the system has time to rally, and the usual functions of the body can be carried on without this artificial aid.

A volume might be filled with the reports of well authenticated cases in proof of this, and, as the statements may be new to some who have not bestowed much attention to this matter, a very brief abstract of a few will be inserted.

These cases prove, to the satisfaction of the writer at least, that many times, persons have been greatly benefited by the electricity that has been imparted to them through friction, when neither the patient or physician have been aware of *what* it was that produced the beneficial result.

The following well-established case of *recovery from drowning*, is condensed from the "Medical Communications of the Massachusetts Medical Society," Vol. viii., No. 3. In the course of an "Address on Medical Jurisprudence," *Prof. D. H. Storer, M.D.*, quoted from the *Northern Lancet*, a communication from Charles McNeil; Esq., of Charlotte, Vt., in regard to a son, who, in August, 1830, fell from a boat in the Lake Champlain, "where he must have lain half an hour, if not longer, when he was brought to the surface. I received the body; it was rigid and cold, as were also the limbs; a bluish cast was spread over the countenance; the deep solicitude of a father discovered no signs of life—no heat; the heart was stilled and the lungs quiescent."

“The body was placed on a bed,” (feathers are non-conductors, therefore, it was isolated), “some of the neighbors were directed to *rub it briskly with flannel cloths*;—an order which they obeyed with great reluctance, from the thought of performing this office on a corpse; and I admit that I somewhat entertained the same opinion. Still I would fain hope, and urged on my friends the continuance of their exertions; the friction was persevered in; warm flannel sheets were applied in rapid succession.

“This treatment was continued for *thirty or forty* minutes, when we were gratified by hearing a feeble murmur in the throat, followed soon after by a slight quivering of the lips. The case, however, was enveloped in doubt and obscurity for a long time, as the recovery was extremely slow.”

Of a similar character, was the following case, under the care of *H. G. Douglass*, Physician to the Stranger's Hospital, Havre. It is taken from the *Medical Gazette*, of December 23, 1842, being an extract from a letter from *Dr. Ladd*.

John Wilson fell from a vessel in a state of intoxication, on Sunday, where the water was from 12 to 16 feet deep,—“Some stragglers saw the accident, and gave the alarm. Two sailors who had *not* perceived it jumped in at hazard, but were unsuccessful in finding him, owing, as it appeared afterward, to *his having sunk into the mud*. A man was then sent to seek at one of the guard-houses for a grappling iron; he was unsuccessful at the two first places, but succeeded at another, and Wilson was hauled by the iron hooking into the waistband of his trousers. It was evident from the appearance of his head and the superior extremities, that he had sunk into the mud. He was carried to the guard-house nearly opposite the vessel, and from thence he was conveyed on a stretcher to the Stranger's Hospital, a distance of half a mile, at least, from the dock.

“On his being brought in, at 10 minutes past 3 P. M., I directed him to be stripped and laid on a bed. *There was not*

the slightest appearance of animation." Water was heated, and bags of hot sand, as well as dry friction with *hot flannels* were constantly applied, as well as lavements of hot water, and others to which sp. terebinth. and tinct. of assafoetida were added.

"Inflation of the lungs was tried, but not persisted in, it not appearing to be attended with any effect, and interfering with the rubbing, *on which I placed great dependence.*

"I was frequently on the point of abandoning all hope, but I saw, or thought I saw, *slight convulsive twitching,*" (indications of the action of electricity,) "in the right inferior eyelid, and around the mouth, *similar to those caused by weak galvanic shocks on muscular fibre.*

"This idea, perhaps, animated me. The relays worked well, and at a *quarter past 11 at night* we were amply repaid in seeing respiration, *eight hours and a half* from the time of immersion, though extremely feeble, established."

In a note, *Dr. Ladd* remarks that:—"Electricity should always be employed in cases of suspended animation," it apparently not having occurred to him that the effect produced by the *dry rubbing with flannel* must have been electrical, and that the phenomena observed were strictly of that character.

In the above narrated cases *something* gave activity and vital energy to the system, when animation appeared to be totally suspended from asphyxia:—the phenomena manifested pointedly indicated electricity as that something. The following experiments, detailed in vol. 4, p. 482, of *Sturgeon's Annals of Electricity*, prove that electricity *will* produce such results.

Three puppies were drowned in cold water, in which they were allowed to remain immersed for the space of fifteen minutes. All vitality had apparently ceased—no motion being perceptible. They were taken out of the water, and one of them was submitted to the influence of electricity and

it was *restored to life*. The remaining two were left without any effort for their restoration, and they continued to remain dead.

After this, three other puppies were drowned in *warm* water, that the mobility of the organs might not be impaired by their becoming cold. They were allowed to remain in the water *forty-five* minutes, and after that, two of them were restored to life by the application of electricity.

Other experiments have been performed on animals that clearly prove that animation may for a long time be suspended, and yet life restored. In fact, the Journals contain the details of so very large a number of cases of *drowning*, or of asphyxia from causes impeding respiration, as well as cases of alarming depression of the vital powers from poisoning with opium and its preparations, that it would seem unnecessary to occupy space in their repetition.

Lest, however, these pages may fall into the hands of those whose recollections are not fresh and clear in regard to the efficacy of this agent in those cases,—and also lest such might be induced to make use of a more *powerful* current than would be required, it is decided to quote the following:

Dr. Ferguson, Surgeon to the Westmeath Dispensatory, in the Dublin Medical Press for July 1st, 1840, narrated a case of apparent death from drowning, when he applied electricity to the chest, for the purpose of inducing artificial respiration. He says:—

“This case must fully establish the utility of voltaic electricity in restoring suspended animation from immersion in water; by acting indirectly on the phrenic nerve and eighth pair, and thus exciting the action of the heart. It will also go to prove, in my opinion, that it is *not* necessary to transmit along the channel of the nerves, *this most wonderful agent as a substitute for nervous influence.*”

Opium, when it destroys vitality in poisonous doses, seems to produce death by putting the different organs, and the

whole system in a state of *sleep*, inertia, and not by inducing any change of structure, except perhaps in the brain, and the nervous ramifications. In these cases, the great sympathetic nerve, and its branches, seem to be less readily brought under the control of the poison, than the cerebro-spinal nervous system, as is evidenced by the labored action of the heart and lungs, long after it is impossible to induce voluntary motion or consciousness on the part of the patient.

If this view be correct, that the poison *primarily* does not produce any organic change, then any extraneous application which will, for the time, supply the place of the *vis nervosa*, or the vital motive power of the system, will keep the animal machine in motion, or *restore* it to action, when motion has been for a short period, suspended, and will counteract the anodyne poison, and restore the patient to life and health.

It has been already conclusively proved that *Galvanism* will stimulate the muscles to action, and the different organs to the performance of their usual labors, and hence, we might reason *a priori*, that it would be the proper application in cases of poisoning by opium and other narcotics. To prove that such reasoning is well founded on facts and experience, I would like to cite a few instances of the efficacy of this agent, in such cases, but want of space will forbid more than a simple reference to them.

The reader is requested to turn to the Medical Gazette, Dec., 23, 1842; Braithwait's Retrospect, part 7, p. 32; the Dublin Medical Press, April 25, 1846; Provincial Medical and Surg. Journal, June 7, 1846; London Lancet, June 19, 1847; West's Reports on Midwifery; the Medical Gazette for Sept., 17, 1847; Transactions of the College of Physicians and Surgeons of Philadelphia; the New York Register of Medicine and Pharmacy; and in short, almost any medical periodical within the past ten years—and he will hardly fail of being convinced of the power of galvanism to restore the vital energies of the system, when there is no fatal organic lesion.

ABSORPTION.

NOTWITHSTANDING that the fact, that electricity is far more active as an agent, to promote the absorption of any adventitious substance that may have been deposited in any part of the human structure, than any other known agent, has been both directly and indirectly asserted by many physicians and surgeons, yet it may not be unadvisable to present this matter again to the attention of the profession.

It is well known that *scrofulous* deposits are frequently to be found in various organs, producing from the irritation they cause, diseases that are always troublesome, and very often fatal. Fatal, usually, from the very low grade of vitality, if any, in the deposite, and the consequent difficulty with which remedial agents are made to act upon them.

This is not considered a proper place to discuss the nature of scrofulous depositions, or to advance proof in favor of the idea that their nature, and manner of deposition are essentially identical in whatever structure they may be found.

There can be no doubt that the first step toward removing tubercle from any part of the system, is to break down the tuberculous structure, and immediately, or at the same time, stimulate the vessels of the parts to an increased activity, so that as fast as the tubercle is softened, the atoms shall be removed and thrown out of the system. In proof that electricity may be relied on to produce these effects, I will refer to a case published in the *Medical Times*, May 27, 1848, by *F. A. Bully, Esq.*, Surgeon to the Berkshire Hospital.

This was a case of *scrofulous swelling of the knee-joint*, occurring in a young woman, the swelling being of three months duration. *Mr. Bully* has treated her for sixteen weeks, with sulphur, carbonate of iron, nutritious diet, and such exercise as she could take, in the open air. At the end of this period, and while the knee was no better than at first, he commenced the use of electro-galvanism. He says:—

“ After the electro-galvanism had been applied every other day, for a fortnight or three weeks, I could observe a very perceptible alteration in the shape of the joints, the more natural quantity of the synovial fluid which remained in the cavity, up to the time she left the hospital, having become absorbed, and I could plainly perceive that the rounded appearance occasioned by the more solid deposite in the ligamentous tissues were gradually becoming less and less apparent, until at the end of about five weeks, she could walk about on the limb without any particular pain or stiffness in the joint, which, by admeasurement, did not exceed, to any apparent extent, the size of the other knee; it was, in fact, evident that the morbid deposite, which I could have no doubt was of the same solid character as usually accompanies the more advanced forms of scrofulous exudations, had been absorbed and taken away by the process employed.”

Should we rely on the testimony of those who have made most use of electricity in the cure of disease, (and there is no apparent reason why their statements are not to be believed) we should come to the conclusion, that there are no class of cases, where beneficial effects are more certain to follow the treatment, than have followed the application of this agent, to disperse and remove tuberculous depositions wherever they may be.

In the *third* number of the *Southern Journal of Medicine and Pharmacy*, *Dr. Ogier*, relates the a case of *Hydrocele*, in which the effused fluid was absorbed from the application of electro-galvanism, which led *H. R. Frost, M. D.*, Professor of *Materia Medica*, in the Medical College of the State of South Carolina, to try its powers in a similar case, in which he, together with the late *Dr. Sinkler*, were the attendants, in which he also was successful in affecting a permanent cure, but not without severe inflammation of the testes—doubtless from having used a too powerful current of the fluid. *Charleston Med. Jour.* July, 1848.

In regard to *absorption*, *Dr. W. F. Channing*, says:—“In effusion of serum or lymph, in some forms of hypertrophy, in bony deposits, rheumatic enlargements, and every undue organic developement, with the exception, perhaps, of some malignant growths, the power of the absorbants needs to be quickened, and this may often be effected by electrical action. In this case, the application is usually made directly to the organ, though the rule still prevails, in acting through the nervous system, that the vital stimulus, artificially applied, directs itself to, or is principally perceived in, that function whose efficiency is suspended. In other words, the tendency of the nervous influence seems to be, to harmonize the various vital functions, disproportionate action appearing thus to proceed from the causes acting originally on the life of the tissues.”

Mr. E. W. Tuson, as elsewhere quoted, says:—“Electro-galvanism is an agent which produces absorption quicker than any medical means that we are acquainted with.” Also—“In glandular swellings, experience has proved to me, that it may be of the greatest service.”

DR. COGEVINA'S APPARATUS AND ITS USE.

In the *Medical Gazette* for May 26, 1848, *T. S. Wells, Esq.*, Surgeon of the Royal Navy, gives a description of the apparatus made use of by *Dr. Cogevina*, of the Civil Hospital of Corfu, by means of which, he treated ulcers, fungus growths, fistulae, and many nervous disorders; and also applied it in the place of the moxa, in the formation of tissues.

The apparatus employed by *Dr. Cogevina*, consists of an oval plate of zinc, from two to four inches in diameter, according to circumstances, to the back of which a flexible wire of pure silver is soldered; and at the other extremity of this wire, a plate of silver of the same size of the zinc, is also soldered. The length of the wire is unimportant, varying

according to the distance at which the two plates were applied.

Dr. Cogevina's experience in the use of this simple apparatus, taught him to adopt the following rules :—

1.—“To secure the effects of the apparatus, it is necessary that the surfaces of the two metallic plates be perfectly smooth and clean, and that each be closely applied upon the body, denuded of cuticle. Thus, when the effect upon one open surface is required, a small puncture must be made at some other part of the body, to form the second.

2.—“Experience has proved, that one of these surfaces must be superior, the other inferior, and that the plate of zinc must always be above that of silver.

3.—“When the plate of zinc is placed upon a slight excoriation, and that of silver upon a suppurating surface, the excoriation beneath the zinc plate, is, in two days converted into a superficial eschar, an inch in circumference. In six days, the apparatus being still constantly applied, eschar extends to the subcutaneous cellular tissue, and presents all the characters of a slough, produced by caustic potass, except that the dead tissues are a little less compact. Cicatrization of the ulcers left after the separation of these sloughs being tardy, it is necessary, in most therapeutic applications of the apparatus, to change the situation of the zinc plates, every second day, and with this precaution, no inconvenience results from the superficial sores.

4.—“When an ulcer presents an indolent or lardaceous base, this unhealthy base is destroyed, and the surface becomes a healthy granulating one after three days application upon it of the zinc plate. In this case, the natural, or artificial abrasion, upon which the silver plate is applied, must be inferior to that upon which the zinc is applied, or the good effects do not follow.

5.—“The zinc plate applied in the same manner upon flabby exuberant granulations, or fungus growths, rapidly destroys them.

6.—“When the silver plate is applied to a surface simply denuded of skin, the zinc being placed superiorly upon another such surface, even although the former be freely suppurating, it is very rapidly dried, and covered with a dense pellicle.

7.—“When two plates are similarly applied, the surface beneath the silver being a deep ulcer, rapid and healthy granulations follow. If the silver plate be left upon the granulating surface, after this has reached the level of the surrounding integuments, the granulations becomes exuberant and flabby, sometimes fungus. In practice, therefore, the apparatus should be removed as the granulations reach the surface, and, when this is done, spontaneous cicatrization follows.

8.—“When the zinc plate is applied upon the superior portion of a very large ulcer, this portion only improves in appearance, while the inferior portion degenerates; but if the plates be applied to the lower portion only, the whole surface of the ulcer improves equally.

9.—“In cases where several ulcers exist upon a limb, and the zinc is applied to a superior, and the silver to an inferior one, or to denuded surfaces, all the ulcers, situated in a direct line between the two plates, improve in appearance, and become healthy sores, and cicatrize, while those on either side of the current, remain unaltered, and sometimes degenerate.

10.—“When the silver plate is applied upon the extremity of a fistulous sore, but little effect is produced; while, if a projecting portion of the silver be carried to the bottom of the fistula, granulation rapidly follows. To fulfil this object, *Dr. Cogevina* has silver plates perforated by screws of the same metal, the points of which are adapted to the shape of the fistula, and readily projected, more or less, by a simple turn of the screw. The application, in these cases, need not be more than a few days; for as soon as healthy granulation commences, the apparatus may be removed, and cicatrization rapidly succeeds.

11.—“In several cases, normal innervation has been restored in paralysed parts, under the use of this apparatus, the zinc being placed superiorly, and the silver inferiorly, so as to include as nearly as possible, the whole of the paralysed part. Disordered functions of particular nerves has been also remedied, by so placing the two plates, that the nerve lies between them.

12.—“The action of the zinc plate is an excellent substitute for the common moxa, and for the caustic potash, when obliteration of a vein is desired. In some cases of varicose ulcers, while the silver plate has been used to hasten cicatrization, an eschar has been purposely formed by the zinc, over the dilated vein above, in order to obtain a radical cure, and these objects have been readily effected.”

In addition to the above rules, *Mr. Wells*, makes the following observations:—

“In conclusion, I would observe, that I think further experiments with this apparatus are required; and, as opportunity offers, I intend to institute a series of observations, to determine whether a second denuded surface be absolutely required—how the results would differ, if one of the plates were applied to the cuticle, moistened with water or acid, and how alteration in the relative position of the plates, would affect the results of their application. *Dr. Cogevina's* cases convince me, that the inferences I have drawn from them, are *generally* correct; but I still consider more experience required to establish their *universal* truth.

“I will only add, that I think this by far the best general method of applying electricity in the treatment of disease. The apparatus is cheap, simple, and portable; it operates without causing pain or uneasiness to the patient, nothing more than slight itching or numbness being felt; its action is, to a certain extent, regular and uniform, slow, and without violence, in all respects affording a much better imitation of the natural currents of vital electricity, than the batteries

in common use, as the action of the latter is powerful, and only susceptible of temporary application."

In the *Lancet* for Jan., 25, 1851, *Mr. Bransby Cooper* speaks of this method of treating ulcers, or the promotion of cicatrization, by means of galvanism. He, however, gives credit to *Dr. Hull*, of the United States, as having called his attention to the matter. Instead of using the ordinary galvanic battery, he made use of one like the above, except that the connecting wire was of copper. *Mr. Cooper* speaks of this simple apparatus, as having been introduced by *Dr. Golding Bird*. The case was one of gun-shot, situated on the inner side of the right foot, and below the ankle, produced by a charge of shot, which passed obliquely through the soft part of the right instep, and injured the navicular bone.

Several modes of treatment were adopted—carrot poultices, leeches, warm water dressings, and the use of sarsaparilla, yet at the end of all this, the ulcer was of the size of the hand.

By means of this apparatus, the ulcer was healed, and the soft parts around assumed a healthy appearance and tone.

Others, and among them, *M. Recamier* of Paris, has made a similar use of galvanism, for the cure of neuralgic and rheumatic pains; and for some years, the attention of the leading surgeons has been strongly directed to this matter.

In *Chapman's Treatise on ulcers, and other sores upon the leg*, recently republished in Cincinnati, with notes and additions by *R. S. Newton, M. D.*, of Cincinnati, *Dr. Chapman*, quotes as follows, from a surgical lecture, published in the *Medical Gazette* for Oct. 1, 1847, by *Mr. Cooper*.

"When these ulcers prove very stubborn, and resist *all* the constitutional and topical remedies usually employed, I have lately witnessed the best results from stimulating their surface, by subjecting it to a stream of negative electricity, by a method I shall describe, and which was recommended by my colleague, *Dr. Golding Bird*."

Mr. Cooper then describes the above apparatus, and method of application, and strongly recommends them to the attention of the profession.

In the *Gazette* for June, 1847, *Dr. Bird* remarks, in regard to the application of electricity, in cases similar to the above, that *Humbolt* had long previously called the attention of the profession to this manner; and that afterwards, *Gräpengeisen* had repeated the experiments of *Humbolt*, and with him, had observed, that the part to which the oxidizable metal, as the zinc, was applied, was much more irritated than the one where the silver was in contact.

It is a matter of minor importance, *who* was the first to apply galvanism in the treatment of ulcers; and as the fact seems fully established, that by means of a very simple apparatus, which is so constructed as to generate a stream of galvanism, that is made to pass through the parts affected, in the proper direction; it now becomes manifestly the duty of the profession to make a fair trial of the remedy in those cases, which do not readily yield to the ordinary method of treatment.

The cases of ulceration above referred to, may all be supposed to be of a non-specific, and of a non malignant character, but to convince the unbelieving, if any such there are, I shall now present some testimony which goes to prove that sores and ulceration of a specific origin, are far more readily and certainly controlled by this, than by any other known method of treatment.

GALVANISM IN SYPHILIS.

IN the *London Medical Gazette* for June, 1846, it is stated, that *M. Krusell*, had obtained permission to establish an Hospital at St. Petersburg, to apply galvanism for the cure of Syphilis, and other external diseases.

The method adopted by *M. Krusell*, is to begin by conducting a galvanic current *from* the diseased surface, for a

certain time. The results afforded by this method, are said to be very striking.

Many kinds of syphilitic sores have been submitted to the treatment; forty-three patients having been treated, and the cases recorded, up to the time of the report. In a few of the cases, other means had been employed, but in nearly all, nothing was used but galvanism. The sores healed in all but a very few of the cases, in a remarkably short time.

PARALYSIS.

PALSY, or a want of the natural power and activity of a part of the human system, may owe its origin to a great variety of causes, some of which, either in their immediate effects, or more remote results, may induce such a change in the structure of the organs or limbs paralysed, as cannot be remedied; while other changes can be rectified, and the power of the organ or structure restored fully to its original potency and activity.

Cerebral Paralysis, one of the most common, and most troublesome forms of this disease,—paralysis of a muscle from exposure to cold, from paralysis of any organ or structure, from over-exertion, or too long continued efforts,—paralysis from deposits in the structure, as in cases following inflammatory rheumatism,—paralysis from enervation, or from the body, or a limb having for a long time been confined to one position,—paralysis from perverted action of the nervous centres, either from derangement of those centres, or from the reflex action of some local disease, that acts upon the organs with which they are either directly or indirectly connected;—paralysis from a sudden shock;—paralysis from lead poisoning, and a variety of other forms of paralysis, frequently present themselves to the attention of the medical practitioner, and are too often treated empirically, and without any beneficial result; mainly because the attendant is not aware of any means by which he can rouse the torpid organ or muscle, and

impart to it tone and activity, until the powers of the system have time to so act as to perpetuate the strength and vitality artificially imparted.

In many cases of paralysis, it may be that no organic lesion exists, and all the parts require, is to be put, and kept in motion by means of an artificial stimulus until the minute vessels and nerves of the part have resumed their wonted activity and vital energy; when the stimulus may be gradually withdrawn, and yet the action will continue.

There are few cases, however, when paralysis has been continued for any considerable time, in which there are not *deposites* formed, of some elements foreign to the structure that must act to clog and obstruct the natural action of the parts, until these *deposites* have been removed.

When speaking of palsies, *Dr. Golding Bird* says: "In thus advocating the Electro-magnetic current as an important and most valuable excitant of paralysed muscles, I must still acknowledge that it is anything but a universal remedy. In the great majority of forms of palsy above described it is, indubitably, in some the curative agent; *in all it expedites and aids the cure, in none is it injurious.* As a general rule, I think it will be found, *cæteris paribus*, to act most effectually in proportion to the acuteness of the case.

In chronic paralysis we must recollect that any new tissue deposited during, perhaps, many months, or longer, although organized like the healthy structure, and provided with its due supply of nerves,—is still composed of fibres which have never obeyed the influence of the will—have never moved at the volition of the patient. This I believe to be the reason of our not at once rousing a long paralysed limb into action. We can here only expect to succeed by submitting the paralysed part *for a long period* to the influence of the remedy."—*Lancet*, June 13, 1846.

As it is not in accordance with the design of this essay, to advocate any idea that is not susceptible of positive and

absolute proof, I shall now cite a few cases, in as condensed form as possible, and yet give a fair exposition of the views of the writers.

Dr. Bird, in Guy's Hospital Reports, says: "Where the paralysis has depended on exposure to *cold* or *rheumatism*, or upon some *functional affection of a local character*, or upon the impression produced by effusion in some part of the cerebro-spinal centre, which had become absorbed under the influence of previous treatment, the result of the application of electricity, was *most successful*."

In regard to cases of *Hysteria Paralysis*, he remarks: "We find these anomalous forms of paralysis connected with hysteria, generally yield to the application of a few electrical shocks. I have, indeed, repeatedly seen hysterical paralysis yield so rapidly to the effect of an electric shock, as strongly to impress those who were watching the case, with the conviction that the whole disease was simulated."

Respecting Lead paralysis of the hand, *Dr. Bird* continues: "In cases where the general health was not much deranged, the use of electricity over the spine, and drawing a few sparks occasionally from the paralysed extensor muscles of the wrist and hand; with the exhibition of an occasional laxative, was generally remarkably successful."

In the *Lancet*, for June 13, 1846, *Dr. Bird* gives the case of an eminent legal gentleman, who had received a hemiplegic attack of paralysis, following cerebral congestion, produced by study and anxiety. "The Electro-magnetic current was applied daily, the patient's footman being the 'medical electrician,' and in a few weeks he quite recovered."

Cases of *paralysis of the muscles* supplied by the portio dura, following sitting at an open window, producing a distorted face. He says:—"I have seen many of this kind; the Electro-magnetic current is of great value here."

Paralysis of a single limb from exhaustion. "These cases," says *Dr. Bird*, "are not unfrequent, and before their

nature was understood, they used to be *fearfully mismanaged*, the paralysis being looked to, rather than the cause producing it, and depletion, and mercury employed, when nutritious food, and stimulants were really indicated." These remarks are followed by references to cases, and the results of the application of electricity, in all of which, the agent proved very beneficial.

Paralysis of the throat and œsophagus, following a sudden attack of severe vomiting.

In the *Proceedings of the Sheffield Medical Society*, is the report of a case under the care of *Dr. Sherman*. The lady was 51 years old, and the attack of vomiting was on the evening of Jan. 31, 1841.

The next morning she could not swallow, but there were no symptoms of inflammation. Subsequently she had paralysis of the left side of the face, and the right arm and leg.

The patient became exceedingly feeble, and neither external or internal stimulants produced any beneficial effect. Nothing could be introduced into the stomach, except through the œsophagus tube.

On the 25th of Feb., Electro-magnetism was applied, with the sanction of *Sir A. J. Knight*. This was applied one hour at a time, three times a day for a month, and twice a day afterwards.

The œsophagus tube was used until the 9th of March, when she could swallow so well, its use was discontinued.

On the 26th of June she could walk up and down stairs perfectly well.

In reference to this case, the *Prov. Med. Journal*, May 4, 1844, says: "*Dr. Wilkinson, Dr. Hodgkin, Mr. Ware, and Mr. Carpen*, ascribe *wonderful power*, to Electro-magnetism in diseases affecting respiration, circulation, digestion and secretion. According to these gentlemen, there is hardly a complaint, which it will not either cure or relieve,—or an indication in therapeutics which it will not satisfactorily fulfil."

With respect to the *Sheffield Medical Society*, it is but right to say, that the members generally agreed with *Dr. Sherman* in ascribing the cure to Electro-magnetism, and that *Dr. Abercrombie* speaks favorably of this agent in similar cases.

M. Matteucci, than whom, perhaps, no man, has given greater attention to the subject under consideration, thinks that *paralysis* and *tetanus*, are the diseases in which electricity will prove of the most utility. His remarks, are recorded in the *Medico-Chirurgical Review*, April, 1845, which, however, apply only to the agent when generated by electric machines, such as were then in use, and he very properly cautions the operators from using those powerful machines too long at a time, as many accidents had occurred from want of attention to that matter.

J. M. Neligan, M.D., in the *Monthly Journal of Medical Science*, for April, 1846, reported cases where he used electricity, in those forms of paralysis, where there appeared to be no organic lesion, but merely a want of nervous energy.

In cases of *wry-necks*, and also of *lead paralysis*, as well as in others, he expresses himself as fully satisfied with the result, "when the weakest power of the instrument was used."

Dr. John Reid made experiments on muscles that were *atrophied* from paralysis, as narrated by *James Paget, Esq.*, Prof. of Anatomy and Surgery to the Royal College of Surgeons,—in the *Medical Gazette*, for Aug. 6th, 1847, and *Mr. Paget* says: "*Dr. Reid's* experiments suggest the remedy."

"When muscles are paralysed through affection of the nervous system, we ought to give them *artificial* exercise; they should often be put in action by galvanism, or otherwise; their action, though thus artificial, will ensure their nutrition, and then, when the nervous system recovers, they may be in a condition ready to act with it."

In the *Lancet*, Aug. 28, 1847, *M. Matteucci* says: "I am

desirous to inform you of some rules which I deem of importance in the application of the current for the cure of palsies. *We should always begin by employing a very feeble current.*"

In the *Medical Gazette*, for June 18, 1847, *Dr. Bird* reports cases of paralysis from lead, of rheumatic paralysis—paralysis of the portio dura—paralysis following local injury—hysterical paralysis, &c. In all these classes of cases his continued experience is decidedly favorable to the use of electricity. In regard to the last, he remarks: "In hysterical paralysis, where the affection, however excited at first, is now uninfluenced by the patient's will, there are few curative remedies so important as the Electro-magnetic current. I have seen a young woman, the subject of hysterical paraplegia for months, move the limbs and walk, although unsteadily, in an hour or two after the application of electricity; and, very lately, another, in *Guy's Hospital*, under my care, with paralysis of the right arm, in which the same successful result occurred. In neither of these cases could I detect simulation, and, not only was there no motive for it, but the interests and desires of the patients were opposed to it, for the paraplegic girl was prevented from becoming a wife by her paralysis, and the young woman with the palsied arm, had an aged mother to whom she appeared deeply attached, depending upon her for her means of support."

He concludes his communication with the following caution.

"In such cases of chronic paralysis, let me beg of you not to give up the treatment too soon. Remember, that if the paralysis be of long continuance, some of the *nerve* tissue, deposited in the palsied muscles, in accordance with the recognized law of nutrition, has never contracted, or moved under the influence of the will; and a patient persistence in the electrical treatment will be necessary before the new fibres become roused into obedience to the *vis nervosa* propagated along the nerves by the will of the patient."

“The number of authentic cases of paralysis cured by electrical treatment, is already sufficiently great, to encourage physicians and patients to persevere in its use. Perseverance indeed is indispensable in the application of the electric current, for without it successful results are impossible.

Dr. Terzi, in a paper published in the *Bulletino dello Scienzi Mediche*, after speaking of the results obtained by *Puccinotti, Fario, Berrutti, Botto, Belingeri, Malinverni*, the illustrious *Matteucci*, and others, speaks of his own mode of applying galvanism, and the success that has followed. He relates several cases in detail, in some of which a complete cure, and others, amelioration, was procured. These cases possess great interest, but want of space will prevent their being inserted here.

The *third* case was one of *facial* paralysis, coming on in a man aged 30, given to venery, and preceded by derangement of the head. Slight but frequent shocks were transmitted during half an hour, for fifteen days, soon after which all traces of the disease disappeared.

In a case of *constipation* from *intestinal paralysis*, where, in spite of the best treatment, the paralysis had been stationary for several years, the patient was cured by *two* applications.

Besides the above, he relates four cases of *hemiplegia*, with *glosiplegia*, in which great amelioration was produced, but not a cure, in consequence, apparently of an insufficiently long perseverance on the part of the patients.

Mr. Balman, of Liverpool, gives the history of a case of *hysterical* paralysis; in the *Medical Gazette*, for Jan. 25, 1850; where the paralysis was complicated with distortion of the spine, irregular menstruation, and leucorrhoea of several years duration; and in which a great variety of treatment had been tried without effecting a cure.

“The influence of galvanism,” says he, “was certainly more

remarkable, than anything I have before witnessed. The effect of this agent was perceptible at each application, but it was not until the remedy had been persevered in for some time, that the beneficial results were manifested so strikingly."

In the *Monthly Journal of Medical Sciences*, for August, 1850, *M. Michon*, Surgeon of La Pitte, reports cases in which he found electricity to be a very efficacious remedy, to supercede the use of the catheter in paralysis of the bladder. As no new principle is involved, it is not thought necessary to go into a detail of these cases.

William Davis, M. D., Physician to the Bath United Hospital, in a paper published in the *Prov. Med. and Surg. Journal*, Nov. 15, 1848, on the "therapeutical value of Electro-Magnetism in Paralysis," relates a case, on which he remarks: "The above case illustrates sufficiently well, the therapeutic influence of electricity, in one form of the disease—namely, rheumatic paralysis of the muscles of the extremities, the great nervous centres remaining intact." He is satisfied that this remedy possesses more value than all others combined.

In 1850, *Dr. Lawrence* published in London, a translation of *M. Froreip's* work, "on the therapeutical application of Electro-Magnetism, in the treatment of rheumatic and paralytic diseases," in which is narrated many interesting and deeply instructive cases of paralysis, mainly from rheumatism, in which galvanism was the *only* remedial agent applied, and in which its success was truly wonderful, but as the author presents no *principle or rules* for guidance in its application, the work is of no value, farther than as it proves the power and efficacy of this agent when used alone.

Under the head of *Anaesthesia*, *J. C. Christopher Esq.*, of London, published in the *Lancet*, for August 8, 1846, a case of the use of galvanism, in a loss of feeling in the skin, and afterwards, all the lower parts of the system, produced by the protracted use of the hip bath, for the cure of leucorrhœa.

The want of power and sensation, had extended to as high as the water came about the waist. The temperature of the parts was below that of the rest of the body; numerous remedies were resorted to without benefit, when the application of Electro-galvanism was resolved upon.

An improvement was observed after the second application. The rectum and bladder were the first to regain their normal condition, the thighs and legs next, the feet and abdomen last. At the end of twenty-two days, the patient was quite restored, no trace of the malady remained.

Several instances are on record, of the power of galvanism, to resuscitate patients sinking under the influence of chloroform, or other anaesthetic agents, among which is that reported by *John Hilton, Esq., F. R. S.*, in the *Lancet* for July 31, 1852. His patient had been placed under the influence of chloroform while her finger was amputated, and she appeared to be recovering from its influence, but on attempting to rise from her seat, she relapsed into a state of insensibility, from which the usual means employed, for the space of two hours, failed to rouse her. Then galvanism was employed, and "it had not only the effect of producing a marked improvement in the pulse, and respiration, but it also produced a dilatation of the pupils, and a complete return of consciousness. That the galvanism deserves the credit of effecting resuscitation, cannot be doubted, from the fact of the previous remedies having proved ineffectual, and from the speedy recovery immediately upon its administration."

Dr. W. M. Cornell, of Boston, communicated in the *Boston Med. and Surg. Journal*, for January, 1848, a case of *Hemiplegia*, cured under his care by the application of Electro-magnetism. He also referred to several other cases of paralysis, cured by him, through the use of the same means.

Dr. Finella, published a paper in the *Anali Univ. di Med.* for Dec., 1846, on the application of galvanism in oph-

thalmia, and aural surgery, in which he speaks highly of this agent, and from the cases cited, he concluded that the *continued* current is the most efficacious, both in amaurosis, or paralysis of the nerve of vision, and also to prevent nervous deafness.

D. Grapengiesser, employed galvanism with satisfactory success, in restoring the hearing to those who were made deaf from paralysis of the auditory nerve.

Dr. Kramer, as reported in the *British and Foreign Med. Review*, July, 1847, says: "The magneto-electric, or electro-magnetic current, acts decidedly as an excitant on the organs of hearing. The application of magneto-electricity, ought always to be made with the greatest precaution, and in the mildest manner."

M. Jobert, in *L. Examineur Medicale*, as translated for the *Medical Gazette*, for June 2, 1843, relates four well marked cases of deafness, in which the cure was complete,—from the application of electricity directly to the internal ear.

M. Donovan, Esq., of Dublin, in the *Dublin Quarterly Journal of Med. Science*, Feb., 1847, quotes several instances of the value of galvanism in loss of sight, from paralysis of the nerve of vision.

As the proof cited, is so very plain and explicit, it will be supposed to be *proved*, that this agent is at least *one* of the most potent known to the profession, as a means of rousing the vital activity of the nerves of either motion or sensation, when they have become paralysed, either from exhaustion, or from other unknown causes.

DISEASE OF THE UTERUS—FREQUENCY OF.

Dr. Bennet, in his work "On the Diseases of the Uterus," says: "Inflammation of the *body* of the uterus, in the unimpregnated state, is, in truth, a rare disease, but inflammation of the *neck* of the uterus is an *exceedingly* common one, so

common, indeed, that the very great majority of females who apply for relief when laboring under uterine symptoms, physical, or functional, will be found on careful examination, to be suffering from its existence.

Leuchorrhœa, dysmenorrhœa, menorrhagia, irritable uterus, prolapsus, etc., are generally studied independently of any such origin, but in reality in nineteen cases out of twenty, when confirmed, they are the immediate *result* of inflammatory disease of the cervix, and only to be effectually treated by attacking the primary disease, to which they owe their existence.

I am in a position to prove by statistical data, that inflammation of the lower segment of the uterus is really as frequent, and plays as important a part, in uterine pathology, as I assert. During the last few years, I have kept a careful register of all the cases of uterine disease, which I have treated at the Western General Dispensary, with which institution I am connected as physician accoucheur. The Western Dispensary is one of the largest institutions of the kind in London, nearly ten thousand patients being annually treated by its medical officers. In analyzing my cases, I find that two hundred and forty-three were suffering from decided inflammatory disease of the cervix or its cavity, and that in two hundred and twenty, ulceration was present," p. 145.

That *Dr. Bennet*, is not in error, in his statement in regard to the frequency of inflammation, and enlargement of the neck of the womb, might be admitted, as the inevitable result of its structure, its functions, during the period of child-bearing—and its very exposed position.

It is admitted by all, that after the female arrives at the age of puberty, her womb is constantly in a state of excitability, and while menstruating, each monthly period is marked by all the general indications of an engorged state of the lower half of the uterus. That these symptoms correctly

indicate the existing state of the womb, has been verified by an examination of that organ, in those who have suddenly died while menstruating, as well as by repeated vaginal examinations, both digitally, and by means of the speculum. This fact, doubtless, was the reason why Moses, as recorded in the eighteenth and twentieth chapters of Leviticus, was commanded to forbid sexual intercourse during the time of the menstrual excitement, under the penalties there mentioned. The womb at those times is *always* larger, and more engorged with blood, than in its normal condition, and it is also lower down in the vaginal canal, and therefore more liable to injury from violence during sexual intercourse.

Although many eminent physicians have denied that the uterus is liable to become *ulcerated*, as frequently as *Dr. Bennet* thinks he has found it so, yet that it is greatly liable to engorgement, and inflammation, has, I think, never been disputed. But lest those who have not given this subject their special attention, may think the sufferings arising from this condition of the organ have been over-estimated, I will here, in as condensed a form as possible, present the views of some of the most eminent members of the profession, in the French metropolis, where the facilities for arriving at an accurate knowledge in these matters, is probably greater than in any other part of the world.

In the *French Academy of Medicine*, *M. Baud* presented a memoir entitled "Deviations, and Engorgements of the Uterus," on which memoir *M. Herver de Chegoin* presented a report, that led to a discussion of this subject, in which some of the most eminent physicians of Paris participated. The discussion of this matter occupied the Academy during several sessions, and, although the *reasons* for the conclusions arrived at were presented in full, there is space here for the *conclusions* alone.

M. Baud was of the opinion, that the deviations of the organ from a normal condition, are for the most part due to a disordered state of the general economy.

Lisfranc expressed as his opinion, that the exact opposite of this is the fact.

M. Herver de Chegoin thinks that *local* engorgements may occur quite independently of a disorder of the general health.

M. Velpeau maintained that *engorgement* of the uterus as an affection independent of inflammation, had no existence; at least so far as the body of the organ is concerned, and as far as concerns the cervix, this state was frequently supposed to exist, when, in fact, *inflexion* of the organ was mistaken for it.

Lisfranc, on the contrary, maintained that the inflexions were the consequences of engorgements; but *Velpeau* was of the opinion that where engorgement existed, it was, as a consequence, of the inflexion.

M. Malgaigne believes, with *Velpeau*, that many uterine affections are local, and call for local remedies, but he thinks the frequency of *ulceration* has been exaggerated.

M. Moreau considers *M. Velpeau's* assertions far too general; for, because ignorant persons may mistake displacements for engorgements, it does not follow that this may not exist. Engorgement of the cervix is of far more frequent occurrence.

M. Jobert considers that *engorgement* of the uterus may exist either as a symptom of other affections, or idiopathically. Congenital deviations are irremediable by art; and while those arising accidentally may be remedied, they cannot be so by local means alone, dependant as they are on the altered state of the tissues, which must be restored to their normal state, mechanical means being used only as auxiliaries.

M. Jobert entered into a long dissertation to show that the symptoms attributed to engorgement, were really due to a *granular* state of the lining membrane of the cavity of the uterus, long since pointed out by *Recamier*.

M. Huguier in answer to *Velpeau's* challenge to exhibit

engorgement in the dead body, observed that, as in engorgements of other tissues, these rapidly disappeared after death, and that he had repeatedly measured the cervix before, and soon after death, and found it diminished afterwards more than one third. Nevertheless, he exhibited preparations to the Academy, which were generally acknowledged to demonstrate the engorgement in question.

M. Roux observed that *engorgement* may be affirmed from analogy, and from pathological anatomy.

M. Amussat believes that, while *Lisfranc* much exaggerated the frequency of engorgement, it would be a great error to deny its existence, or to attribute it entirely to the operation of deviations, as also to refuse to admit that the affections of the uterus may exert a great effect on the system at large.

M. Recamier, the originator of the modern pathology of uterine disease, delivered a discourse, tending to demonstrate the reality of uterine engorgement, which he regarded of an erectile nature, exactly analogous to the erectile engorgements about the rectum.

M. Paul Dubois said, there can be no longer any doubt that anterversions and retroversions of the womb are accidents of frequent occurrence.

M. Paul Dubois remarked that in the course of the discussion, the words *inflexion*, and *displacement*, had been used as if of the same signification, but he thought they should be used to designate quite different derangements of the uterus. *Inflection* should be used to denote an alteration in the *form* of the uterus, while *displacement* indicated a change in the situation and direction, but not necessarily in the form.

During a similar discussion in London, *Dr. Murphy* said that "He had seen hundreds of cases of uterine disease, and in seven tenths of these there was uterine inflammation. Instances of that disease were met with every week in his practice."

Dr. Bennet says: "Out of three hundred cases presenting uterine symptoms, he had found two hundred and forty-three of inflammation, and two hundred and twenty-two of ulceration of the cervix uteri."

Dr. Stewart said he "wished particularly to know whether there were not, in a considerable proportion of those who presented themselves with symptoms of uterine disease, a peculiar state of the os and cervix uteri—ulceration, granular state, or abrasion, call it by what name you will? If there were not, he must disbelieve all his past experience"

Dr. Locock said: "With respect to the frequency of ulcerations of the uterus, so called,—for whether real ulcerations or not, all understood what was meant by the phrase,—he must say he considered such cases extremely common, and the touch was rarely sufficient to discover their exact nature.

The writer of the report of the above meeting, (*Dr. Rankin*.) says—"Some years' experience enables us to state that the frequency of inflammatory engorgements, superficial erosions, and granular ulcerations, is not in the least exaggerated by *Dr. Bennet*, or *Mr. Whitehead*. We do not stickle for the term *ulceration*, but we assert that a condition of the os and cervix is *very frequent*, in which the epithelium is lost, and granulations, more or less luxuriant, pour forth a mucopurulent discharge; that these conditions are the source of deteriorated health."

In a communication to the Edinburgh Obstetrical Society, published in the *Edinburgh Monthly Journal*, *Professor Simpson* states, that the surface of the cervix uteri is liable to inflammation of an eruptive character.

Among these special inflammations of the cervix uteri, and the top of the vagina, *Dr. Simpson* had observed eruptions referable to the vascular, tubercular, papular, and erythematic orders of the classification of *Willan* and *Bateman*; and *Dr. Simpson* suggested that perhaps these erup-

tions were occasionally the origin and basis of the common variety of granular cervical ulcers.

Dr. J. F. Tilt, in a paper published in the *London Lancet*, on "Clinical Illustrations of Sub-Acute Ovaritis," says, with regard to the *predisposing causes* of sub-acute ovaritis, that "*irregularity of the menstrual process*, is one the most frequently observed, for eight times out of ten it occurred in connection with menstruation."

"The *Terminations*, or Morbid Conditions induced by sub-acute ovaritis, were, a *painful congestion* of the womb, in four out of ten instances; in three, remittent menstruation; a deficiency of the menstrual secretions in three more; in two, billious plethory.

Dr. Clarkson T. Collins, M.D., delivered, by the request of the "Berkshire District Medical Society" of Mass., a Lecture before that Society on the 23d of Nov., 1852, in which he made the following statements:—

"In 1843 I became connected with the New York Asylum for Lying-in Women, and about the same time with the Eastern Dispensary, two of the most excellent medical charities of that city. These two institutions report annually over twenty thousand patients.

In this situation I found myself daily meeting with diseases of females, many of which could be traced *directly* or *indirectly* to some abnormal condition of the organs of reproduction.

Such I also experienced in my private practice. *I was constantly annoyed and disappointed in my treatment of these cases.* I sought to extricate myself by the experience of older members of the profession. I saw that the true pathology of the disease still remained in obscurity.

Slight experience in the practice of medicine, confirms us in the belief that no part of the human body is so liable to functional derangement, and organic disease, as the female *genital* organs. No class of diseases have remained in

greater *obscurity*, and none, I affirm, are more susceptible of treatment."—*Boston Med. & Sur. Journal*, Jan. 5, 1853.

M. Valleux, of Paris, in the year 1852, delivered a Course of Lectures at the "Hôpital de la Pitié," on the subject of "Displacements of the Uterus," which were reported to the "*Union Médicale*," by *M. T. Gallard*, and have been translated for the *Boston Med. & Sur. Journal*, by *L. Parks, Jr. M.D.*, of Boston.

In the first Lecture, as published in the *Boston Journal*, *M. Valleux* says:—"These displacements, gentlemen, are much more frequent than you would be persuaded to believe. If, in fact, you visit a hospital, where diseases of the uterus are specially attended to, you will be astonished at the great number of patients you will find affected with these complaints, which, some years since, were scarcely mentioned; and there is assuredly not a medical or surgical clinique of any kind, which might not present to you several cases of them."

DISEASES OF THE OVARIES:—FREQUENCY OF.

"Of all the organs of the human frame, none are so often affected by disease as the ovaries. Suppressed menstruation, which is a frequent cause of sterility, can generally be traced to diseases of the ovaries."

The above quotation from *Neumann*, is chosen by *Edward John Tilt, M.D.*, as the opening of his *prolegomenon*, in his valuable work on "Diseases of Menstruation, and Ovarian Inflammation;" and the opinion of the learned author of the quotation is fully substantiated by the observations of other eminent medical writers.

Morgani says—"If I wished to enumerate all the lesions of the ovaries and oviducts which I have seen in my dissections, this letter would be the longest of them all."

Kruger exclaims—"How frequently have authors noticed the numerous anatomico-pathological lesions of the ovaries."

Another writer is quoted as saying—" We can have no hesitation in believing, that the ovaria and the fallopian tubes must, for many years of female life, be the common seats of disease; and probably some of the most obscure cases occurring in medical practice, belong to chronic ovaritis, especially where we cannot trace the symptoms to an acute attack." *Dr. Ashwell* says—" Dull and heavy pains in the region of the ovaria, lasting for months, are the consequence of chronic inflammation of the ovaries. I mention the circumstance, because they are too often regarded as neuralgic, and treated accordingly, painful menstruation and sterility being the results." Again the same author says—" Of all the organs of the human body, scarcely any seem so prone either to functional or organic disease as the ovaries; for I can with truth say, that I have rarely, when examining these important organs after death, found them entirely healthy." *Page 6, 3d edition.*

Dr. Robert Lee, in the *Cyclopedia of Practical Medicine*, says that in many cases of disordered menstruation, chlorosis, and hysteria, the ovaries were the real seat of the disease; and the above assertions are substantiated by *J. P. Frank*, *Dr. Cheston*, and many European and American writers.

Most, if not all modern writers, admit that the ovaries are the organs, which by their physiological functions, excite menstruation; and that a healthy and natural menstruation is dependent upon the healthy structure of the ovaria,—that it is the ovaria which call the uterus into action, and which give it the monthly stimulus to the performance of its functions.

That derangements and irregularities of the menstrual function are exceedingly common, will be admitted by all; and that these derangements are but the results of a change in the ovaries and uterus, is equally apparent, yet the *effects* which may follow these irregularities, are not probably as well understood as they should be.

Dr. Tilt presents the subject in the following manner:—

“What are the principle diseases of menstruation?

Amenorrhœa, or suppressed menstruation.

Dysmenorrhœa, or painful menstruation.

Menorrhagia, or profuse menstruation.

Leucorrhœa, or vicarious discharges; and

Hysteria.”

Amenorrhœa, he says, may be caused by many conditions of the reproductive organs, as by a chlorotic arrest of development, subacute or acute ovaritis, inflammation of the womb, &c., &c.

Dysmenorrhœa may be caused by subacute ovaritis, ovarian peritonitis, a neuralgic ovarian affection, inflammation of the womb, stricture of its neck, its induration or ulceration, or a cancerous affection of the neck of the womb, &c., &c.

Menorrhagia may be caused by subacute ovaritis, a neuralgic affection of the ovaries, uterine catarrh, cancerous affection of the womb, ulceration of the neck, retroversion of the womb, and by irritable uterus.

Leucorrhœa may be caused by hyper-secretion of the mucous follicles, chronic catarrh of the fallopian tubes, uterine catarrh, ulceration of the neck of the womb, and by various inflammations of the vagina and the internal organs. Hence he infers, that the present ill success of the common modes of treating these diseases, is, in many cases, owing to the fact, that the *symptoms*, and not the *cause*, leads to the selection of the means used.

Dr. Tilt, and others, as has been shown, consider that the disease of the *ovaries*, in most cases, is the primary cause of many disorders of the other pelvic organs, although those organs may sometimes become first the seat of disease, which leads the ovaries to become complicated also; and from that opinion he deduces the conclusion, that there is no way in which the menstrual function can be made to become natural,

except by removing the disease which had produced the irregularity or suppression; and that any course of medication which is found to cause a healthy menstruation, must produce this result by first restoring the ovaries, and the other reproductive organs, to a condition approaching that of health.

A large amount of evidence, in proof of the efficacy of galvanism in the treatment of derangements of menstruation, and of course for the cure of those diseases which produce such derangements, might be produced, but the following is thought to be sufficient to convince any scientific physician.

PROLAPSUS UTERI.

“Prolapsus, or falling of the uterus, either partial or complete, is generally attributed to the laxity of the uterine ligaments. This opinion I believe to be mistaken, and to be founded on an anatomical error. The uterus is not so much supported and maintained in situ by its ligaments as by the pressure of the surrounding organs, and the pressure of the upper part of the vagina on its lower segment. In a word, it is more *poised* than *suspended* in the centre of the pelvic cavity; and that such was the intention of nature is obvious from the small size and lightness of the virgin and unimpregnated uterus.

It is certainly one of the problems of animal economy, that an organ which weighs several pounds when its functions are fully called into action, at the moment of parturition, should, in a state of vacuity only weigh an ounce and a quarter. A large, heavy, organ would, however, have required powerful means of sustentation, which would have been incompatible with the enlargement and change of position that takes place in pregnancy.

The necessary result of this extreme lightness of the unimpregnated uterus, and of the slight amount of support afforded by its ligaments, is, that it is very movable.

This anatomical fact accounts for the *displacements* which *inevitably* occur when any one region of the womb increases in weight. Should it be the cervix that becomes enlarged and heavy, as occurs when it is the seat of inflammation, the entire organ falls in the direction of the axis of the pelvic outlet, and approximating to the vulva, constitutes partial prolapsus; the extent of the prolapsus depending principally on the extent of the hypertrophy of the cervix, and on the contractility of the vagina.

The vagina in a healthy state is not a mere open pouch, but a contractile closed canal, like the rectum—which closes on, and supports the uterine neck, and, in my opinion, has, generally speaking, as much to do with the support of the uterus as the uterine ligaments themselves. In virgins, with whom the vagina is very contractile, prolapsus is seldom carried to any extent. In married women who have had children, it is often considerable, the cervix, with them, frequently reaching the vulva, occasionally protruding externally, and even dragging after it the entire uterus, so as to constitute complete prolapsus—or *procedentia uteri*.

This latter form of prolapsus is nearly always accompanied by complete relaxation of the vagina and vulva, the former constituting a wide, non-contractile pouch, and the latter offering no kind of support to the prolapsed uterus."—*Bennet*, p. 215.

"Such being the real cause of partial prolapsus, in nearly all the cases that are met with, it is evident that the *mechanical* means *generally* resorted to, such as pessaries, etc., are perfectly useless as curative agents; that they actually *increase* the tendency of prolapsus, by irritating the inflamed tissues, and destroying through distention, the natural contractility of the vagina," p. 16.

"*Abdominal Supporters*, and bandages have been much recommended and used by most practitioners, in the treatment of prolapsus of the uterus. Their advantage is limited

to taking off the pressure of the intestines from the womb, by the support afforded to the lower part of the abdomen.

The uterus, in the non-pregnant state, being concealed within the pelvis, an abdominal bandage cannot, clearly, give it any direct support. They really afford considerable relief, however, to women in whom the uterus is enlarged, sensitive, and prolapsed, but can only be considered *palliative* remedies, principally valuable to females in whom the real nature of the inflammatory disease under which they are suffering, has not been recognised, and who, being left to take their chance, are glad to adopt any means that can give the slightest relief.

There are cases, however, in which the abdomen is large, and loose in which a bandage gives great relief, and seems to contribute indirectly to keep the uterus in its position, both before and after treatment," pp. 303, 304.

"Prolapsus of the cervix, as I have fully explained in the first part of this work, is nearly always the result of its inflammation and enlargement, and not, as is generally supposed, of the laxity of the lateral ligaments.

As a natural result, therefore, all attempts to remedy the prolapsus, and to keep the uterus in its natural position by pessaries, and other mechanical contrivances, are not only irrational, but injurious. Pessaries, it is true, whilst applied, keep up the womb, but in so doing, they aggravate the inflammatory disease, which almost invariably occasions the prolapsus—their presence greatly irritating the inflamed tissues. The continued dilatation of the vagina, also, with which the retention of a pessary is attended, by dilating the vaginal canal, and destroying what little of its natural contractility inflammation has left, deprives the neck of the uterus of a very powerful and important natural support. In a word, in forty-nine cases out of fifty, in which pessaries are now employed, the patient is absolutely injured instead of being benefitted," p. 302.

SYMPTOMS, ETC.—Among the *local* symptoms of *lapsus uteri*, and inflammation of the cervix, *Dr. Bennet* enumerates, *pruritis vulvae*, *constipation*, *hemorrhoids*, and *prolapsus ani*; *congestion* and *irritability* of the bladder, and *urethra*; pain in the *upper lumbar* regions, and about the *kidneys*; inflammation and pain in the *ovarian region*, and across the lower part of the abdomen, more especially on the left side; pain over the sacrum, and in the hypo-gastric region; pain in the hip, and round the crista of the ilium, in the groin, and down the thigh, posteriorly along the course of the sciatic nerves and its ramifications, and anteriorly and internally along the course of the anterior crural and obturator nerves; derangements of the menstrual functions, as *dysmenorrhœa*, *irregular menstruation*, *profuse*, or *scanty menstruation*, or an entire suppression of the secretion, and also *profuse uterine hemorrhage*.

Among other *results* from this condition of the reproductive organs, he mentions *sterility*, and states that in many cases of sterility, by curing the disease, the female became capable of child-bearing. Among other causes of sterility, mention is made of *uterine inertia*, or the absence of the sexual appetite, sometimes carried to such extent as to produce *loathing* and *disgust*, even in the absence of physical pain.

Pain in the stomach, and *dyspepsia*, or impaired digestion, from sympathetic re-action on the stomach of the inflammatory disease of the uterine neck, are frequently met with. *Difficulty in breathing*; derangements, in short, of any organs, to which branches of the sympathetic nerves are distributed, producing an impaired condition of the *general nutrition*, or of the functions of *any of these organs*. Symptoms of disease or derangement of the *cerebro-spinal* nervous centres, are among the common symptoms of inflammation of the pelvic organs.

The derangements of the cerebral functions may be so great as to produce insanity, and our author advances the

opinion, that this is the most common predisposing, if not the actual exciting cause of insanity among females. He says:

“The most intellectual and strong-minded women are not exempt from this re action of the uterine disease on the nervous system. Under its influence they become irritable and capricious, without the slightest suspicion being entertained by those around them as to the cause of the change that has taken place in their mental state. I have, indeed, no hesitation in stating that the very frequent existence of uterine diseases, modifying the temper and mental state, without suspicion being entertained as to the real physical cause of the change, either by the friends or by medical attendants, has unfavorably influenced the opinions of the moralist respecting the female character. My experience would tend to prove that when a female, whatever her rank in society, is perfectly well, she is rarely irritable, nervous or capricious; and that when these mental conditions are present in a very marked degree, they will be too often found referable to the unsuspected existence of chronic uterine disease.”—Page 324.

The *special senses*, are also, not unfrequently affected, especially the *sight* and *hearing*. The *cutaneous sensibility* all over the body, or in particular regions, is sometimes greatly exaggerated. The patient suffers from wakefulness, or the sleep is not refreshing; and many other symptoms, indicating that the entire nervous system is liable to become involved by the local disease.

All these distressing symptoms disappear as the original disease is cured, and can only be controlled by restoring the pelvic organs to a state of health.

Such, in short, is the conclusion to which *Dr. Bennet*, and others have arrived and such are here presented to the profession as well established medical facts.

For further evidence in proof of the value of galvanism in

the treatment of various diseases, and derangements of the system, the reader is referred to *Dunghison's New Remedies*, 6th edition, pages 296 to 303, and also pages 392 to 399. As this work is supposed to be in most physicians' libraries, it is thought this reference will be sufficient without any quotations.

Much very strong and positive testimony may also be found in most Nos. of *Braithwait's Retrospect*, and *Rankin's Abstract*, to which works the reader is also referred. In the last numbers of each of the above, are cases showing the power of galvanism to restore suspended animation from the administration of *chloroform*.

Within the last few years the savans of Europe have endeavored to avail themselves of this agent in forwarding the growth of *plants*, and their experiments have established the fact, that it does greatly increase their *vital energy*, and facilitate their growth.

Dr. Renter, (*Kastener's Archives*, vol. 18, p. 43,) states that seeds planted in galvanised earth, germinate much sooner than seeds planted in earth not thus prepared.

Dr. Bishoff, (*Manual of Botany*, vol. 2, p. 192,) says—"If the atmosphere be highly charged with electricity, it advances the germination of seeds."

Alexander von Humbolt speaks of the experiments of *Nallet*, *Manbray*, *Lacepede*, *Achard*, *Cavallo*, and others, whose repeated experiments had verified the fact.—*Aphorisms*, p. 79.

Mr. Shepphard, and others in England, have recently tried various methods for imparting galvanism to seeds and plants in different stages of growth, but chiefly by means of a copper and zinc plate, sunk into the ground at either end of the row of plants to be acted upon, and the plates connected by means of a wire. Some of the plants grew with astonishing rapidity, and to an astonishing size, and the experimenters express themselves greatly satisfied of the power of galvanism to increase the vital energy of plants as well as animals.

RULES FOR THE APPLICATION OF GALVANISM.

The writers already quoted have expressed themselves so distinctly, positively, and uniformly, in regard to the manner in which galvanism should be applied, that nothing remains to be done on that point but to *sum up* their statements in a concise form. But there is *one* very important matter,—in fact one that lies at the foundation of all correct and scientific use of this agent, that seems to have been frequently overlooked. I refer to the *kind* of galvanism employed, and especially whether of the *intense* or *destructive* kind, or otherwise.

As some, who are not practical chemists, do not appear to perceive wherein this distinction consists, I will briefly refer to the views of a few eminent chemists on this point.

Silliman, in the *First Principles of Chemistry*, presents the following proposition:—

“ *Quantity and Intensity.*—We learn the remarkable fact, that no matter how much we may increase the number of members of the voltaic circle, the *quantity* of electricity passing in the current, is equal only to that evolved by a single cell. But the current which has passed through a number of similar cells, has acquired an *intensity* exactly proportioned to the number. Thus, *no single cell*, however large, would ever afford electricity of a *tension* sufficiently high to decompose water, or give the slightest shock to the animal frame.”

Smee, in his *Elements of Electro-Metallurgy*, p. 10, Am. edition, says:—“ A hundred batteries may be conjoined, but no more electricity is obtained; for the same *amount* of electricity passes as when one cell is used. Now, however, this same *amount* can pass through a much greater resistance, for it would seem as if, at every alternation of the battery, the

electric fluid obtained a *push* to overcome any obstacle afforded to its passage."

Brande says, (page 213, vol. 1, of his *Manual of Chemistry*;) that the *intensity*, as shown by *Faraday*, in his researches, is in proportion to the *number* of plates, while the *quantity* is dependent upon the *extent* of the plate. The same position is taken by *Sir H. Davy*, in the *Philosophical Transactions* for 1840. *Hoblyn* says, page 89:—"It is necessary to point out the distinction between *quantity* and *intensity*." *Gray* says, page 86, that—"Quantity refers to the *amount* of electric fluid set in motion; *tension*, or *intensity*, to the energy with which the current is impelled."

Although authors have been thus plain in pointing out the source of the *destructive* element in galvanism, yet neither those who have invented, manufactured, or applied the instruments in use by the profession, seem to have kept this distinction clearly in view. Belts, chains, and other modifications of the simple galvanic battery, have been devised, and the first idea seems to have been, to make the surface of the single pair *quite small*, so that but little *amount* of the agent would be generated, and then to increase the *intensity* or *destructiveness* of this agent, by uniting as large a number of these pairs of metals as possible in the single circle. These are very powerful to destroy, to decompose, but cannot impart any great amount of healthful energy to the part to which they are applied.

In the selection of an apparatus, the first thing is to get one that has but *one element*—that is but one plate of the metal which is the most readily acted upon. This plate should be sufficiently large to generate the *amount* of galvanism required, and that amount may be diminished at pleasure, by cutting off a part of the current either from the whole surface of the plate, or from a part of its surface.

The apparatus should be so arranged, that the part to be acted upon can be kept under the *continued* influence of the

agent, for the desired length of time. Thus we avoid the *reaction* and *exhaustion* which follow when a stimulant has been powerful, applied but a short time, and then suddenly withdrawn.

The apparatus should be simple in its construction, so as not to be liable to become deranged while not under the eye of the physician.

To increase the vital activity and energy of any organ, and to impart the power of *motion* in an organ that has become more or less paralysed, the apparatus should be so arranged, that the *positive* plate, or the copper, should be *above*, or toward the *origin* of the nerves which are distributed to that organ, and the *negative*, or zinc plate, should be on the opposite side, or at the *extremities* of the nerves.

This rule is based on the fact, that all *motion*, or *increased action* in any organ, originates in an impression received *from* the brain, which impression passes *from* the nervous centre *to* the extremities of the branches of the nerves.

To rouse *sensation* in any organ, as the sense of hearing, of sight, of touch, &c., the position of the plates should be reversed, so as to cause the galvanic influence to pass *from* the *extremities* of the nerves to their origin. This rule is based on the fact, that our nerves of *sensation* are acted upon by *external* impressions, and that these impressions are carried *from* the *extremities* of the nerves of sensation to the nervous centre.

Thus in each of the above cases, the galvanic influence is made to traverse in the direction of the *vis nervosa*. In applying the battery as last directed, great care should be used, as if two or more elements be used, or, in other words, if *intense* galvanism is applied, great pain will be felt, and irremediable harm may be done.

In making use of galvanism as a therapeutic agent, it should not be relied on to the exclusion of all other treatment; neither should a cure of the disease for which it is

applied, be anticipated in a miraculously short space of time. Disease in any organ produces a change in the condition and structure of the organ diseased, and time must be allowed for the processes of absorption and deposition necessary to bring the organ back to its normal condition. Galvanism, when properly applied, will be found of great value in hastening these processes; yet it will not do to apply it of such power as to *destroy* the organ from which we wish to remove the abnormal accumulations, or even to carry the action of that organ beyond the condition of *health*. As galvanism possesses great power over the animal economy, therefore it is imperatively necessary that patients to whom it is applied, should be immediately under the care and attention of a skillful physician. Any agent that is powerful, must be dangerous when applied in an improper manner; and one possessing the power to decompose water, and even the most intractable metals, should no more be placed beyond the control of those who fully understand its power and mode of action, than the locomotive should be allowed to start upon the track without being accompanied with a well instructed engineer.

AMENORRHŒA.

Dr. Golding Bird, in *Guy's Hospital Reports*, when speaking of the effects of electricity in cases of amenorrhœa, says:

“Scarcely any cases have been submitted to electrical treatment, in which its sanitary influence has been so strongly marked, as in those in which the menstrual function was deficient.

“The rule for insuring success in the great mass of cases of amenorrhœa, is sufficiently simple. Improve the general health by exercise and tonics; remove the accumulations often present in the bowels, by appropriate purgatives; and then a few electric shocks, often a single one will be sufficient to produce menstruation, and at once restore the pre-

viously deficient function. With but one or two exceptions, every case in which the general health was not too severely deranged, as by chlorosis, *has been successful*; of course not including those, who, from timidity or other causes never appeared but once at the hospital.

“In general, whenever the menstrual discharge has appeared under the influence of the electric treatment, I have directed the remedy to be intermitted as soon as the flow has been fairly established, and its use recommenced about a week before its expected return.

In the *Dublin Quarterly Journal of Med. Science*, Nov., 1846, *Dr. Golding Bird*, repeats his assertion previously made, that “scarcely any cases had been submitted to the electric treatment, in which its sanitary influence has so strongly marked as those in which the menstrual function was deficient.”

Again, in the *Medical Gazette* for June 18, 1847, *Dr. Bird* says: “In electricity, we possess *the only really direct emenagogue*, which the experience of our profession has furnished us with. I do not think I have ever known it to fail to excite menstruation, when the uterus was capable of performing this function.

I have repeatedly known the catamenia, although previously absent for months, appear almost immediately after the use of electricity; in more than one case, the discharge actually appeared within a few minutes.

In the same paper, *Dr. Bird*, when speaking of the use of electricity in *Chorea*, refers to the disease in girls, from disturbance of enervation from *amenorrhœa*, and he says, that by means of electricity, the catamenia will be generally excited, and the rapidity of the cure increased. After these remarks, he narrates the case of a girl aged sixteen, who had menstruation for the first time, three months previously. After the disappearance of the discharge, she became the subject of involuntary movements of the right arm and hand.

These had increased in intensity up to the present time. She appeared at the electrical room in July, 1848; sparks were taken from the spine, and a few shocks passed through the pelvis. After the electricity had been applied five times, the catamenia occurred, and the chorea vanished. She continued well until the 19th of Sept., when, as the discharge had not appeared at the proper time, she applied at the Hospital. A few shocks through the pelvis excited the deficient function, and she left quite well.

In addition to the above, *Dr. Bird*, also relates the case of *Eliza Raven*, in whom, he says, "the chorea either depended *abinitio*, upon the non-performance of the uterine function, or was kept up by it; and accordingly, a few electric shocks, through the pelvis, by restoring the deficient menstrual discharge, at once cured the patient."

Dr. Robert McDaniel, in the *Dublin Medical Press* for Aug. 12, 1846, remarks, that "the practitioner often meets with instances where females have suffered for years from complete arrest of the menses, or from their being secreted scantily, and with difficulty and pain, or when the discharge comes on abundantly, and without pain at one time, whilst at the next period, the patient suffers excessively, and it scarcely presents itself. And in another class, severe dysmenorrhœa has existed for years before the physician is consulted.

Now, there are not, perhaps, any diseases in which the ordinary courses of treatment are more unsuccessful. In such cases, our treatment, however judicious, often fails completely.

It is under such circumstances and in such cases, that electro-galvanism acts with the greatest success, inducing a return of the menses, when arrested or producing an easy and abundant secretion of them in those cases, where the process has been inefficiently and painfully performed for many years previously; and this change is soon followed by an amelioration of all the distressing symptoms under which the patient has labored."

This writer reports several cases that confirm, in a most

favorable manner, his view of the value of galvanism as an emenagogue.

M. Rayer in the *Jour. des Conn.* Dec., 1847, mentions a patient who had, for two years, been subject to severe hæmatamesis, followed by amenorrhœa, who had been treated for more than eight months by different means, without any beneficial effect.

After the fifth sitting, the menses reappeared, for the first time, although small in quantity, and for one day only. The hæmatamesis did not recur from this time; the following month, some days before the period of the menses, the electricity was repeated; they then flowed more abundantly, and continued for several days. The patient progressively recovered.

M. Rager obtained a similar result on a female, who had an affection of the nipple, and had seen nothing for several months. The menses occurred after the third sitting.

M. Rognetta, in commenting on these cases, says that *Scarpa* particularly insisted on the emenagogue properties of electricity.

Bonert Mojin applied galvanism to a girl of eighteen, who had never menstruated. She was galvanised during six days, and on the seventh, she menstruated, and soon she was restored to perfect health.

He also obtained equally happy results in several other cases, in which he used this agent.

Dr. Collins says: "A female, æt. 35, unmarried, rather delicate constitution; her menses were stopped by taking cold, some seven months before I first saw her. I tried all the usual remedies prescribed in such cases, but I did not succeed in bringing about the desired effect. I have been using the electro-magnetic machine in some other cases, with the happiest effect; and I therefore was induced to use it in this case, in which it succeeded most perfectly. *Lancet*, Jan. 25, 1845.

Dr. Locock, Physician to the *York Dispensary*, says, of this mode of treatment: "Although the use of electro-gal-

vanism as an emenagogue, is no new thing in medicine, it is to *Dr. Cumming*, of Edinburgh, that we are indebted for much valuable, and as I think *new* information, as to the class of cases, and the mode in which it may be most advantageously applied. I would particularly refer the reader to *Dr. Cumming's* paper, "On the use of Electro-galvanism, in peculiar affections of the mucus membrane of the bowels," where he will find ample instructions as to the best mode of applying the remedy, the precautions that should be taken, and the adjuvants that should be administered."—*Medical Times*, July 20, 1850.

Dr. Byrone reported a case in the *Charleston Medical and Surgical Journal*, of a girl aged 12 years, who was evidently suffering from *hysterical* periodical convulsions, dependent upon an attempt of the system to establish menstruation, in which electro-magnetism was signally beneficial.

In the *British American Journal*, as reprinted in the *Dublin Medical Press*, for Aug. 12, 1846, *Dr. Robert McDonnell* reports several cases which place the efficacy of electro-galvanism in various uterine derangements, but especially in amenorrhœa, and dysmenorrhœa, in a very favorable light.

In regard to *Leucorrhœa*, and other uterine derangements, *Dr. Locock*, says: "If *Leucorrhœa*, or symptoms indicative of uterine congestion, displacement, or structural change, or of ovarian irritation, be found to exist, then the gastric, or gastro-enteric phenomena must be considered as in etiological relation to the pelvic, and the daily local application of electricity will be the best remedy."—*Med. Times*. July 20, 1850.

"As an emenagogue," remarks *Dr. Dewees*—"in cases of simple obstruction or retention, it is a most certain and powerful remedy." And again, "where the flow has been immoderate, I have received signal benefit from it; the reason is obvious, upon reflecting on what has been said. I have twice favorably resorted to the *continued current*, in threatened abortion, apparently resulting from irregular nervous supply to the uterus, the contractile efforts being calmed by it."

SEYMOUR'S GALVANIC SUPPORTER.

This apparatus possesses all the *mechanical* advantages of the Abdominal Supporters now in use, and also some valuable advantages, over them beside the *galvanic* attachment.

The springs which serve as conductors of the *negative* galvanism, around and above the hips to the *positive* poles near the spine, are so arranged, that they can be varied in breadth, to suit pelves of different sizes; and the springs are so tempered that their shape can be altered at will to accommodate the depth of the pelvis, and the distance from the pubis to the spine, as well as to make as much pressure, or produce as much *uplifting* of the abdomen as the particular case may require. As a mere *mechanical* apparatus, it possesses these advantages over all others that have come under observation; but its chief value, as an aid in the cure of disease, is the peculiar combination of the zinc and copper lining to the pads, and their connection by means of the steel conductors, which act as springs. The zinc which lines the front pad, is readily acted upon when placed in direct contact with the surface, by the acid of the perspiratory fluid, and generates galvanism in sufficient quantities for all ordinary purposes. In fact, experience has proved that there are very few patients to whom the instrument can be applied continuously for twenty-four hours to the surface without actually destroying the cuticle, and producing active ulceration. This ulceration, however, readily heals of itself, when the galvanic current is lessened or entirely cut off, by interposing a piece of linen cloth or other non-conducting substance between the zinc pad and the skin. By means of a cloth, smeared with any mild unguent, the ulcerations, when discovered, may be protected from the galvanic influence, when they will readily heal. In applying the Supporter, springs of the proper length, should be selected, and after the pads are combined with them they should be so bent (which can readily be done with the fingers), as that no undue pressure shall be felt at any point, and the highest part of the

springs over the crests of the ilium should be so far back, as to allow the front pad to be brought down nearly to the pubic bones; allowing the copper pads to rest each side of the spine, but as high or higher than the top of the sacrum. The springs near the front pad should be bent so that there shall be but little uplifting or pressure at first, and this can be increased afterwards, as it is found the case requires, and the patient can bear. Although a single pair of plates will not produce the convulsions and pain that follow the application of the chains, belts, or batteries, still the galvanometer, indicates that a large amount of galvanism is generated, and frequently patients are so impressible that they cannot at first bear the full influence of the Supporter, without a feeling of exhaustion, and languor, and perhaps, irritability of the nerves;—therefore, it is frequently better to interpose from the first, a thin piece of cotton, or linen between the front pad and the surface, and let the power of the instrument be increased as experience indicates.

The perspiration is sufficiently acid in all cases, to act freely upon the metals, and their surface should be scoured each day, so as to remove the oxide that is formed. For most cases, it is better to apply the Supporter in the morning before the patient rises, whether next the surface or not, as then the pelvic organs are more nearly in their normal relations, than when the upright position has been allowed to change the position of them, when any portion is weakened by disease. It can be so fitted as to cause no inconvenient pressure, and does not in any way interfere with the dress, or with any active exercise the patient may wish to engage in; and usually it will be found convenient to wear it constantly for some little time.

Again, I would caution both physician and patient, against the supposition that this apparatus is of itself, to cure, the disease, without the oversight of a scientific physician. It is powerful to aid in the cure of many distressing and intractable complaints, but its very *power* for good, when

rightly applied, causes it to be *exceedingly hurtful and dangerous* when improperly used. When fitted properly, and the amount of galvanism generated is adapted to the exigencies of the case, it will impart activity to the circulatory apparatus, to the exhalents and absorbents, and aid in the transmission of the nervous influence, and thus impart tone, activity, and vital energy, to the organ or tissue upon which it acts, and render such organs and tissues far more susceptible to the influence of remedial agents, in some instances increasing in this way the *effect of remedies*, so that the patient can no longer bear one-tenth as much at a dose as was before required to produce any manifest effect.

This power of galvanism, to rouse a dormant organ, so that it will respond to a remedy, is one of its most valuable properties, and also the source of great danger, when not properly appreciated, and understood. All experience has proved the great value of the Galvanic Supporter in uterine derangements, but it should not be used in cases of pregnancy, as, if the galvanic current, of the full strength be allowed to traverse a gravid uterus there will be great danger of its producing abortion. If there is threatened abortion from a relaxed condition of the uterus or from hemorrhage, the application of the weak current will be found of the greatest value, but only in that condition of the uterus.

Dr. Radford, of Manchester, England, *Dr. Tracey E. Waller*, *Dr. Johnson*, of Salop, *Dr. H. Wilson*, of Runcorn, and many others, have borne convincing testimony of the value of this agent to control uterine hemorrhage; and *Dr. W. F. Channing*, of Boston, says, that when uterine hemorrhage exists of a *passive* character, (and such is the case in most instances of hemorrhage from the *unimpregnated*, and sometimes from the gravid uterus). "Electricity may be with confidence employed, though with discretion in cases of inflammation. A moderate, uninterrupted galvanic current, may be sent through the organ. The power of electricity in producing organic contractility would here be of use."

Allusion has been made to the *irritation*, of the surface resulting from the application of the galvanic apparatus, and this will be found an admirable method of producing the counter-irritation from which many physicians have derived so much benefit in treating chronic diseases of the reproductive and other organs, and especially for the inflammation of the *ovaria*. It will be found, as a counter-irritant alone, irrespective of its vitalizing power, far superior to cantharides or the other irritants in common use, and very happy results have been derived from its application. The superiority of the *continued* stimulation of this method of counter irritation over that which like the blister, must be interrupted for the healing to occur, must be apparent to all. With this apparatus, the irritation may be as active as desired, and continued for any period of time.

If the oxyde of the zinc should become absorbed, it can do no harm, as most writers on materia medica have supposed zinc to be a tonic to the *nerves*, as iron is to the blood and muscular fibre, and that it should be administered to supply any *waste* or loss of nervous energy, the result of over-exercise or disease of the nervous system.

We have spoken of the influence of galvanism in imparting activity and health to the *female* reproductive organs, and overcoming the causes which render her sterile; but those of the *male* are also liable to suffer, and to loose their virile power from many causes.

Masturbation, or a too free indulgence in sexual intercourse in early life, has rendered the after years of many victims to these follies, but years of misery and regret. Various, and sometimes very dangerous and powerful remedies have been resorted to, to repair the loss, but as yet the profession have found nothing that meets their wishes, and the wants of this numerous class of sufferers. It is true that by the aid of active and destructive stimulation, applied either to the genital organs, or to the whole system, the lost

power may seem restored for a time, but the barren nuptial beds, and the puny, early-dying progeny that sometimes follow these forced efforts at reproduction, strongly attest to the ill success that has followed this course of procedure. It is not pretended that the Supporter will cure *all* those who suffer from weakness or disease of the reproductive organs, but it is capable of the most satisfactory and immediate proof from only a few hours trial of it, that the current will produce a pleasing sensation of warmth and life to all the organs it pervades; and in this, as well as in all other cases, it seems more readily to pass through those parts that are but slightly under the influence of the nervous system, and the wearer will soon perceive its influence upon the procreative power.

The error, however, should not be committed, of supposing that the organs are at once restored to a state of *healthful* activity. These organs whether in the male or the female, are of a complex character in their structure, and have various functions to perform. The instrument should be worn long enough to give time for the organs to change from a diseased to a normal condition, and they should not be called upon to perform their functions until sufficient strength is obtained, so that reaction shall not be followed by exhaustion.

In all that class of diseases which are the result of sexual weakness, whether in the form of involuntary seminal discharges in the male, or the kindred disease frequently occurring in the female; or in short, in all diseases of the reproductive organs of either sex, where the amount of vital energy is less than natural, or where the nerves are in an excitable condition, or suffering from *neuralgia*, the Supporter will be found very useful, both as generating a curative agent, and also one which will place the organs in a condition to respond to any remedies the attendant may prescribe.

