A NEW MANUAL

OF

Electro-Therapeutics,

AND A BRIEF

Treatise on Anatomy and Physiology.

ILLUSTRATED.

BY

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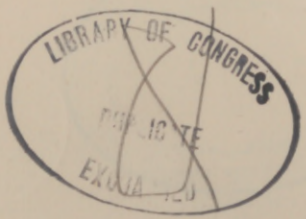

DEDICATED

TO

HUMANITY AND SCIENCE.

THE AUTHOR.

PREFACE.

In consideration of the fact, accepted by liberal and progressive practitioners, that "all medical systems" and "curative agents" belong to the true physician, irrespective of "pathy," should be combined without violation of any true "*code of medical ethics*," as a grand polytherapeutic, the author is induced to offer the present volume on Electro-Therapeutics, not antagonistic to, but as a correlation of the other systems of Therapeutics.

The many innovations upon the pedantry of certain factions, during the past ten years, rendering theories once scouted at and denounced with caustic opprobrium and prejudice, *as unsound*, the present accepted practice of best authorized medical regents, with undoubted attributes of sound scientific acumen, is a second plea for this exhaustive hand-book upon the principles and practice of Electro-Therapeutics.

Morover, the growing necessity and constant demand for a *rationale* of Electrical cure, safe and sure, beyond the hap-hazard of unscientific and unphysiological experiments for a system based upon well-proven methods, available alike for private and general practice, has urged the author to tabulate in simple terms, and adapted to simple apparatuses, the following principles for such practice. The author does not deny the efficacy nor the skillful workmanship

of various batteries, but has sought to offer a concise and complete system as adapted to *one electrical machine* and methodical applications, which will be effectual when administered intelligently and in close adherence to certain given principles, operating in harmony with physiological laws.

Where, as the author has, unlimited confidence in the efficacy resulting from scientific application of electricity, a confidence educed from personal experience and date gleaned from daily use of this subtle element; she does not hesitate to denounce most emphatically its exercise by unscientific hands, as an agent capable of originating great mischief, and distressing physical derangements.

A careful and thorough diagnosis is requisite to facilitate successful results. The author only vouches for applications resulting "thus and so," when all the conditions are observed, and the proper disease is addressed by the operator, and the proper discrimination of what kind of electricity should be used to affect various tissues, organs, nerves, ligaments, blood, etc., for such differences do exist, and are herein maintained upon a firm basis of experience and well attested facts.

The author only hopes that this grand science of sciences will henceforth arouse new interests, and medical colleges will give the subject proper consideration hereafter, so that the student shall be conversant with the subtle uses, and avoid the unscientific abuse, of Electro-Therapeutics.

PHILADELPHIA, PA., March, 1875.

ERRATA.

In Preface, pp. VIII, 10th line from top for date, read *data.*

On pp. 152, 9th line from top, omit the words "*and brandy.*"

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NOTICE.

THIS work may be ordered from the Author, the Editor, W. B. KEEN, COOKE & Co., Chicago, and J. B. LIPPINCOTT & Co., Philadelphia.

Price $10. Free on receipt of price.

PART I.

CHAPTER I.

HUMAN ANATOMY AND PHYSIOLOGY.

THE author feels it necessary, before proceeding to a consideration of *Electro - Therapeutics*, to give in as comprehensive language as possible the anatomical structure and physiological organism which constitutes life and health, or disease, in the human form, herein subsequently to be acted upon.

Assuming that the readers stand in the light of uninformed pupils, the effort on the part of the author will be directed to render as lucid and give as wide a range of ideas upon these subjects as possible, without the perplexity of wading through technical nomenclature.

An organism is a body composed of separate parts called organs. It is definite in form and function, and each part or organ is necessary to the full perfection of the whole structure. Unorganized matter, or the contrary, is not necessarily made up of separate parts; it does not consist of organs, nor are the sizes and

forms of inorganic masses limited or definite, except in respect to crystalline formations, which are always definite. Inorganic substances, such as minerals, earths, fluids, gases, etc., may be unlimited in size, and heterogeneous in the shape of their several masses; but plants and animals always assume certain definite shapes and sizes, ranging within certain normal limits. You may break up and divide inorganic bodies into any number of subdivisions, and each part shall retain its identity, and be still the same substance; but you can not take from an organized body any portion, however minute, without damaging its integrity, and depriving it of an essential part of its structure.

The study of anatomy deals with and describes dead matter. Physiology treats of the powers, motions, and functions of living bodies. Physiology also includes a survey of all animated structures, from the simplest forms of the vegetable to the highest conditions of animal existence; but as the human structure may be regarded as a microcosm, including every form of life below itself, so the study of man is the most instructive and comprehensive of all other branches.

The human organism is made up of matter and force,—matter, in its three states of solid, fluid and gaseous; and force, including all the various forms of motion, the sum of which we call life.

The fluids in animal bodies exist chiefly in the form of chyme, chyle, lymph, blood, the different juices secreted by special glands, and water.

The solid portions are called tissues, and consist of bone, muscle, cartilage, membrane, adipose, cellular

and areolar tissues, nervous matter, hair, teeth, and nails.

The fluids contain in solution all the materials for the formation of solids, and as the fluids and solids are mutually convertible, and constantly interchanging states, their constituent elements do not differ materially from each other.

The following elements are found in more or less variable proportions in the human system: oxygen, hydrogen, nitrogen, carbon, sulphur, phosphorus, silicon, chlorine, fluorine, and iron. There are other elements occasionally found in the body, such as manganesium, aluminum, and copper, but these are rather incidental than constant in their presence.

There are, without reckoning the teeth, about two hundred and eight pieces of bone, arranged for the most part in pairs, and grouped symmetrically on either side of the body. The bony structure may be divided into the cranium inclosing the brain, the bones of the face, the trunk, including the sternum, vertebræ, twelve pairs of ribs, the collar-bones and shoulder-blades, and the pelvis, which supports the abdominal regions. The lower extremities consist of the thigh and knee-bones, the legs, feet and toes. The upper extremities include the arms, hands and fingers.

The cranium incloses the brain and its appropriate system of blood-vessels, and also bounds the face, organs of special sense, and cranial nerves. The thorax and vertebræ inclose the heart, lungs, blood-vessels, and spinal cord. The pelvic basin supports the stomach, liver, pancreas, spleen, bladder, intestines,

and organs of generation. Thus the bony structure performs the important office of protecting, as in an inclosed lattice-work, the vital organs. There are certain pieces of bone in the pelvis, face, head, and spine which are single and uniform; all the rest are arranged, like the extremities, in pairs, on either side of the body. Each pair of bones differs in some respects from every other pair, and all are fastened together by joints called articulations. The cranium is not formed of one compact mass, but consists of several pieces, firmly united by the interlocking of notched edges, called sutures. The long bones of the extremities are hard, hollow cylinders, lined with membrane, on which blood-vessels are distributed for the nutriment of their substance. The long bones are expanded at the extremities, so as to present surfaces for articulation with other bones. Some of these bones are united by a ball and socket, others by flat surfaces, but all are firmly bound together by muscles and ligaments, and the end of each bone is covered with a layer of cartilage, lubricated by means of a sac of serous membrane, which effuses a peculiar fluid, called synovia, the use of which is to keep the joints moist and supple.

The bones are composed, in the first place, of cartilage, which is converted into osseous tissue by the deposition of phosphate and carbonate of lime. In infancy, cartilaginous or animal matter constitutes the chief portion of the skeleton; in adults, the lime increases, hardening the bones, and communicating strength to the frame; in old age, however, the animal matter dissipates so rapidly that the bones become ex-

ceedingly brittle, — hence it is that fractures to persons in advanced life are so dangerous and difficult to repair.

Without entering into the minutiæ of detail which belongs to the anatomy of the bones, it is enough to call attention to the beautiful mechanism of which the frame-work is composed, the position it occupies in the human economy, and to note how admirably the finest principles of mechanics are carried out in the articulation of the several joints, and the freedom with which every part of the structure moves.

The respiratory apparatus commences with the mouth, which conducts the inhaled air through the trachea (windpipe) into the lungs. The trachea is a strong, highly elastic tube, composed of muscular, fibrous, and mucous membrane, all of which line and connect about eighteen cartilaginous rings, the contractile action of which is admirably adapted to produce the various inflexions of the voice essential in speaking or singing.

We may here pause to remark that all portions of the viscera or internal organs that are exposed to the air are lined with mucous membrane, and all the internal organs themselves are inclosed in sacs of serous membrane, the office of which is to secrete a watery fluid, called serum. It is by the effusion of serum that the various organs are lubricated, and any undue irritation, from their friction one upon the other, is avoided.

The trachea terminates, as it enters the thorax, in two arches, called bronchi, and these, dividing off into the right and the left lung, subdivide and ramify into

an immense system of tubing, every fiber of which ends in a minute air-cell. The tissue of the lungs is composed of fine areolar membrane, air-cells, bronchial tubing, arteries, veins, and capillaries. The air-cells are composed of microscopic sacs of membrane. The bronchial tubes, veins, arteries, and capillaries of the lungs are all attenuated to the utmost degree of fineness, and so profusely distributed that the entire mass of the lungs may be said to consist of an immense surface of membrane, with blood-vessels on one side and air-cells on the other. The blood and air do not come into contact, although the fine and permeable character of the membrane permits the nutritive quality of the blood to pass into and nourish the air-cells, and the vitalizing properties of the inhaled air to act upon and change materially the character of the blood. It has been estimated that there are at least six hundred millions of air-cells in the lungs, each one of which is supplied by an artery communicating with a vein, and inflated by the air inhaled in the act of inspiration. The surface presented by the membrane of the lungs would, it is supposed, cover more than thirty times that of the whole body, and the capacity for inflating this light, spongy tissue is provided for, first, by the elastic intercostal muscles which connect the ribs together and expand with every respiration, and next by the action of the large muscular membrane called the diaphragm, which separates the thorax from the abdomen, and alternately curves upwards and downwards with the actions of inspiration and exhalation performed by the lungs. The chief function of the respiratory organs

is that of aerating the blood, which is carried into the lung-tissues by the pulmonary artery from the right ventricle of the heart. At this point the blood is finally collected by the veins from all portions of the system, and, being charged with the impurities and effete matters, gathered up in traversing the body, presents the appearance of a dark purple, almost black, fluid, when poured through the right vena cava or large vein into the heart.

By the exposure of the venous blood to the oxygen of the atmosphere inhaled through the lungs, its impurities are in part disengaged and given off in the form of carbonic acid gas; the whole mass of blood, or nearly the whole, becomes changed in tone and color; the dark purple hue is converted into a bright scarlet, and by the time the pulmonary circulation is completed, the blood is arterialized and poured back into the heart through the left auricle, in a condition sufficiently renovated to form pabulum for the support and nourishment of the entire system.

We must now trace in more detail the circulatory process, and note the intimate connection and interdependence which it maintains with the respiratory system. The heart is the center of the circulatory apparatus, and it is situated in the thorax, between the right and left lungs. The point or apex slants forwards towards the left lung, on which it slightly impinges, the base or broad part inclining backwards and upwards towards the right shoulder. Although the formation of muscular fiber is uniform in all parts of the system, the closely-knit and strongly-packed fibers of the heart

constitute it the most powerful muscle of the whole body. It is protected from friction against other organs by a smooth serous membrane or sac containing cardiacal fluid, and this sac is spread over the whole surface of the heart, and so doubled on itself as to form a close bag, called the pericardium, or heart-case.

The heart itself is divided internally in the direction of its length into two halves, which, though so closely connected as to form one, constitute it in reality a double organ. Each part also being called upon to perform different functions from the other, the walls of each side differ in thickness in proportion to their uses. Thus, the right side (the office of which is simply to receive the blood and propel it with moderate force into the lungs) exhibits muscular walls less thick, and valves less elaborately fashioned than the left, through which the blood is received from the lungs, and propelled by the aortal artery through the whole body.

There are four principal cavities in the heart, the first two of which are termed auricles, situated on each side, right and left, though not exactly uniform, and two other cavities termed ventricles, both right and left of the heart, though less uniform even than the auricles. The auricles perform the part of receivers, the ventricles that of propellers.

Between each cavity there is a beautifully constructed valve, the duty of which is to permit the flow of blood in one direction, but to prevent its return again through the same orifice.

The auricle on the right side is furnished with a three-pointed valve, called tricuspid, and that on the left

with a two-pointed valve, termed bicuspid. Both these membranes are attached to the walls of the heart by little muscular cords, and though they appear to be merely finely attenuated threads, they are fashioned, like the valves, with an extraordinary amount of strength and resisting power.

Besides the auricular valves, there are two sets communicating between the ventricles and the arteries. These are termed semilunar valves, and their office is to afford passage from the ventricles to the arteries: the right ventricle forcing the blood into the pulmonary artery, and from thence through the lungs, and the left ventricle by the great aorta throughout the whole body.

In order to gain a correct idea of the course in which the tidal currents of the blood are projected, it is necessary to have a starting-point; and this we shall find by commencing to trace the circuit from the left ventricle. Remember always that the blood does not flow in regular channels through the heart, but that it is propelled by a strong impulse through each valve into its separate cavity. In the left ventricle we find the blood in that bright scarlet condition peculiar to the arterial flow. If we should pierce a vein in any part of the living structure, we shall observe a moderate but by no means impulsive flow of the contained fluid; but if we should sever an artery, a violent upward rush of the blood will testify to the momentum with which the current has been impelled. This impulse is originated by the muscular contraction peculiar to the left ventricular cavity, which forces the blood with immense power

through the large arterial tube crowning the broad base of the heart, called the aorta. Directly after receiving the first flow of the arterial fluid, the aorta divides like an arch to the right and left, and again subdivides into four main trunks,—two branches of which extend upwards, when they are called the carotid arteries, and supply the different portions of the throat and head, the other two trunks tend downwards, and branch off on either side of the body into a complex system of tubing, ending in an inextricable net-work of fine hair-like passages called capillaries. The ramifications of this extensive system of vessels are supposed to extend in length to several miles, and it is thus that arterial blood is furnished to the body, supplying the entire system with nutrition and the life-giving oxygen inhaled through the lungs.

In the capillaries, the blood parts with its nutritive qualities, and from thence it is taken up by the veins, the extent and ramifications of which correspond in all respects with the arteries, only that its dark purple, almost black, hue, denotes the absence of the vitalizing elements found in the arteries; but it must be remembered that the chief office of the veins is to carry the blood back again to the great central reservoir of circulatory power in the heart. This they effect by being distributed side by side with the arteries,— intersecting them in thousands of yards of fine hair-like tubing, until they expand into larger proportions, and finally concentrate into four main trunks about the heart, corresponding to the position of the arteries. The large trunks which carry back the venous blood from the

heart and throat are called the jugular veins, and the branches which return the blood from the trunk and extremities are termed venæ cavæ. Through these the blood is emptied into the right auricle, and from thence through the tricuspid valve into the right ventricle. Here what is called the great systemic circulation ends, and here the pulmonary or *lesser* circulation commences; for it must be remembered that we started on our analysis by tracing the blood from the left ventricle, but before it can reach this point there must intervene that complete pulmonary circuit through the lungs to which we have previously called attention. The object of this lesser system of circulation is, as before stated, to expose the blood to the oxygen inhaled by the act of respiration, and thus to effect that radical change that converts the dark venous flow into the healthful and vitalizing condition of arterial blood.

The wonders of the circulatory system, and the effects of health or disease which result from a thorough understanding of its influence, cannot of course be fully appreciated from the condensed description which is herewith presented. It is enough to say, however, that if, as the best informed physiologists allow, a single grain of poison infused into any given portion of the organism will traverse the whole circulatory extent of tubing in something less than three minutes of time, what an array of poisonous elements are we not perpetually introducing into our systems, in the shape of vitiated airs, fermented liquors, and other injurious articles of food, in the ignorant and unphysio-

logical modes in which nine-tenths of the community pass their lives!

We now add a brief sketch of the methods by which food is prepared for the nourishment of the system through the digestive apparatus.

The organs of digestion commence with the teeth, and include the mouth, salivary glands, œsophagus, or food-pipe, the stomach, duodenum, or entrance to the small intestine, the pancreas, liver, gall-bladder, and lacteals.

The three kinds of teeth found in the human jaw are called incisors, canine, and molars. The first of these are designed simply to divide the food, the second to tear it, and the third to bruise or grind it. There are two sets of teeth, namely, the milk-teeth, which supply the gums of infancy and childhood, and the permanent teeth, which take the place of the others, from about the age of six to eight years.

The extreme hardness, diverse fashion, and separate offices performed by the three varieties of teeth fastened into the human jaw, taken in connection with similarly diverse functions performed by other portions of the digestive apparatus, demonstrate the food designed to sustain man should be of a mixed character, and include animal, vegetable, and cereal productions.

Besides the act of mastication, another important process takes place in the mouth, and this consists of insalivation, or the moistening and preparing the food for swallowing by the mixture of saliva. This fluid is secreted from three different sets of glands: the one

pair situated just below each ear, and called the parotid glands ; the other pair placed beneath the tongue, called sublingual ; and the third, or submaxillary, placed near the angles of the lower jaw.

The fluids secreted from these three sets of glands differ in character, but in combination form saliva. A certain portion of saliva is always found in the mouth, except its flow is restrained by disease, but, like the gastric juice of the stomach, the moment food is presented to the mouth the flow is greatly increased, and sometimes occurs even when the thought of food excites the nerves which supply the salivary glands; this result is known in what is vulgarly called "setting the mouth watering" at the sight or mention of desirable food. After the food has been duly masticated and moistened by the saliva, it is collected by the muscles of the cheeks and the action of the tongue, and conveyed against the back part or vail of the palate, which is so hung as to close the cavity of the mouth in rest, yet in swallowing to open it freely and permit the passage of the food into the pharynx.

The œsophagus is an elastic muscular tube resembling the trachea in construction, inclosed on its external surface by a serous membrane; then follows a layer of thick elastic muscular membrane, the whole being lined with mucous membrane.

By the muscular contractions of the œsophagus, the food is next forced through an orifice near the heart, surrounded with a strong band, or sphincter, into the main digestive cavity, or stomach.

The human stomach is an oblong membraneous bag,

situated just below the diaphragm, and placed somewhat obliquely across the abdomen. It has two orifices: the one just alluded to, namely, the cardiac orifice, by which the food is received, and the other at its smaller extremity, called the pyloric orifice, the office of which is to convey the semi-digested food from the stomach into the intestines. Both these orifices are surrounded with muscular bands, which close upon the interior sac, and only open or expand when it is essential to receive or expel the food from the cavity of the stomach.

The stomach has three coats, consisting of an external covering, or serous membrane; a muscular or middle coating, formed of highly elastic muscular fiber, the property of which is to contract and expand, and thus promote the rolling motion occurring whilst the food is being digested in the stomach; and an inner lining, called, as before stated, the mucous membrane, the office of which is not only to cover the interior surface with a smooth slimy fluid, but also to contain the countless number of little follicles or glands through which the gastric juices are poured out and secreted; in fact, the entire of the mucous membrane or inner lining of the stomach is pierced with little glands and processes so thickly set, that millions of them may be counted under the microscope. When this organ contains no food these glands are at rest, but directly food is introduced into the cardiac orifice, the follicles pour out an acrid fluid secreted within them, which, running down into the contents of the stomach, so dissolves and changes them that all mat-

ters which are susceptible of digestion become converted into a pulpy mass called chyme.

Nothing but solid matter, and that of an organic nature, is acted upon by the gastric fluid. Liquids are at once got rid of, and when introduced into the stomach in large quantities, materially interfere with the process of digestion. Solid tissues, such as cooked meat, fish, and bread, are most readily dissolved by the gastric juices. Saccharine and starchy matters are ejected in an unchanged state into the small intestines. Gastric fluid, though poured in large quantities into the stomach during the process of digestion, does not remain there, nor is it all absorbed by the food; some portions of it are reabsorbed into the capillaries which surround and overlay the glands, and thus pass into the general circulation, and perform the function of nourishing or vitiating the tissues of the body; but the greater portion of the solids, when they are susceptible of being dissolved by the gastric juices, are carried off through the pyloric orifice into the duodenum, or first part of the alimentary canal.

The usual length of the small intestine in man is about twenty-five feet. The opening then widens into a much larger passage, called the colon, or great intestine, the length of which, for about five feet, is traversed by the waste matter, which is finally ejected from the system. The intestines, like the stomach, have three coats or membranes, consisting of the peritoneal, or serous, the muscular, and the mucous.

The surface of the mucous lining of the small intestine is even more numerously studded with small

glands, called villi, than the stomach. Through these villi the nutritive portions of the food are absorbed by a set of vessels called lacteals, but not until the chyme, or half-digested food, has been further prepared by a juice, secreted by a long gland situated on the right side of the stomach, called the pancreas. This gland pours out a fluid called the pancreatic juice, and its peculiar property seems to be to mix with and prepare the fatty matters taken into the system for general distribution.

The final act of the digestive process is performed by the liver. This is a large gland, divided into several lobes, pierced thickly with blood-vessels, and having a circulation of its own, called the portal circulation.

One of the chief offices of the liver is to secrete or manufacture a bitter, acrid fluid, called bile. This is poured out into a small duct, adhering to the lower side of the liver, called the gall-bladder. There is a duct which leads direct from the liver into the gall-bladder, and from this again into the small intestine, at or about the same point as the pancreatic duct, and this is called the bile-duct. Through this passage the biliary fluid is poured in a given quantity into the small intestine, changing so materially the character of the chyme, that after it has passed beyond the pancreatic and bile ducts it is converted into a white, milk-like fluid; in fact, it now assumes that rudimental condition of which blood is formed, and, having undergone its last change in the act of digestion, it is called chyle, and is taken up by absorption through the mucous membrane of the small intestine into a set of vessels termed lacteals, and from

thence it is poured into the general circulation through the blood-vessels.

Whatever residue contains matter which is not fit for nutriment is forced on into the colon, and as the lining membrane in this intestine is no longer supplied with nutritive glands, the contained matter becomes hard and comparatively dry, and is expelled in regular course from the system by the excrementary passage.

It now only remains for us to add a few words of description concerning the lacteals, through which the thoroughly digested food is ultimately converted into chyle and poured into the general circulation.

The lacteals form part of an extensive fluid system, called lymphatics, of which that portion termed lacteals originates in the mucous membrane of the alimentary canal. Here they are imbedded in the form of villi, or minute tubules, imperceptible to the naked eye; and the chyle, or digested food, in its liquid, milky state, is absorbed into these villi, from whence it passes into larger passages, uniting into great branches, and finally combining into one trunk, called the thoracic duct.

Into this main passage all the lymphatics and lacteals are emptied. Its situation is in front of the second lower joint of the spine, or lumbar vertebræ, and after continuing up the backbone until it reaches a valvular opening, just beneath the clavicle, or collar-bone, it discharges its contents into the left subclavian vein, becomes commingled with the returning currents of venous blood, and is carried into the right cavity of the heart, to be lost in the general circulation.

CHAPTER II.

THE BRAIN AND NERVOUS SYSTEM.

UNDER the microscope the diameter of blood-discs is one four-thousandth part of an inch!

Then consider hundreds of millions of air sacs in the lungs, miles of tubing in the blood-vessels and capillaries, and millions of cells occupied in forming the brain,—are so many words, which, however true, bring no sense of realization to the mind seeking to learn the grand machinery of life outside of the dissecting room; or from works devoted exclusively to the delineation of anatomy and physiology.

Therefore, in this volume, all minutiæ of description is withheld, which apply to the original formation of tissues, and the simple statement that all the different portions of the body, whether bone, muscle, membrane, cartilage, or nervous matter, are constructed from minute cells, the primary form of which is a sac of membrane of infinitesimal attenuation and nuclei of microscopic size.

Millions of these, flattened, elongated, rounded, or pressed into spheroids, go to make up a single fiber of muscular or nervous matter. Bundles of fibers, countless in multitude, are bound together to form a mass o tissue; whilst the human body includes the totality of

all tissues, organs, systems, and apparatuses. Passing forward then to the grand results of formation, we are now about to enter upon that peculiar system of organic life which connects the realms of matter and force, and in part reveals the causation underlying the variety of motions which make up the life-principle.

When we turn from the dead body, which is in reality inorganic matter, and contemplate the immense variety of powers and functions manifest in the living structure itself, it becomes impossible to narrow down our investigations to the inert masses examined by anatomy; hence we must push into the avenues opened up by physiology.

To determine the source of those marvelous activities which proceed with with such regular order in life, and ascertain what element it is, the absence of which stills those activities into death, and reduces their instrument of expression to inert matter, has been the problem of ages, and one which even now would not have been susceptible of solution if a partial disclosure of the mystery had not been made by the researches of physiologists, and the light which modern science has thrown upon the powers and functions of the nervous system, under the stimulus of *Electricity*.

For some time past the theory has been advanced, that the hidden and mysterious forces of life were generated by the brain and nervous system in what is termed "*nerve aura*," and that this element would account for all the phenomena vaguely attributed to a "*vital principle*."

The simple fact that the nerves, like the rest of the

organs, perish at death, and that their tissues retain none of the properties assumed to belong to them except they are acted upon from without, is a sufficient refutation of the fallacy that the "*vital principle*" and "*nerve aura*" are one and the same element; but when we find a force which produces upon the organism the effects which we attribute to the "vital principle," when we find that force capable of moving the muscles, stimulating the circulation, promoting digestion and respiration, and acting even upon the nervous system itself, are we not justified in assuming that such force is one and the same with the "*vital principle?*" We have a sufficient array of phenomena, through whatever media we observe the action of electricity, to determine that it is the true motor of vital force, and that the physiologist who carefully observes its working as a therapeutic agent, and the anatomist who watches its effects even upon dead matter, have plausible reason to assume that they approach a solution of the problem of life.

Mr. St. Clair Gray published in 1872 a paper upon the origin of nerve-force, which he illustrated by what he considers to be a newly discovered source of natural electricity. During some of his experiments he prepared a cell or cup, containing a solution of caustic potash, in which sticks of phosphorus and sulphur were placed; within half an hour the sulphur was apparently unaffected, the phosphorus was reduced to an oily mass at the bottom of the cell. After a time, it was ascertained that several salts of potassium occurred in the solution, and that sulphur at the point of

contact with the phosphorus sustained a considerable loss of substance. Similar conditions being found at the end of three months, the phosphorus still fluid, and the sulphur having a continued waste, the amount of electricity generated was tested by Thomson's electrometer, and the electric motive force was 162°, in comparison with a Daniell cell, which only gave 120°; the difference was 42° in favor of the new cell. The constancy of this original battery was shown by its continuing to work steadily after the expiration of several months.

Mr. Gray proceeds from these hints to suggest a new hypothesis in regard to nerve-force; and starting with the assumption that nerve-power has in it an electric element, he endeavored to ascertain its source, which, after elaborate experiment, he believes can be found in the sulphur and phosphorus of the human body: the brain contains considerable phosphorus, whilst sulphur exists in the liver, and an alkaline solution is circulated between them. He took a frog, and having secured anæsthesia by application of chloroform, an incision was made through the abdominal walls in the right hypochondriac region; and a copper wire passed into the substance of the liver. The eyeball was then pierced, and a similar piece of copper wire brought in contact with the brain by passing it through the optic foramen. The free extremities of the copper wires were brought in contact with the exposed sciatic nerve of another frog's hind-leg, when powerful convulsions were immediately induced in the muscles.

Mr. Gray evolved from these experiments the opinion, that at least a portion of this electric current is generated by the action of the alkaline fluid on the sulphur and phosphorus contained in the liver and brain. Although the living body is known to have other sources of electricity, Mr. Gray believes that the prime agent in nervo-motor power is derived from the reaction of the brain and liver, especially in view of the fact that the kidneys excrete about 72 grains per diem of phosphoric acid, and of sulphuric acid nearly 100 grains are produced per diem, chiefly from the brain and liver.

Mr. Gray also advances the idea—which the author has every reason to corroborate, and has frequently declared in part explanation of her own discovery of electrical cranial diagnosis—namely, that the sympathetic nerve, with its branches and ganglia, is not a separate or isolated system, but merely a constitutent part of the general nervous system, having the function of regulating the movements of involuntary muscular fiber, and obtaining its nerve-force from the brain. He suggests an arrangement similar to that of the Leyden-jar, as occurring in the membranes inclosing the viscera, the lungs, the heart, and the great serous cavities of the body; whereas the author in a former volume has written, "I would liken the human organism not to a magnet, which has been done so often, but to a great natural battery, of which the lungs are the magnets, generating the electricity for the whole organism; the nerves, the wires or conductors; the heart, the helix or intensifying factor; the head and

feet corresponding to the positive and negative poles. Conceive that the lungs generate the fluid from the oxygen of the atmosphere, and we have a never-failing electric reservoir, in which the slightest perturbation in the current produces, as is well known, a corresponding disturbance in the electric condition of the body; and as the electric forces resident in the various organs of the human body are simply modifications of those which vitalize human nature at large, it follows that any excess or diminution in their quantity, or any impoverishment in quality, may be supplied by a judicious administration of induced electricity. It is upon this basis the author's system of Electro-Therapeutics operates. Her theory of the electric force in its connection with the human organism recognizes it as the motor-power of the life principle."

Not to anticipate in this place the arguments which can be presented to support this theory, we will proceed to briefly consider the structure of the brain and nervous system, and see thereby how far we are justified in assuming that, in their operation, we find the instrumentalities through which the life-forces act.

It has long been believed that consciousness, intelligence, and will, find in the nervous matter of the brain the seat of those properties by which mind acts upon matter. As a full analysis of all that might be advanced in reference to the subtle links which connect mind and matter would involve psychological, as well as physiological, considerations, we must limit ourselves to the physical relations of our subject, alluding to its psychological connections only where it is essential to

elucidate the influences which mind exercises upon matter in different conditions of health and disease.

In the nervous apparatus of man we find two well-marked and distinct systems — the cerebro-spinal, and the sympathetic or ganglionic system. The cerebro-spinal consists of the brain, the spinal cord, and the nerves, which extend these great centers to the ultimate extremities of the body. (See Fig. 4.)

The brain is composed of a soft, pulpy tissue, and is inclosed in the cavity formed by the cranium. The mass of the brain is divided, first, into two principal portions, called the cerebrum, or front brain, and the cerebellum, or back brain.

The cerebrum occupies all the anterior and upper part of the cranial cavity; it also extends to the posterior region of the head, covering the upper portion of the cerebellum, and resting on the membranes which divide the two. It is seven-eighths larger than the cerebellum, and is supposed to be the principal seat of the intellectual faculties.

The mass of the cerebrum is divided into two hemispheres or lateral halves, and again, these have three prominences on either side, called lobes. The lobes are the special masses which fill the concave portion of the skull at the forehead, temples, and back of the head.

The hemispheres are divided by a double fold of membrane, which dips down between them, and cuts the cerebrum into two distinct halves. There are transverse bands of nervous matter connecting these hemispheres, called commissures, and the last and largest of these is situated at the base of the cerebrum,

forming a strong band of nerve-fibers, called the corpus-callosum. Towards the base of the cerebrum it becomes inflected inwards, then expands, and forms an intricate cavity, with several chambers, called ventricles.

The surface of the cerebrum is folded up into an immense number of convolutions, which pierce deeply into the substance, and form a complete mass of fissures and eminences. Brain-matter, although uniform in consistence, presents two striking varieties of color, and a specialty in the arrangement of its surfaces. The external surface is composed of a thick layer of nervous matter of a gray color, called, from its ash-like hue, cineritious, and this dips down into all the convolutions, piercing the internal mass in a well-defined, though exceedingly irregular, layer.

This interior mass is of a milky-white substance, semi-fluid in consistency, and called medullary. Notwithstanding the irregularity of surface occasioned by the convoluted nature of the cineritious layer, it does not commingle with the medullary, but the gray and white substances preserve their distinct positions throughout the whole mass. The brain is more abundantly supplied with blood than any other organ of the body; but if the extent of brain-surface were limited by the size of the mass, only one-tenth of the quantity of blood would be sent to the brain that it now receives, and this additional provision for its nutrition is derived from the blood-vessels spread out on the membranes, and piercing all the convolutions into which the mass is folded.

There are three membranes inclosing the brain. The external is a strong, firm tissue, lining the cranial cavity and adhering closely to the bones; it also dips down between the two hemispheres, and being reflected back over either side, forms the double fold which divides them. This membrane is called the *dura mater*, or "hard mother," from the belief of the old anatomists that it originated all the strong membranes of the body.

The second membrane is called the *arachnoid*, or "spider-web," from its exceeding attenuation. This membrane dips into all the convolutions, and upon its surface is spread out the extensive vascular system which supplies the brain with blood.

The third and inner membrane is an exceedingly fine and delicate investiture which incloses all the brain matter, and is termed *pia mater*, or "soft mother," in contradistinction to the dura mater.

Myriads of minute vessels are spread out between these membranes, besides which there is a serous fluid secreted by the arachnoid, serving the same lubricating purpose as that effected by the serous sacs, which inclose the heart, lungs, and other internal organs. All these membranes, in the same order as they exist in the cranium, form the tubular sheath which invests the spinal cord.

The cerebellum, or back brain, is situated at the base of the cerebrum or front brain, and is in part covered by it. In structure, as in functions, it differs from the cerebrum, its surface being furrowed with lines or ridges instead of convolutions. Like the cerebrum, it is divided into two hemispheres, separated by

folds of membrane, and united by commissures, or transverse bands of nervous matter. The gray and white matter are arranged in layers similar to the cerebrum, but it is a curious feature in the cerebellum, that when a vertical section of the mass is cut into, and solidified by being frozen or otherwise, the white matter is found in the form of a well defined tree, called from this appearance the *arbor vitæ*, or tree of life.

At the upper part of the spinal column is a singular bulb-shaped mass of white matter, called the medulla oblongata. It is situated immediately beneath the corpus callosum, between the right and left hemispheres of the cerebellum, and forms the point of union between the brain and spinal cord, although it properly belongs to the latter.

Its functions in the nervous system are complicated and important, so that anatomists assign it a very prominent position in the distribution of nerve-force.

Fig. 2, illustrating the brain, will give some idea of the divisions and subdivisions into which it is resolved; suffice to mention four, the functions of which are far more important than their diminutive size would seem to portend. The medulla oblongata is divided into two halves, like the spinal cord, and although these are transversed and united by bands of nerve-fibers, the functions of these columns are obviously different.

The anterior half of the medulla is the gate through which all the powers of motion are transmitted to the nerves throughout the body.

The posterior half of the medulla oblongata, per-

forms the same office for the sensory nerves; in fact, whatever powers originate in the brain must be transmitted through the medulla oblongata, and in reflex action, whatever sensations are transmitted to the brain must in like manner pass through this singular little mass of nervous matter.

The medulla oblongata is also subdivided laterally, so that two distinct centers of sensation are found to exist in the posterior half, and two corresponding centers of motion in the anterior column. Experiments show that if one of the anterior columns of the medulla oblongata is cut away, the power of motion in the opposite half of the body is lost, although in the other half motion will remain, and sensation is unimpaired; remove the other half of the anterior column, and all motion ceases; the same results to the powers of sensation are obtained by cutting away the posterior columns separately or together.

Experiments made on living animals have shown that whilst successive portions of the brain may be cut away until it is all removed, so long as the medulla oblongata remains uninjured, the functions of breathing, deglutition, and the automatic processes of life still go on undisturbed.

A very slight wound at the center of the medulla oblongata is sufficient to produce death, and the functions of motion and sensation are, as we have shown, absolutely dependent on its integrity and perfectness.

Many physiologists assume that the instinctive powers of animal life are centered in the cerebellum; but whilst that organ is undoubtedly essential to govern and

co-ordinate the instinctive powers, the much smaller mass of medulla oblongata is evidently the chief center of the powers themselves, and without its preservation, motion, sensation, and even life itself, cease to animate the organism.

There are twelve pairs of nerves given off from the brain, and from thence to the organs of special sense, and different portions of the head.

The first pair are called the olfactory nerves, and terminate in the inner portions of the nose.

The second pair are called the optic nerves, and supply the retina of the eye.

The third, fourth, fifth and sixth pairs are also distributed about the eyes; the third, fourth and sixth pairs being motor nerves.

The fifth pair, called tri-facial, are sensory, and send off branches which supply the cheeks, nose and mouth.

The seventh pair are the general motor nerves of the facial nerves.

The eighth pair, called auditory nerves, end in the interior of the eye.

The ninth pair supply the back of the mouth and pharynx.

The tenth pair, the important pneumogastric nerves, originating in the medulla oblongata, communicate with the lungs, heart, and stomach, and ramify through the entire viscera to a considerable extent. (See Fig. 3.)

The eleventh pair supply the muscles of the neck.

The twelfth pair communicate with the tongue and the organs of speech.

The two pairs, eleventh and twelfth, are called spinal accessory and hyoglossal; but physiologists are not in general agreed upon the classification and names of the cranial nerves.

The nerves are mostly cells, or tubules, composed of membraneous sacs or sheaths, lined with nervous matter, inclosing nerve-filaments in the form of bundles, which stretch away, divide, and subdivide, but never lose the original quality of sensation or motion which they derive from their roots. In every membraneous sheath there are two distinct sets of filaments, one of which communicates with the cerebral hemispheres, and the other with the spinal cord.

The spinal cord is a long, irregular column of nerve-substance, inclosed in a sheath, composed of the cranial membranes prolonged down the spine. It extends from the medulla oblongata to the second lumbar vertebra of the spine. (See Fig. 4.)

The spinal cord, although composed of gray and white nervous matter like the brain, presents a different arrangement of the layers,—the white matter being on the external, and the gray or cineritious mass forming a band which traverses the interior of the column.

Like the medulla oblongata, the spinal cord is divided into two symmetrical halves, united in the middle by a commissure, or converging lines of nerve-fiber; it is also separated into an interior and posterior column by a vertical fissure. Each lateral half is traversed by two longitudinal tracts, which separate it by distinct furrows. Thus there are on either side

three well-marked columns, called the anterior, posterior, and lateral.

The spinal cord is enlarged at the neck and loins, and from these expansions are given off the nerves which supply the upper and lower extremities.

From the spinal cord are given off thirty-two pairs of nerves, the roots of which spring from either side of the cord, right and left.

The first eight pairs arise in the region of the neck and are called *Cervical.*

The next twelve pairs, corresponding to the number of the ribs, are termed *Dorsal.*

Then five pairs, which spring from the lumbar vertebræ.

The remaining six pairs originate in the vertebral bones which divide the basin of the pelvis, and supply the lower abdominal regions.

Every nerve-trunk arises from a distinct root, and these roots originate in pairs, one in the anterior and the other in the posterior half of the column.

The nerves which spring from the posterior half are nerves of sensation; those from the anterior division of the cord, motor nerves. Like the columns of the medulla oblongata, if one of the sensory nerves be divided at any portion of its length, the ultimate point which it supplies becomes destitute of sensation. A corresponding effect is produced by dividing a motor nerve: the muscle or joint with which it communicates will never more move, and that result, notwithstanding that the brain and spinal cord may remain in their perfect integrity.

To cut or sever a cord itself in any portion of its length is paralysis of both motion and sensation in all those parts of the body supplied by the nerves arising below the point of injury; in fact, it is manifest that the stupendous powers of motion and sensation find their instrumentalities in these little insignificant-looking nerve filaments; sever, wound, or injure them, and paralysis of motion, or sensation, is just as inevitably the result as if the columns of the medulla oblongata were cut away as above described. The nerves arise, as we have said, in pairs; a nerve of motion and sensation in one-half of the column, and corresponding roots springing from the other half,—the sensory nerve-roots arising from the posterior division, the motor nerve-roots from the anterior.

These pairs arise at first singly, but they soon after combine into a ganglionic knot, again to divide and subdivide and ramify into countless fibrous lengths, supplying every part of the body, reaching to the ultimate points of the spine, the interior of the bones, muscles, membranes, tissues and blood-vessels; in fact, it is impossible to conceive any portion of the organism which is not supplied with some ramification, great or small, from the main trunks of the cerebro-spinal system.

It must be noted that nervous action is invariably dual or reflex: for example, the cerebrum wills to move a joint or contract a muscle; the thought is immediately telegraphed through the medulla oblongata to the desired point, and whatever sensation is produced by that motion is instantaneously telegraphed back again to the brain by the corresponding nerve of *the pair*.

Of course there are a vast number of motions going on in the system which proceed wholly independent of volition. Many of these arise under the influence of the pneumogastric and spinal accessory nerves, also from the ganglionic or sympathetic system, the nerves of which supply the functions of organic life; but whatever motions are produced under the influence of nerve-action, are telegraphed back to the brain by reflex action.

When the organism is in health, the motions that proceed in the various departments of organic life are so mechanically perfect, that they produce no other sensation than a generally exhilarating realization of life; but when, on the contrary, there is a lack of *equilibrium* in the organism, and torpidity or excessive action ensues, the result is disease, and the announcement of its presence is telegraphed to the brain in the sensation called pain.

Possibly it may be argued against this position, that the ganglionic nerves (the system which supplies the viscera, and is profusely distributed about the head and trunk) are neither sensory nor motor, hence that those portions of the organism supplied by the sympathetic system, do not convey to the brain the sensations of pain,

To fully comprehend the working of this complex scheme of nervous action, we must consider the nature and origin of the ganglionic or sympathetic system, and its connection with the cerebro-spinal nerves. (See Fig. 5.)

The sympathetic system consists of a double chain of nervous ganglia, running along the front and sides

of the spinal column, and connected with each other by slender longitudinal filaments. Each ganglion is reinforced by a motor and a sensitive filament, derived from the cerebro-spinal system, and thus the organs supplied by the sympathetic nerves are brought directly into communication with the brain, which is kept informed of all the influences operating on the various organs supplied by the sympathetics. The nerves of this system are distributed to the heart, liver, spleen, kidneys, intestines, generative organs, head, neck, lungs, and blood-vessels.

The whole organism abounds in ganglia, which form plexuses of glands and nerves, and completely overlay the organs which they supply. Masses of sympathetic ganglia abound in the abdominal regions, the largest of which, from its numerous inosculations, has been named the *solar plexus;* but the entire system communicates, first with each ramification of its own system, next with the cerebro-spinal system, and finally with all the internal viscera.

Notwithstanding the connections between the two systems are preserved throughout the body, they are nevertheless much scattered; and as the sensory and motor nerves do not penetrate into the internal portions of the organism, where the sympathetics most abound, it follows that the telegraphic communications which the latter send off to the brain must proceed more slowly, as they act through a secondary system. It is for this reason that the parts of the body immediately under the influence of the cerebro-spinal nerves are more sensitive to pain than those supplied by the sym-

pathetics. The sensations travel more slowly, and the motions, being purely instinctive, do not report themselves to the brain as directly as those operating immediately under the influence of the will. Still, they are reported, and it is by this intimate connection between the two systems that the brain is kept informed of all that is transpiring in the body,—of all its states and conditions,—and that without the fatigue and wear which would ensue if every motion were immediately under the influence of the will.

In the foregoing brief summary of the action of the two systems of nerves, their mutual relations to each other, and the intelligence resident in the brain, we may clearly understand how the skillful physician is enabled to interpret the nerve-language which assumes the tone of pain; and the only marvel is, that the experience and observation of more than two thousand years of medical practice have not been sufficient to reduce sympathetic indications to a far more exact status than that which it at present occupies.

At this juncture let us review the functions of the brain and nervous systems.

First. The cerebrum is obviously the seat of consciousness. Notwithstanding how structureless and insignificant may appear the matter of this grand cranial instrument, considered in its physiological workings it is the seat of consciousness.

Second. The cerebellum is the governing organ, which controls and directs in harmonious combinations all the purely instinctive motions of the system, and enables the will, emanating from cerebral influences, to put designs into execution.

Third. The medulla oblongata keeps the gate through which the mandates of the mind pass forth, and the obedient responses of the muscles, or the complaints of any diseased organs inform the consciousness of their condition.

Fourth. The cerebro-spinal nerves, with their dual functions of motion and sensation, provoke the muscles to act, and report faithfully back to the brain the sensations which all such actions have produced.

Fifth. The pneumogastric and spinal accessory nerves, together with the whole array of the sympathetic system pierce into the dark and hidden places, removed from the exercise of the will; but still they cannot escape from the duty of reporting their condition upon the little fibers of the cerebro-spinal system with which they are connected, and this again sounds the alarm in the tones of pain through the cerebral hemispheres, where it reports itself, with the accompanying demand upon the physician's art to restore the equilibrium which any suffering organ has lost.

The nervous fluid is compared by many authoritative writers to *electric action*. The author makes this claim, and thereupon bases her system of Electro-Therapeutics. Moreover, claiming that the nervous system makes a correct record of all diseases, and all the conditions under which the organism is or may be laboring, that it can locate and disclose the *exact* extent of the degradation which has beset hidden organs, internal tissues, tumors imbedded in secret places, making a chart upon the brain, which the author's discovery of Electro-Cranial Diagnosis can delineate if properly addressed by intelligent and informed practitioners.

CHAPTER III.

ORGANS OF GENERATION.

THE pelvis or basin, situated in the adult about the middle of the body, is, as before stated, a large bony cavity, open above and below, and contains a portion of the intestines and the urinary and genital organs; serving as well for the strong points of articulations of the lower limbs, the attachment of their muscles, and the accomplishment of their movements. It is composed of four flat, broad, unequally thick bones, which are different in shape, size, and association, touching and articulated at some part of their surface, and closely united by extensions of muscular fibers or ligamentous fasciæ.

The pelvis supports the vertebral column behind, and is sustained in front by the ossa femorum or thigh bone.

The sacrum and coccyx form the median line of the junction of the posterior pelvic bones, and the two anterior bones are united before and at the sides — called illio. (See Figs. 15 and 16.)

The chief office of the pelvis seems, in the female, for the protection of the fœtus, and the parts inservient to reproduction.

The organs of reproduction, differing in the male

and female, bear a singular resemblance in the peculiar affections they are susceptible of, and have compensative parts, as will be hereafter explained.

In the female the parts of generation are complicated. Those inservient to copulation are the vulva and vagina; others to conception, and the protection of the fœtus for a determined time, as the uterus, situated between the bladder and rectum. It is flattened on the front surface and is nearly an inch in thickness; it is two inches broad at the fundus or base, and becomes narrower towards the vagina, and is called at its termination the cervix or neck, to distinguish it from the rest of the organ, called the body—*corpus uteri*. At the point where the body of the uterus is continuous below with the neck, it is constricted, forming the internal orifice. (See Fig. 13.)

The appendages of the uterus are six in number, *i. e.*, two Fallopian tubes, the two ovaries, and the two round ligaments. These structures, nerves, blood vessels and some muscular fibers are enclosed in two folds of the peritoneum, which constitutes the broad ligaments. Their position is as follows: in front are the round ligaments, the Fallopian tubes occuping the free margin of the broad ligaments; the ovaries and their ligaments are behind and below the Fallopian tubes. (See Fig. 12.)

The Fallopian tubes convey the ova from the ovaries to the cavity of the uterus, situated in the free margin of the broad ligaments, extending from each superior angle of the uterus to the sides of the pelvis. The length of each tube is about four inches, the

aperture or canal is exceedingly minute; commencing at their connection with the uterus, it gradually widens and terminates in a bell-like orifice with a series of fringe-like processes termed *fimbriæ,* one of which is connected with the outer end of the ovary, as may be seen in Fig. 12.

The ovaries are oval-shaped elongated bodies, one on each side of the uterus, in the back part of the broad ligament, under and back of the Fallopian tubes.

The ovaries are connected to the uterus by ligaments, associated with their inner extremity, and at the outer extremity, to the above mentioned fimbriated extremity of the Fallopian tubes by a short cord or ligament; in the posterior part to the *broad ligament.*

The size of the ovaries are about an inch and a half in length, and three-quarters of an inch in width, and about one-third of an inch thick — their weight from one *to two drachms.* Imbedded in the tissue of the internal surface of the ovaries are the Graafian vesicles, containing the ova. The fluid contained in these vesicles is albuminous, and holds the ovum. The Graafian vesicles gradually motive, work out to the surface of the *ovaries,* burst, and liberate the fluid and ova, passing into the Fallopian tubes; the fimbriated extremities are supposed to grasp the ovaries, and hence the mature ova are conducted through the tube into the Fallopian tubes, and conveyed to the uterus, and at regular periods are eliminated from the uterus, producing menstruation, unless the ovum is fecundated.

The two round ligaments of the uterus are two round cords, composed of tissue, nerves, vessels, and fibers,

between four and five inches long, situated below and in front of the Fallopian tubes, between layers of the broad ligaments. They commence on each side at the superior angle of the uterus, pass forward through the internal abdominal ring, along the inguinal canal, to the labia majora, or lips of the vulva.

The menstrual flow is a kind of capillary discharge, and is supplied, according to authorized physiologists, from the uterine mucous membrane, and is the consequence, and, at the same time, the natural termination of the periodical conjestion of the accessory parts.—*Vide* Dalton's Physiology.

The peculiar correspondence, and yet marked difference, in the male and female organs of generation, has frequently been commented upon by physiologists. A celebrated writer has avowed that the idiosyncrasies of sex bore such strong analogy that the male was only the female turned inside out, for the ovaries and uterus in the female corresponded to the testes and prostrate glands in the male (see Fig. 14); and so the author has found in this system of Electro-Therapeutics, that the peculiar abdominal weight, caused from over-strained ligaments holding the genito-urinary organs *in situ*, were to be addressed in a similar way in both sexes: and whereas the male is more subject to prolapse of the bladder than is the female, by reason of the incumbent weight and strain upon the organs. The uterus in the female is the organ for compensative displacements.

The weight and pulling of connective tissues and deep fascia extending beyond and above the perito-

neum, yet a part of such, produces a peculiarly noticeable distressed tone of depression in the voice, and the unmistakable lassitude in both sexes, when any displacement or pressure exists in the genito-urinary organs; hence the importance in these organs for health, and the ligaments and muscles firm and unrelaxed.

Many of the weakening difficulties which drain the vitality of both sexes are of the same nature, and must be treated in similar manner. For instance, leucorrhœa in the female and seminal emissions from the male bear so strong an analogy they met with the same constitutional treatments in both sex. However the entire being of both sexes require the totality of differences to make the distinctions, it is the physician's duty to instruct the people how to maintain in health and purity.

To those seeking a fuller knowledge, the anatomy and physiology of Grey and Dalton are highly commended as explicit and authoritative.

CHAPTER IV.

ANATOMICAL AND PHYSIOLOGICAL ILLUSTRATIONS.

THE editor for obvious reasons has concluded to arrange all the figures in Chapter IV. The purpose of this chapter is not to fully illustrate human anatomy, but merely illustrate such organs, and circulatory, nervous and other systems as are especially and peculiarly dealt with by the author in her system of Electro-Therapeutics.

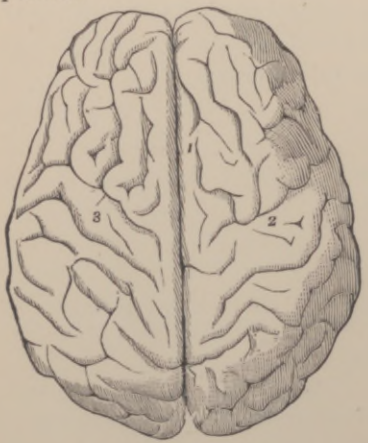


Fig. 1.

Top view of the cerebrum, showing its convolutions, and lobes, and commissures. The dura mater, arachnoid, and pia mater membranes cannot be illustrated by these simple figures.

Fig. 2.

Vertical section of the brain, revealing the cerebrum, cerebellum, or tree of life, the medulla oblongata, and continuation from such to the spinal cord.

To Dr. John Dalton, and Dr. Henry Gray's publisher, Mr. Henry C. Lea, the editor has occasion to extend thanks for their courtesy in allowing copies from the engravings in their respective works on Human Physiology and Human Anatomy.

Figures 1 and 2 are from models of the author.

PNEUMOGASTRIC NERVE WITH ITS PRINCIPAL BRANCHES.

Fig. 3.

1. Pharyngeal branch.
2. Superior laryngeal branch.
3. Inferior laryngeal.
4. Pulmonary branches.
5. Stomach.
6. Liver.

Although this great nerve—at its origin sensitive—when ramified into its tributaries is considered extremely dull and comparatively non-sensitive; it contributes in its distribution of nervous force to both muscular coats and mucous membranes of the organs to which it relates. Its origin in the middle of the back portion of the medulla oblongata, and its direct distribution to four vital organs —namely, the heart, lungs, stomach and liver, renders it important.

CEREBRO-SPINAL SYSTEM OF MAN.

1. Cerebrum.
2. Cerebellum.
3. 3. 3. Spinal cord and nerves.
4. 4. Brachial nerves.
5. 5. Sacral nerves.

Fig. 4.

The spinal cord is cylindrical, and running from one end of the spinal canal to the other, and connected at its anterior extremity with the ganglia of the brain, it is divided, by an anterior and posterior median fissure, into two lateral halves, which still remain connected with each other by a central mass or commissure. Its inner portions are occupied by a gray matter, which forms a continuous ganglionic chain, running from one extremity of the cord to the other; its outer portions are composed of white substance, the filaments of which run for the most part in a longitudinal direction, connecting the different parts of the cord with each other, and the cord itself with the ganglia of the brain.

The pairs of nerves given off from the spinal cord are larger where the nerves are distributed to the arms and legs; for instance, the cervical nerves which supply the arms, and the sacral nerves which supply the legs, are larger than the dorsal and lumbar *nerves*. By examination of Fig. 4, the philosophy of placing the electricity on the cervical vertebra to affect the arms and shoulders can be comprehended. Moreover, considering that the cerebro-spinal system consisting, as it does, of a series of ganglia, sending out nerves to the corresponding parts of the body, and the spinal cord supplies the integument and muscles of neck, trunk, and extremities, with the ganglia of the brain, besides supplying the corresponding parts of the head, preside over the organs of the special sense, and perform various other functions of purely nervous character; hence, that the author's system of Electro-Therapeutics is so frequently addressed to the *basilar* region, and down the length of the vertebral column, as the *base to work out a cure upon*, is possessed of fundamental soundness, and evolved from purely physiological laws.

SYMPATHETIC NERVE.

According to Dalton's Human Physiology, the sympathetic nerve is distributed to organs over which the consciousness and will have no immediate control. It serves as a medium of reflex action between the sensitive and motor part of the digestive, excretory, and generative apparatuses, and it is certain that it also takes part in the reflex actions in which the cerebro-spinal system is at the same time interested. There are accordingly three different kinds of reflex action taking place wholly or partially through the sympathetic system, which may be observed in the living body.

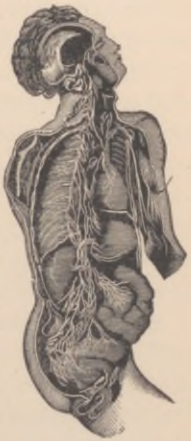


Fig. 5—No. 1.

1. *Reflex actions taking place from the internal organs through the sympathetic and cerebro-spinal* systems, to the voluntary muscles and sensitive surfaces. The convulsions of young children are often owing to irritation of indigested food in the intestinal canal. Attacks of indigestion are also known to produce temporary amaurosis, double lesion, strabismus, and even hemiplegia. Nausea, and a diminished or capricious appetite, are often prominent symptoms of early pregnancy, induced by the peculiar condition of the uterine mucous membrane.

2. *Reflex action taking place from the sensitive surfaces,*

through the cerebro-spinal and sympathetic systems, to the involuntary muscles and secreting organs. Imprudent exposure of the integument to cold and wet will often induce diarrhœa. Mental and moral impressions, conveyed through the spinal senses, will affect the motions of the heart, and disturb the processes of digestion and secretion. Terror, or an absorbing interest of any kind, will produce a dilatation of the pupil, and communicate in this way a peculiarly wild and unusual expression to the eye. Disagreeable sights, odors, or even unpleasant occurrences, are capable of hastening or arresting the menstrual discharge, or of inducing premature delivery.

3. *Reflex actions taking place through the sympathetic system, from one part of the internal organs to another.* The contact of food with the mucous membrane of the small intestine excites a peristaltic movement of the muscular coat. The mutual action of digestive, urinary and internal generative organs upon each other takes place through the medium of the sympathetic ganglia and their nerves. The variations of the capillary circulation in different abdominal viscera, corresponding with the state of activity or repose of their associate organs, are to be referred to a similar nervous influence. These phenomena are not accompanied by any consciousness on the part of the individual, nor by any apparent intervention of the cerebro-spinal system.

The author here must subjoin that the co-operation and sympathy existent between these great sympathetic, ganglionic and cerebro-spinal systems — in fact, the totality of forces and nervous intelligences making

man—has rendered her discovery of cranial diagnosis but a translation of causes, whose effects the physiologists have only attested but never heretofore explained. However, the author cannot refrain from expressing gratitude that Dalton and others have rendered the path so clear by their delineation of revealed nature as it has been opened up to their investigation.

SYMPATHETIC NERVES, ACCORDING TO GRAY'S ANATOMY.

1. Carotid plexus.
2. Superior cervical ganglion.
3. Middle cervical ganglion.
4. Interior cervical ganglion.
5. Pharyngeal branches.
6. Cardiac branches.
7. Deep cardiac plexus.
8. Superficial cardiac plexus.
9. Dorsal ganglia.
10. Dorsal ganglia.
11. Solar plexus.
12. Aortic plexus.
13. Hypogastric plexus.
14. Inferior hypogastric.
15. Sacral ganglia.
16. Lumbar ganglia.

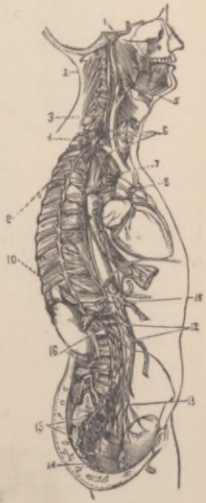


Fig. 5.—No. 2.

FRONT VIEW OF LUNGS AND HEART.

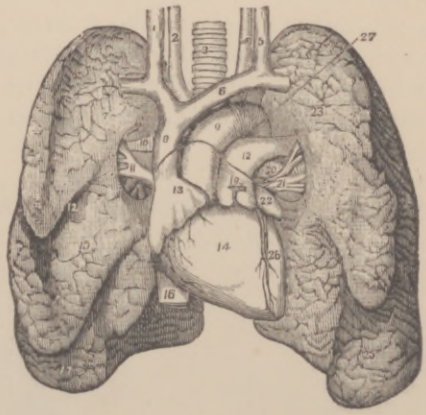


Fig. 6.

1. Right internal jugular vein.
2. Right common carotid.
3. Trachea.
4. Left common carotid.
5. Left internal jugular.
6. Left vena innominata.
7. Superior lobe right lung.
8. Vena cava superior.
9. Arch of aorta.
10. Right bronchus.
11. Right pulmonary vein.
12. Left pulmonary arch.
13. Right auricle of heart.
14. Right ventricle of heart.
15. Middle lobe.
16 Vena cava inferior.
17. Inferior lobe of right lung.
18.
19. Pulmonary artery.
20. Left bronchus.
21. Left pulmonary vein.
22. Left auricle.
23. Superior lobe left lung.
24.
25. Inferior lobe left lung.
26. Left ventricle.
27. Ductus arterio.

EIGHT PAIR OF NERVES.

Course of distribution of the eight pair of *nerves*, consisting of three nerves, *i. e.*, glosso-pharyngeal, pneumogastric, and spinal accessory.

1. Glosso-pharyngeal.
2. Pneumo-gastric.
3. Spinal accessory.
4. Stylo-glossus.
5. Sterno mastoid.
6. Jugular vein.
7. Internal carotid.
8. Stylo-pharyngeal.
9. Hyoglossus.
10. Common carotid.
11. Trapezias.
12. Subclavian.
13. Thyroid body.
14. Super-laryngeal.
15. External laryngeal.
16. Inferior laryngeal.
17. Cardiac.
18. Arch of the aorta.
19. Pulmonary branches.
20. Diaphragm.
21. Left pneumo-gastric.
22. Anterior surface of stomach.

Fig. 7.

FRONT VIEW OF THE THORAX.

The thorax is bounded in front by the sternum, the six upper costal cartilages, the ribs, and intercostal muscles; at the sides, by the ribs and intercostal muscles; and behind, by the same structures and the dorsal portion of the vertebral column.

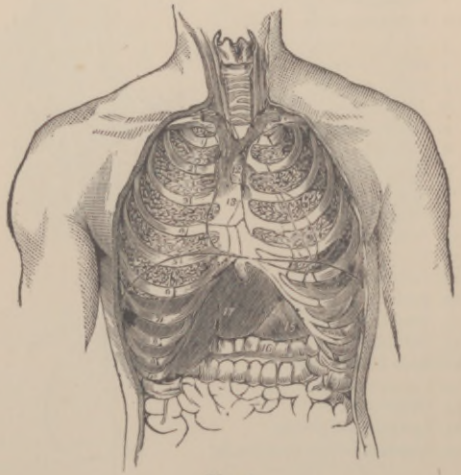


Fig. 8.

1. } True or sternum ribs.
2. }
3. }
4. }
5. }
6. }
7. }
8. } Three false or short ribs.
9. } Two floating ribs.
10. }

11. Superior cava.
12. Aorta.
13. Right auricle.
15. Stomach.
16. Transverse colon.
17. Liver.

The thorax is a conical framework, formed partly of bones, and partly of the soft tissues by which they are

connected together. It is supported, and its back part is formed by the middle, or dorsal, region of the spine. It is narrow above, broad below, flattened before and behind, and somewhat cordiform on a transverse section.

The *superior opening* of the thorax is bounded on each side by the first rib; in front, by the upper border of the sternum; and behind, by the first dorsal vertebra. It is broader from side to side than from before backwards; and its direction is backwards and upwards.

The *lower opening*, or *base*, is bounded in front by the ensiform cartilage; behind, by the last dorsal vertebra; and on each side of the last rib, the diaphragm filling in the intervening space. Its direction is obliquely downwards and backwards, so that the cavity of the thorax is much deeper on the posterior than on the anterior wall. It is wider transversely than from before backwards. Its outer surface is convex; but it is more flattened at the center than at the sides. Its floor is higher on the right than on the left side, corresponding in the dead body to the upper border of the fifth costal cartilage on the right side; and to the corresponding part of the sixth cartilage on the left side.

The parts which pass through the upper opening of the thorax are, from before backwards, the sterno-hyoid and the sterno-thyroid muscles, the remains of the thymus gland, the trachea, œsophagus, thoracic duct, and the longus colli muscles on each side; on the sides, the arteria innominata, the left carotid and left

subclavian arteries, the internal mammary and superior intercostal arteries, the right and left venæ innominatæ, and the inferior thyroid veins, the pneumogastric, sympathetic, phrenic, and cardiac nerves, the anterior branch of the first dorsal nerve, and the recurrent laryngeal nerve of the left side. The apex of each lung, covered by the pleura, also projects through this aperture, a little above the margin of the first rib.

The viscera contained in the thorax are, the heart, enclosed in its membraneous bag, the pericardium, and the lungs, invested by the pleuræ.

THE REFLECTIONS OF THE PERITONEUM.

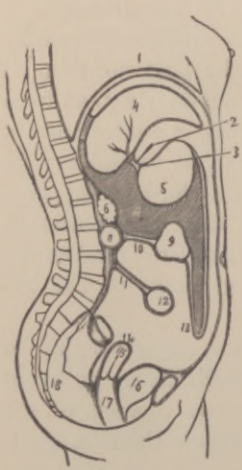


Fig. 9.

1. Pleura.
2. Passes through foramen of Winslow.
3. Lesser omentum.
4. Liver.
5. Stomach.
6. Pancreas.
7. Lesser cavity of peritoneum.
8. Duodenum.
9. Transverse colon.
10. Meso colon.
11. Mesentery.
12. Small intestine.
13. Great omentum.
14. Fundus uterus.
15. Uterus.
16. Bladder.
17. Vagina.
18. Rectum.

SECTIONAL VIEW OF NOSE, MOUTH, PHARYNX, ETC.

1. Opening nasai.
2. Bristle through Steno's duct.
3. Superior turbinated.
4. Middle turbinated.
5. Opening of the Eustachian tube.
6. Inferior turbinated.
7. Soft palate.
8. Pharynx, extending down to œsophagus.
9. Tongue.
10. Bones of cervical vertebra.
11. Interior larynx.
12. Cricoid cartilage.
13. Thyroid cartilage.

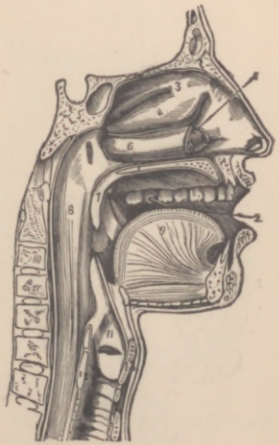
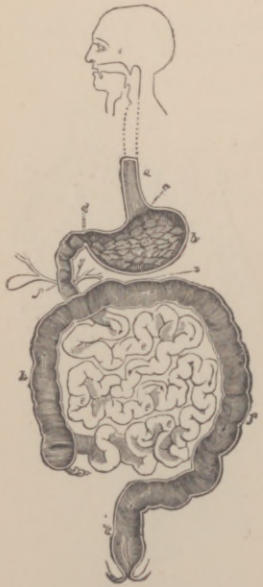


Fig. 10.

ALIMENTARY CANAL.



a—Œsophagus.
b—Stomach.
c—Cardiac orifice.
d—Pylorus.
e—Small intestines.
f and *g*—Biliary duct.
h—Ascending colon.
i—Transverse colon.
j—Descending colon.
k—Rectum and anus.

Fig. 11.

From tongue to *anus* is a consecutive canal with a similar mucous lining. The author has found, in states of constipation, where there existed congestion of the alimentary canal, a most efficacious electric treatment, by placing the *spatula*, or tongue instrument, on the tongue—positive pole; and an electrode at the anus—negative pole. See treatment for "*Constipation.*"

APPENDAGES OF THE UTERUS.

Anterior View.

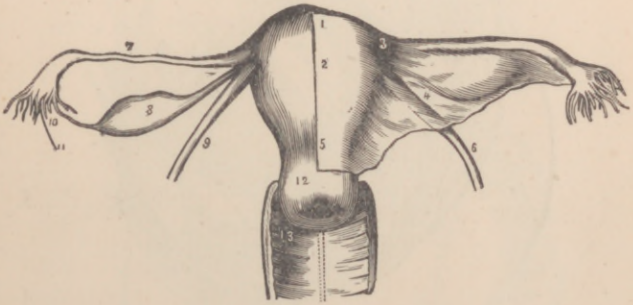


Fig. 12.

1. Fundus of uterus.
2. Body of uterus.
3. Peritoneum.
4. Broad ligament.
5. Neck of uterus.
6. Round ligament.
7. Fallopian tubes.
8. Ovary and ligament of ovaries.
9. Round ligament.
10. Fimbriated extremity of Fallopian tubes.
11. Ostium internum, abdominal.
12. Os, or mouth of the uterus.
13. Interior wall of the vagina.

SECTION OF FEMALE PELVIS SHOWING POSITION OF VISCERA.

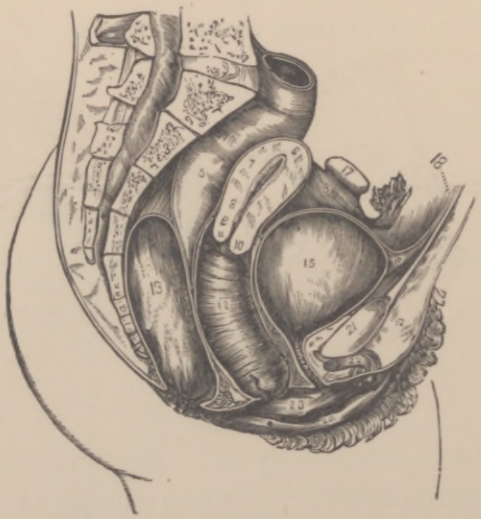


Fig. 13.

1. Last lumbar.
2. Sacrum.
3. Sacrum.
4. Coccyx.
5. Rectum covered with peritoneum.
6. Fundus of uterus.
7. Center of uterus.
8. Cervix.
9. Os uteri.
10. Anterior lip of the os.
11. Posterior lip of the os.
12. Vagina.
13. Interior of rectum.
14. Urethra.
15. Bladder.
16. Broad ligament, extending from which are the fimbriated extremities of Fallopian tubes.
17. Ovary.
18. Section of peritoneum.
19. Urachus, or suspensory ligament for bladder.
20. Symphysis pubis.
21. Mons veneris.
22. Clitoris.
23. Labia minor.
24. Labia major.

SIDE VIEW OF PELVIC VISCERA OF MALE SUBJECT, SHOWING PELVIC AND PERINEAL FASCIA.

Fig. 14.

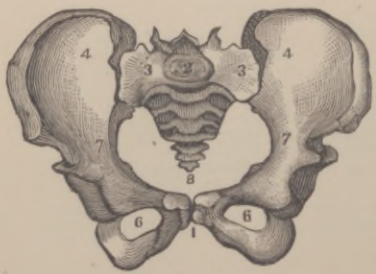
1. Peritoneum.
2.
3. Rectum.
4. Vesical fold.
4.
5. Ureter.
6.
7. Bladder.
8. Rectum.
9. Visceral layers of pelvic fascia.
9. Visceral layers of pelvic fascia.
10. Prostate gland.
11. Symphysis pubis.
12. Peritoneum.
13. Urethra.
14. Bulb.
15. Dorsal veins of penis.
16. Dorsal veins of penis.
17. Corpus cavernosum.
18. Glans.
19. Corpus spongiosum.
20. Scrotina.
21. Cowper's gland.
22. Levator ani.
23. Sphincter ani.
24. Coccyx.

ARTICULATION OF PELVIS—HIP POSTERIOR VIEW.

1. Supra spinous ligament.
2. Sacrum.
3. Posterior sacro iliac ligament.
4.
5. Posterior spine of the ilium.
6.
7.
8. Great sacro.
9. Coccyx.
10. Lesser sacro sciatic foramen.
11. Capsular ligament.
12. Anterior or lesser sacro sciatic ligament.
13. Neck of the femur.
14. Inter-trochanteric.
15. Tuberosity — spreading above is the greater sacro sciatic ligament.
16. Femur.

Fig. 15.

ANTERIOR VIEW OF FEMALE PELVIS BONE.



1. Pubic arch and outlet of pelvis.
2. Spinal cord and section of vertebra.
3. } Sacrum.
3. }
4. } Ilium—the outer brim
4. } called crest of ilium.
6. } Obturator foramen.
6. }
7. } Brim of true pelvis.
7. }
8. Coccyx — and the surrounding space represents inlet of pelvis.

Fig. 16.

LYMPHATICS AND LACTEALS.

Fig. 17.

Lymphatic vessels are found in almost every part of the organism, arising at the surface of membranes and in the tissue of organs; they carry into the veins the lymph from respective parts. The lymphatics are of two orders, *i. e.*, superficial and deep seated; they often cross each other in their tortuous course, and their anastomoses are very numerous. Without a very definite knowledge of the remote arrangements of the vessels, we can only say that all the lymphatics of the body ultimately discharge themselves at the junction of the subclavian and internal jugular veins.

The lacteals are the absorbants which originate in the small intestines, and supply the mammary glands with milk during the period of gestation. During digestion these vessels contain a transparent, colorless lymph.

Whilst intestinal absorption is progressing after a meal containing fatty ingredients, the lacteals may be seen as white opaque vessels, distended with *milky chyle;* but the presence of chyle is only transitory. The nutritive materials soon pass by catalyctic transformation into other forms, and become assimilated to the pre-existing elements of the circulating fluids, and belong to the great system of nutrition, absorption, re-absorption, secretion, and *elimination.*

CHAPTER V.

GENERAL REVIEW.

THE impossibility of combining in a volume dedicated to the interests of a special department of *Therapeutics* all the important minutiæ of Anatomy, Physiology and Histo-Chemistry, is very apparent; but the author has tabulated, from authorized works, a synopsis of human bones, vessels, blood nerves, muscles, organs, etc., which will, she hopes, elicit sufficient interest to arouse the reader to a conscious necessity that the topics are full of vital significance, demanding investigation through the channels of standard authors. Again take pleasure in commending Dalton and Küss for Physiology, Gray and Holden for Anatomy. There exists a shocking state of ignorance concerning the anatomy and physiology of our own beings: until such is usurped by a common-sense understanding, the moral and physical standard must be mediocre. Nature and all its grand evolutions are grand facts, not to be put aside out of a sense of false shame.

LIST OF BONES IN HUMAN ADULT.

BONES OF THE HEAD.

Bones of Cranium or Skull	Frontal	1
	Parietal	2
	Occipital	1
	Temporal	2
	Ethnoid	1
	Sphenoid	1

Bones of the Face	Superior maxillary	2
	Malar or Cheek	2
	Nasal	2
	Lachrymal	2
	Palatine	2
	Inferior spongy	2
	Vomer	1
	Inferior maxillary	1
Dentes or Teeth	Incisors	8
	Cupsidati	4
	Molares	20
Bone of the Tongue	Hyoid	1
Bones of the Ear	Malletus	2
	Incus	2
	Orbiculare	2
	Stapes	2

BONES OF THE TRUNK.

Vertebræ	Cervical	7
	Dorsal	12
	Lumbar	5
Sacrum os		1
Coccygis		1
The Thorax	Sternum	1
	Ribs	24
The Pelvis	Innominatum	2
The Shoulder	Clavicle	2
	Scapula	2
The Arm	Humerus	2
Fore-Arm	Ulna	2
	Radius	2

THE HAND.

Carpus or Wrist	Naviculare	2
	Lunare	2
	Cuneiforme	2
	Orbiculare	2
	Trapezium	2
	Trapezoides	2
	Magnum	2
	Unciforme	2
Metacarpus		10
Phalanges		18

BONES OF THE LOWER EXTREMITY.

The Thigh	Femur	2
The Leg	Patella	2
	Tibia	2
	Fibula	2
Tarsus or Instep	Calcis os	2
	Astragalus	2
	Cuboides	2
	Naviculare	2
	Cuneiforme	6
Metatarsus		10
Phalanges		28

TABLE OF THE VEINS.

I. Veins which form the Superior Vena Cava.

1. Subclavians, which receive the

1. Axillary.

1. Basilic, formed of the
   1. Posterior ulnar.
   2. Anterior ulnar.
   3. Median cephalic.
2. Cephalic, forming the
   1. Superficial radial.
   2. Median cephalic.
3. Circumflex veins.
4. Inferior scapular.
5. Long thoracic.
6. Superior thoracic.
7. Acromial veins.

2. External jugular.

1. Internal maxillary, composed of the
   1. Pterygoid.
   2. Sphenopalatine.
   3. Alveolar.
   4. Infraörbitar.
   5. Mental.
   6. Inferior dental.
   7. Deep temporal.
2. Superficial temporal, composed of the
   1. Middle temporal.
   2. Anterior auriculars.
   3. Transverse of the face.
3. Posterior auricular. The trunk then takes the name of external jugular, and in its course along the neck receives—
4. Cervical cutaneous.
5. Tracheloscapular, etc.

3. Internal jugular.

1. Superior cerebral veins.
2. Veins of the corpus striatum.
3. Veins of the choroid plexus.
4. Superior cerebellar veins.
5. Inferior cerebellar veins.
6. Lateral and inferior cerebral veins.
7. Ophthalmic vein, composed of the
   1. Lachrymal.
   2. Central of the retina.
   3. Infraörbitar.
   4. Ciliary.
   5. Ethmoidal.
   6. Palpebral, and
   7. Nasal veins.
8. Facial vein, called angular, near the eye, receiving the
   1. Palpebral, and
   2. Superciliary veins.
   3. Dorsals of the nose.
   4. Superior. } Coronaries of the lip.
   5. Inferior. }
   6. Several buccal, and
   7. Masseteric veins.
   8. Ranine.
   9. Submental, and
   10. Inferior palatine.
9. Lingual and pharyngeal veins.
10. Superior thyroid.
11. Occipital, and
12. Veins of the diploë.

2. Right internal mammary vein.
3. Inferior thyroid vein, opening into the vena cava, between the two subclavians.
4. Vena azygos, which receives the
   1. Right bronchial.
   2. Intercostal veins.
   3. Semiäzygos.

II. Veins which form the Inferior Vena Cava.

Common Iliacs.

1. External iliacs, formed by the
   1. Femoral or crural, which is a continuation of the
   2. Popliteal, commencing by three veins which accompany the fibular arteries, and receiving the
      1. External saphena and
      2. Internal saphena which receive
         1. Several abdominal veins.
         2. Circumflex iliac and
         3. External pudic veins.
2. Internal iliacs, which receive the
   1. Vesical veins, commencing with the
   2. Sacrolateral veins.
      1. Dorsal veins of the penis in the male.
      2. Veins of clitoris in the female.
3. Middle sacral vein.
4. Lumbar veins—four in number on each side, commencing by
   1. An abdominal branch.
   2. A dorsal branch.
5. Spermatic veins, commencing with
   1. The spermatic plexus in the male.
   2. The veins of the ovarium, Fallopian tube, etc., in the female.
6. Renal veins.
7. Capsular and adipose veins.
8. Hepatic veins.
9. Middle,
10. Left and
11. Right
    Hepatic veins.
12. Inferior diaphragmatic veins, two in number.

III. Veins of the Heart.

1. Great right coronary.
2. Small right coronary.
3. Left coronary veins.

IV. Veins which form the Vena Porta.

1. Splenic vein.
   1. Veins which correspond to the vasa brevia.
   2. Right and left gastroëpiploic.
   3. Duodenal, and
   4. Pancreatic veins.
   5. Coronary vein of the stomach, and
   6. Small mesenteric vein.
2. Superior mesenteric vein.

TABLE OF THE PRINCIPAL ARTERIES OF THE BODY.

All the arteries take their rise from the pulmonary artery, or the aorta, and the names generally indicate the parts to which they are distributed.

I. ARTERIA PULMONALIS.

The pulmonary artery arises from the right ventricle, and soon divides into a right and left branch, one of which is distributed to each lung.

II. ARTERIA AORTA.

The aorta rises from the left ventricle. It is the common trunk of the arteries of the body, and may be divided into five portions.

(A) *Arteries furnished by the aorta at its origin.*

1. A. Cardiaca or coronaria anterior.
2. A. Cardiaca or coronaria posterior.

(B) *Arteries furnished by the aorta at its arch.*

The arch of the aorta gives off, to the left, two considerable trunks—the *arteria carotidea primitiva*, and *A. subclavia;* and, to the right, a single trunk which is larger—the *A. innominata* or *brachiocephalica*, which divides into the *primitive carotid* and *subclavian.*

I. *Arteria Carotidea primitiva.* — Divides into A. carotidea externa and A. carotidea interna.

1. A. Carotidea externa. — Furnishes — 1. *A. thyroidea superior.* 2. *A. lingualis*, which gives off the A. dorsalis linguæ and A. sublingualis.

1. A. Carotidea externa — *continued.*

3. *A. facialis vel A. maxillaris externa*, which furnishes the A. palatina inferior, the A. submentalis, and A. coronaria superior and inferior.
4. *A. occipitalis*, which gives off the A. mastoidea posterior.
5. *A. auricularis posterior*, which gives off the A. stylo-mastoidea.
6. A. pharyngea inferior.

The external carotid ultimately divides into the temporal artery and internal maxillary.

(A) *A. Temporalis.* — Furnishes *A. tranversalis faciei*, *A. auricularis anterior*, and *A. temporalis media*.

(B) *A. Maxillaris interna.* — Furnishes thirteen branches, viz.: *A. meningea media*, *A. dentalis inferior*, *A. temporalis profunda posterior*, *A. masseterina*, *A. pterygoidea*, *A. buccalis*, *A. temporalis profunda anterior*, *A. alveolaris*, *A. suborbitaris*, *A. vidiana*, *A. pterygopalatina*, or *pharyngea superior*, *A. palatina superior*, and *A. sphenopalatina*.

2. A. Carotidea interna. — Furnishes — 1. *A. ophthalmica*, which gives off A. lacrymalis, A. centralis retinæ, A. supraorbitaria *vel* superciliaris, A. ciliares posteriores, A. ciliares longæ, A. muscularis superior *et* inferior, A. ethmoidalis, posterior *et* anterior, A. palpebralis superior *et* inferior, A. nasalis and A. frontalis.
2. *A. communicans Willisii.*
3. *A. choroidea.*
4. *A. cerebralis anterior.*
5. *A. cerebralis media.*

II. *Arteria subclavia.* — Furnishes — 1. *A. vertebralis*, which gives off A. spinalis anterior *et* posterior, A. cerebellosa inferior and forms — by uniting itself with that of the opposite side — the basilaris, divided into A. cerebellosa superior and A. cerebralis posterior.
2. *A. thyroidea inferior*, which gives off A. cervicalis ascendens.
3. *A. mammaria interna*, which gives off the A. mediastina anterior and A. diaphragmatica superior.
4. *A. intercostalis superior.*
5. *A. cervicalis transversa.*
6. *A. scapularis superior.*
7. *A. cervicalis posterior vel profunda.* Farther on, the subclavian artery continues its progress under the name A. axillaris.

1. A. Axillaris. — Furnishes — 1. *A. acromialis.* 2. *thoracica superior.* 3. *A. thoracica inferior vel longa vel mammaria externa.* 4. *A. scapularis inferior vel communis.* 5. *A circumflexa anterior.* Farther on, the axillary artery continues under the name A. brachialis.

2. A. Brachialis. — Furnishes — 1. *A. humeralis profunda vel collateralis externa.* 2. *A. collateralis interna.* It afterwards divides into the *radial* and *cubital* or *ulnar* arteries.

(A) A. Radialis. — Gives off *A. recurrens radialis, A. dorsalis carpi, A. dorsalis metacarpi, A. dorsalis pollicis;* and terminates in forming the *Arcus palmaris profundis.*

(B) A. Cubitalis sen Ulnaris. — Gives off *A. recurrens cubitalis anterior* and *posterior; A. interossea anterior* and *posterior*, which latter furnishes *A. recurrens radialis posterior*. It terminates in forming the *superficial palmar arch*, which gives off *A. collaterales digitorum.*

III. ARTERIES GIVEN OFF BY THE AORTA IN THE THORAX.

These arteries are —
1. A. bronchica, *dextra et sinistra.*
2. A. œsphagœa (to the number of four, five or six.
3. A. mediastinœ posteriores.
4. *A. intercostales inferiores vel aorticæ* (to the number of eight, nine or ten).

IV. ARTERIES FURNISHED BY THE AORTA IN THE ABDOMEN.

1. A. Diaphragmatica. — *A. diaphragmatica vel phrenica, dextra et sinistra.*

2. A. Cœliaca. — Which divides into three branches: 1. *A. coronaria ventriculi.* 2. *A. hepatica*, which gives off A. pylorica, A. gastrœpiploica dextra, and A. cystica; and, 3. the *A. splenica*, which gives off A. gastro-epiploica sinistra, and vasa brevia.

3. A. Mesenterica superior. — Which gives off, at its concavity, the *A. colica dextra superior, media et inferior*, and at its convex part from fifteen to twenty *Rami intestinals.*

4. A. Mesenterica inferior. — Which gives off *A. colica superior media* and *inferior*, and divides into A. hæmorrhoidales superiores.
5. The *A. Capsulares mediæ* (to the number of two on each side).
6. A. Renales vel Emulgentes.
7. *A. Spermaticæ.*
8. *A. Lumbares* (to the number of four or five on each side).

V. ARTERIES RESULTING FROM THE BIFURCATION OF THE AORTA.

The aorta, a little above its bifurcation, gives off the *A. sacra media*, and divides into *A. iliacæ primitivæ.*

The *A. iliaca primitiva* into A. iliaca interna and A. iliaca externa.

1. A. Iliaca interna. — Furnishes — 1. *A. ilio lumbaris.* 2. *A. sacra lateralis.* 3. *A. glutea vel iliaca posterior.* 4. *A. umbilicalis.* 5. *A. vesicalis.* 6. *A. obturatoria.* 7. *A. hæmorrhoidea media.* 8. *A. uterina.* 9. *A. vaginalis.* 10. *A. ischiatica.* 11. *A. prudenda interna*, which gives off the *A. hæmorrhoidales inferiores*, *A. of the septum*, *A. transversa perinei*, *A. corporis cavernosi* and A. dorsalis penis.
2. A. Iliaca externa. — Furnishes—1. *A. epigastrica.* 2. *A. iliaca anterior vel circumflexa ilii*, and is continued afterwards under the name of *crural* or *femoral artery.*

3. A. Cruralis sen Femoralis. — Furnishes — 1. *A. subcatanea abdominalis.* 2. *A. pudenda superficialis* and *profunda.* 3. *A. muscularis superficialis.* 4. *A. muscularis profunda,* which gives off the A. circumflexa externa and interna, and the three perforantes, distinguished into superior, middle and inferior. Farther on, the crural artery continues under the name *A. poplitæa.*

4. A. Poplitæa. — Furnishes — 1. *A. articulares superiores, interna, media et externa.* 2. A. gemellæ. 3. *Articulares inferiores (interna et externa).* 4. A. tibialis antica, which at the foot takes the name *A. dorsalis tarsi,* and gives off the tarsal and metatarsal arteries. In the leg, the popliteal artery divides into the peroneal and posterior tibial.

5. A. Peronæa. — Divides into *A. peronæa antica* and *A. peronæa postica.*

6. A. Tibialis postica. — Divides into *A. plantaris interna* and *A. plantaris externa.* The latter, by anastomosing with the *A. dorsalis tarsi,* forms the *plantar arch,* whence arise *rami superiores vel perforantes postici, R. inferiores postici et antici,* which give off rami perforantes antici.

—(Collated from Dunglison.)

TABLE OF THE CRANIAL NERVES.

1. First nerve — Filaments to the nose.
2. Second nerve — To retina of the eyeball.
3. Third nerve — To muscles of the orbit.
4. Fourth nerve — To superior oblique muscle.
5. Fifth or tri-facial nerve.
   - Ophthalmic
     - Meningeal.
     - Lachrymal
       - Lachrymal.
       - Palpebral.
     - Frontal
       - Supra-orbital.
       - Supra-trochlear.
     - Nasal
       - To lent. ganglion.
       - Ciliary nerves
       - Infra-trochlear.
       - Nasal.
   - Ophthalmic, or Lenticular ganglion
     - Connecting branches
       - To nasal nerve.
       - To the third nerve.
     - Ciliary nerves
       - To sympathetic.
   - Superior maxillary
     - Orbital branch
       - Malar.
       - Temporal.
     - To Meckel's ganglion.
     - Posterior dental anterior.
     - Dental infra-orbital.
   - Meckel's ganglion
     - Internal branches
       - Nasal.
       - Naso-palatine.
     - Ascending — To the orbit.
     - Descending
       - Anterior palatine.
       - Posterior.
       - External.
     - Posterior
       - Vidian.
       - Pharyngeal.
   - Inferior maxillary
     - Small or muscular part
       - Deep temporal.
       - Masseteric.
       - Buccal.
       - Pterygoid.
     - Large or sensory part
       - Auriculo-temporal
         - Articular, and to meatus, parotid, auricular, temporal.
       - Gustatory
         - To sub-maxillary and sub-lingual ganglia.
         - To hypoglossal.
         - To the tongue.
       - Inferior dental
         - Mylo-hyoid.
         - Labial.
         - Incisor.
   - Otic ganglion
     - Connecting branches
       - To Jacobson's nerve.
     - Branches for muscles
       - To the fifth and sympathetic.
   - Sub-maxillary ganglion
     - Connecting branches
       - To the gustatory chorda tympani, and sympathetic.
     - Branches to the glands and the mucous membrane of the mouth.

- 6. Sixth nerve — To external rectus.
- 7. Seventh nerve.
  - Portio dura
    - Connecting branches
      - To join auditory.
      - To Meckel's ganglion.
      - Tympanic and sympathetic nerves.
      - The chorda tympani.
    - Branches for distribution
      - Posterior auricular.
      - Digastric branch.
      - Stylo-hyoid branch.
      - Temporo-facial
        - Temporal.
        - Malar.
        - Infra-orbital.
      - Cervico-facial
        - Buccal.
        - Supra-maxillary.
        - Infra-maxillary.
  - Portio mollis
    - To the portio dura
      - To the common sac.
      - To the saccule.
      - To the semi-circular canals.
    - Nerve to cochlea
    - Nerve to vestibule.
- 8. Eighth nerve.
  - Glosso-pharyngeal.
    - Connecting branches
      - To vagus.
      - To sympathethic.
      - Jacobson's nerve.
        - Joins otic ganglion
        - Supplies tympanum.
    - Branches for distribution.
      - To carotid artery.
      - To the pharynx.
      - Tonsillitic branches.
      - Muscular.
      - Lingual.
  - Pneumo gastric.
    - Connecting branches
      - To glosso-pharyngeal.
      - Sympathetic and auricular nerves.
      - To the hypoglossal.
    - Branches for distribution.
      - Pharyngeal nerve.
      - Superior laryngeal.
        - External laryngeal
        - Ascending to the mucous membrane.
        - Descending to join the inferior laryngeal.
      - Cardiac nerves.
      - Inferior laryngeal.
        - Cardiac.
        - Æsophageal.
        - Bracheal.
        - To constrictor and muscles of larynx.
        - To join superior laryngeal.
  - Spinal accessory.
    - Connecting branches
      - To pneumo gastric.
      - To the cervical plexus.
    - Branches for distribution.
      - To sterno-mastoideus and trapezius.

- 9. Ninth or hypoglossal nerve
  - Connecting branches
    - To the pneumogastric nerve.
    - To the sympathetic
    - To loop of atlas.
    - To gustatory nerve.
  - Branches for distribution
    - Descendens noni thyro-hyoid nerve.
    - To the lingual muscles and tongue.

TABLE OF THE SPINAL AND SYMPATHETIC NERVES OF THE HEAD AND NECK.

Spinal Nerves.

- The cervical spinal nerves divide into
  - Anterior branches.
    - The first four form the Cervical plexus which gives off
      - Superficial ascending
        - Small occipital nerve.
        - Great auricular.
        - Superficial cervical.
      - Superficial descending
        - Supra-acromial.
        - Supra-clavicular.
        - Supra-sternal.
      - Deep internal
        - To the pneumo-gastric.
        - To the hypoglossal.
        - To the sympathetic.
        - To rectus major muscle.
        - To diaphragm nerves to descendens noni.
    - To join the spinal accessory.
    - To the sterno mastoideus.
    - To the trapezius.
    - To the levator anguli scapulæ.
    - The last four and first dorsal form the Brachial plexus, which gives off
      - Branches above the clavicle
        - The rhomboid nerve.
        - To the phrenic nerve.
        - Supra-scapular nerve.
        - Subclavian branch.
        - Posterior thoracic, or respiratory.
        - To the scaleni muscles.
      - Branches below
        - Are dissected with the upper limb.
  - Posterior branches.
    - Are distributed to the muscles of the back, and give off cutaneous nerves.

SYMPATHETIC NERVE.

The sympathetic nerve has in the neck

- 1. Superior cervical ganglion has
  - Ascending branches, which unite in plexuses.
    - Carotid plexus, which gives
      - Branch to tympanic plexus.
      - To the vidian.
      - To the sixth and fifth cranial nerves.
    - Cavernous plexus, which gives branches
      - To the third cranial nerve.
      - To the fourth cranial nerve.
      - To the fifth and lenticular ganglion.
      - To the carotid artery and branches.
  - External branches
    - To join pneumo-gastric and hypo-glossal nerves to the spinal nerves.
  - Internal branches
    - Pharyngeal branches.
    - Superficial cardiac nerve,
  - Branches to vessels.
    - Nervi molles.
- 2. Middle cervical ganglion
  - External branches.
    - To the spinal nerves.
  - Internal
    - Middle cardiac nerve, to supply thyoid body and join the external laryngeal.
  - Anterior branches.
    - To the subclavian artery.
- 3. Inferior cervical ganglion
  - External
    - To the spinal nerves forming vertebral plexus.
  - Internal.
    - Inferior cardiac nerve.

TABLE OF THE SPINAL NERVES OF THE UPPER LIMB.

Brachial plexus gives off below the clavicle.

- Anterior thoracic
  - Superficial.
  - Deep.
- Sub-scapular
  - Superior.
  - Inferior.
  - Long.
- Circumflex
  - Articular.
  - Cutaneous.
  - To teres minor.
  - To deltoid.
- Nerve of Wrisberg.
- Internal cutaneous.
  - Small cutaneous.
  - Anterior of forearm.
  - Posterior of forearm.
- Musculo cutaneous.
  - To coraco-brachialis biceps and brachialis anticus.
  - Cutaneous external of forearm.
  - Articular to carpus.
- Median
  - To pronator teres.
  - To muscles of forearm, except flexor ulnaris and part of profundus.
  - Anterior interosseous.
  - Cutaneous palmar.
  - To muscles of thumb in part.
  - Five digital branches.

Brachial Plexus—continued.

- **Ulnar**
  - Articular to elbow.
  - To flexor carpi ulnaris.
  - To flexor profundus in part.
  - Cutaneous branch of forearm and palm.
  - Dorsal cutaneous of the hand.
  - Superficial palmar division — Communicating two digital branches.
  - Deep palmar nerve.
- **Musculo spiral**
  - Internal cutaneous.
  - To triceps and anconeus.
  - External cutaneous.
  - To supinator and extensor radialis longus.
  - Posterior interosseus — Muscular. Articular.
  - **Radial** — Cutaneous of back of thumb and of first two fingers and half the next.

TABLE OF THE SPINAL NERVES IN THE ABDOMEN.

Lumbar spinal nerves divide into

- **Posterior branches**
  - Internal. — Muscular.
  - External — Muscular. Cutaneous.
- **Anterior branches; of these the four first end in the *lumbar plexus** which supplies**
  - Ilio-hypo-gastric — Cutaneous of the ilium. Hypo-gastric branch.
  - Ilio-inguinal — To integuments of the groin.
  - External cutaneous — To integuments of the thigh.
  - Genito-crural — Genital branch. Crural branch.
  - Anterior crural
    - Branches inside the pelvis — To the iliacus muscle. To the femoral artery.
    - Branches outside the pelvis — Are noticed in the thigh.
  - Obturator — Accessory — Other offsets are described in the thigh.

*The lumbo-sacral gives off the superior gluteal nerve.

Sacral spinal nerves divide into

- Posterior branches unite together and give off ..... Muscular and cutaneous filaments.
- The anterior branches of the four superior unite with the lumbo-sacral in the *sacral plexus*, and furnish
  - Branches inside the pelvis .....
    - Visceral.
    - To levator ani.
    - To obturator internus.
    - To the pysiformis.
  - Branches outside the pelvis .....
    - Pudic .....
      - Inferior hæmorrhoidal.
      - Superficial perinæal (*anterior and posterior*) muscular.
      - To the bulb.
      - Dorsal of the penis.
    - Inferior hæmorrhoidal (*sometimes*).
    - To the superior gemellus.
    - To the inferior gemellus and the quadratus articular.....
    - Small sciatic..
    - Great sciatic..

    These are described in the thigh.

TABLE OF THE SYMPATHETIC NERVE OF THE ABDOMEN.

Solar plexus or prevertebral center of the abdomen, furnishes the following plexuses :

- Diaphragmatic.
- Cæliac .....
  - Coronary plexus.
  - Hepatic .....
    - Pyloric.
    - Right gastro-epiploic.
    - Pancreatic-duodenal.
    - Cystic.
  - Eplenic .....
    - Left gastro-epiploic.
    - Pancreatic.
- Superior mesenteric ..... Offsets to small and large intestines.
- Suprarenal.
- Renal ..... Spermatic plexus, filaments to the.
- Aortic ..... Hypogastric.
- Spermatic.
- Inferiormesenteric
  - Offsets to the large intestine.
  - Superior hæmorrhoidal.

Hypogastric plexus ends in the pelvic plexus on each side, which gives the following plexuses :

- Inferior hæmorrhoidal.
- Vesical .....
  - Prostatic.
  - Cavernous.
  - Deferential.
  - To vesiculæ seminales.
- Uterine.
- Vaginal.

- Gangliated cord of the sympathetic in the abdomen supplies
  - External branches — To the lumbar and sacral spinal nerves.
  - Internal
    - To aortic plexus.
    - To hypogastric plexus.
    - To join round middle sacral artery between the cords on the coccyx in the *ganglion impar*.
- This receives
  - Great splanchnic nerves.
  - Part of small splanchnic.
  - Offset of pneumo-gastric.

  This is joined above by
  - The aortic plexus.
  - Filaments from the lumbar ganglia.

PNEUMO-GASTRIC NERVE IN THE ABDOMEN.

- Pneumo-gastric
  - Right
    - Coronary branches to the back of the stomach.
    - Filaments to join the cæliac and splenic plexuses.
  - Left
    - Coronary branches to the front of the stomach and the hepatic plexus.

TABLE OF MUSCLES.

Arranged after the manner of Dr. Barclay, according to their actions.

THE HEAD IS MOVED

Forwards by	*Backwards by*	*To either side by*
Platysma myoides,	Digastria,	Platysma myoides,
Sterno-mastoideus,	Part of trapezius,	Sterno-mastoideus,
Rectus anticus major,	Splenius capitis,	Part of trapezius,
Rectus anticus minor,	Complexus,	Splenius capitis,
Assisted (when the lower jaw is fixed) by	Trachelo-mastoideus,	Splenius colli,
Mylo-hyoideus,	Rectus posticus major,	Trachelo-mastoideus,
Genio-hyoideus,	Rectus posticus minor,	Complexus.
Genio-hyo-glossus,	Obliquus captis superior.	
Digastrici.		

THE NECK IS MOVED

Forwards by	*Backwards by*	*Laterally by*
Platysma myoides, Sterno-mastoideus, Digastricus, Mylo-hyoideus, Genio-hyoideus, Genio-hyo-glossus, Omo-hyoidei, Sterno-hyoidei, Thyro-hyoidei, Rectus anticus minor, Longus colli.	Part of trapezius, Rhomboideus minor, Serratus posticus superior, Splenius capitis, Splenius colli, Complexus, Trachelo-mastoideus, Transversalis colli, Inter-spinales colli, Semi-spinales colli, Rectus posticus major, Rectus posticus minor, Obliquus capitis superior, Obliquus capitis inferior, Scaleni postici, Levator scapulæ.	Various combinations of those muscles which separately moved it forwards and backwards, assisted by the scaleni, inter transversales, and recti laterales.

THE TRUNK IS MOVED

Forwards by	*Backwards by*	*Laterally by*
Rectus abdominis, Pyramidalis, Obliquus externus abdominis, Obliquus internus, Psoas magnus, Psoas parvous, *Assisted (when the arms are carried forwards) by* Pectoralis major, Pectoralis minor, Serratus magnus.	Trapezius, Rhomboideus major, Latissimus dorsi, Serratus posticus superior, Serratus posticus inferior, Sacro-lumbalis, Longissimus dorsi, Spinales dorsi, Semi-spinales dorsi, Multifidus spinæ, Inter-transversales dorsi et lumborum.	Obliquus externus, Obliquus internus, Quadratus lumborum, Longissimus dorsi, Sacro-lumbalis, Serrati postici, Latissimus dorsi.

THE SCAPULA IS MOVED

Upwards by	*Downwards by*	*Forwards by*	*Backwards by*
Trapezius, Levator scapulæ, Rhomboidei.	Lower part of trapezius, Latissimus dorsi, Pectoralis minor.	Pectoralis minor, Serratus magnus.	Part of trapezius, Rhomboidei, Latissimus dorsi.

THE HUMERUS IS MOVED

Forwards by	*Backwards by*	*Inwards by*	*Rotated inwards by*
Part of deltoid,	Part of deltoid,	Part of pectoralis major,	Subscapularis,
Part of pectoralis major,	Teres major,	Latissimus dorsi.	*Assisted occasionally by*
Assisted in some circumstances by	Teres minor,		Pectoralis major,
Biceps,	Long head of triceps,		Latissimus and teres major.
Coraco-brachialis,	Latissimus dorsi.		*Outwards by*
			Supra-spinatus,
			Infra-spinatus,
			Teres minor.

THE FOREARM IS MOVED

Forwards by	*Backwards by*	*Rotated inwards by*
Biceps,	Triceps,	Pronator teres,
Brachialis anticus,	Anconeus.	Flexor carpi radialis,
Pronator teres,		Palmaris longus,
Assisted by		Flexor sublimis,
Flexor carpi radialis,		Pronator quadratus.
Flexor sublimis,		*Outwards by*
Flexor ulnaris,		Biceps,
Supinator longus.		Supinator brevis,
		Extensor secundi internodii.

THE CARPUS IS MOVED

Forwards by	*Backwards by*	*Outwards by*	*Inwards by*
Flexor carpi radialis,	Extensor carpi radialis longior,	Flexor carpi radialis,	Flexor sublimis,
Palmaris longus,	Extensor carpi radialis brevior,	Extensor carpi radialis longior,	Flexor carpi ulnaris,
Flexor sublimis,	Extensor secundi internodii.	Extensor carpi radialis brevior,	Flexor profundus,
Flexor carpi ulnaris,	Indicator,	Extensor ossis metacarpi,	Extensor communis digitorum,
Flexor profundus,	Extensor communis digitorum,	Extensor primi internodii.	Extensor minimi digiti,
Flexor longus pollicis.	Extensor proprius pollicis.		Extensor carpi ulnaris.

THE THUMB IS MOVED

Inwards and forwards, across the palm, by	*Outwards and backwards by*	*Upwards and forwards, away from the other fingers, by*	*Backwards and inwards, to the other fingers, by*
Opponens pollicis, Flexor brevis, Flexor longus.	Extensor ossis metacarpi pollicis, Extensor primi internodii, Extensor secundi internodii.	Abductor, *Assisted by part of the* Flexor brevis.	Abductor, Extensor primi internodii, Extensor secundi internodii.

THE FINGERS ARE MOVED

Forwards, or flexed, by	*Backwards, or extended, by*	*Outwards, to radial border, by*	*Inwards by*
Flexor sublimis, Flexor profundus, Lumbricales, Interossei, Flexor brevis digiti minimi, Abductor digiti minimi.	Extensor communis, Extensor minimi digiti, Indicator.	Abductor indicis, Abductor digiti minimi, Interossei.	Abductor digiti minimi, Interossei.

THE THIGH IS MOVED

Forwards by	*Backwards by*	*Inwards by*	*Outwards by*
Psoas magnus, Iliacus, Tensor vaginæ femoris, Pectineus, Abductor longus, Abductor brevis.	Gluteus maximus, Part of gluteus medius, Pyriformis, Obturator internus, Part of abductor magnus, Long head of biceps, Semi-tendinosus, Semi-membranosus.	Psoas magnus, Iliacus, Pectineus, Gracilis, Abductor longus, Abductor brevis, Abductor magnus, Obturator externus, Quadratis femoris.	Tensor vaginæ femoris, Gluteus maximus, Gluteus medius, Gluteus minimus, Pyriformis.

THE THIGH IS ROTATED

Inwards by

Tensor vaginæ femoris,
Part of gluteus medius,
And, when the leg is extended, by
Sartorius,
Semi-tendinosus.

Outwards by

Gluteus maximus,
Part of gluteus medius,
Pyriformis,
Gemellus superior,
Obturator internus,
Gemellus inferior,
Quadratus femoris,
Obturator externus,
Psoas magnus,
Iliacus,
Abductor longus,
Abductor brevis,
Abductor magnus,
Biceps cruris, slightly.

THE LEG IS MOVED

Backwards, or flexed, by

Semi-tendinosus,
Biceps,
Semi-membranosus,
Gracilis,
Sartorius,
Popliteus.

Extended by

Rectus,
Crureus,
Vastus externus,
Vastus internus.

THE FOOT IS MOVED

Forwards, or flexed, by

Tibialis anticus,
Extensor proprius pollicis,
Extensor longus digitorum,
Peroneus tertius.

Backwards, or extended, by

Gastrocnemius,
Plantaris,
Soleus,
Flexor longus digitorum,
Flexor longus pollicis,
Tibialis posticus,
Peroneus longus,
Peroneus brevis.

Inclined inwards by

Extensor proprius pollicis,
Flexor longus digitorum,
Flexor longus pollicis,
Tibialis posticus.

Outwards by

Peroneus longus,
Peroneus brevis,
Extensor longus digitorum,
Peroneus tertius.

THE TOES ARE MOVED

Backwards, or flexed, by	*Forwards, or extended, by*	*Inclined inwards by*	*Outwards by*
Abductor pollicis, Flexor brevis digitorum, Abductor minimi digiti, Flexor longus pollicis, Flexor digitorum, Flexor accessorius, Lumbricales, Flexor brevis pollicis, Abductor pollicis, Flexor brevis minimi digiti. Interossei.	Extensor longus digitorum, Extensor proprius pollicis, Extensor brevis digitorum.	Abductor pollicis, Interossei.	Abductor pollicis, Abductor digiti minimi, Interossei.

Normal temperature of adult 98° to 100°.

Average pulsation per minute:

At birth	130 to 140
Puberty	80 to 85
Adult	70 to 75
Old age	50 to 65

Average weight of blood, in proportion to entire weight of body, is as 1 to 8, consequently the body of a man weighing 145 pounds will contain about 18 pounds of blood.

According to another authority:

Blood arterial, 15 to 20 pounds.

Proportion of arterial blood to venous, 4 to 9.

The average proportion of each organic element in 1000 part of healthy blood, according to Le Cann, and M.M. Andrae and Gavarret: fibrin, 3; red corpuscles, 127; solid matter of serum, 80; water, 790; but in inflammation the amount of fibrin may be increased to 10, and the albumen diminished, as in Bright's disease of the kidneys, etc., and in fevers, etc. the fibrin diminishes in quantity.

The average weight of each organ in the adult, according to Quain, is as follows:

Heart, male	11 ounces
" female	9 "
Brain, male	49½ "
" female	44 "
Spinal cord	1 to 1¾ "
Liver	50 to 60 "
Pancreas	2¼ to 3½ ounces
Spleen	5 to 7 "
Lungs, male	45 ounces
" female	32 "

Thyroid cartilage	1 to 2 ounces.
Kidneys	4½ "
Suprarenal capsules	2 drachms
Prostrate	6 "
Testes	¾ to 1 ounce
Unimpregnated uterus	7 to 12 drachms

According to other authors the capacity and size of various organs:

Gall Bladder, about	4 inches long
" " capacity	1½ fluid ounces
Spleen	4 to 5 inches long
"	2 to 3 inches wide
"	1½ inches thick
Kidneys	3 to 5 inches long
"	2 to 3 inches wide
"	1 inch, and over, thick

EXUDATION AND ABSORPTION OF THE LYMPHATIC SYSTEM.

According to Dalton the daily quantity of all the fluids secreted and reabsorbed during 24 *hours*, the activity with which enclosmosis and exosmosis goes on in the living body. In the following table, the quantities are all calculated for a man weighing 140 pounds.

Secreted and re-absorbed during 24 hours.

Saliva	20.164	grains,	or	2.880	pounds
Gastric juice	98.000	"	"	14.000	"
Bile	16.940	"	"	2.420	"
Pancreatic juice	13.140	"	"	1.872	"
Lymph	27.048	"	"	3.864	"
Total				25.036	

A little over twenty-five pounds, therefore of the animal fluids transude through the internal membranes, and are restored to the blood by reabsorption in the course of a single day.

This will in part demonstrate to the thoughtful the necessity of keeping the alimentary system in a healthy state of nutrition, and will likewise prove that the ingredients of the digestive secretions affect the blood no less, in fact that it is the intimate relation, co-ordination, and totality of every atom of the component parts of the human organism, which requires differential treatment and care in order to preserve normal condition of health and development, and that the vital changes constantly going on, must be re-supplied.

Dalton estimates: " Renovation of the body by the nutritive process, the entire quantity of the material assimilated and decomposed by the living body. As the food taken into the alimentary canal absorbed by the blood after digestion the quantity of oxygen appropriated from the atmosphere in respiration. The amount of carbonic acid evolved with the breath and that of the various excretory substances discharged from the body. The following table shows in an approximative manner the quantity of these different ingredients of ingesta, and egesta. A completed form, *the* results of experience.

Absorbed in 24 hours.			Discharged during 24 hours.		
Oxygen	1.470	pounds	Carbonic Acid	1.630	pounds
Water	4.535	"	Aqueous Vapor	1.555	"
Albuminous matter	.305	"	Perspiration	1.930	"
Starch	.660	"	Water of the Urine	2.020	"
Fat	.220	"	Urea and salts	.137	"
Salts	.040	"	Fæces	.358	"
Total	7.230		Total	7.230	

The average amount of fæces discharged in 24 hours is from 4 to 6 ounces, when the amount of solid food taken may have been 45 ounces.

The average amount of urine secreted in 24 hours is 52½ fluid ounces.

In a healthy human subject of average weight (140 pounds) a little more than seven pounds are thus discharged and absorbed.

CHAPTER VI.

MEDICAL ELECTRICITY.

ELECTRICITY is one of a great variety of forces, all of which are probably of identical essence, viz.: motion, and are therefore now popularly known as "modes of motion."

Whether electricity is, as many scientists claim for it, the element in which resides the sum of all forces and motors, it is a settled fact that natural electricity is present in all bodies. Whatever the ultimate combination of forces may be which produces in animate beings the result so vaguely called "life principle," the author claims that there is in the human system a sufficient number of phenomena accompanying nervous and muscular, nervous and arterial action, to demonstrate that the said "life principle" is something analogous to electricity, and that this force, properly distributed throughout the organism, maintains health, and when disturbed results in disease, and when suspended, is death.

As electric forces of the human organism are simply modifications of those which vitalize nature at large, it follows that any excess or diminution in their quantity, or an impoverishment of their quality, must result in a disordered condition of the organism.

Vital forces, in health and disease, are but modes of motion. Thus electricity and vital force are assimilated.

Curative and pathogenic agents of all kinds, electricity included, are such by virtue of the forces or modes of *molecular motion*, which they are able to excite in the living organism ; *i. e.*, in the sphere of vital force.

Curative and pathogenic agents aside from hygienic agents, and such like, differ from each other only in consequence of their *force-waves*, being homologous, or hetrologous with objective forces, co-operate in maintaining health, and in curing disease; the heterologous impairs health and prevents cure.

Electricity, in its many modifications may be so administered as to be thus homologous to the organism as a whole, as well as locally; and, on the other hand, so as to be heterologous; hence, may be both curative and pathogenic.

Graduation of quantity and tension of the electrical currents; the choice of the currents themselves; a minute subdivision or otherwise of such currents, by slow or rapid interruptions; the discriminating application of the negative and positive poles; and the direction and course of the currents, are the ordinary means of rendering the use of this agent curative in disease. And whatever be the electric-curative, it may be relied on as certain that a misuse of the same agent will result unfortunately, and with detriment to health.

The word quantity is often confounded with the word primary, as applied to currents; and the word intensity is often confounded with the word secondary. This is

because we usually see the primary current, *i. e.*, that known as voltaic or galvanic and coming directly from the cups, obviously active, only when the amount of generating surface, and the resultant amount of electricity are very considerable; its flow being quiescent. But the secondary or "induced current,"—obtained by means of a coil of fine wire simply brought near to the primary, and known also as Faradic, from Faraday, who described it—this is generally seen in a state of concentrated and precise mobility which enables it to pass with a sort of momentum *through* matter which would only absorb, as it were, the more indefinitely and sluggishly moving primary current. The two differing somewhat as do a conical bullet from a rifle, and the charge of small shot from a fowling-piece. But the primary current gets tension from a subdivision of the pair of primary plates into co-operative series; and the secondary current gets both amounts, and measurably the condition called quantity by changing mere matters of mechanism, and the character of the conducting media.

Using the word "quantity" rightly, we mean then that this is a *condition* in which either a large or small amount of electricity is indifferent in regard to any given line of polarization; hence diffuses itself near and around its point of liberation, and readily becomes transformed by obstacles into other forces, as in the *heating* of a wire, which forces the electricity suddenly into concentration.

Of "intensity," in like manner, we say that it is also a *condition;* the—large or small amount of—electricity

is concentrated, drawn, as it were, from a nebulous diffusion into the form of a thunder-bolt, and thus made intensely polar, and so capable of passing, in comparatively tenuous lines, *through* intervening matter, instead of over it, and only into it.

From the foregoing, we shall see why we must still use the primary current in most cases requiring the condition named quantity; and the secondary current in most cases requiring the condition called intensity; without forgetting that the primary current may be had in high tension, or that the secondary current may be had in connection with great *amount*, provided the coils be not destroyed in its passage.

All these variations have an individuality as well as a therapeutic value of their own. Thus the primary current, applied to tumors, is highly electrolytic—having the power to decompose morbid matter. It affects healthy muscles, on the other hand, very little; but the secondary affects muscles very much (the amount aside.)

Muscles with eccentric paralysis, as from lead, on the contrary, are very apt to be responsive, more or less, to the primary, not at all to the secondary current. Electrical gymnastics restore such muscles and their nerves, using always the current which most affects them, and changing as their approach of health alters their susceptibility.

Healthy nerve-trunks feel it very little, but to it neuralgia is most amenable, as is also the function of the optic nerve.

Ordinary primary current batteries, however, to be

effective must be bulky and expensive; and judging from the practical success of the system herein detailed, almost needless; cures being rapidly obtained in curable cases by simpler and more portable, as well as less costly apparatus; a point on which superiority may justly be claimed for the system itself.

Acute lesions or acute morbid processes, even of the brain and spinal cord, are no contra-indications for the proper use of electricity as a curative. In this, of course, the author is aware that she is contradicted by most practitioners, and yet can but reiterate the statement from the abundant teachings of a long and varied experience.

Except for purposes of rapid cauterization (comparatively but rarely needed, even for the separation of pedunculated tumors, as will be seen under that head, in this volume), the multiple current batteries of Dr. Jerome Kidder are quite adequate to all the exigencies of Electro-Therapeutics.

These batteries consist of one or two Smee's elements (zinc and platina), with three or four helices, whereby the tension of the resulting currents is modified; as every factor in every current must modify the current itself, and the primary current is also combined with the secondary in actual administration in greatly different degrees. Hence, according to the posts (lettered from A to D and to E, respectively) to which the conductors are attached, one may vary the nature of the resulting current very much. These batteries have also a special mechanism in a sliding cylinder or piston for regulating *the strength*. Grose's, Bunsen's and

Daniell's batteries are simply modifications intended to secure permanent and steady activity.

The different qualities of the several currents of Kidder's machine render them homologous to the forces inherent in the various and different tissues of the body, as well as to various morbid products, and even to extraneous and pathogenetic *materials* finding place and working mischief therein. Hence by properly individualizing the cure of disease and the currents of electricity, all curable diseases, and many called incurable, whether dynamic merely, or substantial and organic, are amenable to Electro-Therapeutics. The several currents, like analogous drugs, may, however, stimulate each other under varying conditions of the vital factor.

Even with such careful selection of the appropriate currents, excessive use of the same, either in strength, frequency or duration of treatment, may produce or aggravate the very symptoms which the same currents, used with due caution according to the directions herein given, will cure.

For instance, BD being applied strong through a metal surface on the skin for a length of time, develops a *burn* at the negative D. But a short application of BD weak, and with a wet napkin between the metal and the skin, is a perfect curative for burns. And so on through the whole field of morbid irritations.

Diseases are found practically to consist of local or general conditions, or both, however similar their names, and even their symptoms or functional manifestations, or indeed their organic lesions, may differ

widely in different persons, or in the same person at different times and stages.

In general we may say the difference may be commonly found connected on one hand with irritative, and on the other hand with paretic states. Locally, and in previously healthy persons the irritative state predominates and calls for a specific method—that of functional regulation, first of all, with concomitant nutritive influences in electric treatment.

In the sphere of the general system, in very many cases, the same is true; yet, in other cases and after exhausting or relaxing influences, local or general, the paretic state predominates, and calls for a different application of the same currents—that of nutritive regulation with concomitant functional effect.

The mere presence of electricity has some influence in both these ways, but the specific stimulating functional influence, hence *in excess exhaustive* prevails in "direct" or downward running currents, the sedative and nutritive in the "reverse" or upward running; counting the positive pole as that which gives the flow, and the negative that which receives it in the molecular movement which completes the electric arc.

In the vast majority of cases the downward currents are to be chosen. These may run on the track of the nerves or athwart them, according as a nervous or purely organic action is wanted, or rather according as the cerebro-spinal or the sympathetic nerves are to be addressed, or according as the venous or arterial circulation may be assailed. In a few cases, as in hæmorrhoids, diarrhœa, and especially *paralysis proper*, the

negative of paretic conditions are to be met by currents of electricity given in reverse directions, that is, the negative pole placed superior in position to the positive pole.

Various electrodes may be used as the cases require. About eight brass plates, of different dimensions (see diagrams) are needed. These are attached by the operator to the copper ends of the conducting cords, the brass ends inserted in the lettered posts of the battery. (The brass is a peculiar alloy, and to this arrangement importance is laid, as prevention against the passage of metallic molecules from the battery into the body.) The plates are covered with a wet napkin or huckaback toweling before ready for use. The aim is always to include or implicate the whole site of the morbid process of disease, so far as may be possible, between these electrodes. For particular purposes, instead of the plates the common electrodes may be employed, covered or not with cloth or a thin sponge, always wet. When it is to be administrated through the person of the operator, which makes the electricity highly *electro-magnetic*, the current should pass mainly from left to right. Excess causes debility to the operator, antidoted by passing the same from right to left; upwards and downwards are also mutually antidotal. The maple-wood sponge-cup, of about two and one half inches diameter, with a handle some six inches long (see cut)

held in the left hand of the operator or patient, as the case may be, the right being used to give off the positive to the patient, although the practice of conveying electricity through the operator to the patient is considered, as a rule, exceedingly prejudicial to the operator, and the same benefits can be obtained by the direct use of the sponge-cup on the patient. This sponge-cup is very useful in the treatment of numerous maladies (see *Displacements, etc.)* Besides these many forms may with ingenuity be extemporized when idiosyncrasies in cases demand special contrivances, but a great variety of appliances are handsomely made and sold by dealers in surgical and electrical apparatuses, which every practitioner should possess *(see diagrams of instruments)*, many of which prove indispensable for the treatment of internal parts, as the bladder, uterus, rectum, nose, ear, etc. The glass eye-cup, and the metalic brush are included. A tin foot-tub is requisite for various purposes, also a similar basin, although ordinary toilet appurtenances can be *utilized*, and a number of pieces of rubber cloth, of different sizes, for protection of the clothing against dampness, for insulation.

Dryness of the skin is indicated for a purely cutaneous effect; deeper action demands moisture, either by means of a sponge or cloths thoroughly wet; slight pressure on the electrodes or plates increases superficial, *vs.* deep action; — strong pressure increases deep action *vs.* superficial.

The distance between the poles being increased diminishes the effect at any one point between them. The strength of the current should have some refer-

ence thereto, and can be regulated by the sliding cylinder.

Little children should first be made accustomed to the apparatus in action, and to the electrodes upon their person before any currents are administered, if possible, and very mildly at the first actual passage of the electric current, if the case is not too urgent to consult these points. The successful physician rather invites the confidence and composure of the patient, than assail with sovereign indifference the disease, irrespective of the patient's idiosyncrasies.

Posture is often important. Displacements, all pelvic troubles, and some cases of debility require recumbency. When the negative is directed to the lower extremities, as often occurs, the feet may be placed with the negative in the foot-tub with water, or on a covered plate or a sponge-covered electrode; or a long plate may be covered, and laid on a rubber cloth on the bed or lounge, beneath the ankles of both legs. The effects are similar in a general way; of course the other pole is assigned its respective position on the patient in accordance with the requirements of the disease afflicting the patient being administered to.

A most important special method is the electro vapor bath. Its use recurs constantly in the course of practice, and is considered indispensable, and as greatly accelerating the desired effect to restore normal circulation, and by cleansing the pores permit of wholesome cutaneous action. Outside of an establishment, it can be made available for home purposes, by employing the portable apparatus herein described, and illustrated by

DIAGRAMS, page 118 *et seq.*

A wooden closet commodious enough to stand up in, and broad and deep enough to allow free action of the arms and legs, bottom lined with zinc to catch the condensed vapor and the water. A latticed seat is adjusted at the back part of the interior of *bath-box* opposite the door, which is always covered with a small crash towel to prevent the hot vapor from coming too freely about the thighs and spine. A foot-tub supplies hot water for the feet. A basin, with face towel, containing cold water to place on the head, and when a sense of suffocation *seems* to ensue, to breathe through. A side window or aperture through which the arm of the operator may pass freely, is on the left of the bath, over which is hung a curtain from the inside to prevent exposure of the patient and keep the vapor from rapid escape, as well as warding off any draughts of cold air. Beneath the window at the forward part of the bath, is a shelf upon which the operator's battery is safely set. The conductors used, where any moisture exists, are covered with pure rubber tubing, to protect against damage. A portable steam boiler, heated by gas stove, or so made as to fit on a stove as a teakettle does, with rubber tubing or iron pipes to conduct the vapor to the *bath-box*, can be regulated with perfect safety, if judgment is exercised in keeping the boiler supplied with sufficient water to generate the vapor as rapidly as exhausted, and keep enough in it to prevent collapse, which only could result from overheating the empty boiler.

The bath should be thoroughly heated before the patient enters, and all qualms as to suffocating will

disappear as soon as perspiration ensues. A gentle friction can be effected by rubbing, either with the palm of the hands, or with a crash towel on the chest, legs, arms, neck and face, and the *scurf* skin will roll up and become detached in an astounding manner. The temperature should range from 90 to 110, to 115 to 120 degrees. Occasionally a patient may experience excellent results by a higher temperature; the length of vaporizing should not exceed twenty-five minutes—about 5 to 10 minutes after perspiration commences. The electricity is administered D in the foot-tub, or as sometimes ordered in No. 7 plate on the seat, covered with a wet towel. And A in the sponge-cup passed down the spine slowly from the base of brain, diverging ONLY when reaching the lumbar region, when the sponge-cup may be passed obliquely from the median line of the spine, to one hip, then to the other. The patient must sit forward on the seat, that the arm of operator may have free action and admit of lifting the sponge-cup off the patient, when an interrupted return from the coccyx to basilar is made; for again it is urged by the author, that the electrization should always be given (except when some peculiar emergency demands reversal), from the base of brain down the spine, or if given on the epigastric region as directed. In some cases the patient can be more conveniently reached if standing.

The patient should sponge off in tepid or quite cool water, and rub thoroughly in the bath-closet after the vapor has been shut off. Some patients allow the attendant to thoroughly rub them with coarse crash tow-

els, then emerge, don their clothing rapidly, and only must exercise care to avoid *draughts*. Can go out soon as cooled off sufficiently to denote reaction. For the first attempts with the vapor bath, it will be advisable to shun lowering weather and general negative conditions of the atmosphere.

Instead of producing a debilitating effect, as the uninformed might anticipate, after one has taken a brief respite after the incumbent fatigue of dressing, the effect is truly exhilarating. The author personally can commend the efficacy of the vapor-bath when weariness and cold is settling upon the physician exposed to inclement weather. Frequently vapor apparatuses have been most ingeniously devised in an *emergency*.

It is remarked that the dynamic and molecular movements in bodies, traversed by electric currents, tend to pursue the route of such currents. The platinum point, for instance, upon which the trembler plays in vibrating, has been found excavated after prolonged use, and a corresponding little metallic bead deposited on the plate below. So, also, mercury has been found in the foot-tub, with the negative pole. And the thermal flow will soon be noted in the feet, when the negative pole is applied, as well as the flow of the blood.

For this reason, morbid material should invariably be invited to an eliminating surface or organ, as the feet, or skin, or the alimentary mucous tract.

For a like reason, the greatest caution is necessary when manipulating about the head, eye or chest. The brain, heart and lungs are not a little intolerant of

electricity, and as to the primary current, the optic nerve also. As to the cerebrum, it should be guarded against all rash treatment; but the basilar region of the occiput (base of brain), is the favorite locality for the positive pole. Upward and reverse currents *may* be needed in paretic states, but apoplectic and paralytic symptoms have occasionally supervened. On the other hand, faintness and nausea sometimes signalize depletion of the brain, during the flow of a downward current. Giddiness is a fair warning of mischief; changing the current is often antidotal, as before said. The manipulations of the chest are very considerably limited to the median line; in fact, front and back, the direct applications over the *lungs* is confined to the sternum and the spinal column.

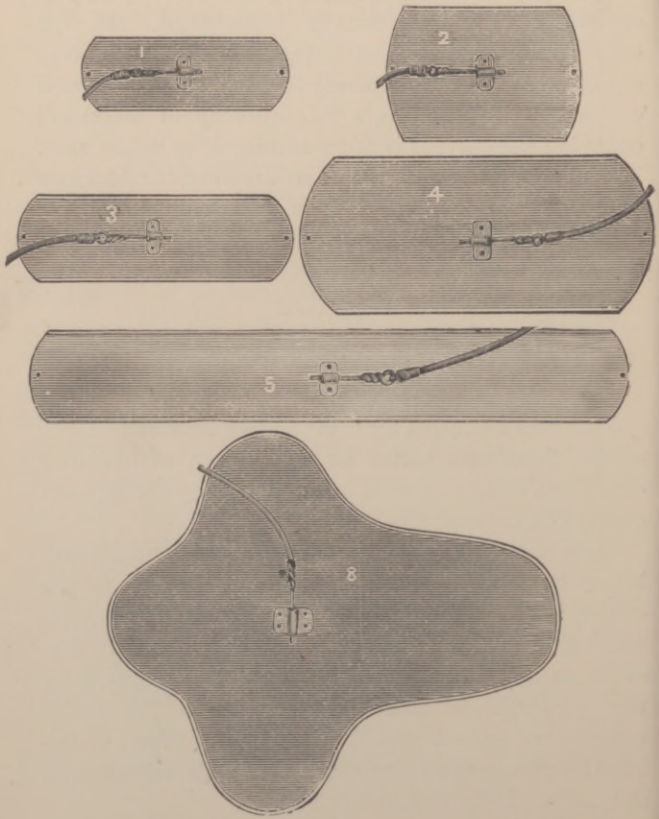
DESCRIPTION OF APPLIANCES USED BY AUTHOR.

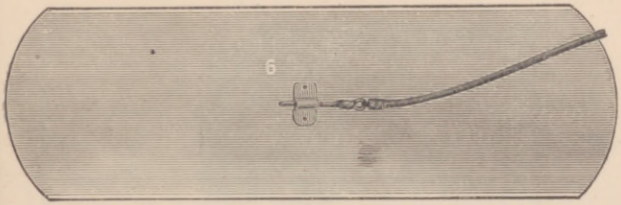
THE cuts represent the comparative sizes and shapes of the thin brass plates for *general use*, as hereafter described, and will always be alluded to by the appended caption of numbers.

They should always be covered with a wet cloth before applying to the body. The little slide in the center is to accommodate the copper end of the connecting cords which are attached to the electric machine, as denominated in directions, or as required by the symptoms of different aberrations. The eyelet holes in the ends are for the insertion of tapes, to fasten the plates upon the body after once adjusted, as optional with the patient or operator.

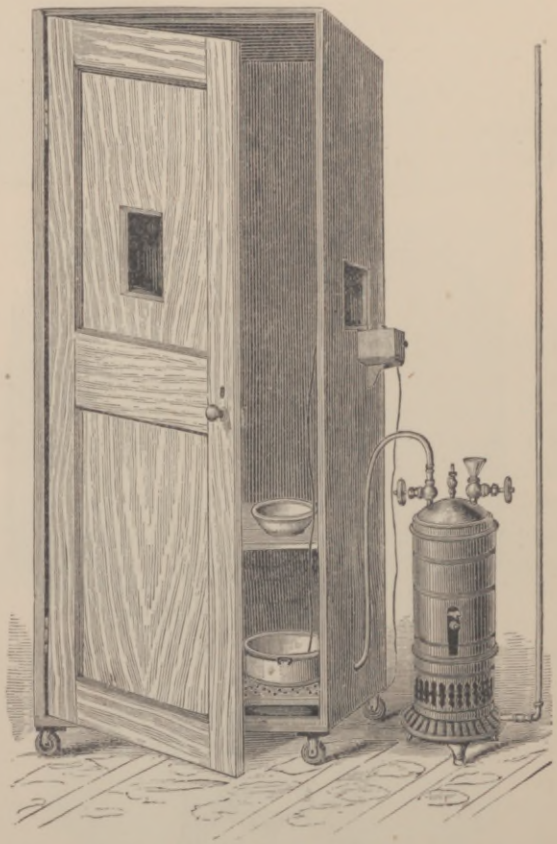
TABLE OF SIZES OF BRASS PLATES.

No.	Inches.	No.	Inches.
1	$1\frac{1}{16} \times 3\frac{3}{4}$	5	$2 \times 11\frac{3}{4}$
2	$2\frac{3}{4} \times 3\frac{3}{4}$	6	$4\frac{1}{4} \times 11\frac{7}{8}$
3	$1\frac{3}{4} \times 5\frac{1}{2}$	7	$8\frac{7}{8} \times 9\frac{7}{8}$
4	$3\frac{1}{8} \times 6\frac{3}{4}$		





ALCOHOL BRASIER FOR CHEMICAL FUMIGATIONS.



PORTABLE VAPOR BATH AND BOILER.

CARE OF THE BATTERY.

The solution for the ordinary batteries consists of nine or ten parts of soft water to one part of chemically pure sulphuric acid.

A little quicksilver should always be in the bottom of the cup of solution sufficient to touch the corners of the zincs, *not the platina*—and by its own action the zincs are kept amalgamated and always ready.

When not in use, the battery can be taken out of the solution, and rested on the top of the cup; or it can be placed in another cup containing water; then no salt will gather for a long time on the zincs to require washing, and the solution can remain in the cup for months, and still be strong, even though the machine should be used daily. Also, the battery may remain in the solution, and by washing the salt from the top of the battery once a fortnight, it is always ready; but it should always be disconnected from the helix when not in use.

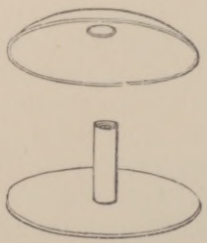
Also, when disconnected from the helix, take care that the wires (if left in the battery) do not swing together so as to touch each other, for this would make a closed circuit, which would cause intense action of the battery, as would be noticed by bubbles of hydrogen arising from the metal opposed to the zinc.

The following distinctions should always be adhered to so as to be universally understood. The BATTERY is the system of metals—as zinc and platina—in the solution. The helix is the coil or coils of wires on a stand (or boxed), and with it a magnet with a spring

for interruption of the current. These TWO—the battery and the helix—are distinct parts, which, together, constitute the MACHINE or apparatus.

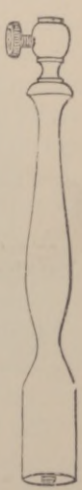
The power is increased by withdrawing gradually the tube or cylinder from the helix.

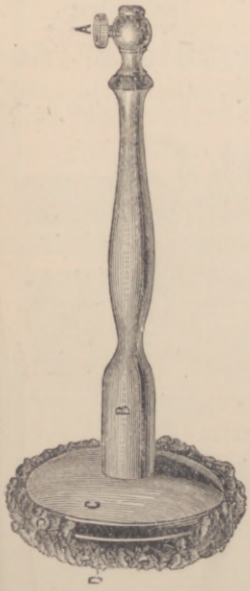
CAUTION.—The acid will eat and destroy any fabric it comes in contact with, unless immediately sponged out with pure water, and moistened in a solution of aqua ammonia, which will restore the color. It is wise to keep a small bottle in the case. The person using the battery should avoid breathing the emanations which are emitted from the open-cup.

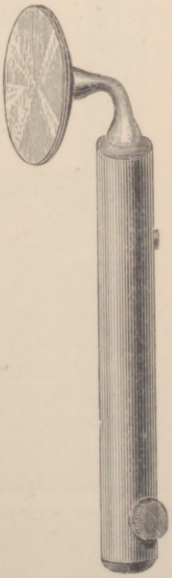


Improved Sponge Holder.

To fix the sponge on this holder, unscrew the handle B by turning the *handle itself* Place the sponge on the under surface of the lower plate D, and bring the edges of the sponge over the edges of the plate; clasp it with the plate C, and hold all together by screwing on the handle B.







Side Sponge Holder
with Interrupter.

A LARGE VARIETY OF OTHER EXTRA APPLIANCES FOR SPECIAL CASES ALWAYS ON HAND.


DR. KIDDER'S
IMPROVED TIP BATTERY,
TEN CURRENT
ELECTRO-MEDICAL APPARATUS.
NEW
YORK.
The Battery is charged or uncharged by merely tipping it one way or the other, and is a perfect hydrostat, to be carried without spilling the fluid.
Medal of Special Award, by the American Institute, to JEROME KIDDER, M.D., for the best Electro-Medical Apparatus yet invented.
PATENTED
DR. JEROME KIDDER
INVENTOR
NEW YORK.

Dr. Jerome Kidder's Electro-Medical Apparatus (No. 5) has four differently conditioned coils, each arranged to use them in various combinations, producing ten different qualities of electricity.

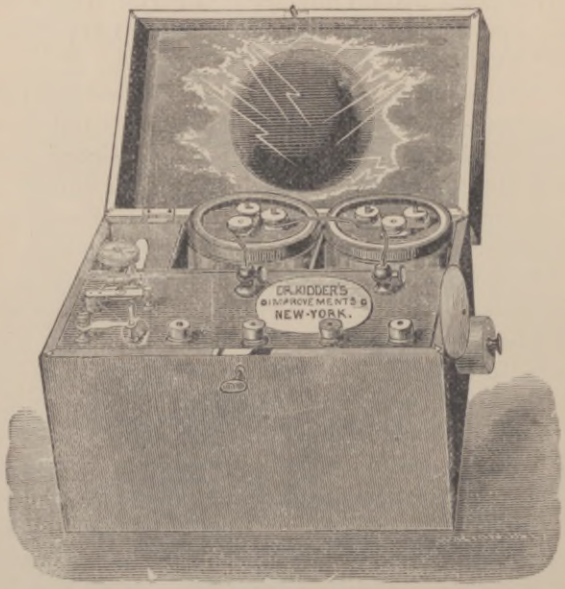
The ten different qualities are as follows: First, AB; Second, AC; Third, AD; Fourth, AE; Fifth, BC; Sixth, BD; Seventh, BE; Eighth, CD; Ninth, CE; Tenth, DE.

"The common electrical machines are made on the principle of simply producing power. Those have only two helices and two currents, the inner helix being always a necessity for producing the current on the outer helix, which has too often been considered valuable in proportion only as it was good to hurt.

"How would such a rule apply in buying a musical instrument? What would you think of a person who would select a piano solely from the amount of pain its noise could give the ear, or of the finish of the case? Do not all persons carefully regard the quality of music is capable of offering to the human ear? Also, what would the most costly piano be worth if its strings were not tuned in accordance with the philosophy of the octaves, diapason, and diapente, within the degrees recognized by the human ear? How important it is, then, that an electrical machine for remedial uses should have the *pitch* of its currents not only sufficiently definite and varied, but also to harmonize to meet the wants of the vital nervous system when used for the treatment of disease?"

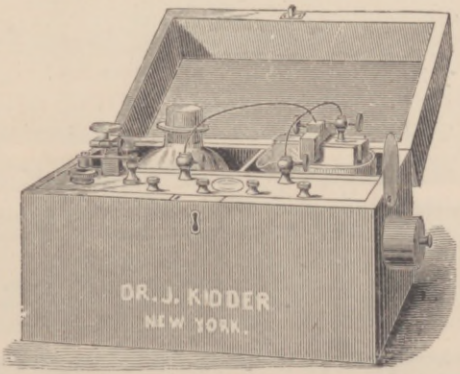
Large Double Battery Physician's Office Electro-Medical Apparatus, having ten currents, by varying

the combinations of four differently conditioned coils, with current-changer to reverse the direction of all the currents. This machine has five posts, and arrangement to throw the second coil also into the primary circuit, but these are not shown in this engraving.

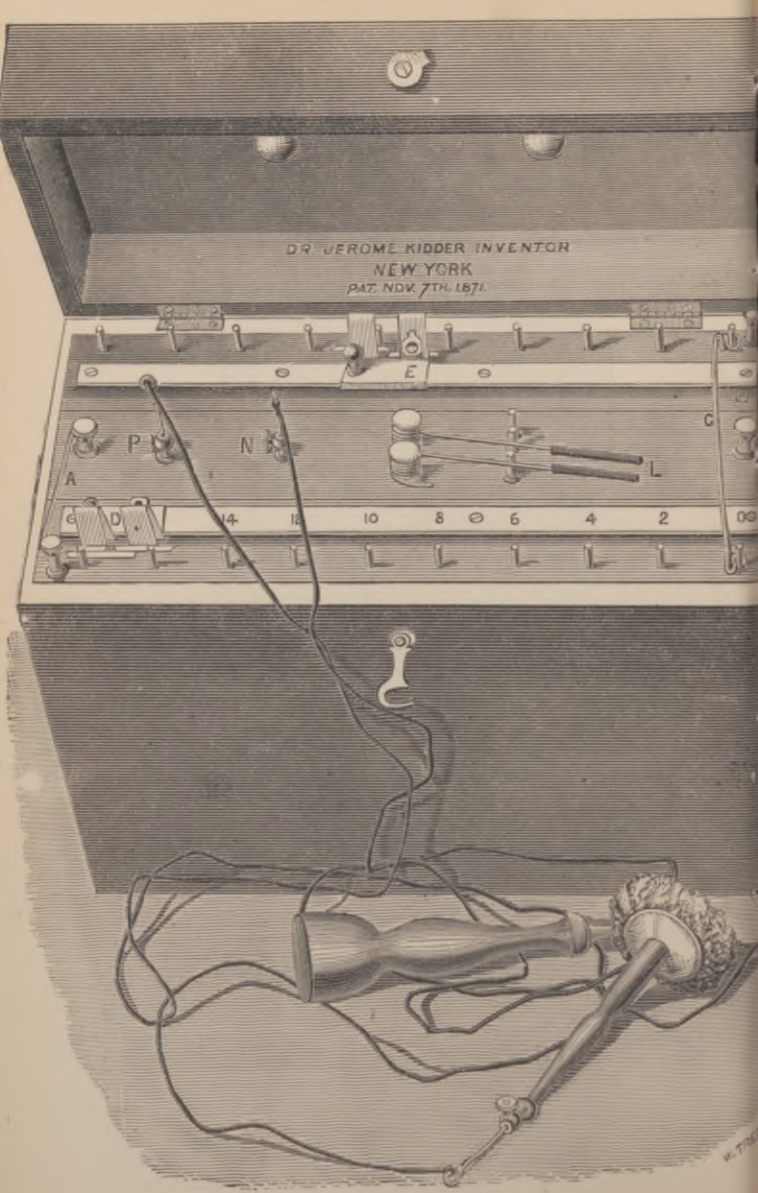


No. 2.

No. 2. Physician's Office Machine, with three coils of pure copper wire, each succeeding coil from the first being of longer and finer wire, and arranged so as to produce six qualities of electricity. Patented in the United States, England, and France.



Six-current Electro-Medical Apparatus in more compact form, for Family use. Single primary coil. Three differently conditioned coils, used either separately or in combinations. Polished walnut case, 7½ inches long, 6 wide, and 6¼ deep. A smaller apparatus is manufactured for the convenience of travelers.


DR. JEROME KIDDER INVENTOR
NEW YORK
PAT. NOV. 7TH. 1871.
E
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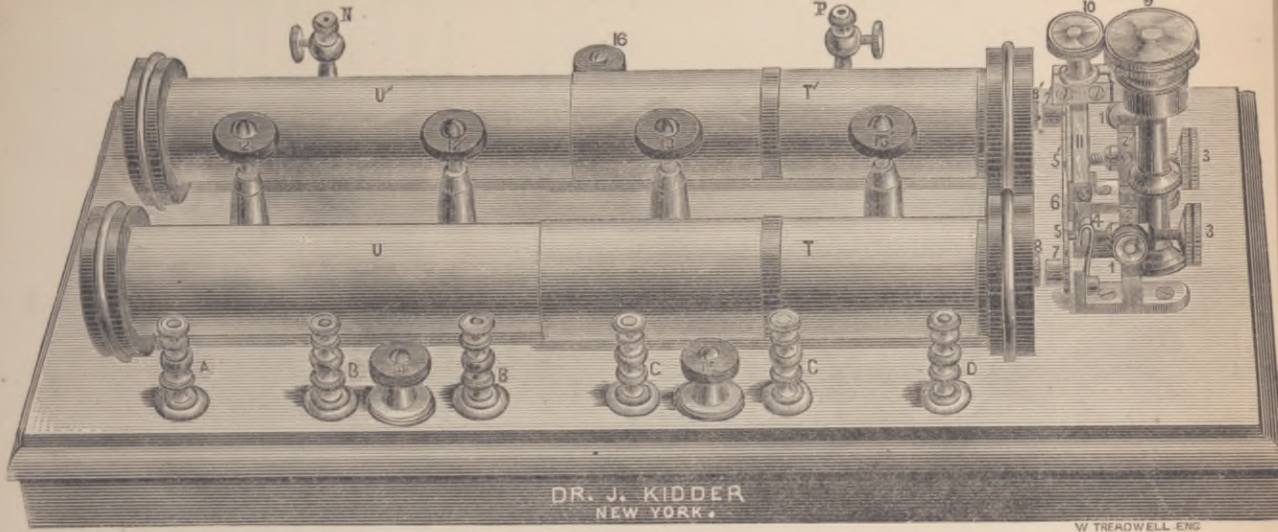
DR. KIDDER'S IMPROVEMENTS IN CELL BATTERIES.

This illustration shows the 18-cell battery with the convenient manipulators of the current. D and E are metalic slides, each having two springs to connect with the poles of the cells. There is a key to lock one of the springs, so as to hold it away from contact with the poles; and when so withdrawn, the current is interrupted as the slide is moved to add or diminish the number of cells in the circuit. But when it is desired to increase or diminish the intensity *without interruptions*, as when using needles to discuss tumors, etc., both springs are allowed to touch the poles as the slide is moved. The current passes when the springs of the slide touch a pole. The levers L touch, *one* the middle and *one* an outside pin of the three in a row where the levers swing. When the levers are brought forward to bear against the middle and front pin, then the screw-cup P is positive and N negative. But if the levers are placed to rest—the front lever against the middle pin and the back lever against the back pin, then the direction of the current is the reverse. In either case, touching either one of the levers so as to break contact with the pin, interrupts the current. Placing the levers between the pins and swinging them backward and forward so that they synchronously touch alternately an outside pin and the middle one, throws the current rapidly and alternately in opposite directions.

The spring wire C is placed so as to connect the

front row of elements with the back row. This wire can be placed across at any opposite poles, thus leaving out of the circuit all the cells at the right of it, and the current is received from all the cells between them and this crossing wire; thus it will be seen that any consecutive number of the cells desired can be brought into the circuit. This battery is now made so that the wires A and B are not needed, and are therefore omitted.

The arms projecting at the ends of the box are to raise the tray of cells to immerse the elements for use, *which are to be lowered when not in use.*



EQUAL ALTERNATING CURRENT APPARATUS.

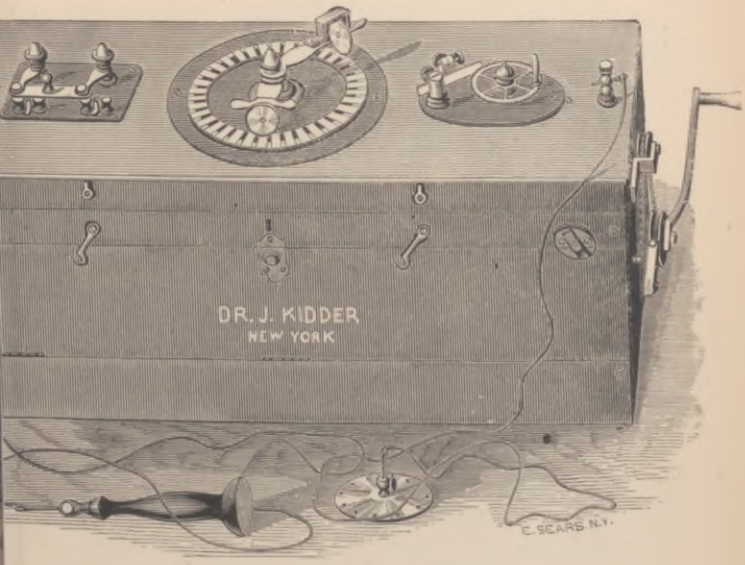
EQUAL ALTERNATING CURRENT APPARATUS.

It is well known, or should be, that the INITIAL CURRENT of the so-called alternating induced current, which has in some instances been called "to and fro," is very weak—not perceptible to the sensation under ordinary circumstances—while the TERMINAL CURRENT produces muscular contractions, etc. The fact that the INITIAL induced current is comparatively so weak, has been noticed by various writers; AND IT CAN BE PROVED by controling the vibrating armature with the thumb and finger, so that we may know when the circuit is closed and when it is broken, the electrodes being in the hands.

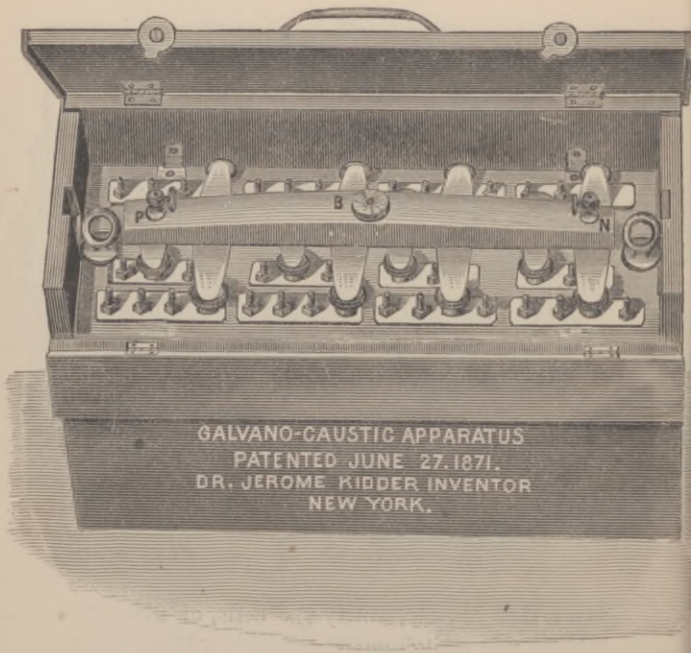
Dr. Kidder patented in 1866 an extra apparatus, entirely unique, by which EQUAL alternating currents are produced. It is accomplished by means of TWO SYSTEMS of helices, their circuits ALTERNATELY being closed and opened by means of a double-armed vibrating arrangement; and the currents are properly represented thus:

Currents of equal power succeed each other in opposite directions; also, the power of each may be varied at pleasure. This apparatus has also many different qualities of currents. The same quality of current showing light to the eye, shows more light when equally alternating than even the negative does when the terminal currents are all turned in one direction, which may be done simply by moving a small knob.

Secured by patent in 1866.



Primary Cell Battery, thirty-six cells, of the larger size, with double switch current reverser, wheel interrupter, and the great circle with wheel-armed compound switch to elect any consecutive number of cells, and also to increase or diminish the number, either with or without breaking the circuit, having also a new patented arrangement added to change the condition from great intensity to great quantity for galvano-cautery. This battery has crank and pulleys to raise the cells to the elements; is in a polished mahogany case.



DR. KIDDER'S IMPROVED GALVANO-CAUSTIC BATTERY.

Patented June 27, 1871.

The most perfect, convenient and practical Caustic Battery.

The elements, consisting of zinc and carbon, have 672 square inches of surface. By means of placing a wooden bar, having metallic springs attached, the eight cells are virtually throwr into four, using all the sur-

face. They can also be thrown into two, or one, by springs suitably attached to a bar for the purpose. Arranging them for the higher quantity, they will heat a shorter and thicker wire, and for the higher intensity will heat a longer and finer wire. The box is 14½ inches long, 6 inches wide, and 11¾ inches deep.

Large size for office, having upwards of 4,000 square inches surface.

PART II.

THE RATIONALE OF CURE.

ELECTRICAL DIAGNOSIS.

THE office of electricity as a diagnostic is only beginning to be appreciated. Indeed, no less a practitioner than Doctor Tibbitts, author of a book on medical electricity, limits this office far more closely than the facts warrant, viz.: to the mere distinctions between the several forms of paralysis, by the comparative effects of galvanic and Faradic currents. These are indeed of capital importance, both in diagnosis and treatment, and may as well be stated here in brief, after which a wider range of view may be profitably taken. To begin with, muscles and nerves are normally responsive, to some extent, to all varieties of electricity. Deficient or excessive response argues a corresponding nutritive and functional activity.

The object, then, is to obtain the vital response to the currents, in the forms known as electro-sensibility and electro-contractility.

The activity of the battery being always known, the

vital response is measured, either by similar portions of the patient's sound parts, or those of another similar person. The ball of the thumb is a good test-point, and the operator ought always to test any current first upon himself.

Paralysis from centric lesion is found to be nearly always attended with diminished reaction to all kinds of electricity.

Paralysis not involving centric lesion gives increased response to galvanism; decreased to Faradism. This is gradually reversed as cure progresses to the normal state. The former is slowly interrupted by successively removing and replacing the electrodes, at regular intervals, or otherwise. The disease is, in this case, often in the nerves themselves, or in tissues adjacent to them.

Lead Palsy, in which slight spinal lesion exists, but the nerves are sometimes reduced to a mere fibrous cord, or at least in a state of fatty degeneration, and muscles also degenerated, is an instance of such eccentric paralysis.

"*Essential Infantile Paralysis*" has the same reactions.

Rheumatic Paralysis responds to both galvanism and Faradism, normally or excessively.

Cerebral Paralysis is not, in the same sense as the spinal, of a centric character at all; hence its reactions differ, under all forms of electricity. Usually, these are normal; or rarely diminished; or, in cases of early rigidity, with still existing irritative lesion, may be augmented.

Hysterical Paralysis has diminished electro-sensibility and normal electro-contractility.

"*Progressive Muscular Atrophy*" has partial abolition of Farado-contractility, proportioned to the number of affected muscular fibers.

Feigned or Doubtful Paralysis may be absolutely determined upon by reference to the foregoing.

LOCAL ORGANIC DIAGNOSIS.

Irritation and *Paresis* of organs are sought for, by placing the poles successively over them. Sensibility and contractility are increased with the former; decreased with the latter. Of course, the current must be so directed as to traverse the organ examined. The former is sometimes spoken of as a positive state; the latter as negative, and require the influence of opposite poles and currents; the former *from* the part, or *through* it; the latter, *to* it.

Local Irritation, not very deeply seated, often displays after a few minutes, circumscribed cutaneous redness; this is often seen upon the spine, after applying the sponge electrode. (*Dry metal* may do the like, anywhere.)

SPINAL DIAGNOSIS.

The negative pole being at the feet; the positive, with sponge-electrode, at the spine, tender or insensible spots may be found. The former may be due to local trouble, obvious to examination, especially in the production of cutaneous redness, by electricity; *i. e.*, even with wet sponge. If not so, the cause will

probably be discovered in the outlying viscera, etc.; as ascertained, for instance, by Keen's Flowers' Nerve Charts. Insensibility may also be purely local, or sympathetic. Both indicate the curative applications.

CRANIAL DIAGNOSIS.

In like manner, but more marvelously, it has been abundantly shown in the long experience of the author that different localities about the head also correspond with internal viscera, etc.; and that even the precise *nature* of the trouble can, by the different sorts of pain elicited by the electric touch, be defined with an accuracy quite transcending the ordinary diagnostic methods, and at a stage in which disease utterly eludes those methods, in many cases.

All attempts heretofore to make known this really important discovery have subjected the author to abuse, as might be expected. But, waiving all such considerations, the discoverer hopes to put it within the power of every scientist and physician to avail himself of its aid; as soon as the proper charts can be perfected, assured that whilst pride may scoff, as always, yet wisdom shall still be justified of her children. All she desires is, that, in the absence of ordinary corroborations of a given diagnosis by this method, the Electro-Therapeutics at least when possible shall be guided in such case, by its indications.

DIFFERENCE IN ELECTRICAL CURRENTS.

The "ten currents" of a full sized battery of Kidder's manufacture are as follows: AB, AC, AD, AE,

BC, BD, BE, CD, CE, DE; of augmenting tension, as the negative is removed to the latter posts; and besides a lessening portion of the primary flow, as we proceed from left to right with the several pairs of posts. Each of these grades, as before stated, has its own definite physiological affinities, some of which are very appreciable to our senses. Also, in a general way, we may say that functional stimulation is most marked in connection with tension; nutrition, with that condition which is called quantity.

Some of the leading properties of these currents may be enumerated as follows:

AB, has been familiarly called the anodyne current; the styptic current (used direct), the tissue current, (rousing from nutritive inertia, and a benumbed life, into capacity and readiness) the *magnetic* current.

AC, the nerve current *used for pain;* also for soreness, and for nervousness, sleeplessness, etc.; anæsthetic, or the opposite, according as used direct or reverse.

AD, the muscle-current; the forcing current; the "running-off" or eliminative current; the bath current, generally used to complete a treatment for disposing of morbid material—after BD. (See BD.)

AE, shock! nervousness with cold surface; (used, base of brain to feet, and stomach to feet), insensibility to other currents.

BC, the blood current; acts on the sanguific function; also on the circulation; ordinary styptic when used reverse.

BD, the connective-tissue current; having special affinity for the general tissue framework, and for arteries,

veins and ligamentous tissues, and humoral elements, of subjective or objective origin; the "breaking-up" current—(retrogressive) stimulant febrifuge; anti-congestive.

BE, (reversed) the main styptic current; also, powerfully anti-phlogistic (direct.)

CD, permeating, as in purulent accumulations internally.

CE, absorbent including veins and lacteals; warming current, in paralysis, in *coldness* of substance and surface, without chilliness; (if "cold stomach," or if gastritis, C in plate No. 5, vertical, E in plate No. 8, to trans-lumbar region—below kidneys.)

DE, warming current; in sensory motor paralysis, with coldness; (used in alternation with BD and AD, if restless and sleepless, also with AC) digestive currents.

Thin brass plates are commonly preferred as electrodes, wrapped with soft toweling, wetted and covered with rubber cloth. They are of the following sizes: No. 1—1½ × 3¾; No. 2—2¾ × 3¾; No. 3—1¾ × 5½; No. 4—3⅛ × 6¾; No. 5—2 × 11¾; No. 6—4¼ × 11⅞; No. 7—8⅞ × 9⅞; No. 8—10¾ × 11½. They will be hereafter referred to by numbers. (See diagrams of plates.)

Treatments are to be repeated as needed; acute cases every half to three hours until better, chronic cases at first daily or oftener—afterwards less often.

It is a mistake sometimes made, to suppose that either pole may be applied indifferently to a diseased part, or that the direction of the current is of no con-

sequence; or, that the variety of currents here insisted on, is unreal, or is a mere difference of strength. True, in the electro-muscular gymnastics, in cases of paralytic wasting, so fully elucidated by Duchenne, the individual muscles, being acted on by simple localized currents primary or secondary, may respond to these, and as they proceed indifferently from whatever direction, but in every other case, especially in allaying inflammation, and the correction of morbid tissue—change resulting therefrom, the precise rules as to poles, direction and choice of currents, as hereinafter laid down, are of *prime importance.*

This statement must be made emphatic as to the discriminating and individualizing use of the multiple-current battery. And just here it must be remarked, first, that every general rule herein given involves a principle of extended applicability; and secondly, that individual cases, which are never identical, must always afford full scope for a wise and skillful variation of these general directions, in order to attain the full curative result.

The properties accredited to the several currents of this battery are to a good extent appreciable by the senses; *e. g.*, the action of AC on the sensory, and of AD on the motor tissues, etc. Much clinical experience corroborates these and other qualities ascribed to these diverse combinations, of quantity and tension, and of the primary and secondary currents.

In the inception of electric practice it is quite possible, as in other methods of treatment that disappointments may be met with. In every such case, it will be

well to reconsider the plan, and in so doing, discover the fault—which will often be found in the scheme or execution of the treatment itself. As usual the patient may have trangressed, and with the aid of cranial diagnosis, or otherwise, this must be ascertained. Meteorological causes may also be found. If these give no clue, then—

First of all, consider whether the manipulations were not of too long duration. Aggravation of original, and even additional symptoms, often proceed from this cause alone. Ten minutes—twenty minutes—rarely over thirty minutes, will be the proper time. Fatigue is ominous of a bad effect. The patients must not delude themselves with the idea that a long treatment is proportionately more effectual.

Secondly. An excessive strength of the proper currents. Immersion of the part in water; increasing the distance between the electrodes; light pressure; with the regulation of the cylinder, control this. Generally the feelings are a good guide—keeping outside of the limits of actual pain.

In this latter event, local symptoms may speedily arise or be aggravated.

Thirdly. Wrong choice of currents, as the use of BD in cases of great *soreness*, instead of AC. The aggravation of this symptom will tell the story; the right use of the right current, or the electric vapor bath, may remedy this.

Sixthly. Local, excluding general treatment, in cases requiring the latter. The development of new troubles is here probable; also, the speedy return of

any which may have been ameliorated. The electric vapor bath here finds place.

Fourthly. Wrong direction of currents. If the patient suddenly sickens under treatment, change the current immediately, to the opposite flow. In plethoric states, an upward current to the head may cause apoplectic and paralytic symptoms. In old paralysis, the opposite direction may aggravate. *Morbid matters* should be invited by the negative to some outlet.

Fifthly. Application of the wrong pole, in any given locality, irrespective of direction. Thus a negative or paretic stomach resents the action of the positive pole, etc.

PARTICULAR MALADIES—MANIPULATIONS.

A general rule is, that the currents, when not otherwise distinctly stated, are to be given "direct" (that is, down the nerves,) or downwards, in some other way —as "through and through,"—the positive pole above the negative pole.

GENERAL DEBILITY—DEPLETION OF NERVE-POWER—LASSITUDE.

Electric vapor bath, with the stimulating current, BD, ten to fifteen minutes. This causes a quiescent condition, superior to the pre-existing lassitude; for the time, you have "equalized the forces;" now, let him go to sleep, and sleep as long as he can. On waking, have nourishment ready, such as a bit of juicy beef or mutton. (Often such patients are also dyspeptic.)

Then, lying down, the following treatment for digestion: D positive pole, plate No. 3, longitudinally on lower half of sternum; E negative pole, plate No. 4, across sacrum, ten minutes. Now, place D in hands ten minutes, causing the thoracic organs to sympathize with the abdominal, in functional stimulation. In *no case* should a full electric treatment be given when the system is suffering from want of food, until this be remedied, if possible. Even eating a cracker may suffice. But a full stomach may deceive, likewise attention should be given to evacuate the bladder before treatment. These observances constitute the rationale of any treatment.

SCROFULOSIS.

This is to be corrected by a persistent daily treatment with the "blood-current" BC; B positive, basilar or between the hands; C negative, to feet or lower legs; using plate No. 1 for the basilar region, plate No. 6 for the legs, the foot tub or plate No. 7 for the feet. Unless specifically stated otherwise, all currents are understood to run downward; that is, are "direct"—the positive above and negative below. The upward are said to be "reverse;" or, the negative above and positive below.

SUSPENDED ANIMATION.

Currents AD, BD, CE, poles at base of (occipital) brain, and at lower extremities, as follows: First, AD; *apply the positive* (as in a large number of other cases), by means of plate No. 1, enveloped in a wet

cloth, and covered with rubber cloth externally. The hair being also wetted, the contact is maintained by the weight of the head on the pillow, or by a strip of bandage round it.

Apply the negative D to the feet, by means of a large sponge on large plate, or on ordinary cylinder electrode. (This is a very common position also, in a variety of cases, as is likewise the following.) In some cases it is more convenient, and it is of like effect, to place the long broad plate (No. 6) under the legs and the calves, the recumbent posture being thus suited. (When the phrase "*basilar to lower extremities*" is used hereafter, the foregoing positions are to be understood.)

In some instances—drowning especially—the patient is to be placed with the face downwards, hence the necessity of fastening on the plates by tapes, or bandages.

Whilst the current is thus running, the cylinder is to be frequently, and at regular intervals, and quickly, drawn out and returned, giving repeated vibrations.

Second. When response is obtained, B to stomach, plate No. 3; D to coccyx, plate No. 8; afterwards elsewhere, if specially indicated. Third. CE, as for chills.

SHOCK—COLLAPSE.

As for suspended animation. In all cases, when the patient responds sufficiently to complain of coldness, use for chills the "warming current" CE, and change to the following, after using the others as required.

CHILLS—OF ALL KINDS.

Current, CE.

First. C basilar to E epigastrium, five minutes.

Second. C hands to E epigastrium, five minutes.

Third. C basilar to E lower extremities, five minutes.

Whenever the "epigastrium" is thus named, the No. 3 plate is to be prepared, and one end placed on the lower end of the sternum, so that the other reaches over the triangular space below.

When a pole is directed for "the hands," a small plate, prepared, is pressed between the open palms; or instead, a large plate, prepared, is laid on a rubber cloth, on the patient's lap, when sitting; or if it be a child, the operator may have to hold the (positive) electrode in his left hand, and its palms upon his own right, in deference to its timidity.

These positions frequently recur.

CONGESTIVE CHILLS.

Currents. BD, in general until there is an amelioration of the congestion, wherever it be; then CE, to restore the temperature, as above.

If the congestion be *cephalic*, B basilar D to feet.

If the congestion be *pulmonic*, as for pneumonia, *i.e.*, bath and B base of brain D in foot tub, then C to base of brain E in No. 4 plate to hypogastrium. For fuller directions, refer to Pneumonia.

If the congestion be *hepatico-splenic*, B in plate No 3 at basilar, with D in plate No. 6 across these organs

diagonally from the navel slanting to the left, will thus implicate the liver, spleen, and lower part of the bowels.

If the congestion be *gastro-enteric*, plate 7, upon abdomen with current D and plate 3 at base of brain, with current A ten to fifteen minutes, then place the D current to the *feet* and the A below the sternum for ten minutes longer. Other conditions must be regarded.

If the congestion be *choleraic* (*vide* Cholera.)

FEVER.

If the disease be febrile, the first and universal indication is to break it. This may often be realized within five to ten minutes; rarely need it take longer than twenty.

Currents, BC, AC.

First. B basilar, C lower limbs ten minutes.

Second. If not better at expiration of this time, change to AC, and continue until successful. In any event, end with AC current, applied for five minutes.

Third. If not very urgent, allow a little respite; if local affections exist, and the case be urgent, proceed at once to treat them according to the nature of the lesion, as directed under the appropriate heads.

Repeat these treatments, in order, as often as required by the return of symptoms, every few hours, or once or twice a day, more or less, as in all other acute cases.

In preparing the plates used in the treatment of fever, hot cloths are necessary.

In some cases, the following routine may be required:

First. BD, base to lower limbs. In five to ten minutes, a moisture may be expected to appear on the surface, along with a more reasonable pulse. Then,

Second. BC (the blood-current) poles as before, five minutes. Then,

Third. From lower half of sternum, No. 3 plate, placed on and parallel with the bone, with positive B; negative C to the inter-renal space, with No. 5 plate, up and down the spine; thus "implicating" organs in the current, which often are in fault; about fifteen minutes. This will reduce the pulse almost to the normal standard; and during the process the patient may go to sleep. The conducting strings may now be simply detached from the machine, and the sleep encouraged. On waking, or on the rise of the fever, in serious cases, as yellow fever, etc., re-attach.

Fourth. If headache be left after treatment, apply BD, base to lower sternum and epigastrium, with the No. 3 plate for the latter, as above. An extra conducting string may be at hand, if thought more convenient, not displacing that going to the spine, which is now simply inert.

If any organ be involved other than the head, the digestive system, etc., being already acted upon, occupy a few minutes at the close of the treatment, with the procedures suited thereto; making in all a course of thirty, NOT more, minutes.

SEVERE INFLAMMATION IN GENERAL.

This must be rapidly overcome; the "weak side" of the machine being first tried, and the current graduated to tolerance (as in all cases) usually, more or less complication may be expected; in which case, the several indications must be successively, or, if practicable, simultaneously met.

Thus, for example, we will suppose a bad case of dyspepsia, with hæmorrhoids, to be aggravated into a violent inflammatory condition. The typical course of treatment for such a case would be, as usual, to attack the most distressing part first. This may be the hæmorrhoidal trouble. If so, proceed thus:

First. Current BE, reversed; positive B, with rectal electrode; introduced, after being lubricated with fine soap or glycerine (as with all similar electrodes;) negative, E, to lumbar spine, with No. 3 plate ten minutes. This reduces the piles. Then,

Second. B, with plate No. 7, applied across abdomen; E, plate No. 4, up and down sacrum; ten minutes; the cloths being as hot as can be borne.

Third. B, with No. 5, applied from sternum to pubis; E, as before; ten minutes.

Then rest; repeating as often as aggravation recurs.

If after electrical treatment soreness appears in any case to have been induced, a few minutes' treatment with AC will antidote it. If

SLEEPLESSNESS,

the electric vapor bath; or, lacking this, we may, when organic affections are the manifest cause of

great sleepnessness, find the following treatment effective:

BC base to bends of knees; "strong side" fifteen minutes. C may, instead, be placed across the loins, below the kidneys. A yet simpler application (same current) is from base to hands; "weak side;" fifteen minutes.

"NERVOUSNESS."

Although a mere symptom, often renders individuals who may suffer from diseases of varied character exceedingly uncomfortable, and is thus prejudicial to speedy recovery. It may appear as local or general irritability, or may even be a product of active electrization, disturbing the functional equilibrium. In such cases, benefit will accrue from AC, run from hands to the negative in same position as before. Any faulty electrization should of course be remedied, either by changing current or addressing different locations.

If a child be cross, irritable, wanting to be let alone. BC, base of brain to feet, ten minutes; to hands, five minutes. If an adult, AC instead, to same parts, five to ten minutes' longer duration. If abdominal discomfort, base of brain to abdomen, ten minutes; base of brain to feet ten minutes. In either case, end with base to hands, five minutes.

INTERMITTENT FEVER.

Treat the paroxysm as aforesaid, chill and heat. During apyrexia diagnosticate the local troubles accu-

rately, and proceed to treat them as such. The electric vapor-bath will *hasten* the cure, as it does in so many other cases, acute and chronic. If correctly managed, the paroxysm seldom occurs more than once: *vide* the local diseases.

REMITTENT FEVER.

Treat the pyrexia as aforesaid; afterwards, the local affections, which are rarely very obscure; and lastly, the general debility, so commonly its sequel. With good nursing, and such repetition of treatment as the symptoms may demand, a speedy recovery may be expected.

Malignant remittent, or congestive remittent, or typho-malarial fever requires like procedures, but more frequent repetition, in order to break up at once the morbid state.

Life is often terminated within a week in serious cases, and no delay is to be thought of. The local congestions resemble those observed in "congestive chills"—which see. The difference may lie simply in the febrile heat, which, though unequal, may be high over most of the body.

CONTINUED FEVERS—TYPHOID.

Fever-Typhus. Treat pyrexia as in other cases, then the local troubles, as ulceration, diarrhœa, hæmorrhage, etc., as for the same maladies otherwise caused. The vapor bath is to be guardedly employed, if needed, remembering the debility existing in many cases, and give a quick tonic, both not to exceed ten minutes.

ULCERATION.

B, with plate No. 6, across umbilicus and below. D, with plate No. 3, at coccyx, fifteen minutes. For remaining soreness A basilar, C, with plate No. 6, located as above ten minutes. Repeat, once or twice a day, meeting other indications instead, if needful at any time of the second daily extra treatment; but aim, in all, to implicate the affected parts, in whatever manipulation may be used.

STUPOR.

If in a child, or very delicate nervous person, AC, base to lower extremities, until ameliorated, say ten to fifteen minutes. If in a usually robust adult, AD, in the same manner.

HÆMORRHAGE.

B at base, C over the right iliac region, with plate No. 2 (this being the supposed origin of the flow.) The principles of this application are to be observed in *all kinds of hæmorrhage.*

BE reversed, however, being potent in paretic conditions of the blood vessels and where the former fails.

DIARRHŒA.

Reversed D No. 4, with B No. 8 from coccyx up, or sitting on sponge, enclosing cylinder electrode and D in No. 6 across upper abdomen, ten minutes; across lower abdomen, ten minutes.

YELLOW FEVER.

Have disinfectants in room, keep patient warm. B in sponge-cup rubbed over the gall-bladder across to

stomach, with D in No. 4 between the kidneys, fifteen minutes. Change immediately to D in No. 3 over epigastric or stomach, and E in No. 8 at coccyx, ten minutes; place the feet in *hot water* with electrode D and B in sponge-cup; knead the bowels fifteen minutes. The treatment must be persisted in and the patient must have perspiration, induced through the use of a regular or improvised vapor bath daily. Drinks of lemon juice and brandy may be administered constantly, and the entire body bathed in lemon juice. Hot applications constantly made to the stomach and bowels, and the mouth swabbed out with a solution of chlorate of potassa. The bowels should be evacuated soon as possible, and an enema of the white of eggs and sulphate of zinc, weak dilution, administered after each *movement.*

ERUPTIVE FEVERS.

In all these the treatment is of two parts, whose underlying principles are identical, viz.:

First. General anti-pyrexial.

Second. Local.

For initial chills, collapse, or convulsions, treat as in like conditions otherwise caused.

For fever, as before directed. Then,

For local affections, as directed under their respective headings.

The electric vapor bath is here extensively useful, under both general and local indications.

MEASLES.

When first symptoms, watery eyes, rasping cough and

fever commence, regulate the temperature of the room, average 75 degrees.

B, at base of brain in sponge-cup.

C, from coccyx of the spine in No. 5 plate, fifteen minutes. Then place

A in No. 1 plate on throat, and

C under the soles of the feet, strong enough to be perceptible to patient, fifteen minutes longer.

Repeat treatment three times daily.

Administering a vapor bath with A at the base of brain and down the spine during the malady.

Careful to keep the patient out of draughts.

SCARLET FEVER.

When the throat is very much ulcerated, a gargle should be used frequently of lemon juice and alum, and a crumb of chlorate of potassa kept in the mouth constantly to keep the putrid condition allayed, then the treatment should be antiphlogistic. B in plate No. 4 below the sternum across the epigastrium. D in plate No. 8 from coccyx up the spine, fifteen minutes, then D to the feet ten minutes, then change to A base of brain in No. 1 plate and C under the hands, ten minutes, place the patient soon as possible in a bath, and keep the body bathed with juice of lime, containing a mere trace of bi-chromate of soda.

The bowels should be kept free. Should the throat get very sore, apply C in the spatula to the tongue, and A with sponge-cup, rub forward on both sides of throat five minutes.

Treatments given every hour, until change for bet-

ter, unless the patient sleeps. Quiet, and an even temperature, *must be observed* in the apartment of patient. Children in household kept out of the room, and preventive measures taken to keep off the disease.

CATARRHAL FEVERS—INFLUENZA—COMMON COLD.

First. The electric vapor with AD, as usual, which may dispose at once of the whole trouble. Repeat once daily. If any local affection remain treat accordingly, at another period of the same day, extending intervals as improvements go on.

Should the pyrexial symptoms be very severe, premise or at first supersede the above, with the treatment suited to them.

RHEUMATIC FEVER—ACTUE RHEUMATISM.

If the fever symptoms be permanent, reduce them as already directed. The more conspicuous troubles are then to be treated as presently shown, and finally, without exhausting the patient by a too lengthy and continuous manipulation. Therefore after sufficient rest, a careful diagnosis (cranial or other) should be made, to determine the existence or not of visceral lesion, particularly of the heart, and not forgetting the liver. Such lesions, when ascertained, are next to be dealt with, repeating either process as indicated from time to time.

In this affection, one is easily tempted to do too much at once, as each affected region successfully seems to demand full treatment; and it will therefore be all-important to proceed with patience, and frequently to

recur to such generalized treatments—tonic, soothing, or otherwise—as may be indicated; or even to give antidotal currents in reverse, avoiding a direction from badly affected joints, etc., to the central vital organs. Nourishment must also be cared for. Neglect of this *systemic need* is certain to lead to bad results, not only in this disease, but in all others. The physician who is guilty of it will soon find himself disgusted with electro-therapeutics.

With this principle in mind, treat the *upper extremities* as follows: First. BD, negative in a tin basin, with the hands immersed; or, the hands laid down on a prepared plate, or rubber cloth on the knees or elsewhere, according to convenience; positive, with sponge-cup, to be moved repeatedly over the affected region, always *downwards*, say twenty minutes. Repeat as needed. Second. After three such treatments, in a bad case, it will be required to use AD, in like manner, for the last half of the time of each manipulation; twenty minutes, all told, being a fair time for one limb.

The *lower extremities* are to be treated in a similar manner; the feet resting on a large sponge on electrode, or a large prepared plate, or in a tin foot-tub, with the electrode immersed.

The spine may be treated, if involved, thus: with the negative at coccyx (sitting on a sponge with contained electrode, or otherwise), or held (for the upper spine) in the hands; the positive is to be applied to this region by means of a prepared plate reaching over the affected region; or, if necessary, by the sponge-cup, moving from above downwards repeatedly.

Affections of the HEART, LIVER, STOMACH, etc., are treated as directed under the head of Inflammations; a portion of the time of each treatment, or alternate treatment, being devoted to this purpose.

CHRONIC RHEUMATISM.

(See Affections of Joints.)

Lumbago, Myalgia, Muscular Rheumatism, etc.

BD, fifteen minutes; AD, ten minutes; varying, if much tenderness, with AC. Negative, applied to distal point, as the coccyx, the hand, or the foot. Positive, in sponge-cup, moved downward over the affected part, avoiding the lungs and heart. If these sympathize, see "Inflammations." Use the electric vapor-bath frequently.

SCIATICA.

Treat with the same currents as in acute rheumatism, varying the manipulations so as to operate mainly on the tract of the affected nerve and its distributions, and using the electric vapor-bath frequently.

In all these, as always, treat the complex states met with in practice, in the order of the severity of the distress to which they give rise.

CEREBRO-SPINAL MENINGITIS—SPOTTED FEVER.

Treat chill and fever as usual.

Sponge-cup with C down the spine. E in electrode covered with sponge, pressed up against the coccyx, if the patient is unable to sit up, otherwise have him sit upon E, in No. 7, fifteen minutes, then change to D,

in No. 2, at base of brain. E, in No. 5, from coccyx up, fifteen minutes. Every other day administer vapor bath — not too hot, or too long — with D in foot-tub, and A at base of brain and down the spine. After bath administer A at base of brain, and C, electrode in the hands, five minutes. Concomitants must be addressed.

VERTIGO

is usually a symptom of gastric derangement, in some cases, of cerebral or other nervous diseases. The nature of the trouble being known, treat accordingly. The cranial diagnosis will enable the physician to proceed with confidence.

If gastric, treat as for dyspepsia, *i. e.*, BD basilar to œsophagus, No. 3 fifteen minutes; also, two or three times a week, the electric vapor-bath with AD.

After this, if necessary, treat further thus: place the patient in recumbent posture, with B at basilar region; B in No. 6 plate at lower extremities; then (after ten minutes) transfer the negative to the hands five minutes, by which proceedings the blood-pressure is equalized. A vapor-bath every other day may often be preferred for the same purpose, until improvement sets in.

If cephalic affections cause vertigo, apply C to coccyx, the physician holding A in his left hand, and moving his fingers about the wetted scalp ten minutes, guarding against aggravation, and against faintness, nausea, etc., from excess, even reversing the current, if not better on desisting. Follow with BD, base to lower limbs fifteen minutes.

In all cephalic electrization, caution is necessary. Faintness, congestion, etc., are, with vertigo itself, warnings sufficient; apoplexy, convulsions, or paralysis, may be the penalty if these be ignored.

After improvement is secured, let the baths be less frequent, other treatments superseding them.

HEADACHE—NERVOUS, GASTRIC, ETC.

Nervous Headache.—AC, base to hands fifteen minutes. (Amelioration will be secured within five minutes.) After three such treatments (aiming at radical cure) apply the same, from base to coccyx, three or four treatments. If the lower extremities be left "nervous," then apply from coccyx to feet.

If very decided soothing measures be demanded, and especially if *sleeplessness* be a prominent complication, give special attention to it by using,

First. CE, base to feet ten minutes.

Second. Long broad plate (No. 6), with C across the epigastrium; E, with No. 4 plate across the lumbar region ten minutes.

Third. Transfer C to hands five minutes.

Abbreviate if not needed in full. Be sure, in all cases of visceral disease, to "implicate" in the flow the morbid organs; in some cases even applying the negative thereto with the positive basilar.

Many cases of nervous headache need only twenty minutes' treatment, half the time from base to the feet, then base to hands.

Localized Affections causing headache. B, basilar;

D, with No. 1 plate, to termination of sternum twenty minutes. After three or four such treatments there may be considerable soreness, then use AC in the same manner, instead of BD.

SICK HEADACHE.

Rarely begin with head treatment, but rather address the stomach. For the attack,

First. B, positive, with No. 1 plate, upon and parallel with ensiform cartilage lower end of sternum; D, negative, No. 4 plate, to lower trans-lumbar space; ten minutes.

Second. B transferred to "base;" five minutes.

Third. Give the treatment for "General Debility."

For *radical cure*, treat daily, at first, as above; but changing the negative to the feet, as the third step, giving also ten minutes to each; and, fourthly, the positive in the hands, five minutes.

After treating thus for one week, vary as follows:

First. B, positive base, D negative, to lumbar region; ten minutes.

Second. A, plate No. 3, positive epigastrium, D, plate No. 7, negative to feet; five minutes.

Third. Transfer D to hands, five minutes, and so on, with discretion.

Where the sick headache is constitutional, the vapor-bath can be used with great benefit twice a week, and applying the electricity over the liver and spleen, always going below the true ribs, so as to avoid the lungs.

INSANITY,

Imbecility, *Melancholy*, etc., mild forms in general, all forms short of mania, are to be met by similar treatment. The author always makes a cranial diagnosis, to discover the cause, and this may be found in the stomach, liver, genital organs, etc.; requiring specific treatment, of course.

Malposition of Organs, as of the uterus, imperatively demands primary attention. So, also, all other local troubles.

A paramount need is to secure a bond of sympathy with the patient at the very outset. In this, the use of AB, in which a sort of mesmeric or soothing resemblance seems to inhere, will afford great aid. (The same current will often help in allaying the suspicious fears of infantile patients); then use E. The negative is applied with a good sized plate, across the hypogastrium; C, the positive, in sponge-cup. If the patient can be induced to talk about the implements, all the better. If not, hold the sponge-cup out of sight—in the left hand, so as to use the right upon his wetted scalp. Ask, "Don't you want me to take away that bad feeling you have? Don't you want to get well and strong and go out?" (Generally the head feels badly. The recumbent posture is best, especially if there be languor.) Say further, "I'll take away all that bad feeling for you," etc. Get him to co-operate in this way.

Usually, there is unequal or deficient warmth, which, after two or three days' treatment, will be cor-

rected, and all the tissues and organs, the stomach, the muscles, ligaments, nerves, etc., be thereby invigorated. If perspiration be obtained, you are sure of having the case well in hand. Then, or in any event, after the third treatment thus, give the electric vapor bath with BD, weak, until confidence is fully established. For the same purpose, the nurse may accompany him in the bath (which, by the way, is a luxury in itself.) If refractory, he may be put into the bath by compulsion, in this way. There is a great gain in time by this measure, hence it ought not to be neglected on any account. The current must never be used so strong as to cause contortion, yet the gain in time bears a close relation to the vigor of the application.

Then the nerve-current AC, and the blood-current BC come into play—for obvious reasons. The patient is apt to be too lean or too fat—the nerve-nutrition and blood-nutrition are usually defective.

Apply these currents alternately — morning and afternoon—for fifteen minutes each, thus:

First. A in plate No. 3, down from base of brain; C in plate No. 4, to hypogastrium, half time; then,

Second. B in hands to C in plate No. 4 to hypogastrium; or to lower limbs; whereby is traversed the sanguific sphere.

Treat daily at first, or oftener even. Then, as improvement occurs, less often. Repeat the nerve-current BC every other day, throughout, five to ten minutes each, and every other day a bath, after about the fourth day's treatment.

MANIA.

In the management of this, force, even the straight jacket may be needed. Cranial diagnosis can scarcely be applied at first; hence, treat symptomatically; adapting treatment as best you may.

First. If the eye be wild, glaring, glassy, with great unrest, B at base of brain, plate No. 1: lower limbs, plate No. 6; 30 minutes, or until the eye softens in expression.

Second. B, "vertical epigastric," with plate No. 1; D to coccyx, plate No. 8; say fifteen minutes at least.

Third. Transfer B to hands, four to six minutes. Repeat daily, or oftener, if needed, for three or four days. Then give A half time, alternating with B at base of brain, D to lower limbs; afterwards, in the alternate, half time.

Fifth. C positive, with plate No. 2, at throat, in front; E negative, with plate No. 5, at coccyx, up spine; implicating the sanguiferous and nutritive organs, etc. Always finish with the more tender currents. Repeat daily, as required.

By this time, if not previously done, sufficient amelioration may be had to permit a cranial diagnosis, after the method of the author, from which obtain indications for further treatment. Also, by this time, the bath may be used, with AD, base to feet, every two or three days, until convalescent; then less often.

INTEMPERANCE.

In whatever state the man or woman is in whom the passion for drink has grown to be a habit, invariably

the stomach is either in a condition of inflammatory fever, or partial paralysis. In these attending states of misery the alimentary canal, covered with poisonous canker, offers continually renewed promptings to drink or die. In the author's experience with such cases the following treatment has proved almost infallible.

Place B, in plate No. 3, from the ensiform cartilage below sternum down over stomach, D in sponge-cup pressed up against the base of brain strong as can be borne, fifteen minutes. Change D from base of brain to palms of hands five minutes, not too strong. Provide dry crackers for the patient, urging him to eat one during treatment—and carry them around in his pocket to eat whenever the sense of thirst arises. At meals drink little or no water, but take a cup of strong coffee without milk but sweetened to suit the taste, eat slices of bread toasted very brown, carefully abstain from any drink but coffee. Continue electric treatment if possible twice daily, in any event, every day for seven or ten days, and then every other day until strength is felt in personal resistance, when the electric treatment may be abated recurring to it only as the appetite may seem to return.

Vapor Baths are most admirably adapted to restore a healthful tone, and eliminate the dregs of the liquor latent in the system. This treatment is equally well adapted to morphine or opium eaters.

NARCOTIC POISONING.

An emetic action is first desired—and is obtained by, First. Applying AD reversed: viz., from vertical epi-

gastrium to base, for five or ten minutes; first giving about three swallows of warm water. This having initiated nausea give,

Second. A in left hand, D in right, and in strong current. Every thirty seconds touch the electrodes together, until full emesis occurs. If it do not shortly, repeat as at first—and so on. After this,

Third. BD, etc., just as in inflammation of the brain.

CHRONIC NARCOTISM.

Involves blood troubles, etc. Treat with

First. BD, throat to coccyx; fifteen minutes.

Second. Transfer D to hypogastrium; fifteen minutes.

Third. Every other day, substitute bath, with AD.

Fourth. Every bath-day, vary by adding AC, within an hour after, which also prevents taking cold. (Time should be taken after any bath, for the temperature of the body to become assimilated to the surrounding air, before going abroad.) Apply from hands to translumbar region, ten minutes.

POISONED WOUNDS.

Their treatment is somewhat similar to that laid down for ulcers (which see.) Supposing a leg to be *bitten by a snake*, wash it with tobacco juice.

First. Plate No. 5, prepared, and girdling the limb above the wound, is to be attached to B; D, in sponge-cup, brushed down to, and off at, wound.

Second. Bath, with AD.

If an upper extremity be wounded, treat similarly.

Or, the patient may manipulate himself, if able, by holding the negative electrode in the hand of the injured side, and brushing with the positive, downwards from the shoulder; and if both limbs be affected, changing hands, at intervals of a couple of minutes. The negative may sometimes be applied conveniently by a plate, prepared, and resting on rubber cloth on lap or table.

Then. bath, as usual, five to ten minutes, if possible; (otherwise, AD; positive brushed down spine; negative in foot-tub; as in bath.) After this application, still in bath, brush (if lower limb) with positive, down the limb; then return with positive to the spine; taking about seven minutes to the whole bath.

The symptoms being controlled, repeat as needed—say, every half hour, until convalescent—*i. e.*, until the effect of the poison is neutralized.

Whilst the battery is being prepared, split a raw onion, and bind it upon the wound; it soon becomes greenish, when it must be renewed, from time to time, with fresh *pieces*.

Bites of rabid animals are to be similarly treated, although the urgency is primarily less, of course.

First. During the paroxysm, treat as for epileptic convulsions—with AD.

Second. If the patient be clammy, put him into the vapor-bath, using CE, instead of the usual current.

Third. BD from base to the muscles and viscera most at fault, and to the cicatrix, in a tin basin with negative electrode; having in view its metamorphic, or "breaking-up" action.

Fourth. For nervous excitability, apply as required AC; from base to hands; or from hands to lower spine, if a more extensive influence be demanded.

Fifth. Three or four treatments of this kind, not too far apart, may be expected to ameliorate the case; when special complaints must be searched for and treated, the aid of cranial diagnosis being invoked.

MINERAL AND IRRITANT POISONINGS.

In some respects, the treatment resembles that for narcotic poisoning, but the procedures, severally, consume a longer time. So as to emesis (not neglecting chemical antidotes.)

During subsequent treatment, daily baths are required.

For the resulting soreness and inflammation, AC; or if the surface be cold, CE; applying either alternately from base to hypogastrium, and from vertical epigastric space to coccyx.

CHRONIC SYMPTOMS.

Same currents, also BD base to feet, alternately with the same from throat to legs below the calves; half treatments, each. Every other day bath with AD. This treatment presupposes organic lesion. If only soreness or coldness be present, use the other currents as directed above. Any local specialties are to be treated intermediately.

NEURALGIA AND TOOTHACHE.

First. *Neuralgic* pain requires CE; supposing it be facial, base to cheek, negative in sponge-cup on

through operator's hand, brushed forwards and downwards. If no better in one minute, change to AC. If much tenderness, AC may be used first, and changed in like manner if insufficient.

Second. If "twitching" pains, also give AC.

Third. If "jumping" pains, give BD, afterwards CE.

Fourth. If the gums be inflamed, use spatula in mouth with negative.

Fifth. If pus form, B near it outside; D upon it inside, to hasten pointing and discharge. This effected,

Sixth. Heal with the aid of AD; the negative on a wet napkin over the suppurating region; positive above.

Seventh. Finish the treatment on systemic indications.

HYSTERIA.

A careful (cranial) diagnosis is first to be instituted, that the real foci of morbid action may be detected, and treated without delay. And first of all *may be* the generative organs. Mechanical displacements demand the first consideration. Congestions, menstrual, digestive and spinal symptoms will also need care in many cases.

For the relief of the paroxysm, use at once, B in No. 5 plate; base of brain down the spinal column. D No. 6 plate across hypogastrium strong ten minutes, then place A No. 1 plate base of brain, C under hands ten minutes; then A No. 8 plate on coccyx and sacral region, and D under soles of the feet eight or ten min-

utes When the paroxysm contracts the trachea, the operator may pass the electricity through himself, using C and locating A at the base of brain. Firmness is requisite, and insist upon the patient's keeping control of himself; never *appear disconcerted* or frustrated.

CHOREA.

Much of the treatment for this affection consists of reversed currents. Here, too, various local troubles demand special attention, from time to time.

The topical treatment is as follows:

First. AC, from the infra-sural spaces to the basilar region (recumbent posture) ten minutes.

Second. Same, from legs to trans-epigastric space (affecting the diaphragm) ten minutes.

Third. BC, hands to trans-renal space five minutes. Total, twenty-five minutes.

In all nervous diseases, the kidneys *must* be attended to, for their action is always faulty.

Repeat, if a child, every other day; if an adult, every day. Local affections may be treated in the intervals. For instance:

If "*biliousness*," apply as in other like cases.

First. BD, from "vertical epigastric" to hypogastrium ten minutes.

Second. Same, vertical epigastric to trans-renal space 10 minutes.

(If any other acute affection, as catarrh, etc., come up in the course of any chronic treatment, rob the commencement of the first and second applications, of five minutes each, in which to treat it.)

If, as in most nervous diseases, we have to deal with actual *congestion of stomach and kidneys*, or at least a disposition thereto, with deficient appetite, etc., in all such cases use B from trans-epigastric D to trans-renal space ten minutes every third day. This speedily tells on the appetite, etc.

If *stuttering*, *dumbness*, and the like, treat with AC, from base to muscles of speech, with the operator's hand ten minutes, alternate days.

The special symptoms being duly cared for, proceed with the chorea proper, varying the process thus:

First. AC, infra-sural (under calves of legs) to trans-renal space ten minutes.

Second. Transfer A to basilar region five minutes.

Third. Transfer C to hands five minutes.

And thus:

First, *a*. Same current, trans-renal (between kidneys) to basilar ten minutes.

Second, *b*. Transfer A from patient's loins to your lap, your left palm upon it; with your right, pass over the muscles of speech ten minutes.

Third, *c*. Transfer A to patient's palms, if an adult; if a child, take its palms in your right; your left as before, ten minutes.

CONVULSIONS—EPILEPTIC, INFANTILE, PUERPERAL, HYDROPHOBIC, TETANIC.

Idiopathic *Epilepsy* proximately depends on unbalanced circulation, this being due to pressure somewhere, in the cerebro-spinal or other nervous tissue, even upon the cerebro-spinal mass itself, as in the region

of the foramen magnum, or elsewhere, in the form of indurated tissue, usually below the medulla oblongata, impeding its free movement in the canal.

The commanding indication is to get rid of this deposit, or neoplasm. The collateral indication is to correct a multitude of local troubles, which are liable to concur with the main affection, especially of the throat, bronchi, nasal passages, and stomach, all of which seem to get better or worse as the general malady does so.

During the spasm, apply: Hot-bath A, base D feet.

Succeed by A, in plate No. 1, base D in plate No. 6, to lower limbs, until better.

Second. Transfer A to hands; or, if the patient be incapable of holding it, apply it instead to and parallel with ensiform cartilage, twenty minutes, or until relieved. Follow with:

Third. AC, or CE, in the same way; the former, if the surface generally be warm; the latter, if cold, especially in the extremities.

For the *cure* of *Epilepsy*, treat thus:

First. Seat the patient on D, in plate No. 7; B, in sponge cup, to be rubbed down from base to sacrum; ten minutes.

Second. Patient recumbent; A, in plate No. 1, positive basilar; negative, D, in plate No. 6, across the stomach, liver, and spleen; ten minutes.

Third. B, in plate No. 8, vertical epigastric; D, in plate No. 4, to trans-lumbar space; ten minutes.

Fourth. Transfer B to hands; five minutes.

Fifth. After three or four daily treatments such as these, the electric vapor-bath *must* be used three days in succession.

Rotate between these procedures and the treatment of special complaints.

INFANTILE ECLAMPSIA.

Flashes of Light.

Applications to the abdomen, for instance, are to be made *hot.*

First. If the child be teething, apply B from base D to abdomen, across the middle, in plate No. 4. The convulsion soon will yield. If not within five minutes, vary by the transfer of the negative to the *epigastrium*, making the compress hotter at the same time.

Second. After the spasm is subdued, connect A with the basilar plate No. 1; C with the sponge-cup; make with it centrifugal or downward passes, as recommended for toothache. Alternately apply within the mouth spatula, with which the inflamed buccal (mouth and cheek) and gingival tissues (relating to the gums) may be manipulated. The spatula may be insulated by rubber, or otherwise, and held therewith in the child's own hand, the current being made agreeable. Treatments, as for toothache, will occupy attention when no spasms are present; alternating with those required for concomitant derangements.

If other causes than teething be found, treat accordingly. (Compare Epilepsy.)

PUERPERAL ECLAMPSIA.

Convulsions During Pregnancy.

First. Treat as for epilepsy, until the convulsion and cerebral congestion subside.

Second. Then use for local uterine effect, B, the positive, attached to plate No. 4 or No. 5, applied to the lower spinal region; D, the negative, with plate No. 7, over the hypogastric region; or, with a smaller electrode, concentrate over uterus, as the sponge-cup, or the vaginal instrument, used internally, etc., to any particular spot which may display morbid conditions.

TETANUS,

contraction of the muscles, and characterized by closing of the jaws, immobility of the limbs.

First. Attach plates and apply very much as for infantile eclampsia, with the important exception that the currents are to be reversed. When the spasm is better:

Second. Apply CE, the "warming and soothing current," as directed under shock and chills, and AE to conclude treatment.

PREVENTION OF MISCARRIAGE.

The author has met with remarkable success in carrying women beyond critical periods of gestation, which, previous to treatment, had always proved fatal to the fœtus, as follows:

Vaginal instrument, D, inserted so as to touch the os uteri; A, in plate No. 8, from coccyx up, the short projections of plate extending on thighs; ten minutes; this when miscarriage is threatened from natural disqualifications.

When warned by vomiting, B, plate No. 3, epigastrium, and D in No. 4 plate, supra-renal space; ten

minutes; daily treatment for six weeks before the critical time, and through the month, then every other day for six weeks, when twice a week will be sufficient until confinement, unless complicated symptoms occur. When immediate miscarriage seems imminent, from some sudden injury or fright, the patient should assume a recumbent posture immediately, and the positive pole B should be applied to part injured, and negative D above the injury, when the first shock is allayed. Apply as for displacements. Conclude the treatments by A, base of brain, and E under the hands for five minutes. In cases like the above, the electric treatment may be administered an hour, and repeated whenever symptoms admonish a disastrous result. Medical aid should always be summoned, for there may exist internal injury and unrecognized hæmorrhage.

PREGNANT VOMITING.

First. D, in plate No. 3, to stomach; D, in plate No. 8, to sacrum, ten minutes.

Second. A to hands; C, No. 8 plate, to sacrum; ten minutes. Given a short time previous to the occurrence of the vomiting, patient always reclining; and alternate No. 1 and No. 2 treatments.

LABOR PAINS ASSISTED.

During the pains, D in plate No. 7, across the abdomen; A in sponge-cup, pressed against the pubic region, or in plate No. 6, across sacrum, to produce contractions, used through term of delivery. After

labor, A in plate No. 7 across abdomen, and C in plate No. 8 from coccyx up; thirty minutes. Should the case be tardy in convalescing after confinement, treat concomitants, and attend to strengthening of the uterus, as *vide* displacements, and the patient will recover strong and natural.

APOPLEXY.

First. AD, base to lower limbs, until amelioration.

Second, *a.* If there be froth at the mouth, a gastric complication is to be inferred, and then BD is to be run from the trans-epigastric space, with B in plate No. 6, which implicates stomach, liver and spleen, to the sacrum, with D in plate No. 4.

b. If simply a moist mouth, run the same current from base to hands.

Third. Discover and treat specialties.

Rotate the several manipulations as indicated, timing them very much by their effects, and giving in pretty good strength.

After the more urgent apoplectiform symptoms are subdued, the patient may remain more or less paralytic, when the following treatment is to be pursued, not forgetting to guard against the congestive effects sometimes wrought by reversed currents, yet not being thereby deterred from their careful and therapeutic adjustment and use:

PARALYSIS,

whether partial or general, hemiplegic or paraplegic, the removal, or at least amelioration of central lesion,

if any exist, is the first indication; although, after acute conditions have been bettered, it may suffice to alternate with this, the treatment of the paralyzed parts.

The latter concerns the nerves of motion, of sensation, of nutrition, and other organic functions variously; in other words, all the nerves of animal and of organic life, with the corresponding muscles and organs of sense. The special symptoms present such features as belong to the special nerve-regions involved.

The treatment by galvanic and by Faradic currents, has already been discussed in brief, and is extensively handled in nearly all works on medical electricity. The treatment here recommended is scarcely to be put in comparison with the former, as the currents of Kidder's battery differ from all others in the qualification effected by the peculiar arrangement of the helices.

For all forms of paralysis two general rules are in point:

First. The currents are most effective when broken at regular intervals by hand or by mechanism, in addition to, or instead of (in case of the primary current), using the trembler; or, as in the instruments of the "Galvano-Faradic Company," by the construction of the trembler itself.

Second. The currents are give *in reverse*, usually.

Currents may be general (of a whole limb), or local (of a single nerve or muscle.) In the last case the nerve is isolated at some superficial portion of its course, the sponge-electrode being here placed; the other pole at its distribution; or the poles are placed

at opposite ends of a single muscle; or the two electrodes, held between different fingers of the same hand at short distance, are placed for a few moments, firmly and well wetted, upon successive portions of its extent. Electric gymnastics thus managed, effect much in nutrition of wasted parts, and in restoration of functional activity.

The patient must be exhorted to constantly repeated kinesipathic or other voluntary endeavor, directed to the paralyzed parts. On the other hand, whatever part be affected, the first evidence of returning power is often a serious temptation to exhaustive effort, which is ruinous, and the danger of which must never be lost sight of. Furthermore, the patient often becomes inattentive to treatment when a fair amount of improvement has been effected. He may be confidently assured that during the intervals of treatment, improvement is stationary. It must be persisted in until complete restoration is effected.

Having already given the points for "localized" treatment, it remains only to give those for a whole limb or the other region. If in the *upper parts* of the body, the hand, cheek, tongue, larynx, or other paralyzed tract, is connected with the positive pole, by plate, sponge-cup, spatula, or the operator's hand, the negative upon the roots of the corresponding nerves, in the spine, graduating the current to the electro-sensibility and electro-contractility of the patient.

At regular intervals, measured by the watch, the cylinder is suddenly drawn out and returned, causing slight shocks and functional responses. Or, instead, a

finger may be lightly rested on the end of the trembler, snapping it equably, say once in every two seconds, more or less, whereby the circuit is successively opened and closed somewhat at will. A delicate trembler would soon be disordered by this proceeding, but that of Kidder's battery is strong, and readily adjusted by a series of regulating screws. Instead, a "rheotome," something like that on telegrapher's table, may be used to regulate the interruptions, being interposed between the instrument and either electrode. On the table it may be managed by the hand; or on the floor by the foot, the hands being left free. Or better than all these, a simple clockwork may be adapted, if desired, for this purpose.

All being ready, apply (supposing both motion and sensation to be involved in the paralysis) in alternate treatments AD and AC, two treatments daily, if recent; if chronic, one each day.

First. AD, twenty-five to forty minutes.

Second. AC, twenty-five to thirty minutes.

Third. If the parts be deficient in animal heat apply CE in the manner directed for chills, for a few minutes, until warmth is obtained.

Paralysis of the Lower Extremity is to be managed on very similar principles, if no visceral paralysis, as of the bladder, rectum, or anus, be present. Often, however, *Paralysis of the Pelvic Viscera* coexists, owing to lumbar injury or otherwise.

For this seat the patient upon the cylinder electrode, enclosed in a sponge applied along the perineum, and connected with the positive; the negative upon the

nerve-roots; proceed as before. Or if the sphincters be particularly affected, introduce the double olive-vesical electrode, with catheter insulator, to the neck of the bladder, or the rectal instrument into that gut, attaching the positive; otherwise as before directed. The generalized action of the bath is also to be always kept in operation, in all forms of paralysis, so far as may be, say at least twice a week.

MYOGRAPHIA—SCRIVENER'S PALSY—WRITER'S SPASM.

The cause of this distressing malady is indicated by its name, *i. e.*, an over-tax upon the nerves and muscles brought in play whilst writing. And the old notion that it originated because the writer used steel-pens, and that the metal was the cause, has been exploded; the true cause is an over-tax, and the treatment should be addressed to the cervical plexus and general stimulation of the entire cerebro-spinal system in the following method:

C in No. 5 plate from base of brain down the spine, thereby implicating the cervical nerves; E in No. 4 plate from coccyx up ten minutes, then remove the plate from coccyx, and place under the affected hand, changing the conductor to C under hands, and E to the plate on the spine ten minutes. The wire stimulator can be used effectually to excite cutaneous action, and should in this case be brushed up the arm—daily treatment

Local Congestions, Inflammations, and allied diseases.

INFLAMMATION OF THE BRAIN.

Wet the hair of the patient so as to make it conduct the electric current to some extent. Keep the fingers of the right hand wetted, so as to manipulate the head, running them under and through the hair, and much of the time moving about, as in the rubbing of tonsorial shampooers, from the frontal region all over the head, except the base of the occiput, at which plate No. 1 or 2 is placed in the first process, with the negative.

First. AC, given as above five minutes, with the variation, during the last half of the time of holding the wet hand still upon the top of the head; or, if need be, a like time after the full five minutes in motion. Then,

Second. BD head, as before, to hypogastrium with No. 4, with a view to visceral concomitants or causes, fifteen minutes.

Third. AD, base to lower limbs ten minutes. Repeat, in severe cases, every two hours.

Special indications are also to be sought for in the final steps of treatment, by means of which the cure may be rendered perfect.

AFFECTIONS OF THE EYES.

Disordered Vision.

First. Place the negative in the hands of the patient, (using AC for sensory, AD for motory affections, etc.)

Second. Wet the back of the head, and the sponge in sponge-cup, five minutes to eye affected.

Third. Brush upwards, most on the worst side, using a current strong enough to cause a "lifting" sensation in the scalp; if equal on both sides, three minutes to each eye, alternately; in all ten to twelve minutes. Repeat as needed.

CONJUNCTIVITIS— OPHTHALMIA.

Use the "eye-cup" containing warm water, or milk and water, by which the current is greatly equalized and moderated. The eye may be opened into the the water; holding the face downwards; the negative attached.

First. BC, (a mild form of current) base of occiput to eye; five minutes. If both eyes be affected, change the water, rinse the cup, refill it for the other eye, and apply.

Second. When the inflammation is almost well, end the treatment with a "tonic" use of AC; A base to hands, five minutes; B base to feet, five minutes.

A nursing infant may be treated (as for other maladies), whilst at the breast; the mother holding the positive in her hand; the operator the negative, with soft sponge electrode, with which the eye is to be gently sponged as needed.

LACHRYMAL OBSTRUCTION.

Treat as for nasal catarrh, but localizing the anterior pole (with small sponge,) over the course of the obstructed duct. In obstinate cases, the positive (a small

olive of sponge, in an ordinary sponge-holder, such as is used in uterine surgery,) may be applied as closely as possibly over the lachrymal sac; the negative, similarly prepared, within the inferior meatus. Make the current mild at first BD, five minutes; AD, five minutes. If soreness supervene, begin or substitute, or finish (according to circumstances), the further treatments, with AC, until that be subdued. Other variations will occur to the mind of the expert. If, for instance, the obstruction be evidently low in the duct, the negative may be applied with the nasal electrode, and the positive at the base of the occiput a judicious length of time.

OTITIS — EARACHE.

For application to the ear, a speculum-electrode of hard rubber is preferred, insulating the conductor, at the end of which is affixed a small bit of fine sponge, to be protruded after introduction into the external meatus; and, *not till then*, attached to the battery, at the negative pole; the positive basilar, thus:

First. BD, base to ear, twenty minutes—*mildly at first.*

Second. Transfer to AC; negative between the hands; strong current; five minutes. If *soreness* appear,

Third. AC, in subsequent treatments, instead of BD; until relieved.

DEAFNESS,

from induration of the membrana tympani, or of the tissues of the cavity of the tympanum, eustachian

tube, and adjacent passages, being the most common form of that defect, depends for cure upon the metamorphosis and reabsortion of the indurating material. The treatment for nasal catarrh may be indicated— or that for chronic tonsillitis, etc.; besides which, for the ear-tissues themselves, apply the positive anteriorly.

First. B, with speculum insulator, the sponge carefully but deeply fixed in the meatus; D. basilar. Or, if the cavity of the tympanum be at fault, especially if the eustachian tube be obstructed, apply

Second. D to the mouth of the eustachian canal, by meant of an insulated conductor wire (within a gum catheter or tube), with a small sponge attached, passed along the floor of the nose.

Third. If soreness supervene, substitute AC.

OTORRHŒA — EARACHE.

Syringe, twice a day, with warm milk and water; *holding the ear downwards.* When cleansed, treat as for inflammation; and if necessary, as for induration.

NASAL CATARRH.

Acute, Chronic.

If dry catarrh, treat thus:

First. B with a sponge cup, on the bridge of the nose; D, basilar five minutes. Repeat, from day to day, until the affection becomes fluent. When fluent, after treatment or otherwise,

Second. A to nose; the operator's fingers being

used as the electrode. Apply D upon the upper part of the sternum, with No. 3 plate, five minutes.

Third. AC, hands to sternum, ten minutes; for a tonic effect, as long treatment of the former kind has a paretic relaxing tendency.

Fourth. Conditional, upon soreness occurring, substitute AC in the previous manipulation (second.)

Fifth. Conditional, on extension of the catarrh to the throat, the last half of the treatment is with the positive around this part, with a flat sponge, and plate, instead of between the hands, AC.

Sixth. Conditional, on the anterior passages being the principal seat of disease, use the nasal electrode therein, with the negative; the positive, basilar.

NASAL POLYPUS.

induce, a discharge—by

First. BD, negative, the bodkin—like the nasal electrode, with sponge wrapped and tied around it, applied within to the polypus; positive, basilar ten minutes.

Second. When it discharges, use weak current; A positive, base of brain; D negative, upon the base of the nose; ten minutes.

STOMATITIS,

occurring often in teething children, the manipulations may be taken from the section or convulsions from *dentition*, *i. e.*, B No. 1 plate base of brain D to No. 4 plate across the abdomen five minutes, then change D at epigastrium and put on hot compresses until relieved.

TONSILLITIS, PHARYNGITIS, ETC.

First. B basilar; D, with muffled spatula (*i. e.*, covered with wet linen) on center of tongue, ten minutes. Repeat as needed; three times, as above; *at least* once or twice a day; if acute; after so doing treat outside, thus:

Second. Positive with sponge-cup or No. 1 plate to throat; negative upon sternum, with No. 3 plate. If the throat does not tolerate the ordinary electrodes, the operator may use his hands instead.

Baths frequently repeated at first, hasten the cure.

DIPHTHERIA.

First. If very bad, begin with BD, base to throat; (with plate;) strong current; continued, if need be, an hour and a half.

Second. When rested, proceed as above directed for tonsillitis. An excellent remedy is found in the following prescription as a gargle, two fluid ounces of camphor water, one drachm of chlorate of potassa diluted in tepid water—use every two hours.

ENLARGED TONSILS.

First. If acute, apply B by the operator's hand, externally over the enlargement; D on sternum; ten minutes.

Second. A, basilar C in sponge-cup, over tonsil; ten minutes.

Third. If insufficient, use BD, base to tongue (spatula). Then,

b, apply AC, as above,

c, use very mild and soothing current; B plate No. 1 base of brain, C under hand; ten minutes each.

CHRONIC ENLARGEMENT OF TONSILS.

First. B basilar; D on tongue, with spatula; twenty minutes. Repeat, four or five times, or until an impression is made, which will certainly be marked by *soreness*.

Now, treat as above ten minutes; followed by

Second. AC, in like manner, drawing the sponge-cup forward first over one tonsil then the other, ten minutes.

PAROTITIS; MUMPS.

First. B, basilar; D, on the swelling; ten minutes.

Second. If soreness, AC in like manner, five minutes.

Third. If soreness be extreme, apply A to the swelling; C in hands, or if a child, on sternum.

Fourth. *a*. If metastasis occur to the brain, A at basilar in plate No. 1, and D in plate No. 8, to coccyx —ten minutes.

b. If to the mammary glands in females, use C in sponge-cup over the swelling on breast, and E on opposite side of breast in plate No. 2, and other general treatments.

c. If in the male patient it occurs to the testicles, a hot sitz-bath with D, and A in sponge cup down the spine from base of brain, ten minutes, three times daily.

Fifth. If gastric troubles supervene, treat as for gastritis.

GOITRE.

First. B, basilar; D, with flat sponge and No. 2 or other plate upon the thyroid enlargement, covering it well, or the plate with wet napkin interposed. The size of the goitre will probably soon lessen, and thereupon soreness may occur. Then,

Second. Relieve with AC, applied in like manner.

Third. Then give alternate treatments with BD and AD.

Each treatment is to be continued about ten minutes, the currents being strong as can be borne. The patient may be suffering under some prolapsed condition of visceral organs, in which case they must be classified and specially treated. Frequent inhalations of carbolic iodide.

LARYNGITIS AND CROUP; ALSO HOARSENESS.

First. B, in sponge-cup upon larynx; D, across sacrum, strong current, fifteen minutes, eight or ten times daily; when the case is bad, and the throat can be gargled with a weak solution of bi-chromate potassium, two or three times daily.

Second. B, basilar; D, on throat; ten minutes.

The former manipulation is in behalf of retrogressive tissue, metamorphosis; the latter, astringent as it were; the reasons for both being hence apparent.

Third. In aggravated cases the very first step will be the use of the *bath;* and in all cases it will greatly

hasten the cure to resort to it, at short intervals; at first, using

BD, from the throat and on the seat (of the bath) five minutes.

TRACHEITIS.

First. Place A around the throat, close to the inferior maxilla, with No. 1 plate prepared with sponge; C along the upper dorsal spine, with No. 3 plate.

Second. C, at throat, a little lower; E, along the lower lumbar spine.

Third. Baths; at least every third day, even in cases not very urgent.

BRONCHITIS.

Acute and Chronic.

First. A, basilar; C, lower throat, with plate and sponge; fifteen minutes, implicates the commencement of the bronchial tract.

Second. C, basilar; E, on ensiform space, parallel with sternum, and extending to epigastrium; ten minutes.

Third. BD, throat to sacrum; ten minutes.

Fourth. Baths; in chronic cases, twice a week; using AD, in the ordinary manner.

ASTHMA.

First. Treat as for bronchitis.

Second. Diagnosticate and treat collateral troubles, which are almost certainly to be found somewhere. Inhalations of ozone highly recommended.

PHTHISIS.

First. Treat as for bronchitis.

In all pulmonary diseases, observe the universal rule, viz.: *never to go over the lungs or heart with the electrodes;* but instead, apply to the median line, front or back, or above or below the position of the lungs.

Second. In very bad cases use No. 5 plate, applied along the spine, so as to implicate the *kidneys* instead of the sacral plate; these organs demanding attention and treatment in such cases, as a rule.

Third. Treat collateral symptoms as required.

For sleeplessness, as before recommended.

For cough,

AC and CE have a special utility in the relief of such symptoms.

PNEUMONIA.

First. Bath, for general impression and local effect, at the same time giving BD from throat to feet; beginning weak, and increasing until as strong as can be borne, eight minutes. If the bath be at all followed by a sense of prostration, the condition is not unfavorable; but if a very marked tonic and calming effect is to be at once sought (in the recumbent posture, and duly protected, etc.), by means of a current which resembles the mesmeric force, A, base B, under hands.

Second. CE, base to hypogastrium. If not used, give the following treatment one hour after the bath, instead

Third. AC, in the same manner.

If very severe, give an hour later the CE current as

above (it being not already used), fifteen to forty minutes, *i. e.*, until soothed.

If still severe, give a treatment one hour later, thus:

Fourth. BD, base to hypogastrium, with No. 4 plate, fifteen to thirty minutes; or,

Fifth. If there be much fever, vary the last half of this treatment with the negative attached to No. 5 plate, applied from the lower part of the sternum down the median abdominal line, say for fifteen minutes, then transfer it to the upper abdomen, across the stomach, liver, and spleen, ten minutes. Follow with AC and CE, as above directed. Apply mustard draughts to feet and over lungs. Give the patient sunight and quiet.

First. A, with No. 5 plate, down the sternum; C, with No. 3 plate, from coccyx up, fifteen minutes. Then,

Second. B, basilar, No. 1 plate; D, with No. 4 plate, across hypogastrium, ten minutes or more, until an impression is made.

Third. Use the supplementary manipulations already described, as needed.

Rotate the various procedures at such intervals as the severity of the disease may render needful. When broken, lengthen the intervals.

PLEURISY.

First. B, along cervical spine, with No. 3 plate; D, with No. 5 plate, around the lower edge of the affected side of the thorax, fifteen minutes; then,

Second. Transfer the negative to lower sternum, down front of the abdomen, fifteen to thirty minutes.

Third. If headache, hold negative in hands; positive basilar, brushed upwards with the sponge-cup. Second treatment: in one, two or three hours.

Fourth. Place D, with No. 2 plate, at coccyx; A in sponge-cup, used as in brush, beginning well up on the sternum, and following it down to the edge of the ribs, and around them, on the affected side, again and again, fifteen minutes.

Fifth. If a bath can be had in place of this last, put the negative, D preferably, in the foot tub, the positive A, used as before, by the patient himself, five minutes; then, apply sponge-cup with the positive, as before, to base of occiput; moving thence downward over the spine, as usual, and being in the operator's hands. Repeat every one, two, or three hours, hot compresses over the affected parts.

CARDITIS,

Endocarditis, Pericarditis.

Treat as for pleurisy of the left side.

CARDIAC PAROXYSMS.

These yield at once to the following treatment: Apply B to base of occiput; or, if more convenient, between the hands: C, with No. 5 plate, around the lower edge of left thorax, twenty to thirty minutes.

CHRONIC HEART DISEASES.

Aside from collateral complaints, which *must* be

duly attended to, as individually required, the following is suited to all forms :

First. Baths, twice a week, with AD, as usual.

Second. B, with No. 5 plate, from base of occiput, down spine ; D, with No. 6 plate, across the middle of the abdomen, thirty minutes daily.

DYSPEPSIA

is nearly always complicated with urinary trouble. Treat, therefore, so as to implicate the kidneys, etc. also, the stomach, liver, spleen, and pancreas.

First. B, with No. 3 plate from ensiform cartilage downward, D with No. 5 plate from coccyx up, twenty-five minutes. Then,

Second. Transfer B to hands five minutes (affects the pulmonic organs, also), usually requiring a weakened current.

Second Treatment.

Third. B, with No. 6 plate across the epigastrium, D across sacrum with No. 4 plate twenty-five minutes.

Fourth. AC, hands to sacrum.

Third Treatment.

Fifth. Bath AD as usual.

Sixth. Having made a thorough diagnosis, and determined the special indications, proceed to treat accordingly, giving attention first to the most distressing ; or if there be much uterine displacement, giving this the preference, as in every case.

PARETIC DIAPHRAGM.

This is attended with weak and sinking sensations, etc., from prolapsus of the viscera of the abdominal cavity, and is the result of mechanical as well as constitutional faults.

Among these may be mentioned dyspepsia, much standing, lounging in bad positions, going up and down stairs, over exertion, straining, tight or heavy clothing about the waist, the general bad habit of ladies who at the bidding of fashion transform the classical and natural short waist into the long waist now so fanatically sought, all are causes of this very troublesome and often distressing malady, together with the mechanical displacement so common in our day.

Treatment is of two parts—to correct the evils referred to, and apply:

First. A, with No. 3 plate along the dorsal spine, D focalized in the epigastrium by No. 1 plate, from ensiform cartilage downwards thirty minutes.

Repeat next day. The third day,

Second. Vapor-bath, D in tub, A brushed (with the sponge-cup) as in pleurisy, two or three minutes alternately to either side, down sternum and around edge of ribs, fifteen minutes in all.

Repeat, from day to day, in similar order.

INFLAMMATION OF ABDOMINAL ORGANS,

Including Diaphragmitis, Gastritis, Enteritis, Hepatitis, Splenitis, Pancreatitis, Nephritis, Metritis, Ovaritis, Peritonitis, &c.

Require manipulations more or less resembling those directed for dyspepsia. Some of these will be here-

after specified. In any case, the electrodes must be located in every instance, so as to implicate fully the precise locality of the diseased action; suitable plates, sponges, etc., being chosen for each as needed, warm or even hot water being also employed in their preparation.

CONSTIPATION.

D positive at anus, sitting on sponge, enclosing electrode; B positive in sponge-cup, kneading the abdomen systematically, in the course of the large bowels, from the right groin upward over the abdomen, down the left groin, ten minutes daily.

A very effectual accessory treatment is found by placing the *spatula* on the tongue with current A, and applying the negative D in an electrode enclosed in a sponge to the rectum.

COLIC, TENESMUS, CRAMPS,

of various kinds; constipative, hepatic, gastric, enteric, renal, menstrual, vesical, etc.

Treat all these on similar principles, manipulating much as if for constipation, with the reverse current A the positive at the outlet of the passage concerned, A the negative in sponge-cup at its summit, moved across the bowels toward the former. If very refractory, as in

PAINTER'S COLIC, ETC.,

First. Apply *hot* compress, on which lay No. 7 plate attached to B, (the stomach is usually *cold*), D with No. 8 plate from coccyx up, ten to thirty minutes or more, very strong, and even with two cups attached to the helices, if one be insufficient. Or,

Second. If there be retching, etc., use No. 3 plate, from ensiform cartilage (end of the sternum) downward until this be mastered. Then, for chilliness or coldness, use

Third. CE, base to hypogastrium, five to ten minutes. The negative may, however, if required, be applied to the lower extremities, instead of the hypogastrium. If the patient complain of being tired, use

Fourth. AC, base to hypogastrium ten minutes. Treatments may be given in the bath, if desired, by tying the plates round the person, by means of the perforations at the ends of the plates, and sitting on the other electrode.

DIARRHŒA.

Not forgetting hepatic and other disturbances as causing this mere symptom, its annoyance and the resulting mischief are often paramount considerations. Besides the cure of such causative conditions, its treatment is as follows:

First. Bath, if practicable.

Second. C in No. 5 plate from end of sternum lengthwise to abdomen, A in No. 6 plate across lower part of the bowels fifteen minutes; the current is obviously reversed. In addition, three drops of tincture of myrrh in teaspoonful of brandy every one half hour until relieved, then three times daily will be effectual.

DYSENTERY.

Colitis, Enteritis, Peritonitis.

The treatment of these is as follows:

First. Bath with AD in the usual way, to be re-

peated in a day or two; also, on the same or the next day.

Second. BD, the positive applied to the abdomen with No. 7 or other plate, the negative to sacrum or anus, with No. 2 or 3 plate, or otherwise, say from coccyx up, strong or weak as required for comfort. Let the patient go to sleep under its action, if he will, and in fifteen to thirty minutes simply detach the conductor from the battery.

Repeat once or twice, or give shorter and more frequent treatments.

CHOLERA AND CHOLERA MORBUS.

During an epidemic, a good prophylactic will be found in the regular use of the electric vapor-bath, and having some bran crackers at hand at all times with which to meet the first cravings of hunger.

For the paroxysm use, as strong as can be borne, the following course:

The great characteristic, despite burning pains and the like, is deficiency of gastro-intestinal heat. Therefore, apply:

First. CE positive with No. 3 plate, from sternum downward; negative with No. 4 plate across sacrum, ten to fifteen minutes, or until better. If now a natural moisture appears on the surface, the patient is safe. Give in the bath, if it be ready; otherwise, without it, the next course combining the vapor-bath.

This second procedure is as follows:

Second. B, with No. 6 plate, across stomach, liver, and spleen; D, with No. 3 plate, from coccyx up.

This is to be continued until all pain is gone, and the evacuations are arrested. If not in bath, the applications may be continued without interruption, if needful, an hour and a quarter. If in bath, after rubbing the patient dry (at the end of the usual time, more or less), finish the application in bed, between blankets.

Now wait for developments, and if the disease inclines to persist or recur, treat at intervals of one, two, more hours, as required, including two baths a day, and observe the following order (as at first):

a. CE; *b.* BD; each ten minutes. Then, for once,

Third. AD in bath, in the usual manner.

Rotate the several methods, using good judgment in varying treatments, if individually required, and taking all the usual preventive and conservative measures besides.

ALBUMINURIA.

Diabetes.

These two affections are considered together, as their Electro-Therapeutic indications are similar; and because, in some sense, their pathological history is assimilated, as when diabetic symptoms, non-saccharine, it may be, prove forerunners of Bright's Disease, etc. What is here said, however, will have direct reference to the latter.

Albuminuria is more or less identified with certain predisposing and exciting causes. Thus, lympathic women, who are heavy and careless eaters, consuming condimentary stimuli largely; or, on the other hand,

daring athletics who habitually and exhaustively exert their whole muscular power; or persons whose professions cause similar exhaustion of muscular and nervous tone, especially where the loins are greatly taxed; blows, falls, strains; all these are conditions which may be precursory to this diseased state of the kidneys.

The cranial diagnosis is capable of revealing a lesion of the region of the kidneys, capable of development into Bright's Disease, in advance of chemical microscopic tests; consisting, sometimes, as dissection has proved, in rapidly fatal cases, of a varicose state of the minute branches of the renal vein, obstructive to the local circulation: deposits of the usual sort with cysts being detected in the immediate vicinity of the varix. Instead of the upper portion of the hilus of the kidney, the lesion may affect the region occupied by origin of the ureter, having then a sort of hæmorrhoidal character. Such a state of things may fail of discovery by other means than cranial diagnosis, whereby it is plainly revealed.

The Electro-Therapeutics of such cases, whether the urine show the presence of sugar albumen cysts, or of none of these, is similar, as already stated; and consists of treatment addressed to the kidneys, and to the associated viscera, as for inflammation, to the system at large, and to certain special indications.

DROPSY.

Among the special indications is one which often arises, not alone in kidney affections, but in many

others; *i. e.*, the prevention of anasarcous accumulations. In Bright's Disease it stands first, hence it is here introduced. If already present, however, their removal or diminution, if possible, is the next best thing to be done; using in both cases the like treatment, but in the latter augmenting the frequency and duration of the various manipulations, having reference always to the vital power and endurance of the patient.

A convenient apparatus for most dropsical affections of the trunk, however caused (and the treatment there given is equally applicable with obvious variations to *cardiac* and *other forms*), is found in a stool with a round seat, slightly concave, and covered to about half its extent at the center with a brass plate, connecting at the under side with a small brass post, perforated to receive the pin of the conductor, an ordinary set-screw securing this in place. Adaptable to this seat are several supplementary plates of different metals and varying sizes.

Elimination of Morbid Materials deposited in the organism, including the metalic poisions, as *mercury*, is effected by like means; also, in part, by the use of the foot-tub, with and without the bath. Supposing that, in a given case to be treated, the cranial diagnosis or other means has demonstrated a mercurial taint, this will have to be corrected as a condition of cure. The procedure will be as follows, and the fluid will at the same time be acted upon:

Lay upon the stool a zinc plate, larger than the brass center. For *trunkal dropsy*, let a still larger

brass plate underlie and project beyond the zinc. If only the dropsy and no mercurialism require treatment, simply *omit the zinc;* proceed otherwise the same. Cover the plate with wet napkin as usual.

First. Attach D to seat; with B, in a large sponge, brush downward repeatedly from base of occiput to just below the kidneys, there giving an outward movement each time to the electrode, alternating sides every five minutes, until the expiration of the treatment, and beginning every stroke at the same point, the basilar region; in all fifteen minutes. Then,

Second. Place B with No. 6 plate across the stomach, liver, and spleen, twelve to fifteen minutes. Then,

Third. If there be œdema of the legs, place the feet on No. 7 plate, or in the foot-tub with D transferred, B with No.8 plate from coccyx up, making sure to reach the inter-renal space, ten minutes, and

Fourth. Transfer B to No. 7 plate, spread over the whole abdomen ten minutes.

The supposed case being a very bad one, the treatment is made thus lengthy. Repeat also, twice a day. Besides every day,

The electric vapor bath with AB. Should the *face* be badly swelled, this will be first in order (but in such an event substitute BD.) In ordinary cases, the first day's routine will be; First, treatment as per 1, 2, 3, 4; the second treatment, bath with AD, and if judged necessary, repeat the former later in the day; or, instead, address the last course to the *minor concomitants*, as pains in the head, palpitation of the heart, and particular effusions which may be attended with extraordi-

nary distress, for instance those of the pleura or pericardium, which require manipulations as if for inflammation of the same parts, but of less duration. If the head pains be in the region of the hairy scalp, treat as for nervous headache; if in the forehead, as for gastric headache.

Refractory cases. Should the dropsy resist this method, recourse may be had to the following, as the final daily manipulation in lieu of that first described, which is still to be held the leading one for each day.

First. If abdominal, use the stool, with D attached, the large brass plate covered with the wet cloth, next the nates with B in sponge-cup, knead the abdomen all over from above downward ten minutes.

Second. If in the extremities, D with No. 7 plate at feet, B with No. 5 (the long narrow plate) covered with the usual wet cloth, and held at the ends by two pieces of insulating rubber-cloth, in the operator's hand, being used as a *stripper* to each leg, beginning at the upper portion of the swelling and moving downward over the foot.

As improvement goes on, these extra manipulations may be remitted.

INCONTINENCE OF URINE.

This in children is frequently caused by local irritation; the parts should be well and frequently bathed and the child cautioned against chafing the parts by yielding to the desire to rub or scratch when burning or irritated.

In adults it frequently occurs from pressure against

the *bladder*, prolapsus of the bladder, straining on the urethral ligaments, and again from calculi deposited in the fundus and irritating the mucous lining of the bladder, and ultimately causing muscular relaxation of the mouth of the urethra.

The plan of electric treatment will be about the same in all cases, if there exists no obscure reason for the weakness.

B in No. 2 plate over the bladder.

D in an electrode wrapped in a sponge pressed against the pubes ten minutes, then change,

A in No. 2 plate over bladder,

C in No. 8 plate, long end between kidneys, the broad wings of plate on the hips, and the blunt end extending toward the coccyx.

This five minutes, neither treatment too strong; in fact the weak side of the battery is preferable, graduating the strength by the cylinder. The treatment can safely be used twice daily until relieved, then one treatment a day until the cure is effected.

If complications exist, they should be addressed with judgment, for they may be the cause of the manifest *disease*.

When the urine scalds the skin and causes an abrasure, great relief can be obtained by first bathing the parts with tepid water, then apply glycerine, laying a piece of old black silk well saturated with water between the parts. This simple attention will yield frequently great immediate relief.

CYSTITIS.

Metritis.

For both these maladies, the electric currents are used in essentially the same manner for virgins and for men. The treatment is similar to treatment (for cystitis) in married women, alternate with the use of the vaginal electrode. The use of any vaginal instruments in virgins is to be avoided, as its effectual treatment can otherwise be obtained in nearly all instances, even of uterine inflammation and displacement.

For General Use.

First. B, with No. 4 plate, across sacrum at a suitable point to insure the proper course of the current, D, with No. 2 plate (the small square plate), at the supra-pubic center, fifteen minutes.

For affections of the urethra, vaginal cavity of cervix, and even of rectum, of a suppurative character, adopt the principles involved in the cure of uterine ulceration, which see, as follows:

Second. In all such cases, use twice a week the electric vapor bath with AD.

Access to these parts is also attainable by way of the rectum and vagina.

OVARITIS.

Requires the interior pole to be located upon the corresponding groin, or if the instrument is used within the vagina, the sponge-cup should be placed upon the side affected. So also when an instrument is used in the rectum.

ULCERATION OF THE GENITO-URINARY PASSAGES, RECTUM, ETC.,

Aphthæ (or consisting of curd-like sloughs), canker.

The neck of the bladder, vagina, cervix uteri, rectum, etc., are subject, like the buccal, and probably all other dermoid tissues, to aphthous irritation, and even actual ulceration. In this region such conditions are evidenced by great pain in urinating, and other well-known symptoms, varying according to locality, and the degree of the morbid condition.

The principle of treatment in all these is the same — what may be called, in electro-therapeutic language, a "running off" treatment, commonly applied thus (supposing it to be the female bladder):

First. B, with No. 2 plate, at supra-pubic center; D attached to the female catheter, which is to be simply engaged in the urethra, gradually increase the strength of the current until it becomes as strong as can be comfortably borne; continue ten minutes.

Second. AD in like manner, but withdrawing the catheter to the orifice, and there holding it five minutes.

The male organs require a longer catheter, insulated or not, at the outer portion by the gum tubing, for the first course the vagina requires the vaginal electrode —(See Figs. of Instruments)—the cervix uteri, the sound-shaped, olive-pointed uterine electrode; the rectum its own instrument, etc. (Compare stomatitis.)

If uterine ulceration extend to the fundus, it may be characterized by membranous or other extreme form

of dysmenorrhœa, and by an exquisite sensitiveness to the contact of instruments, whilst the depth of the morbid process renders a considerable depth of insertion necessary for the first course. Then (and this may be done without a speculum) proceed thus:

First. The patient recumbent, the battery at the side of the couch, attached a conductor to Sims' sound, insulated, all but say three inches, but not yet connected with the battery; D with No. 2 plate supra-pubic. Holding the sound, with the right index finger guiding it, carry it *to*, but not yet into, the os. Then with a very gentle current connect this conductor with the B post, whereby BD is made to flow *in* reverse, acting as a local anæsthetic. Increase the strength as the benumbing effect becomes apparent, up to the maximum of endurance; now gradually pass the sound quite to fundus. Once fairly located,

Second. Reverse the current, giving still BD, but from above downwards. This is done by simply changing the position of the brass pins of the conductors at the battery, without disturbing either patient or appliances; continue thus ten minutes, then,

Third. Withdraw the sound to the os, and transfer the pin of the pubic conductor to A, five minutes; when tolerated, increase treatments to thirty minutes in all.

UTERINE DISPLACEMENTS.

Causes: long-waisted dressing, and all its pernicious results; weakening of the muscular system by any means; every thing that excites unduly, or congests the uterus and ovaries; falls, blows, strains; careless-

ness as to voiding the contents of the bowels and bladder—of these very common but avoidable affections,

Virginal cases, with *rarest exceptions*, need only external applications with electricity, to cure them perfectly. Married women, especially if the parts are relaxed by child-bearing, require, as a preliminary, manual replacement of the uterus, followed immediately by internal treatment. If these manual replacements are requisite, let it be remembered that in repositing this organ, *lateral* deviation usually forms part of the trouble, whatever its main character may be, and that the first corrective movement must be lateral also; *after* which, the median deviation will much more readily yield and be retained by simply lying in the posture exactly reversing the bent of the total deviation, with attention to all the mechanical and other indications involved.

The importance of prompt attention to these troubles may be estimated by a moment's reflection on the fact, that two-thirds of the tubercular cases which occur in young girls, the first note of danger is sounded in the form of some uterine difficulty. Then the "saucy stomach," wrong eating, with unhealthy tastes, impoverished blood, and phthisis. And on the other hand, early attention to uterine troubles, seemingly of the most insignificant character, has again and again broken up the whole tendency, and saved a life from sinking into the inherited grave of a "consumptive family."

The general rule to treat the most distressing symp-

toms first, finds an imperative exception in cases of "galloping consumption," traceable to and associated with uterine displacement, etc. In all such cases the special rule is to "treat the uterus in a hurry!"

Whenever you see a waxy-faced girl, make sure of uterine displacement! And fail not to give warning of what may come of it.

For electric *treatment*, the universal position *is* BD *dorsal*. To tone up ligaments, muscles, etc., is the indication. Vesical prolapse is met by the same processes.

In *virginal cases* apply as follows, the treatment for married women, with this exception, that the positive is placed upon the sacrum, not in the vagina.

In all, the concomitant complaints are, of course, to receive a due share of the operator's attention.

In the married, the vaginal instrument is used. Here, as in all other internal procedures, it must be remembered that the mucous secretion acts in a dispersive manner on electric currents; less, however, when given in reverse, *from* the mucous electrode. (It *may* also be found that the nerve-currents observe a predominate flow of like sort; centripetal in the mucous tract, centrifugal in the cutaneous sphere.) The *reverse current*, then, is here used. Being also an essentially paretic state with which we deal, the rule is also corroborated by this indication. Use AD.

First. Have hot and cold water at hand; and every thing else in good order. Place the battery on a stand or chair, near the right of the couch; attach the vaginal electrode to A, and let it lie in the hot water, by way of preparation; before introducing, rub with

fine soap, "elder-flower," preferably, or glycerine, also lubricate the index-finger, throw a shawl over the patient; ask her to raise and flex her left knee; keeping her *hands down;* reassure her; examine, and correct the prolapse, if not previously done, using the right hand; pass the vaginal electrode alongside of the finger to the posterior cul-de-sac, or, if there be metritis, to the os; as indeed may be done in other cases; withdraw the finger, holding the instrument inside in undisturbed position; direct her to breathe quietly, for fear it be expelled; crowd a towel firmly under it; lowering the knee, whilst it is held.

Now, remove the hand; have ready the sponge-cup, attached to the conductor, but not to the battery. Carry its handle inside the outer sleeve of your right arm, that it may not touch the patient's limbs; place the palm on the outside of the cup, and carry it up to the left groin; place the sponge well over the ovary; connect to the battery; draw out the cylinder as strong as can be borne, then quickly return it by means of the left hand, which will cause active contraction; continue five to seven minutes.

Second. When, after this time, the contraction has nearly ceased, lift the pin from the post, and so disconnect; reapply sponge to right ovary, reassuring her again, and cautioning her to keep her arms down; and proceed as before; five to seven minutes.

Third. Disconnect as before, and re-apply at the supra-pubic center, over the uterus itself.

Do not continue longer at either point, than seven minutes, nor after contraction ceases. If this be neg-

lected, soreness will ensue, and retard treatment, even requiring to be antidoted.

Duchene's double ovarian electrode is employed to advantage in all cases—as the *third* manipulation.

Warning must be given beforehand, in such cases, that something of this kind is to be expected, say in the course of ten days, or sooner, if the treatments be frequent, as they may be when time is limited—especially if much tissue—metamorphosis be involved in the process of cure.

Not less than four days of consecutive treatment must be stipulated for, at the commencement, with all old cases, as this is needed to be effective, although the immediate effect is often very marked after a single treatment.

Fourth. Should, however, headache follow, antidote it by AC, from base of occiput to vagina.

If general nervous excitement, use the same letters; hands to vagina.

Now, come abundant and imperative cautions — to eschew all lifting, reaching up, stooping, going up and down stairs; and not least, sexual intercourse, during three or four days, at least from the beginning—and later, according to condition. And in combing the hair she must *sit down*. These warnings are requisite to guard against straining the ligaments sustaining the uterus to obviate relapse.

In cases of very limited time, treatments may be given, provided all the cautions be observed scrupulously, at intervals of two hours—or, say four daily, for four days. If no such haste, once daily; when, in

about thirty days, a cure may be expected—or if bad, sixty days.

Much of the final success of the treatment must of course depend upon a better observance of hygienic conditions than were probably in vogue with the patient prior to consultation; and of this fact she must be duly informed.

ORDINARY DYSMENORRHŒA.

Painful Menstruation.

Menstruation does not contra-indicate electrization, by any means; but affords an indication for the preference of the positive pole in the vagina; giving upward currents, which do good work in relieving pain and prolapse. At this time, however, no instrument is to be passed within the os—only to its orifice; the negative, with No. 2 plate supra-pubic.

If the irritative-symptoms predominate, begin with BD; end with AD.

If soreness be marked, it implies ligamental relaxation; use AD; for, owing to the dispersive influence of the moisture, this current is so modified as to deliver in part BD, which it in some sense includes; the latter being the ligamental current proper; beside which, muscular tissues are also concerned, requiring AD for its own effects.

METRORRHAGIA.

Uterine Hæmorrhage.

Usual after delivery—still liable to occur when the vascular condition of the uterus is favorable.

Apply, in reverse, B; the positive electrode, enveloped in a sponge, and placed between the labia; D the negative, with No. 4 plate on the epigastrium. (If need be, use the vaginal instrument internally.)

UTERINE INERTIA, IN LABOR.

A in vagina, or between the labia; D in sponge-cup; gently knead the abdominal region of the uterine globe all over, from above downward. Vibrating the current will cause action and renew labor pains.

IMPOTENCE.

The hygienic conditions of cure are well understood, and cannot be over-rated.

The electric treatment is as follows:

First. BD in reverse; B, with No. 7 plate covered by a large, soft, and wetted sponge, on which the patient sits; D, in sponge-cup, rub from below up to the kidneys; twenty minutes.

Second. AC from hands, or from base, to hypogastrium; to allay excitement, and to tone the nervous system; five minutes. Repeat these for three treatments.

Third. Fourth treatment, *in bath*, thus:

B at external genitals, etc., as before; D, basilar; three minutes.

b. D in foot-tub; B sponged down the spine; five minutes.

Rotate with the foregoing manipulations as long as required.

GONORRHŒA.

Have a cup for the exclusive use of the case, in which place the negative and the end of the penis with water; if a woman, a vaginal electrode introduced instead. The positive is to be applied above the pubis, or at the spine, or around the penis.

First. BD continued for ten minutes.

Second. Then change to AD; ten minutes.

Repeat once a day, or oftener, according to the urgency of the symptoms, and varying with other treatments, if needed, to meet special indications, as for fever, etc.

SYPHILIS.

Primary Ulcers.

Manipulate, if much inflamed, as in gonorrhœa, taking care to submerge the affected portion of the surface. But in the more common indolent condition, whether of chancre or chancroid, prefer a focalized treatment by means of a small sponge attached to a cotton spool by a loop of wire passed through it; the whole insulated with rubber cloth for the safety of the operator, as in other like treatments. The negative thus applied, with BD, is metaphorphic; with AD, eliminative; ten minutes each, daily or oftener. (Compare ordinary ulceration.) This brings about a simple, healing condition, which soon changes to cicatrization.

Bubo,

(a painful swelling of the lympathics of the penis.)

First. Submerge the penis in basin of water with D;

B, with sponge electrode, upon the swelling; twenty minutes.

Second. AD, moving the positive over the swelling toward the negative; five minutes.

Third. If great soreness, AC instead, *from scrotum down.*

CONSTITUTIONAL SYPHILIS.

Make frequent use of this electric vapor-bath, using in alternate treatments, BD and AD. In addition, treat whatever localizations exist. For cutaneous syphilis, the bath, with mercurial fumigation of a mild sort, is required. For mercurialism combined with it, resort to the eliminating stool, etc. (*Vide* cutaneous diseases, etc.)

HYDROCELE,

(a collection of serous fluid in the areolar tissues of the scrotum, or testicles.)

Submerge the scrotum with the negative; or, wet the sponge freely, and accommodate the scrotum in it, surrounded by a plate with D; apply B above for ten minutes; then put A in its stead, ten minutes.

VARICOCELE.

First. Patient recumbent; having located the veins and applied the No. 1 plate on either side of them with AC, in sponge-cup, on the opposite; focalizing the current; ten minutes.

Second. Connect the same with B, No. 1 plate ten minutes.

Repeat daily. Attend to any hepatic, renal, or other concomitant.

VARIX OF THE LEGS.

Varicose Veins.

Use centripetal current AC. Patient recumbent.

First. Place the positive with No. 5 plate above the heel, and overlying the lower portion of the veins; the negative with No. 3 plate beside the coccyx upward on the same side, treating the worst side first; then the other; ten minutes each. Then,

Second. Attach the negative to No. 5 plate, and place both legs at once on the plate, and then each one separately. Remove the positive to the sponge-cup; sponge upwards in the course of the veins; the worst leg first; ten minutes each.

Third. Apply the positive A to the basilar region; the negative C as before; five to ten minutes.

Fourth. Bath every day in both these affections.

Fifth. Correct visceral troubles.

ANEURISM.

If near to bursting, maintain a free medium of mucilage of quince-seed upon its surface as a precaution, combining with it a little vinegar or lemon juice, say ten drops to the ounce, and no more. Apply with the handle of a silver spoon. One ounce and a half at a time may *be applied.*

Wherever located, the principles of treatment are the same. Supposing it to be a protruding, anterior, aortic tumor, apply, the patient reclining,

First. C, with No. 3 plate, along the spine, below the level of the protrusion; holding A in your own

left hand, wet two fingers of your right with the acidulated mucilage, and apply, moving them around the upper half of the tumor again and again, continuing this manipulation twenty minutes. The first two or three minutes should be preparatory to this, using only a little tepid water to soften the cuticle and favor absorption.

Other Aneurisms

are to be treated in like manner, placing the negative on the lower course of the artery.

Aneurism in Delicate Situations,

as about the orbit, requires careful manipulation; and for this, the positive is to be bound on the right wrist of the operator, who uses this hand for manipulation, the negative being held upon the carotid.

ANEURISM BY ANASTOMOSIS.

Treat as for protruding aneurism; negative on the nearest arterial trunk, below; the positive applied by hand or by sponge-cup.

Treat daily (with AC) at first, twenty minutes.

INDURATIONS—ADENOID AND OTHER. TUMORS—BENIGN AND MALIGNANT.

First. As a general thing, we can depend on BD as a "breaking-up" current; AD to "run off" the debris; applying the positive to the tumor, the negative near some emunctory. Patient recumbent, if convenient.

Second. But, should it be characterized by extreme hardness, as is scirrhus; supposing it accessible, begin with CE, the "warming and softening" current, which is diffusive, and prepares the way for BD, which follows it. Use the former twenty minutes; the latter five minutes.

Repeat this daily for several days, or until there is perceptible softening or diminution. This done, apply,

Third. BD, thirty to forty minutes, next day.

Fourth. AD in bath, base to feet, twenty minutes.

Fifth. For subsequent nervous irritability (especially after BD) use AC; hands to coccȳx; five to ten minutes.

If, whilst applying the currents, the patient fall asleep, disconnect the conductor from the battery and wait.

MAMMARY TUMORS.

Cancers.

Protect the lungs, by moving the negative with sponge-cup over the glands and off at the nipple, the positive being if the attachments are upwards, placed at the same side of the cervical spine; if the attachments be downward, however, apply the positive below. If there be intercostal attachments, place the positive behind, and nearly opposite to the negative. If any sort of discharge comes on through the nipple, the cure is certain. Watch for it, after the third treatment.

Apply the negative with No. 3 plate along the spine, a little lower than the diseased spot, at center, or a lit-

tle to one side as indicated, the positive as near as may be upon the disease. Employ the usual currents daily.

UTERINE TUMORS.

Use vaginal electrode, or ball, to the os, with the negative sponge-cup or No. 2 plate, with positive supra-pubic. These growths may discharge by vagina, bladder, or rectum.

CAULIFLOWER-GROWTHS

are apt to slough off.

POLYPI

may be separated from their attachments, by a loop of brass wire connected with D, or by an ordinary uterine sound pressed against the pedicle on either side alternately, fifteen minutes to each side, total thirty minutes.

(The positive, as before, supra-pubic.) Repeat daily, kneading the abdomen, as for constipation, the first few treatments. Baths are indispensable every third day.

OVARIAN TUMORS.

Cystic, Fibrous.

The first procedure, in all tumor cases, is to discover if there is any uterine displacement, and address the first treatment to remedy the deflection. See displacements.

Place B in No. 6 plate across the external prominence made by the tumor and D in sponge-cup, knead the lower part of the bowels fifteen minutes, then

change to A in the vaginal instrument, which should be placed against os uteri, and D in sponge-cup over the tumor. *Strong vibrations*, so as to cause considerable motion. Again, A in the uterine sound should be judiciously introduced and swept around the fundus of the uterus, and plate No. 8 placed so as to implicate both ovaries, the fundus of uterus and external down as far as plate allows.

Baths to be taken every other day with D, No. 7 plate on the seat, A in the sponge-cup, and the *entire* external surface of the tumor manipulated. These external electrizations of tumors, are slower than the electroytic needles, but safer, and less liable to produce *metastasis* or shock.

The author does not question the most excellent methods of Dr. Althaus, or any other electrical surgeon, but stakes her experience as attended by success, and commends itself for *simplicity*.

Frequently in cases of tumor, the strength of batteries are increased by additional *jars*. All tumors are treated with special reference to destroy morbid conditions and disperse or absorb and eliminate the morbid functions, hence they must be addressed in a similar *method*.

Tumors on the Extremities.

Run BD and AD from tumor to foot, alternate days. If painful substitute BC. The foot-tub, containing water, with the negative, may be preferred.

ENCEPHALOID CANCERS.

Is sometimes identifiable with a syphilitic, or syphili-

tico mercurial taint, which in the course of electric manipulations, will be exhibited, by the inevitable cutaneous elimination, and by the mercurial sign, in the latter case. If not syphilitic, it can be done away with without breaking.

If unbroken, apply the positive above and upon the growth, the negative below, BD and AD, alternate sittings of thirty minutes each.

If broken (as with other open cancers), apply the negative to the raw surface, with sponge or cloth intervening, under a plate, a rubber cloth over all. The positive is to be so placed as to give a centrifugal flow over the nerves *to* the growth.

Under this process, it may rapidly slough, but without much hæmorrhage.

HÆMORRHAGES

(of all kinds), are readily stopped by AB, centrifugal or direct or reverse current.

When the surface presents a perfectly healthy ulcerated appearance, use AC direct currents to heal, as with other suppurating cavities. If slow to heal, apply a tepid wet cloth to the whole suppurating surface, and around it; on this a sponge containing the negative electrode, the positive to the surface near by and higher up, twenty minutes daily.

Injury to the skin by the negative is possible in manipulating tumors, hence it should be kept moving so much as may be, as already directed, toward natural ducts and emunctories, but a suppurating surface is itself such. The *resolvent* action is also enhanced,

favoring elimination, and by the migratory use of the electrode above described.

SYPHILITIC TAINT,

is to be met as directed for constitutional syphilis.

OPEN CANCER,

carcinoma of the breast, for instance. Treat as for tumor, regardless of ulceration. If burning and itching pains, use AD; if coldness, CE; if soreness, AC.

COLLOID CANCER

may be found in the rectum, etc., causing stricture, or other troubles.

Treat with rectal instrument.

First. BD, from lumbar spine to stricture, fifteen minutes.

Second. Same current, but B supra-pubic.

After three treatments, alternate this with

Third. AD, used in the same way every other day.

Fourth. Attend to concomitants.

In all varieties of cancer, there is a great probability of other organs, internal and external lymphatics, etc., participating. These are to be watched, and morbid changes timely appreciated and actively treated. To this end, always promote a tendency to the outlets of the body, and preferably outward and downward.

Treatment of the local malady is to be perfected by a clinching generalized course, as indicated.

ERYSIPELAS

implicates all affected organs, by the course of the currents, as in other cases, reaching the varied functions and tissues by the selection of the currents, as indicated.

First. If purely superficial, apply a tepid wet cloth, over which apply A by hand; C basilar, No. 1 plate, supposing it be facial; or if in a limb, negative to foot. Make the current and the touch such as the extreme tenderness will tolerate, using short and frequent treatments, applying for protection in the intervals, tepid flax-seed tea, or dry rye-meal. In the various movement of the fingers during the treatment, pass frequently outside the limits of the inflammation, expecting thereby positively to *prevent its spread.*

Second. If deeper, as is common, the faciæ are involved, indicating BD; the positive used as before, or with plate or sponge-cup, moving downwards towards the negative (not too much space between, but rather close, limiting the extent of current from morbid region.)

Third. Daily (each morning at first, afterwards each evening), give the electric vapor-bath, after which *a preventive to "catching cold"* may be needed; then,

Fourth. CE, positive basilar; negative successively to the trans-epigastric region, to the feet, to the hands, five minutes each.

Fifth. If much nervous irritability, and even sleeplessness and restlessness, use AC, base to lumbar vertebra, then to feet, ten minutes each.

Sixth. If phlegmonous, guard against suppuration, arrest it, and cause re-absorption, if requisite and feasible, by localized use of BD alternately with AD, frequently repeated, covering the diseased tract fully with tepid wet cloth, to which apply the negative by a large plate, tied or held in place; positive on affected space opposite, and a little above.

Seventh. If pus have already formed in such amount as to demand discharge, a suitable spot is chosen, and the negative focalized there by means of the wire brush, with its ends gathered into a compact bunch, thus acting as a gradual cautery, which is readily regulated in the extent and depth to which it shall act; the positive above, and at a short distance only from the other pole. If sloughs form internally, space must be made for their escape. If suppuration be wide-spread, several openings may be required, not forgetting to allow, by position, for drainage.

Eighth. If sloughing occur extensively, a fatal issue is inevitable, unless checked immediately. Hence, it demands early preventive attention, wherever phlegmonous erysipelas attacks a dense structure, such as the dorsal facia, either of the thigh or trunk; the course recommended for this form in general being the prophylactic in such case.

Ninth. The general system, and special organs and functions must be duly cared for.

FURUNCULUS.

Boil.

PANARITIUM.

Commonly called Run-a-round.

INGROWING—*Nails.*

BURNS, BRUISES, FROST-BITE.

ABSCESSES.

SPRAINS.

However diverse in pathology, all these affections require like manipulations with electricity.

An important condition of permanent success consists in curing the sympathetic extension of the morbid process along the track of the nerve-trunks involved. Neglect of this is fruitful of relapse, of which a *sprain* affords marked illustration, and with which may be classed also the ordinary subacute rheumatic joint. Undue use, after relief, also causes much mischief in both these cases.

Stiffening, and the like, requires a persistent after-treatment for its relief, in accordance with the direction under Defective Joints.

The typical procedure, in all the above affections, is this:

First. B, above, with plate tied or bound on, both front and back, or half round the member, then the other, thus avoiding surface waste; D in basin, with the diseased part, or, instead, in sponge-cup, brushed downward over it, a wet cloth intervening. Continue and repeat as needed. Later, AD. If a felon, on one finger, isolate it in the water, resting it on the surface

of the basin, an insulating rubber cloth between the hand and the edge of the basin, BD twenty to thirty minutes; AD five minutes. Repeat as soon as half an hour, if the pain again becomes severe.

ANTHRAX—CARBUNCLE.

Treat as for phlegmonous erysipelas. The core, or slough of deep fascia, is to be liberated by the wire-brush cautery, as soon as may be, as explained in that connection. In boils there is also a slough or core, formed however of the superficial fascia. The core of the felon is formed of the theca of the finger, or of the palmar fascia. In all, there exist like electro-therapeutic indications. After BD has been used, and a change for the better effected, substitute AD.

FELON; WHITLOW.

Prepare a bath for the hand of saltpetre and spirits of turpentine; place D in the bowl, and A to No. 3 plate tied around the wrist, make the current as strong as can be borne for thirty minutes, then bandage the finger with a solution of spirits of turpentine, resorting to the electricity, if convenient, three times daily, always keeping the finger or hand bandaged in spirits of turpentine and *saltpetre*, when not treating generally; if taken in season, this will break up the felon. If it is necessary to lance the felon, do so before an application of electricity. Very seldom does a patient lose even the nail, with this treatment. And the tendons of the fingers are not indurated and inflexible afterwards.

PUSTULA MALIGNA.

A species of anthrax or *malignant boil.* It has been repeatedly induced by reception of an animal infection into the organism; is gangrenous, and usually fatal, because it evades detection until the entire system has become inocculated, and poisoned. The immediate use of nitrate of silver, in burning out the poison, and the part plunged in a bath, very hot, of strong carbonate of soda (common washing soda) with the positive A at base of brain; and D in the bath—in which is immersed the affected part, for twenty five minutes, and poultices of flaxseed, sprinkled over with *sulphate of zinc*, applied frequently to the *issue.* Electricity should be addressed *above* the entrance, or beyond the track of the poison taint and to the issue. An electric needle plunged into the pustule—and several places in the tract of the poison—will be found most effectual. Mercy or tenderness must be held abeyant in these rare yet most dangerous cases.

Electrical application should be made every hour—and the patient should be carried into a bath, when an attendant needs must *go in* also, to support his fainting form. The author has cured one very malignant case, when all hope seemed gone. The poison was received from a slight prick caused by a *lead waste pipe*, and only assumed the appearance of an insignificant water blister, for a few hours subsequent to the accident, when fainting ensued, and the poison streaked through the system like mad. The author was present and acted without *delay* and in the face of the verdict of

death, pronounced by medical counsel carried the patient through, but long weeks of horrible suffering and doubt *ensued;* before the taint of infectious disease was eradicated from the patient's system.

These pustules have been caused by the bite of a *blow-fly* which had been feeding on putrid carrion—hence the sting of any winged fly is not too insignificant to demand and receive immediate attention, for this disease culminates in about forty-eight hours in death unless arrested.

ULCERS,

are very often but symptoms of some constitutional defect, as scrofula, or of general sclerosis, as in old people, etc. Diet and other hygienic conditions, must be met; and in the latter case, may be mentioned the value of buttermilk for food.

In other cases, organic or mechanical obstruction exists above the ulcer, and must be discovered and corrected, as in varicose ulcer. Aside from such indications, use (supposing external ulceration)

First. B, in band or otherwise, above the sore; D, to, or below it; if much inflamed, in sponge-cup, moved around it, and downwards, twenty-five minutes.

Second. When improved, let the last five minutes be with AD. (For internal ulcers, *vide* those of the uterus, etc.)

Indolent *ulcers* require preliminary treatment as for indurations.

FISTULA.

First. Use first, the treatment for indurations.

Second. Next, having obtained a healthy surface,

keep the cavity at rest from mutual friction of its walls (which often prevents such an occurrence in the first place) to allow it to heal.

Third. Apply (if external, as of the anus, etc.) a wet cloth over the whole tract of the fistula, or instead, a sponge, with D; B, above, and adjacent; twenty minutes daily.

Fourth. When improved, substitute AD.

Fifth. If internal, as of the vagina and bladder, treat as above, upon both aspects (alternately introducing the negative electrode into the vagina and into the bladder.) After each treatment, if the fistula be small, and the surface well dried, a piece of adhesive plaster may be made to adhere to the vaginal aspect, supported by a cotton-glycerine pessary (diluting the glycerine if irritable) thus expediting cicatrization. The recumbent posture, the urinal, etc., are also important adjuvants.

Repeat daily; not omitting the treatment of concomitants.

CUTANEOUS DISEASES.

The relation of these affections to the neuroses, as well as to Electro-Therapeutics, has lately afforded an interesting topic for discussion, but being foreign to our present purpose, may be here passed by.

Certain constitutional vices also bear relation to them; and the same may be said of many visceral derangements. Every one of these concomitants must have a full share of attention in treatment.

Again, certain cutaneous diseases are wholly inde-

pendent, others closely dependent, on the presence of parasites—vegetable or animal. Even these become impossible, in a condition sufficiently resistent, with due attention to cleanliness or substantial comfort in general.

The electric vapor-bath is a prominent remedy in all forms; either in its ordinary method, simply, or with the addition of medicated fumigations. These are placed in an open vessel, over a spirit-lamp, under the seat of the bath. See Figure of Fumigating Brasier.

The fumigations are prescribed only in refractory cases. For non-parasitic forms the Gnaphalium, or Life Everlasting, is the substance thus used. For parasitic diseases, as well as syphilitic, the prescription is eight grains of the black oxide of mercury in each bath treatment. The usual application of AD in the bath, it is thought, prevents the penetration of the mercurial beyond the cuticle, to any extent. The oxide is moistened with water, and as the steam from the boiler begins to fill the bath, the spirit-lamp is lighted, and the patient enters; but a window is provided through which, exclusively, he is allowed to breathe the outside air. Continue the bath in the usual way twenty minutes.

By mixing with the oxide an equal quantity of simple prepared chalk, it is made to volatilize more slowly if desired.

When the head and face require fumigation, wet them with a solution of 2½ drachms of calomel and 1½ ounces lime water; separately treat in bath whilst thus wet, alternating with the general treatment.

After such fumigation, the patient should avoid exposure, not even leaving the house during the next three hours. Dry days are greatly preferable. Repeat about every other day.

LEPROSY.

Requires the use of the red oxide of mercury as a fumigation, every third bath (eight grains to bath,) After two weeks of such treatment, give every second day only, and on the intervening days a systemic treatment as follows :

First. B, No. 3 plate, vertical epigastric, D No. 8 plate, coccyx, fifteen minutes.

Second. Transfer B to hands, five minutes.

If infants require fumigation, decrease the dose of mercurial, and in the bath the positive must be fastened or held in position at the occipital base, also the negative at the feet, using the weak (right) side of the battery.

PSORIASIS—(ITCH.)

The bath is given thrice weekly, the black oxide with the second.

All the forms of skin-diseases are likewise to have the following, out of the bath, from day to day, viz. :

First. B basilar, D successively to feet, to hands, to coccyx, twenty minutes.

Second. BC, same way five minutes.

Third. If nervous troubles, occasionally AC, hands to coccyx, or base to feet, if more convenient.

SMALL POX, OR VARIOLOID.

This dread disease is of two varieties, namely *distinct* when the pustules are separated, and distinct elevations with unaffected spaces between the pustules and the *confluent*, where the pustules spread out and run together, covering the entire surface as one continuous eruption.

Epsom salts pulverized and sprinkled over the entire body will allay the irritation, and the legs should be bandaged in a solution of Epsom salts. A very hot vapor bath daily with the same fumigation as recommended under heading of cutaneous diseases.

B, at base of brain in plate No. 1, and

C, at feet in plate No. 6, twenty minutes, three times daily.

A, under the sacral region in plate No. 8.

D, under feet in plate No. 7, ten minutes, to allay the swelling of limbs any time between regular treatments. Room should be kept to 70° even temperature. Draughts are disastrous.

Carbolic disinfectants should be profusely used.

DISEASES OF JOINTS, ETC.

Chronic or Subacute Sequelæ of Sprains, Rheumatism, etc.

If tissue changes are still active, as shown by tumefaction, pain, etc., treat as in the acute forms.

If only the sequelæ and consequent disability, give:

First. Place the extremity, a foot or hand, as the case may be, on plate or in tub with water, as most convenient, with E, C in sponge-cup, moved repeatedly

down over the affected portions of the limb. This current is "warming, soothing, anti-paralytic."

Second. Give special attention to concomitants.

SYNOVITIS.

First. Apply D in electrode covered with sponge, in bend of (knee) joint, sponge-cup with B brushed backwards and downwards, or a flat sponge and plate covering the front and sides of the joint twenty minutes, AD five minutes, same way.

Second. If soreness AC; after this,

Third. Treat fever, and other concomitants.

Such treatment will probably obviate suppuration, resolving its beginnings also.

SUPPURATION.

Open and discharge with aspirator, then treat as above.

Hot applications are always to be preferred to cold. The bath is an essential remedy when the Electrode D is placed in foot tub and A in sponge-cup, rubbed down from the hip to knee-joint and over the knee. An electric plaster develops the suppuration rapidly, and eliminates the disease. The patient can improvise such a plaster by procuring a few strips of zinc and copper, and overlapping the copper on zinc, and *vice versa*, zinc on copper alternately, until the links form a chain long enough to encircle the leg above the joint. There should be a piece of thin linen intervening between metal and leg, and wet in vinegar and salt. However, when convenient, the electric

plaster can be purchased ready for use, sparing the patient trouble.

INFILTRATION OF PUS.

BD, AD, etc., positive in sponge-cup, longitudinal currents by sections of the limb, keeping the positive brushes downward. This, after opening as freely as required, and securing discharge of pus.

MORBUS COXARIAUS.

Hip Joint Disease.

WHITE SWELLING.

First. Every other day for two weeks, give the electric vapor bath, first in the usual manner ten minutes.

Second. Still in both apply sponge-cup with positive above the joint and other affected parts successively, holding it firmly thereon, acting more deeply than if brushed.

Third. On the intervening days, BD base to feet ten minutes.

Fourth. Reverse five minutes to equalize the forces, then

Fifth. Move B to sponge-cup and apply above the joint; if the knee, use instead a plate, or better a knee-cap of brass or other metal with wet cloth or sponge between, twenty minutes.

Sixth. If very sore, use during the last five minutes negative under the foot, positive upon joint. This is the same application as is commonly used for tooth-ache, neuralgia and sciatica.

Diseases of other joints of like nature, as of the shoulder, elbow, and ankle, may be treated on similar

principles. And what has already been said under the head of Synovitis, may apply, in place, to these special affections.

STIFF JOINTS.

Deformed, Contracted, Dry, Cracking Joints.

For such cases, joint caps are to be provided, to fit over prominences. To these, the positive is commonly attached; if the heel, the negative; the prepared plate No. 3 going over the front of the joint. If the knee-cap be used, apply the negative pole in the bend of the joint, with sponge, the limb being flexed. Rub the parts well with oil after treatment.

First. BD, twenty minutes.

Second. AD, ten minutes.

Repeat twice a day until better, unless soreness comes on, then pause a day or two, or ameliorate, *if very severe*, by AC, or CE. Then resume.

If the whole limb be more or less stiffened, the following may be first used, viz.:

First. Same currents, from back, hip, thigh, to foot.

WEAK JOINTS.

D placed successively in the bend of each joint, five to ten minutes each.

A, in sponge-cup, moved down over sacrum, hip, sciatic nerve, etc, the lower extremity being supposed to be affected. Repeat daily.

The joints should be worked, and although causing some discomfort at first, persisted in by the operator, finally strength will reward the effort. When

joints or curvatures are advised to be manipulated, the author does not wish to convey the false idea that severity or protracted movements shall be administered. Frequency and judicious gentleness, and force always understood.

CURVATURE OF SPINE.

The complicated forms of lateral, forward and backward curvature of the spine; renders it almost impracticable to lay down given forms of treatments. One observance will always meet with attending effectual results, namely: the positive pole should be applied to the contracted side of the spinal curve or curves, and the negative pole on the outer or peripheral aspect of the curvature.

First. The patient should be stripped and placed upon a flat table or pillowless lounge, although the table is preferable for many reasons, and the operator should be assisted by a well trained hand, so that the patient may be *stretched* by grasping the ankles and under the arms, and at the expiration of breath, proceed to stretch steadily together, always expending more strength on the contracted limbs. This should be done successively during each session, not more than six or eight times; during this stretching the electricity should be attached to the patient as follows:

A in No. 5 plate from the base of brain down the spine.

D in plate No. 8 from the coccyx up to the lumbar region, ten minutes.

Then turn the patient on his face; use C in the sponge-cup on the inward curve.

D in second sponge-cup on the outer peripheral of the curve, altering the negative and positive as the curves deflect *in or out;* this ten minutes. The patient should be instructed in a series of gymnastics in order to call into action and encourage normal activity of muscles and circulation.

Every fourth treatment a vapor-bath, in which the feet should be placed in hot water with the negative electrode D, and A in sponge-cup rubbed down the spine from the base of brain to coccyx, and about once a week the patient should be seated on plate No. seven, the negative D attached; C positive used from base of brain down to the coccyx, 5 minutes; then the positive C used vigorously across the *diaphragm* so as to implicate the liver and spleen.

These cases require patience and judicious administration of treatments, which will result in a very remarkable amelioration of the conditions of not *only a deformity*, but of the serious physical disqualifications and suffering incumbent.

The author has had the worst and most complicated cases yield to this treatment, and in comparatively brief time, the condition of deformity and disease so altered that the *crooked, abject* patient assumed an erect *position*, and matured in a normal manner.

If the patient uses crutches, great care should be exercised in constant examination of the length of the staffs, that they may not be so short as to cause the body to be inclined too far forward in walking, there-

by compressing the lungs and stomach; then again that they may not be so long that they crowd *the shoulders up* and out of position. The staffs may require gradual lengthening out. Another point is to admonish the patient to sleep in as flat a position as possible, shunning pillows. Lying flat *on the face* is an excellent plan. Of course in these cases the patient must unite *his* earnest endeavors with the physician's efforts towards the one end of health getting, for so much depends upon hygiene and the *minor detailed* modes of life, etc. Constipation must be mainly guarded against.

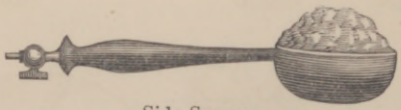
Conjointly, Electro-Therapeutics, physician, and patient can achieve marvels.

Instruments and Appliances Referred to in this Book.

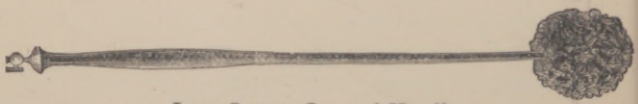
Sponge Handle.

Universal Handle.

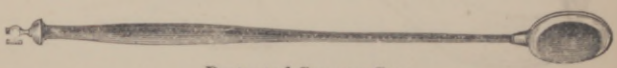
Sponge Holder, with Interrupter.



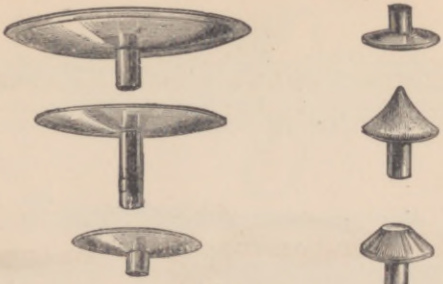
Side Sponge.



Long Sponge Cup and Handle.



Protected Sponge Cup.

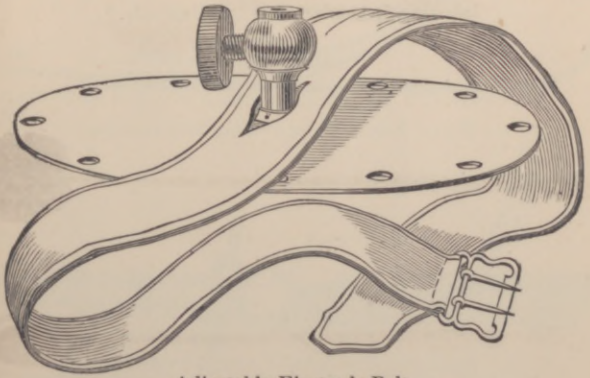


Discs.

Ear and Nasal Prong.

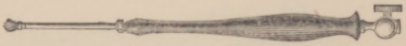
Author's Double Ovarian Electrode.

Hollow Metallic Electrode.

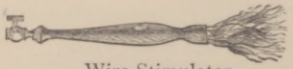


Adjustable Electrode Belt.

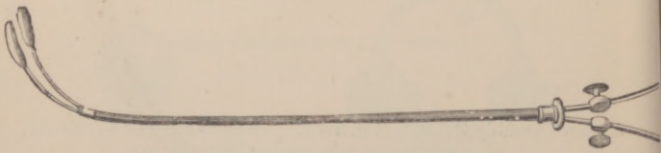
Silver Wire Stimulator.



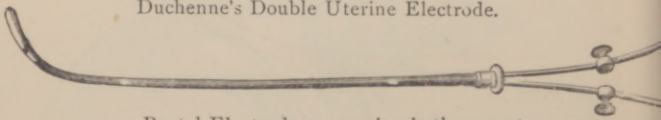
Wire Stimulator.



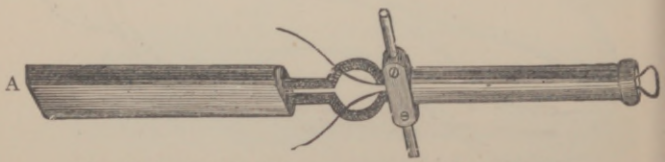
Wire Stimulator.



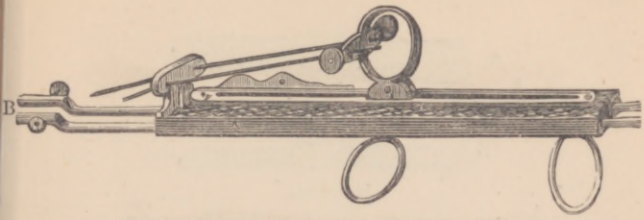
Duchenne's Double Uterine Electrode.



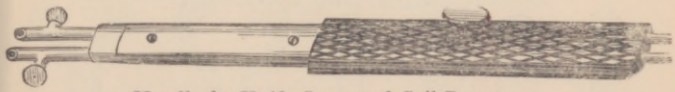
Rectal Electrode, conveying both currents.



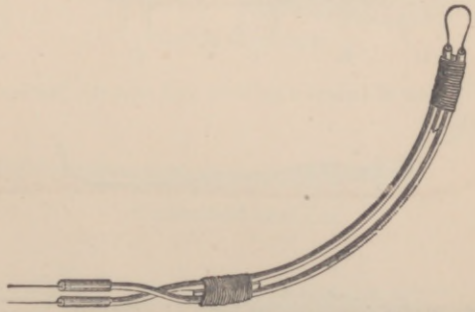
Handle for Platrinus' Cutting Loop, for Galvanic Battery.



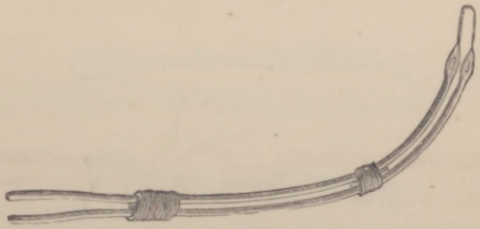
Handle for Cutting Loop, or Galvanic Battery.



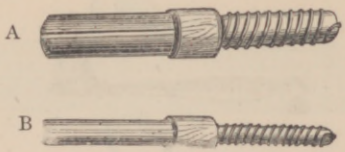
Handle for Knife, Loop and Coil Burners.



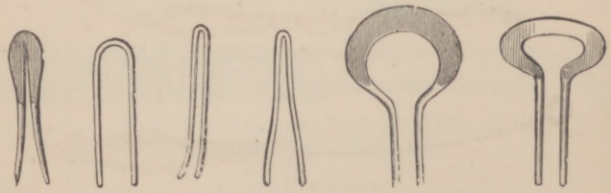
Wire Loop for Larynx. To be used with Handle C.



Burner for Larynx. To be used with Handle C.

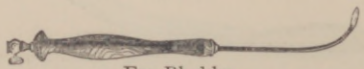


Handles.



Burners of various sizes to be used with the handles.

Throat Electrode.



For Bladder.

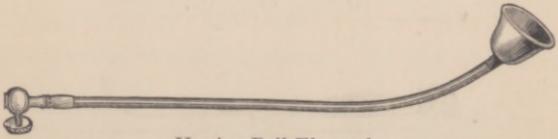
Spatula.

Glass Eye Cup.

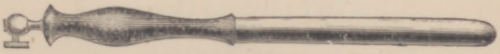
Ear Instrument.

Rectal Instrument.

Uterine Instrument.

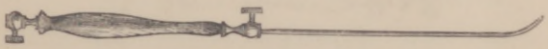


Uterine Bell Electrode.



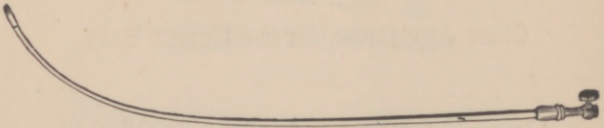
No. 1 Vaginal Instrument.

No. 2 Vaginal Instrument.

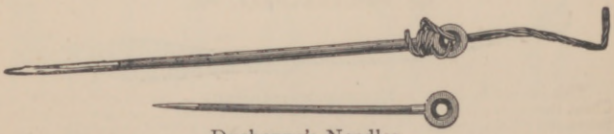


Silver-plated Urethral Electrode.

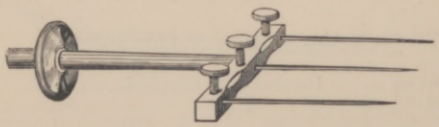
Instrument for Bladder.



Rubber Electrode for Bladder.



Duchenne's Needles.



Needles for Galvano-Puncture.

ELECTRO-MAGNETIC

CHEST PROTECTORS, INSOLES,

AND

Other Appliances for the Human Body,

INVENTED BY

DR. ELIZABETH J. FRENCH,

OF PHILADELPHIA, PA.

This invention (form and combination of metals) is peculiarly adapted to Chest Protectors to be worn over the lungs, front and back, and for Insoles for Boots and Shoes, generating a silent, but constant current of electricity; stimulating and equalizing the circulation, removing and preventing

Colds, Coughs, Rheumatism, Cramps, and like Complaints.

The Insoles are but one-sixteenth of an inch in thickness, to be worn in boots or shoes, and are invaluable to old or young, weak and strong.

They are inexpensive and very effective. As an experiment they cost but **FIFTY CENTS** a pair, and as an investment they have no equal; they return you manifold in comfort and saving of doctor's bills and the expense and inconvenience of disagreeable drugs. They are unequaled as a guard against exposure.

The Electro-Magnetic Chest Protector not only supplies the place of all other Chest Protectors as a covering for the lungs, but imparts a magnetic warmth to the entire throat, lungs and stomach.

The Chest Protector, in a majority of cases, should be worn over one or more of the undergarments, especially in cases of weak and sensitive organisms the battery being in many cases too powerful when worn next to the body Each person must exercise their own judgment after a trial. Price per Pair: **Children's Size, $1.50; Adults, $1.75; Double Felt, $2.**

If you will try the Chest Protectors and Insoles above described, you will advise all your friends to buy them, and ever after bless the person who directed your attention to this invention as a "Good Samaritan."

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"Professor French in her new work gives a very full account of her great discovery respecting electrical cranial diagnosis and the scientific application of nine different currents of electricity to the cure of disease. It gives a thorough system of hygiene, and one of the most consistent we ever read. However much may be said against her electrical panacea as an hallucination or otherwise, she has wrought wonderful cures in chronic and physician-abandoned cases. Happily, there is no check of potency to the progress of science."—*Ohio Farmer.*