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Blanchard (V. W.)

A

NEW MODE OF TREATING DISEASE

BY THE

APPLICATION OF HEAT AND COLD

OVER THE

GANGLIONIC CENTRES

OF THE

SYMPATHETIC NERVOUS SYSTEM.

By VIRGIL W. BLANCHARD, M.D.

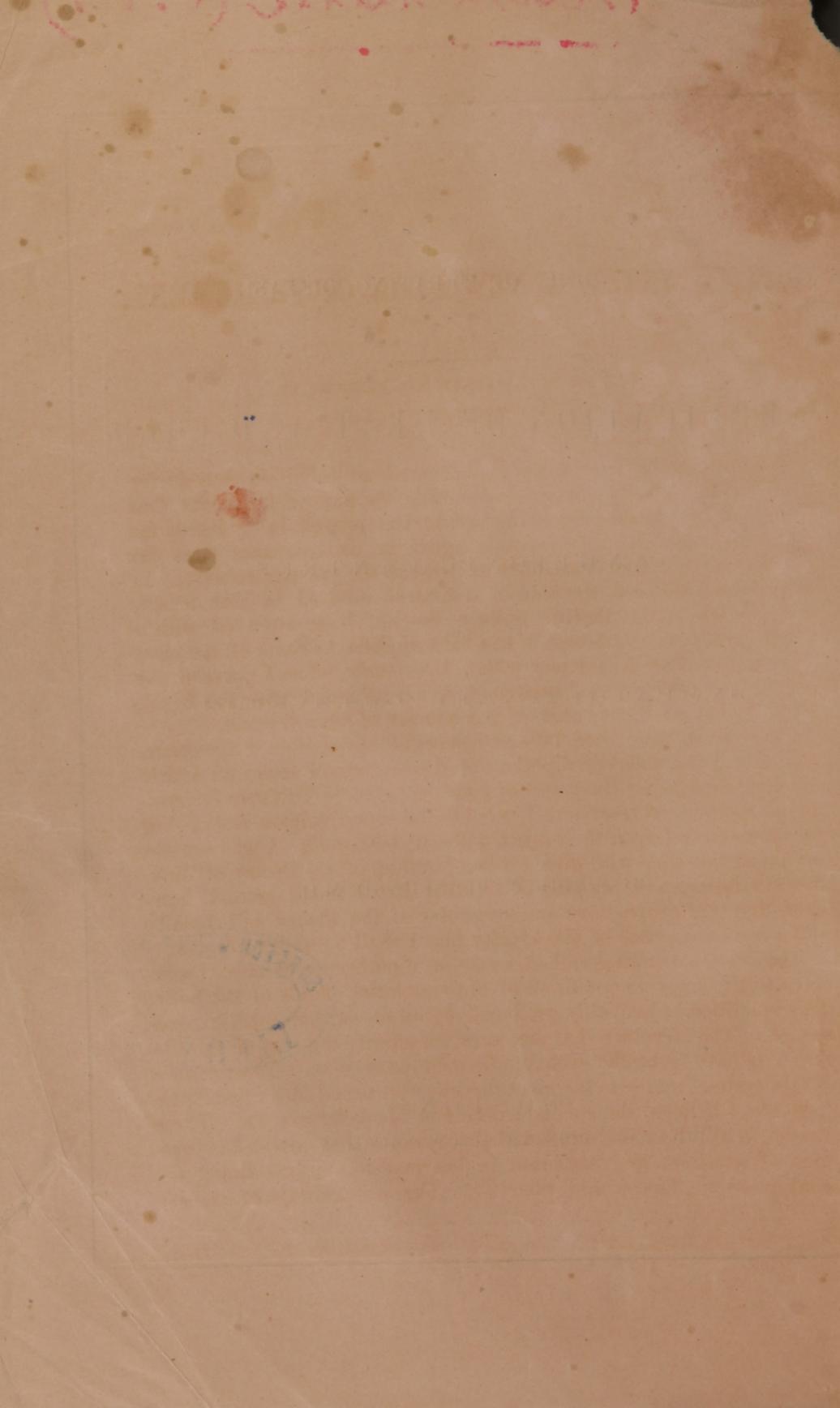
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DIPHtherITIS—A NEW PLAN OF TREATMENT.

BY VIRGIL W. BLANCHARD, M.D., BRIDPORT, VT.



I do not claim that I have discovered an infallible remedy for diphtheritic disease; yet I do affirm that the plan of treatment that I shall propose in the following article has proved in my hands far more successful as a therapeutic agent in its treatment than the "tonic course" that constitutes at present the popular remedy. In fact, since I adopted the plan of treatment advised in this article, my practice in diphtheritic disease has not been attended with a single fatal result, although it has been applied to some of the most severe cases that I have met with. Previously, while I pursued the usual "tonic course" of treatment, it was attended with the frightful mortality of 75 per cent. of the number of cases treated.

To enter at this time into an exhaustive discussion of the cause, nature and treatment of diphtheritic disease would make an article too cumbersome for the pages of your JOURNAL.* To those interested in my plan of treatment I would say, that a volume embodying my views in full upon the subject will soon be issued. I will content myself at this time with giving a brief outline of my theory of diphtheritic disease and my plan of treating it. I would remark, however, that the proportions and symmetry of the theory will signally suffer in consequence of the brevity that I shall be obliged to use.

The remote or pre-germinal cause of diphtheritic disease I conceive to be a morbid condition of the circulating fluids of the body. This condition is probably produced by an obscure miasmatic atmosphere. The structure that becomes essentially the seat of the disease I believe to be the sympathetic nervous system. The portions of this system that are the most directly concerned in its manifestations are, I believe, the sphenopalatine or Meckel's ganglia. These ganglia, it will be recollected, distribute nerves that govern the functions of nutrition and secretion in the mucous surface lining the nasal passages, fauces and pharynx. The procatartic or exciting

* Boston Medical and Surgical Journal, Vol. Ixix., No. 25.

cause may be a common sore throat, or any cause that is in itself an irritant to the mucous membrane lining the nasal passages and throat. Through this irritation a morbid impression additional to the one produced by the diphtheritic poison circulating with the blood, is made through their afferent nerves upon the sphenopalatine or Meckel's ganglia, the two morbid impressions concurring to light up in the mucous tissue to which they distribute their nerves an exaggerated function of nutrition and secretion, the fruit of which is the characteristic deposit. That the ganglia of the sympathetic nervous system are independent of each other in the elaboration and transmission of nervous fluid, is an established physiological fact. It is also highly probable that when a single ganglion is stimulated or excited from any cause, it has the power of diverting from the rest belonging to the same system, and especially from those adjacent, the *spiritus vitalis* or their own proper secretions; diminishing, thereby, the functions of nutrition and secretion in those tissues they supply with nerves, while the same functions are exalted in those tissues that are supplied by the nerves of the dominant ganglion.

My theory of diphtheritic disease then, is, that the sphenopalatine or Meckel's ganglia, under the influence of morbid excitement, appropriate to themselves more than their proportion of the nervous fluid of the nervous system to which they belong, by the aid of which they are enabled to carry on a morbidly exaggerated function of nutrition and secretion in the tissue to which they distribute nerves. The morbid excitation is produced by two causes—one the general, the other the local. The general one I term the remote or pregerminal; the local one, the exciting or procatartic cause.

While this morbid excitement is present in the sphenopalatine or Meckel's ganglia, there is a diminished function of nutrition and secretion, from a lack of the normal supply of nervous fluid, in all the tissues of the body except those that are supplied by the nerves from these ganglia. This explains the diminished action in all of the important secretory organs of the body which characterizes a severe case of diphtheritic disease. To this obstruction of the secretory process may probably be ascribed the rapid deterioration of the blood that doubtless takes place in consequence of the failure of the appropriate glands to eliminate from it the poisonous qualities which it contains. The partiality of the diphtheritic inflammation for the mucous surface lining the nasal passages and throat, is also explained by the fact that these tracts are more exposed than the rest within the body to the effects of irritating agencies. Thus it will be seen that the mucous surface lining the nasal passages and throat is the only one within the body which is exposed in any considerable degree to the exciting cause of the disease. A blistered or excoriated surface upon the periphery of the body becomes, from the same cause, a procatartic agent, that may involve the nervous centre from which it receives its nerves of nutrition and secretion.

In the treatment of diphtheritic disease it is my aim to cut off communication in the sympathetic nervous system between its ganglia belonging to the trunk and those belonging to the cranium. I effect this by applying a sedative agent to the site of the superior cervical ganglia. The sedative agent must be of such degree of power as to deprive, completely or in part, the nervous centres beneath it of the power of elaborating and transmitting the *spiritus vitalis*. The sphenopalatine or Meckel's ganglia being thus in a state of partial or complete isolation, will no longer be enabled to divert, from the ganglia belonging to the trunk, their normal secretion of nervous fluid, by the aid of which they are enabled in diphtheritic disease to produce a monstrosity in nutrition and secretion. In addition to this, I apply a stimulating agent to the site of the ganglia of the trunk situated in the dorsal and lumbar regions. This is done to increase the secretion of the nervous fluid in those ganglia, which is no longer diverted from its proper channels, in order to re-establish as soon and as completely as possible the functions of nutrition and secretion in the important secretory glands to which they distribute nerves. I also administer internally, iron in combination with nux vomica or its active principle strychnine, usually the combination known as the citrate of iron and strychnine. The iron supplies the blood with hæmatosin, which in the course of the disease is rapidly destroyed. The strychnia acts as a stimulant and tonic to the spinal cord. Such an action produced upon its tissue will probably produce the effect of counter-irritation upon that portion of its own system contained within the cranium. From such an effect, through the channels of communication that connect this portion with the sympathetic nervous system of the same region, there may be produced upon the sphenopalatine or Meckel's ganglia a similar, though less decided result. I sometimes prescribe internally a mild diuretic, and always as nutritious a diet of animal food (usually broths) as the patient will accept. Diffusible stimulus, quinine, and all agents, except iron, that have a tendency to excite the cerebral functions, for obvious reasons I avoid.

My course of treatment, it will be seen, has not in view the elimination of the diphtheritic poison from the blood by the aid of neutralizing agents, but the restoration and stimulation of the functions of nutrition and secretion, from the tonic and curative action of which it will rapidly disappear through the natural emunctories of the body. The *modus operandi*, with my plan of treatment, is as follows:—I apply ice, and in some cases a more refrigerant agent, to the site of the superior cervical ganglia of the sympathetic nervous system, or to a surface (in a child) about two inches square upon each side of the spine, about one inch below the occipital bone. At the same time I apply heat, either by the application of hot water contained in India rubber bags, or by napkins wrung out of hot water, to the site of the ganglia in the dorsal and lumbar regions, or to

each side of the spine below the shoulders, its entire length. The applications of the refrigerating agent and of the heat *must be constant*, and the degree of each must depend upon the type of the disease. Internally, I administer the citrate of iron and strychnia, as already mentioned, sometimes combined with a mild diuretic. When the secretion of the skin is excessively deficient, I have used with advantage the nitro-muriatic acid bath.

The following case of diphtheritic disease is the last severe one that I have treated according to the above plan. I copy it *verbatim* from my record.

Bridport, Dec. 9th, 1863. Ten o'clock, P.M. Called to see a daughter of Mr. Rinaldo Kingsland. Disease, diphtheria; duration of same, 28 hours. Age of patient, 8 years. Pulse 175 per minute, very soft and irregular. Skin very hot and dry. Secretion of kidneys very deficient, no urine having passed for ten hours. Respiration much oppressed and hurried; deglutition extremely difficult; the fauces and pharynx heavily loaded with a brownish deposit; cough very croupy; nostrils discharging an amber-colored excoriating secretion; the breath horribly fœtid; the neck, in the parotid and sub-maxillary regions, badly swollen; the forehead and nasal regions pinched, the eyelids œdematous, and the cheeks puffed and shining. A physician was called in at 10 o'clock, who prescribed a tonic and diuretic, the patient rapidly growing worse under the effect. Prescribed ice for the back of neck, and napkins wrung out of hot water for each side of the spine below the shoulders; internally two grains of the citrate of iron, in combination with one twenty-fourth of a grain of strychnia, together with five drops of sweet spirits of nitre once in three hours.

Dec. 9th, 11 o'clock, P.M.—Respiration less hurried; pulse 160 per minute. Patient complains that the ice is not cold enough—that it is getting warm.

Dec. 10th, 9 o'clock, A.M.—Respiration much improved; pulse 130 per minute, and improved in tone; deglutition less difficult. Gave the patient some animal broth; same treatment. At 4 o'clock, P.M., patient was more comfortable. Pulse 120 per minute, and decidedly improved in tone; respiration free, and but little hurried; breath less fœtid; discharge from the nostrils less, and not so excoriating; skin moist; secretion of the kidneys increased. The patient takes broth freely, and remarks that the application of heat and cold to the region of the spine feels grateful. Same treatment.

Dec. 11th, 10 o'clock, A.M.—Pulse 120, improving in tone; respiration natural; breath less fœtid; urine more plentiful; countenance assuming a natural expression. Same treatment.

Dec. 12th.—Patient improving. Pulse 110, quite firm; resolution of the swelling in the neck taking place, the deposit becoming detached from the mucous surface of the throat; discharge from the nostrils ceased; breath but little tainted. The patient takes solid animal food, besides the broth. Same treatment.

Dec. 13th.—Patient better; strength and appetite improving; the deposit becoming rapidly detached; the breath sweet; the secretions of the skin and kidneys normal. Same treatment.

Dec. 14th.—All the symptoms better. Patient complains that the ice and heat applied to the spinal region feel disagreeable; discontinue their application, but give the dose of my former prescription once in six hours.

Dec. 16th.—Patient sitting up, and improving rapidly.

Dec. 18th.—The patient gaining rapidly in strength.

Dec. 20th.—Patient enjoying an excellent appetite, and able to sit up most of the time. Discontinue the iron and strychnia.

DECEMBER 25th, 1863.

THE USE OF HEAT AND COLD APPLIED TO THE SYMPATHETIC NERVOUS SYSTEM.

BY VIRGIL W. BLANCHARD, M.D., BRIDPORT, VT.

IN No. 25 of Vol. LXIX. of this JOURNAL,* a paper on Diphtheritis was issued under my name. Since its publication numerous inquiries have reached me respecting the theory that I propose in that article, which it may not be improper to answer at this time. Before I proceed to its discussion, however, I will state, in answer to other inquiries—that I do not apply the ice or the cold dressing in diphtheritis merely “to the inflamed tissue” or “to the swelling in the laryngeal region” that usually accompanies the disease, but *invariably* to that portion of the cervical region, beneath which is situated the superior cervical ganglia of the sympathetic nervous system, allowing it to extend backwards to the spinous processes of the vertebræ. In this respect my treatment differs from any previously proposed. I would also state that I consider the application of the hot dressing to the site of the ganglia of the sympathetic system in the spinal region, and to the spine itself below the shoulders, secondary in importance to the refrigerant dressing applied in the cervical region, yet no severe case can be treated successfully without it; that I have found the use of iron in combination with strychnine not absolutely necessary to the recovery of the patient, but to hasten convalescence, and to prevent in a great measure the occurrence of those symptoms of debility of the motor portions of the cerebro-spinal nervous system that so frequently accompany and follow severe cases of diphtheritic disease; that I place no reliance “on gargles” or “internal applications to the throat, astringent or stimulant,” “as radical means of cure”;—yet when the disease is excessively putrid in type chlorinated washes may be used, in my opinion, with advantage—as such, the chlorate of potash and the muriate of ammonia I prefer. The alterative effect produced by the internal administration of the muriate of ammonia in the initial

* Boston Medical and Surgical Journal, Vol. lxx., No. 12.

stage of the disease, I believe to be in some cases highly beneficial. As will be seen in the following portion of this paper, the theory that I have advanced respecting diphtheritic disease was not "extemporized to suit a certain system of practice," but is a "specimen brick" of a general theory from which a system of practice naturally arises that I have adopted for the past four years, in many instances with the happiest results. I "continue to apply the same treatment in diphtheritic disease that I advise," even in the most malignant cases, with unvarying success. I now propose to discuss briefly the importance of the sympathetic nervous system as a dominant tissue in the animal body, the important part its centres play in inflammatory processes, and to give an outline, at least, of a general theory and a system of practice founded thereupon, that I have adopted in many instances with the most flattering success.

The sympathetic nervous system presents to the student a field of inquiry that is rich in physiological and therapeutical interest. Its importance as a dominant tissue in the animal structure to which it belongs cannot be over estimated. Its functions controlling those of the organic glandular and circulatory systems, are manifestly second to none in the animal body. It is the fountain and channel of organic life. It is the agent that prepares from the blood in the wonderful laboratories of the secretory organs those fluids that are necessary in the various processes of the animal economy. It is the indirect force that reduces the aliment to primitive elements, and the probable one that diverts into the blood those that are requisite and assimilable, and the direct one that rolls this fluid in rythmical currents through the arterial channels that permeate the animal tissue. The cerebro-spinal nervous system through intellection, locomotion and muscular adaptation, provides the aliment, while the sympathetic is probably that which fabricates out of its appropriate elements the various tissues that enter into the composition of the animal body.*

* In this view taken of the sympathetic nervous system, it is considered *indirectly*, in part, the sole agent, from which are derived the organic forces that supply the body. That the sensitive nerves of the cerebro-spinal system have an office, and an important one, in the organic processes of nutrition and secretion, cannot be denied. The experiments, however, of Magendie and Longet, showing that destructive disease of the eye occurs much more quickly after the division of the trigeminal nerve in front of the Casserian ganglion, where it is joined by the sympathetic fibres which pass with it to the eye, than when the division is made between the ganglion and brain, seem to prove conclusively that the influence of the sympathetic is much greater than that of the sensitive nerves. As the *sole* agent of distribution, not of elaboration, the sympathetic centres are considered the fountain of secretory and nutritive vitality. On this point the opinions of Kirkes and Paget seem to me to be the best fortified and the most conclusive. They remark, in their *Manual of Physiology*, page 372—"Probably, therefore, the safest view of the question is to regard all the processes of organic life in man as liable to the combined influences of the cerebro-spinal and the sympathetic systems; to consider that those influences may be so combined as that the sympathetic nerves and ganglia may be in man, as in the lower animals, the parts through which the ordinary and constant influence of the nervous force is exercised on the organic processes; while the cerebro-spinal nervous centres and their ganglia are the parts from which the proper sympathetic ganglia derive supplies of nervous force, and from which, more often and more regularly than in the lower animals, the processes of the organic and the animal life are made to work in connection and mutual adaptation."

From this stand-point, and this alone, can be appreciated the importance of the functions of the sympathetic nervous system to the health and welfare of the animal body.

It should, however, be borne in mind that the nervous tissue is the only seat in the animal body of *actual force*, that all the organs and apparatuses of which it is composed are only passive instruments or agents for its awakening, life-giving power. As the student investigates the processes of life, as exhibited in the animal body, from the obscurity and doubt that overshadow some of the functions of the nervous tissue he is apt to lose sight of its importance as the fountain of the *vis a tergo* that endows other less obscure organs with all their wonderful capabilities, that so challenge the admiration and arrest the attention. Indeed, it seems to me that the agency of the nervous tissue in all of the vital processes in the animal economy, especially that portion from which originate the secretory and nutritive forces, is ignored too much by medical students and authors of the present day. A disease, whatever it may be, is "all lung," "all liver," "all kidney," or "a complication of visceral difficulties," as the case may be, according to the opinion of too great a proportion of those whose decisions illustrate the science of medicine, in our country. That one or more of these important organs, in each instance, may be diseased, I do not doubt; yet behind them in the nervous tissue, by whose secretions their capabilities and powers are awakened into activity and usefulness, is the primary trouble and derangement. To aim a blow at the seat of the disease, whatever it may be, forms at least a part of the most efficient therapeutical endeavor that the human mind can devise.

These considerations have led me, during the past four years, to attempt to make a more direct application of certain therapeutical agents to the primary seat of disease, viz., the nervous centres, than I find advised by the most prolific and erudite writers on the theory and practice of medicine. In this investigation my attention has been directed chiefly to the ganglionic centres of the sympathetic nervous system. The therapeutical agents that I have used in this connection the most freely and successfully are heat and cold. These two agents are of course applied externally. The idea of applying heat and cold externally upon the ganglionic regions of the sympathetic nervous system, as therapeutical agents, was suggested to my mind by witnessing operations in the office of a dentist friend, in which cold applied to the patient's jaw became an anæsthetic agent of sufficient power to enable the operator to extract teeth without pain and without injury to the patient. The fact of being able to accomplish this refutes the objection raised by some against this mode of practice, "that the centres of the sympathetic nervous system lie so deeply beneath the surface as to be entirely unaffected by the external application of heat and cold." It is highly probable that the effect of either agent, especially that of cold, when experi-

enced even in a slight degree by the tissue of the sympathetic nervous system, modifies more or less the elaboration and transmission of the *spiritus vitalis*, or its own proper secretion.*

May this not afford an explanation to the fact, that when the sympathetic ganglia in the spinal region (assuming that this portion of the sympathetic system governs the organic functions in the cutaneous system) are in a state of excitement and the individual is perspiring freely, a cold current of air coming in contact with the region of the spine at once checks the perspiration and is sometimes followed by a chill and some local congestion?

Where diaphoresis is desired, the happy result that follows the application of the hot dressing to the site of all the sympathetic ganglia in the spinal region, is another proof of the susceptibility of the nervous centres beneath to external applications. In the cervical and in the upper portion of the dorsal region the remoteness of the nervous centres of the sympathetic and cerebro-spinal systems from the external surface cannot be urged as an objection to the probability that their tissues may be deprived, partially or completely, of the power of elaborating and transmitting their secretions of nervous force or fluid, or may be stimulated to a greater efficiency in function by the proper application of the refrigerant or hot dressing to the epidermis above them. The happy results that follow the proper application of each dressing in various diseases abundantly substantiate this point.

It has been my experience that inflammatory processes, occurring in only those organs that are supplied with sympathetic and sensitive nerves arising from nervous centres *above* the sixth dorsal ganglia of the sympathetic system, are immediately cut short by the treatment I advise. Inflammatory processes occurring in other organs of the body are restrained and modified by the application of the same principle of treatment, but in less degree. Inflammatory processes occurring in any tissue or organ supplied with sympathetic nerves arising from nervous centres above the third cervical ganglia of the sympathetic system, are the ones that are the most successfully treated by this mode of practice; as at this point, or at any point in the cervical region, the nervous connection between the cranial portions and the rest of the sympathetic and cerebro-spinal nervous systems may be partially or completely broken by a proper application of the refrigerant dressing.

Besides the direct stimulant and sedative effect produced by the application of the refrigerant and hot dressing over the site of certain ganglia of the sympathetic system, a similar or miniature one is probably experienced by adjacent and perhaps remote centres be-

* In every instance when the application of the cold and hot dressing is advised in this paper, it should be understood as applying not only to the two principal trunks of the sympathetic nerve in the spinal region, but to corresponding portions of the spine itself. This is necessary in order to control the functions of the sympathetic spinal ganglia seated upon the posterior or sensitive roots of the cerebro-spinal nerves.

longing to the same system, resulting from sympathetic impression or conduction of the peculiar state or condition of the centres receiving the direct impression. Thus by applying the refrigerant dressing to the superior cervical ganglia of the sympathetic system, not only is the elaboration and transmission of the *spiritus vitalis* retarded and perhaps abolished in their tissue, but the state or condition they experience during its effects is sympathetically assumed by adjacent and even remote ganglia belonging to the same system. This sympathy finds an analogy in certain diseases incidental to the cerebro-spinal nervous system.

Excepting in certain diseases, where the hot dressing should be applied over the site of all the ganglia of the sympathetic system, the refrigerant dressing should be applied only over those ganglionic centres that distribute sympathetic nerves to that portion or organ of the body in which the inflammatory action is occurring; while the hot dressing should be applied over the site of all those numerous centres that supply with organic vitality those portions of the body that are only sympathetically involved. Besides this effect, that of isolating partially or completely in its nervous connection that portion or tissue of the body where the disease may exist, from that portion that is only sympathetically involved, is to be desired.

The domination of one ganglion of the sympathetic nervous system over adjacent ones or over the entire system when stimulated or excited by morbid agency, is beyond question. That each ganglion possesses the capacity, during a period of health in the animal body, to secrete or originate a sufficient volume of the *spiritus vitalis* to carry on normally the functions of nutrition and secretion in the tissue to which it distributes nerves, with the aid afforded by corresponding sensitive nerves, is admitted by all. In fact it will be plainly seen that the integrity of the organic processes in the aggregate, or the organic health of the body, is dependent upon a complete fulfilment of the functions of each ganglion belonging to the sympathetic nervous system. This would of course include a normal distribution of the nervous force or fluid, as well as a normal elaboration.

That the nervous force may be diverted from its proper channels and become subservient to other purposes than to fulfil the functions of the ganglion that produced it, is manifest in many of the morbid processes occurring in the animal body.

This condition, or an abnormal distribution of the nervous force, underlies, in my opinion, all inflammatory processes excepting those of a specific or malignant character. It explains many of the phenomena incidental to inflammatory action that are otherwise difficult to understand. It explains the deficiency of action in the secretory glands and the impaired nutrition in all the tissues of the body, excepting the one involved, which characterizes a virulent inflammatory action. Taking this view of the subject, in symptomatic fever super-

vening after a severe gun-shot wound, we see the organic forces of the body, or the *spiritus vitalis*, flowing from all the rest of the ganglionic centres of the sympathetic system to the aid of the nervous centres that distribute sympathetic nerves to the tissue or organ that sustains the lesion. We have, as the result, a diminished circulation and an impaired nutrition in the rest of the body. The entire sympathetic nervous system represents a certain available force that is just sufficient to fulfil normally the organic functions of the body; and if in a certain tissue or organ the process of reparation is superadded to that of nutrition and secretion, it logically follows that in the rest of the body organic vitality must be diminished.

This theory exhibits a unity of purpose among the organic forces of the body, in the presence of inflammations, that is in keeping with the perspective wisdom exhibited in all of the physiological functions. It exhibits all inflammatory processes, excepting those of a specific or malignant character, as having a direct recuperative tendency. It solves the problem of inflammation. Viewed in this light, inflammation is no longer primarily, as Cullen taught,* "a spasm of the extreme arteries supporting an increased action in the course of the same"; or, as Hunter taught,† "an increase of life, or an increased disposition to use with more violence the life which the machine or the part is in possession of"; or, as Alison‡ asserted, that it "consists essentially in a local increase of a vital property of attraction existing among the particles of the blood, and between them and the surrounding textures, and with which other vital properties are connected and simultaneously excited," but simply in an augmentation of the organic forces in the locality involved, and a proportional diminution of similar vitality in the rest of the body. Simple inflammation, then, always suggests reparation. The event to be the most dreaded in its progress is not so much a superabundance of vital force in the part affected, as the proportional diversion of the same from the rest of the body, especially from the secretory and excretory glands and organs. The secretion of a normal *quality* of nervous force is dependent in a great measure upon the completeness with which the secretory and excretory glands and organs perform their functions. If they fail to fulfil their office with a certain degree of integrity for want of a sufficient organic vitality, the blood inevitably becomes poisoned. If the *pabulum vitæ* becomes corrupted, then the nervous tissue can no longer elaborate from it a healthy secretion to operate the organic mechanism of the body, and the whole fabric rapidly goes to ruin.

In the treatment of inflammation, taking this view of the subject, three indications naturally arise,—1st, To diminish the flow of the *spiritus vitalis* to the part affected, if it be sufficient in volume to seriously impair the functions of the secretory and excretory glands

* "Cullen's First Lines."

† Hunter on the Blood, &c., pp. 334 and 335. London: 1793.

‡ Outlines of Pathology. Edinburgh: 1843.

and organs. 2d, To increase, if possible, the functions of those nervous centres that supply the secretory and excretory glands and organs with organic vitality. 3d, To husband, in the greatest possible degree, the organic forces, as they constitute the *vis medicatrix nature*, which must in all cases effect the cure if it takes place.

The first indication I fulfil by the application of the refrigerant dressing to the site of the nervous centres that distribute sympathetic and sensitive nerves to the tissue or organ that is involved in the inflammatory process; or, if possible, I isolate in its nervous connection, by such application, that portion from the rest of the body. To meet the second, I apply the hot dressing to the site of those nervous centres of the sympathetic system whose functions I would stimulate to the highest possible efficiency. To meet the third indication, I enjoin absolute rest of mind and body, in order to relieve the organic forces as much as possible of the burden of nutrition, that the greater part of their power may be expended in the processes of reparation and secretion. In the regimen as an auxiliary to rest, a dry, pure, rarefied atmosphere, with a uniformly high temperature, say 75° Fah., will tend greatly to diminish the nutritive function. Such an atmosphere contains much less oxygen, per cubic inch, than its opposite. The amount of oxygen being diminished by rarefaction to the *minimum* standard compatible with a normal maintenance of the organic functions, will diminish, of course, combustion in the tissues, and proportionally diminish the function of nutrition. Sufficient attention has not been given to this point, in my opinion, by therapeutists generally. If the function of nutrition be carried on with only a moderate activity in the tissues of the body in the presence of a formidable inflammatory action, the secretory and excretory glands and organs will almost invariably falter in their functions for want of a normal supply of nervous force to endow them with appropriate capabilities. As an auxiliary to obtain rest, opiates should be used freely if indicated.

Reparation of the injury that is the cause of the inflammatory action, whether it be the result of traumatic lesion or idiopathic congestion, and the maintenance of the functions of the secretory and excretory glands and organs, should absorb *all* of the organic forces of the body that can be directed to such purposes. The refrigerant and the hot dressing may be each applied, enclosed in India rubber bags or others composed of any flexible material. Such I formerly used, but latterly have laid them aside. I now apply the refrigerant dressing (ice or freezing mixtures) immediately in contact with the skin above the nervous centres that I wish to affect; and for the hot dressing I prefer napkins frequently wrung out of hot water to any other. The application of the cold dressing is at first a little disagreeable; but soon the patient not only tolerates it, but desires its application. The application of both the refrigerant and the hot dressing must be *constant* and *continued*, until the inflammatory ac-

tion subsides. By a direct application of each dressing to the epidermis as advised, the effect of moisture applied to the part is super-added to that of sedatives and stimulation, which my experience has led me to regard as highly important. After proper control of the organic forces shall have been gained in the manner I propose, animal food (in the form of broths), and even stimulants, both diffusible and permanent, may be given in small quantities with the happiest results.

The new form of practice that I propose in this paper does not contain any new principle in therapeutics, but is only a modification of one of the oldest and most efficient embodied in medical science. Cold and heat have been used from time immemorial as therapeutical agents. Inflammatory processes occurring in external tissues of the body have been treated more successfully by the refrigerant and hot dressing than on any other plan. The practice that I advise differs from the old mode, only in this respect, that I apply the cold and hot dressing to the surface above the nervous centres that supply the inflamed tissue or organ with sympathetic and sensitive nerves, rather than to the diseased part itself. This principle I do not develop except in cases of inflammatory action occurring in internal tissues or organs of the body. The diseases to which I have successfully applied it are all inflammatory processes incidental to the cranial, cervical and thoracic regions, excepting those of a specific or malignant character. Inflammatory action occurring in the abdominal region, especially that involving the rectum and the urinary apparatus, may be modified by this mode of treatment, but in less degree.

The first case treated by myself on this new principle occurred in November, 1859. It was a case of double pneumonia. Arterial sedatives and alteratives had been freely used without avail. In the left lung the respiration had become bronchial, and the lower lobe of the right lung was seriously involved. The patient was delirious. I applied the refrigerant dressing (ice) to the site of the six upper dorsal ganglia of the sympathetic system, allowing it to extend backwards to the spinous processes of the vertebræ; to the site of the rest of the sympathetic ganglia in the cervical, dorsal and lumbar regions, and to corresponding portions of the spine I applied the hot dressing. The first effect that I perceived from the application was an improved respiratory action. The frequency of the pulse was soon diminished, and the patient became conscious. Under the effects of this treatment the patient rapidly recovered. The cold and hot dressing was continued upon the spinal region until expectoration was freely established. Napkins wrung out of cold water were finally substituted for the ice as a refrigerant dressing, to avoid extreme reaction. This point I always insist upon.

The good result following the treatment in this first instance, led me subsequently to employ it in certain diseases almost exclusively. Meningitis, iritis, pharyngitis, laryngitis, tonsillitis, diphtheritis,

croup, pneumonia, bronchitis, pleurisy, pericarditis, and endocarditis, I have treated successfully.* In diphtheritis, I pursued for a long time the usual "tonic course" of treatment, but as nearly all my patients died under its effects, I at last substituted my new mode, with surprisingly happy results. The reason that I did not at first adopt it in diphtheritic disease, was, that I believed the disease to be of a specific or malignant character. In typhoid diseases, or in those complicated with a typhoid condition, excepting diphtheritis, I have had no experience with this treatment.

Before I proceed to give the *modus operandi* with this new mode of treatment, as I have applied it in different diseases, I will give a brief synopsis of the principal features in the anatomy of the sympathetic nervous system, for the purpose of a clearer exhibition of the principle involved.

In a general view, the sympathetic nervous system may be described as arranged in two principal divisions. The first division may be considered to include the ganglia seated on, or close to the cerebral and spinal nerves, with the filaments issuing from them; the second, to comprise the ganglia on the two main branches of the sympathetic, and on the branches in the visceral cavities. To the first belong the ophthalmic, otic and submaxillary ganglia on the divisions of the fifth nerve; and probably the ganglia on the glosso-pharyngeal and pneumogastric nerves, and on the posterior roots of the spinal nerves; for, from all these, fibres appear to originate, which in structure resemble those derived from the proper ganglia of the sympathetic, and are distributed to the same parts. To the second division belong the ganglia arranged in a continuous line along the sides of the vertebræ, with their connecting cords, which make up what have been usually called the trunks of the sympathetic nerve, and all the ganglia placed irregularly on the branches of the sympathetic distributed to the viscera. That each ganglion is an organ controlling certain functions in a definite locality within the body, is the opinion of some of our best physiologists.—(Vide Kirkes and Paget's Manual of Physiology, page 366.)

The ophthalmic ganglion distributes nerves to the globe of the eye; the otic, to the tympanum. The submaxillary ganglion supplies with nerves the side of the tongue, the submaxillary gland and Wharton's duct. The spheno-palatine or Meckel's ganglia supply with their nerves of distribution the mucous surface lining the nasal passages; and partially the mucous surface lining the passages within the cervical region. The ganglia seated upon the fifth and upon the glosso-pharyngeal and pneumo-gastric nerves, together with the carotid plexuses and their derivations, supply the meninges of the

* Numerous cases could be reported of each disease mentioned, excepting pericarditis and endocarditis, treated successfully on this new plan. In pericarditis, I have applied this new treatment to only one case, which eventuated favorably. I have at present a case of endocarditis under treatment, which promises a favorable result.

brain and that viscus itself. From the cervical ganglia, cords of communication descend to the superficial and deep cardiac plexuses. The six upper dorsal ganglia distribute nerves to the aorta, œsophagus and lungs. From the sixth, seventh, eighth, ninth and tenth thoracic ganglia, the great splanchnic nerves originate, which terminate in the semi-lunar ganglia. The last thoracic ganglia, through the third splanchnic nerves, and in common with the renal plexuses, distribute nerves to the kidneys. The lower lumbar ganglia, in common with the termination of the aortic plexuses, forming the hypogastric plexuses, distribute nerves to the pelvic viscera. The ganglion impar of the coccyx distributes nerves to the rectum. The superficial and deep cardiac plexuses, together with the ganglionic tissue found in its own substance, distribute nerves to the heart.

From the ganglia seated upon the posterior roots of the spinal nerves, and from the great sympathetic trunks upon each side of the spine, those nerves probably arise that control the organic functions in the cutaneous system and muscular tissue of the striated variety. Upon reference to the minute anatomy of the parts (Vide Kölliker, CXIV. and XV., 1844-5; Volkmann, CXXVI.; Todd and Bowman, XXXIX.), it will be seen that quite a proportion of the nerves that arise from the spinal ganglia pass into the posterior roots of the spinal nerves and are distributed with them. Of the fibres derived from the great sympathetic trunks, some go direct to the viscera, the rest pass through the branches of communication that connect them with the anterior branches of the spinal nerves, and joining those spinal nerves, proceed with them to their respective seats of distribution. The spinal nerves supply the muscles of the striated variety, which are found in a considerable proportion near the periphery of the body in close proximity to the cutaneous system. Hence, those nerves of the sympathetic system that join the cerebro-spinal nerves, that supply the voluntary muscles, would naturally and probably be the ones that would supply those muscles and the tissues excentric to them.

In meningitis, iritis, pharyngitis, laryngitis, tonsillitis and diphtheritis, and in cases which exhibit an apoplectic tendency, I apply the refrigerant dressing to the site of the superior cervical ganglia* of the sympathetic nervous system, allowing it to extend backwards to the spinous processes of the vertebræ, that the sedative effect resulting therefrom may be experienced by that portion of the sympathetic

* The much talked of experiment of Bernard, in which he found that on extirpating a ganglion of the sympathetic nerve, or dividing the filaments proceeding thence, the organic action in the part supplied with nerves by the ganglion or divided filaments was heightened; and that on applying galvanic stimulus to the divided nerve, the increased action subsided; and that by dividing the nerves connecting the part with the cerebro-spinal system an exactly opposite effect took place, led me to try the effect of the refrigerant dressing applied to the spine alone, accompanied with the hot dressing applied to corresponding portions of the sympathetic system. The result of the trial (I applied it in four cases of thoracic inflammation) was a failure. The same cases, when treated with the refrigerant and hot dressing as I advise, recovered immediately.

system seated upon the posterior roots of the spinal nerves. In either of these diseases, when the inflammatory action is excessive, I allow the refrigerant dressing to extend downwards so as to cover over the site of the middle cervical ganglia and corresponding portions of the spinal ganglia of the same system. At the same time, I apply the hot dressing, by means of napkins wrung out of hot water, to the site of all the ganglia of the sympathetic system in the dorsal, lumbar and sacral regions. In an adult I usually apply the hot dressing, about four inches in width, to the surface on either side of the spinous processes of the vertebræ. In pseudo-membranous croup, I apply the refrigerant dressing to the three ganglia of the cervical region, and to the corresponding spinal ganglia of the sympathetic system; and the hot dressing the same as advised in meningitis. In pneumonia, bronchitis and pleurisy, I apply the refrigerant dressing to the site of the six upper dorsal ganglia of the sympathetic, and the corresponding spinal ganglia of the same system; and the hot dressing to the site of the cervical ganglia, the site of the six lower dorsal ganglia, the site of the lumbar and sacral ganglia, and to the corresponding spinal ganglia of the same system. In pericarditis and endocarditis, I apply the refrigerant dressing to the three cervical ganglia of the sympathetic, and to the sixth, seventh and eighth dorsal ganglia; and the hot dressing to the site of all the other sympathetic ganglia in the spinal region. In the last-named diseases the sedative impression seems to be transmitted to the superficial and deep cardiac plexuses, through the superior, middle and inferior cardiac nerves, and through the great splanchnic nerves. In inflammation of the kidneys I apply the refrigerant dressing to the site of the last thoracic ganglia of the sympathetic, and at the same time I apply the hot dressing to the site of all the ganglionic centres above, in the spinal region, belonging to the same system. In inflammatory conditions affecting one or more of the pelvic viscera, excepting the rectum, I apply the refrigerant dressing to the site of the lumbar ganglia of the sympathetic; and the hot dressing to the site of all the ganglionic centres above in the spinal region, belonging to the same system. In inflammation of the rectum, I apply the refrigerant dressing to the site of the ganglion impar of the sympathetic; and the hot dressing to the site of all the ganglionic centres above, in the spinal region, belonging to the same system. In exanthematous diseases, and in other morbid conditions where a general stimulant effect is desired, I apply the hot dressing to the site of all the ganglionic centres of the sympathetic system. Any organ in the body may be stimulated in its organic functions by the application of the hot dressing to the site of those ganglionic centres that supply it with sympathetic nerves. The effect of stimulation may also be produced by the frequent application and withdrawal of the refrigerant dressing to the site of the nervous centres by which the organ is supplied with sympathetic nerves.

This determines conclusively that the reactionary effect following, is greater, or at least equal to the primary sedative effect, unless the sedative agent be gradually diminished in force as it is withdrawn, which will prevent it from taking place; and it also indicates that an increase of the inflammatory action will ensue, if in the presence of acute inflammation in any organ the refrigerant dressing is applied as advised, and then removed abruptly before it has subsided.

In cases where the inflammatory action is slight, dry cupping, or the application of counter-irritation over the ganglionic centres of the sympathetic, I have found beneficial. Where diaphoresis is desired, and where a general stimulant impression on the cutaneous system is indicated as the best means of obtaining it, the hot dressing applied to the site of all the ganglionic centres of the sympathetic in the spinal region, will be found to answer an admirable purpose.

With this mode of treatment—to produce a general alterative effect—I use the muriate of ammonia in place of the mercurial. Opium I use freely, when indicated. A dry, pure atmosphere, of a uniformly high temperature, say 75° Fah., is in all cases to be desired. When the inflammatory action is purely cranial or cranio-cervical, and is accompanied with debility of the motor nerves of the cerebro-spinal system, I invariably use preparations of nux vomica with advantage.

What I have written comprises an epitome of my experience in this new mode of treating disease, which I believe will prove, if properly developed, to be an auxiliary to those means already adopted, by which medical science alleviates pain and prolongs human life.

MARCH 20th, 1864.

