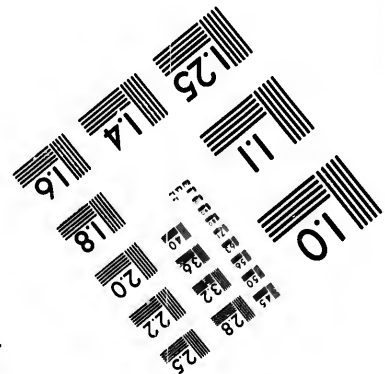
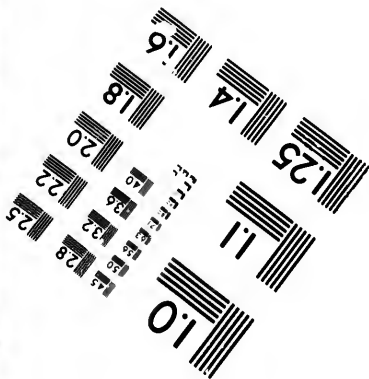
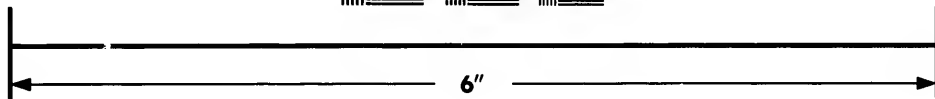
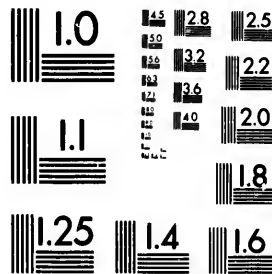


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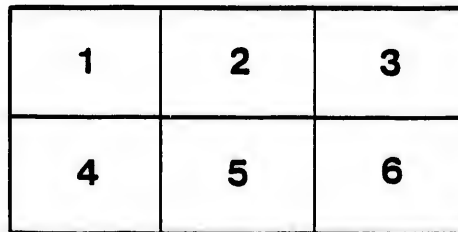
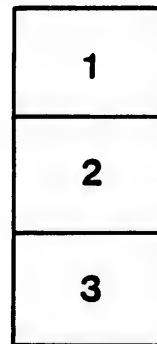
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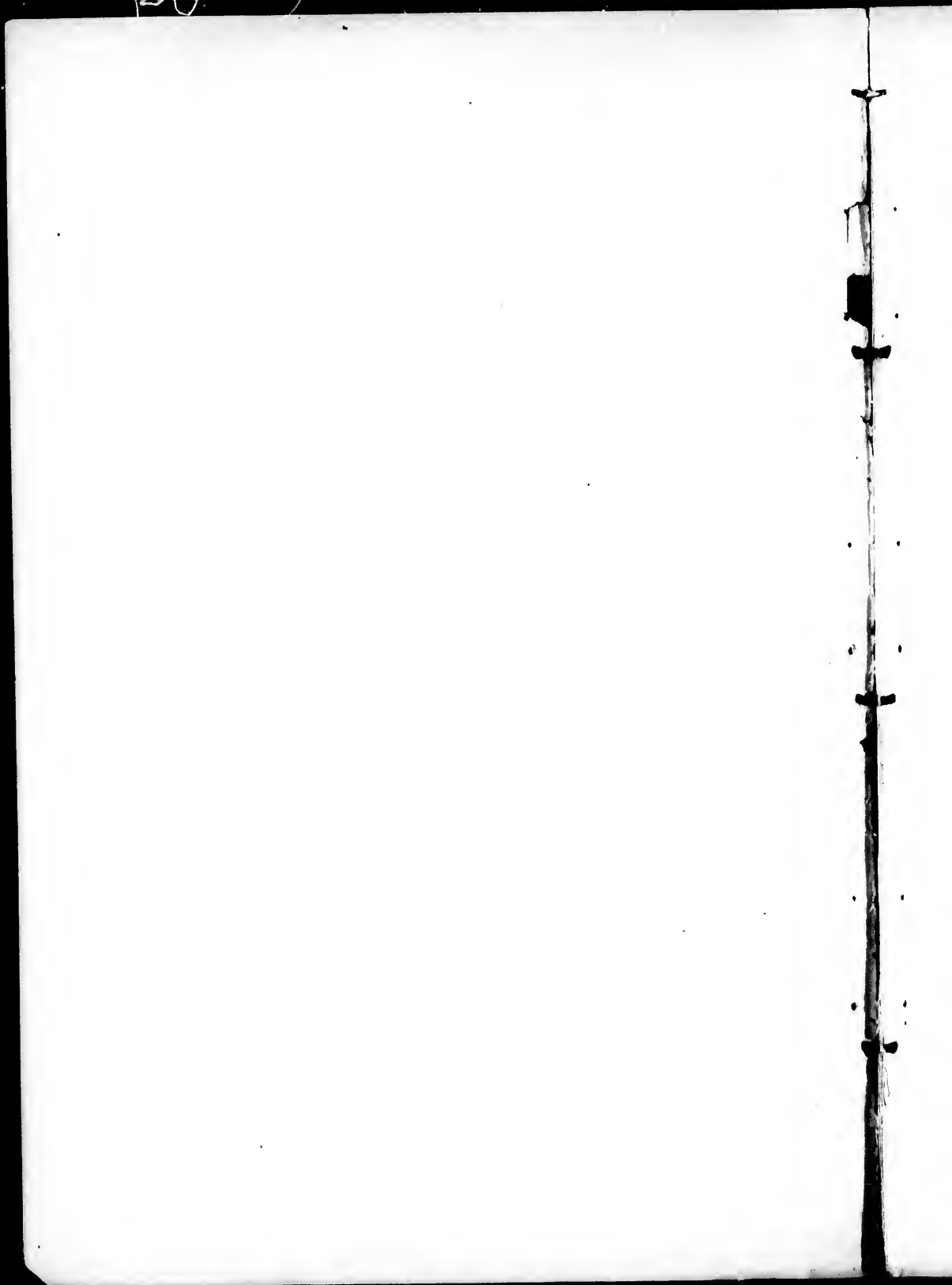
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Vaso-Motor Therapeutics

BY

. . . W. E. BESSEY, M.D., C.M., L. & M.C.P.S. . . .

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1892



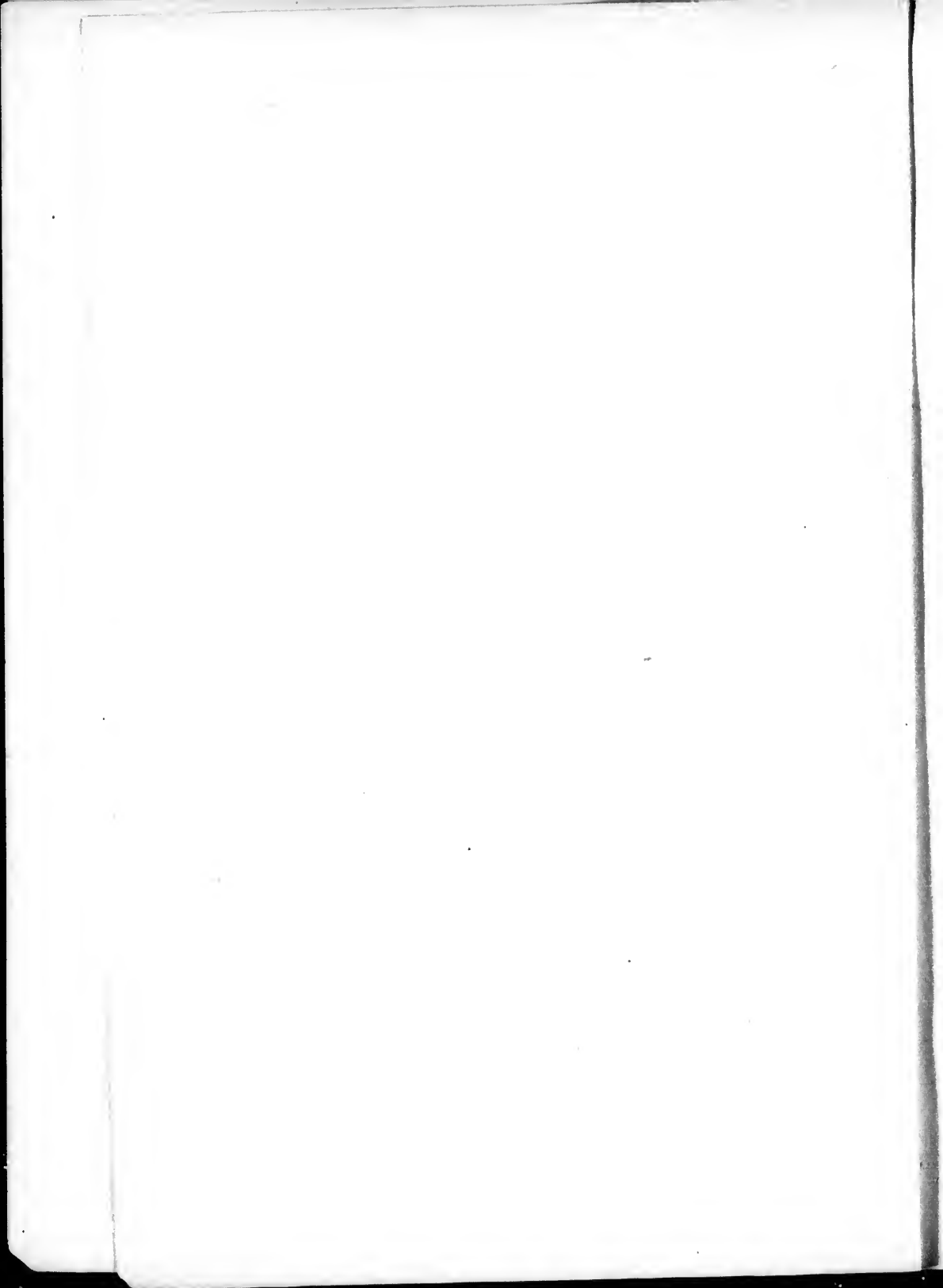
Preface.

♦ ♦

To the interests of progress in medical thought the following pages are dedicated, in the hope that (if in no other way) by making the reader *think*, it may benefit the individual, promote the advancement of true medical science, and bear fruit in improved methods of practice, thus ending in blessing to mankind.

THE AUTHOR.

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Vaso-Motor Therapeutics.

By W. E. BESSEY, M.D.

THAT large numbers are being destroyed annually by disorders of the circulation, nutrition, and secretions, and thousands are being kept miserable by chronic diseases, for lack of a clear conception of the general principles of Vaso-motor Therapeutics by the general medical profession, is, I think, a statement which cannot be disputed, and of which orificial surgery (as I understand it) is merely one of its many modes of application.

To understand this great principle is to get a very different conception of what is comprehended under the nomenclature of disease, and enables us to understand sea-sickness, vomiting in pregnancy, emotional disturbances, and sympathetic ailments, resulting from transmitted nervous irritation.

The effects of heat and cold in producing sickness are recognized, as in diarrhœa originated by heat, and excessive action of the kidneys from the effects of cold.

The onset of cholera in hot climates is peculiarly insidious and without pain; so is the chronic diarrhœa resulting from exposure to the heat of furnaces and hot climates.

Ordinarily some irritating material in the bowels causes slight flux, which, being without pain, soon subsides, calling for no special medical attention. However, in the highly nervous, the irritating ingesta causes reflex vomiting, griping and colic, and passes along the offending material with much violence, thus causing the distress experienced until the irritating cause is expelled.

In the diarrhœa from heat, and that from emotional distress, the spinal nerve centres, and those in intimate connection with them, which directly govern the alimentary canal, becomes suffused with blood much more copiously than is natural by the stimulant effects of excessive external heat, in hot climates, or of temperate climates in summer, and most rapidly by the direct rays of the sun on the patient's back. The result upon the alimentary canal may be stated as follows:

(a) The blood vessels nourishing the intestines receive a larger supply of nervous influence from the vaso-motor centres than before (the operation or application of heat to the dorsum), and hence contracting more vigorously than natural, cut off, to a proportionate extent, the supply of blood to, and consequently nourishment of, the intestinal walls. The bowels thereby lose their usual vigor, and so become highly sensitive and excitable, and susceptible of being excited and thrown into excessive or convulsive activity by any stimulus applied, which, under their normal condition, would but slightly affect them.

(b) When the skin has become blanched and bloodless in sea-sickness, sweat exudes most copiously; so also in the first stage of acute bronchitis, when the bronchial mucous membrane is swollen so as to severely impede respiration from the abnormally large amount of blood circulating in it, and at the same time painfully dry, the application of heat between the scapula, by rendering the vaso-motor nerve centres more active than before, will not only stimulate the blood vessels of the bronchial mucous membrane to contract, thus lessening the amount of blood circulating in the walls of the air tubes, and causing respiration to become easier, but simultaneously will cause bronchial mucus to be freely secreted, and is usually seen in attacks of bronchial asthma. It has been found also that when nausea is produced by applying heat to the back, the immediate cause of the nausea has been the pouring out of an abnormal amount of mucous into the stomach, and it has been found that in all cases heat applied to the spine will inevitably increase the secretion of mucous throughout the intestinal canal. Acting upon this physiological fact, cases of obstinate constipation accompanied by a feverish state of the intestinal tract, and a great want of intestinal mucous, have been overcome by the application of heat in the dorso-lumbar region. Thus it will be seen how the bowels may become peculiarly susceptible to the nervous influence which causes irregular spasmodic contractions, as in colic, and the preternaturally frequent and rapid expulsion of their contents, as in diarrhœa.

Now precisely those hyperæmic conditions of the nervous centres presiding over the bowels, which have resulted in the two groups of phenomena already explained, also induce an excessive exaltation of the excito-motor or reflex functions of these nervous centres, thus causing them to transmit their stimulating influence to the muscular fibres surrounding the bowels, with a copiousness and intensity far surpassing the normal amount, so that the circular muscles, though enfeebled, but rendered peculiarly excitable, contract more rapidly and vigorously than usual.

An association of the three conditions, namely, enfeeblement of

the muscular wall of the intestine, preternatural exudation from its mucous membrane, and excessive muscular activity, all dependent upon hyperæmia of the dorsal and lumbar nervous centres, produces all those forms of intestinal flux known as diarrhœa in temperate climates. The proof of the correctness of this idea lies in the fact that summer diarrhœa may be readily checked by the application of ice to the spine, while diarrhœa may be as readily induced by the application of heat to the dorso-lumbar region.

So also in hemorrhage from the bowels, the application of the rubber bag filled with hot water to the dorso-lumbar region is extraordinarily successful, but if long continued will induce diarrhœa. While in diarrhœa there may be always found an exciting cause, the argument is that it is not as capable of exciting an attack of diarrhœa in winter as in summer, and the reason for its efficiency in summer depends almost entirely upon the hyperæmic state of the nervous centres along the back, and specially of those presiding over the intestine functions of the alimentary canal. By excess of blood in them they are predisposed to abnormal excitement. Then only can any irritating substance induce diarrhœa. If the proximate cause of the two kinds of diarrhœa be the hyperæmic state of the vaso-motor nerve centres induced by heat, there must at the same time be a diminution of the amount of blood in the peripheral arterioles, not only of the bowels, but also of the whole body, for the contractile force exerted upon the arteries generally will lessen their diameters and will thus lessen the blood currents supplying the capillary vessels throughout the system. The pulse will become feeble, textural nutrition will be lessened, the animal functions impaired, a sense of weakness and lassitude will be induced, and as the vital chemistry in every part of the structure proceeds more languidly than before, because the diminished blood currents supply less chemical material than usual, the vitality (as it is termed) will be less; the amount of heat evolved will be lessened also, and consequently the temperature of the body will fall, so that weakness, feeble pulse, and chilliness are the symptoms prominent. Hence the very disagreeable sinking sensation in the abdomen, with the sense of cold, which causes people to resort to stimulants and apply heat to the abdomen or wear flannel wraps, or as in some countries, aprons of sheep skin or leather over the abdomen.

DIARRHŒA FROM MOTION.

The motion of a ship being communicated to the abdominal and pelvic viscera, which (rising and falling) cause a more or less violent concussion with each other and with the abdominal walls, and having their contents thus violently agitated, receive a great number of

abnormal shocks. These are conveyed to the superior and inferior mesenteric nervous plexuses, which transmit the complaint to the vertebral ganglia of the great sympathetic. These forward it along the rami-communicantes to the spinal cord, which thus excited, sends motor impulses in the reverse direction, hence the violent emesis and peristalsis which is set up.

VASO-MOTOR THERAPEUTICS.

ITS BEARING ON THE RECTAL TREATMENT OF FUNCTIONAL AND NERVOUS DISEASES.

PROF. PRATT says :—"It will be a new theory of the *causation of disease* to many to learn for the first time, perhaps, that 'all forms of chronic disease have one common predisposing cause, and that cause is a *nerve waste* occasioned by *orificial irritation* at the lower openings of the body.'"

In addition to this, there is "the reflex action of irritations in general"—as a rusty nail in the hand or foot or anywhere else, which may irritate, by reflex action, the central ganglia, and induce tetanus ; thus pregnancy, by its stretching of the muscle fibres of the uterus, and by its tension at the internal os, may induce trouble in the stomach, head or heart by reflex action, instead of being felt in the pelvis ; and irritation at any of the lower orifices, instead of causing trouble at the seat of irritation, may be reflected to any of the other orifices, or indeed to any other part of the body. There is an especially close relation between rectal inflammation and lumbar pains, or congestive irritation of the lumbar nerve ganglia, and with the great sciatic, causing lumbago and sciatica ; and every one knows of the close relation between the rectum and lungs, the popular belief being that to cure a fistula is to aggravate a lung trouble. This relation is of special importance, because the chest, in its action, is a great suction pump drawing the blood from all parts of the body back to the heart or centre of circulation.

The action of instrumental *dilatation* of the anal sphincter in suspending the breathing is indicative of this close relation, and demonstrates that any influence that affects the respiration affects also the entire body. In distension of the sphincter the respiration is invariably more or less oppressed. Distension of the urethra by use of sounds produces a like effect, but dilatation of the ext. sphincter alone will not produce it ; the internal sphincter must be distended to produce any effect on the respiration, showing that it is an effect of the sympathetic system of nerves and not of the cerebro-spinal.

“ The immediate relief of the respiration from distension of these constrictor muscles, and the known sympathy between all involuntary fibres contracting and relaxing in mutual sympathy, is the only philosophical explanation of the instantaneous and marvellous effects upon the entire circulation following it, setting in motion dormant functions and restoring circulation and functions.”

Although some physiologists have contended that nerve force is not essential to vital action, yet practically it has never been shown that any of the involuntary organs can act to the slightest extent when cut off from all nerve influence. Practically, therefore, we may conclude that it is the nerve force that keeps up the action of the whole system, very much as steam keeps up the action of the engine.

NERVE FORCE

being the moving power in all vital phenomena, a proper supply of *nerve force* means a good circulation, and this in its turn secures a vigorous *cell life* in the various tissues; and this means a healthy metamorphosis of tissue, constantly going on in a part, or, in plain English, a healthy activity in the process of waste and repair.

Now this nerve or vital force being of such fundamental importance, it becomes necessary to enquire whence it is obtained, and how it may be maintained or placed in a good condition.

WHENCE OBTAINED.

Physiology teaches us that there is in the human organism two systems of nerves—one called the cerebro-spinal, the other the great sympathetic. The cerebro-spinal contained in the brain and spinal cord, presides over the senses and voluntary motions of the body, bringing us into relation with the external world; the sympathetic presides over and controls organic life and function—the interior phenomena of natural life—in other words, an inner, unconscious, self-existent life, presiding over the deep, hidden processes of growth, nutrition, reproduction, etc., governing the heart's action—circulation; the lungs working—respiration; the action of the stomach—digestion; the great glandular system—secretion and excretion; the elaboration of the vital fluid—assimilation; waste and repair—nutrition and every unconscious operation of our being.

Both these nervous systems have a radiating centre. That of the cerebro-spinal is the brain. That of the sympathetic system—the cerebrum-abdominale—is in the centre of the body; it is focal to the great viscera of the abdomen—the touching point of lungs, heart and stomach, the location exactly coincident with emotional sensation. In that spot is found a tissue or network of nerves, the largest of a series of similar clusters of small nerve masses or

network of nerves situated near all the internal organs, and closely connected each with the other, forming a chain or circuit of nerve centres, presiding over special functions and bringing every organ into sympathy with every other. With this system of nervous communication and its influence in functional disturbance we have very much to do in our specialty, dealing with functional disorders of the rectum, uterus, bladder and sexual apparatus, also with brain and spinal irritation (superinduced by reflected irritation), with mal-nutrition, indigestion and mal-assimilation, asthma and other lung troubles, heart palpitation and many obscure chronic cases really dependent for their cause upon mal-nutrition.

Anent the offices of the great sympathetic nerve in the process of digestion and nutrition, Sawyer says : "The abdominal organs do not maintain their tone, secrete their juices and nourish themselves by their own inherent vitality, but they are enabled to do these things because they are enervated, vitalized or supplied with nerve-force by the brain and spine through the sympathetic nervous system.

"That portion of the sympathetic system which directly supplies the vital (breathing, circulating, digesting) organs with power, is placed for protection and convenience in the great cavities of the chest and abdomen.

"Here the sympathetic centres, with their connecting nerves, form a double chain in front of the spine, extending from the neck to the pelvis.

"This outlying dependency of the brain and spine is independent of the will, and is on duty day and night ; its nerve-cells are kept charged with *nerve force* by the central nervous system, and act as reservoirs of vitality for the internal organs."

It will be clearly seen how important to the due supply of nerve force to the abdominal organs must be the preservation of these parts *in health*, and how serious to the due performance of function in these organs, as well as in those of the pelvis or sexual system, must be the uninterrupted flow of the nerve currents between the central nervous system—the brain and spine—and this outlying chain of nervous ganglia. Further on we will have something special to say on this subject, but it is appropriate to say here that this is just what does occur in every case of functional disorder ; the interruption of the nerve currents being traceable to local trouble in the lower portion of the rectum. The removal of this interruption at once changes the whole aspect of the case, and starts the invalid on the road to recovery.

If we continue our enquiries into the particulars about this great sympathetic centre in the abdomen, we find that in this spot—the

neighborhood of the stomach—is found a tissue or network of nerves, which anatomists call the Solar Plexus; by ancient religious writers it has been designated “the heart” or centre of feeling. By modern psychologists it has been termed the “*Cerebrum Abdominale*,” the “belly brain,” the brain in the intestines; by a few the “Soul Centre,” because writers on insanity designate it as the “Seat of Melancholy.” The true fact is that it is the “Sympathetic Centre,” or “Centre of Sympathy” of the body.

It is true, at all events, that the noblest part of our nature—because the centre in which emotion springs, and the house of the principle of being, which is of more importance than the centre of thought, action, or doing—dwells in the great semi-lunar ganglia of the Solar Plexus of the great sympathetic chain of nerve centres.

To quote from a learned lady physiologist, whose name, however, does not appear among the galaxy of illustrious scientists, “the priority or governing influence between these two systems remains to be settled. Physiologists are not agreed. [Yet all sturdy thinkers give *reason* the preference over *emotion*—hence put the brain, the organ of reason, over the Sympathetic Ganglia, or organ of feeling.] They—the nervous systems—are intimately complicated and interdependent; filaments of communication passing from each to the other, but which is least dependent, which is dynamic, seems to be a matter of controversy. [This controversy is the struggle for supremacy between man and woman.] Perhaps it will never be settled till the question of priority between the head and the heart is settled; till it is settled where the truest wisdom resides—in the seat of instinct and emotion or in the seat of reason. If it is true that the sympathetic system presides over the organic structures (internal organs), then the principle that *we are* is more important than what *we do*, because *being* is the fountain of *doing*, should help to settle it.” (Thus, woman-like, she argues that the mother is greater than the father in the principle of being.)

“At any rate, according to physiology, one of the nervous systems, and perhaps the oldest, has its centre in *that mysterious deep where true emotion springs*.” (Noyes.)

A notable allusion to this sympathetic centre (semi-lunar ganglion of the Solar Plexus) occurs in an old magazine article by a Dr. Holmes, which appeared in December, 1862, in the *Atlantic Monthly*, shortly after the battle of Antietam, in which he narrates his experiences while in search of his son wounded in that battle. Nearing the scene of the engagement he met an officer of his son’s regiment, of whom he made anxious enquiries about his boy. He says: “From his lips I learned of the mishaps of the regiment. ‘My captain’s

wound' he spoke of as less grave than at first thought, but he incidentally mentioned having heard a story that he was killed—a fiction doubtless—a mistake—a palpable absurdity—not to be thought of or taken into account. 'Oh, no! Of course not—but what dull ache is this I feel in that obscurely sensitive region somewhere below the heart, where the *nervous centre*, called the *semi-lunar ganglion*, lies in quiet unconsciousness until a grief, a mastering anxiety, or a cruel loss produces an impression on us that reaches it through all the non-conductors which isolate it from ordinary impressions.'

Again, after hearing, with assuring details, of his son's safety—though slightly wounded—he says: "The dead pain I had felt in the semi-lunar ganglion (which I must remind my reader is a kind of stupid, unreasoning second brain—cerebrum abdominale—nearest the pit of the stomach, common to man and beast, which aches in the supreme moments of life, as when the dam loses her young, or the wild horse is lassoed) stopped short. There was a feeling as if I had slipped off a light boat, cut a strangling garter or had a grumbling tooth removed—only it (the feeling) was all over my system."

The semi-lunar ganglion here referred to is synonymous with the Solar Plexus, being the axis or centre of it. All physiologists admit the possession of this nervous centre governing their affectional nature, and that it is the seat of that mysterious instinct, the law of self-preservation, and unconscious life or existence. And metaphysicians believe it to be the centre through which men hold communication with the Divine.

Bulwer Lytton, in his "Strange Story," goes so far as to make his hero, the physician, bewail the sharing this part of his nature with the vegetable creation—in fact with all organized life.

The hero is dismissed from the door of his *lady-love*, with a "not at home." He believes himself supplanted. His first feeling is resentment, and he turns proudly away. But presently he feels "a dull, gnawing sorrow coming heavily down upon all other emotions, stifling and replacing them." He makes his hero soliloquise thus, as he disconsolately and abstractedly pursues his walk, "Why should I feel thus? I have said how the physician should enter the sick room—'a calm intelligence.' But if you strike a blow on the heart the intellect suffers. Little worth I suspect was my calm intelligence on that occasion."

Bichat, in his famous book on "Life and Death" divides life into two classes—animal and organic. "Man's intellect, with the brain for its centre, belongs to the life Animal; his passions to the life Organic—centered in the viscera. Alas! if the noblest passions through which we lift ourselves into the normal realm of the sublime and beautiful

really have their centre in the life which the very vegetable, that lives organically, shares with us ; and, alas ! if it be that life which we share with the vegetable *that can cloud, obstruct, suspend*, annul that life centered in the brain, which we share with every being howsoever angelic, inhabitant in every star, howsoever remote, on whom the Creator bestows the faculty of thought."

We question if it is any hindrance to man that he is the "paragon of animals" in his affectional nature, since when life ceases to hold sway in his composite organism the same chemical laws restore the elements entering into his physical composition to their primitive "dust" as operate in animals. Nor can we see any misfortune in being thus linked to nature and forming a part of the "great procession" of organized life on this planet. Is it not sublime to live and move amid such a panorama of wonderful living organisms ? "Fearfully and wonderfully made" is the expression used by the sacred writer, referring to man. We would add, accurately constructed and wisely adapted in all ways to fulfil his destiny and achieve triumphs as yet not conceived of by mind, for greater and grander must be these conceptions, since they are but the reflex of outward impressions gathered from the progressive achievements of man's past and present. Man's mental possibilities must therefore, in the very nature of things, be limitless and unconfined.

From what has been noted, it might be inferred that sorrow alone reveals the existence of this sympathetic ganglionic centre of our being. Not so ; a great rapture, a mastering joy, the supreme moment of love—all these produce a shock equally felt, and *joy* has killed many a weak one, as well as *grief*. It needs no argument either to prove that there is a point beyond which pleasure becomes a pain, although that point may be different in all ; in other words, *intensity* of either joy or pleasure, grief or suffering, soon carries the experience of the subject into another sphere or condition, and *joy* becomes ecstasy, and ecstasy becomes *pain*, while *pain* loses itself in *unconsciousness*, and this when unrelieved results in death. It is common to distinguish the sexes as the respective representatives of heart and mind ; woman being considered as the representative of *feeling*, man of reason and intellect. But is this true ? or is it because woman in her domestic relations is more exclusively called upon to express feeling than man, whose pursuits require that he shall use his intellect more exclusively, and the exigencies of life require that he should allow his understanding to interfere with and regulate his feelings at all times ? Again, woman is commonly said to have more heart than man, because she is governed by her feelings—is the creature of impulse. Contrary to this comes the fact that woman can be more cruel and more cold and calculating

in her revenge than man. And we may be certain that while woman has more affection for children, because of her maternal instincts, man has more understanding and shows the most benevolence and universal sympathy ; in fact that the most enduring and largest balance of affection is on his side.

Another writer on the effect of "appealing to the passions," says : "The emotions are involuntary and are not governed by the reason, and they spring from a centre which is the centre also of a system of nerves that control the involuntary motions of the body. On the other hand, mental operations are comparatively voluntary, and we trace them to the brain, which is the centre of a system of nerves that control the voluntary motions of the body."

Emotional acts, such as *blushing*, must be traced to our inner consciousness, not to the brain, but to the Solar Plexus. The *blush* is a phenomena of the sympathetic nervous system. This system has a peculiar power over the blood vessels to alter their size, and it is by the expansion of those vessels that the face is suddenly suffused with rose in *blushing*.

We explain it thus : the changing colors of the face express emotion ; emotion has its seat in—what is popularly expressed as—the heart ; (this is misleading, as the heart, which governs circulation, is not an emotional centre) ; the *heart*, or centre of sympathy, is anatomically the Solar Plexus of the sympathetic, and therefore "the centre" of a system of nerves which have the power to alter the diameter of the blood vessels, and the dilatation and contraction of these vessels cause the changing colors of the face. The pallor of fright is the effect of a sudden contraction of these vessels ; so through the medium of sympathetic nerves the cheeks are mantled with scarlet, or the face is "blanched with the palor of death," just as the sensibility at the pit of the stomach may happen to be touched. Now what has happened when the sympathetic has lost its power of blushing ? It is paralysed, has partially or totally lost its function. This is temporary ; when permanent, death ensues. As in the eye a filament of a sympathetic nerve controls the dilitation and contraction of the pupil, so the sympathetic becomes the fountain of expression for the eye ; a straight line of telegraph from the Solar Plexus to the eye and the innumerable variations in the size of the pupil mark a cypher by which the heart speaks. A little movement in the eye, almost microscopic, is transcendental in power. The twitching of the eye is imperious over everything, for all the grand motor nerves of the cerebro-spinal are obedient to its sway. The sympathetic system consists of central collections of nerve cells or ganglion, and these derive connecting nervous filaments—*rami-communicantes*—from the spinal cord, thus forming a double

chain of nerve ganglia in front of the spine extending from the neck to the pelvis ; through this arrangement the spinal cord itself, as well as those dorsal segments of the sympathetic from which the splanchnic nerves are derived, is brought into intimate relation, functionally, with the abdominal viscera, and any direct sedative influence applied to the spinal region is propagated indirectly to the mesenteric plexuses, and less blood being supplied to these nervous centres, any preternatural action in the abdominal or pelvic viscera, such as diarrhœa or flooding, is incapable of being continued ; such disturbance of function being admittedly due to the hyperæmia or congestion, more or less excessive, of these nerve centres which preside over the bowels, and notably therefore the superior and inferior mesenteric plexuses.

VASO MOTOR NERVOUS SYSTEM.

The sympathetic nervous system is sometimes called the vaso-motor, but the vaso-motor nerves (to which is assigned the duty of regulating the complicated circulating changes of the entire system) consist of central collections of nerve cells and innumerable fine filaments of nerves encircling like a network, and running along in the walls of every blood vessel of the body—the greater portion being made up of filaments from the sympathetic (which largely predominates in their control) and a few filaments from the motor tract of the spinal cord or central nervous system.

The vaso-motor nerves, which regulate the blood pressure by contracting and dilating the blood vessels, come from the spinal cord. This was first recognized by Waller & Budge. They pass out with the roots of the spinal nerves and then reach their peripheral terminal expansions by various routes which may be classified into two principal groups.

The largest group leave the spinal nerves with the nervi-communicantes and enter the sympathetic together, and after running a short distance with the sympathetic, leave it again in two ways—1st, as independent branches of the great sympathetic, by the splanchnic nerves, which furnish the vaso-motor supply to the abdominal viscera ; 2nd, another group return again to the spinal cord through the rami-communicantes and then are distributed to the muscles, bones and skin.

They are also divided into two groups according to their function—namely, those which when irritated contract the vessels, and those which when irritated dilate them.

- The vassic-constrictors give tone to the blood-vessels and exert a continual influence on the distribution of the blood and on the fullness

of the blood vessels. They are under the control of ganglionic centres of the spinal cord, especially the Medulla oblongata.

The important part played by the Med. ob. in governing this function led to the supposition that it contained all the centres of the vaso-motor nerves, and the spinal cord none. But Schlesinger showed that it could not be this centre alone that controlled the vaso-constrictors, and later on, in 1878, Stricker, of Vienna, Austria, proved the existence of centres for the vaso-constrictors on the boundary line between the cervical and dorsal portions of the cord. And the vaso-motor nerve centres which dominate the constrictors have been proved by Ludwig and Thiry to control the blood pressure also. This is a fundamental law of Physiology, and a second fundamental law discovered by Ludwig was that "the blood vessels of the abdominal viscera are the principal regulators of the blood-pressure," that is, have so great a capacity, and by dilatation and contraction can increase or diminish their contents to such an extent, that they act like a mighty reservoir, and if this be carried to excess and the vassic-constrictor nerves of the abdominal viscera be completely paralysed, the rush of blood into these abdominal vessels would be so great that other parts would become anemic, or the animal might die from fatal syncope.

Now the nerves which control these abdominal blood vessels lie principally in the splanchnic nerves, therefore when the splanchnics are affected intense hyperemia of the abdominal vessels is produced, with corresponding anemia of other organs.

This hyperemia is an active one, involving an acceleration of the blood current in the affected part, and is of vast extent, involving *all* the abdominal viscera.

Stricker calls this active hyperemia caused by paralysis of the vaso-constrictors "*a hyperemia paralysis*," to distinguish it from the hyperemia caused by irritation of the vaso-dilators, which he termed "hyperemia of irritation." This and the existence of vaso-dilators were discovered by Claude Bernard in 1858. These are liberally supplied to the Sciatic.

The fact that vaso-dilator nerves are contained in the posterior sensory roots is of great importance in the diagnosis of disease, and enables us to understand the doctrine of hyperemia and a number of important pathological phenomena, such as neuralgias accompanied by hyperemia. This is understood when we know that the sensitive spinal roots contain vaso-dilators. Irritation of sensitive roots will necessarily cause pain and hyperemia, and the seat of hyperemia will be found to correspond with the terminal point of the nerve irritated. This is observed in Eczema, Herpes Zoster, etc.

The practical application of this knowledge lies in it enabling us to understand the difference between the two forms of hyperemia of the blood-vessels and their results, namely, that resulting from paralysis of the vaso-constrictors, which causes the fatal hyperemia of congestion, and inflammation, or apoplexy, and that resulting from irritation of the sensitive nerves, and through their reflexes to the posterior sensory centre of the spinal cord (which contains the controlling centres of the vaso-dilators), causing irritation of the vaso-dilators and temporary dilatation of the blood vessels, flushing of the capillaries, and redness of the surface, as seen in blushing in sensitive or emotional people, and the reddening of a part from rubbing or the temporary application of a mustard plaster.

Paralysis of the vaso-constrictors causes permanent loss of tone in the walls of the blood-vessels, with dilatation and abnormal congestion, which is followed by effusion into the cellular tissue, inflammation and suppuration. Whereas the hyperemia resulting from the temporary excitation of the vaso-dilators is salutary and beneficial.

The vaso-constrictors exert a continuous tonic action upon the walls of the blood-vessels, and loss of tone in the blood-vessels must be remedied by increased stimulus, and improved nutrition of the vaso-constrictor nerve centres.

But the vaso-dilators only act temporarily when aroused by some special irritation or excitation, as in dilatation of the internal sphinctor muscles, and the flushing of the capillaries which follows is highly beneficial, improving the healthy activity in all parts, increasing the healthy blood supply, and therefore improving nutrition.

It is now well understood that the capillaries are the feeders of the tissues, and organs of the body, being themselves tubes of living protoplasm, continuous with the *intima* of the blood-vessels lining the entire vascular system.

The arrangement of nervous filaments supplied to the blood vessels has a most important relation to the comfort of the individual. The blood vessels are not rigid and unyielding tubes, but are very elastic, and have the property of dilating and contracting—changes of calibre which occur under a variety of circumstances. For example—when exposed to cold the vessels of the surface contract and the blood recedes to the interior to be kept from chilling; under great heat it rushes to the surface and exudes a portion of its water as sweat to cool the body by its evaporation; under sudden fear the face becomes blanched; under anger it becomes reddened with excitement, etc., etc. In health all goes well, but in weakness of the central nervous system, the action of the vaso-motor nerves is apt to become unsteady, the blood vessels become abnormally susceptible, are not properly con-

trolled, and derangements of circulation result. Excessive blushing, hot flushes and congestive headaches, show want of control or unsteadiness of circulation from a weakened or irritated nervous system. Constant coldness of feet and hands show vaso-motor spasms.

It is with the vaso-motor system of nerves that we will have most to do in the disturbed functions found present in chronic diseases, and with the reflex irritations dealt with in our special treatment of disease.

REFLEX IRRITATION.

To understand *reflex irritation* it is necessary to know the general plan of arrangement of the nervous system and centres ; this is double—the voluntary, with two centres ; the involuntary, with many centres.

The central nervous system—or voluntary—consists of the brain, a mass of soft grey and white tissue, which fills the cavity of the skull ; and the spinal cord, about the size of the little finger and 16 inches long, is enclosed in a bony case of skull and spine, and communicates with every other part of the body by means of nerves.

Irritation of the involuntary nerve centres does not cause motor spasms as in the voluntary, but impaired function follows, and consequently ill health.

Nerve substance, in health, appears alike in all, but vast differences exist in quality, which cannot be determined, one being that of the philosopher, the other that of the fool.

These nerves constantly transmit nervous sensations from every part of the body, through the spine, to the brain, and conduct nervous impulses from the brain and spine to other parts of the body.

Local disease, causing irritation in any part, is capable of producing back-action or reflection on some other part, thus an impression made upon one part of the body may influence some distant part by influencing nerve-centres common to both.

Sawyer says :—"The principle of reflex action is the basis of a certain proportion of cases of nervous impairment, which might be described as back-acting, reflex, afferent or inverse neurasthenic. In this form the nerve-weakness is secondary to local diseases in some other part of the body."

Slight persistent morbid impressions are capable, by their cumulative action, of producing very serious diseases, either at the point of irritation, when it is purely local in its action, or in distant parts, in which case the irritation is reflected to some distant organ—usually the weakest—which shows at first symptoms of disturbed function, from disturbed circulation. And if this is long continued, structural changes follow, abnormal conditions are produced and a permanently diseased condition established.

In our daily experience we meet with cases of a great variety of chronic troubles, such as Dyspepsia, Liver Complaint, Asthma, Cardiac distress and Palpitation of the Heart, pain in loins, back, head or down the sciatic nerves, irritation of the Bladder, Womb troubles, Kidney troubles, Spinal weakness or irritation, Epilepsy or Fits, Chorea or St. Vitus' Dance—all due to irritation of the great sympathetic nerves from diseases located in the rectum. Proof—removal of irritation by the curing of the rectal difficulty cures the distant disease of which it had been the exciting cause.

EXAMPLES OF REFLEX IRRITATION.

A rusty nail in the foot may produce Tetanus or Lockjaw—a *result* distant from the *cause*. Epilepsy or Fits, every form of persistent convulsive disorder, Chorea or St. Vitus Dance may result from such apparently inadequate irritatives as hardened wax in the ear, chronic constipation, or rectal ulceration. The irritation of teething, worms, or undigested food in children frequently causes convulsions.

Phymosis in children, by the irritating impression of the tight foreskin, has sometimes caused nervous disturbance, convulsions or paralysis.

Chronic dyspepsia produces constitutional symptoms and mental disturbances to be seen everywhere. Nasal Catarrh—a local disorder due to mucous membranal mal-assimilation for its cause, giving rise to the existence of morbid secretions (in which, in many cases, the *Asthmatos ciliaris*, a minute parasite, finds a lodgment, keeping up a perpetual irritation), may develop a long train of disordered mental and nervous symptoms.

Hay-fever, a purely reflex vaso-motor nervous disorder, arising from the irritating presence of a poisonous pollen on the Schneiderian membrane, is shown to be a respiratory neurosis, in which are sensitive respiratory nerve centres, and unstable vaso-motor innovations from debility due to disordered action of the vaso-motor nervous system, superinduced by rectal trouble, is not only instantly relieved, but positively cured by removal of the source of irritation in the rectum. Neurotic or spasmodic Asthma being due to rectal irritation of the great sympathetic or pneumogastric nerve, from indigestion in stomach, is curable in same way—removal of rectal difficulty removes stomach trouble and with it all source of irritation, hence patient is cured.

Many uncontrolable convulsive nervous troubles remain unrelieved because of want of thoroughness in the treatment—it has never gone deep enough to remove the cause or source of irritation.

The curative treatment of convulsive disorders must reach to the

removal of the perpetual cause of irritation ; whereas usually no account at all is taken of this, and the attention directed solely to the centric irritation or disorder, which is only a result not the cause.

Diseases of the reproductive organs : the womb, ovaries and clitoris in the female ; of the prepuce or penis in the male, with the long train of mental and nervous symptoms they give rise to, are directly due to disease in the rectum. Long series of irritating morbid impressions acting and reacting upon the brain and spine, harass, irritate and depress, these parts, impair nutrition and lessen their capacity for creating a supply of vital force.

Speaking of *Spinal Irritations*, an eminent writer says : " In many cases of ' spinal irritation,' which, no doubt, may be owing to engorgement of the cord and the roots of the nerves, and which produces reflex excitations to distant parts, causing Palpitation, Neuralgia, Congestion and engorgement of the parenchyma of the pelvic and abdominal organs, etc., there will be found to exist as a dependent cause a great amount of local irritation in the lower bowel or rectal pouch, and this may be in the character of a subacute or parenchymatous chronic inflammation, contracted sphincters, venous congestion from a condition of semi-vaso-motor paralysis, feverish condition of the alimentary tract, all due to and dependent upon a morbid or abnormal condition of the great sympathetic or nervous system which governs all functional and organic life." In such cases local treatment of the rectum and expansion of sphincters is urgently demanded, while cold to the spine will be found eminently remedial.

Spinal irritation with reflex symptoms to various distant parts of the organic system, varying in their character and seat according to the part of the spinal cord affected, have been noticed and recorded by many observers—but the *exciting cause* of the spinal irritation has not been so easy to ascertain. Sometimes the exciting cause acts slowly—at others with great rapidity. In the latter case the portion of the spine affected has been reduced to a condition of susceptibility by *mal-assimilation* of nutrition extending over a considerable period of time ; or by an active *nerve-waste* operating more rapidly, and bringing about a state of exhaustion in a shorter period of time, since it may be, as a physiological principle, that any cause capable of reducing the powers of the system may produce spinal irritation.

Now, the underlying pathological condition will be found, in every case of impaired function, or spinal irritation, to be mal-nutrition ; and this is applicable to the whole class of Neuroses. And this can be traced in every case to a disordered condition of the great sympathetic, or nerve—governing organic life, and therefore governing digestion, assimilation, nutrition, or as we ordinarily phrase it, *waste* and *repair*.

Now, let there be brought about by local inflammation of the mucous membrane of the rectum, an amount of irritation of the nerve filaments capable of exciting spasmodic contraction of the involuntary muscle walls of any part of, or the whole intestinal tube, and straight-way there is set up a spasmodic stricture or pressure upon the veins or capillaries supplying blood to the part. Or the same irritation may cause at first contraction (vassic-spasms), followed in time by relaxation of the muscular coats of these blood vessels—vassic-paralysis—and piles result as a sequence, or the nerve currents may be so interfered with as to produce disturbed function in distant organs—or the irritation be transmitted to the greater or lesser sciatic nerves, producing characteristic symptoms of sciatica, or to the lumbar plexus, producing symptoms of lumbago, or to some portion of the spinal cord itself.

Specialists are accused by general practitioners of limiting their usefulness by concentrating their attention too fixedly on one part or one class of diseases—this we deny.

On the contrary, we, as specialists, by fixing our attention upon the orifices of the body, studying their anatomical relations minutely, their office and functions in the general economy, and the pathology of the diseases to which they are subject, instead of limiting our usefulness, greatly extend it and increase our efficiency.

It is by such special studies that we find in these local disturbances and diseased processes which give rise to brain and spine complications, grave mental and nervous symptoms, organic functional disturbances and chronic ailments from which thousands have hitherto suffered in helpless despair, who now, in consequence of specialists acquiring great expertness in physical diagnosis and the treatment of neurotic and chronic affections, are daily finding relief, and in scriptural language are able to "take up their burdens and walk," rejoicing in that health which is the right of every living creature.

Hay Fever, and neurotic or spasmodic Asthma, have baffled the general practitioner to find either cause or cure. One writer says :— "It cannot be traced to any physical cause. There is no local disease to explain the paroxysm, and we can only suppose over-sensibility of nerve ends and nerve centres to irritants often trivial, and not noticed by ordinary persons." What a confession! Well, we *can* tell what the physical cause is and to what it may be traced.

It is due to an excess of nervous irritability of "the filaments of the pneumogastric nerves that go direct to the air tube and lungs." The pneumogastric nerve, as its name implies, supplies nervous filaments, not only to the lungs, but also to the upper part of the alimentary canal, namely the pharynx, œsophagus and stomach; and any indigestion or other irritation of these parts may show its effects

in the form of contracted lungs and asthmatic paroxysms. These diseases, however, are dependent upon a pulmonary neurosis, or spasmodic excitability of the nerves of a part, and Hay Fever, Rose Cold, Hay Asthma, &c., or rather Asthma caused by different irritants existing in the atmosphere and coming into contact with the hyperæsthetic or excessively excitable nerve filaments of the highly sensitive air passages, exciting reflex-motor-spasms and difficulty of respiration.

Asthma may also arise from deranged digestion, mal-assimilation of food, rectal inflammation, or whatever else produces irritation of the filaments of the great sympathetic nerve or the pneumogastric.

As to its cure, everyone knows that the removal of the patient out of an atmosphere loaded with the pollen of poisonous plants (such as timothy and ragweed) suffices to avoid an attack.

As a remedy for this pulmonary neurosis on which Asthma depends, *nux vomica* has a high reputation, because it acts upon the pneumogastric and the great sympathetic, while strychnia acts directly upon the motor column of the spinal cord.

It has been administered with advantage in the nervous movements of Pregnancy, Dyspepsia, Nervous Palpitation of the Heart, Melancholy, Nervous and Periodical Cough, Spasmodic Asthma and finally in Albumenuria. Why? Simply because temporarily it acted as a tonic, and improved the mucous membranal assimilation, the nervous assimilation, the functional action of the various organs, and in the pulmonary neurosis temporarily diminished by its tonic action on the nerve filaments supplied thereto.

This we do in another way—by removing the nerve depression and consequent serious impairment of function by local treatment of the rectum.

In ordinary practice patients are relieved of a paroxysm of Spasmodic Asthma or Hay Fever by the local application with a feather to the nostrils of a strong solution of cocaine in glycerine, which possesses the power of allaying irritation and reducing the engorgement of the mucous membrane at the beginning of an attack, or medication of those filaments of the pneumogastric and sympathetic nerves that go direct to the air passages (air tubes and lungs) by inhalations of various fumes and vapors—such as oxygen, fumes of nitre paper, stramonium and tobacco—the most efficacious compound fumigation being powdered lobelia, stramonium, salt-petre and black tea, of each two ounces, mixed, sifted and burned, and the fumes inhaled; this causes relaxation of the spasm and relieves the paroxysm—but it is only a temporary expedient, and both patient and physician seek for some means of cure more radical and permanent in its effects.

"Efficiently to treat Spasmodic Asthma, in its various forms, including Hay Fever, we must recollect that we are dealing with a *pulmonary neurosis* and endeavour to allay any irritation of the Pneumogastric Nerve as much as lies in our power," says Dr. Thorowgood.

Sawyer says:—"The prevailing theory now is that *Hay Fever* is a *respiratory neurosis*, in which irritated nerve-ends, over sensitive respiratory nerve-centres, unstable respiratory vaso-motor innervation, act in different proportion in each case. *Neurotic-Asthma* is that variety of spasmodic difficult breathing, which cannot be traced to any physical cause." Oh! can't it? Well, Dr. Sawyer, you are correct in your definition, but not in stating the trouble cannot be traced to its cause. Again, he says: "The treatment of *Hay Fever* and that of *Neurotic-Asthma* are similar."

Dr. Thorowgood says:—"A state of exhaustion may be induced which always increases any kind of nervous irritability; and, further than this, the long-continued innutrition (mal-assimilation) leads to actual structural change of a degenerative kind in the lung-tissue"; and concludes his very able article by saying: "We certainly have no specific for the cure of this disease"—a very sensible conclusion so far as dosing the patient with drugs is concerned.

Orificial surgery can do this most effectually by removing local disease—and its consequent irritation etc.—found existing within the nasal passage and rectum.

Dr. Thorowgood's observation led him to treat "the stomach and liver with a view to the removal of all cause of irritation of the pneumogastric, and made use of certain tonics (nitro-glycerine, nux vomica and strychnia) that have in some way or another a permanently curative power over neuroses of the lungs and heart." But the supply of filaments of the sympathetic to the breathing apparatus and the effect of a diseased condition of the mucous membrane of these passages from lack of nutrition—mucous membranal mal-assimilation—causing the vitality in it to be at a low ebb, and consequently to favor diseased processes, and to become highly irritable and sensitive to the presence of different irritants existing in the atmosphere, which a healthy mucous membrane would not be affected by—seems to have passed unnoticed by him. Now we are having evidence presented to us daily of the frequent existence in the rectum of diseased conditions which so affect the portal circulation as to disturb the liver; the intestinal terminal filaments of sympathetic nerves as to produce nervous or irritable Dyspepsia; and to produce such an atonic condition of the muscular coat of the bowels as to partially arrest peristaltic action in them, arrest secretion, prevent absorption, and favor a feverish state

with diminished motion and constipation, thus producing a direct irritation of the pneumogastric nerve, to which Dr. Thorowgood attributes all spasmodic affections of the breathing apparatus.

The laboratory experiments of Bert Traube, Burdon Saunderson, Foster and other physiologists, have shown that irritation of the pneumogastric nerve causes spasmodic contraction of the lungs and arrest of respiration; the arrest being more easily produced during expiration than during inspiration. The lungs themselves contract just as does a sponge when squeezed in the hand; and so long as this contraction continues, so long does the paroxysm of Asthma and difficult breathing exist. Prolonged expiratory effort alone, as by a violent burst of coughing or a fit of laughter, are very apt to determine a fit of spasmodic Asthma in one predisposed thereto; illustrating the fact shown by the experiments here alluded to, that arrest of respiration from closure of the lungs is more easily produced during expiration than during inspiration.

One writer, speaking of these and other facts not here referred to, says:—"These are matters tolerably well known and understood; and yet, in the practical treatment of such a complaint as spasmodic Asthma, we seem hardly to get that help from this physiological and anatomical knowledge to which we are fairly entitled." Now let us see why.

First, because the part played by the great sympathetic nerve, and diseases of the rectum, have been entirely ignored or overlooked by these observers. Of course, the pneumogastric nerve, as its name implies, supplies nervous filaments to not only the lungs, but also to the upper part of the alimentary canal, namely, the pharynx, œsophagus, stomach and also to the diaphragm: hence any irritation of these parts may show its effects in the form of contracted lungs and difficult breathing. But the great sympathetic supplies filaments to all these, and any disturbance of this system of nerves produces choking sensations also—as evidenced in the Globus Hystercus of Hysteria; it also supplies, not filaments only, but a large network—the cardiac plexus—to the heart, hence any nervous disturbance of this great system produces Palpitation of the Heart. To the stomach it supplies the gastric plexus and lies close to the great solar plexus or centre of sympathetic or emotional influence—and therefore the stomach may be disturbed by an irritation anywhere.

H. Cripps, F.R.C.S., says:—"The rectum receives its nerve supply from the hypogastric plexus of the sympathetic. The nerves supplying the *highly sensitive surface* about the anal margin, are derived both from the fourth sacral and the pudic; while the external sphincter and levator ani also obtain filaments from both these sources. The

terminal filaments or branches of these nerves communicate freely with the small sciatic, and through it with the sacral plexus and the great sciatic. These communications explain the phenomenon of transferred pain sometimes experienced in rectal disease, mentioned by Brodie in his vol. iii., p. 141."

These facts we have known, and have stated before in the following language, showing how functional organic disturbances are due to rectal and other irritations quite distant from the organ where the irritation is located :

" The chief nerve supply of the rectum is at the lower portion and around the anus ; the middle and upper portions possessing very little sensibility—so little, in fact, that the gravest diseases, as cancer and ulcer, may exist there and not manifest their presence by any pain ; and large accumulations of fœcal matter may exist in the rectal pouch without causing suffering. The bladder may even be punctured through the rectum without causing pain, and strong caustics applied with little suffering. But at the anus or entrance to the bowel quite the opposite conditions exist, and it is exceedingly sensitive. According to Krause the nerves end in the mucous membrane of the anus in club-shaped bulbs, which lie under papillæ—these when enlarged become very painful. An ulcer or fissure occurring there always causes intense pain and sometimes gives rise to spasmodic fits or convulsions because the filaments of a motor or sensory nerve being exposed, an excitomotory apparatus is at once established, and nervous disturbance, or fits, may be the result, although no suspicion of the close connection between the two may exist. But cure the trouble in the rectum and no more fits occur—proof positive. The pelvic-plexuses of the sympathetic are placed one on either side of the rectum and vagina. Each is composed of prolongations from the hypogastric plexus above, united with branches from the sacral nerves.

" The distribution of the spinal nerves serves to explain many of the reflex and so-called anomalous symptoms of pain which are met with in diseases of the rectum and anus. Thus a pain in the foot at the termination of the great sciatic nerve was *removed* by curing prolapsing hemorrhoids—the irritation had been conveyed along the pudic nerve to the sacral plexus, thence to the great sciatic and so on to the foot. Thus in the same way a fissure of the anus may cause pain in the lumbar or iliac regions, pain down the sciatic nerve, loss of sensation or cramps in the legs, symptoms of bladder, urethral or uterine diseases, Dyspepsia, Asthma, Heart Palpitation, heaviness of the head, or more general nervous phenomena.

The tonic contraction of the sphinctor muscle is (in part at least) due to the influence of a nerve centre located in the lumbar region,

and if this nerve connection be injured or severed relaxation takes place and prolapsus follows. This nerve centre is subject to a variety of influences and the sphinctor muscle may be relaxed or contracted by the will or emotion or local stimulation, as when fear among soldiers when drawn up in line at the beginning of a battle causes many of them to lose control of their bowels and have a passage, soiling their clothing. We are thus particular to refer to the supply of nerves to these parts in order to make it clear and plain to the reader how intimate the relation is between *cause* and *effect* when sympathetic diseases in various parts of the system are found to have been due to rectal diseases."

It will now be evident to the reader that it is not sufficient to treat the apparent seat of disease, as, for instance, where a pain is located, without removing the cause—which may be far distant—for the reason that the pain only is treated, the cause is not found out and removed. So, very naturally, Nature's cry for relief will return sooner or later.

Deficient *nerve force* in any vasor-motor nerve centre causes the organs or blood vessels governed by it to become relaxed, the circulation impeded; and with decreased vital power, such parts become congested, and ultimately diseased. Attention to the local symptom or pain, if there be any, is of much less consequence than the restoration of a healthy action to the nerve centres, thereby conveying an abundant supply of vital force to the diseased parts, changing the action therein from a diseased to a healthy one.

Alluding to this important subject, Alonzo B. Palmer, M.D., L.L.D., in his recent work, *Science and Practice of Medicine*, very pertinently says:—"Many, even of the enlightened members of the profession, do not fully appreciate how injurious are the effects of habitual constipation. The long-continued retention of fecal matter which should be expelled, often undergoing putrefactive changes, is almost certain to be followed by the absorption of materials which contaminate the blood and system. Moreover, the presence of mechanically or chemically irritating materials continually impressing and more or less irritating the intestinal nerves, affects very unfavorably the whole nervous system, especially in sensitive persons, and leads to a great variety of sensory, motor, nutritive, functional and even mental abnormalities." This disturbance to the general health has been produced by the irritation of the great sympathetic nervous system of ganglia, which supplies more terminal filaments to this organ than any other, and lies in direct contact with one of the great ganglionic centres of this sympathetic system or chain of ganglia, which bring into sympathy every organ with every other organ in the

body, and in this way disease, or disturbed function at least, is found to have resulted in every important organ of the human system. The extent to which inflammatory diseases of the rectum have produced disease in distant parts through sympathetic action transmitted through the great sympathetic system of nerves and its ganglia, can only be appreciated by close observation and study, coupled with the extensive experience which special practice in orificial surgery alone affords.

DISEASES OF THE RECTUM .

are incident to civilized races of mankind and very perceptibly increase with the advancement of civilization. There are but few, however, very few, who ever know what trouble comes from that part of the body.

It is now known that the majority of those abnormal pathological conditions of the urethra, prostate gland, bladder, womb and vagina which were supposed to give rise to irritative disturbance and disease in almost every other part of the human system, are only secondary effects resulting from inflammatory diseased conditions of the rectum. To enumerate the diseases produced by irritation of the nerve centres, and consequently curable by treatment directed to the removal of the cause, one would need to recount a list of ailments that would astonish the uninitiated.

Let it suffice to say that proper and thorough treatment of the rectum not only relieves but cures absolutely a formidable list of chronic ailments, including Chronic Constipation, Chronic Diarrhœa, Dyspepsia, Bronchial Cough, Asthma, Palpitation of the Heart, Angina Pectoris, Heart Syncope from weakness or insufficiency, Nervous Debility, Impotency, Paralysis, Hysteria, Chronic Melancholy, Hypochondria, Insanity, Mono-Mania, Insomnia, Skin troubles, including Eczema, Herpes, Acne, Chronic Ulcerations, etc., Muscular Rheumatism, joint affections and a long array of stomach, liver and lung troubles, with sexual disorders too numerous to mention—in fact, every form of disease in which the cause may be traced to a failure on the part of the nervous system to properly perform its duty.

To choose an illustration. The fire under the boiler affects the water in the boiler, converts it into steam, thereby creating a force that moves the engine, that sends power and renders useful for practical purposes every machine in a vast manufactory; let there be anything wrong about the boiler and the whole system of machinery is disturbed or deficient in action. Similarly, we say the sympathetic ganglionic system of nerves governs all the functions of all the organs in the body.

The great pelvic plexuses of this system lie in immediate contact with the rectum, and their filaments are spread over every portion of

the pelvic cavity governing the animal propensities, as well as the animal functions of the entire system. Now let there be any fever with chronic constipation, any inflammation, any ulceration, any fissures, or any fistulas or abscesses; there this nerve is at once affected, its action disturbed, and thus irritation and disturbance is reflected or transmitted throughout the entire chain of nervous ganglia; the general vitality is at once lowered, distant organs are certain to be affected, and it is only a question of which is the weakest and most susceptible to determine in advance which function or organ will be the sufferer. So, given a diseased rectum thus sympathetically connected in the closest relations with every important organ, and the physician has not far to seek for some suffering organ or function, quite distant, it may be, from the diseased part or focus of irritation, and enquiry reveals a dyspepsia, a heart trouble, or a confirmed asthma, etc., etc. Is this difficult to understand? You say no, but is it true? We assert it in the most positive manner, that rectal troubles are responsible for ninety-nine hundredths (99-100) of all the functional disturbances to which the great afflicted army of invalids are subjected.

The truth is that the pathological conditions which, through their irritating effect upon the great sympathetic system of nerves, have set up disease in every nook and corner of the human organism, have been either entirely overlooked, neglected, or but imperfectly understood. But in this, as in every other field of science, the motto applies: "Knowledge is power and always leads to success."

This brings us to consider the subject of "Nervous irritation."

The "*proximate cause*" of diarrhœa may help us to understand the influence of the spinal centres over the intestinal canal. It has been noted that the diarrhœa that precedes Cholera is generally painless, and hence the insidious character of the onset of that fatal disease. Patients supposing that irritating material in the bowel—irritating injesta—cause diarrhœa and reflex action, resulting in sensations more or less pronounced of the nature of griping colic, the intestinal contractions being both especially vigorous and concentrated in turn and intensity, passing along the offending material with undue force, thus causing the distress.

But in the premonitory diarrhœa of Cholera the order of causation is reversed. The *dorsal nervous centres* and those sympathetic centres in intimate connection with them, the superior and inferior mesenteric, which directly govern the alimentary canal, become suffused with blood (hyperemic or congested) much more copiously than is natural by the stimulant effects of the excessive external heat in hot climates, and hot seasons of temperate climates, and most rapidly by the direct rays of the sun on the back of the patient.

The effect upon the intestinal or alimentary canal (for we are dealing with it in its entirety) may be stated as follows, and is the same as that which obtains in delicate, highly nervous, and susceptible persons, in whom excessive convulsive activity, or fits, may be induced by the most ordinary excitement. The blood-vessels nourishing the bowels receive a larger supply of nervous influence from the vasomotor centres than before, and hence contracting more vigorously than natural, cut off to a proportionate extent the supply of blood to, and consequently the nourishment of, the intestinal walls. These lose their wonted robustness and become "highly nervous" and susceptible of excitement, and excessive activity, as in diarrhœa, from causes which in a healthy condition would but slightly affect them.

Again, in sea-sickness, when the skin is most blanched and bloodless, perspiration exudes most copiously; in the first stage of Bronchitis—when the bronchial mucous membrane is so swollen from the abnormally large amount of blood circulating in it, seriously impeding respiration, at the same time that it is completely and painfully dry—the application of heat between the scapulæ, by rendering the vasomotor nerve centre more active than before, not only stimulates the blood vessels of the bronchial mucous membrane to contract, thus lessening the amount of blood circulating in the walls of the air tube and causing respiration to become much easier, but, simultaneously, causes bronchial mucous to be freely secreted. Analogically reasoning, when by applying heat to the back, nausea is induced, the proximate cause is the secretion of an abnormal or excessive amount of mucous in the stomach. Heat thus applied increases the secretion of mucous throughout the intestinal canal.

Acting on this physiological fact, it is a common eastern practice to recommend the application of heat in the dorso-lumbar regions to overcome constipation due to a want of intestinal mucous.

Sawyer says, "Chronic constipation is not always, but only *very often* a sign of *nervous impairment*, in which case it depends upon deficient moisture in the motions (deficient intestinal secretion) or upon debility (poor innervation) of the unstriped muscular fibres, which constitute the middle wall of the lower bowel."

Sir Andrew Clarke (Physician to the Queen) considers constipation both an *effect* and a *cause* of disease, and applies the term "Fœcal anemia" to "a class of cases in which the elements of disease are *retained accumulation* in the lower bowel, chemical decomposition with formation of poisonous matter, absorption into the blood and chronic blood poisoning." This surely is an indictment sufficiently strong against the evil results of habitual Constipation by the highest and most respectable medical authorities, in our power to quote. But

one of the ablest modern writers adds a "knock-down" blow in the following language: "All morbid conditions of the pelvic and reproductive organs are especially aggravated by Chronic Constipation."

In many instances this Chronic Constipation is the direct cause of Hemorrhoids from the mechanical pressure on the blood vessels interfering with free circulation, and Verneuil has called attention to the fact that the hemorrhoidal veins pass through the muscular walls, believing that contraction of the muscular fibres of the coats of the rectum compress these veins and obstruct the return of blood to the portal circulation, thereby furnishing one of the most active causes of internal Hemorrhoids, when taken jointly with a degree of *vaso-motor paralysis*.

The anatomical arrangement of the rectal veins corroborate this view, and we give it briefly, thus: "The *veins* returning the blood from the anal margin are the middle and inferior hemorrhoidal, the blood from which eventually finds its way into the internal iliac; but the rectum proper returns its blood by the superior hemorrhoidal, from whence the blood passes by the inferior mesenteric to join the portal circulation. The superior hemorrhoidal veins commence close to the anal verge, rather beneath the muco-cutaneous surface than the mucous membrane proper. Some ten or twelve minute branches start from little pouch-like dilatations, pass up the bowel for an inch or more, gradually converging into five or six larger veins, which uniting eventually form the inferior mesenteric vein. For the first three inches the rectal veins run beneath the mucous membrane, between it and the muscular coats. They then perforate the muscular coats, running the rest of their course external to the bowel. The hemorrhoidal plexus of veins can be injected through the inferior mesenteric; but there is no communication with the iliac veins; and the hemorrhoidal plexus cannot be injected from the iliac veins, showing communication does not exist."

With this short reference to the supply of veins to the rectum—in which we are deeply interested—we will return to a consideration of the Pathology of Diarrhœa, Constipation and Fits, which we think strongly supports our theory of *vaso-motor therapeutics*.

The flux of diarrhœa is undoubtedly increased—if it is not caused—by a copious exudation of mucous, as the result of hyperemia of the nerve centres. This hypothesis accounts for all the phenomena of diarrhœa, and is corroborated by the results of application of heat or cold to the spine.

Assuming that the bowels in diarrhœa have become in a condition rendering them *peculiarly susceptible to that nervous influence* which causes their peristaltic contractions and preternaturally frequent

and rapid expulsion of their contents, precisely those *hyperemic conditions of the nervous centres presiding over the bowels* which have resulted in the two groups of phenomena already explained, induce an excessive exaltation of the excito-motor or reflex functions of these nervous centres, and causes them to transmit their stimulating influence to the muscular fibres surrounding the bowels with a copiousness and intensity far surpassing the normal amount. Hence these circular muscles, enfeebled, but rendered peculiarly excitable, as explained, contract more rapidly and vigorously than usual.

The association of three conditions, viz., enfeeblement of the muscular wall of the intestine, preternatural muscular activity, and excessive exudation from the mucus membrane of the intestine—*all dependent upon hyperemia of the nervous centres*—constitutes all forms of intestinal flux known as the diarrhœa of summer and hot climates; also long continued chronic cases lasting over a period of years—but due to the same cause and a hyperemic condition of the nervous system.

John Chapman, M.D., M.R.C.S., M.R.C.P., London, says: "Summer diarrhœas are generally supposed to be due to the eating of fruit, which is more abundant than in winter, and in numerous cases it may be an exciting cause—but, if the same exciting cause were in operation in winter it would be far from equally *efficient*—its efficiency in summer being due almost wholly to the hyperemic state of the nervous centres generally along the back, and especially those presiding over the nourishment and function of the alimentary canal. These, *by excess of blood in them*, are predisposed to abnormal excitement. Then only will fruit taken into the stomach become an exciting cause of diarrhœa; moreover, thousands of persons who abstain from fruit, and are not guilty of irregularities of any kind, are nevertheless attacked with summer diarrhœa. At a loss to account for their sufferings, they ascribe them to irritating ingesta in the shape of foul gases, the influence of some mysterious, inscrutable agency; or more commonly to some unknown action of the great heat in summer. This wide-spread instinctive notion of the cause of the *malady* is almost as remarkable and interesting as the complete empirical anticipation by the *Swiss Mountain Guides* of this theory of disease."

PERIPHERAL CIRCULATION.

It may be commonly observed in debilitated sufferers and persons suffering from vaso-motor paralysis that the superficial veins in the extremities are *not full*, but scarcely perceptible, while the extremities and surface of the body are always cold. Now this is capable of explanation in the following manner: If the proximate cause of bowel derangements, chronic diarrhœa, constipation, be what we allege it to

be, a *hyperemic condition of the vaso-motor nerve centres* in the former case, and its opposite in the latter, it must effect a diminution in the amount of blood in the *peripheral blood vessels* not only of the bowels but of the whole body, since the contractile force exerted upon the arteries generally will lessen their diameters and will thus lessen the blood currents supplying the capillary vessels throughout the body. It necessarily must follow that the pulse becomes feeble in volume; *textural nutrition* being lessened the animal functions will be impaired, and a sense of lassitude and weakness induced. And—as the vital chemistry in every pore of the structure proceeds less rapidly than before—the lessened blood currents supplying less chemical materials than before, the amount of heat evolved will be lessened and the temperature of the body be lowered. The bowels being the chief seat of disturbance in Diarrhœa, the sense of coldness and disagreeable sinking sensation is felt there, causing sufferers to resort to warm stimulants and to apply warmth with benefit, wear a bandage of flannel known as “the cholera belt”—to preserve the animal heat, or, as in Sweden, to wear a long leather apron to the knees, and eat pepper corns. The “cold stage” in all diseases is due to the same cause—“great disturbance of the vaso-motor nerve centres”—hence Ague Congestive Chills, Pneumonia, Sea-sickness, Diarrhœa and Cholera are pathologically related, although different diseases.

NERVOUS IRRITATION.

It may appear strange to some to hear the assertion made in their hearing for the first time that Sea-sickness is due pathologically to *nervous irritation*. Yet such is the fact, and it is undoubtedly induced in the following way: “The motion of the ship is communicated to the abdominal and pelvic viscera, which, rising and falling, coming in more or less violent concussion with each other and with the abdominal walls, and having their contents also violently moved to and fro, thus receive an enormous number of abnormal shocks and impressions; these are conveyed to the superior and inferior mesenteric sympathetic plexuses, which transmit the complaint to the vertebral ganglia of the sympathetic. These forward it along the *rami-communicantes* to the spinal cord, which—when thus excited to a considerable degree—sends unusually energetic motor impulse in the reverse direction to the circular muscles along the complaining organs. These muscles therefore contract with excessive vigor and co-operate with the preternaturally active mucous membrane of the stomach and other secreting organs along the alimentary canal, inducing vomiting and diarrhœa.

“It will be seen,” says Chapman, “that in this case motion originates irritation; irritation propagated to the nervous centres through

the sensory nerve causes an unwonted afflux of blood to these centres, their functional power becomes thereby increased, and consequently their reflex actions become proportionately more nervous and intense." This is good corroborative testimony. The conditions of the nervous centres in question induced by motion are closely analogous to those induced by heat, and the results, so far as the bowels are concerned, though less in intensity, are the same in kind as those which heat produces.

The reason why, in Sea-sickness, one person suffers from both vomiting and diarrhœa, and another from vomiting only, is that in those who do suffer from diarrhœa the *special segments* of the nervous system, which preside over the nutrition and function of the bowels, are especially feeble and excitable, and therefore peculiarly liable to derangement.

The irritation of dentition in children, from irritating ingesta, drinking impure water, inhaling noxious gases, ulceration of the bowels (as in phthisis), the diarrhœa symptom in numerous diseases (as typhoid fever), and forms of the malady in which its primary cause operates in the first instance on the mucous membrane of some part of the alimentary canal, *the nerves of which are irritated*; the nerve currents to the sympathetic nerve centres and to the spinal cord are greatly increased in number and intensity; these organs become unduly excited and receive an extraordinary afflux of blood; their functional power is proportionately exalted, their reflex activity intensified, and the phenomena of *intense reflection* along the alimentary tract necessarily ensues—which is diarrhœa. This is often associated with nausea and vomiting, pallor, coldness of surface, feeble pulse, weakness of all degrees, and in its extreme form with fatal collapse. In all these instances the proximate cause is hyperemia of the spinal and sympathetic nervous centres, including especially the mesenteric plexuses.

Anxiety in some persons brings on diarrhœa. Fear will do the same, as in case of soldiers before a great battle; so also will painful emotions in some; vehement excitement of the feelings in others; mental emotion in some, and any violent emotion producing hysteria in many nervous ladies ends in a movement of the bowels—in others fits or convulsions. In all such cases *congestion* or hyperemia of the nerve centres is *the primary physical fact*; the order of causation being as follows, and much the same in all fits: Terrifying or exciting impressions, suddenly communicated, are conveyed to the sensory ganglia and are thence distributed to the cellular structure constituting the cerebral convolutions; these are thrown into tumultuous excitement, which is propagated along the motor tracts with the rapidity of lightning down the whole spinal axis, and latterly to the ganglia of

the sympathetic. These, becoming suddenly swollen with blood, instantly act with intensely vehement energy, and diffuse their subtle stimulus in all directions. As the source of the powerful impressions which they have received is cerebral in this case, so the *chief* direction in which the vaso-motor impulses are reflected is toward the brain; hence quick as thought the *cerebral arteries* are contracted with preternatural energy, and thus, in extreme cases, the brain being rendered comparatively bloodless, the person is stunned as if by a blow; the face pallid, cold sweat exudes from it; if consciousness is not abolished mental power is still greatly enfeebled; and, in the same manner and by the same agency as the phenomena of ordinary diarrhœa are induced, the strength of the whole muscular system is impaired; the temperature of the surface of the body is lowered; the muscular walls of the intestines enfeebled; their mucous membrane exudes its appropriate secretion superabundantly; their peristaltic action becomes excessive; thus emotional diarrhœa, or diarrhœa originating in mental emotion, is clearly due to the same proximate cause as that on which all forms of intestinal pluxes depend—namely, that whatever may be the primary or ultimate causes of the various forms of diarrhœa, the proximate cause of all is the same, viz., by hyperemia—more or less excessive—of these nervous centres which preside over the bowels, and notably, therefore, of the superior and inferior mesenteric plexuses.

The logical deduction to be made from all this is that if we can control the amount of blood in the spinal nerve centres by removing internal irritation, increasing or diminishing it at our command, we should be able to avert, control or absolutely cure any case of obstinate constipation, chronic diarrhœa, or congestion of the lower bowel, we might encounter. This we accomplish by removing the brake from the wheel—by expanding the sphinctor muscle to a judicious extent so as to relieve the vaso-motor paralysis which allowed stasis of blood to take place in the hemorrhoidal and mesenteric veins, thus superinducing the formation of piles; or, if the mucous membrane be very vascular, a sedative effect by application of cold or heat to the dorsal and lumbar regions, as circumstances may indicate, because, as a matter of fact, it is possible to lessen the amount of blood in nervous segments along the back at a considerable distance above or below those particular segments over which heat or cold is applied. In like manner bowel disturbance may effect by irritation several nervous segments, producing a correspondingly wide range of symptoms. All this is in obedience to a natural physiological law dominating the nerve centres, viz., "that when one nervous segment is rendered either anemic or hyperemic, the adjoining one will assume a like condition, though in a lesser degree, which those further removed will, in propor-

tion to their nearness, also participate in the state impressed on the one first affected."

As the spinal cord, and those dorsal segments of the sympathetic from which the splanchnic nerves are derived, are intimately related, functionally, to the abdominal viscera, it follows that *any intestinal irritation*, such as the diarrhœa of dentition in children, will produce *spinal irritation, preternatural excitability, general irritability and convulsions*, often ending in hyperemia or permanent congestion and permanent epilepsy or paralysis.

Conversely (as Chapman pertinently says in relation to the treatment of the diarrhœa and cholera of India), by the application of ice along appropriate segments of the spinal region, that influence being propagated indirectly to the mesenteric plexus, the whole nervous centres involved are supplied with less blood than before, and are thereby rendered incapable of continuing those preternatural actions on which the production and continuance of diarrhœa depend. "These considerations," he continues, "led me to treat diarrhœa (and all other intestinal fluxes) by the application of the spinal ice-bag *along the lumbar and lower dorsal regions* in all cases; and when the cerebral and thoracic conditions are such as to permit the exertion of a sedative influence along the cervical and upper dorsal region, to avail myself of the great additional power which may be exercised by applying ice on each cell of the rubber bag at once along the whole spine," and children fall into a calm sleep in consequence. In relation to cholera, he says: "I hold that the general arterial contractions effected throughout the system by the vehement operation of the cause in question, viz., extreme hyperemia of the spinal and sympathetic nerve centres, by depriving the capillary vessels in all parts of the body of their wonted supply of blood, induce the muscular debility, tremors, vertigo, impairment of respiration, cold breath, sense of faintness, coldness of the whole surface of the body, coldness and lividness of the lips and tongue, blueness of the entire surface of the body, the sunken and appalling countenance, and the fatal collapse characteristic of the disease.

"That the nausea, vomiting, 'rice water stools,' cold sweat, peculiar odor from the body, etc., are due to the continued action of the *hyperemic spinal cord* and sympathetic nervous centres, in the same manner as they induce phenomena of the like kind, though less in degree, in summer diarrhœa, sea-sickness, etc.;" adding significantly that "if any spinal congestion or inflammation threatens to occur, special applications of heat should be made; in head affections (as cerebro-spinal meningitis) along the cervical and upper dorsal vertebra, in chest affections (as pneumonia) between the scapula, and in abdominal affections along the lower dorsal and lumbar vertebra."

The instinctive action which leads persons when cold in winter to warm themselves by turning their backs to the fire, and the general glow of warmth which rapidly spreads throughout the system in consequence, everybody is familiar with, and is but another illustration of the influence of the spinal nerve centres and the lateral sympathetic spinal ganglia associated therewith.

The general principle, of which this treatment of diarrhœa is an application, *forbids the use of drugs and stimulants*. Heat, as an auxiliary remedy, should be had recourse to in severe cases, as, for instance, "the operation of the spinal ice-bag in overcoming the *vassic spasms generally* should be facilitated by keeping the patient warm with blankets; and co-operation of a like kind should be afforded to overcome the *special coldness* (vassic spasms) of the abdomen by the application of heat over its surface, and the same to overcome the *special coldness* (again vassic spasms) of the hands and feet.

Again, M. Claude Bernard and Dr. Brown-Séquard have proved that the governance or control of *animal temperature* belongs to the sympathetic, and is in all cases attended with coldness of the surface; it is due to *vassic spasms* from irritation of the *vaso-motor* filaments of this nerve. In support of this view, Dr. Altheus states: "There are facts to prove that a continuous electrical current applied to the back by moistened conductors has a physiological action on the spinal cord, and sympathetic, for a current directed to the lower cervical and upper dorsal will cause the iris (of the eye) to contract, showing that there is physiological transmission of part of the current to the cilio-spinal region of the cord and corresponding gangliæ of the sympathetic which preside over the functions of the iris or pupil of the eye. Also that a continuous current applied to the lower lumbar portion of the spine will cause a glow heat in the legs and feet without any direct application to these latter, of or to the inside of thigh, and will be felt in the foot, showing same connection as in sciatic pain transmitted from rectal irritation." This application of a galvanic current to the spine exerting the same kind of influence on the congested spinal cord, and sympathetic ganglia, and through the latter on the vascular system generally, proves the same physiological connection as does the application of ice to the spine.

He further states: "The immediate action on the mucous membrane of the alimentary canal of all stimulants and irritants, increasing the amount of blood in that membrane, is objectionable, as their ultimate action on the nervous system intensifying the hyperemia of the nerve centres, must prolong and intensify the malady." Thus, strychnia, opium, nerve stimulants, tea, coffee he excludes, believing that they congest the spinal and ganglionic nerve centres. He says, "I have a strong conviction that *coffee* is capable of acting very injuri-

ously on persons predisposed to undue action of the *automatic nerve centres*, causing, in some cases, a peculiar and distressingly exciting influence upon the heart, through the sympathetic, and affecting the kidneys similar to opium through the spinal and ganglionic nerve centres."

"All influences, whether intellectual, moral or physical, which tend to *exalt the activity* or susceptibility of the nervous system, increase its liability to derangement, and notably *predispose* it to those perverted *actions* called '*functional diseases*,' of which diarrhœa and cholera are examples; moreover, in eastern countries the use of opium creates in the nervous system a condition peculiarly favorable for the generation of cholera symptoms by the solar heat. And the great increase of '*functional disorders*' in Europe and America within the present century may be referred *not only* to the increased activity of the nervous system as expressed in the intense excitements, anxieties, and struggles, incident to the present phase of modern civilization, but also to the free use of nerve stimulants, of various kinds, that induce hyperemia of the nervous centres."

It is well known that the poisonous influence of tea, coca, opium and alcohol is on the *vaso-motor nerve centres*, and that in the initial stage of its effects "*the cerebral arteries are so closely clasped by their muscular coats* (vassic spasm) as to prevent even that moderate flow of blood through the brain which is essential to that process of nourishment forming a part of the function of sleep, hence they induce a condition of wakefulness."

Stimulants and narcotics, such as alcohol and opium, although known to induce congestion of the brain and spinal cord, are, nevertheless, administered by some physicians under pathological conditions where it undoubtedly already exists; and clinical evidence abounds which shows that in spinal hyperemia, and congestion of the brain, the administration of opium does but aggravate the symptoms and increase danger. Post mortem examination reveals congestion of brain, and acute destructive inflammation of the spinal cord—nerve hyperemia being developed into fatal myelitis.

We may incidentally learn something from the

ACTION OF ALCOHOL.

After the phase of cerebral congestion induced by *alcohol* has been passed through, the sympathetic nerve comes under its influence, and its hyperemic state causes contraction of the cerebral arteries, and therefore cerebral anemia. *Full doses* of opium restore the attractive force of the brain tissue for blood, and the blood flowing in fuller streams, the brain receives new nourishment and assumes the state associated with the process of nourishment—the repose of sleep—hence in early stages of alcoholism opium is an antidote, but not in the

later. Where the alcoholic poisonous influence continues to be exerted, the vaso-motor filaments become paralyzed, the venous coats relaxed, *stasis* or *stagnation of blood takes place*, and the part is *chemically congested*. Opium here would do harm—the brain becomes overwhelmed and comatose, followed by death. This is seen in the purple, livid and swollen face, increasing stupidity and stertorous breathing of drunkenness.

Tetanus, or lock-jaw, consists prominently of hyperemia, followed by inflammation, and in advanced stages even to disintegration of the spinal cord.

In obedience to the physiological law that “when a certain condition of defect, or excess of blood, has been induced in any given segment of the nervous system, a like condition, though less in degree, will be assumed by the proximate segments,” the excessive hyperemia of the spinal cord is partaken of by the collateral ganglia of the sympathetic, and consequently associated with the tetanus of the voluntary muscles is a tetanoid condition of the involuntary muscles, more especially those governed by the ganglionic centres ranged most closely along the spine.

As the upper part of that chain of ganglia governs the cerebral arteries, which become spasmodically contracted (vassic spasms) and are held so firmly *in the grip of their* surrounding muscles (tetanic spasms) that even under the strong stimulus of large doses of opium the *cell tissue* of the brain is powerless to attract blood through them in sufficient volume to produce cerebral hyperemia—the first stage of opium poisoning. While the intense nervous irritation caused by the diseased condition of the cord is propagated to the brain, inducing *insomnia* and preventing sleep. In such cases the drug spends its force on the spinal cord and sympathetic, and by inducing functional depression and complete vasso-motor paralysis, speedily causes death.

These are somewhat lengthy explanations of physiological conditions commonly met with and recognized by the unprofessional reader, as well as the professional, as conditions known to exist. The recognition of the important part played by the sympathetic nerve system in organic life, and of the vaso-motor nerves governing the circulation of the blood, has introduced an era of the physiological treatment of disturbed function without the use of drugs.

I quote from a pamphlet on the “Restoration of Health, or Treatment of Disease without Drugs,” the following:—

“For centuries it has been the prevailing belief that disease was some sort of malignant entity, something to be attacked, fought and destroyed. With this theory of the nature of disease, it is easily comprehended why the practice of physicians has been such as it has. Supposing it to be something to be destroyed, it would seem very

appropriate that poisons, the most destructive agents, should be employed for the purpose. But the world is rapidly becoming enlightened upon this subject through the influence of this new orificial philosophy, which advocates the following principles relating to disease:—

"1. *Disease is remedial effort.* In other words, it is an effort of nature to remove obstructions or correct abnormal conditions.

"2. *All curative power exists in the living system.* Men may supply conditions, and thus facilitate recovery; but nature does all the healing work.

"3. *Drugs and medicines never cure.* They may change the seat of disease, may create new diseases, but they never cure the patient.

"4. The agencies which nature can use in her healing work are those known as hygienic, the chief of which are *pure air, proper food, pure water, proper clothing, sunlight, exercise, rest, mental influences, and electricity.* Disease originates in an abuse or non-use of these agents, setting up an irritation in the nerve centres, or at the mouths of organs causing reflex disturbances; *health* is only to be obtained by the removal of all local causes of irritation in the orifices of the body.

"5. Disease or irritation of an organ always begins at its mouth, bodily nerve waste begins at the openings or orifices of the body; and the lower ones especially, for obvious reasons.

"6. The condition of the nerve power of the sympathetic has more to do with the health of the human body than is generally supposed.

"7. The fundamental principle of the new philosophy is 'that orificial irritation is a predisposing factor in chronic diseases generally, acting through the vaso-motor paralysis,' which it induces, causing inertia and interference with functional activity.

"8. Orificial treatment will cure chronic and functional diseases without the aid of medicine."—*Dr. Hill.*

9. The long continuance of a disorder, the failure of the system to rebound spontaneously, or respond to remedial measures is evidence of nerve waste. In such cases there can invariably be found some irritation at the lower openings of the body.

10. The smoothing of the rough openings of the body, and the securing of proper dilatation of the sphincters guarding the lower openings, immediately and permanently improves capillary circulation, and hence the nutrition of the body is improved, and its reactive powers increased. "By such treatment four-fifths of all the cases now abandoned as incurable are found to be easily, safely and permanently cured."—*Prof. Pratt.*

"We may say that the world is becoming enlightened upon this subject; this is the case with the more intelligent classes, and especially does the medical profession seem to be awakening to a recognition

of the truth of the principles above stated. It may be said that drugs are still largely employed by allopathic, homeopathic, eclectic and hygienic physicians; this is true, notwithstanding the fact that many of the most eminent men in these different schools have unhesitatingly declared their unbelief in the efficacy of drugs as remedies for disease. "The greater the quack the more medicine given or prescribed," says an eminent man in his address to a representative assembly of physicians and surgeons. Here is the chief ground of complaint which *the new philosophy* finds against the medical profession. College professors and learned doctors admit and even declare the truth, but in their practice persist in perpetuating methods of treatment which are only consistent with old and exploded theories. Listen to the following admissions of some of the most eminent of the doctors of allopathic medication, and then attempt to harmonize such confessions with the nearly universal practice of drugging and dosing every ailment:—

"Modern medicine inclines to regard diseases no longer as distinct entities, but, rather, as perverted life processes."—*N. A. Review* for July, 1873.

"Says Reynolds, in his compendious work on practice, 'No specific remedy will cure.' Again, 'Energetic antiphlogistic treatment is energetic mischief.'

"Said Prof. Alonzo Clarke, M.D., 'All our curative agents are poisonous; and, as a consequence, every dose diminishes the patient's vitality.'

"Says Prof. St. John, M.D., 'All medicines are poisonous.'

"Says Prof. Martyn Paine, M.D., LL.D., 'Drug medicines do but cure one disease by producing another.'

"Said Prof. Jos. M. Smith, M.D., 'Drugs do not cure disease.'

"John Mason Good, M.D., F.R.S., said of medicines, 'They have destroyed more lives than war, pestilence, and famine combined.'

"Said Dr. Bostwick, 'Every dose of medicine given is a blind experiment on the vitality of the patient.'

The late Sir Benj. Brodie, physician to Queen Victoria said: "I have ceased to rely upon drugs for the cure of diseased conditions. I rely upon the healing power of nature—the *vis medicatrix nature*."

"The above are but a very few of the testimonies which might be presented *against the use of drugs*; but are not the eminent authorities quoted, and the cogent sentences uttered by them, sufficient to convince any candid man of the truth of the propositions for the support of which they are presented? We think this is the case; but if further evidence is required, we have only to point to the thousands of chronic invalids who are flocking to official surgeons for treatment, and who have been made physical wrecks by the use of powerful drugs—the

unnumbered throng of *miserable dyspeptics* who have ruined their digestion by making apothecary shops of their stomachs—the hundreds of cripples whose prospects for life have been ruined by mercury and like poisons. Orificial surgery and rectal medication offers to replace this wretched and dangerous system of medical practice, by one which is wholly safe, wonderfully simple, and eminently efficient. This system has saved the lives of thousands of individuals whose friends and physicians had given them up to die. All we ask is careful and candid investigation of the principles of orificial philosophy.

My own testimony is that no medicine can give energy—that must come from the conversion of food into nerve force. I believe in reconstructive medicine—curing by nutrition.

Now, when derangements which may be *chronic*, of long standing—or *acute*, more recent in their origin—of the great sympathetic, or nerve of organic life and function, are met with and recognized by us as the cause of perverted function or source of certain diseased phenomena complained of by a patient, why should we not express it in so many words and explain it just as we are in the habit of doing to our patients daily. Should we go to our brethren who adhere to ancient dogmas and exploded theories, hat in hand, and say, please, gentlemen, we do not believe in your old theories; we have learned different? May we speak of them as we find them, or shall we patiently wait a few years until you have had time and inclination to investigate the matter, and get there, for your endorsement before mentioning it ourselves? Away with such arrant nonsense. There is no monopoly in medical thought, any more than in any other science. And as there can issue no edict in this free country from Pope or Academy to prevent Edison from pursuing his investigations, and experiments, and bringing forth new facts, and applying them in new ways for the convenience and well-being of the race; so there should be no *bar sinister* to progressive medical thought and investigation, or progress in medicine, providing that progress be in the development of fact and not of *mere theory* of an uncertain and ephemeral character.

We recognize that active, living organs cannot long continue to perform their functions if not kept up to a normal standard by healthy nutrition. That *healthy nutrition* of the various organs is dependent upon a healthy circulation, and a proper absorption and assimilation of nutriment. If the blood current is strong and free, we are well; if, on the other hand, the general circulation is sluggish, if local congestions occur, disease is a necessary consequence, because the blood being the nutrition circulator, the tissue depends on it for food supply. All remedial measures for the relief of the ills of the body should be directed to the establishing of a healthy nutrition and circulation,

which means a healthy digestion, or vito-chemical metamorphosis of food into nutriment of the blood, which contains all the assimilative nutrient elements of digestion ready for absorption and assimilation into the *cell life* of the various tissues, providing for the means of growth, activity and repair. Now as there could be no assimilation without the product of digestion furnishing the material to assimilate, and no circulation without the power upon which it depends—*nerve force*—on which alone the circulation depends for its activity—therefore, a proper supply of *nerve force* means a good circulation, with all its advantages, while waste of nerve force, or an insufficient supply, means a weak, or poor circulation, with all its consequences. This *nerve force* comes from and is supplied by the vaso-motor filaments of the great sympathetic.

It is admitted by physiologists that both the cerebro-spinal and the sympathetic nervous systems are concerned in influencing vaso-motor function.

The various emotions can affect the action of the heart, and digestion or the action of the stomach, and even assimilation, as some suppose, through the cerebro-spinal system, and this influence may extend to oxygenation of the blood in the lungs, to cell life or metamorphosis of tissue, both as regards waste and repair, growth and decay. While through the involuntary or sympathetic nervous ganglia the vital force necessary to carry on the animal functions during waking or sleeping, active or resting, is furnished independent of the will, but not independent of the cerebro-spinal system altogether, as some have asserted, for the nerve force of the sympathetic is supposed to be derived from the cerebro-spinal, although natural order would suggest the very opposite. Each system of nerves, as before explained, has its own special function to perform. The cerebro-spinal controls the action of every voluntary muscle of the body, and Prof. Pratt calls it "the direct connecting link between the spiritual and physical man." I could quote for him a lady who thinks different. Muscles are either voluntary or involuntary. All voluntary muscles are striated, all involuntary muscles are not striated. The former are under the direction and control of the cerebro-spinal system. The latter are caused to act only by an influence that comes from the sympathetic nervous system. Now these involuntary muscle fibres are made to constitute *one of the coats* of every tube in the body—including the alimentary canal, the respiratory ducts, the urinary tracts, and the blood-vessels and lymphatics, and they are so arranged in circular and longitudinal layers as by their alternate action of contraction and elongation to secure rhythm (or vermicular motion), by which all involuntary processes are carried out." We live by the automatic

action of tubes. These involuntary muscular fibres are in close sympathy, and any spasmodic contraction of any of them by any local or reflected irritation, will speedily excite contraction in the adjoining fibres, and may thus be transmitted to the entire mass of involuntary fibres, as in cholera or tetanus, interfering thereby with the proper functions and circulation of the entire body; relief of this tension will afford in such cases universal relief.

The lower openings of the body are supplied with sphinctor muscles arranged in double manner. The most internal are involuntary and controlled by the sympathetic. The more external are voluntary and controlled by the cerebro-spinal nervous system.

Spasmodic contractions of the sphinctor muscles of the bladder, and the internal sphinctor of the rectum, will waste nervous power and lower the tone of the entire nervous system. The sexual organs in both sexes taking their nervous supply from the sympathetic, it follows that whatever wastes sexual power, causes a waste of sympathetic nerve force, and correspondingly weakens every organ controlled thereby.

With these data in view, the following proposition was made in 1887 by Prof. Pratt, which subsequent experience has confirmed, and every one who has had the advantage of an extensive experience will admit that it has a much wider application than was imagined by its author. It is in reference to the intimate relation between orificial irritation and chronic suffering in all its forms, and the reflex action or effects of irritatives in general, before now fully dealt with in this brochure, more particularly the close reflex relation existing between the rectum and lungs.

It is this: "That all forms of chronic diseases have one common predisposing cause, and that cause is a nerve waste occasioned by orificial irritation at the lower openings of the body. That these irritations induce a rigidity of the sphinctors guarding the parts, which either continues sympathetically affecting the rest of the involuntary muscular system, and steadily draining the nervous power that supplies it, until the whole strength terminates in a *rigor mortis*, or tiring out in the hopeless grip, becomes exhausted and relaxes into the inertia of paralysis."

Irritation at any of the lower orifices may not be felt at the seat of irritation, but be reflected to any of the other openings or to any other part of the body.

Owing to the action of the respiration on circulation, any influence that affects respiration affects also the activity of the entire body.

Again, any surgical operation that does not interfere with or involve the sphincters or nerves of respiration, may be performed under profound anæsthesia, and yet breathing be maintained regularly and

uninterruptedly. But if while under the influence of the anæsthetic the operation for rectal dilatation be undertaken, the respiration will invariably be more or less oppressed, responding to the stretching of the sphincters so keenly, as to place the ability of the patient to breathe entirely in the hands of the operator, being suspended while continued, and resumed when discontinued. The introduction of large sounds in the urethra will produce a similar effect. This effect follows the dilatation of muscles controlled only by the sympathetic. The effect upon the respiration of stretching the sphincters, and the close sympathy existing between all involuntary fibres contracting and relaxing in mutual sympathy, Prof. Pratt considers "the only philosophical explanation why orificial work has such instantaneous and truly marvellous effects upon the entire circulation—warming at once the extremities which before were abnormally cold, and cooling parts that were abnormally hot, setting in motion functions that had long been dormant, subduing the obstructing action, and thus restoring order out of functional chaos—in a word, more or less completely re-establishing uniformity of function and circulation throughout the entire system."

The whole problem of the treatment of chronic diseases, according to this theory, is to re-establish and maintain a strong and steady circulation of the blood, and the first step to that end is "by proper orificial work to stop the involuntary nerve waste which is invariably found to exist." Much of the disease and weakness of the male sex—mental, nerval and physical—might be entirely prevented by proper attention to the hygiene of the sexual system. The entire reproductive apparatus—in both sexes—derives its nerve supply from that general reservoir of sympathetic influence upon which we rely for the performance of all the vital functions. A waste of sexual power therefore must mean a waste of sympathetic power in general, or the undermining of all the life-giving forces of the system.

The orificial treatment for sexual weaknesses is simple and effective, the results far-reaching and frequently marvellous in their character. "The treatment of diseases of these parts has been solved by the introduction of one simple measure, which allays sexual irritability in the young, cures impotency and restores the lost powers of those advanced in life, develops atrophied testes, reduces those hypertrophied, offers the greatest relief for prostatic troubles, and extends its healing influence to the bladder and kidneys."

Prof. Pratt says: "The influence for good this measure exercises over the entire system can only be appreciated by those who have seen the practical results obtained by this method."

Thus far we have considered only the methods recommended for the removal of sources of irritation at the lower orifices of the body, in order to stop the waste of nerve force in the treatment of chronic

diseases. After stopping the nerve waste by removal of orificial irritation, I would add nutritive remedies such as the hypophosphites and the tissue cell salts of Schusster. The after treatment should include every possible physical means of promoting and establishing a vigorous and healthy circulation. This may include electricity, massage, pure air, cheerful surroundings, fresh (not stale or pickled) food well cooked, baths, etc., etc.

VASO-MOTOR INFLUENCE OVER THE CIRCULATION.

The presence of foreign bodies, local irritation in the stomach, bowels or rectum, may produce *excessive contraction* of the muscular coat of the blood vessels, and thereby diminish its nutrition, as inhibition of the nerve currents in a nerve supplying a part may produce excessive relaxation; as when the vagus is irritated it causes the heart to beat slower and the respirations to proportionately increase in frequency. Let us not leave this by merely stating it as a fact, but understand just *why* it is so. The filaments from the *par vagum* sent to the heart are inhibitory in function, and when stimulated they necessarily diminish the pulsations of that organ, while those distributed to the lungs have a function which might almost be called a special sense, viz., that of translating the irritation, which results largely from an excess of carbonic acid gas, into a sense of air hunger, or a desire for more oxygen. These nerves belong to the sympathetic nervous system.

CHANGES IN CALIBRE OF THE MINUTE ARTERIES.

Dr. Foster, of Cambridge, England, in his admirable work on Physiology, says: "The middle coat of all arteries contains circularly disposed plain muscular fibres. As the arteries become smaller, the muscular element becomes more and more prominent as compared with the elastic element, until, in the minute arteries, the middle coat consists entirely of a series of plain muscular fibres wrapped round the elastic internal coat. *Nerve fibres belonging to the sympathetic system* are distributed largely to blood vessels, but their terminations have not as yet been clearly made out. By galvanic, still better by mechanical stimulation, this muscular coat may, in the living arteries, be made to contract. During this contraction, which has the slow character belonging to the contraction of all plain muscles, the *calibre* of the vessel is diminished."

The web of the frog's foot, examined under the microscope, shows the individual small arteries to vary in calibre, being sometimes narrowed, sometimes dilated. During the narrowing, which is obviously due to a contraction of the muscular coat of the artery, the attached capillary area and the corresponding veins become less filled with blood and paler. During dilation, which corresponds with relaxation of the muscular coat, the same parts are filled with blood, and redder.

It is obvious that the pressure at the entrance to any given artery remaining the same, more blood will enter the artery when relaxation takes place, and consequently the resistance offered by the artery is lessened, and less when contraction occurs and the resistance is increased. Blood always flows in the direction of the least resistance.

The small arteries frequently manifest what may be called spontaneous variations in their calibre of a rhythmical character.

The variation in width of the vessel in a frog's foot, without any corresponding variation in the heart-beat, is an event occurring in the general vaso-motor system. Similar variations may be seen in the mesentery of the mammal.

The most striking and most easily observed instance of rhythmical constriction and dilatation is to be found in the median nerve of the ear of the rabbit. If the ear be held up before the light the arteries will appear at one moment pale and hardly visible, the whole ear appearing pallid. At another time the arteries slowly widen out, becoming thick and red, the whole ear blushing, and many small vessels previously invisible come into view. Again the artery narrows and the blush fades away—and this may be repeated at irregular intervals. The extent and intensity of the vasic *constriction* or *dilatation* which may be observed in the frog's web are found to vary very largely. Irregular variations of slight extent occur even when the animal is apparently subjected to no disturbing causes; while as the result of experimental interference the arteries may become *constricted*—in some cases almost to obliteration—or *dilated* until they acquire double or more than double their normal diameter.

This *constriction* or *dilation* may be brought about not only by treatment (irritation) applied directly to the web, but also by changes affecting the nerve of the leg. Thus, section of the sciatic nerve is generally followed by a *dilation* which may be slight or which may be marked, and which is sometimes preceded by a *passing constriction*; while stimulation of the peripheral stump of the divided nerve by an interrupted current of moderate intensity generally gives rise to constriction, often so great as to almost obliterate some of the minute arteries.

These facts show that the contracted elements of the minute arteries of the web of the frog's foot are capable, by contraction or relaxation, of causing constriction or dilation of the calibre of the arteries; and that this condition of *constriction* or *dilatation* may be brought about through the agency of the nerves.

VASO-MOTOR NERVES.

In warm-blooded animals we have (without watching the circulation, as in a frog under a microscope), abundant evidence of the influence of the nervous system on the calibre of the arteries. Thus

division of the cervical sympathetic on one side causes dilation of the minute arteries of the head of the same side, shown by an increased supply of blood sent to the parts, if performed on a rabbit the effect on the circulation of the ear is very striking. The whole ear is redder than normal; its arteries are obviously dilated; its veins unusually full; innumerable minute vessels, before invisible, come into view; and the temperature may be more than a degree higher than on the other side.

Division of the sciatic nerve causes similar dilation of the small arteries of the foot and leg; the *vessels of the balls* of the toes are seen to be dilated and *injected*; and a thermometer placed between the toes shows a rise of temperature amounting to several degrees.

Division of the brachial plexus shows a dilation of the blood-vessels of the arm. This may be demonstrated by means of the *plethysmograph*, in which the arm is introduced into a close chamber filled with fluid. An increase or decrease of blood sent into the arm will lead to an increase or decrease of the volume of the arm, and the amount of pressure of the fluid can be easily registered.

Division of the *splanchnic nerves* produces a dilation of the blood-vessels of the intestines and other abdominal viscera; therefore irritation of these nerves would lead to congestion of bowels.

Division of the *hypoglossical nerve* on one side causes dilation of the vessels in the corresponding half of the tongue.

Division of a nerve supplying a muscle causes a large and sudden increase in the venous flow from the muscle, indicating that the muscular arteries have been dilated; and in the frog this dilation consequent on section of the nerve may be observed by placing a thin muscle under a microscope and watching the calibre of the small arteries, and the circulation through them while the nerve is being cut. So that in all parts of the body certain vascular areas stand in such relation to certain nerves that the division of the nerves causes a dilation of the minute arteries in, and a correspondingly increased supply of blood to, that area. These nerves we speak of as *vaso-motor nerves*, or as nerves containing *vaso-motor* fibres, and these vaso-motor fibres are found sometimes in sympathetic nerves and sometimes in cerebro-spinal nerves.—(Foster.)

Therefore, says Riechot, if the division of a vaso-motor nerve, or nerve containing vaso-motor fibres, leads to the dilatation of the arteries of its appropriate vascular area, it is obvious that previous to that division these arteries were in a state of *permanent constriction*, due to a *permanent constriction* of their muscular coats.

This *permanent constriction* may vary considerably in degree, and is spoken of as "tone" or "arterial tone" by physiologists. This is normal to arteries whose vaso-motor fibres have not been cut, and

which are otherwise in a normal condition. But, when the vaso-motor fibres have been divided, constriction gives place to *dilation*, the arteries are said to have lost tone, and when the constriction becomes greater than normal from any circumstance, the tone is said to be increased.

This "arterial tone" is the most important factor in the circulation. This is diminished in the condition Burton describes as constitutional venosity, and prescribes for it nux vomica and fluoric acid. In the normal condition of the body the minute arteries are in a state of tonic constriction; it is the resistance offered by this constriction which constitutes the peripheral resistance, one of the two great factors of blood pressure. The normal flow of the blood is dependent upon this; changes in this tone in the blood vessels of any particular area affects the circulation very injuriously. Changes in a small vessel by constriction or dilation is seen more in its local than general effects. If human, the area of the artery affected is large, the general effects are vassic hyperemia. If a monometer be connected with the carotid artery and the splanchnic nerve be divided, a conspicuous and steady fall of pressure is observed, because section of the splanchnic nerve causes the mesenteric and other abdominal arteries to dilate, and then, being very numerous, a large amount of peripheral resistance is taken away and the blood pressure falls accordingly; a *large* measure of flow into the portal veins takes place, and the supply of blood to the face, arms and legs is proportionally diminished. This dilation of the arteries is not instantaneous, but somewhat gradual. This condition is observed in derangements of the portal circulation from vaso-motor paralysis, and is evidenced by bowel congestion and pallor of face, with coldness of the extremities.

Arterial tone, both general and local, is a powerful instrument for determining the flow of blood, to the various organs and tissues of the body, and thus becomes a *means* of indirectly influencing their functional activity.

We find that the *vaso-motor nerves* are connected with, and arterial tone is regulated by, the central nervous system, and that the calibre of the arteries of any vascular area may be varied according to the varied needs of the system.

Section of the cervical sympathetic in the neck causes dilation or loss of tone in the blood vessels of the head and face. No such dilation of the vessels of the head and face takes place when the thoracic sympathetic chain is divided anywhere below the upper thoracic ganglia; but dilation does occur after division of certain of the rami-communicantes connecting the spinal cord with the cervical sympathetic through the lower cervical or upper thoracic ganglia.

Hence the normal tone of the arteries of the head and face is

maintained by influences produced from the cerebral nervous system passing through certain *rami-communicantes* into the cervical sympathetic, and ascending to the head and face by that nerve; or in other words, the vaso-motor fibres of the vessels of the head and face may be traced from the sympathetic to the lower cervical ganglia, and thence by *rami-communicantes* into the spinal cord. In a *similar manner* the *vaso-motor* fibres of the splanchnic nerves, giving the mesenteric and other abdominal arteries, can also be traced into the spinal cord; as may also those of the sciatic governing the blood vessels of the leg, and of the brachial nerve, governing those of the fore arm. In fact, all vaso-motor fibres may thus be traced into the spinal cord, being all connected with the central nervous system.

There are also nerves in the body, stimulation of which always brings about arterial dilation, as well as section, while other nerves there are of a mixed character, intermediate between the cervical sympathetic, and the muscular nerves, in which stimulation produces at one time constriction, at another dilation, such as the sciatic section of this nerve produces dilation of the vessels of the foot, but the dilation soon disappears, the foot becoming cool and pale. In all these cases section produces dilation; subsequent stimulation causes constriction or dilation, as may be. This explains the condition of things found in disease. But there are other nerves, such as the *nervi-exigentes*. section of which does not produce any marked change in a vascular area, and yet stimulation brings about dilation often of an extreme character.

The erection of the penis is chiefly due to dilation of branches of the pudic arteries, whereby a large quantity of blood is discharged into the Veinous Sinuses. Now erection may be artificially produced by stimulating the peripheral ends of the divided *nervi-exigentes*, which are branches from the 1st, 2nd and 3rd sacral nerve passing across the pelvis, an interrupted current to the peripheral ends of these nerves, secure turgidity of the corpus cavernosum. Simple section of these nerves will not of itself give rise to an *erection*.

Similarly the *Sub-maxillary Gland*, a secretory organ, is supplied by two nerves, the chorda-tympani and the cervical sympathetic; section produces no effect—but stimulation of the former causes dilation, of the latter constriction.

Now all this shows a tone in certain parts independent of the central nervous system, as in the corpora-cavernosa and sub-maxillary gland. Also there are nerves which when stimulated cause dilation, or *vaso-dilator nerves*, and nerves which, when stimulated, cause constriction, or vaso-constrictor nerves.

Now the vaso-motor fibres of the *nervi-exigentes*, chorda-tympani, and muscles are vaso-dilators of the cervical sympathetic and splanchnic

nerves, are vaso-constrictor. In the cases of the corpora-cavernosa of the penis and the sub-maxillary gland, dilation is the result of complete or partial loss of local tone; in fact, vaso-dilators act by inhibiting and vaso-constrictors by augmenting the activity of the local mechanism giving rise to local tone.

From the erection of the penis which follows stimulation of the nervi-exigentes, and the injection of the sub-maxillary gland, which follows stimulation of the chorda-tympani, inhibition of the heart by stimulation of the *vagus* or pneumogastric.

Just as the rhythmic contraction of the heart fibres is stopped by the *vagus*, so the true contraction of the arterial fibres is stopped by the change of nerve segments. Thence it is self-evident that dilation is in all cases synonymous with inhibition and constriction—in all cases mere augmentation of local tone. It is possible that dilation may be brought about in different ways, and so also with contraction. This is a tempting view and useful as a working hypothesis.

The general effects of dilation are briefly these: Supposing that the total quantity of blood issuing from the ventricle remains the same—that is to say, supposing that the quantity of blood put into circulation is constant, the surplus passing through the dilated area must be taken away from the rest of the circulation; consequently the fulness of the dilated area will lead to an emptying of the other area.

This is seen very clearly when the dilated area is a capacious one. At the same time, *local dilation* causes a *local diminution* of peripheral resistance. This in turn causes a lowering of the general arterial pressure. The effects of local constriction—similarly local and general—are naturally the reverse of those of dilation.

In the vascular area directly affected less blood passes through the capillaries in a given time, and in consequence less total interchange between the blood and the tissues takes place (diminished nutrition of the tissues), though each unit-volume of blood which does pass through more deeply affected. The blood pressure in the corresponding arteries is increased, and, if the area be large, the pressure in even distant arteries may be heightened.

This subject is of vast practical importance to every medical practitioner who wishes to understand the disturbances of the circulation of the blood which occur in the system.

It is not by any means exhausted, or much more than touched upon, but if what has been written will help to interest the profession in the study of functional and reflex disturbances, I shall be satisfied.

W. E. B.

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