

O'Reilly (J.)
Present to L. B. Beall

The Connection of the Nervous Centres of Animal
and Organic Life. By JOHN O'REILLY, M. D.,
Licentiate and Fellow of the Royal College of
Surgeons in Ireland, Resident Fellow of the
New York Academy of Medicine.



It is generally admitted that the secretions from all glandular bodies, as well as the skin and mucus membrane, depend on the presence as well as the agency of the organic nerves: Acknowledging this to be true, it must be confessed that it is just as difficult to trace nervous filaments in their structure as in the maternal or fetal vessels in the placenta. The deduction to be arrived at from the observations just made, is, that if it were possible to remove every particle of the body with the exception of the substance of the organic nervous system, that the outline of the body would remain perfect, as well as a true delineation of all the viscera as well as the blood vessels and muscles.

The retina is the termination or the expansion of the optic nerve. The optic nerve takes its origin from the corpus geniculatum externum and a white fasciculus sent from the nates. The pineal gland rests on the tubercula quadrigemina and is attached to the inner margins of the optic thalami by two bands of white cerebral matter; in color and appearance it bears a strong resemblance to a ganglion belonging to the organic nervous system. The third nerve arises from the inner border of the crus cerebri; it is distributed to the levator palpebræ and all the muscles attached to the eye ball with the exception of the superior oblique and external rectus, it communicates by a small branch with the lenticular ganglion. The ganglion is an exceedingly small body; it sends several filaments to the iris, some of which are lost on the ciliary ligament. I am stating facts without entering into minute particulars.

The movements of the iris show that the nerves which supply it must come from a source endowed with vital intelligence and instinct. Every person knows that the iris adjusts itself to meet circumstances, and that it vigorously contracts when the retina is threatened with danger by too strong a light being thrown on it. If the lenticular ganglion possesses the faculties just stated, and that it is only connected to the brain by a small branch of the third nerve, I think it may be fairly asked why the pineal gland (which I look on in the light of the chief ganglion of the organic nervous system) which communicates with the brain itself, should not have similar characteristics. That the mind's eye must see objects pictured on the retina, before the iris discharges its functions, is evident from what occurs in cases of amaurosis resulting from a disorganized condition of the brain, the pupil in such cases continuing dilated. It follows as a consequence, that the nerves proceeding from the lenticular ganglion must act in concert with a sound condition of the brain. As the conservatism of life rests with the ganglionic nervous centres, it is expedient to the well being of the body, that the mind should have free communication with the centre of organic life, so as to be capable of imparting to it, as well as receiving from it, the rules for governing the other nervous centres of organic life.

Ocular demonstration declares that the mind and the ganglion operate consentaneously, as is witnessed in the case of the retina, when exposed to light or darkness, and the movements of the iris under such contingencies. The division of the communicating branch of the third nerve, demonstrates that the ganglion does not act without corresponding with the brain and central organic ganglion. The cornea in persons who are obliged to look at very small objects, is rendered convex, by the action of the muscles receiving branches from the third nerve and the axis of vision is properly directed by the action of the muscles specified. How is this matter to be accounted for? the mind becomes conscious through the retina that the latter requires assistance; it is not able to afford the aid required, it communes with the central ganglion (the pineal gland), receives power, which it directs to the lenticular ganglion; reflex action takes place through the branch of communication of the third nerve; the muscles are thus enabled to co-operate in harmony with the mind; it follows, as a sequence, that the ganglion must have knowledge of what is passing in the mind, and this is further proved by recollecting, that the third nerve is a motor nerve, not guided by intelligence, and that neither the fourth or sixth nerves, which are distributed to muscles, whose action would be to distort the eyes from the proper focus, have any connection with the ganglion.

When a person is overwhelmed with grief, tears are freely shed; the nose as well as the eyes become suffused. The mind, as in the former instance, communicates its troubles to the central ganglion, and by reflex action through it, to the lenticular ganglion, through the nasal branch of the fifth nerve, which is distributed to the pituitary membrane, the integuments at the extremity of the nose, the upper eye-lid, the tensor tarsi muscle, the root of the nose, the lachrymal sac and caruncula lachrymalis; hence the source of the tears is easily explained.

When a person is anxious to hear a sound at a distance, the tympanum is rendered tense, by the action of the tensor tympani muscle; before this can take place, the mind must be made acquainted by the portio mollis of the necessity of further assistance, it communicates with the central ganglion. What is the position of the parts concerned? The tensor tympani is supplied with motor branches from the facial nerve; the mind cannot effect anything through it, but the muscle receives branches from the otic ganglion, which is under the influence of the central ganglion, which inosculate with the branches of the facial nerve, and thus the muscle is capable of acting in unison with the mind. Can it be doubted but that the otic ganglion is co-equal in intelligence with the mind, in regulating the action of the muscle, to meet the requirements of the mind.

That such small bodies as the ganglions alluded to, should possess so much instinct is marvellous in the highest degree. It also follows *a fortiori* that all the other ganglia are possessed of the same faculties in guiding the actions of the organs they are established to preside over.

A man that has made a speculation in railroad stock in which he is interested to a large extent, is told that the directors are a band of swindlers; that the concern is a mere bubble. The mind becomes deranged; it sympathises with the central ganglion, with which it is united. How, I should remark, the cerebrum is placed in the same position with respect to the ganglion that the motor nerve of the third or sensitive branch of the fifth nerves is connected with the lenticular ganglion, the announcement is forwarded by the par vagum to the pulmonic plexus, hurried respiration succeeds to the cardiac plexus, inducing violent palpitation to the solar plexus, causing the stomach to refuse food to the hepatic plexus, producing a secretion of bile; to the mesenteric plexus causing diarrhoea; to the renal plexus, inducing a secretion of

urine to the hypogastric and sacral plexus, throwing the sphincter vesicæ off its guard, followed by wetting of the pantaloons, and in case of woman a short time pregnant, abortion produced by contraction of uterus. From this exposition the fatal consequences attendant on the division of the par vagum must be manifest, as it actually severs the connecting thread of life. This is proved by recollecting when a man gets a blow on the semi-lunar ganglion, that death instantaneously follows. The unity of action between the mind and the ganglia is rendered apparent when a man is about making a large leap: the mind surveys the distance, the will acts through the spinal chord under the reflex influence of the central ganglion, the motor nerves are summoned to action; the intervertebral ganglia sends them filaments to accompany and instruct them how to exercise their power on the muscles, acting on the same principle that governs the lenticular ganglion and third nerve; and thus it is that the muscles act in strict harmony with the mind, propelling the body to the distance contemplated.

The inference, from what has been stated is clear, that the spinal nerves are a triple compound composed of sensitive motor and organic filaments, so that wherever one is found the other two must be present. The nerves of organic life act consentaneously with the will wherever located, provided there is a nervous connection established between them; for instance, when a man is playing on a musical instrument, he has his mind fixed on the music book, his fingers move rapidly in harmony with his mind. Now, the nerves distributed to the fingers are branches of the brachial plexus, are capable of giving sensation and motion as well as organic life to the parts they are destined to supply, in consequence of being connected with the organic ganglia at the roots of the nerves. The otic and lenticular ganglia again explain the phenomenon.

I presume it must be conceded that physiologists, in experimenting on the hind legs of frogs, have committed a most palpable mistake: they appear to have lost sight of the fact that the spinal nerves are a triple compound. I think the peculiarities of the afferent, efferent and excito motor nerves, can be readily accounted for when the triple compound nature of the spinal nerves is duly studied. The action of these nerves is attributable to the organic nervous filament they contain.

When a person suffers from irritation in the bowels, caused by worms or indigestible food—here I must observe, that the intestines

are exclusively supplied with nerves from the ganglionic system, and that the muscular fibres contract without the agency of motor nerves from the spinal chord. This fact proves that the iris does not require to have the ciliary nerves, influenced by a reflected action of the tubercula quadrigemina through the communicating branch of the third : to revert to the patient—he is attacked with convulsions, the irritation is propagated to the brain, from thence to the central ganglion and by reflex action from it to the brain and spinal chord, and next through the motor roots of the nerves to the intervertebral ganglia, the organic filament communicates with the muscles, the result is alternate relaxation and contraction of the muscles; now this is an action of the muscles independent of the will, and cannot be imitated by the most strenuous exertions of the will.

Again, a man gets a lacerated wound in the palm of the hand; the first thing he complains of, if he is about to get tetanus, is that he has caught cold, that his throat is sore, and that he cannot swallow; in some time the muscles about the neck and face become rigidly contracted; next, the muscles of the upper part of the trunk and finally the muscles of the lower part. This condition of the muscles could not be produced by the motor spinal nerves, in as much as the muscles would relax; no man can continue muscular exertion over a given period. What happens, can be thus explained: the irritation is conveyed through the organic filament, to the cervical ganglia, and then the muscles of the neck which are furnished with nerves from these ganglia, become contracted; here I need scarcely remark the superior cervical ganglion furnishes the pharynx with nerves. All the ganglia in due time become affected, those connected with the spinal nerves, and similar consequences are the result.

When an individual takes an overdose of strychnine, the muscles become rigidly contracted. Here the poison acts on the organic nerves, and through them on the muscles. It therefore follows when the muscles are paralyzed, that strychnine excites spasms in the muscles a fact which is too well known to need comment.

A man gets a dislocation of the shoulder, by throwing him off his guard it is easily reduced; but let him see what you are going to do, although he is most anxious to assist your efforts, the muscles will become forcibly contracted, and baffle your attempts to accomplish your object. Here, too, the mind and the muscles act together, through the influence of the ganglia, placed at the roots of the brachial plexus.

When chloroform is administered, it first acts on the organic nerves in the bronchial ramifications; secondarily, on the brain, known by the delirium that takes place; thirdly, on the central organic ganglion, and from it, by reflex action, on the brain and spinal chord; and through the nerves, of the latter, on the intervertebral ganglia, and ultimately the filaments which proceed from the latter, to the muscles. That chloroform operates in the manner described is made painfully true, when the heart of man under its influence ceases to beat when all human efforts will prove futile, in some instances, to restore its vital action—and thus demonstrating, by death, that chloroform is able to destroy an organ endowed with the greatest degree of muscular strength.

When a man gets drunk, the intoxicating liquor makes its first impression on the organic nerves in the coats of the stomach; the par vagum announces its presence to the brain, which becomes exhilarated, and after some time, it shares its insidious sensation with the central organic ganglion, which reflects the intelligence through the brain and spinal chord to the intervertebral ganglia, and from the latter to the filaments destined to supply the muscles. This description is literally true: when witnessing the movements of a drunken man, his lower extremities will be observed not to obey his will; his legs cross one another; he stumbles from side to side; and, if he has imbibed too much, the muscles refuse to move and he falls prostrate to the earth, perhaps to awaken in another world. Here it is evident that the faulty movements of the muscles, as well as their loss of power, is caused by the ganglia at the roots of the lumbar and sacral plexus, and that death is caused by the destruction of the ganglionic system; post-mortem examination fails to discover any lesion. My friend Doctor Finnell, who has made such an immense number of examinations of the dead bodies of drunkards and others, can corroborate this statement.

I hope I have now given ample proof that the muscular fibres of the muscles are furnished with nerves from the organic nervous system; that the muscles owe their enormous power to their connection with the nerves in question. It may be said, no nervous filament can be discovered in the muscular fibre; but the same observation is true of capillary arteries and veins, although no person doubts their presence.

When a drop of prussic acid is placed on the tongue of the subject, as Doctor Copeland remarks, dies before the poison has time to get into the circulation; post-mortem examination discloses that the

blood is fluid and dark colored in the blood vessels, caused by the death of the organic nerves in the internal coats of the vessels.

If a man is subjected to great violence and sustains a compound dislocation, he will quickly fall into a state of collapse. The surface of the body will grow cold, the heart will almost cease to beat, the sphincters will be relaxed, and if a surgeon is so imprudent as to perform amputation under such circumstances, it is ten to one but the operation will be attended with fatal consequences; inasmuch as the patient's organic nervous system is unable to bear an additional shock.

Surgeons attribute this condition of the patient to sympathy; but it is more: it is direct and continued communication of the nerves in the part injured with the nerves in other parts. How is the cold on the surface of the body to be accounted for? By the vitality of the organic nerves in the skin being impaired in vitality, and by their being unable to emanate the oxygen from the capillary arteries; (this is an hypothesis.)

When a person is seized with Asiatic Cholera, on the hottest day in summer, the body becomes colder than the surrounding atmosphere; the powers of life quickly give way, and the patient falls a victim to the poisonous influence exercised on the organic nervous system. The state of the patient in Cholera, goes to prove what I have just stated, that the production of animal heat is a vital action depending on the integral condition of the organic nerves.

As some persons may say, all I have said about the pineal gland being the great organic nervous centre of organic life, is mere speculation; I must remark, that if the wisest man in the world, a century ago, was shown a galvanic battery, and told that it was susceptible of generating an immaterial agent that could send a message by a small wire from one extremity of the globe to the other in a second, he would look on the individual giving him such assurance as a man laboring under mental alienation. I cannot help remarking there is an analogy between the pineal gland and the battery; the particles of gritty matter resemble the metallic plates, and the gelatinous matter the acid mixture. The Omnipotent Creator, who showed such infinite wisdom and unity of design in the construction of the organs of sense, did not place the pineal gland in such an important locality for a useless purpose. I strongly conjecture that the ganglion is so constructed as to regulate the *aura vitæ*.

It may be objected, that the gland or ganglion cannot receive and give impressions at the same time. The gland is connected with the brain itself; the nerves proceeding from the brain may be said to be continuations of it. The lenticular ganglion receives impressions from the brain through the branch of the third nerve, and sends communications to the muscles of the eye-ball, by the same nerve at the same instant. This matter I think is now fully elucidated; what is true of the one organ is equally true of the other. I now submit that life is centred in the organic nervous system; that the brain and its appendages are attached for the purpose of affording a seat for the organs of sense, intellect, judgment, volition, sensation and motion. That the ganglionic system is capable of influencing all the functions of the body, as relates to its preservation and harmonious action as well as the preservation of the species; that the attributes of the cerebro spinal system are instituted for man's guidance and connection with the world—that whereas, man has the power to control his mind, he has no control over his life

The will is seated in the brain; this is an admitted fact. The will has no influence over the organs of life. The lenticular ganglion is an organ of life; therefore, the brain can have no power over it.

The lenticular ganglion is connected with the brain by a small nerve, and acts in concert with it

It is the law of the organic ganglia to act in communion with one another.

Therefore, as the lenticular ganglion acts in consequence of being connected with the brain, it follows that there must be an organic ganglion located within the brain. And such is the fact; and placed, too, in the very centre of the brain and in direct communication with it, called the pineal gland, but more worthy of the title of being styled the president of the organic nervous system

That there is a close and intimate connection between the organs of animal and organic life, is a matter that cannot be disputed and such close union is necessary for the well being of man. Life is the special gift of the Deity.

“And the Lord God formed man of the slime of the earth and breathed into his face the breath of life; and Man became a living soul”—GENESIS, Chp. V. 7.

Having traced the effects of the nervous system to their final cause, I will conclude. I could have entered more fully into details but I deemed it would be superfluous to do so, having found the master key to unlock the difficulties connected with the nervous system.

230 FOURTH STREET, WASHINGTON SQUARE,

January, 1859.

POSTSCRIPT.

Since writing the foregoing article, I have read Bernard's experiments on the nerves entering the sub-maxillary gland. His remarks, with respect to the blood becoming arterial, and the blood-vessels becoming dilated when the tympano facial nerve is acting, and consequently the secretion of saliva is susceptible of explanation precisely on the same principles as those governing the connection between the nasal branch of the fifth and its communication with the lenticular ganglion; in the one case, tears are secreted—in the other, saliva. With respect to the blood vessels contracting, and the blood becoming venous, when the tympano fascial nerve is in a state of quiescence, being caused by the action of the organic nerves derived from the corrotid plexus, it is clear these nerves preside over the circulation of the blood in the gland; the former condition of the nerves described is destined to make the mind act in concert with the vital action of the organic nerves, whilst the latter is instituted for the preservation of the gland itself.

Browne Sequard has demonstrated that irritation of the skin at certain points causes epilepsy. Now, I submit that the phenomenon is produced in the organic nervous filament, which communicates with a sensitive nerve, and thus, in some instances, conveyed directly to the brain; in others, to the spinal chord and thence to the brain. The irritation thus propagated being extended to the central ganglion, and, by reflex action, from the ganglia to the brain and spinal chord, thence to the ganglia at the roots of the nerves, and, finally, to the nervous filaments supplying the muscles. Here, the brain is known to be implicated by loss of volition, and the central ganglion and other ganglia by the convulsions which supervene. When a person dies of epilepsy, it often happens, no organic lesion can be found; under such circumstances death being caused by irritation, and ultimately, destruction of the organic nervous system.

In delirium tremens, the irritation is propagated from the organic nerves in the coats of the stomach, by the par vagum, to the brain, from the latter to the central ganglion; by reflex action, to the brain and spinal chord, to the intervertebral ganglia and organic filaments. Hence the delirium can be explained—the nervous twitchings of the muscles, the convulsions as well as the death of the patient—by the irritation and final exhaustion of the organic nervous system: here, too, post-mortem examination often fails to account for death. Thus, a man apparently, and in truth, possessed of great muscular strength, dies in an incredibly short time; perhaps, by an attack of convulsions or syncope: thus showing, the cessation of the heart's action depends on the destruction of the organic nervous system.

Every physician knows that hysteria can be almost always traced to irritation of the genital organs. The organic nerves of the uterus act consentaneously with the central organic ganglion through the connection of the hypogastric and sacral nerves with the uterine and vaginal nerves to the spinal chord, and thence to the brain; the phenomena which succeeds does not now require explanation.

Epilepsy produced by irritative masturbation of the genital organs, can, in the male, be readily understood in the same way.

Compression of the brain, followed by loss of volition, sensation and motion, as well as characterized by a slow pulse, stertorous breathing, and dilated pupils; here—recollecting the location of the central organic ganglion, and knowing that it can be compressed through pressure on the brain, it accounts for the condition of the patient.

A slice of the brain may be removed without disturbing the functions of organic life; because, there is no pressure exercised on the central ganglion.

A man eats certain kinds of shell or putrid fish, and it is followed by cutaneous eruption; the connection, here, between the organic nerves of the skin and the stomach, is the cause, by continuity of surface.

When a man gets concussion of the brain, he gets into a partial state of coma from which he can be partly made conscious; but it is well known, that even when his intellectual faculties are almost totally annihilated, he will get up and pass water; this fact shows how the organic nervous system presides over the protection of the body. In making post-mortem examination of persons who have died of concussion of the brain, no lesion of the brain, very often, can be discovered. Mr. Collis used to remark in his lectures, that the only thing that could be observable, was, that the brain seemed to be compressed, so as not to fill the cranium.

Here, it will be perceived, if the brain is thus circumstanced, it must necessarily compress the pineal gland, or central ganglion of organic life, and thus squeeze the vital principle out of the gland, and; consequently, the destruction of life itself.

In poisoning from lead, the muscular fibres of the intestines become apasmodically contracted, although not furnished with motor spinal nerves, or apparently any, nerves. The abdominal muscles become rigidly contracted after some time; showing that the same influence operates over them. If the irritation is kept up, paralysis of the muscles follow, particularly in the arm, showing the destruction of the organic nerves.

In caries of the vertebræ the muscles of the lower extremity are rigid, and a man walks as if on stilts. Here the irritation is propagated to the intervertebral ganglion and organic filaments, proceeding from the latter to the muscles.

A man gets bad typhus fever, the abdomen becomes tympanitic, the pulse scarcely perceptible, the action of the heart extremely feeble, with involuntary discharges of feces, and retention of urine. Here the organic nervous system is on the brink of death. It has lost its power over the intestines and heart, and it cannot keep garrison over the bladder or rectum.

A man gets ileus, or invagination of the intestines; is followed by spasms of the muscular fibres of the part affected; the part of the intestines above the stricture becomes dilated, whilst the part below is constricted. When mortification sets in, the powers of life situated in the organic system quickly give way; recognized by the absence of the pulse, the intermitting action of the heart, the cold, clammy perspiration, the hiccup and Hippocratic countenance, together with the relaxation of the bowels; thus showing that death, has destroyed the barrier of obstruction.

When a man wishes to feel anything, he directs the mind to it; communication is thus had with the central ganglion; which acts, by reflex action through the brain, spinal chord and roots of the spinal nerves on intervertebral ganglion and organic filament accompanying the brachial plexus; at the top of the index finger, the branch of the median nerve and organic nerve inosculate, and thus the mind is made sensible of the nature of the part touched. Thus, the organic nerve acts as an afferent and efferent nerve.

When a young fellow sees a handsome girl he becomes enamoured with her—the genital organs sympathize; here the optic nerve communicates the impression to the brain, the latter corresponds with the central ganglion, which by reflex action through the brain and spinal chord to the sacral ganglia and plexus, the spermatic nerve inosculates with the organic nerves in the organs of generation, and here they act and harmonize with the brain.

John Hunter remarks, to perform the act of copulation well, the mind must be fully intent on the object. This proves that the brain must act through the central ganglion.

It therefore follows that the organic nerves act at all times consentaneously. I am satisfied the nerves in the fetal and maternal vessel form a ganglion in the placental lobule, thus keeping direct communication up between mother and child, and thus verifying the truth of the Gospel: "And it came to pass that when Elizabeth heard the salutation of Mary the infant leaped in her womb."

When a man gets an attack of intermitting fever, the rigor is characteristic, the organic nervous system is all out of order and the condition of the surface shows how much the organic nerves in the skin are implicated. Reflection will at once suggest what occurs.

Here let me observe, that God showed, by his own act, that air or breath was necessary for the life of man, for the moment breathing ceases man is the same as when God formed him of the slime of the earth. Man is made of the elements of the earth, and how true it is—"Remember, man, thou art but dust, and into dust thou must return."

From J. M. M.

W. M. M.

C. J. Brooke

