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MATERIALS FOR AN ALPHABET
TO THE
SCIENCE OF MEDICINE,
EMBRACING
AN INQUIRY
INTO THE
NATURE OF THE MIND AND PASSIONS.

Addressed to the Medical Society of Philadelphia.

BY JAMES PENDLETON, JUN. 1/1854
OF VIRGINIA,
HONORARY MEMBER OF THE PHILADELPHIA MEDICAL SOCIETY.

Aliquid semper ad utilitatem afferendum. ctc.

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.....
1805.



TO
JOHN RANDOLPH, Esq.
OF VIRGINIA.

ACCEPT, Sir, this dedication as an inadequate, though cordial tribute to talents, energy and purity of motive. That you may live in the day of your retribution, when the support of truth will not come under the ascription of policy, ought to be the warm wish of all friends to the progression of virtue.

THE AUTHOR.

TRUTH HAS BEEN IMPROPERLY IMAGINED AT THE BOTTOM OF
A WELL; IT LIES MUCH NEARER TO THE SURFACE.

Divisions of Purley.

GENTLEMEN,

THE object of this essay is, to offer opinions that have remained in silence, involving the most important principles in medical science; an accurate knowledge of which is indispensable for the proper treatment of disorders. Without an alphabet, or a correct view of fundamental principles, we must continue in darkness, though aided by the experience of a thousand years. For ages past we have been crying out for remedies; and, in truth, for ages we have had remedies enough, without knowing how to apply them. The most scientific legislator is incapable of adopting correct measures, or proper laws, unless he is acquainted with the characters of the people over whom he presides: and the most extensive information of chymistry, botany and pharmacy, will avail nothing, without a knowledge of the laws of organic life....In short, it is impossible for us to pronounce the effect of

any agent whatever, without we know the nature of the surface on which it is to operate. The science of medicine has this great advantage over the science of government; that it admits of a permanent and correct system from the invariable laws of animal œconomy; whereas the mind and passions are continually changing from physical operations; and nothing can be more absurd, than to believe that any political theory will guard against the revolutions that must appear in the unlimited and eventful volume of time.

It must be admitted, that theories, in all ages of the world, have been more frequently received from the warp of authority, than from a conviction of their propriety..... This truth, so fatal to the progression of science, induced the immortal CULLEN to say: that he wished the doctrines of great men could be delivered by persons low in authority; by which the free inquiry of others would be excited, and all errors thereby detected. The sentiments that I shall oppose, may be chiefly found in the medical elements of Dr. BROWN; whose information and inventive genius are as highly appreciated by me, as by any person; but doubtless no one ought to surrender his judgment to any mere authority, however respectable; if so, but few publications would be offered; and, as the accurate ST. PIERRE observes, a child raised on the

shoulders of an adult, may command a more extensive view than the person supporting him.

I will now proceed to the points in view, and, having no other object than truth, shall avoid the unnecessary and misleading complexity of DARWIN, in modifying the erroneous compression of Dr. BROWN.

I shall first endeavour to prove, that Excitability is a compound of matter and quality, or of animal and mechanical power: secondly, that Debility is only a predisposing cause to disorder; and shew wherein the identity of direct and indirect debility consists: then establish the propriety of expunging the term Sedative; and conclude with an inquiry into the materiality of the mind and passions.

As every disease proceeds from a change in the solids and fluids, and as I shall prove, that excitability is composed of an animal and mechanical power, it follows, that a knowledge of it enables us to meet every phenomenon of the body. It is not my intention to follow Dr. BROWN through the application of his principles; as it is alone sufficient to prove, that his data were false, and consequently his conclusions. He asserts, that excitability is an aptitude for action, resting on nervous influence only, and that it is increased by the abstraction of stimuli; which sentiments it is the first object of this essay to displace.

Life must be acknowledged a forced state, and the circumstances on which it rests, are stimuli and excitability; life, therefore, is excitement, and all the phænomena in health, predisposition, and disorder, are entirely referable to the same causes. Some gentlemen have contended, that life is a natural and not a forced state; because the nervous fluid is the principle of animation, and is co-existent with the formation of man; and because animals have been revived from the torpid state of many years. But this is a deceiving sentiment; for the nervous fluid only has a greater aptitude to sensation than any other matter; and may be considered as inert matter, until roused into sensation by the influence of stimuli....If sensorial fluid constituted life without the aid of stimuli; it follows, that putrefaction is the only evidence of death, and that man is buried alive....which would be a melancholy fact indeed....for evident it is, that the greatest part of mankind descend to the tomb with even a preternatural quantity of sensorial power.

By excitability, I mean that great principle in animal matter, that may be excited by stimuli, and is composed of stimulability and vibratility.*

* An inanimate chord possesses an excitability, that only consists of vibratility, and demands a mechanical power to throw it into action; but stimulability is a necessary component part of animal excitability.

The introduction of these terms demands no apology, for manifest it is, that we must have fixed terms, as to every branch of science; and I have preferred those, because they are forcibly descriptive, and from their similarity of sound.

Life may then be said to rest on stimuli, stimulability, and vibratility.....By stimulability, I mean sensorial power, nervous influence, or sensibility, which alone discriminates animate from inanimate matter. By the latter, I mean that aptitude in animal fibres of being thrown into contraction through stimulability and stimuli; or, in other words, elasticity or contractility, and vis restitutionis; and may be properly called the proximate cause of excitement or life. Stimuli are those agents that are capable of calling into contraction the excitability or aptitude for action above defined, otherwise to give rise to fibrous motion, through the animal and mechanical power.

Debility is both direct and indirect. By the former is meant that state of the system, which follows the abstraction of stimuli: such is the effect of cold, venesection, abstemious diet, &c. all of which *ultimately* tend to diminish the excitement.* By indirect debility, is meant that state which is induced by excessive action, or is that

* I have used the word *ultimately*, because I shall prove, that the first effect of every agent, is stimulation.

which succeeds the preternatural operation of stimuli.

I will now proceed with the consideration of that important surface on which stimuli act, and which is properly called excitability.

It may be proper for me, first to offer one of the fallacious conclusions of Dr. BROWN, produced by his false opinion of excitability. He says, that if the excitability (by which he meant nothing more than nervous power) was increased by the application of stimuli, death could never appear. This continued increase of nervous influence, would surely be a preventive to death, if (as he says) life depended on nervous influence and stimuli alone; but I shall make it manifest, that to these, he must add the contractile power of the vessels; for man, under this increasing sensibility, without a proportionable increase of *tone*,* would, in ten days after birth, be subjected to convulsions, and all the ligaments of life would be ruptured.

Dr. DARWIN has fallen into the same error, by his neglect of this mere mechanical, yet great principle of excitability. He observes, that if the mind could be kept under a pleasant and uniform

* I shall frequently use the word *tone*, for the sake of brevity, and by it mean, the mechanical power, or vibratilitiy.

excitement, the nervous secretion, and life, would be protracted, ad infinitum.

Such is the importance of this mechanical power, (a principle never valued,) that the sensorial influence, and consequently life, could not exist without it.

I have said, that excitability was composed of an *animal* and *mechanical power*, or of the *matter* of sensibility, and of the *quality* of contracting on sensation;* to elucidate which, let us first direct our view to ophthalmia. In this disorder, we see the serous vessels distended with red globules, the admission of which must not be ascribed to a diminished sensibility, but to a prostrated tone; for the sensorial power is preternaturally increased, the vessels being much more sensible of the operation of stimuli, than previous to the inflammation, but they cannot contract from the application of stimuli, because their mechanical power is lost. An increase of sensorial power, though attended with a departure of tone, may be readily seen in the inflammation of all delicate vessels. Dr. HUNTER; in speaking of the felon, says, “there is an increased

* By sensation I mean the first effect of stimuli on sensibility, or the first degree of motion that precedes or invites contraction. Next to contraction come the diseased links of sensibility, which are irritability, irritation, and inflammation, or disordered action.

action but a decreased power;”* by which he could mean nothing more than increased sensibility and an injured tone. This prostration of tone, with an increase of sensorial power, is not confined to delicate vessels, but may be seen in all cases of indirect debility.

It must be universally admitted that the sensorial power is a nervous secretion, and the following fact is a sufficient evidence. Compress a nerve and the parts to which it is attached are immediately paralyzed. It may be said that the division or compression of an artery produces the same effect. To which I reply, that if the action is destroyed, the nervous secretion must be also. The blood constitutes no part of animal or sensorial power; being merely intended to afford heat and distention, with visceral secretions, &c.—Granting, that the nerves prepare their fluid from the blood, it does not follow that the blood contains a vital power. Each system of the body has its appropriate functions, and each fluid its peculiar properties; and I cannot see why we should attach the same principle to the sanguiferous and nervous system. We know, that the lungs command a great quantity of blood, and more heat than any other part of the

* It is very easy to conceive that increased excitement may attend a lessened tone, but the pulse is feeble; because the contraction is not full or complete; which I shall prove to be the most favourable state for the increase of secretions.

body; yet they possess but a low degree of sensibility; which must be ascribed to their small share of nervous matter. If the lungs contained as much sensorial power as many other parts of the body, we should be subjected to a continual cough. The nervous power is not a stimulus, but the surface, on which the other secretions and all stimuli operate.

If then the sensorial power is a nervous secretion, and if secretion depends on action, it follows that indirect debility is attended with an accumulation of sensorial influence; which is particularly evident in that involuntary action of the muscles, improperly called the shaking palsy, and in the nervous state of fever. Since the animal power is supported by the mechanical, it follows that if the latter was not destroyed by action, man would *never die*.*

An increase of sensorial power in fever, is very manifest, when the tone is much injured; for

* A late ingenious writer on the Zoonomia, wishes to know from whence proceeds this sensorial power, since action is necessary for its existence, and this action cannot take place without it. I reply, that the process of generation furnishes the sensorial power, which is afterwards supported by action. Farther than this we cannot go, nor is it necessary; for we may behold principles and know how to apply them, without being able to account for their remote cause.... We know that matter is supported by motion, and that motion cannot exist without matter; and here we are abruptly met by inexplicable arcana. In short, the above question is nothing less than a demand of the first cause of all creation.

the pulse may be quickly raised by a stimulus, that would effect no alteration in health. And I may here ask; if indirect debility was attended with a diminution of nervous power, (which is the established opinion) how can we account for this excitable state of the system in fever; and how can we explain the truth, that old persons are less liable to fever than the youthful; if we grant that direct debility produces an accumulation of animal or sensorial power?

When fever reaches irregular action or ends in disorder, it is the consequence of a prostrated tone, and a morbid increase of animal or nervous influence.... We find that the oppressed pulse which follows a morbid increase of action, cannot be raised by stimuli only for a short time; but if we take the oppression from the vessels by the lancet, the excitement is immediately restored, and the stimulus that could produce no change in the pulse, now increases it much. This must not be ascribed (as it universally is) to an increase of the sensorial power, but of the mechanical power or spring. The vessels previous to the abstraction of blood, were as sensible of the operation of stimuli as afterwards, but the pulse could not be raised until the tone was restored by depletion.

An increase of sensorial power invariably follows the application of stimuli, and the continua-

tion of that increase is supported until the tone is nearly destroyed.... Though the material part of excitability, or the secretion of sensorial power rests on action; yet we may discover it to increase when the action is much weakened; and it is in an accumulated state, when death has made a near approach. A morbid increase of all secretions is produced by a preternatural increase of action, and the most favorable state for this morbid secretion is the quick and feeble pulse, that invites that state of fever properly termed nervous; which is attended with an alarming secretion of sensorial power and a prostrated tone. A moderate action supports the secretion of nervous power, and a feeble and imperfect contraction, lessening the resistance of the vessels, favours its diffusion.... This truth is strongly supported by the speedy and beneficial effects of depletion in nervous twitching; which restores the contractile power of the vessels, and thereby lessens the efflux of sensorial influence.

If the diminution of excitement produced an increase of sensorial power, why do not stimuli instantly seize a part that has lost its excitement from the influence of cold? Not even fire will produce the least sensation at first; but when the sensorial power is roused, and the excitement revived, then the influx of blood is rapid, and the sensation great. Why is depletion used to lessen the ex-

citement, if the abstraction of stimulus produced an increase of sensorial power? Surely the lancet would produce an effect different from what was intended, by increasing the aptitude for action. In short, it is impossible to account for inflammation without we admit, that the nervous power is increased by stimuli; and to believe otherwise is not less absurd than to contend that the compression of a nerve produces an increase of nervous influence in the parts below, and to adduce the torpor of the vessels as an evidence.

I confess that if blood is abstracted in an advanced state of indirect debility, the weakest stimulus will instantly raise the excitement: but this is owing to the presence of a morbid quantity of sensorial power, which was produced by the previous preternatural action and rendered useless by the prostrated tone....I may further observe, that the diminution of excitement from the abstraction of stimuli, produces a contraction of the vessels, and the influx of blood that follows the renewal of action, by suddenly distending the fibres, creates a preternatural sensation, with half the quantity of sensorial power, that a healthy state demands.... This truth is strongly manifested in the effect of stimuli after the influence of cold, or after the loss of blood in a healthy state; when the sensation is very great, with less than a healthy quantity of

nervous power....Moderate distention is a counter-agent to the sensorial power and prevents even the usual and healthy quantity of nervous power from producing pain; nor can diseased sensation take place unless the vessels are under a preternatural contraction, or until the action becomes so high and continues so long as to overcome or weaken the mechanical force.

To the facts presented in this last paragraph, we may ascribe all the false conclusions respecting excitability.

The departure of mechanical power uniformly precedes the exhaustion of sensorial secretion.... The system may be suddenly prostrated by the operation of a powerful stimulus which *appears* to suspend the excitement from the exhaustion of nervous power before the tone of the vessels could be much injured....But this conclusion is wrong; for the suspension of action is induced by the violent distention that leaves the vessels in a struggling state; and from which the lancet will relieve them by restoring their spring....It is very easy to conceive that the influx of blood may be so rapid as to prostrate a mechanical power in a few hours, that might have supported a moderate excitement for more than one hundred years.

Disorders proceeding from an increase of secretion are exclusively attached to indirect debility

and those that require not this secretion, may be induced by either of the debilities. The operation of stimuli may be so powerful as to prostrate the excitement before a morbid secretion can be produced; but the usual increase of stimuli finally produces that increase of sensorial power on which inflammation depends, and death cannot take place until inflammation is induced.* As inflammation depends upon a morbid secretion, it follows that it cannot attend direct debility; for when a preternatural increase of action appears, direct debility becomes superseded by indirect. From what I have advanced two facts may be deduced.....First, that disease very seldom reaches inflammation or disorder; Secondly, that death is preceded by inflammation in all cases, excepting those induced suddenly by powerful stimuli, and those from a direct diminution of excitement; which very seldom appear.†

Since morbid secretions depend on preternatural action, we must conclude that indirect de-

* Inflammation is the handmaid of disorder in all cases of indirect debility, that are not suddenly induced.

† I have met with only one instance of disorder from direct debility, and the same may be induced, (though requiring a different treatment) by the sudden operation of a powerful stimulus. The case was epileptic; brought on by a direct and gradual diminution of excitement, without the interposition of fever; in which, depletion would have produced death.

bility is the precursor to bilious diseases ; and it is of importance to know, that any fluid morbidly secreted, becomes the nourishing and supporting cause of fever, and ought to be dislodged as soon as possible. It may be said that we frequently find a preternatural quantity of bile, without being attended with fever.....To which I reply, that the secreting system may be under a morbid excitement for some time before an increase of arterial action takes place ; and a moderate action will produce a morbid secretion, when the mechanical power is weakened by heat or any relaxing cause. Thus we explain why cold so speedily checks bilious complaints.*

I believe that the greatest part of mankind depart with more than a necessary quantity of nervous power, and the cause of their death is a complete prostration of tone. This may be readily seen in persons who go off with inflammatory complaints ; in whom the destruction of tone renders that remaining sensorial power useless, which would require but common stimuli to support long and healthy action, could it be translated to contractile vessels.

* May we not consider bile, not only the supporting, but the exciting cause of the fever attached to it ; since we uniformly find a preternatural quantity on the approach of a bilious fever ?

This view of excitability would have convinced the medical characters who attended our illustrious Washington, of the equal propriety of stimuli and the lancet. Bleeding was expedient to lessen the obstruction, and that bleeding lessened the sensorial power, already too low from an advanced life.

I think it will be acknowledged that the animal power is increased by stimuli; that excitability is composed of an animal and mechanical power, and that to ascertain at any time the measure of *excitability*, and the proper treatment; it is necessary to know the change that has taken place in its component parts. The chief object of the physician ought to be, to keep the sensorial and mechanical power upon a par, which necessarily adapts the excitement to the excitability.

I will now, Gentlemen, present to your view the impropriety of terming debility.....disorder.

By disorder, we conceive an inordinate action, error loci, or an incapacity of the vessels to propel their fluids in a regular manner; which is produced by debility. Disease and debility, which generally accompany each other, invariably precede disorder, and may exist a great length of time before disorder appears. Let us direct our attention to the first stage of fever, when there is debility, and an absence of ease; but irregular

excitement, or disorder, does not appear until that debility injures the excitability so much, as to render the vessels unable to support their natural operations.....Dr. BROWN, in attempting to prove debility to be disorder, defines good and bad health. The former, he says, is an easy, pleasant, and exact use of all the functions of the body; and bad health consists in an uneasy, difficult, or disturbed exercise of all or any of the functions. As to the accuracy of this statement we consent; but it does not follow that debility must be attended with unequal excitement, or that the absence of vigorous action is necessarily a morbid one. The Doctor had acknowledged what he seems here to forget, viz. that the phænomena of life, were health, predisposition, and disorder. I ask, what can constitute this predisposition if not debility? Manifest it must be, that disorder cannot appear, unless preceded by debility; and we may see instances of debility not even attended by disease; as is strongly evinced by those in the decline of life, who feel perfectly easy under a manifest debility.

If the excitement is proportionable to the strength of the vessels, as much regularity exists in the functions, as in the most healthy state of the body. The most emaciated and delicate persons may have health as well as the most robust;

though they are not so far from disorder. An equalised excitement constitutes health, be that excitement at any degree in the scale of life.... The abettors of Dr. BROWN say, that death frequently appears from debility alone; and ask, how a liability to disorder can alone produce death? I reply, that I have seen death from old age, or a natural diminution of excitement, but with evident symptoms of the interposition of irregular action; for a certain grade of debility must produce an unequal excitement, and death cannot take place until that disordered action is produced: consequently no one can die with debility alone.

Dr. BROWN extends his inaccuracy farther, by saying, that debility, induced by high morbid action, is the highest grade of disorder, and the immediate precursor of death. He evidently puts the cause in the place of the effect, for morbid action (as I have proved) is the consequence, and not the cause of debility.

As disorder then, is an irregularity of action, produced by debility; it must be granted, that debility is only a predisposing or inviting cause to disorder.

I am now led to consider the unity of the the two debilities, which Dr. BROWN, and others, have opposed, from their being induced by opposite causes; one by an abstraction of stimulus,

and the other by the application of a preternatural quantity.....To their opposite causes I assent, but their difference does not necessarily follow. It cannot be difficult to conceive, that different causes may terminate at the same point by an extension of operation. An increase of action as to the mind or body, must finally produce the same debility, as a direct diminution of action, and a difference of causes must make an identity of debility, before disordered action can appear. Dr. BROWN confesses, that they are attended with an equal diminution of excitement, and consequently with an equal derangement, or disease of excitability,* which establishes their identity beyond the reach of doubt.

This equal loss of excitement, or aptitude to inordinate action, is doubtless the inosculating point of the debilities, and the invariable precursor of disorder; for morbid action from indirect debility cannot take place, until the excitement is as far below the standard of perfect health, as it must be from direct debility.

Life is supported by circumstances resting on each other, and the preternatural increase or diminution of either must finally produce the same loss of action, or an equal aptitude to disorder.

* The derangement of excitability is equal, though not the same.

May I not extend the identity of the debilities farther than the predisposing point, and say, that the same disorders may be produced by either?.... We have but little more than theory to support this sentiment, as direct debility but seldom reaches the point of irregular or disordered actions; unless united or superseded by indirect.*

As it is allowed that the two debilities terminate in an equal diminution of excitement, and that inflammation or inordinate action of any kind, is the immediate consequence of that lessened excitement or incapacity of the vessels to propel or govern their fluids; then must their equal predisposition to disorder, or their identity, be also granted.

This identity of debility, or unity of disorder, presents the key, by which we may, with safety and ease, enter those numerous apartments in the temple of medical science, which have for ages required a separate one.

Having considered the different actions of the body, we will now proceed to the nature of the agents, that produce and influence excitement; in which it is my object to establish the propriety of expunging the term *sedative*.

Stimuli are defined to be those agents, that increase the excitement; but it is more correct to

* In describing excitability, this question was noticed.

characterize them by additional sensation; because the sensation may be increased without an increase of excitement....If we admit then, that an increased sensation constitutes a stimulus, it must follow that every cause in the material world has a stimulating effect....If an agent did not produce a sensation greater than the existing action of the body, it would be impossible for us to be sensible of its operation. This truth is supported by one that is acknowledged by the medical world, viz.....That two contemporary actions cannot exist; or that the greater must displace the less.

It is immaterial whether the increased sensation is produced by a contraction or distention of the vessels....The terms stimulus, agent, cause and operation, may be considered completely synonymous;...and in short, whatever produces an effect, must be a stimulus; for there is no term opposite to stimulus but the word nullity....If the stimulus of contraction, is greater or as great as the stimulus of distention we must conclude that cold, fear, and all of those causes which have been placed among the first of sedatives, are really to be valued as the most powerful stimuli; for their effects absolutely produce the highest degree of pain from contraction....It is acknowledged that the above supposed sedatives do increase the secretory functions, and even produce convulsions;

which can only be the consequence of an increased sensation.....The lachrymal effusion that results from the influence of *cold*, is an incontestable evidence of its stimulating effect.....If gentlemen by sedatives mean those agents which terminate in a diminished excitement, or which ultimately abstract the irritation of the system, they may then embrace the most potent stimuli, that ever influenced the human body.....*Digitalis* is at first a powerful stimulus, yet speedily terminates in a considerable loss of excitement.....Even blood-letting is in many cases a very powerful stimulus: I have known the arterial system increased twenty and thirty pulsations to the minute, by the abstraction of blood....I will go farther and say; that I have seen a pulse that was completely stifled, excited into febrile action in one hour by the lancet. The lancet increases the spring of the vessels; thereby admitting a more rapid influx of blood, and consequently a greater sensation.....I think it would be most proper to divide all agents, into *positive* and *negative* stimuli.....By the former I mean those causes that diffuse their effects through the body in an equiform manner, and swell the whole vascular system....By the latter I mean those agents that produce a partial distention, by a partial contraction.....If some vessels are contracted, it follows, that the revulsion of blood must swell

those more deeply seated.... Thus we find the same cause operating as a stimulus by opposite actions. To this last system of agents, we may attach cold, fear, and all those causes which produce a contraction of the vessels by the abstraction or repulsion of heat. We may also add sal plumbi, alumen, and a thousand other medicines which produce contraction from a specific astringency..... Nature has so wisely adapted the blood and other agents to the principles of life, or to the excitability, that we are insensible of their influence, in supporting excitement..... True it is that without sensation life could never have taken place; but the pleasure of healthy or usual distention (as I have before said) becomes a counter-agent to the sensorial power, balances sensation, and leaves us under an insensible action... It must then follow that when an agent is applied in health or in perfect ease, it must produce not only an increased, but an original sensation; there being no sensation previously.

I am willing to admit darkness to have some claim to the term sedative; as I am disposed to believe that it diminishes the excitement, without any sensible operation.

I cannot avoid offering a few remarks respecting an opinion that is prevalent in medical schools. It is said that each medicine directs its influence on its peculiar or appropriate system of the body;

or that one medicine operates on the nervous system, another on the sanguiferous or muscular, &c.....Permit me to ask whether the nervous system is not the principle of sensation....If so, surely all agents invariably excite the nervous system, and no system of the body can be influenced, only through the medium of the nerves....If every system is not affected, it must be ascribed to the weakness of the stimulus that is applied.....I grant that a stimulus will first excite the system that contains the greatest quantity of animal matter; which may tend to abstract the nervous influence from other parts; but if the stimulus is sufficiently powerful, its effects will pervade the whole body....Jalap passes through the stomach and operates on the bowels; but this is owing to a difference in the state of the food.....That in the stomach is more solid, and better calculated to resist the influence of an agent; whereas the aliment in the intestines has undergone a considerable concoction; assumes an irritating property, and is in a proper state for uniting its influence with the medicine....All purgative medicines would be converted into emetics, if they were exhibited when the stomach had but a small quantity of food, and that food in an attenuated or digested state.

Having enquired into *excitability*, as far as it respects the healthy and diseased action of the body;

we are now invited to consider its connection with the mind and passions.

It must be universally granted, that the mind of man is coeval with his senses. For sooner ought we to expect vegetation from the earth without seed, than ideas from the brain without senses. We must then conclude, and a few facts will incontrovertibly prove, that the mind is nothing more than the sensorial power, or the effect of external agents passing through the organs of sense, to the great source of sensorial secretion.*

If the mind was spiritual, or immaterial, surely no age whatever could affect it; and how often do we behold persons, completely deprived of intellectual power from the debility of an advanced life? The dependence of the mind on the nervous power, is strongly manifested in those, who have been subjected for a length of time to a chronic rheumatism in the head; by which not only the memory but all the mental attributes are much weakened, from a diminution of nervous secretion. Many who have reached their great climacteric, still retain a clear perception and correct memory; but this must be ascribed to the stimulus of reflection, (being uniformly persons of extensive

* It is very evident that every animal has some degree of mind; and consequently a proportional claim, with man, on the protection of Providence.

information) which supports the necessary quantity of sensorial power for the mind; but the passions are invariably brought down, or moderated by old age; as they depend on that vigor or mechanical force, which is not the concomitant of an advanced life.... Since the mind rests on the sensorial power, and since the latter is increased by action, it follows that the mental vigor may be increased by stimuli. This truth is very evident in the first stage of fever, and after a few glasses of wine, before the vessels are under an *unpleasant distention*; when the imagination is more fertile, the perception more acute, and impressions are revived that have been displaced for years.... But when the action becomes high and the vessels much distended, then the dominion or power of the mind is transferred to the heart, and converted into passions; or rather into an aptitude for receiving them. The passions depend on a mechanical force, or a flux of blood to the heart, that stifles or weakens the intellectual power; for two perfect or perceptible actions cannot co-exist. If a beautiful woman is presented to my view, the heart is instantly excited, and the mind remains inactive or is incapable of a correct examination into her merit and the propriety of the attachment, until the passion retires into a quiescent state: but if her beauty is not sufficient to rouse my heart, then my mind may examine

her merit, and if it decides forcibly in her favour, the decision will be translated to the heart, and passion will exist. An agent that is not great enough to excite the heart may rouse the mind, and the mind is always enfeebled proportionably to the increase of a passion. From what has been said we must conclude that the passions may and may not be indebted to the mind.

It may be asked why the mind should not be deposited in the heart, or diffused through the body, since it depends on the sensorial power? The obvious reply is, that there is not a sufficient quantity of nervous power in other parts of the body to produce ideal sensation; and if there was more in the heart than in the brain, the violent action of the heart and its appendant vessels, would prevent perception. When we reflect that the passions depend on a mechanical power, we may readily see, why they are attached to the heart, where the greatest action exists....From what has been advanced, two facts may be deduced: First, that if the vessels of the brain were as large, or the action as great, as in the heart, our mind would be converted into passions; as the passions depend on an influx of blood or a mechanical power, that would stifle the mind: Secondly, that the formation or character of the mind depends much on the passions and organism of the vessels....Such is the

alliance of the sensorial and mechanical power with the mind and passions, that the character of a person may be known by the constitution of the body.

A physician of great celebrity and extensive knowledge of the world, told me that he seldom erred in forming an opinion of the natural capacity and disposition, from the pulse, in its usual and healthy state....Why should not the same experience empower us to pronounce with equal accuracy, the liability of a person to some particular sentiment or passion, that enables us to decide on his aptitude to some particular disorder; since the mind, heart and body are reciprocally dependant, and controuled by the same natural law? I confess that acquirements make great changes, but will not prevent our seeing the fundamental principles and natural tendency of a person.

What then can be of more importance than a knowledge of excitability, since it not only enables us to meet every phænomenon of the body, but to explain the keen and quick perception of some, and the slow, though extensive research of others; and to account for the irritable and violent, the moderate and phlegmatic temper?

However hypothetical my sentiments may appear; they are deduced from close observation and long experience.

Before I retire from you, Gentlemen, permit me to observe, that in approaching the objects of this essay, I have been concise, and perhaps irregular; leaving an improvement of the way to others....I may add, that I do not expect my sentiments will be readily received, having opposed authors of exalted fame, and supported a simplicity that is hostile to the pride of science.

JAMES PENDLETON, jun.

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