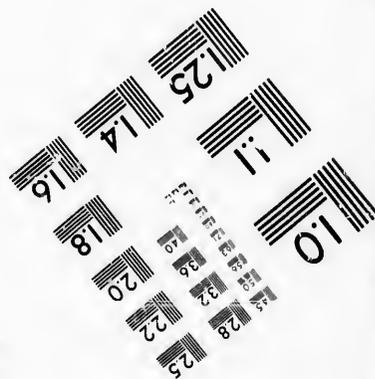
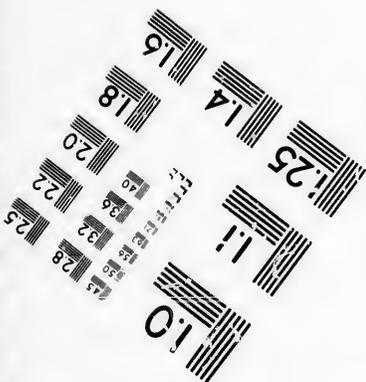
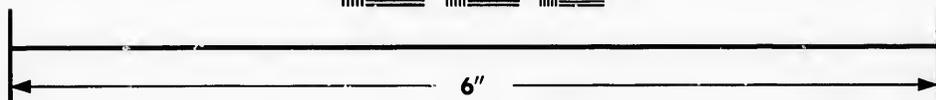
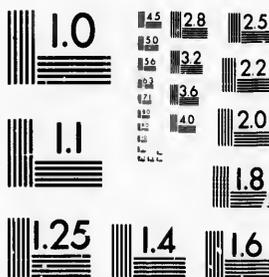


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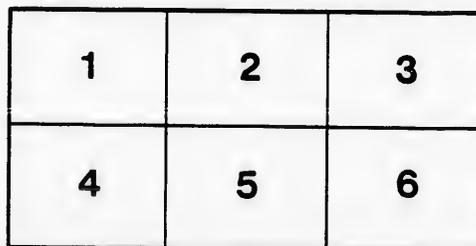
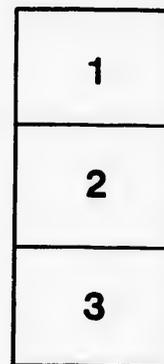
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ADDRESS

DELIVERED AT THE OPENING OF THE SUMMER SESSION
CLINIC FOR DISEASES OF THE NERVOUS SYSTEM,
MCGILL UNIVERSITY, APRIL 14TH, 1885.

BY

HENRY HOWARD, M.D.

Gentlemen,—Your professor, and my esteemed friend, Dr. Stewart, kindly invited me to give the opening lecture to his summer session clinical course on diseases of the nervous system. I consented to do so with great pleasure, because I know he will treat his subject from the standpoint of a physical scientist, the only point from which any of the diseases of the human frame can be treated scientifically.

Yesterday I received the *American Journal of Neurology and Psychiatry*, one of the best edited journals on this continent, which contains the valedictory address of the Hon. Wm. Barnes, past-President of the Society of Medical Jurisprudence and State Medicine, in which he says, reviewing the work of the past year :
“ At the fifteenth regular meeting of the Society, held in May, 1884, Dr. Henry Howard of Montreal read a paper entitled
“ *Why Lawyers and Doctors fail to agree.* Dr. Howard maintained that experimental philosophy was the only true basis upon which to found all jurisprudence--all medical jurisprudence, all education, and all social order ; and that physical science should be the beginning and ending of *all* education.
“ If penal codes were based upon it, the criminal would be tried

“ by nature’s laws for any offence against social order, and, if convicted, would be separated from Society as an abnormal man that must be taken care of, both for his own sake and the protection of society, and to return to society only on becoming a normal man.”

I have quoted for you the foregoing that you may learn that any opinions that may fall from me while delivering this lecture cannot be stronger than those I have already expressed, and which have been already published.

When we treat of man in his normal state, we simply treat of organized matter and its phenomenon, organs and their physiology or functions. In fact, let us treat of nature as a whole, of which man forms an integral part, and we have nothing to treat of but matter and its phenomena. In the vast universe that, in truth, we possess so little knowledge of, there may be some other entity besides matter, if so be that matter be an entity and not a phenomenon; but we don’t know it—we cannot find it out by physical research. As physical scientists, we only know and treat of matter and its phenomena, things of the natural order, and of this, I regret to say, our knowledge is very limited. Strange that the subject which is of the greatest importance to man should be the subject, of all others, man knows least of. In all the past countless ages man seems to have considered it his first duty to try and find out the supernatural, and they are now as near to the attainment of their object as they were millions of years ago. Doubtless there is a supernatural. I believe myself, most fervently, there is, because natural presupposes supernatural; in other words, *cause* supernatural for *effect* natural. Physical science leads us thus far, but no further. We cannot treat of the supernatural by means of the natural order, therefore, as physicists, we have to treat of nature and nature only—that is, of matter and its phenomenon. Some believe that matter differs in kind. I only find that it differs in degree, and that it is indestructible; and in this I am in accord with the greatest physical scientists or experimental philosophers in the world. Judging the degree of matter by its phenomenon, the highest degree is the nervous system in man, and as this system itself

differs very much in degree structurally, so, consequently, must it differ in degree functionally, for all the varied functions of the various degrees of matter owe their functions to their structure, and alterations of functions must in all cases be preceded by alteration of structure. For example, the structure of the cornea, or glass of the eye, is transparent, and one of its functions is to transmit rays of light; but if this function is lost, if from disease the cornea is rendered opaque, then the function of transmitting light is lost. Motion is the function of muscular fibre, but if the motor nerve that supplies the muscle becomes paralyzed, the muscle, for the time being, loses its function.

Experiments on animals by vivisection, and the experiments that disease and accidents make on man, has proven that the grey or cortical substance of the brain is, more particularly, the structures of which mind is the function, although, in reality, there is no part of the nervous system which is not either directly or indirectly connected with the function of mind. Consequently I have given to the whole nervous system the term *materia cogitans*, or mind matter, or matter of the mind. Now mind may be an entity, or it may be in all matter, only we can't find it; we can only find it as phenomena of nervous matter, and where there is not nervous matter we cannot find mind. Therefore, when you ask me, as a physicist, what is mind, I must answer you a phenomenon of nervous matter. That is the language of physical science, and, unlike metaphysics, is at least comprehensible, or admits of being reasoned upon. The metaphysician may assume something else, but the physicist, as such, cannot admit of assumption; he treats only of the natural order, and only knows physical facts. Now, then, if you enquire of me, what is mind in the abstract? I answer you, I don't know; I only know it as a phenomenon of matter. What is force? A phenomenon of matter. What is sensation? A phenomenon of matter. What is consciousness? A phenomenon of matter. What is moticity? A phenomenon of matter. What is intellect? A phenomenon of matter. What is instinct? A phenomenon of matter. What is automatism? A phenomenon of matter. What is reflex action? A phenomenon of matter. What is con-

duct? A phenomenon of matter. What is electricity? A phenomenon of matter. What is that which we call life, in its three different degrees—dynamic in the mineral matter, biological in the vegetable matter, and biotic in animal matter? Physical science teaches us that even life is a phenomenon of matter. There may be life without matter, I don't say there is not. It may be an entity; I don't say it is not. I only say it is only demonstrable to us as a phenomenon of matter.

It is well, then, gentlemen, that when we come to treat of all, or any, of the different forms or degrees of all the different diseases that man is heir to, either by hereditary transmission, traumatism, or idiopathicism, that we only know matter and its phenomena, and of it only can we treat—that is, we only know man anatomically and the functions of his organs and tissues.

I must warn you now, gentlemen, that it has become fashionable—as fashionable as evil-speaking, lying, slandering and bank robbing—for the most immoral portion of society to hold up their hands with an assumed holy horror, and denounce the teaching which I have now given to you as sceptical, malevolistic, infidel, and irreligious. But don't you trouble yourself about what these people say. It is not a question of religion at all, and, believe me, you can believe all this that I have just said, as a physical scientist, and much more, and yet be honorable Christian gentlemen, or honorable gentlemen without the prefix Christian—Jews, for example, who are certainly as honorable as Christians.

There are others, good men, who, under the false impression that the natural is antagonistic to the supernatural, about which they know so little, protest against physical science, and would arrest us in our search of nature's laws. Mistaking sentimental conversation for religion, they will not even study physical science, afraid it should disturb their sentimentalism.

I would have physical science, or natural experimental philosophy, the basis of medical education. I would have it practically studied, by observation, from nature. I would have it the basis of law, order and civilization. I would have all men to know all they possibly could of nature's laws, and live in obedience to them. I would have the fact taught that all the so-

called sciences, if sciences at all, were physical sciences. I would have it taught that the very first principle of physical science was the fact that we had nothing to study nature from but matter and its phenomena; that is, material structures and their functions. That although matter was one, differing only in degree; that because of this difference, there were various structures, and consequently as great a variety of phenomena, I would have less books, and more observation, particularly in the education of youth, providing them with such a natural moral environment to draw their knowledge from, such as technical education provides, that the environment itself would cultivate their physical intellectual organization during the evolution or development of their intellectual organs.

If our social order was based upon nature's laws, and if we lived in accord with these laws, there would be but little occasion for either doctors or lawyers, because disease and sickness is due to a breach of nature's laws, and crime is the outcome of either teratological or pathological defect of organisms, from breaches of nature's laws. I would throw no obstacle in the way of any man in studying any of the arts, which I call also physical science, nor of language. But the standard of merit, if I admitted such a standard, in schools, colleges and universities, should be a knowledge of physical science or experimental philosophy.

You ask me would I interfere with the teaching of the supernatural. I have already said I believe in the supernatural, therefore, as a matter of course, I could not oppose its teaching; but I recognize that of necessity, while the two orders—supernatural and natural—are different, they are not antagonistic, and should not be made to clash.

And now, gentlemen, with your permission, I will turn to the nervous system. A vast subject, a truly grand subject, is disease of the nervous system—the one of all others which connects us with the physiology of the whole human frame; but a subject nearly, or I may say absolutely, impossible for any teacher to do justice to, or for students to derive much benefit from, unless the teacher has provided himself with plenty of abnormal living

material, and I vouch to you that your professor has taken good care to provide himself with an abundance of this material. I was agreeably surprised, I might say astounded, when visiting his dispensary, to see the number of cases he had succeeded in collecting, representing so many different phases of the diseases of the nervous system, both local or peripheral, and general or central, and in different stages of pathological defect. I even saw many in the different stages of teratological defect. I was particularly struck with the features of one imbecile boy, whom no doubt you in time will see, which caused me to turn to your professor and say, "These are the sort from whence come our criminal class of society." Now there are two things to possibly save such boys as that from becoming criminal fools: time and favorable circumstances, such as a good environment, while evolution is causing the development of the cortical substance of the brain, and all other portions of the *materia cogitans*.

In my making use of the expression agreeably surprised, I hope you do not for a moment suppose that it was, or is, a pleasure to me to find that a large portion of the human race are immoral criminal fools, and that because of teratological or pathological defect in some part of their *materia cogitans*. What I meant by the expression was simply that, knowing such to be the case, I was both pleased and surprised to find that your learned professor had succeeded in surrounding himself with so many of these cases, not only as a clinical teacher, but because of the benefit these creatures were receiving from what I saw to be scientific treatment.

True physical science, when applied to the treatment of disease, consists in our recognizing the fact that for physical effect there must be physical cause, and in our treatment of disease, our duty is, when we see effect, to look for cause. Treating disease from any other standpoint, no matter how successful such treatment may be, is empiricism—it is not science; and until this truth is recognized and acted upon by the medical profession generally, none of us can claim to be members of a purely scientific profession. The same reasoning, from the same premises, is equally applicable to the members of all other professions, and to none

more so than those of the legal profession, whose members cannot even comprehend justice or equity unless as physical scientists. Legislatures cannot make just and equitable laws, except as physical scientists, consequently we have such everlasting bungling and empiricism in the making of our laws, even the pitiful sight of law-makers breaking one law by making another. The law-maker, the administrator of the law, the lawyer, and the medical man, as well as he who cultivates the growth of a tree, or fashions a steam-engine, all equally alike must recognize the physical fact, and act upon it, that for physical effect there must be physical cause ; to act otherwise is to act unscientifically and immorally.

No doubt, because of our ignorance of physical laws, we are sometimes, as it were, forced to empirical practice in our profession. Frequently, for want of knowing the cause of suffering, we render a person insensible by a dose of chloral or morphine. And can any one deny but that much of the practice of the present day of the gynæcologists is not empirical. How many cases of young girls more particularly, now treated for uterine diseases, never had that organ diseased. Hear what Dr. Wm. Goodell, of the University of Pennsylvania, says on that subject: "The crying medical error of the day is the mistaking of nerve disease for womb disease. From this widespread delusion it has come to pass that no organ in the human body is so over-treated and, consequently, so maltreated, as the womb."

Gentlemen, this sort of medical treatment is neither scientific nor moral. Here scientific morality, in the treatment of all diseases, consists in knowing the physical cause for physical effect, and this we never will know perfectly till physical science be made the basis of medical knowledge. I said scientifically, and have added the term morally, for moral conduct depends upon physical cause. What is conduct? We judge of every man by his conduct, and properly so ; but how would we define conduct. Whether it be good or bad, what is it? It is simply muscular motion, for which there must be a cause. In other words, conduct, whether good or bad, moral or immoral, is the effect of a cause. Your clinical teacher will show you a para-

lyzed muscle, and he will tell you it is a badly-conducted muscle, because it does not perform its normal function. It is an immoral muscle ; it does not, because it cannot, obey the will, or cannot be controlled by the inhibitory function of the intellectual nerve centre. He will tell you that this muscle is an immoral, badly conducted muscle that cannot perform its normal functions, because the nerve that supplies it has lost its force, and discharges no force to the muscular fibre to cause these fibres to contract, so that the loss of nerve function causes a loss of muscular function. Here is the effect of a cause, and your clinical teacher, before prescribing therapeutical treatment for this case, or rendering a prognosis, will first search for the cause of all this troublesome effect, which he finds. He being acquainted with the general anatomy and physiology of the nervous system, knows that this paralyzed nerve may suffer from a pathological defect, in any part of its course, from one of numerous causes, either chemical or mechanical ; that it may be central, or that it may be local—that is, peripheral,—but wherever the lesion may be localized, lesion there must be, whatever be its nature, because there cannot be functional change without structural.

It is absurd to speak of any morbid or abnormal state of any portion of the human frame as merely functional. There can be no functional derangement without structural derangement, no matter how simple it may be ; but it is not necessary that we should find structural defect in the immediate locality of functional defect. For example, what we term dyspepsia is very frequently due more to cerebral than to stomach structure, and, on the other hand, some of the brain functions may be deranged through fault of stomach structure. Any peripheral irritation may cause derangement of the functions of the nerve centres, and any lesions of any of the centres may only develop itself through the medium of their peripherals. These are facts well known to every educated member of the profession ; but the trouble is to diagnose. Where is the structural derangement for the functional effect ? That is the question of questions in our profession. That is what you will, to a great degree, learn, in the course of lectures you are about to enter upon, on the

diseases of the nervous system. This is an education not to be got from books. You may be able to commit to memory a library of books, and yet not know the most simple of those nervous diseases when called upon to diagnose it. No, gentlemen, to diagnose these diseases you must learn from your observation of nature; even then, in very many of these obscure cases, you will only succeed in a true diagnosis by exhausting the negative, a practice very successfully resorted to by that recognized scientific neurologist, Dr. E. C. Seguin of New York.

I would next point out to you, gentlemen, that as physical science teaches us that all matter is one, only differing in degree and not in kind, so does it teach us that nature is one of which man forms an integral part, consequently man should learn of her, know her laws, and live in obedience to them above all things; that he should learn the fact that he who lives in the breach of nature's laws does so at his own risk, and is sure to bring upon either himself or his offspring her just punishment. Nature is no respecter of persons: she makes no allowance, not even for ignorance. She inflicts sure punishment for the breach of her laws, not only to the third and fourth generation, but to the tenth and twelfth generation. If any knowledge would make man a moral man, this knowledge should do so, but, unfortunately, it has not. And why? Simply because the immoral man is a criminal fool, in virtue of some pathological or teratological defect in some part of his *materia cogitans*, no matter what may have been its somatic etiology. Every man's conduct is the outcome of the functions of his *materia cogitans*. If its functions be normal, the man's conduct will be normal, and he will consequently be a moral man, living in obedience to nature's laws, and delighting in his knowledge of them. If its functions be abnormal, his conduct will be abnormal; he will be a fool, and consequently an immoral criminal. The *materia cogitans*, like unto all other organic structures, has its peculiar functions, which functions are what the structures make them. If the structure be normal, the function will be normal and conduct normal. If the structure be abnormal, the function will be abnormal and conduct abnormal. We know a moral man by

observing his conduct and finding it in accord with his good environment, and we know his conduct is the outcome of force or phenomenon of his *materia cogitans*. So the immoral criminal fool shows what he is by his conduct, and we know that his conduct is also the outcome of the forces or phenomena of his *materia cogitans*. In the one case there is normal structure and function of the *materia cogitans*, causing right action. In the other case, there has been abnormal structure and function of the *materia cogitans*, causing wrong action. This is the ethical explanation of right and wrong. From a physical standpoint, morality and intelligence are the product of one; immorality and folly the product of the other. This is a law which governs all matter; all its phenomenon or force depends for its characteristic upon its mechanical and chemical structure, and the highest knowledge we can possibly attain to is the knowledge of matter and its phenomena. Matter in all its different degrees; phenomena in their numerous and varied forms.

As physical scientists, we cannot help recognizing that all criminals are fools, whether it be due, in each particular case, to teratological or pathological defect in the person's *materia cogitans*. If from pathological defect we term the person a maniac, if from teratological defect we term such a person an imbecile or fool, the fool or imbecile has never been anything else but a fool or imbecile, because of teratological defect; and his degree of imbecility will depend upon the deformity or teratological defect in his *materia cogitans*. If the imbecile be young, his *materia cogitans* may improve by growth and development, so that he may cease to be a fool, and grow up to be a moral man. But if he has outlived the age of development, and be an immoral criminal fool, such is he likely to remain to the end of the chapter, to be a curse to all whom he comes in contact with. Such fools are to be found in all the different grades of society, as society is graded. It is quite different with the insane or maniacal fools. They have lost something which they possessed—their intelligence; lost it by pathological defect in their *materia cogitans*. They should be treated with the most scientific care, with the object of restoring the abnormal organ

or structure to a normal state, after which there will be normal function and normal conduct.

There are many persons under the impression that because a man is what they term smart, that he is necessarily an intelligent man. Never was there a greater mistake. An immoral criminal fool may be, and very generally is, smart, clever ; and, indeed, it is necessary to be such to be a successful criminal. But all that does not give proof of intelligence, no more than does the memory of words. An intelligent man must necessarily be a moral man ; indeed the terms morality and intelligence are synonymous terms. Morality and intelligence are functions of the higher nerve centres in the cortical substance of the cerebrum. These centres are cells whose functions are to receive the forces carried to them from without by means of the afferent or centripital nerves, also called sensory nerves. and when these forces are received, to adjust them and store them up for use when required, then, by their emissive functions, discharge these forces to the muscles by means of the afferent or centrifugal nerves, thus causing muscular action or conduct. These higher intellectual nerve centres possess not only the functions of receiving forces, adjusting forces, storing forces, and emitting, but they have also the functions of sensation and inhibition ; and in virtue of all these functions, these centres are the centres of intelligence and conduct, and all these functions will be good or bad as the structure of the *materia cogitans* be normal or abnormal.

It is an established physical fact that the higher the nerve centres, the lower the organization ; and the lower the nerve centres, the higher are they organized. This explains how rapidly a man changes from sanity to insanity, from being an intelligent man to be a fool. It is a very slight cause that will injure the structures of the cells constituting the higher nerve centres, and, consequently, disarrange their functions because of their low organizations. It is well known what a glass of brandy, a dose of opium, or a whiff of ether or chloroform will do with these nerve centres ; fortunately, the lower centres, because higher organized, are not so sensitive to these drugs,

or there would be more deaths from inebriety, and, consequently, less fools and maniacs.

Why are the highest centres the lowest organized? For two reasons. First, they are not actually necessary for life, as others are; their destruction does not cause death. Secondly, they are chiefly formed and altogether developed after birth. Those centres most, or actually, necessary for existence are the first developed and the higher organized. The higher centres being the last evolved and developed, accounts for the fact that wisdom comes with age; and being of so low an organization accounts for the other physical fact that, in the natural order of things, they are the first to decay, consequently it so frequently occurs in old age that intelligence declines while yet the vegetative organs, so highly organized, are healthy and vigorous. Then the truth of the old adage is established, "Once a man and twice a child." None of us, gentlemen, would, I hope, desire to live to that stage of existence; better the end of evolution.

Taking the nerve centres from above downward, we have next in order, after intelligence, the instinctive centres, then the automatic and the reflex. Now the lower the intellectual functions, such as we have it in infancy and childhood, the higher do we find the instinctive, the automatic and the reflex functions. I speak of normal functions. For example, all other things being equal, we observe in infancy and childhood how much more active these functions are than in manhood; and we find that as the intellectual functions increase the lower functions decrease; a child is solely guided by the functions instinctive, automatic, and reflex, while the intellectual man is governed by his intellectual centres, consequently his other high centres, but lower than his intellectual, for want of use, lose to a great degree their functions. But let this man, from some pathological defect in his *materia cogitans*, lose the function of intelligence and become insane from the loss of equilibrium in his mental forces, such, for example, as is found in a drunken man, and immediately he is governed, not by his abnormal intellectual nerve centre, which has, at least for the time being, lost its functions, but by

his normal instinctive, automatic and reflex centres and their functions. The functions of these centres can be normal while the functions of the intellectual centres are abnormal. But these centres have no inhibitory nerve centre to control their functions and consequent conduct, because the nerve centre, which, by its inhibitory function, controls man's general conduct, comes from the organ of intelligence, so that conduct to be moral, must be intelligent and moral—that is, under the control of the intellectual nerve centre in virtue of its inhibitory function.

The drunken man, who is intellectually a fool, will escape such extraordinary dangers, have such narrow escapes of his life, protected by his lower centres, particularly the functions of his instinctive centres, that it appears to the ignorant and superstitious to be miraculous, which has given origin to the old saying that there is a special providence to watch over and care for the drunken man.

From closely observing the foregoing physical laws which governs our organisms, particularly our higher nerve centres and the nerve circulation of molecular force, we can understand that an intellectual man must necessarily be a moral man, and that an immoral criminal is a fool—a fool because wanting in intelligence, wanting in inhibitory nerve force, his conduct is the outcome of the functions of his instinctive, automatic and reflex nerve centres, and possessing these centres, together with the sympathetic and emotional, and all their functions, there is no reason why such a fool should not also be a cunning knave, and pass for a smart business man who can dupe and get money even out of the most intelligent men by appealing to their sympathy.

Notwithstanding the fact of the increase of insanity, or pathological defect in the higher nerve centres, no doubt chiefly due to their low organization, yet there is hardly a case that the general practitioner is called upon to treat that is not in some way connected with the lower nerve centres or their peripheral branches. The lower nerve centres in man, and in the whole animal kingdom, are the first evolved, and necessarily the highest organized; and all other things being equal, they are the last

to decay, yet, from a thousand different causes, both chemical and mechanical, are they subject to pathological defect, and although abnormal disintegration in the higher nerve centres causes mania and imbecility or dementia, yet their destruction does not necessarily terminate in death, whereas abnormal disintegration or dissolution in lower nerve centres does terminate in death. Now normal evolution and dissolution is the natural law of our existence, and our organisms—that is, of our higher intellectual centres—discharge their forces in virtue of the law of disintegration and reintegration, so that by the latter law these organs recuperate all they lose by emitting force. But should, from pathological cause, reintegration become arrested, the result will be mania in some stage from loss of equilibrium in the mental forces, loss of intellectual forces. Now so many of our vital organs are dependent for their motive forces upon the lower nerve centres that abnormal disintegration in them generally terminates in death, so that while abnormal disintegration in the higher centres leads to a loss of equilibrium in mental forces and consequent insanity. Abnormal disintegration of lower centres leads to death, if so be that it supplies force to a vital organ (lungs or heart for example), and paralysis, if to a muscle or tissue. All these facts you will learn by the clinical course of lectures you are about to enter upon. Keep always, gentlemen, before your eyes that in dealing with physical science there may be, and certainly is, great ignorance as yet, but there is no mystery. We have nothing to treat with, or of, but matter and its functions. Let us be only sure that structure is normal, then we will know that function is normal, and the consequence will be that conduct will be normal also.

When we consider the nervous system with regard to mind, as one of its functions, or forces, or phenomenon, we must remember that it is as much a circulating system as is the vascular system. The latter mechanism circulates the blood into every part of the animal economy by means of that great pump, the heart. So do the nerves circulate vital or molecular force into every part of the animal economy by that great ganglion, the brain, and all the lesser ganglia. The whole ganglionic

system has very properly been called the heart of the nervous circulation, and, reasoning from analogy, we are justified in concluding that any pathological defect of the nervous system, particularly in the afferent or efferent nerves, or in the higher nerve centres, which defect would in any way obstruct molecular circulation, must of necessity affect mind as one of the functions of the *materia cogitans*, and that such a cause would also affect some one or more of the function of any of the lower nerve centres. Not only that, but we have a right to expect that any irritation of the peripheral afferent nerves must derange the functions of their centres.

When there is such a large anatomical surface in such numerous nerve tubes and fibres for the circulation of molecular force, and when we consider the number of these nerves that have other functions, such as trophic and vasomotor, because of their union with the great sympathetic system, we are not surprised to find that there are so many different physical causes to derange the equilibrium of mental functions and cause mania ; nor, under the circumstances, can we be surprised at finding so many of the lower centres suffering in their varied functions. We cannot wonder at the various degrees of mania and its various psychological developments, and we must see how necessary is the history of a case and the necessity of a knowledge of all its physical symptoms, as well as that of conduct, to enable us to diagnose the locality of the nerve lesion in the *materia cogitans*, and to find out whether that lesion be the result of chemical or mechanical cause. It is only by attaining to this knowledge that mania can be treated scientifically ; indeed no disease, no more than mania, can be treated scientifically unless we know its somatic etiology. Treatment, under any other circumstances, is, as I have already said, empirical, no matter how successful it may be, and empirical treatment is sometimes very successful, yet it is not science.

I have pointed out the physical fact that the lower nerve centres are the first evolved and the highest organized, and the higher nerve centres the last evolved and lowest organized : that the lower centres are actually necessary for life, and the higher

for intelligence. Morphology teaches us that it is the same laws that govern the evolution of all animal organisms. The lower the animal organisms are, the fewer and more simple the nerve centres ; the higher the animal organisms, the more numerous and complicated the nerve centres, but the higher the functions of these centres. An animal without any intellectual nerve centres will have the higher instinctive, automatic and reflex centres ; that is, the functions of these centres will be of a higher order than will the same functions in an animal with high intellectual functions. All other things being equal, a woman is not, with all due respect for the sex, as highly organized, intellectually, as man ; but a woman's instinctive functions are very much higher than man's, so much so as to sometimes make it appear she was of the higher order of intellect. A woman instinctively will know there is danger, and guards against it, long before a man will discover it by his intelligence ; but this does not justify giving a woman the *same* high education as man—they are not fitted for it, socially, morally, intellectually or politically. There is no reason why they should not have as high, or even higher, education than man, but not the *same* : the difference in their organisms and their functions forbid it. The stations of the man and woman are two different stations, both equally honorable but not the same in the natural order ; both in accord with their physical organization ; both intelligent, but not the same intelligence.

A dog who, of the lower animals, it would appear, is the highest in intelligence next to man, but still much lower than man, will instinctively recognise danger before a man will recognize it by his intelligence. And as we descend from the dog to the lower grades of animal organisms, we find it to be a physical fact that the lower the functions of the higher organisms, the higher, comparatively, are the functions of the lower centres, or lower organisms. Let us take reproduction of species as the best and most familiar physiological proof, and we find the lower the organism the more prolific, so that from observation we have the homely term, "ill weeds grow apace."

From the foregoing facts, it is no very difficult thing to under-

stand, what I have more than once observed, that a man can be an immoral and criminal fool for want of intelligence, and, at the same time, in virtue of lower centres, whose functions are instinct and automatism, a smart and clever business man.

In speaking so much on the general physiology of the nervous system, it was that you might, in some degree, be interested as well as instructed, for I can conceive no more interesting subject to the medical student or medical man than the physiology of the nervous system, seeing that all our functions are in virtue of that system. If our functions be normal, it is because the structure of the nervous system is normal. All force that is subjective is through the nervous system. All that is objective, from whence we receive knowledge, is by the nervous system also. And although, properly speaking, that particular portion of the nervous system which constitutes the *materia cogitans*, no doubt, is the grey matter, the cortical portion, whether it may, or may not, have other functions, pathology has demonstrated the fact that wherever there is grey matter, whether covering the brain, the spinal cord or any other nerves or ganglions, in one form or another, there we find mind as a phenomenon of that matter.

Whether, as I have already said, mind be an entity or not, we do not know, and it is doubtful if we ever will know; but we are sure that we can possess no knowledge of it, except as a function of grey nerve structure. As I said in the opening part of this lecture, there may be mind in all matter, but we only can recognize it as a function of the *materia cogitans*. So it is with biotic life, or conscious sensation. We only find it in animal organisms as a function of the nervous system, as we find biological life with motion and apparent sensation as functions of vegetable organisms, and dynamic life in minerals. But consciousness we only know as a function of the *materia cogitans*. Dr. Mercer of London, England, one of the recognized physiologists of the day, speaking of the functions of man, says "his chief functions are to eat and to work. We work that we may eat, and eat that we may work. We cannot live without eating; and we cannot eat without working." Not a very high standard,

gentlemen, for that supposed God-like animal, man ; nevertheless, we have to swallow the description as a great physiological truth.

As to the diseases to which the nervous system is subject, their name is legion. The afferent or centripetal nerves and the efferent or centrifugal nerves are subject to all sort of lesions in every part of their course, both mechanical and chemical. The same is it with the sympathetic and vaso-motor nerves, and all the nerves of sense. And not only are not all these nerves subject to various forms of disease, but the same may be said concerning all nerve centres, whether their centres be situated in the cortex of the brain, medulla oblongata, or spinal cord. In fact, it is impossible for any one part of the human frame to suffer from any disease whatever without complication with some portion of the nervous system. You may rest assured, that to go through the names of all these different diseases and lesions will take more than one lecture. And here I would give you one warning, and that is, never to treat lightly the most simple lesion of a peripheral nerve, for such lesions are always dangerous, whether the cause be chemical or mechanical.

Remember that in animal organisms two laws are always going on at the same time, viz., evolution and dissolution, and that there should be an equilibrium between these forces, it is as necessary that we should have a normal vital circulation through the nervous system as it is to have normal blood circulation through the vascular system. Always bear in mind that, as medical men and physical scientists, in the treatment of diseases we know no mystery, but for every physical effect look for a physical cause.

Gentlemen, there are but few medical practitioners who, looking back to the days of their studentship, have not regretted opportunities lost that never returned ; something that they had left undone that they wished they had done, for the faults of youth are more of omission than commission. But once a man begins his medical practice, and to struggle with the world for his daily bread, he cannot go back again. I would, therefore, urge upon you not to neglect the opportunity now offered of

clinically studying nervous diseases, or the day will surely come when, if you do so, you will deeply regret it; and if the study of the nervous diseases is important, no less so is the therapeutical study of the medicine by which you expect to treat its diseases successfully. You must not only know the physiology of animal matter, but the physiology of vegetable and mineral matter. Then when you have diagnosed pathological defect in any part of the nervous system, you will be the better prepared to prescribe the most suitable medicine to restore the pathological organ to its physiological state of existence.

Gentlemen, you will, I regret to say, meet many men in the medical profession, as well as outside of it, who, ignorant of physical science themselves, will sneer at it, and try to turn you from the study of it, by speaking loudly about learning something practical, meaning thereby empirical treatment of disease. But if you would be scientific mediciners, you must be physicists, you must be men to study the physiology of matter in all and every degree of its stages, mineral, vegetable and animal, and then will you be truly scientific medical men. Then may we look forward, hopefully, for the time when the medical profession will be a truly scientific one, because it will be based upon physical science or natural experimental philosophy. And to the man of law, I would, with the highest respect, say, "Don't reject physical science, because it teaches you that every man is intellectually and morally what he is, in virtue of the functions of his physical or structural organization, but rather study it carefully, that you may be the better able to comprehend the causes of all the different effects that come under your observation in this world of uncivilized barbarians not governed by the natural law of the survival of the fittest, but the survival of those who know no law but that might is right, who are incapable of settling a constitutional question except by leaving the question to be settled by the arbitrament of the sword."

