AMERICAN
JOURNAL OF INSANITY,
FOR JULY, 1846.

ARTICLE I.

THOUGHTS ON THE RELATION OF PHYSIOLOGY TO
PSYCHOLOGY.

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I propose to show the connexion between the Physiology of the nervous system, and Psychology, and to establish the distinction between them. For want of attending to this connexion, Psychologists have lost sight of an interesting face of their science; for want of attending to this distinction, Physiologists have fallen into great confusion, and have been led into many absurdities and contradictions.

Physiology and Psychology embrace phenomena of different orders, and which are learned by different means. Hence they may be distinguished from each other. These two orders of phenomena are connected together, and to a certain extent are mutually dependent. Hence the two sciences have a point of contact, and it is important to examine this point, and see how they touch without becoming confounded.

By means of the five senses, we become acquainted with the external world. We find a substance having extension, figure, impenetrability, color, and exhibiting certain changes or movements, called phenomena. This substance which is external to us, which possesses these properties, and exhibits these phenomena, we call *matter*, and these properties and phenomena, we call *material*.

Our knowledge of the properties and phenomena of mat-

ter, and of their relations, constitutes physical science, or rather the physical sciences, for there are several. The divisions of the physical sciences depend on the differences in the properties and phenomena of the objects of nature, and on the impossibility of reducing them to one general principle. Thus, we find in living beings, phenomena which are different from those of dead matter, and it is impossible to reduce the one into the other, by any means of analyzing these phenomena we at present possess ; and hence we have a science of organized or living matter, and one of inorganized or dead matter. In like manner, secondary divisions are established.

But all these sciences agree in this, that the properties and phenomena they embrace, are learned by the five senses, that they belong to something external to us, and not to us, that this something has extension, figure, divisibility, exists in a certain place, moves, and is called *matter*. Hence, notwithstanding their differences, they are all connected together as physical sciences, or sciences of matter.

But physical science is not the whole of science. There are phenomena which do not fall within its domain. When I say, I think, I remember, I am angry, I am affirming the existence of phenomena which are real and certain ; as much so as when I say that this candle burns, or this pen falls. These phenomena are indeed those of which we are the most sure, for I might listen with patience to one who should attempt to persuade me that I do not see an object which seems to be before me, because my senses have already deceived me, but if one should undertake to persuade me that I am not angry when I feel that I am so, or that I do not will, what I suppose I will, his attempt would appear to me supremely absurd.

These phenomena of thought, will, &c., are then real. Besides this, they do not seem to have any relation to extent, or space, or movement from place to place ; they take place in *ourselves*, and not in that which is external to us. They are not learned by any of the five senses, for we do not see ourselves will, nor hear ourselves will ; nor can we

touch or taste or smell volition; they are learned by consciousness, an internal sense, which informs us of ourselves, and what passes in us, but which gives no knowledge of what is external to us, just as the five senses inform us of the external world, and what passes in it, but give us no knowledge of ourselves.

There are then phenomena, of the reality of which, we cannot doubt, which occur within ourselves, and not in that which is external to us, which have no relation to figure, or space, or movement, which are not learned by the senses, but by consciousness; and just as we say that one class of phenomena belongs to the external world, to a substance called *matter*, so we say that these latter phenomena belong to the internal world, to a substance called *mind*.

It is true, that it is by consciousness that we are made acquainted with the impressions made on the five senses, so that ultimately, all our knowledge of the external world is a matter of consciousness. In this case, however, we are conscious of impressions made on us from without, and which are irresistibly referred to something external to us, and between which and us, the senses have served as a medium; while in the case of the phenomena of thought, will, &c., we are conscious of what takes place, directly in us, without any reference to the external world.

The man who should shut up his five senses, and endeavor to find the external world, *matter*, by his consciousness, would be guilty of an absurdity, for consciousness, does not reveal to him this external world, except through the medium of the senses. So the man who should neglect his consciousness, and endeavor to find the internal world, *mind*, by his five senses, would be guilty of a like absurdity. It is true, that by the senses he might find the external manifestations of mind, but of the phenomena themselves he could have no idea without consciousness. When I see a man gesticulating in a certain manner, I conclude he is angry, not because I see his anger, for I see only his gesticulations, but by my own consciousness I know

what anger is, and how it manifests itself externally in me. Had I never been angry myself, I might have known that a man in certain circumstances, would execute certain movements, but I never could have had an idea of anger.

Since then, the phenomena of thought, will, feeling, &c., occurring within ourselves, and learned by consciousness, are real, they may be studied, analyzed, and their relations may be discovered ; that is, they may form the basis of a science, for to constitute a science, it is only necessary to have phenomena having fixed relations to each other. Psychology is the science which takes cognizance of mind, and its phenomena, as Physical science takes cognizance of matter and its phenomena.

To resume. There is then an external world of matter, the properties and phenomena of which are learned by the five senses, and the knowledge of this world constitutes physical science. There is also an internal world of mind, which is revealed to us by consciousness, and the knowledge of this world constitutes Psychology. The domain of Physical science is, then, the *external world, matter*. The domain of Psychology is the *internal world, mind*.

Such is the distinction between Psychology and Physical science. To deny the propriety of this distinction, we must either deny the reality of the phenomena of consciousness, or we must show that these phenomena do not differ from those learned by the senses. That is, it must be shown that those phenomena which we refer to the simple, indivisible substance we call *I*, are of the same nature as those we refer to the extended, divisible substance we call *matter*.

Whether ultimately, matter and mind may be proved to be one thing under different faces, whether a unity or third term may be found which will unite these two terms, is a question of metaphysics, of which the solution is not necessary for my present purpose. The great point I wish now to establish, is, that mind as we know it, is different from matter as we know it. If in the progress of science, one of

the two substances is to disappear, I doubt not, it will be mind which will swallow up matter, and not the reverse.

I have now shown the distinction between Physical science and Psychology; I proceed to show how they come in contact.

Physiology is a branch of physical science. It embraces the phenomena of organized matter, which are learned by means of the senses, and which even when studied in our own bodies are recognised as belonging to something external to us, and not as belonging to *us*. So far as these phenomena relate to nutrition and reproduction, there is no danger of any confusion, but when we come to the phenomena of animal life, or of the nervous system, then we must proceed with great caution, if we would avoid the errors into which physiologists have been, and still are, so commonly led.

The phenomena of consciousness, psychological phenomena are, in many cases, perhaps in all, accompanied by movements in the nervous system. These movements accompany, but do not constitute psychological acts. These acts take place, although we do not know there is a nervous system, and are always very different from anything we can conceive as occurring in this system. If anger, for example, is accompanied by some movement or change in a particular portion of the grey matter of the cerebral hemispheres, we can not conceive that this movement or change is anger. Take any conceivable change in this matter, any movement molecular or in mass, and it would appear most absurd, to call this movement anger. It would appear absurd because we cannot conceive of anger as a material movement which is cognizable by the senses; it is a phenomenon of a different order, cognizable by consciousness. That it should be accompanied by a material movement as its cause or its effect, is a fact which we may attempt to prove, it bears no absurdity in its face; but that it is this material movement, is an assertion so absurd that common sense at once rejects it.

We have now come to the point of contact between Psychology and the Physiology of the nervous system, to the confines of the material and spiritual world, and we must proceed in our investigation with caution.

Let us take the case of a sensation, analyze it into its elements, and see what belongs to matter, what to mind.

I lay my hand on the table, and feel it. This is a sensation. This sensation is a mental phenomenon; so little apparent connection has it with matter or a nervous system, that many persons experience such sensations all their lives, without knowing that there is a nerve, or what it is. But we can demonstrate that besides this sensation, this mental phenomenon, there are material movements without which it can not occur. Thus, if the nerve is divided, no sensation occurs when the impression is made on the hand, and by a series of investigations, we find that an impression has been made by the external object on the extremity of one or more nervous fibres, that this impression has traveled along these fibres to some point in the interior of the brain which can not be determined in the present state of the science, and when it has reached this point, the sensation is produced. Here are two things, a nervous transmission and a sensation. The first a material, the second a mental phenomenon. The nervous transmission causes the sensation, but is not the sensation; it is analogous to the transmission of electrical currents along wires. Suppose now that an electrical current, in its passage, finds a combustible matter, it will set it on fire. Here the current causes the combustion, but it is not itself combustion, so nervous transmission causes sensation, but is not sensation.

Suppose we could make the change which occurs in the nervous fibre, or in the grey matter into which it plunges, obvious to the senses, and then, that we lay bare the parts in a living animal and excite this movement, and say to a spectator, look at this movement, change, whatever it may be, *this is sensation you are seeing*: would it not appear absurd? Would not the man, thus addressed, say, it is impossible for

me or any other person to see or feel in any way the sensation of another animal ; I see a nervous movement, and that may be the cause of the sensation ; but the sensation itself can only be felt by the patient, it is a matter of consciousness, and I can not be conscious of what is going on in another, though I may see all the material movements or changes in his body.

One who had not read books of Physiology, who was ignorant of all the confusion which arises from not distinguishing between nervimotion, or whatever else we may call the material movements of the nervous system, and mental acts, would suppose I was wasting time on a point sufficiently clear. But those who read books of physiology, even the most modern, who find sensibility attributed to the nerves, and who have noticed all the floundering it causes among writers on the reflex action of the spinal chord, some of whom talk of sensations of which the individual is not conscious, will agree with me as to the necessity of reforming physiological language, and it may be, physiological science on this point.

If we take the case of a voluntary movement, we find the same elements entering into its production, but in an inverse order. We have the volition a mental phenomenon, acting upon nervous fibres in the brain at a point, which like that where sensation is produced, cannot be determined with certainty ; the impression here made, is transmitted along the fibre to the muscle or muscles, and the voluntary movement succeeds. Here the mental phenomenon precedes the nervimotion, instead of following it, as in sensation.

Volition is so manifestly an act of the mind, and not a nervous action, that physiologists have avoided the error of considering volition as a property of the nerves, though there would be the same propriety in it, as there is in ascribing to them sensibility.

Not only is it true of sensation and volition, that they are connected with certain nervous movements, either as cause or effect, but the same thing appears to be true of all the

mental operations. Various facts which are sufficiently familiar to all physiologists, demonstrate that the mental operations are under the influence of the cerebral hemispheres, and are perverted or suspended when these nervous masses are diseased or destroyed. Still we must carefully bear in mind the distinction between the nervous movements and the mental operations, at the same time that we admit their connexion.

As to the mode of the connexion between the mind and the body, and how the one acts upon the other, it would be unprofitable here to speculate. Descartes, who was one of the first who clearly established the distinction between the substance which thinks, *mind*, and the substance which is extended, *matter*, found it impossible to frame even an hypothesis of their mode of union, and in a kind of philosophical despair, resolved it all into a miraculous effort of God, a *divine assistance*. Leibnitz invented his hypothesis of the *preestablished harmony*, according to which the nervous movements and the mental operations correspond, but without any relation of cause and effect. Imagine two parallel movements, one occurring in the nervous system, and the other in the mind, and so arranged that they shall always correspond in time, and you have the view of Leibnitz of the mode of union of the soul and body. Hence, when I execute a voluntary movement, it is not the volition which causes the movement in the nervous fibre, but this movement occurs at the same time with the volition; and so sensation occurs in the mind at the same moment that the impression is made on the nervous fibre.

Others again, seeing that so long as this duality was admitted, no explanation of the reactions of mind and matter could be possible, have endeavored to get rid of it. Some have denied the existence of mind, and have made thought an attribute of the substance matter. These are the materialists. Others have made matter only a mode of manifestation of mind. These are the spiritualists. While a third class have endeavored to find a third term which should include

both matter and mind. Such for example is the system of Spinoza.

It is not necessary for Physiologists, nor even for Psychologists, to attempt the solution of these problems of transcendental metaphysics, problems which are so vast, so difficult of solution, that no one metaphysician has as yet been able to seize more than one of their faces. For practical purposes, we have a task more humble, but more easy. We have to study, not the nature of the two substances nor the nature of their relation, but this relation itself as it manifests itself to the senses and to consciousness. The great questions for us to answer are these: what nervous movements correspond to given mental acts? what is the mechanism of these movements? and how are the mental acts affected by changes in the nervous system or in the rest of the body? Without undertaking to explain how an impression transmitted along a nervous fibre gives rise to a sensation or is accompanied by a sensation, we study the different elements necessary for the production of sensations, and the modifications of sensation produced by changes in the nervous fibre. So of the other mental operations. We can not explain how it is that the instincts or the intellectual acts should be connected with nervous movements in the grey matter of the hemispheres, but we may study the conditions of this grey matter necessary for the healthy manifestation of these acts.

Cabanis appears to have been the first who conceived the idea of studying the connexion between the moral and physical nature of man, not as a question of abstract metaphysics but as a matter of fact to be settled by observation and experiment. His work on the *Rapports du moral et du physique*, does indeed attempt a sort of solution of the metaphysical question by denying the existence of mind, and this is the portion of it which is the weakest and most amenable to criticism, but to him at least belongs the glory of having conceived thus clearly the problem of their relations as matters of fact.

To resume. The Physiology of the nervous system embraces all the facts in relation to the movements, or changes, which occur in the nervous matter. It is a science of facts, cognizable to the five senses, and uses the same modes of investigation as the other physical sciences.

Psychology is the science of mind. It is founded on facts of consciousness which are not cognizable to the senses. It embraces all the mental operations, which are very different from changes in nervous matter, and hence Psychology is not merely a chapter of physiology, but a separate and independent science.

But there is a connexion between nervous movements and mental acts, the nature and mode of which is unknown. The study of the facts relating to this connexion between man's physical and spiritual nature, constitutes a middle ground on which the Physiologist and Psychologist meet. The Psychologist must come from the exclusive study of facts of consciousness, in order to understand many of the influences to which they are subjected, and the Physiologist in tracing nervous movements, comes at last to facts of consciousness, for the comprehension of which he must look to Psychology.

ARTICLE II.

ON IMPULSIVE INSANITY.

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Communicated to the Provincial Medical and Surgical Association, at the Anniversary Meeting, held at Sheffield, July 30th and 31st, 1845.

The functions of the brain and nervous system in health, and under disease, confessedly constitute an abstruse and