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A. T. Ormond

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PHYSIOLOGY AND MENTAL SCIENCE.

ON SOME BEARINGS OF THE FORMER ON THE LATTER, BY
PROFESSOR A. T. ORMOND, OF THE UNIVERSITY
OF MINNESOTA.

[ABSTRACT.]

Man is a concrete of body and mind. Bodily functions from the subject matter of physiology, mental functions of psychology. The middle region of relation between the physical and mental has been the subject of speculation for centuries with very meager results. Des Cartes, the founder of modern speculative philosophy, gave some attention to the relation of body and mind, and decided that the point of contact is the pineal gland. After Des Cartes the opinion became general that the nature of the relation is a mystery. Within a century and a half a new science to which the name of physiological psychology has been given, has come into existence. Its problem is the relation between mind and brain. David Hartley, an English physician, was its founder. He looked into the relations of the nervous system to the mind, and concluded that all thought is accompanied by nerve vibrations on which it depends. Hartley is sometimes unjustly styled a materialist. A little later the French physician, Cabanis, drew the materialistic conclusion that thought is

merely a secretion of the brain. The German materialists of whom Büchner is the exponent, taught that mental action is a function of the brain, just as sound is a function of the steam whistle. These doctrines were too *crass*, however, to satisfy the scientific mind. Within the last quarter century W. B. Carpenter, Maudesly and other English physiologists, and in Germany, Helmholtz, Wundt, Lotze and others scarcely less noted, have been making the relations of body and mind, and especially the physical conditions of mental action, a subject of careful enquiry. The result is a large mass of valuable, and in some instances, surprising facts. They have proved that physical conditions are much more intimately related to mental action than was generally suspected. The mental and physical seem to be interwoven into one web. They have found the mental functions environed, so to speak, with a network of mechanical laws and relations. It is strongly argued that every mental act has its objective counterpart in some molecular motion on which it depends. From the physical side, which is the outside, man seems to be a complete machine, which may be set in motion and produce or reproduce in an automatic manner. The parallelism between mental action and molecular motion seems to be so complete that were it possible to photograph the nerve movements accompanying mental action, we might obtain a complete physiological alphabet of thought. It has also been shown in general that whatever affects body, affects mind and that disturbances of special organs of the brain are followed by special disturbances of the mental functions. The investigators all agree that the upper brain, or *cerebral hemispheres*, is the special organ of mind. Dr. Ferrier in his "Functions of the Brain," gives a long series of experiments which have convinced him that the *cerebrum* is the seat of sensation, that it is divisible into three main tracts, the posterior, medial and frontal. The sensory tracts lie in the posterior

region, the motor in the medial, while the frontal tract is, according to Ferrier, the intellectual region, *par excellence*. These conclusions are not borne out by all the German investigators, and perhaps the only settled point is that the *cerebrum*, as a whole is the special organ of mind.

The general results reveal a very intimate connection between the nervous system and mental action. The burning question is, how are the facts to be explained? Alexander Bain extends the principle of the correlation of forces over the sphere of mental phenomena, and seeks by means of it, to explain the relations between body and mind. He concludes that mental forces are simply transformed physical forces, and that consciousness is therefore the reverse side of molecular motion. Hence, mental laws must be ultimately identical with the laws of nerve action. Dr. Maudesly, the English physiologist, takes substantially the same view, reducing psychology to a species of neurology. The result is that nearly the whole sphere of psychology has been usurped and consciousness is given little or nothing to do. The tendency of these writers is toward a mechanical explanation of mind. When mental action is merged into physical, the human being begins to look and act like an automaton. Prof. Huxley admits this, and with his usual candor, states his belief that man is a piece of machinery whose consciousness is a spectator that observes the working of things, but has no power to influence their movements.

Many voices have been heard on the other side and the powerful influence of mental upon bodily conditions has been urged as proof that mind is not a mere function of brain and nerve. It is claimed that the will has power to initiate mental processes for which no antecedent nerve motion can be discerned. It is pointed out that to reduce consciousness to the rank of a mere spectator, is to contradict its own testimony. And the impossibility of discovering any common

attribute of molecular motion and consciousness is cited as proof that the grounds are not quite sufficient for assuming the correlation of molecular and mental phenomena.

The outcome of these physiological inquiries seems to be that we are brought face to face in the sphere of mind with the same problem that confronts us in the universe at large, namely, the relation of mechanism to power or energy. Looking at nature from the outside, we see a system of mechanical movements proceeding with the regularity of law. All natural phenomena can be expressed in mechanical formulæ. But when we ask, is there anything deeper than this in nature? All science and philosophy answer, yes. Science founds law on energy, and Mr. Spencer asserts as the most certain fact of knowledge, the existence of an underlying Power of which all nature is a phenomenon. To one who reflects it will appear that the same answer must be given regarding the mechanical phenomena of that *microcosm*, man. From the outside all seem to be nerve function and molecular motion. But deeper than this mechanism in man, as in nature, there is a power which energizes behind the law and of which the law is the index. What then is the relation of consciousness to the power that energizes in man? Physiology enables us to state this question but cannot give the answer. A fundamental and inexpugnable element in consciousness is the sense of power. Expunge that and you make a radical change in consciousness. It is difficult to conceive how the sense of power could arise were consciousness a mere spectator, or how we could come into possession of our idea of power which we apply as a category to the phenomena of nature. The most reasonable explanation seems to be that we have the idea of power because we are primarily conscious of power. It is the energizing soul within the mechanism that is conscious of itself and its activities. If this be true, the utmost stretch of mechanism

is as little inconsistent with a living soul in man as it is with an energizing power in nature.

Physiology has shed a flood of light on the border land between the physical and the mental. It has brought to light and emphasized the dependence of mind on bodily conditions, and it has made valuable contributions to the psychology of the senses. Its temptation is to become one-sided and to fall into materialism. The physiologist who investigates mental phenomena from the physical standpoint needs to be a philosopher with sufficient breadth to keep both sides of his problem constantly in view.