

**ON MEMORY AND THE  
SPECIFIC ENERGIES OF  
THE NERVOUS SYSTEM**

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On Memory and the Specific Energies of the Nervous System by Ewald Hering

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# ON MEMORY

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## THE SPECIFIC ENERGIES OF THE NERVOUS SYSTEM

*Karl* BY *Konstantin*  
PROF. EWALD, HERING

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## MEMORY AS A GENERAL FUNCTION OF ORGANISED MATTER.\*

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WHEN a scientist leaves behind him his own special province of inquiry, to make an excursion into the realm of philosophy, he may cherish the hope of solving the great problem which underlies the minor questions to which he has devoted his life, but he must be prepared for being secretly discredited with those of his colleagues who still remain quietly at work with the subjects of their specialty, and at the same time must expect the mistrust of the rightful representatives of the empire of speculation. He runs the risk of losing his reputation with the former and of gaining nothing with the latter.

The subject for which I ask your attention on this occasion is a most alluring one ; but in accordance with what I have just said, it is not my intention to abandon the domain of natural science to which my studies have been devoted, but only to attempt to reach

\*An address delivered before the Imperial Academy of Sciences, at Vienna, May 30, 1870.

a higher ground from which we may enjoy a freer and more general survey.

It will seem in the course of this paper as though I am not always faithful to this purpose; for I shall often have occasion to tarry in the province of psychology. Consequently, for my own justification, allow me to point out the extent to which psychological inquiries form, not only an allowable, but also an indispensable accompaniment of physiological research.

The animal human organism with its material mechanism is the subject of physiology. But consciousness is a simultaneous datum. Besides the moving of the atoms of the brain according to certain laws, the inner life of our soul is woven of sensations and conceptions, of feeling and will.

Everyone experiences this in himself; and it is a fact also which beams forth from the faces of his fellow-beings. It breathes in the life of all higher organised animals, and even the simplest creatures bear some vestiges of it. Who can fix the limit of empsychosis in the empire of organic nature?

In the face of such a dual aspect of organic life what can physiology best do? Shall science be blind-folded on the one side, in order the better to comprehend the other?

As long as a physiologist is a mere physicist—and I use the word physicist now in its most comprehensive sense—his method of inquiring into organic nature is altogether one-sided. But it is justly so. As a crystal



is to the mineralogist, so to the physiologist of this class is a man or an animal—a mere lump of matter. An animal feels, of course, pleasure and pain, and with the material phenomena of the human body mental emotions are connected; but that is no reason why a physicist should take a different view of the corporeal existence of man, who to him remains a compound of matter subject to the same irrefragable laws as stones and plants; like a machine, his motions are causally connected with each other and dependent upon their surroundings.

Neither sensation nor conception nor conscious will can form a link in the chain of the material processes of which the physical life of organisms consists. When I answer a question, the initial material process is conducted from the organ of hearing by sensory nerve-fibres to the brain, and must pass through it as a material process in order to reach the motor nerves of the organ of speech. It cannot, after having arrived at a certain spot in the brain, enter into something immaterial, in order to be re-transformed, in some other place of the brain, into another material process. A caravan in the desert might just as well enter the oasis of a mirage, to return thence after a refreshing rest into the actual desert.

Such is the physiologist, so far as he is a physicist. He stands behind the stage and carefully observes the working of the machinery and the movements of the actors, but he misses the meaning of the action, which

a spectator readily understands. Now, should a physiologist never be allowed to change his point of view?

True, his object is not to understand a world of concepts, but a world of realities. Nevertheless, if now and then he changes his point of observation and looks at things from the other side, or at least accepts from trustworthy observers the results of their experience, he will derive much benefit from such an attitude and will better comprehend both the apparatus he is studying and its methods of working.

For this very reason psychology is an indispensable auxiliary of physiology. If the latter science has hitherto not made much use of the former, it has not been wholly the fault of physiology. Psychology has only lately worked her fields with the plough of induction, and it is only in such a soil that the fruits can be raised for which the physiologist has most need.

The neurologist is thus placed between the physicist and the psychologist. The physicist regards the causal continuity of material processes as the basis of his inquiry; the thoughtful psychologist seeks for the laws of conscious life: and in so doing works according to the rules of inductive methods, assuming the validity of an inalterable order. Now, if the physiologist learns from simple self-observation that conscious life is dependent upon his bodily functions, and *vice versa* that his body to some extent is subject to his will, he has only to assume that *this interdependence of mind and body is arranged according to certain laws* and the link

is found which connects the science of matter with the science of consciousness.

Thus considered, phenomena of consciousness appear to be functions of material changes of organised substance, and *vice versa*. As I wish to avoid all misconceptions, let me mention (although it is included in the term function) that the converse of this assertion means that material processes of the cerebral substance also appear to be functions of the phenomena of consciousness. For if two variables are dependent upon each other, according to certain laws, a change of the one demanding a change of the other, and *vice versa*, the one is called a function of the other.

This does not mean that the two variables, matter and consciousness, are connected with each other as cause and effect; for we do not know anything about that. Materialism explains consciousness as the outcome of matter, idealism takes the opposite view, and a third position might postulate the identity of spirit and matter. The physiologist, as such, should not meddle with such questions.

Aided by this hypothesis of a functional connexion between spiritual and material facts, modern physiology is enabled to bring the phenomena of consciousness within the domain of its inquiry, without leaving the *terra firma* of scientific method. The physiologist, as a physicist, observes how a beam of light, a wave of sound, or a vibration of heat affects the organs of sensation; how they enter the nerves, are trans-