tion and even death of the animal after actively using the organ for some time,* and the fact that no other origin of it has been pointed out, would seem in some degree, to justify us in coming to this conclusion.†

If we pass now to heat we shall find exactly the same relationship prevail; there can be no doubt but that our perceptions of heat and cold depend upon a conversion of heat into nerve-force taking place in the peripheral extremities of the nerves which transmit such impressions. The argument for the establishment of this, and which would apply in all similar cases, would take something of this form, Given a force applied to the extremity of a nerve, and *then* a force of a different character passing along that nerve. Either (1) the subsequent force, which passes along the nerve must be generated *de novo*—i. e., created; or (2) it must have been roused from a dormant state; or (3) it is the resultant by conversion of the force which has in any case excited it. Now we have seen reasons above for rejecting the two first conclusions, it only remains to us therefore to accept the last explanation.

Heat applied to a nerve of special sense produces the sensation that is caused by a normal stimulus of that nerve through its special organ. Thus, applied to the optic nerve, flashes of light are seen; to the auditory, noises heard, and so on; applied to the course of a motor nerve it produces motion in the muscles supplied by it; in all cases, causing a current of nerve force to pass along the nerve to which it is applied as the first step in its operations.‡

Conversely, there are phenomena that make it highly probable that although we must attribute most of the heat developed in the human body to *direct* chemical action, some of it may be derived from a conversion of nerve force into it. In this way we may account for "the sudden elevation of temperature that occurs under the influence of nervous excitement, whether general or local; the equally sudden diminution that marks the influence of the depressing passions, and the rapid cooling of bodies of which the nervous centres have been destroyed, notwithstanding that respiration is artificially maintained, and the circulation continues.||"

Chemical re-agents applied to nerves in their course will produce all the effects which we have seen to follow the application of heat and electricity;§ while, as the converse of this, it is well known that nerve influence may change the chemical properties of the secretions in the most marked manner, and even probably produce chemical alteration in the blood itself, or the solid parts of the organism;¶ and that it excites chemical change in the muscles there can be no doubt.

We have a striking instance of the conversion of light into nerve force in the phenomena of sight, the mode of which conversion being a matter of little im-

* Encyclopœdia Britannica, 8th edition. Art. Electricity.

† Compare Carpenter's "Principles of Comparative Physiology," pp. 408–471.—Encyclopœdia Britannica, 8th Edition, Art. Electricity; and Carpenter on the "Mutual relation of the Vital and Physical forces," Phil. Tran., 1850.

‡ Carpenter, Phil. Tran. 1850.

|| Carpenter, "Principles of comparative Physiology," p. 401; see also his "Human Physiology," pp. 417 et seq.

§ Carpenter, Phil. Tran. 1850.

¶ Carpenter, "Human Physiology," pp. 740–746.