

their mode of action in producing it. By the light already shed on this subject it is justifiable to believe that essential fevers result in most cases from the introduction of a poison into the system, and that its presence initiates that complexus of morbid phenomena known as essential fever. As heat is only a mode of motion, all abnormal elevation of temperature in the animal organism must be the result of excessive motion therein, and is only an index of morbid processes taking place in disturbed cystogeny and retrograde metamorphosis.

An eminent English writer, whose name I forget, believes the heat of fever to be the result of intensely rapid cell generation; but as the elevation of protoplasm to more complex matter is a synthetical process, heat would be used and not produced in accomplishing it. It may be, however, that cells thus rapidly formed, being ephemeral in their nature, undergo equally rapid disintegration, and are decomposed into substances much simpler in chemical composition than the protoplasm from which they were formed, and that the excess of heat so produced over the amount used in the cell formation accounts for the increased heat observed in the pyrexial state. If to heat so produced be added that resulting from rapid retrograde metamorphosis of tissue previously formed, a plausible explanation of the rise in temperature is reached. In whatever way produced, the abnormal temperature becomes the chief factor in a chain of morbid action always injurious and often dangerous.

I have here the heart of a turtle recently removed from the body. It will be observed that when heat is applied by holding the plate over a lamp the pulsations become more frequent, and that placing it on a piece of ice causes the heart to beat more slowly. Placing it again over the lamp the pulsations immediately increase in frequency, and again changing it to the ice the pulsations fall as before. This phenomenon was first observed by Dr. Brunton, and suggested to my mind the propriety of instituting a series of observations on the action of cold applied to the surface of the human body during febrile action.

The result of these observations has convinced me that in the external application of cold we possess an agent that merits far more attention from the profession than it receives.

Although we cannot apply heat and cold directly to the human heart, as has been witnessed in the experiment just made, we can deprive the blood in the superficial capillaries of its heat, and send it back in a cooler stream to the laboring and exhausted heart, and so produce a similar effect to that produced by cold upon the heart of the turtle. The nerves of the heart are not alone susceptible to the influence of heat and cold, but every organ under the control of the great sympathetic responds to the influence of these agents. Nor is this all: it will be shown in this paper that they are also capable of producing by reflex action through the cerebro-spinal system the most marked effects upon the organs normally under volitional control.

The sequence of morbid processes in fever seems to me to be as follows: 1st. The generation within the body of the introduction from without of a poison; 2nd. Excessive molecular motion in tissue undergoing disintegration as a result of the presence of such poison. 3rd. The transmission of the resulting heat to nervous centres by the sympathetic filaments to their ganglia, by afferent nerves to the centres of the cerebro-spinal system, and to both by the blood. 4th. Reconversion of heat into motion, as seen in increased functional activity of the heart, lungs, skin and some other organs, and in some cases in the violent explosions of force as manifested in convulsions of the voluntary muscles.

It will be found on examination that the successful treatment of fever has for its object the arrest of one or all of these diseased actions. We attempt to eliminate the poison that has initiated the train of morbid action, or, failing to do so, we try to arrest the undue metamorphosis of tissue by diminishing the oxygen-carrying power of the blood. We try to allay reflex action in the nervous tissue, or we endeavor to convey from the body the excess of heat generated.

If we succeed in eliminating the poison, or in neutralizing it, the patient is cured, and our aim accomplished, but from the nature of the poison we are often unable, in the present state of medical knowledge, to do either, and so excessive molecular motion goes on, heat continues to be generated in too great amount, and we have no alternative but to interpose obstacles to the passage of oxygen to the tissues.