

Experimental Researches on the Regional Temperature of the Head, under Conditions of Rest, Intellectual Activity and Emotion. By J. S. LOMBARD, M.D., formerly Assistant Professor of Physiology in Harvard University, U.S. London: A. K. Lewis, 1879.

Experimental Researches on the Temperature of the Head. By J. S. LOMBARD, M.D. London: A. K. Lewis, 1881.

The researches undertaken by Dr. Lombard are obviously of great interest and importance to the medical psychologist.

Dr. Lombard finds that two conditions are essential to the production of heat sufficient to be shown on the head; 1st, the work must be continuous for some minutes; 2nd, the mind must be applied with considerable intensity.

It is often impossible to detect any change of temperature in the heads of those who work *leisurely*. The addition of certain figures would represent a certain expenditure of force, whether slowly or rapidly performed, the total production of heat being the same in both cases. In the slow addition, however, the production of heat per unit of time will be too small for detection.

The author thus describes two modes of experimenting, considered without special reference to the comparative effect of different regions or sides of the head: 1, to affix one pile to the head, and another with its current opposed to that of the first, to some other part of the body—the thigh, for example—thus obtaining the difference of temperature between the two parts. 2, to apply one pile to the head, as before, and to use an opposing current of constant strength sufficient to keep the spot of light of the galvanometer on the scale when the pile upon the head is in action. Dr. Lombard finds that the temperature of the thigh often falls during prolonged mental exertion, sometimes slightly, at other times very markedly. Contraction of blood-vessels under vaso-motor influence is set down as one cause of the fall of temperature, as occurs according to Mosso during mental exertion, in the forearm. (“Archives de Physiologie,” 2me série, t. iii., p. 177.)

In regard to different regions of the head, it appears that intellectual work causes a rise of temperature in all anterior, middle, and posterior regions of the head, that the rapidity and degree of this rise are different in the different regions; that the kind of work which affects one region in the

greatest or least degree, affects similarly the other regions, and that, in the particular spaces examined, the order of the regions with regard to both degree and rapidity of rise of temperature is first, the Anterior, secondly, the Middle, and thirdly, the Posterior region. Again, in the particular individual experimented upon, the greatest effect was produced by composition; the next greatest effect by rapid arithmetical computations; and the least effect by making of notes. It must be added that exceptions to these general conclusions occur; thus, the anterior region does not invariably show the highest rise of temperature.

Other experiments show that, in the majority of cases, in all three regions, the greater rise of temperature, in intellectual work, occurs on the left side; the percentage being, *left* side, 66·24; *right* side, 19·23; equal 14·42.

The emotions are reduced to experimental control with most difficulty. It is fortunate that some persons can arouse, almost voluntarily, certain emotions by the reading or recitation of appropriate pieces. Mere mechanical reading fails to produce any effect. Recitation to oneself causes a higher temperature than recitation aloud.

Emotion shows its influence on the temperature of the head more quickly and more decidedly than that of intellectual work. Like intellectual work it causes a rise of temperature in all regions of the head; there is less difference in the different regions, but the order of the regions is the same. The rise of temperature is higher, in emotional activity, on the left than the right side, being 60·41 p.c., while 21·52 are in favour of the right side, and 18·05 in favour of equality of the two sides.

Dr. Lombard believes that in both intellectual and emotional activity the higher degrees of rise of temperature on the head are in part due to vascular disturbance.

How far do the temperatures of points of the outer surface represent those of cerebral tissue lying directly beneath them? The reply the author gives is as follows:—There is no certainty that the relative temperatures of small subdivisions of the outer surface represent exactly the relative temperatures of the underlying tracts of brain-surface, but it is highly probable that in the case of *larger* areas, a definite relation exists between the two classes of values; hence the inference, that taking the rise of temperature as the best available measure of functional activity, the relative elevations of temperature of areas of a certain size of the outer

surface, during mental exercise, represent, with considerable correctness, the relative degrees of functional activity of the corresponding underlying portions of brain-surface (p. 209).

The results as regards the temperature of the two sides of the head differ from Broca, Gray, Maragliano and Seppilli, who held that the left side has *always* the highest temperature. Dr. Lombard, assisted by Dr. Haynes, subsequently made a number of observations, recorded in the second volume at the head of this review. Dr. Amidon, of New York, having published a number of experiments, entitled "The Effect of Willed Muscular Movements on the Temperature of the Head," and having attempted to show not only that these movements cause elevations of temperature at the surface of the head, sufficiently marked to be capable of detection with thermometers, but also that the contractions of different muscles affect the temperatures of different well-defined areas of the integument of the head—each muscle, according to him having a special thermal centre in the cortex, the temperature of which is increased when the muscle acts, in a degree sufficient to produce a change of temperature in a circumscribed area, appreciable by the thermometer—he mapped out twenty-five districts on the head corresponding to as many muscles.

Our author's researches have not confirmed his conclusions. They indicate that the changes of temperature are most probably seated in tissues external to the brain, and have no immediate connection with cerebral action. The causes were found to be generally obscure, only some of them being accounted for by changes of the temperature of the air and alterations of the general circulation. Of 81 results, only 3 could be construed as affording evidence of a rise of temperature due to muscular contraction *per se*; indeed, muscular movements seemed rather to cause a fall of temperature, such cases being five times as numerous as those in which a rise of temperature prevails. MM. Bert and Franck have also failed to confirm the conclusions of Dr. Amidon.

It is granted, however, that in a certain number of cases, the muscular movements in some way cause a disturbance of the head-temperature, but in what way is not yet clear.

With regard to the relation between the temperature of the air and that of the head, elaborate observations were subsequently made by Dr. Lombard, and while there appears to be a general relation between them, the fall in that of the head is slight compared with that occurring in the air, the

maximum of the former being 1.6° C., while the latter at its greatest, is 11.9° C.

We have for the most part given the conclusions arrived at in these works in the words of the author, interspersed throughout the papers. It would have been a convenience to the reader had there been a brief *résumé* at the close. The works themselves must be read to be understood. The publisher deserves credit for having issued them with scant probability of their having the circulation which they merit, and which would make them remunerative. The labour of the author is meritorious and must have been great.

Leçons Orales sur les Phrénopathies, &c. Par J. GUISLAIN.
2me Edit, publiée par les soins du Dr. Ingels. Gand:
1880.

We welcome a new edition of this excellent work, and are glad that the lot of editing it has fallen into such capable hands as Dr. Ingels'. Our only occasion for regret is that he has not indicated the paragraphs which are additions by himself to the original work, "necessitated by the progress of Science." It is true that if they are supposed to differ from the views held by Guislain, they are given in a note. No doubt Dr. Ingels has most conscientiously done this work, but the incorporation of new matter, without indications, destroys the historical unity of the book. This remark does not apply to the additions which consist of materials found among the author's papers after his death. Belgium has just reason to be proud of Guislain. He was the greatest clinical observer and teacher of his day. He began at the right end—observation. His graphic descriptions are unsurpassed. He regarded the study of mental disorders as the most arduous of all. He spent ten years in examining patients during life and after death; ten others he spent in reflecting upon what he had observed. It was only during the latter, he tells us, that he learnt how to cure. But Guislain was not only a physician, observing and treating the insane. He was a reformer. His influence must have been great in inaugurating a change in the condition of the insane in Belgium. What that condition was may be gathered from his statement that they were the object of an infamous traffic; that they were immured and forgotten in dark prisons, that they were looked upon as animals, to be pro-