

chief vaso-motor centre is in the medulla oblongata, with probably lesser centres in the spinal cord. These are among the well-authenticated facts of recent physiology. It is in determining the action or play of this mechanism, that I have the temerity to claim that our physiologists have made an "unscientific use of the imagination." The theory of the text-books is that when the influence of the vaso-motor centre is cut off from the arterial muscle in any way, hyperæmia of the arteries results. Thus in destruction of the nervous centres by the operation of "pithing"—as a result of section of the spinal cord just below the medulla, and on section of the chief vaso-motor nerve trunks, in the body or viscera, it is claimed that the corresponding arteries are more or less dilated. Dr. Burdon Sanderson contents himself with stating that under these circumstances, "the arteries are relaxed," and again, that they "become permanently larger" (a). Other physiological teachers, such as Prof. Kuss, say that here the arteries are "dilated," while Dr. Sidney Ringer, in his excellent "Therapeutics," has it that "the arteries remain widely dilated" (b). We shall presently see how far these statements are justified by the facts.

SECTION OF THE CERVICAL SYMPATHETIC.

To M. Claude Bernard and Dr. Brown-Sequard we are largely indebted for what is known on this subject, as observed by them in the famous experiment on the cervical sympathetic. Dr. Brown-Sequard enters into the details at great length in his "Physiology and Pathology of the Central Nervous System." Yet nowhere in this work, in regard to this or any other section of cord or nerve, does he once assert that the arteries are dilated. In the pages devoted to it he refers to the contemporary experiments on this subject by Waller, Donders and his pupils, by Kussmaul and Tenner, Moritz and Schiff, yet he makes no mention of an allusion to dilated arteries by any of these eminent observers. This is surely significant. With him it was always "the blood vessels" which are "paralyzed" and "the blood vessels" which are "dilated." He says that "the hanging down of an animal, by holding it up by its hind legs, in producing a congestion of the brain, produces very nearly all the effects of this section" (c).

(a) Hand-book, pp. 245-256.

(b) 6th Amer. Ed., p. 312.

(c) *Ib.*, p. 143.

From these considerations it will be evident, first, that it was by no means apparent—was indeed a matter of great difficulty to determine accurately what particular "vessels" were enlarged, hidden as they mostly were beneath the skin and its subjacent tissues. Nay, it is not too much to say, that the statement that it is the arteries that are enlarged is purely hypothetical, and not based upon an actual demonstration of the facts. Secondly, it will be also evident from the statement just quoted from Dr. Brown-Sequard, that venous hyperæmia, the result of the blood being forced out of the arteries by their partial contraction, "very nearly accounts for all the effects of this section." The truth of this will not only appear from what is to follow now, but from the effect of other sections to be noted. Notwithstanding an increased afflux of blood, and consequently a relative elevation of temperature, with heightened sensibility, "the intimate acts of nutrition appear to be modified in nothing. . . . Nor does it appear that this hyperæmia, however intense or prolonged it may be, has ever the effect, save under exceptional circumstances, of determining by itself the development of inflammatory action" (d). This could hardly be the case if the hyperæmia were arterial.

Among the effects of this section on muscles, as recorded by Dr. Brown-Sequard, are contraction of the pupil, retraction of the eye-ball, partial closing of the eye-lids, contraction of "almost all the muscles of the eye," and also of the muscles of the angle of the mouth and nose; contraction of the erectile muscles of the ear, and others. Now, seeing that it is *contraction*, and not relaxation of all these muscles, which follows section of this nerve, the law of analogy would require that the muscles of the arteries supplied by this nerve be contracted also; otherwise the anomaly would exist of the same nerve producing contraction in a large number of muscles and relaxation in a single instance. Why should the arterial muscle be regarded as an exception among so many others, especially when all the facts of the case are compatible with arterial contraction and venous fullness?

As for the second part of the experiment, in which the hyperæmia is dissipated by faradization of the distal end of the cut nerve, that is easily accounted for. The terminal branches of the cut

(d) M. Charcot, Lect. Nerv. Sys., pp. 90-91.