

arterial tension; and the cardiac muscle having a lighter load to lift, is driven faster by its own motor ganglia. Here, we submit, is the true physiological explanation of the increased frequency of the heart after section of the vagus.

We have elsewhere ("Physiological Therapeutics") produced able authorities for regarding section or mechanical injury of nerve tissue as equivalent to an excitation of its functional activity: and we are glad now to be able to add additional examples of its being so regarded by other Physiologists of distinction. Thus Dr. Ferrier in experimenting on the brain of a monkey, attributes a marked excitement of the sexual appetite to the effect on adjoining brain tissue of cutting away and removing the occipital lobes, although at the time the animal was much prostrated.* And Dr. Burdon-Sanderson regards excision of the sinus venosus of the frog's heart (preferably by a blunt scissors) as a source of excitation to the neighboring ganglion of the septum.† We may remark, in passing, that this additional evidence not only sustains what is said above as to excitation attending the section of the vagus, but it furnishes a valuable confirmation of the view propounded in our published work, that section of the cervical sympathetic produces dilatation of the cerebral arteries, not by paralyzing that nerve (as is generally assumed), but by exciting it. And we may add that the effects of section of the splanchnics in accelerating the heart's action‡ just as section of the vagus does, admits of a similar explanation; the excitation of the splanchnics acting reflexly on the vaso-motor branches of the thoracic sympathetics, through the great nervous circle referred to above.

The theory of Physiologists as to the inhibitory power of the vagi rests in no small degree on the fact that faradization of the vagus arrests the heart: and as faradization is regarded as equivalent to "excitation," in order that the heart may be stopped by a "stimulus," it is necessary to assume that it is the antagonists or inhibitors of the motor power of the heart which is thus excited.

In order to render the facts intelligible it is necessary to remember that in frogs (the animals on which these experiments have been chiefly performed and the action of whose hearts is best understood), the contractions of the heart originate

in the sinus venosus, or large vena cava, close to the auricle into which the entire venous supply empties. The sinus venosus is consequently regarded as the seat of the chief motor ganglion of the heart (Remak's). Close to the junction of the sinus with the auricle, and in the auricular septum, a ganglion of inhibitory power is hypothetically located (Ludwig's). The office of this is supposed to be to restrain or inhibit both the motor ganglion of the sinus and a second motor ganglion (Bidder's) at the junction of the auricle with the ventricle. The vagus is believed to pass into the heart close to the ganglion of the sinus, to which it sends branches, and to terminate in Ludwig's inhibitory ganglion. Faradic "excitation" of the vagus, or of its terminal inhibitory ganglion, is said to arrest the heart in the manner stated. So much for the aspect of the case, as seen by the Physiology of the day

We have elsewhere ("Physiological Therapeutics") produced substantial evidence that electricity is not an exciter, but a paralyzer of nerve tissue; and without delaying to refer to the proofs of this statement here, we proceed to apply this view of its action to the case before us.

Weber found that when faradization was applied to the ventricle of the heart "the irritated portion, little by little, contracted till it took no part in the rhythmical heart movement." Applied to the bulb of the aorta "the pulsations of the entire heart became more active and stronger," owing doubtless to the sudden contractions thus produced in the aorta aiding in the propulsion of its contained blood. Here the motor nerves of the heart were uninfluenced, but on the application of the electrodes to the vena cava (sinus) "the heart after a few seconds stood still, and began again to pulsate some time after the removal of the irritation, and then in a slower rhythm.* When to this is added the well known fact that faradization produces spasmodic contractions in muscular tissue everywhere, proportionate to the strength of the current, we are prepared to account for the arrest of the heart by electricity as follows:

It is evident that it is through the sinus venosus that the effect in question is produced,* and as this is believed by Physiologists to be the seat of the chief motor ganglion of the heart, the arrest of

* Functions of the Brain, pp. 197, 198. † Handbook, etc., p. 278. ‡ Handbook, etc., p. 259.

* Hammond's Trans. of Meyer's Elec. in Prac. Med., p. 80. † Handbook, etc., p. 276.