

the superimposed ingesta, as a consequence of which the œsophagus "becomes greatly distended." Whether the ingesta are thus forcibly detained or "forcibly ejected" would appear to depend on the point at which the vagi are cut. But in either case, the result, so far from being a proof of paralysis, really bears evidence of activity of the muscle. And this is confirmed by the observation of Dr. M. Hall, that "the simple contractility of the muscular fibre [of the œsophagus] occasions a distinct peristaltic movement along the tube *after its nerves have been divided*, causing it to discharge its contents when cut across." [Italics mine.] (a).

Dr. Burdon Sanderson expresses the idea uppermost in the physiological mind, in stating that after section of the vagi "the muscular fibres of the œsophagus are paralyzed, so that regurgitation of food from the stomach is apt to take place" (b). Dr. W. B. Carpenter seems to pass over this part of the subject lightly, and it is not till treating of the effects of section of the vagi on the gastric secretions that he plainly states that "the first obvious effects of this operation are vomiting (in animals that are capable of it) and loathing of food" (c). He also tells us, in another place, that the re-opening of the cardiac orifice, on pressure from within, is one of the first of that series of reverse actions which constitute vomiting (d). It is evident that the "pressure" referred to and the force necessarily required to eject the contents of the stomach and œsophagus could not come from "paralyzed" muscles, which the facts show to be really undergoing active contraction. That nerve force is actually in abeyance in the act of vomiting was fully recognized by Dr. Anstie, who places it among the effects of paralysis of the medulla oblongata in narcosis (e). While the vomiting of migraine, he says, "marks the lowest point of nervous depression." (f).

Had those eminent physiologists, Drs. Todd and Bowman, doubts of the truth of the physiological theory of the day, and a prescience of what the future had in store, when they wrote: "The office of the gastric branches of the vagi nerves appears, from Dr. Reid's experiments, to be chiefly to con-

trol the movements of the muscular coat of the stomach. [Italics mine.] (g). That is precisely what the scope of this paper is designed to show—that in so far as the involuntary muscles, at least, are concerned, the function of uerve force is not to stimulate, but to restrain and control muscular activity; which all physiologists regard as an inherent endowment of muscular tissue.

THE BRONCHIAL MUSCLES.

Dr. Burdon Sanderson informs the readers of the "Hand-Book," that after section of the vagi "the muscular fibres of the bronchial tubes are in a similar condition" to those of the œsophagus and stomach (h). Then it is evident that the muscular bands come under the rule or law laid down above, and contract, like other muscles of this class, when deprived of nervous influence.

THE NASAL MUSCLES.

It is a curious fact, that "owing to the great size of the vellum pendulum palati, the horse is unable to breathe through the mouth" (i). As a consequence, respiration is carried on in this animal exclusively through his nose; and when both the facial nerves are cut, or paralyzed, "the nostrils immediately collapse, and the animal dies by suffocation" (j). A result very similar, so far as the closure of the nostrils is concerned, has occurred in the human subject, during paralysis of the facial nerve. Thus, Sir Thomas Watson, reporting the case of the girl, Jane Smith, says: "When she tried to snuff in air through her nose, not being able to keep the right nostril stiff and open, its sides came together, and no air passed up that side" (k). A little reflection will show that this is necessarily due to muscular contraction. The effect produced is not to be accounted for by any filling up or stuffing of the nasal passage by relaxed or paralyzed muscles, because the muscles are on the exterior of the cartilages, and mucous membrane or fibrous tissue does not contract or respond to nerve action. The obstruction is caused by the cartilages of the nose coming together, for which the only adequate explanation is the action of the constricting muscles, which, as in other similar cases, assert their power when nervous restraint is removed.

(a) Dr. Carpenter's Hum. Phys., 5th Amer. Ed., p. 404.

(b) Hand-book for Phys. Lab., Amer. Ed., p. 318.

(c) Ib. p. 423. (d) Ib. p. 404.

(e) Stimulants and Narcotics, p. 168.

(f) Neuralgia, p. 39.

(g) Phys. Anat., p. 493.

(h) Ib. p. 318.

(i) Strangeway's Veterinary Anat., p. 209.

(j) Bernard, quoted by Dr. Dalton, Phys., p. 458.

(k) Lectures, Prac. Physic, p. 366.