of the vagi it causes contraction of the œsophagus and stomach and "in most cases vomiting" (a). Just as we have before seen, results from section of those nerves. We have had proof that section of the spinal cord and of vaso-motor nerve trunks induce contraction of corresponding arterioles. Similar effect is produced by electrization of the same parts, the calibre of the arteries being sometimes reduced to one-sixth of their normal size (b).

Dr. M. Foster tells us that section of the spinal cord at the medulla, or in the dorsal region, arrests the secretion of urine; and such a section of the cord is of course a paralyzing act. He also tells us that the electrization of the spinal cord below the medulla also arrests the secretion of urine. Then is not this a paralyzing act also ? It is unnecessary to multiply examples. Shall we continue to call an agent a stimulant and refer to it as an excitant of nerve activity, the ordinary effects of which on nerves are equivalent to nerve section, nerve paralysis and death !

MILD CURRENTS PARALYZE.

It is sometimes said that powerful currents may paralyze and even kill, but that mild or weak currents merely stimulate or excite. Is there any proof of this? Where in the records of electrophysiology do we find a claim for opposite effects from weak and strong currents? It is true that we are cautioned against the depressing effects of long continued applications of even mild currents. But this is not the present point. The short seance, with its mild currents, may and probably does afford a simulation of increased vigor, but this is mainly due to the moderate exercise which it gives the muscles and their consequently improved nutrition (c); perhaps also in some degree to the mental impressions of the patient. The longer seances, with stronger currents, are fatiguing and exhausting in proportion as they are depressing or paralyzing.

Is it not true that the weakest current which can affect a muscle at all, causes a momentary contraction of the muscle; and that the strongest current that can be borne during life, or that can be brought to play upon a still irritable nerve and muscle after death, simply produces a more vigorous effect of the same kind; the contraction be-

coming continuous in spasm or tetanus? It is never contraction on one hand and relaxation on the other, unless, indeed, other conditions intervene and muscular contractile energy is at an end. As a matter of fact, weak and strong currents act precisely in the same manner, and differ only in the lesser or greater contraction of the muscle which they produce. The process is a uniform one, as indeed it must be, since a purely physical force cannot change its character, and play fast and loose in the mode of its operation.

The treatises on this subject bear ample evidence of the paralyzing effects of electrization when even weak currents are used, as could only be the case for therapeutic purposes. Althaus found that the electric current produced an anæsthetic and paralyzing effect on the ulnar and sciatic nerves. Drs. Beard and Rockwell tell us that "in rhinitis, pharyngitis and laryngitis,"--where only very mild currents are admissible,---"they have for years been accustomed continually to make use of the benumbing effects of electrization" (d). Even "weak electrization of the upper part of the neck may arrest respiration," as well as produce spasm of the glottis and of the muscles of inspiration (e). Currents necessarily weak, because applied to the neck of "a sensitive young lady," induced anæmia of the brain, with drowsiness and other effects indicative of arterial contraction (f). Other authors equally allude to the "paralyzing effects of the constant current" (g). From these considerations I hold that there is no evidence whatever that weak and strong currents produce opposite effects, or that one may paralyze and the other stimulate.

DIRECT AND INVERSE CURRENTS.

A great deal has been written about the different effects of direct and inverse currents. Dr. J. Russell Reynolds, in reply to the question, "What current should I use to relieve pain and spasm, the direct or inverse?" answers :--- "All I have to say is that so far as I have seen it does not make the smallest difference. Theoretically it makes a very great difference, but practically it makes none" (h). Now, I think that the evidence showing that both these currents are paralyzing is

⁽a) Meyer's Prac. Elec. Hammond, p. 87.

⁽b) Weber-Meyers, Ib., p. 88.

⁽c) Drs. Beard and Rockwell.

⁽d) Med. and Surg Elec., p. 123. (e) Ib., p. 133. (h) Ib., p. 134. (t) Valentine, Matteucci, Eckhard, Meyers,

⁽g) Clinical Uses, etc., p. 18,