

- III. "On the Influence of the Galvanic Current on the Excitability of the Motor Nerves of Man." By AUGUSTUS WALLER, M.D., and A. DE WATTEVILLE, M.A., B.Sc. Communicated by J. S. BURDON SANDERSON, M.D., F.R.S. Received February 2, 1882.

(Abstract.)

The object of the experiments described in this paper is to demonstrate on the living nerves of man, alterations of excitability during and after the passage of a galvanic current, and to determine how far such alterations concord with the results obtained by Pflüger and other physiologists on the excised frog's nerve.

In order to subject the nerve to the influence of a "polarising" current, and to test its excitability by means of induction currents, the secondary coil is introduced into the galvanic circuit, so that the points of entrance and exit of the two currents (galvanic and induced) coincide at the two electrodes. One electrode, N, is applied over the nerve, the other, F, to any distant part of the body.

The density of the current which passes in the nerve is much greater in the "polar" region (that is, immediately under the electrode N) than in the adjacent region, which may be termed the "peri-polar" zone, and the authors' experiments go to prove that these two regions are to be physiologically distinguished by the fact that their electrotonic states are opposed.

The authors observe that the excitatory effect of an induction current is increased during the passage of a galvanic current in the same direction, diminished during its passage in an opposite direction, that the increase is greater when both currents are directed from F to N than when both are directed from N to F, and that the diminution is greater when the induction current is from F to N and the galvanic current from N to F than when these two currents flow in the reverse direction.

These results admit of a complete explanation, for which the grounds are stated in the paper. During the passage of the galvanic current from F to N katelectrotonus is set up in the polar region and anelectrotonus in the peri-polar region; during the passage of a galvanic current from N to F the polar region is in anelectrotonus, the peri-polar in katelectrotonus. At the passage of the induction current from F to N excitation is made in the polar region, at its passage from N to F in the peri-polar region.

Some subsidiary phenomena are discussed, and an experimental proof is given of the physiological reality of the above changes.

In addition to the induction current the authors have used the

make and break of the battery current as the test of excitability. They find that the effect of the make excitation is increased when it falls upon a katelectrotonic region, polar or peri-polar, that the effect of the break excitation is diminished when it occurs in an anelectrotonic region, polar or peri-polar, and that increase and diminution are more marked in the case of the polar than that of the peri-polar region.

They also tested the polar region by mechanical excitation, and obtained evidence of increased excitability at the kathode, of diminished excitability at the anode.

The authors have also observed "after-effects" of polarisation corresponding with the after-effects of electrotonus in the frog's nerve as described by Pflüger.

The experiments were for the most part made on the peroneal nerve, which was selected on account of its superficial course, and the facility with which the muscular responses could be recorded graphically.

IV. "On the Excretion of Nitrogen by the Skin." By J. BYRNE POWER, L.C.P.I. Communicated by Professor EMERSON REYNOLDS, F.R.S. Received February 7, 1882.

During the years 1877-78, I conducted a series of experiments on the excretion of nitrogen by the skin. Some of the data then obtained were communicated at the Dublin Meeting of the British Association, but I have since extended the inquiry, and now beg to submit an account of the investigations.

The results obtained by various experiments as to the existence of nitrogen in the sweat have been contradictory. Voit,* Ranke,* Parkes,† and others, relying on indirect methods, have denied its existence, finding that the quantity excreted by the kidneys and intestinal tract was equal to, and in some cases even exceeded, that ingested, therefore leaving no room for any excretion by the skin.

On the other hand, Anselmius,‡ Berzelius,§ Favre,|| Funke,¶ and

* "Schmidt's Jahrb.," Bd. cxvii, pp. 1-10. Voit made further experiments on doves with confirmatory results. On the other hand, Seegen and Nowak made subsequent experiments upon dogs with opposite results; these again are contradicted by Gruber ("Virchow and Hirsch, Jahrgang," Bd. I, 1881, p. 163). I do not myself believe that experiments on the lower animals are conclusive on this point in human physiology.

† "The Lancet," 1871, vol. i, p. 400.

‡ Berzelius, "Traité de Chimie." Traduit par M. Esslenger. Tom. vii, p. 324. Paris: 1833.

§ *Op. cit.*, p. 325.

|| "Archiv Gén. de Méd.," 1853, Tom. ii, pp. 1-20.

¶ "Beiträge zur Kenntniss der Schweissecretion." Moleschott's "Untersuchungen zur Naturlehre," iv, 36.