

**LECTURES ON  
PHYSIOLOGY: FIRST  
SERIES ON  
ANIMAL ELECTRICITY**

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Lectures on Physiology: First Series on Animal Electricity by Augustus D. Waller

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**AUGUSTUS D. WALLER**

**LECTURES ON  
PHYSIOLOGY: FIRST  
SERIES ON  
ANIMAL ELECTRICITY**



LECTURES ON PHYSIOLOGY

*FIRST SERIES*

ON ANIMAL ELECTRICITY

BY  
*Revised*  
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## ANIMAL ELECTRICITY.

“Wonderful as are the laws and phenomena of electricity when made evident to us in inorganic or dead matter, their interest can bear scarcely any comparison with that which attaches to the same force when connected with the nervous system and with life.”—FARADAY, “*Experimental Researches in Electricity*,” Fifteenth series, 1844.

## LECTURE I.

Currents of animal electricity are produced by animal voltaic couples, in which injured or active protoplasm is electro-positive (“zincative”), resting protoplasm electro-negative (“zincable”).

The utilisation of a nerve as a test-object representative of living matter.

*Experiments.*—Current of a voltaic couple. Current of injury of muscle—its negative variation. Current of injury of nerve—its negative variation. Parallelism between mechanical and electrical effects. Electrical effects of non-electrical stimuli. Action of ether and of chloroform upon isolated nerve.

THE master-key to many otherwise most intricate and complex problems of animal electricity is a very simple idea. Active matter is electropositive<sup>1</sup> to in-

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<sup>1</sup> This nomenclature, which is the opposite to the conventional denotation, will perhaps be found justified by the context

active matter; more active matter is electropositive to less active matter; matter that is by any means stirred up to greater activity is rendered electropositive towards undisturbed matter, matter whose action is lowered is electronegative to matter whose action is normal.

Picture to yourself a uniform mass or strand of protoplasm, that is to say of living matter, inactive at

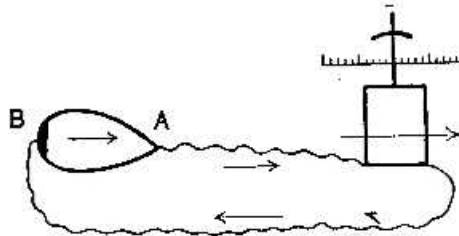


FIG. 1.—A lump of protoplasm as a voltaic couple.  
Any injured, *i.e.*, chemically active spot B is zincative to any uninjured spot A. Current in the lump is from B to A, in the galvanometer from A to B.

of these lectures. In the phraseology generally employed by physiologists the active spot is said to be "negative," and the term "negativity of action" is derived from this. But more correctly speaking the active spot is positive, and we should properly say "positivity of action." But to reverse these and other derived terms in common use would lead to hopeless confusion, which I desire to escape by employing the terms zincative, zincativity. Moreover we shall soon experience the want of a word to denote that a resting spot, capable of activity, is capable of becoming positive, or has a capability for becoming positive; this will be met by the words zincable, zincability, which are by no means to be taken as synonymous with the terms excitable,