

SCIENCE

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CONTENTS

The American Association for the Advancement of Science:—

Antagonism and Permeability: PROFESSOR
W. J. V. OSTERHOUT 97

John Muir: PRESIDENT CHARLES R. VAN HISE. 103

Scientific Events:—

School of the General Education Board; The Edward L. Trudeau Foundation for Research and Teaching in Tuberculosis; Awards and Prizes of the Paris Academy of Sciences 109

Scientific Notes and News 111

University and Educational News 112

Discussion and Correspondence:—

Possible Suspension of the Rules of Nomenclature in Holothuria: DR. C. W. STILES.
Do the Fowler's Toad and the American Toad Interbreed? RICHARD DECKERT. *The Popular Names of North American Plants:* J. ADAMS. *Propulsion by Surface Tension:* DR. GEORGE F. BECKER 113

Scientific Books:—

Stager's Sylow Factor Table: PROFESSOR D. N. LEHMER. *Rose's Feeding the Family:* DR. C. F. LANGWORTHY 115

Recent Progress in Paleontology: DRs. C. R. EASTMAN, W. K. GREGORY AND W. D. MATTHEW 117

Special Articles:—

The Reflection of γ -Rays by Crystals: DR. P. B. PERKINS 121

Societies and Academies:—

The Biological Society of Washington: DR. M. W. LYON, JR. 124

ANTAGONISM AND PERMEABILITY¹

By antagonism we mean that one toxic substance acts as an antidote to another. A solution containing salts in the proper proportions may have none of the toxic action of the individual salts. Such a mixture has been called by Loeb a physiologically balanced solution. It is found that physiological balance is of the greatest importance not only for marine organisms, but also for fresh-water and terrestrial plants and animals: these considerations have found practical application in agriculture.

In the hope of throwing light on the cause of antagonism the speaker made experiments on the penetration of salts into the cell. It was found that while NaCl alone penetrated rapidly the addition of a little CaCl₂ delayed penetration. It therefore seemed as though calcium antagonized sodium by preventing more or less completely its entrance into the cell. This idea had been suggested by Loeb but had not received experimental support.

These experiments (which included a number of salts) were carried out by means of the method of plasmolysis. This method did not yield quantitative data of the desired precision, but it was found possible to obtain much more accurate results by the method of electrical conductivity. By this method we measure the resistance offered by protoplasm to the passage of ions. In sodium chloride the resistance rapidly diminishes until it becomes stationary: this means that in NaCl the permeability of the protoplasm rapidly increases until death occurs,

¹ Address delivered before Section G, American Association for the Advancement of Science, at a symposium, December 27, 1916.