

SCIENCE

FRIDAY, JANUARY 28, 1921

ELECTRIFICATION OF WATER AND OSMOTIC FLOW¹

I

CONTENTS

Electrification of Water and Osmotic Flow:

DR. JACQUES LOEB 77

Henry Andrews Bumstead: PROFESSOR R. A.

MILLIKAN 84

Scientific Events:—

Polar Research; Anthropological Publications of the Canadian Arctic Expedition; Administration of the Alaska Forests; Fishery Matters in Congress; The Washington Academy of Sciences; Samuel J. Meltzer.

85

Scientific Notes and News 88

University and Educational News 90

Discussion and Correspondence:—

A Meteor Fall in the Atlantic: HENRY S. WASHINGTON. Musical Notation: DR. T. P. HALL. Pulsation of a Cat's Heart after Death: DR. HORACE GUNTHER. Stock Cultures of a Protozoan: DR. JOSEPH H. BODINE.

90

Quotations:—

The British Committee for Aiding Men of Letters and Science in Russia 93

Special Articles:—

Star Time Observations with an Engineer's Y-Level: DR. WILLARD J. FISHER 94

The American Society of Naturalists: PROFESSOR A. FRANKLIN SHULL 95

The American Society of Zoologists: PROFESSOR W. C. ALLEE 97

MSS. intended for publication and books, etc., intended for review should be sent to The Editor of Science, Garrison-on-Hudson, N. Y.

THE exchange of water and solutes between the cell and the surrounding fluid is one of the important factors in the mechanism of life, and a complete theory of the osmotic flow is therefore a postulate of biology. It was a marked advance when the experiments of Pfeffer and de Vries led van't Hoff to the formulation of the modern theory of osmotic pressure. According to this theory the molecules of the solute behave like the molecules of a gas in the same volume and at the same temperature, and the gas pressure of the solute measures the "attraction" of a watery solution for pure water through a strictly semipermeable membrane. Yet it is obvious to-day that in a liquid the electrical forces between solvent and solute must play a rôle and no adequate provision is made for these forces in van't Hoff's law. Traube rejected van't Hoff's theory altogether, suggesting instead that the osmotic flow was from the liquid with lower to the liquid with higher surface tension (and higher intrinsic pressure).

Tinker has shown that van't Hoff's theory for osmosis holds strictly only in the case of *ideal* solutions, *i.e.*, when the process of solution occurs without heat of dilution and change in volume, but that in the case of *non-ideal* solutions Traube's ideas explain the deviations from the gas law which are bound to occur. When two different *ideal* solutions containing equal numbers of particles of solute in equal volume are separated by a strictly semipermeable membrane, equal numbers of molecules of water will diffuse simul-

¹ Presidential address prepared for the Chicago meeting of the American Society of Naturalists, December 30, 1920.