

would have been able to write on paper. It can be put on the slide as soon as the paraffin ribbon has been mounted. If the slide was clean when the label was written, water, alcohol and xylol may be applied to it freely without any danger of injury. Ordinary abrasion such as the slide frequently encounters in use will not in any wise affect the permanency of these labels. They can, however, be scratched off easily with a dull knife (or scrubbed off with scouring soap). A white paper label pasted on the *back* of the slide will make it even more conspicuous.

LANCE BURLINGAME

STANFORD UNIVERSITY, CALIFORNIA,

January 14, 1914

A NEW NAME FOR THE MARMOT OF THE CANADIAN ROCKIES

MR. ARTHUR H. HOWELL has called my attention to the fact that the name applied by me to the large marmot from the Moose Pass branch of the Smoky River, Alberta, *Marmota sibirica*,¹ is preoccupied by *Arctomys sibirica* Wolf.² The marmot of the Moose Pass region may be called *Marmota oxytona*.

N. HOLLISTER

U. S. NATIONAL MUSEUM,

November 5, 1913

SCIENTIFIC BOOKS

Mathematical Monographs. Edited by MANSFIELD MERRIMAN and ROBERT S. WOODWARD. No. 12. *The Theory of Relativity.* By ROBERT D. CARMICHAEL. New York, John Wiley & Sons. 1913. Pp. 74.

Unlike most presentations of the theory of relativity, which contain a considerable amount of technical mathematical physics, Carmichael's is non-technical and logical in the same way that the discussion of the foundation principles of geometry or mechanics or chemistry might be made non-technical and logical. The book may, therefore, be read with ease by the mathematician who has little or no knowledge of modern physics or by the physicist

¹ Smithsonian Miscellaneous Collections, Vol. 56, No. 35, p. 1, February 7, 1912.

² Linne's "Natursystem," Vol. 2, p. 481, 1808.

who is unacquainted with mathematical analysis; it might be read by the engineer or, for the most part, by the philosopher. The work is in no sense a mere compilation from the investigations of previous authors, but represents a considerable amount of independent investigation of which the major part has appeared in contributions to the *Physical Review*.

The strongest and most satisfactory part of the book is that dealing with the statement of the postulates upon which the theory is built and with the direct consequences of the postulates. Less final and satisfactory are those parts where the physical theories (as distinguished from the results of physical experiments) which might conceivably underlie the theory are mentioned. This lack of finality and satisfaction is, however, quite unavoidable in these latter days when so many phenomena apparently subversive of long-accepted notions are constantly being unveiled. One has only to read the report on "La Théorie du Rayonnement et les Quanta,"¹ of the colloquium held at Brussels in 1911 to see in what a state of partial bewilderment and contradiction are the leading physicists of our time. The riot of new hypothesis and theory in the last volume (No. 26) of the *Philosophical Magazine* is a similar indication.

The author abstains from electromagnetic theory and confines his attention to the relation of the theory of relativity to the concepts of length and time, of mass and energy; he has, however, to mention that fundamental unit of electricity, the electron. He does well to emphasize the independence of the theory of any hypothesis as to the existence or non-existence of the ether, even though he subsequently finds it useful to make use of the ether in discussing the physical nature of mass. He could profitably have gone a little more into detail with regard to the relation between the ether and relativity.

Once we admit the existence of a stagnant ether, we have at hand at least a logical fixed system of reference; we may logically speak of

¹ Langevin and Broglie, Gauthier-Villars, 1912.

absolute motion, even though we may be unable experimentally to determine the absolute motion; the change of mass and of length which arise in moving systems are then but the natural consequences of the redistribution of the lines of force issuing from the moving charges; our concept of time and distance is no longer in need of modification; we have essentially the original Lorentz point of view. The theory of relativity then is merely a collection of results interpreted on moving axes (with local time) and abstracted from the underlying ether; the fundamental postulate *M* of the theory, that we can not detect absolute motion, is a natural consequence of the fact that the transformations between different sets of moving axes (and times) form a group. For instance, if two particles move in different directions through the ether each is actually shortened in the direction of motion, but observers attached to the particles can observe no shortening because everything in the system is similarly shortened. And moreover, since the transformations above mentioned form a group, each observer, abstracting from any conception of the ether and experimentally unaware of any shortening in his system, concludes that the system of the other observer is shortened in the direction of their relative motion and by the amount appropriate thereto.

On the other hand, if we take the point of view that what we can not directly observe does not exist, if we take the theory of relativity as itself fundamental and banish the ether, then we have no such physical or conceptual basis upon which to explain the shortening, the alterations in mass, or the changes in time, and we are forced to change our concepts of mass, length and time; we are forced to all those new ideas which the theory of relativity brings in and which seem incongruous or bizarre to many persons, and these ideas assume a semblance of naturalness only when our universe is interpreted as four-dimensional with space and time unified and inherently interrelated, in the manner adopted by Minkowski or Wilson and Lewis or McLaren. Which of the two points of view we adopt depends largely upon our turn of mind.

There are philosophers who feel that we are entirely free to construct for ourselves any image of the physical universe which seems most natural and easy; they will probably hold to the ether as long as possible. There are others who feel that we should not intrude into the image any ideas which represent things not immediately subject to experiment; they will declare for the principle of relativity as fundamental and not as derived, just as Walther Ritz declared against electric and magnetic field-intensities *E* and *H*.

The author knows all this and covers most of it in different parts of his work, but seems nowhere to collect it. The brief discussion of the mass of light is too indefinite to convey any useful impression to me. The attempt at the end of the work to outline a further experiment bearing on the theory is laudable in itself and shows that the author has thought deeply into his subject from other sides than the logical.

EDWIN BIDWELL WILSON

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Osmotic Pressure. By ALEXANDER FINDLAY. Longmans, Green and Co., New York. Cloth, 8vo. Pp. 84. Price \$1.00.

This book by Dr. Findlay is one of the series of monographs on inorganic and physical chemistry of which he is the editor. The purpose of these monographs is "to place before advanced students of chemistry, accounts of certain sections of inorganic and physical chemistry fuller and more extended in scope than can be obtained in ordinary text-books." The present monograph deals with semi-permeable membranes and osmotic pressure, 6 pages; van't Hoff's theory of dilute solutions, 4 pages; direct determination of osmotic pressure of concentrated solutions, 12 pages; discussion of the recent determinations of osmotic pressure and of the van't Hoff theory, 4 pages; the general theory of ideal solutions, 10 pages; discussion of the osmotic pressure of aqueous solutions of cane sugar in the light of the theory of ideal solutions, 13 pages; indirect determinations of the osmotic pressure, 15 pages; views regarding the cause of osmosis