History and Method of Science. The first volume of this work was issued by the Oxford University Press in 1917. I understand that the second volume is now ready for the press and Dr. Singer tells me that he hopes to share with me the editorial responsibilities of the third and succeeding volumes. Thus, *Isis* and the *Studies* would be supplementary one to the other, and between them would provide suitable outlet for new work on the history and philosophy of science.

GEORGE SARTON
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A STEADY CALENDAR

TO THE EDITOR OF SCIENCE: The interruption of our recent scientific meetings by the coming of Sunday in the middle of the (Christmas) week—a reputed impossibility that happens every five or six years—is one of the many inconveniences that we half-consciously endure as the result of inheriting a varying calendar from the unscientific past. If in adopting any one of the many improved calendars that have been proposed, we should annually sacrifice upon the altar of reason a single day in ordinary years and two days in leap years, as extra days without week-day names, then Christmas and New Years would always fall on the same day of the week; and by waiting to begin the sacrifice until those holidays come on a Saturday or a Monday, the scientific meetings of the last five days of the year, which have become so well established among us, would never thereafter be broken in half by an interrupting Sunday. Home celebrations and scientific meetings would both profit by the change. How can we best bring it about?

W. M. DAVIS
CAMBRIDGE, MASS.,
January 4, 1919

SCIENTIFIC BOOKS

Forced Movements, Tropisms and Animal Conduct. By J. LOEB. Philadelphia. 1918. Pp. 209, 42 figs.

The scope and character of this volume are in large part explained by the fact that it is offered as one of a series of monographs in which it is proposed to cover the field of recent developments in biology. The announced titles of the volumes scheduled to follow this first number deal, not so much with rational divisions of the science, as with those particular phases of physiology that have been the subjects of investigation at the hands of the respective writers. This general plan, already justified by its success in the treatment of modern advances in physical and biological chemistry, and in human physiology, necessarily results in a less closely coordinated system of monographs when applied to physiology proper—the latest of the sciences to acquire a realization of the analytical significance of quantitative methods of thought.

The first volume of the proposed series, then, endeavors to present within the space of some 170 pages a concise statement of the theory of tropisms, their origin in forced movements under various forms of activation, and their importance for the analysis of animal conduct, including that of *Homo*. Much of the matter discussed is, of course, no longer new; about half the content of the book is already familiar from the author's similar article in Winterstein's "Handbuch," and other publications; but as a compact, clear, and characteristically vigorous statement of the essential quantitative data upon which the tropism doctrine now rests, the book is welcome and in the main satisfying. In the introductory section it is pointed out that tropistic phenomena, depending upon the orientations of the animal as a whole, rather than the segmental reflexes, must be made the starting point for the analysis of conduct; that these tropistic orientations must first be studied in the behavior of bilateral animals; and that the key to the understanding of tropisms lies in forced movements initiated through differential tensions in symmetrical contractile elements of the body, not in the distinction of "pleasure" from "pain." It is only on such a basis, so far as we know, that quantitative laws may be deduced adequate for the description of behavior. This procedure is illustrated partic-

ularly in the discussion of phototropism, for which the experimental evidence is the most comprehensive.

Doubtless the portion of the book liable to excite the most general interest is that dealing with "Instincts" and "Memory images and tropisms." The author's views on these topics, now well known, are here incisively restated, and on some points extended. It is held that the preservative instincts are tropisms; and that the "problem of free will" is essentially solved through recognition of the orienting influence of memory images—which, being in man multitudinous, render impossible the prediction of individual behavior. The orienting powers of memory images afford an inviting topic for research, and one as yet very inadequately explored.

Two directions in which the results of tropistic analysis are of use to the naturalist are not so fully developed as one might wish: the value of determinate behavior in animals as a starting point for the experimental investigation of irritability, and the significance of the physical viewpoint for the analysis of organic phenomena as actually seen in nature. The limitations of space, however, have compelled great brevity of treatment. Nevertheless, the reader of this book should succeed in gaining fast hold of the conception that mere complexity is no bar to ultimate clarity of understanding in these matters; and should, in addition, acquire a healthy distrust toward the indiscriminate application of "laboratory results" to field conditions. The tropism doctrine, in other words, is in no sense an artificial simplification of "animal behavior." In this connection, specifically, the book will be particularly valuable as an introductory manual for students. To the investigator, already familiar with these ideas (it is to be presumed, but not in all instances correctly), the book has less new material to offer.

A bibliography of some 554 entries, not very well arranged and comprising some repetitions, together with a brief index of two and a quarter pages, complete the book. It is stated, rather bluntly, that the bibliography intentionally excludes "controversial and amateurish publications," and to that extent it should prove a useful guide. The citations are less complete for the years since 1911 than for the preceding period. No attempt has been made to critically discuss the contents of the publications listed, which is in many respects a blessing; for it is as a unitary presentation of the author's views that the monograph will be read with interest by all workers in this field.

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THE GEOLOGICAL SOCIETY OF AMERICA

THE thirty-first annual meeting of the Geological Society of America was held in the rooms of the Department of Geology, Johns Hopkins University, Baltimore, Md., on Friday and Saturday, December 27–28, 1918, under the presidency of Dr. Whitman Cross of the United States Geological Survey.

The following program was presented:

Geology as a basis of citizenship: JOSEPH POGUE. (Read by title.)

Sources of and tendencies in American geology: JOSEPH BARRELL.

Geology as a synthetic science: WARREN D. SMITH. (Read by title.)

The United States Geological Survey as a civic institution during the war: SIDNEY PAIGE.

The military contribution of civilian engineers: GEORGE OTIS SMITH.

Presentation of geological information for engineering purposes: T. WAYLAND VAUGHAN.

Engineering geology in and after the war: CHARLES P. BERKEY.

Geology in the Students Army Training Corps: HERBERT E. GREGORY.

Cooperation in geological instruction: HERBERT E. GREGORY.

Map making, map reading and physiography in the training of men for the army and navy: WALLACE W. ATWOOD.

War work by the department of geology at the University of Oregon: WARREN D. SMITH. (Read by title.)

Recent earthquakes of Porto Rico: HARRY F. REID and STEPHEN W. TABER.

Structure of the Pacific ranges of California: BAILEY WILLIS.

Migration of geo-synclines: AMADEUS W. GRABAU.