Time, knowledge, and the nebulae: an introduction to the meanings of time in physics, astronomy, and philosophy, and the relativities of Einstein and of Milne. Martin Johnson. New York: Dover, 1947. Pp. 189. $2.75.

Milne's Kinematical Relativity, which is derived from definitions of distance and time in terms of simultaneity and succession at the observer, was first published some 15 years ago. It is considered by many (including Dr. Johnson) to be as great a philosophical advance as Einstein's Relativity of 1904 or Newton's Laws of Motion.

In this little book Dr. Johnson presents in readable form a survey of various relativities and cosmologies together with their philosophical implications. Two basic themes are developed. The first concerns the nature of time, this leading to a rejection of causality in favor of "functional dependences," and to a critical examination of the various contexts in which "time" is used. The second and more important theme has to do with the *Principle of Communicability*, proposed by Johnson as the philosophical basis of all science. On this principle, the relativity transformations and time scales of Milne are shown to be necessary in order that experience (*i.e.* the Laws of Physics) may be communicated intelligibly from one observer to another.

Many scientists will want to bring themselves up to date on relativity and the changing philosophy of science by reading this excellent work. Nonmathematical readers will find most of the mathematics easy to follow, although the addition of simple space-time diagrams would have been an immense help to the uninitiated reader. It is unfortunate, too, that there is scarcely mention of geological time, of time in evolution, or of accelerated reference systems. The spiral form and the red-shifts of the spiral nebulae are discussed fully, but the significance of Hubble's surveys determining density distribution is ignored.

Time, knowledge, and the nebulae should stimulate further research among astronomers and physicists by pointing to new possibilities in the interpretation of data. As Prof. Milne says in the forward: "... only ... through the consideration of the problem of time, can the important questions of physics be properly investigated."

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Methods of mathematical physics. Harold and Bertha Swirles Jeffreys. Cambridge, Engl.: at the Univ. Press, 1946. Pp. vii + 679. $15.00.

The authors preface their large Cambridge volume with the statement: "This book is intended to provide an account of those parts of pure mathematics that are most frequently needed in physics." This they have done by giving an account of fairly extensive topics, principally in analysis beyond the calculus, and by then applying methods developed therefrom to selected problems in physics. The consequence is a most useful compendium of special methods and results, rich in problems but somewhat lacking in general points of view which would tie the material treated into a more unified whole.

In developing the more purely mathematical topics the authors have been guided by the sound principle that high standards of rigor are as necessary for applicable as for pure mathematics; it is recognized that in order to achieve such rigor without undue complications some sacrifice of generality must be made. Thus, in proving theorems in real and complex variable, conditions are postulated which are sufficiently broad to cover the proposed applications, and the theorems are then proved with the rigor appropriate to the subject; the authors are justifiably less concerned with whether the conditions postulated are necessary for the truth of the theorem. In this spirit an admirable exposition is made of series, integration, calculus of variations, conformal mapping, linear differential equations, and a host of other topics. The chapters on vectors, tensors, matrices, and operators present and apply a wealth of useful results, but it seems to the present reviewer that their treatment from a more fundamental algebraic point of view would lead to a deeper understanding, both of the topics in themselves and of their role in modern physics.

The physical fields to which the mathematics is applied are almost as broad as physics itself—including, as they do, dynamics, hydrodynamics, elasticity, and electromagnetism, among others. It is to be observed that these applications are to specific topics in these fields and that a fuller appreciation of their significance requires some previous familiarity with the fields. Perhaps the greatest lacuna is the quantum theory, which is touched upon altogether too lightly in view of its importance in modern physics and astrophysics, and which offers an excellent opportunity to draw together several fields under a unified mathematical viewpoint.

Altogether the book offers a wealth of well-treated material which should prove most useful as a source or reference for students, teachers, and advanced workers in physical science. It is a source of gratification to note that physically and typographically the Cambridge University Press has here done a job which is well up to their high prewar standards.

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The Soochow astronomical chart. W. Carl Rufus and Hsing-Chih Tien. Ann Arbor: Univ. Michigan Press, 1945. Pp. 24. (Illustrated.)

In the Wên Miao temple near Soochow, Kiangsu, China, there is a star map, about three feet in diameter, accompanied by a text prepared in 1193, engraved in stone in 1247. Eduard Chavannes published, in 1913, a reproduction of the chart, with a French translation of the text, but without an identification of the asterisms and stars or a translation of their names ("L'Instruction d'un futur empereur de Chine en l'an 1193, Carte astronomique," *Acad. Inscr. Belles-Lettres, Mém. Asie orientale*, 1913, **1**, 43–57). The present publication offers, in addition to a good reproduction of the star map and of the accompanying text, an introduction, a description of the star map, an annotated translation of the text, and tables of 313 asterisms and 1,440 stars, with their names and, when feasible, their identification.

The text of the "instructions for a future emperor" is a blend of cosmography and political astrology. The star map has the North Pole in the center; the three concentric circles mark the circumpolar asterisms (ca. 35°, latitude of Kai-Feng Fu, Honan, seat of the Government, 1214–67), the equator, and the limit of southern asterisms (ca. −55°). The 28 lunar mansions —of unequal extent—are shown by radial lines extending from