

ventional relativity, electrodynamics, gravitation, atomic and nuclear physics are swept away for the apparent reason that the author does not understand them. They are replaced by a hotch-potch of pseudo-scientific jargon that will mean very little to the orthodox scientist. Apart from UFOs and ball lightning (always good to throw in the face of orthodoxy) nearly all of the phenomena discussed in the book already have perfectly acceptable explanations, so it is hard to understand the motivation of the work.

No doubt many laymen will enjoy this polemical assault on the humble scientist, who is portrayed here as a sort of space age wizard juggling meaningless symbols to conjure up incomprehensible results. This book will be of no use, though, to anyone seriously interested in either the aether or good science. PAUL DAVIES

Harnessing the Tides

Tidal Power. Edited by T. J. Gray and O. K. Gashus. (Proceedings of Tidal Power, held May 24–29, 1970, at the Atlantic Industrial Research Institute, Nova Scotia Technical College, Halifax, Nova Scotia.) Pp. 630. (Plenum Press: New York and London, 1972.) \$32.20.

THE ever increasing demand for electrical power on the one hand and concern for the quality of the environment on the other has led to a reappraisal of the world's tidal power potential. This book is the proceedings of an international conference on the subject, held in Halifax, Nova Scotia, in 1970. Because of this venue, it perhaps is not surprising that the first four papers explore many aspects of tidal power in the context of the Bay of Fundy proposals. A less specific introduction might have been preferable, but it can be argued that discussion of tidal power can rarely be divorced from particular topography. The complexities and benefits of this power source are further brought out in descriptions of existing or projected plants in France (La Rance), Russia (Kislaya Guba), the Argentine (San José) and Alaska (Cook Inlet). Problems associated with the integration of tidal power into a general supply network and the interesting possibilities of linking tidal power closely with pumped storage are the subjects of the next five papers. Methods of barrage construction, notably those in vogue in the Netherlands, design of sluice gates and the evolution of the straight flow turbine (a critical factor in the economic viability of tidal power) are then dealt

with in four contributions. Three chapters are devoted to the important topic of the behaviour of concrete, ferrous and non-ferrous metals in a marine environment. An oddly placed but useful chapter poses a number of questions, mainly of constructional and operational nature, which require further research and evaluation. Environmental effects receive attention both in broad terms and in relation to specific locations. In particular, siltation is a recurring theme, one paper dealing with a mathematical study of siltation in the Thames estuary (not, however, linked with power generation). Discussion sessions of the conference are not reported and some valuable comment and observation may have been lost. Inevitably, because of the number of contributors, the book suffers from restatement of basic principles, and requirements, but, on the credit side, each contribution has something refreshing to add. Little attention is paid to model studies and there are one or two significant omissions in the historical references; for example, no mention is made of Gibson's investigation of the Severn Barrage scheme. The volume, pleasingly printed and well illustrated by line diagrams, photographs and graphs, forms a valuable, if expensive, record of current thinking on tidal power.

GEORGE D. MATTHEW

Aspects of Atmosphere

Thermospheric Circulation. Edited by Willis L. Webb. Pp. xix+372. (MIT: Cambridge, Massachusetts, and London, March 1972.) \$14.95.

Physics of the Upper Atmosphere. Edited by Franco Verniani. (International School of Atmospheric Physics, Proceedings of the 1st Course, Erice, June 15–29, 1970.) Pp. xxiv+461. (Editrice Compositori: Bologna, 1971.)

THE Earth's upper atmosphere continues to be a topic of lively research interest and the above proceedings of two 1970 summer schools on the subject have recently been published. The first was held at the University of Texas at El Paso in cooperation with the Atmospheric Sciences Laboratory, US Army Electronics Command, White Sands Missile Range, and the second at the "Ettore Majorana" Centre for Scientific Culture sponsored by CNR (the Italian National Research Council), the Italian Ministry for Public Education and the Regional Sicilian Government.

The interdisciplinary character of many rewarding areas of research is well exemplified by the atmospheric sciences, which involve physics,

meteorology, aeronomy, chemistry, radio engineering and space science. In the foreword to the first of these books, Fred L. Whipple refers to "... interface phenomena, partly or wholly arising from external radiation or particles from space impinging on our own private space ship, the Earth". The book, however, is entitled *Thermospheric Circulation*, which is defined in the opening chapter as "the geocirculation system which occupies the atmospheric region above 80 km altitude". Not surprisingly, six of the fifteen chapters are devoted to the radiometer trail method of wind measurement. This is the only continuous means of wind measurement that is available above 80 km and offers the possibility of synoptic study of the atmosphere to 110 km. The remaining chapters contain condensed reviews on the airglow, noctilucent clouds, the lower ionosphere and its interaction with the neutral atmosphere, and the topside ionosphere. The content of the book, however, falls far short of what one might expect from the title. On the observational side, circulation in the upper thermosphere has been revealed by rocket trail releases and the analysis of satellite orbital inclinations; while on the theoretical side, computations of thermospheric winds have been carried out with various assumptions regarding the effects of ion drag and viscosity. These topics are not included. *Thermospheric Circulation* is a potpourri of basic lower thermosphere physics and status reporting on radiometer wind measuring techniques and results. The book is printed offset and has no index.

Physics of the Upper Atmosphere also emphasizes the interdisciplinary character of the Earth's upper atmosphere. Composition studies of the lower ionosphere are well covered by R. S. Narcisi. M. Petit deals with basic physical processes of ions and electrons in one chapter, which serves as a basis for a chapter on Thomson scatter—the incoherent scattering of electromagnetic waves from free electrons. This technique is now providing valuable data for studying many properties of the ionosphere. A chapter by F. Mariani treats the theory, observation and measurement of the geomagnetic field with notable conciseness and clarity. Chapters by P. W. Blum and M. Roemer deal with the density and temperature structure of the thermosphere as understood from satellite drag effects and time-dependent models. Theory on the dynamics of the upper ionosphere is found in a chapter by M. Sylvain. The book deals with basic physical principles and their applications to current research, and could usefully be read as an introduction to current research papers. Not included are topics such