Progress in Fast Neutron Physics. Edited by Gerald C. Phillips, Jerry B. Marion, and Jacob R. Risser. University of Chicago Press, Chicago, (1963). 397 pages, $8.50.

The preparation of review papers as such has become relatively unusual in physics. The review paper has been replaced by the review talk presented at a topical conference. The subsequent publication of the conference proceedings then provides a set of papers which are more-or-less related and which may be organized loosely into a book. At best, the speed of publication of conference proceedings more than compensates for the more careful presentation that may be achieved in the review paper. The proceedings of the Rice University Conference on "Progress in Fast Neutron Physics," held in February, 1963, were published within eight months after the conference - a good record.

The stated purpose of the twenty-two long and five short papers included in the proceedings is to "summarize the current status of this important field of nuclear research." This objective is met in general. In most areas, the reviews cover research since the preparation of Marion and Fowler's *Fast Neutron Physics* and many authors contributed to both books.

Topics covered include monoenergetic neutron sources, sources of polarized ions and neutrons, and the continuous neutron spectra produced due to the deuteron breakup in deuteron - produced "monoenergetic" sources. Results on neutron reactions indicate areas of agreement with both direct interaction and compound nucleus calculations. Neutron and gamma-ray spectral data from neutron inelastic scattering and radiative capture illustrate the remarkable recent advances in techniques in these areas.

Other descriptions of experimental techniques cover solid-state detectors, problems of angular-distribution measurements of scattered neutrons, and preparation of polarized targets. Havens and Newson present results obtained by time of flight and with monoenergetic sources which show that the long - standing gap in neutron energy between these two techniques has been closed. The energy at which the methods meet is a subject for vigorous resolutionship.

Recent polarized-neutron scattering results are reviewed and Willard gives a historical survey of neutron scattering. Other historical papers include a commemoration of Tom Bonner, for whom the conference and proceedings are intended as a memorial, a fascinating account by Cockcroft of his early work in nuclear physics, and an authoritative description of the development of the Van de Graaff accelerator by Herb.

Finally, Bretscher outlines the increasing demands for nuclear data for reactor design. His cogent but brief (nine pages) account is perhaps the most pertinent of the book for many ANS members. Bretscher points out that even for fast reactors the neutron spectrum peaks in the few-keV energy region for the large, dilute systems of interest today. Since only three of the contributions to this volume consider neutron energies as low as the keV region, the direct interest of the reactor designer in the material of this book will be limited.

In summary, for reference in this area one should first consult both volumes of *Fast Neutron Physics*, which is already seriously out of date in many sections. Then it is possible to turn to the present volume to see what has happened recently.

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About the reviewer: Fred Maienschein is Associate Director of the Neutron Physics Division at the Oak Ridge National Laboratory where for several years he has been making measurements of gamma-ray spectra of interest in the shielding of reactors and (currently) of manned spacecraft. He is Vice Chairman of the Shielding Division of the American Nuclear Society and a member of the U. S. Atomic Energy Commission's Advisory Committee on Reactor Physics and the European-American Committee on Reactor Physics.

Nuclear Radiation in Geophysics. Edited by H. Israel and A. Krebs. Academic Press, (1962). 430 pp. $18.00.

Nuclear Radiation In Geophysics, as the title indicates, is a book of complex and varied information. It is presented by authors from different disciplines. Some articles are written in English and some in German. Such a book, by nature, cannot be as uniform as one written by a single author. There had to be some heterogeneity and overlapping. The book, however, fulfills the editors' concept as set forth in that each individual chapter of the survey should be presented by an expert in the proper field in his own style and in his own words. The book attempts "a summary statement on the role of natural, artificial, and man-made radioactivity - of nuclear radiation in the broadest sense of the word - in the geophysical area with the goal to sketch the essential features of our science, the principal directions of current inquiries and of future research."

The material presented covers the geophysical interpretation of distribution of radioactivity in the lithosphere, the atmosphere, and the sea and sediments. Methods of interpretation of the origin, distribution and dynamics of the transport of radionuclides in the atmoshpere are developed and presented. This includes the applications of natural, cosmic-ray-induced and man-made radioisotopes as tracers, e.g. geochronology. A similar development is made for hydrology. Recent data of cosmic ray flux and the production of radionuclides by interaction of cosmic rays with stable isotopes are presented. Fallout (wet and dry scavenging) is discussed. The biological aspects of natural as well as man-made radioactivity is reviewed. The lithosphere, hydrosphere and oceanic sediments are treated in a concise manner. The atmosphere and associated phenomena are treated in great detail, which tends to give the overall presentation an apparent bias. The section on cosmic rays in geophysics is excellent, although it includes too many data.

The same subject matter is sometimes discussed by different authors in a slightly different form, quoting the same literature. This might be quite confusing to the readers. Carbon 14 dating and the radiocarbon inventory are discussed by several authors. Condensation of radioisotopes on aerosols, fallout, as well as cosmic-ray-produced radioisotopes are also treated by several authors. In the article, "Methods of Measurement", Geiger-Mueller and proportional counters are discussed in too much detail. This information can easily be obtained from standard books of nuclear instrumentation or nuclear physics. Gamma spectroscopy, which is one of the most important methods in geophysics, is not explored thoroughly enough. No mention is made of solid-state detectors, which are becoming increasingly important in beta counting and alpha-particle spectrometry. Preparation of thin sources, so important for alpha spectrometry, is not mentioned at all. There are inconsistencies in the nomenclature, alphabetical names (RaDEF) and isotopic element designations. Some typographical errors distract from the text.

The bibliography is excellent and up to date. The subject index is presented in both German and English in idomatic translation, which is very helpful to readers. The book as a whole is a valuable contribution to earth and physical scientists. It can be recommended to scientists who are already familiar with older books, Sverdrup, *et al.*, Rankama *et al.*, and Faul.

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About the Reviewers: The reviewers are members of the staff of the Special Training Division of the Oak Ridge Institute of Nuclear Studies, and are authors of papers on chemical oceanography, geophysics, geochronology, and the exchange of permanent gases between the atmosphere and the sea.

Dr. Rona holds a Ph.D. in Chemistry from the University of Budapest and has been associated with a number of universities and laboratories both in Europe and the United States. She was at the Vienna Radium Institute during the period 1924-38 and held an associate professorship at Trinity College during the war years. Prior to her tenure at ORINS, to which she came in 1951, she was at the Argonne National Laboratory.

Dr. Ibert completed his graduate training at Texas A & M College in 1963 and has carried on research in activation analysis, analytical chemistry and oceanography. His greatest scientific interest is in the geochemistry of the seas, the rivers and the lakes.

Nuclear Physics, An Introduction. By W. E. Burcham, F. R. S., McGraw-Hill Book Company, Inc., New York-San Francisco (1963), 739 pp, $12.00.

In this book of some 700 short pages, Professor Burcham presents a modern and comprehensive account of nuclear physics, stressing basic concepts, crucial experiments, and current problems. To the initiated, this book is a pleasure. Its many illustrations are first-rate in simplicity and originality. Others, less familiar with the subject, will appreciate having this book on the shelf, especially because they will find carefully and wisely selected references at the end of each chapter.

According to the preface "a compromise has been adopted" between an historical treatment and a strictly logical presentation to make the book digestible to an "undergraduate who is approaching the end of a first-degree course in physics." However, despite the subtitle "An Introduction", this is hardly a text book. Instead, it is a small encyclopedia. Each section and subsection is a jewel of conciseness. Such a treasure chest is not for the undergraduate unless he can claim an unusual amount of attention from his teachers. In this age of mass education, an introduction in the hands of an undergraduate should treat selected topics in depth, rather than touching on so many things. The more conscientious student wants to see derivations of the equations to learn why they contain particular variables in particular combintions, and thus, to aid his memory. This should not be left to references, especially not to books