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.

Elizabeth Rona
Edward R. Ibert

Special Training Division
Oak Ridge Institute of Nuclear Studies
Oak Ridge, Tennessee

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 that are strictly on the graduate level. Moreover, Burcham's book lacks "exercises" that can be so helpful by stimulating comprehension and curiosity.

The book comes in five parts. An introductory Part A contains a brief account of the quantum theory of atoms and molecules. This paves the way for a first look at the nucleus as a part of the atom, at the effects of nuclear spin and magnetic moment on the electronic energy levels (hyperfine structure). Part B, comprising 220 pages, covers modern experimental techniques, stressing physical principles rather than engineering detail and ranging from the tiny surface-barrier detectors to the giant bubble chambers and BeV machines. To some this may be the most useful part of the book while others may skip it without much loss in continuity.

Parts C and D, which occupy nearly 300 pages, form the core of this project, treating the static properties and the dynamic behavior of nuclei. Part C follows the progress that led from the earlier, more primitive, nuclear concepts, via our increasing knowledge of the detailed properties of the nuclear energy states and of the distribution of the nuclear charge, to the latest parade of sophisticated "models" in the world of nuclear fashion. Part D features up-to-date expositions of nuclear transitions including the Mössbauer effect, of nuclear reactions, of radioactive decay including parity nonconservation, of nuclear orientation and of experiments on angular correlation.

The final part, E, is a brief account of nuclear forces offering a glimpse into high energy physics. Eight appendices are devoted to miscellaneous detail, including a rather rudimentary sketch on fission and another one on the nuclear reactor.

The flawless presentation, the emphasis on important points by indentation, itemization, and italics, and the careful editing add to the value of the book. For a mature reader it is indeed an unusually helpful guide through the mysteries of the atomic nucleus.

Gerhard Dessauer

Savannah River Laboratory
Aiken, South Carolina

About the Reviewer: Gerhard Dessauer, a Fellow of the ANS, holds degrees in chemistry and physics. He obtained his Ph.D. at the University of Rochester where he demonstrated proton-induced fission. After working for the Manhattan District's biophysical branch during the war, he joined General Electric's Knolls Atomic Power Laboratory where he made early contributions to the techniques of experimental reactor physics. In 1951 he joined the Du Pont Company to develop design information for the physics facilities to be installed at the Savannah River Laboratory. He is at present the Director of the Laboratory's Physics Section.