ments. The typography and binding are of high quality, but the book is not without errors in typography and assembly. There are a few work-ups, missing letters, and the like—but very few. It is impossible to tell which "E. Schwartz" wrote which article (cf. pp. x, 324, and 855). There is some overlapping and repetition among some of the articles. This cannot be avoided unless the editor deprives the authors of a degree of individuality. There is also the inevitable lack of overall organization which is an unavoidable premium paid for the benefits of an encyclopedia. Finally, in view of the publishers' statement in his prospectus: "the world's foremost authorities on radiation science . . ." are the authors of this encyclopedia, one cannot help noting that several of these foremost authorities are among the missing. Although it would have been nice to hear from them, their fields have been adequately covered by some who may be considered as lesser lights, but none the less competent.

" . . . a glass, where you may see the inmost part . . ." The editor has collected articles covering an extensive variety of subjects within the field. He has chosen the articles and authors to cover both theory and applications. He has arranged the material in a manner that makes it readily accessible. His "glass" is a good one. We share his hope that it will prove to be the best glass of all.

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About the Reviewer: A. C. Eckert is now in the Research Activity at Allison where he is concerned with energy-conversion problems. His graduate work at the University of Illinois was in analytical chemistry and X-ray diffraction, and about half of his subsequent time has been spent in these fields. His graduate research was on carbon blacks, and his subsequent experience included some graduate teaching on the side. The remaining time has been spent on such excursions as gas flow problems, technical personnel administration, and electrochemistry—particularly related to liquid-metal fused-salt systems.

Radioactive Dating. Proceedings of a Symposium held in Athens, 19 - 23 November 1962, jointly sponsored by the International Atomic Energy Agency and the International Council of Scientific Unions through the Joint Commission on Applied Radioactivity; published by the International Atomic Energy Agency, Vienna and distributed by the National Agency for International Publications, Inc., and UNESCO Publications Center, 317 East 34th Street, New York 16, New York, (1963) 440 pages, $8.50.

This book reviews present radioactive dating techniques through a series of thirty-one papers presented at the Athens Conference in November 1962. A good fraction of the leaders in the field were present and all of the papers have an authoritative ring.

Radioactivity has always been useful for dating, as has been clear from the beginning of the first decade of this century. But this application has gradually developed and been proliferated to the point that there are now many clocks and many techniques available. Although most of the thirty-one papers presented in this volume are research papers, they nevertheless give an up-to-the-minute view and presentation of the techniques—at least to the informed reader. The book is divided into four sections—the first on methodology and the last three on applications, first to geochemistry and geophysics, secondly to geology, and finally to meteorites. The methodology section has a paper on the half-life of C^{14}, another on counter techniques, a third on the rhenium-osmium clock, etc., all by leaders in the field. In the applications section for geochemistry, there's a very interesting paper on the natural variations in the ratio of U^{234} to U^{238} by D. L. Thurber, one on geochronology with Pb^{210} by E. D. Goldberg, another on the use of disequilibrium and thorium isotopes by R. Coulomb and associates, one on the long- and short-term geophysical processes using natural radioactivity by Lal of India and his associates, and two papers on radiocarbon dating and atmospheric circulation—one on radiocarbon dating of the ocean and another on measurement of atmospheric circulation by means of radiocarbon. In the applications to geology section and in the meteorite section, a dozen important papers are given.

A volume of this sort probably will be short-lived in terms of its timeliness, but it certainly will remain a valuable reference book for a number of years, for materials are collected here which are widely disseminated in the literature and several of them have not been published as yet. It, like the symposium it sprang from, brought together the daters and let them talk and work together for several days—so in reading this volume one is brought up-to-date. It is a kind of review in the sense that even though the papers are largely research papers they do make a good attempt to bring the reader in on the current status of the research.

Perhaps a word or two should be said about

some of the salient points made. One of the most striking new developments in the technique of radioactive dating is that of measuring the lapse of time after a meteorite falls. This technique rests on the fact that when the meteorite falls the atmosphere thereafter shields it from cosmic ray bombardment and, whereas a meteorite probably was in radioactive equilibrium before falling to the earth, it suddenly is thrown out of equilibrium, the more so as time passes after the fall. Thus the degree of disequilibrium gives what can be a quite accurate measure of the time since its fall or the age of the meteorite. This technique is somewhat similarly applied to measuring the time since breakup of whatever larger bodies may have given many of the meteorites. There are strange results from this technique in this respect—some meteorites appear to have had the cosmic rays shining on them for only a few million years, while others go well back into the billions. It is also surprising how old some of the meteorites in museums appear to be, thousands and tens of thousands of years having elapsed since fall. It leads one to wonder how they were so well preserved and in particular why the irons haven't rusted away.

Among the leaders at the conference were Cameron of the IAEA itself, Damon of Arizona, Fireman of the Smithsonian Astrophysical Observatory, Goldberg of La Jolla, Herr of Cologne, Hinterberger of Mainz, Hurley of M.I.T., Kohman of Carnegie Tech, Kulp of Columbia, Kuroda of Arkansas, Münnich of Heidelberg, Oeschger of Bern, Olsson of Uppsala, Reed of the Argonne Laboratory, Suess of La Jolla, Vinogradov of Moscow, Vogel of Groningen, and Zähringer of Heidelberg.

The International Atomic Energy Agency publications are assuming impressive importance in the scientific literature and this, their latest addition, is above their usual standards in quality. It also is comforting that it is published within one year of the time of the conference.

A particularly interesting paper on radiocarbon dating within the U.S.S.R. was read by Dr. A. P. Vinogradov in which the age of a Siberian mammoth is given at 11,700 ± 300 years, and it is concluded that the last inflow of water from the Sea of Marmora through the Bosporus occurred about 8000 years ago.

The newer methods of radioactive dating show the characteristic uncertainties of new methods but appear to be promising for the future. In particular the rhenium/osmium method for iron meteorites gives us hope where little else exists. And the thermoluminescence technique, beset as it is with many troubles, seems to have possibilities if the requisite understanding of the fundamental processes involved is gained as further researches are carried out. The paper on natural fission is intriguing. When one takes Dr. Kuroda's results and combines them with Dr. Oeschger's extremely sensitive counters, one sees possibilities of developing techniques which could be truly revolutionary, for the number of natural fission products is quite large and we are prevented from using them at the present time mainly because of the difficulty of measuring them.

It is a pleasure to recommend this book for the libraries of all radioactive daters and to all geophysicists, geologists and meteorite scientists who aim to keep their libraries current and up-to-date on dating geophysics.

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About the Reviewer: Professor Willard F. Libby, Nobel laureate in Chemistry in 1960, a USAEC commissioner from 1954 to 1959, winner of the Albert Einstein Medal in 1959, and now Professor of Chemistry at the University of California, has been a principal contributor to the field of radioactive dating.

Elementary Plasma Physics. By Conrad L. Longmire. Interscience Publishers (New York, 1963). 296 pages. $9.75.

The recent spate of books in plasma physics has been of generally high quality and this book by Longmire is no exception. It is based on a series of lectures given by the author at Los Alamos in 1956-1957. These lecture notes were widely distributed at that time and have been of great value to workers in the field. Now the author has made considerable revisions and additions to those notes and put them out in book form.

The major portion of the book is concerned with the derivation of plasma phenomena from the viewpoint of first-order orbit theory. In this method, one discusses the motion of individual particles in electric and magnetic fields, and then superposes all the particles to obtain the charge and current densities to be inserted in Maxwell's equations. This approach to the plasma equations offers one the easiest physical insight into the mechanics of a plasma. The author, who contributed considerably to this portion of the literature, is well qualified to discuss this approach and does it well. Thus, after an initial chapter in which the conservation laws of a plasma are derived in a