Nuclear Physics

Nuclear Interactions. Sergio DeBenedetti. Wiley, New York, 1964. xxiv + 636 pp. Illus. $16.

In the introduction to this work DeBenedetti remarks that the book was written primarily for his own benefit in collecting the principal ideas concerned with nuclear interactions. But many others, especially graduate students, will benefit from his labor, for the number of topics covered is remarkable. There are modern and detailed discussions on nuclear forces, nuclear models (with a strong emphasis on recent developments in pairing correlations), scattering, electromagnetic radiation, nuclear reactions, pion physics, and weak interactions. Sufficient background is developed so that those who have completed only one semester of a graduate course in quantum mechanics can understand the text. There are good introductions to the quantum mechanics of angular momentum, the Dirac equation, and Feynman diagrams.

The author has selected beautifully simple illustrative examples, which are always clearly explained. In my opinion these constitute the highest virtue of the book, and should make it a delight to lecturers seeking reference material.

DeBenedetti has attempted to present the experimental evidence for every physical idea discussed. As a result the book is an encyclopedia of the basic experiments of nuclear physics which should prove useful to experts in the field. The author also endeavored to present the mathematical proof for all equations in the volume. Toward this end he was quite successful, considering the wide scope of the manuscript. For several proofs, standard works such as Blatt and Weisskopf's *Theoretical Nuclear Physics*, are given for reference. Since the proofs thus treated are readily available in other books, their incorporation into this volume would have reduced its value, and the author was wise simply to refer to them.

There are a few theoretical points in the book which could be more clearly presented. The section on weak interactions, for example, may give the reader the impression that parity nonconservation can be attributed to the zero rest-mass of the neutrino. It should be pointed out more forcefully that, even if the free neutrino obeys the Weyl equation, this would not necessarily imply the nonconservation of parity in β-decay. Such points are far apart, however, and do not detract from the illustration of experiments.

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Chemical Analysis

Trace Analysis of Semiconductor Materials. J. Paul Cali, Ed. Pergamon, London; Macmillan, New York, 1964. x + 282 pp. Illus. $10.

In a day when the frontiers of chemical analysis are in the areas of trace analysis and high purity, it is interesting to note how seldom those areas are the subjects of books. Proponents of individual methods pursue in depth their particular favorites, but few appear willing to make, or are interested in, intercomparisons. Any book such as this one, which contains discussions of different methods, will therefore find a waiting audience. Furthermore, this book covers the field of semiconductor materials—the first field in which definite physical effects could regularly be ascribed to submicrogram amounts of trace elements.

The editor's own chapter on activation analysis, which accounts for half the book, is an excellent example of the format suitable for such a volume. Here we find not only thorough background information on the method but extensive tables of interferences and practical sensitivities. Of equal importance, and more unique, are capsule descriptions of actual experimental situations, catalogued first by matrix and later by element. The latter summaries will be of interest to those who apply activation to other fields. Although, at first glance, this summary seems to be based almost entirely on the traditional radiochemistry of precipitation coupled with occasional use of solvent extraction and ion exchange, it is of course merely indicative of the state of radiochemistry in 1961 and emphasizes the contributions still to be made in this area.

The last chapter applies the same general approach to the methods of absorption, fluorescence, and polarography, with considerable success. Although the text is much more abbreviated, the principles of the methods and the instrumentation are introduced, and specific examples in the semiconductor field are given. The chapter on mass spectrometry is more descriptive in nature, without the specific detailed examples—mirroring perhaps the lack of quantitativeness in the present state of the art. But this chapter defines the basis for operation of the method and serves to complement the other chapters. On the other hand, the chapter on emission spectroscopy is a major disappointment. The authors have presented another perfunctory literature review of the method rather than a critical synthesis of the art.

With the exception of the chapter on emission spectroscopy, the book should prove very useful to the trace analyst working in any area of the field. Although the text is more than 2 years out of date and the field is a rapidly changing one, the author's approach remains valid.

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Darwin's First Edition

On the Origin of Species. Charles Darwin. With an introduction by Ernst Mayr. Harvard University Press, Cambridge, Mass., 1964 (facsimile of the first edition, 1859). x + 502 pp. $5.95.

It was a very happy idea to publish a facsimile of the first edition of *On the Origin of Species*; the price of copies of the original edition has reached the thousand dollar bracket, and in contemporary literature all page-references are to the original pagination, which was not followed in previous reprints of the first edition. Now, with this very reasonably priced and beautifully produced book, not only historians of science but also biologists will have the opportunity of following the fascinating thought-trails, still far from fully explored, of that remarkable man Darwin.

Few if any persons are so well qualified as Harvard's Ernst Mayr to execute so helpfully and gracefully the delicate task of writing a worthy foreword to such a classic. Biologists and thinking general readers already owe him a great debt for his outstanding researches in the field of species formation, and also for his valuable demonstration of the need to abandon the