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.

PAUL GOLDHAMMER
Department of Physics,
University of Kansas

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.

W. W. MEINKE
Division of Analytical Chemistry,
National Bureau of Standards

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

old view that "types" are the real thing in biology, whereas they are in fact only an abstraction (often imaginary) because reality resides in varying populations and gene-pools. As Mayr has so rightly stressed in his invaluable *Animal Species and Evolution* (Harvard University Press, 1963), "The replacement of typological thinking by population thinking is perhaps the greatest conceptual revolution that has taken place in biology." Not the least remarkable thing about Darwin's theories is the way in which their cogency has actually been reinforced by that revolution. After all, in the realm of thought, Darwin himself was one of the most powerful and certainly the kindliest revolutionary that the world has seen, and the fruits of his work still have not been fully appreciated.

SIR GAVIN DE BEER
39 Shrewsbury House, Cheyne Walk, London, England

General Botany

Allgemeine Botanik. Kurzes Lehrbuch für Mediziner und Naturwissenschaftler. Wilhelm Nultsch. Thieme, Stuttgart, Germany, 1964. xii + 372 pp. Illus. DM. 9.80.

This short but comprehensive textbook of general botany approaches the plant through a consideration of its basic components. The first chapter is devoted to the molecular structure of the plant and its products. Within its 22 pages there are 66 chemical and structural formulas in addition to the numbered figures. This sets a pattern for the entire book, a pattern in which essential molecules, enzymes, metabolic pathways, and end products are graphically represented. Within the limitations of the book, considerable space is given to the chemical structure and significance of plant products of toxic and pharmacologic importance.

The next three chapters describe the physical, chemical, and morphological differentiation of protoplasm and the cell. The four electronmicrographs used to illustrate protoplasmic differentiation represent structures in *Euglena gracilis*. A systematic consideration of representatives of four phyla of the plant kingdom is covered in a short 25-page chapter, and this is followed by a chapter on plant organization, anatomy, growth habit, and differentiation. The structures and functions of leaf, root, and stem are presented in three chapters, which precede the 43-page discussion of the energy and chemical relationships involved in the essential activities of the autotrophic plant. A brief chapter is devoted to heterotrophy, including saprophytism, parasitism, symbiosis, and the adaptations of insectivorous plants.

Reproduction, the chromosomal basis of inheritance, the genetic code, phage and virus multiplication, and extrachromosomal inheritance receive proportionate attention. There is an important chapter on metabolic products, such as antibiotics and growth factors, and their influence on development. The final chapter deals with various tropisms exhibited by plants.

The book concludes with a listing of orders and representative families, a bibliography of ten items, and a 24-page index. The book fulfills its promise of a comprehensive textbook which presents its subject in present-day terms of modern technics and concepts.

CHESTER W. EMMONS
Medical Mycology Section, National Institute of Allergy and Infectious Diseases, National Institutes of Health

Polymer Chemistry

Macromolecular Synthesis. A periodic publication of methods for the preparation of macromolecules. vol. 1. C. G. Overberger, Ed. Wiley, New York, 1963. x + 81 pp. Illus. $4.75.

This excellent first volume of a new "syntheses" series, a series in the pattern set by *Organic Syntheses*, belongs on the book shelf of every practicing polymer chemist and in every science related library. The objectives endorsed by its editorial and advisory board are particularly noteworthy—"to provide trustworthy examples of polymer preparations for organic laboratory courses . . . [and to] provide help to industrial firms wishing to enter the field." It is proposed to include in future volumes of the series preparations of all types of monomers and polymers, including those of biochemical origin. Much credit for this volume must be given to Overberger who has submitted or checked 7 of the 19 preparations considered in the volume. Four of the 13 members of the editorial board and 1 of the 6 members of the advisory board have contributed or checked 9 of the 19 preparations. Obviously this represents great strength in reserve.

The preparations listed in volume 1 are illustrative mainly of recent novel developments in the field rather than of basic standard types. It is thus particularly timely and useful. There are preparations of five crystalline, isotactic, and syndiotactic vinyl polymers and preparations of one polycarbonate, one terephthalate, one cyclopolymer, two olefin copolymers, one polydisulfide, one 1-nylon, and two polycarbamates. Novel techniques are illustrated by an interfacial polymerization, a cyclopolymerization, an oxidative coupling polymerization, a catalytic air oxidative polymerization, and an aldehyde solvent polymerization.

Each preparation is described in terms of a preparative procedure (which has been checked independently and is therefore reliable), including data characterizing the polymer, notes, methods of preparation, and references. Unfortunately the last two sections are very incomplete with respect to most of the preparations. In the case of five preparations no references to the literature are given. The novice should not interpret this as indicating a lack of reliable reports that describe these processes or a lack of other valuable sources of information. The editor's acknowledgment to Sorenson and Campbell's *Preparative Methods of Polymer Chemistry* helps in part to alleviate this situation. In the same spirit, reference may be made to the two comprehensive volumes in the Houben-Weyl series, *Makromolekulare Stoffe*, volume 14, parts 1 and 2. It is hoped, however, that in future volumes the submitters will share their unusual knowledge of the literature through more detailed handling of this portion of their contribution.

The unusual demands for purity and for control of conditions placed on the experimenter in polymer chemistry makes this undertaking one of unique value. Every research scientist who is active in the field will have many occasions to be grateful to the editors and contributors for their devoted effort in helping to define these exacting and elusive specifications. Such devotion deserves the support of the community of polymer scientists, and I heartily endorse the appeal for submission of suitable preparations.

RICHARD H. WILEY
Department of Chemistry, University of Louisville