Book Reviews

Introduction to Radiochemistry. Gerhart Friedlander and Joseph W. Kennedy. New York: John Wiley; London: Chapman & Hall, 1949. 412 pp. $5.00.

Since its inception in the discovery by the Curies in 1898 that differences in chemical properties can be exploited to separate from pitchblende the two different radioactive elements polonium and radium, the field of radiochemistry has experienced an ever growing importance marked by two great accelerating discoveries—artificial radioactivity, in 1934, and nuclear fission, in 1939. It is now a popular and fertile province of research encompassing large territories of almost all branches of chemistry and of molecular, atomic, and nuclear physics, and even enjoys the ultimate mark of respectability: courses in radiochemistry are being offered by many of our universities.

The student of radiochemistry has long been without an adequate textbook, for the established references—the older works of Soddy; the classic treatises by Rutherford, by Meyer and von Schweidler, by Curie, and by Kohlrausch; the Cornell lectures of Hahn; and the admirable survey by Hevesy and Paneth—although still invaluable compendia of information on natural radioactivity, are all most severely dated. Friedlander and Kennedy have now filled this void with a fine and comprehensive book. Intended primarily for the student of chemistry, their volume should also prove extremely useful to students of physics, and to biologists, geologists, engineers, and others. It provides a modern, mainly descriptive, and simple though remarkably extensive account of radiochemistry and of much of nuclear physics as well. No previous knowledge of nuclear physics is demanded of the reader. Indeed, nuclear physics itself necessarily merits the greatest attention, and only some 60 out of 412 pages deal with essentially chemical matters. The selection of chemistry material is, incidentally just what should be acquired by any *physicist.*

The book is well written throughout and pleasantly free of errors. A great many references, fairly well organized, are included, and numerous skillfully contrived exercises, many with answers provided, enhance its value both for use in the classroom and for purposes of self-instruction. The figures are good, but no reproductions of cloud chamber photographs or photographic emulsion tracks are included—a regrettable omission in the reviewer's opinion, for such pictures, in addition to their scientific importance, have unique pedagogical value. Four appendices include useful reference data.

The appearance of this volume emphasizes the need for a modern laboratory manual, since a laboratory course in conjunction with lectures following this text should do much to complement and vivify the subject matter. It may also be remarked that the book is in no sense an advanced treatise, and the authors have wisely refrained from attempting to make it one. An advanced monograph on contemporary developments and problems in radiochemistry is sorely needed.

As an introductory text this excellent work by Friedlander and Kennedy can be highly recommended.

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The Transuranium Elements: Research Papers, 2 vols. Glenn T. Seaborg, Joseph J. Katz, and Winston M. Manning, Eds. New York: McGraw-Hill, 1949. 1733 pp. $15.00 a set.

The identification and first tracer chemical studies of a true transuranic element were announced in May, 1940; microgram amounts of pure solid compounds of a transuranium element were first prepared in August, 1942. The approximate deadline for much of the work included in this volume of the Plutonium Project Record is January 1, 1946, although some is more recent. The body of chemical and nuclear-chemical knowledge of neptunium, plutonium, americium, and curium contained in the 1,733 text pages of this book is impressive when it is viewed against this timetable.

The volume is important because, with a very few exceptions, it contains the sole scientific report of the chemistry of the transuranium elements written on the level of normal research journal publications that is available to the general body of scientists. It is fair to say that the detailed understanding of neptunium and plutonium achieved since May, 1940, as it is revealed here, approaches our present understanding of most common elements, and far exceeds the reliable information we have about many naturally occurring elements known to science for much longer periods of time.

As indicated, the book is a compilation of research papers which in the normal course of events would have seen journal publication. As would be true of any volume comprising all papers dealing with a single element or group of elements, *The Transuranium Elements* exhibits great unevenness. Notes such as are published in "Letters to the Editor," significant principally for historical reasons, are found side by side with papers as long as 45 printed pages, recording in detail work which was obviously pursued over a considerable period of time. Work that was involuntarily interrupted also contributes to the unevenness, as do the idiosyncrasies and varying degrees of experience of the many authors represented. Many of the papers meet the most exacting journal standards for concise clarity, but because of editorial choice and the absence of journal space limitations, the papers as a whole probably take more room than they otherwise might. In some cases this results in the reader's being given more information on important details than he might get in standard journal publications. One clear advantage this group of papers has over a compilation from normal journals is that errors

of fact and interpretation in early work have obviously been caught and eliminated at various stages prior to publication of the finished volume, so that it presents a considerable unanimity of opinon. This is not to say that other errors may not be revealed by later researches.

Approximately half of the papers may be classed as physical or nuclear-chemical in content, and half as chemical. Some three-quarters of the papers deal with plutonium, about one-sixth with neptunium, and only a few with americium and curium. Partly because of the comparative nature of some studies, papers dealing with the rare earths, radium, actinium, thorium, protactinium, and uranium are also found. Aside from the large body of data on the synthetic elements, the greatest contributions of the volume to other fields of science are techniques and instruments developed for nuclear-chemical studies, particularly with alpha emitters, and the demonstration of the possibilities for ingenious applications of microtechniques to problems in inorganic chemistry. The book also has a pedagogic value for research students, in demonstrating the applications of textbook material to actual laboratory problems, and the methods used to obtain scientific data in new situations.

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Traité de Zoologie: Anatomie, Systématique, Biologie: Oiseaux, Vol. XV. Pierre-P. Grassé, ed. Paris VI^{e}, France: Masson et Cie, 1950. 1164 pp. 6000 fr.

With the appearance of this thick volume all students of avian biology are aided in their work by a comprehensive treatise that is literally packed with useful information, well presented and amply illustrated, and accompanied by well-selected lists of references to the literature. Unlike the similarly comprehensive volume written by Stresemann some years ago, the present work is the product of a group of authors. The advantage of a group of specialists' pooling their information is often offset by a resulting lack of uniformity in approach and presentation, but the editor of this volume has overcome the lack to a remarkable degree, and the volume is free from the literary jerks and mental changes of focus usually found in such composite treatises.

N. Mayaud contributed six chapters, on skin and plumage, biology of reproduction, food, longevity, voice and nonvocal sounds, and behavior and social life; A. Portmann eight chapters, on skeleton, nervous system, sense organs, circulatory system, respiratory system, digestive tract, body temperature and warm-bloodedness, and postembryonic development; E. OEhmichen three chapters, on musculature, flight, and terrestrial locomotion, swimming, and diving; P.-P. Grassé two chapters, on the uropygial gland and the organization of social life; A. Rochon-Duvigneaud a single chapter, on eyes and vision; J. Benoir three chapters, on endocrine glands, urogenital system, reproduction-sexual characters and hormones in relation to the seasonal sexual cycle; R. Matthey one chapter, on chromosomes of birds; J. Pasteels one chapter, on embryonic development; F. Bourlière two chapters, on ecological factors and adjustments, and physiology of migration; J. Piveteau one chapter, on the origin and evolution of birds; J. Berlioz three chapters, on the systematic description of the subclasses, orders, and families of birds, geographic distribution, and general aspects and origin of migration; and E. Letard the final chapter, on domestic birds' origin.

The contents of the book are made readily accessible by a good index and a detailed table of contents. The illustrations and the text are well printed but the type of paper used is not uniform throughout the book. The volume should be of great use and value to workers in many and diverse fields that utilize avian materials in their studies, and deserves a wide distribution among scientific libraries.

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Survey of Biological Progress, Vol. 1. George S. Avery, Jr., ed. New York: Academic Press, 1949. 396 pp. $6.80.

This stimulating volume is the first *Survey of Biological Progress,* and is the result of an undertaking which its editors hope will be repeated annually. In the words of its editor-in-chief, it is designed to provide "a medium for integrated presentation of facts and thoughts from all fields of biology," "to offset in a certain measure the isolating effect of rapidly increasing specialization" and "to serve the biologist who wishes to be well-informed in fields marginal to or beyond his own special sphere of interests—fields he would have neither the time nor opportunity to follow systematically in the original literature." The editorial staff and the advisory board, along with the twelve authors and the institutions they represent, are indicative of the high standards of the articles included in the *Survey* and the dependability of its contents.

The volume includes eleven chapters, the first of which is a discussion by Harriet B. Creighton on "Teaching Biology Today"—a brilliant and challenging presentation of the general goals in teaching an introductory course in biological science. The remaining chapters are devoted to recent developments in a large area of biology, in some instances of fundamental sciences and in others of applied sciences.

Many chapters emphasize the influence of findings in one field on the interpretations of known facts in allied fields. The outstanding importance of cancer research and the aspects of cellular physiology to which it is related is indicated by the fact that 42 percent of that part of the volume relating to current research is devoted to a consideration of viruses, enzymes, genes, and antigens and their interrelations as well as their relationships to cancer problems. There are 594 references in the four chapters covering this large segment of the book.

In his stimulating chapter on "Genes and Gene Action," Bentley Glass shows how current researches on the nature of gene action are uniting the "phenomena of classical genetics, cytoplasmic inheritance, cellular differentiation, and enzymatic adaptation." After summarizing Sonneborn's view that "cancer may result