Book Reviews

Spectroscopy at Radio and Microwave Frequencies. D. J. E. Ingram. Philosophical Library, New York, 1956. 332 pp. Illus. $15.

The rapid and extensive development of spectroscopy in the radio-frequency and microwave regions during recent years has created an important demand for review articles and textbooks in these fields. This most recent addition to the still limited number should be welcome and useful. The author sets out to cover essentially all radio-frequency and microwave spectroscopy at a level appropriate for the nonspecialized worker or student of physics. He achieves worth-while but limited success, partly because this is a small book and partly because a penetrating treatment and optimum choice of material in such a wide range of fields would require slightly superhuman ability. The book does consider and discuss techniques and elementary theory of microwave spectroscopy of gases, electronic paramagnetic resonance, ferromagnetic resonance, molecular and atomic beams, nuclear paramagnetic resonance, nuclear quadrupole resonance, and their applications to various fields. It provides useful, brief discussion and a handy summary of results obtained as well as a liberal supply of references.

The book has several faults, which I will mention in order of increasing importance. First, the author is apparently not sufficiently familiar with the literature in some areas of the wide fields he covers to specify unerringly the sources of various contributions to the developments discussed. This fault is probably important only to those contributors who may feel slighted and sensitive. Second, his lack of perspective is disappointing. To quote from the preface, he evidently planned "a broad approach" to radio-frequency and microwave spectroscopy, and "a critical review." The approach is broad in that he mentions a wide variety of topics, but hardly critical or penetrating. Nor is the treatment balanced in the amount of space given to various topics. Molecular and atomic-beam spectroscopy is treated in 10 pages and nuclear paramagnetic resonance, in 20, whereas electronic paramagnetism is allotted nearly 70. This makes the treatment of electronic paramagnetic resonance particularly good, but that of some other fields distinctly minimal. Finally, there are some important errors. For example, Table 9.1, which summarizes the usefulness of the various techniques in yielding physical information, contains both misleading and incorrect statements. Similarly, the paragraph on measurement of nuclear magnetic moments by Zeeman effects in gaseous spectroscopy is almost completely incorrect. Such errors can be very misleading to someone who dips casually into this volume for orientation and guidance.

In spite of such definite limitations, the book is interesting and informative. It should be helpful to anyone wanting a quick view of modern research in radio-frequency and microwave spectroscopy, and also to those who are somewhat more deeply interested in the active and valuable field of electronic paramagnetic resonance.

C. H. Townes

Columbia University

Therapeutic Use of Artificial Radioisotopes. Paul F. Hahn, Ed. Wiley, New York; Chapman & Hall, London, 1956. 414 pp. Illus. $10.

Despite the availability of radioactive materials, Paul Hahn points out in the preface of this book that "tremendous strides" in the treatment of malignant disease have not been made. Criticism of past research is not a feature of this book, although Hahn stresses the need for new and ingenious ways to use isotopes in therapy.

The editor is the senior author of chapters dealing with the production and handling of isotopes, the use of radioactive colloids in chronic leukemia, and the use of silver-coated radioactive colloids as adjuvants in the surgical treatment of bronchiogenic carcinoma. Introductory chapters, written by G. Hevesy, C. W. Sheppard, and by A. Aaran Yalow, dealing with the problems of therapy, physics, and dosimetry help prepare the reader for the more practical chapters which deal with particular facets of radioisotope therapy in man. D. L. Tabern's chapter dealing with the availability and procurement of isotopes includes photographs of the forms necessary to secure radioisotopes from the U.S. Atomic Energy Commission.

Hymer L. Friedell and Paul Salerno present the one chapter based only on research data in laboratory animals. In this the differences in the distribution of radioactive materials in the liver, spleen, and bone are correlated with some of the biologic effects of mixtures of radioactive materials. Other chapters deal with the techniques of radioactive isotope therapy which have been used with varying degrees of success in human beings. Edwin E. Osgood is the author of a chapter which discusses in detail the use of phosphorus-32 in the treatment of leukemia and polycythemia. Osgood does present follow-up statistics for a large group of treated patients.

The techniques of using radioactive colloids is emphasized in this book. J. H. Muller of Switzerland discusses the intraperitoneal application of radiocolloids in patients with neoplasms involving the peritoneum. Gould A. Andrews of the Oak Ridge Institute of Nuclear Studies discusses the treatment of pleural effusion secondary to neoplasms with radioactive colloids. These chapters outline well the techniques for the use of radioactive colloids for the therapy of serous effusions secondary to neoplasms. The use of radioactive colloids to treat serous effusions secondary to neoplasms is more widely accepted than is the local interstitial use of radioactive colloids in and adjacent to neoplasms.

Separate chapters by authors with unique experience in using radiocolloids in carcinoma of the uterine cervix and carcinoma of the prostate are presented. The use of radioactive colloids interstitially in tumors and adjacent tissue may have value alone or when combined with other types of therapy such as surgery. Uniform distribution of the colloid in tumor and adjacent tissue is difficult to achieve. Often the uptake of the interstitially administered material is less in nodes containing large aggregates of tumor than it is in normal lymph nodes. In a chapter dealing with the use of radioactive colloids in carcinoma of the lung, Hahn recommends the techniques as an adjuvant to surgical treatment. The authors' collective experience with radioactive colloids is extensive and the record of this experience is perhaps the best part of this book.

Several of the chapters are written by British scientists as follows: D. W. Smithers, D. M. Wallace, and N. G. Trott discuss their use of bromine-82 in an intraluminal rubber bag to treat carcinoma of the urinary bladder. The only chapter dealing entirely with nonneoplastic lesions is that on the treat-

ment of thyrotoxicosis by radioiodine by N. B. Myant. E. E. Pochin writes the chapter on the use of iodine-131 in the treatment of thyroid carcinoma. M. Lederman and W. K. Sinclair describe application of beta and gamma emitters to superficial lesions. Special emphasis is given to the therapy of superficial lesions of the eye in this chapter.

The use of small "seeds" of cobalt-60 and gold-198 locally is discussed by U. K. Henschke. G. H. Fletcher is the author of a chapter dealing with the use of cobalt-60 as an external radiation source.

The emphasis of this book is on the techniques and effects of artificial radioisotopes as internal emitters. Too few of the authors present follow-up data for sizable groups of patients treated. Although the techniques may not be used in the same fashion as they are presented, the experience recorded will help direct further efforts in therapy with radioactive materials.

RICHARD L. SWARM
National Cancer Institute

The Biochemistry and Physiology of Bone. Geoffrey H. Bourne, Ed. Academic Press, New York, 1956. 875 pp. Illus. $20.

This treatise has been gathered from the contributions of numerous authors from many countries and with diverse academic and scientific associations. It exemplifies the wide range of modern interest in the study of bone and related structures and recapitulates the long-standing concern with, and appreciation of, the complexities of these tissues in comparative zoology, general anatomy and histology, embryology, growth and development, experimental research, and pathology. These studies have been considered by the various authors in separate sections which are more or less comprehensive. This results in a certain degree of overlap which, though inevitable, is not necessarily disadvantageous.

The primary constituents of bony tissues are reviewed from the standpoint of anatomy only in the broader sense of bone types and development. The more particularized discussion of cancellous and compact bone as organized structures is based on research with the modern tools of biophysics, chemistry, and histochemistry. Ground substance of connective tissue and cartilage, the organic matrix of bone, collagen fibers of connective tissue, and the ultrastructure and distribution of mineral salts represent a few of these special studies. The osteoblast and osteoclast are discussed from the standpoint of general cytology and also on the wider basis of histochemistry and physiology. The role of phosphatase, the occurrence of citric acid, the process of calcification, and autoradiographic features of bone formation and growth are described in the human embryo and fetus, in tissue culture, and in relation to structural and physiologic controls of growth and development. Repair and transplantation effects with induction form a related, if separate, consideration.

The effects of vitamins A, C, and D on fibers, ground substance, cartilage, and bone are fully discussed, both in their manifestations when they are deficient and also for the additional information that can be gained from the effects that their lack or excess have in broader fields of bone chemistry, physiology, and biology.

The hormones including ovarian, testicular, and adrenal cortical steroids, the anterior pituitary, thyroid and parathyroid regulation of skeletal growth, development and homeostasis are well presented. Many of these features are necessarily experimental and based on comparative studies, as are the effects of radioisotopes and external and internal irradiation. The last section has more detailed clinical data than do other sections of this treatise and includes a more comprehensive survey of marrow and hematopoietic tissue as affected together with bone under a wide range of conditions. The mark of the atom is well documented in other chapters but finds one of its more interesting and important expressions in the sections on osteodysplasia and neoplasia associated with radiation effects.

Relations between electrolyte imbalance, matrices, cells, aging processes, and pathologic calcification are given general consideration. This work is a general and comprehensive one and is not primarily designed to present the pathology of bone and dental structures, even though alterations in their biochemistry and physiology are essentially reflections of such processes.

The illustrations, tables, and bibliography are good and cover the immense field well. The treatise can be recommended for the importance it should have for any discipline concerned with the subject of bone and related structures.

RAYMOND GETTINGER
St. Vincent's Hospital, New York

Photosynthesis and Related Processes. vol. II, pt. 2. *Kinetics and Photosynthesis*; addenda to vol I and vol. II, pt. 1. Eugene I. Rabinowitch. Interscience, New York, 1956. 877 pp. Illus. $18.50.

With this volume Eugene I. Rabinowitch brings to a close his comprehensive review, of which volume I was published in 1945 and volume II, part 1, in 1951. The present book completes, in chapters 31–34, the discussion of kinetics of photosynthesis, with chapters on the temperature factor, the pigment factor, and various time effects, including induction phenomena and the effect of intermittent light. The rest of the book consists of addenda to the previous volumes, with chapters on two areas of knowledge in photosynthesis which have been greatly enlarged in recent years: photochemistry of chlorophyll and the chemical path of carbon dioxide. A final chapter, covering a number of topics, brings all phases of the review up to date as of 1955.

By means of the addenda the author has succeeded admirably, both in completing his intended broad coverage of subject matter and in producing an up-to-date work. The difficulties to be overcome in achieving these objectives will be appreciated by those familiar with the recent rapid progress in research in photosynthesis. Moreover, it would seem that this final volume has appeared at an opportune moment. The chemical pathway of carbon in photosynthesis is just becoming clearly known, while the mechanisms of the primary photochemical reactions and of oxygen evolution from water remain subjects of speculation built around scattered but promising bits of evidence.

The author has held to his policy of discussing all alternative theories and significant experiments. One result of this is that the final volume brings the entire review to more than 2000 pages. While some of the pages of earlier volumes could, no doubt, be eliminated at this date, the organization of the complete work is such that the two previous volumes must be available to permit full use of the present one as a reference work. However, in some sections recent progress so outweighs earlier work that reference to the first two books would be chiefly for historical reasons. Reference use is facilitated by the inclusion of a rather detailed table of contents and author index for this volume, and a 66-page subject index for all three volumes.

Progress in the past decade in elucidation of the chemical path of carbon in photosynthesis is described in some 70 pages. Unfortunately, some of the arguments which led to the present form of the carbon reduction cycle are nearly lost in the account of the interesting historical development. For example, the support given the proposed sugar phosphate rearrangements by the sugar degradation data on page 1672 is never fully discussed, although these rearrangements are of key importance in the cycle.

Among the many interesting topics reviewed in chapter 37, I shall mention, here, only the very significant discoveries regarding the structure and composition of chloroplast and subchloroplast particles. Electron miscroscopy has been particularly revealing in this connection,