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.

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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.

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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,

and a number of micrographs have been beautifully reproduced in this chapter. This work has inspired a number of interesting proposals for the structure of the photochemical apparatus and its mechanism of action.

The book concludes with a lucid epilog summarizing the current status of knowledge of photosynthesis. This section includes four more outstanding electron micrographs of chloroplast sections. The author's expressed hope that this monograph will not rapidly become obsolete seems well justified. Even if progress in our understanding of photosynthesis continues at its present rapid pace, it is likely that this volume will be useful to the research worker for a number of years and will, in fact, contribute substantially to that progress.

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International Review of Cytology. vol. V. G. H. Bourne and J. F. Danielli, Eds. Academic Press, New York, 1956. 570 pp. Illus. $11.50.

This is the fifth volume in an annual series whose aim, as it is expressed in the editor's foreword, is to survey "the whole of cytology and cell physiology in order to enable those interested in cell biology to form more easily a unified concept of the field." Fourteen independent reviews, dealing primarily with animal cells or microorganisms, are included. These papers encompass broad problems of cellular organization in relation to metabolism, growth, development, differentiation, and heredity. Structural patterns are considered at the molecular, particulate, and cellular levels; functional relations are stressed throughout the book, with reference to underlying physical or chemical mechanisms. The contributors have been selected from seven different countries; by this criterion, "the *International Review of Cytology* has become increasingly international." It has also become increasingly expansive over the years.

The individual contributions include topics as diverse as the chemical composition of the bacterial cell wall (C. S. Cummins) and the cytology of spermatogenesis (V. Nath). There are also articles dealing with intracellular *p*H (P. C. Caldwell), activity of enzymes in red cells (T. A. J. Prankerd), uptake and transfer of macromolecules (A. M. Schechtman), protoplasmic contractility in relation to gel structure (D. Marsland), the acrosome reaction (Jean Dan), and cell secretion (L. C. U. Junqueira and G. C. Hirsch), which reflect many different aproaches to problems of cell physiology. Reviews on theories of enzyme adaptation (J. Mandelstam) and cytophotometry in the study of nuclear DNA (R. and C. Vendrely) consider problems of special interest to geneticists. In addition, there are reviews dealing with the use of labeled antibodies in histochemistry (A. H. Coons) and with the structure and properties of cellular organelles, including mitochondria (J. W. Harman; W. Andrew) and cytomembranes (F. S. Sjöstrand), that reveal current interests and activities in cytochemistry and electron microscopy. Obviously, there is something here for almost every cytologist, *chacun à son goût*.

As is usual in a compilation of this type, the individual contributions vary greatly with respect to breadth of literature survey and intensity of analysis. At one extreme, little more is recorded that the historical background and a catalog of recent findings; at the other, one is presented with a thoughtful evaluation of current information and a perspective of unsolved problems of general interest. There is a measure of overlapping in coverage of subject material (in accordance with a stated editorial policy), which serves to bring into sharper focus areas of conflicting opinion (the reality of the mitochondrial membrane, the function of the acrosome, and so forth) and to emphasize the need for further exploration. The reproduction of electron micrographs, although reasonably good in this book, must be better in future volumes if the reader is to be privileged to assess critically the pictorial evidence on which are based important conclusions and generalizations about extremely fine cellular structure. Typographic errors are relatively few, but occasional lapses in respect to clarity of expression and precision of scientific terminology could have been avoided through more rigorous editing.

Despite minor imperfections, this book might profitably be studied by every student of cellular biology who seeks information about accomplishments in areas beyond his special sphere of research activity. The *Review* is intended "to emphasize the unity of cytology," and cytologists will probably agree that these 14 papers serve to illustrate the diversity of techniques and talents now being utilized in the ever-widening search for a better understanding of the properties of the living cell.

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New Books

National Science Foundation, Sixth Annual Report for the Fiscal Year Ended June 30, 1956. National Science Foundation, Washington, 1956 (order from Supt. of Documents, GPO, Washington 25). 189 pp. $0.75.

Atoms and the Universe. An account of modern views on the structure of matter and the universe. G. O. Jones, J. Rotblat, G. J. Whitrow. Scribner's, New York, 1956. 254 pp. $4.50.

Analytical Pathology. Treatises in the perspective of biology, chemistry, and physics. Robert C. Mellors, Ed. Blakiston Div., McGraw-Hill, New York, 1957. 477 pp. $12.

Nonparametric Methods in Statistics. D. A. S. Fraser. Wiley, New York; Chapman & Hall, London, 1957. 299 pp. $8.50.

Modern Introductory Physics. Ira M. Freeman. McGraw-Hill, New York, ed 2, 1957. 497 pp. $6.

Fundamentals of Physics. Henry Semat. Rinehart, New York, ed. 3, 1957. 914 pp. $8.

XVth International Congress of Pure and Applied Chemistry. Main Congress lectures and lectures in the sections. Birkhauser, Basel, 1956. 240 pp. F. 32.

Symposium Sulla Eparina. Milan, 19 December 1955. Organizzato dalla Lombarda di Scienze Mediche e Biologiche. Stamperia Cesare Tamburini, Milan, 1956. 263 pp.

College Writing. A functional approach to college composition. Cecil B. Williams and John Ball. Ronald Press, New York, 1957. 475 pp. $3.75.

Quantum Chemistry. An introduction. Walter Kauzmann. Academic Press, New York, 1957. 744 pp. $12.

The Enjoyment of Mathematics. Selections from mathematics for the amateur. Hans Rademacher and Otto Toeplitz. Translated by Herbert Zuckerman. Princeton University Press, Princeton, N.J., 1957. 204 pp. $4.50.

Microcalorimétrie. Applications physicochimiques et biologiques. E. Calvet and H. Prat. Masson, Paris, 1956. 395 pp. Paper, F. 4500; cloth, F. 5200.

Integrated Anatomy and Physiology. Carl C. Francis and Gordon L. Farrell. Mosby, St. Louis, ed 3, 1957. 641 pp. $5.85.

Electrical Measurements and Their Applications (based on *Advanced Electrical Measurements,* 1932, 1941). Walter C. Michels. Van Nostrand, Princeton, N.J., 1957. 331 pp. $6.75.

Climate and Economic Development in the Tropics. Douglas H. K. Lee. Harper (for the Council on Foreign Relations), New York, 1957. 182 pp. $3.50.

The Grenville Problem. Royal Society of Canada Special Publs. No. 1. James E. Thomson, Ed. University of Toronto Press and The Royal Society of Canada, Toronto, 1956. 119 pp. $3.95.

Plant Propagation. John P. Mahlstede and Ernest S. Haber. Wiley, New York; Chapman & Hall, London, 1957. 413 pp. $7.50.

How to Prospect for Uranium. Hubert L. Barnes. Dover, New York, 1956. 117 pp. $1.

Handbuch der Physik. vol. XXXV, *Atoms I.* 454 pp. DM. 99.50. vol. XXXII, *Structural Research.* 603 pp. DM. 144. S. Flugge, Ed. Springer, Berlin, 1957.

Why Wages Rise. F. A. Harper. Foundation for Economic Education, Inc. Irvington-On-Hudson, N.Y., 1957. 124 pp. $1.50.