printed on glossy paper, and the quality of the illustrations is to be commended.)

The section on aeronautical applications includes a description of navigational instruments, gyro-verticals, rate-of-turn indicators, and automatic pilots. Naval gunnery, aircraft bombsights, gyroscopic gunsights, and the control of torpedoes and guided missiles are discussed in the section on military applications. This section is understandably brief, although the automatic pilot mechanism of the V-2 is described in some detail. References are given throughout the book and a bibliography is included in the appendix.

The book is recommended as a reference to anyone wishing to learn the details of the practical applications of gyroscopic principles. It is in no sense a textbook and the description of "why" the gyroscope works is not as complete or satisfactory as that of "how."

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Fundamentals of Radiobiology. Z. M. Bacq and Peter Alexander. Academic Press, New York; Butterworths, London, 1955. xii + 389 pp. Illus. $6.50.

This book is a stimulating review of radiation biology as it appears to a physiologist and a radiation chemist. The first four chapters deal with the elements of radiation physics and with the radiation chemistry of water and of large molecules. They are a succinct and well-balanced review of the basic principles and recent developments in these fields. The emphasis in much of the remainder of the book is on the early biochemical and physiological effects, especially in mammals. Considerable space is devoted to protective substances and means of influencing recovery. The view is developed that many of the biological effects are mediated by radicals, especially HO_2, and that the original damage is often in the cytoplasmic organization, quite possibly in the structures that serve to keep the various enzyme systems and substrates partially separate from one another. This book is the most complete presentation of this point of view available and obviously contrasts sharply with interpretations that emphasize the role of the nucleus and the target theory. One may disagree with some of the conclusions but must still recognize that it is a thought-provoking account well worth careful reading.

However, there are certain shortcomings that cannot be entirely ignored. The proofreading was not done very carefully. More data should have been given on the toxicity of compounds, such as cysteamine, that are recommended as practical protective agents. One could wish that more effort had been made to relate the biochemical and physiological findings with histological and cytological observations. For example, it would be useful to know how far some of the biochemical effects could be interpreted as incidental consequences of cell death.

The chapter on cytology and genetics is to a very large extent confined to the Koller-Darlington point of view. This is not the place to detail the objections that can be raised to their position. The real difficulty arises from the misleading one-sidedness of the chaper. A reader unfamiliar with the field would hardly realize that there was another point of view with a considerable group of adherents. Thus a paragraph is devoted to Lane's intensity experiment without mention that three groups of workers have failed to confirm his work and have severely criticized portions of it. It would have been better to have omitted this chapter entirely than to have given such a misleading account.

Despite such shortcomings, the book is an important addition to the literature of radiation biology and should be read by all who are interested in this field.

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The Nucleic Acids. Chemistry and biology. vol. I. Erwin Chargaff and J. N. Davidson, Eds. Academic Press, New York, 1955. xi + 692 pp. Illus. $16.80.

To surpass an excellent little compendium entitled *The Biochemistry of the Nucleic Acids,* its author would have to enlist a constellation of experts and somehow contrive to distill from the separate work of their several minds an organized treatment of this ever-growing topic. With the aid of an equally illustrious fellow-editor, that British author has succeeded in accomplishing these things in volume I of what promises to be the classic reference book in the nucleic acid field.

In the first volume the organic and physical chemistry of the nucleic acids and their constituents and the distribution in nature of the component purine and pyrimidine bases are thoroughly considered. A later volume is to deal with the biological distribution and functions of the nucleic acids, their biosynthesis and that of their constituents. Except for the compact little book mentioned, there has been no treatise issued in this field for almost 25 years. It might be best to indicate for prospective readers the scope and character of this rather expensive new book rather than attempt high criticism of what is, after all, the only work of its kind.

A short introduction by the editors builds a historical framework that helps to provide perspective and organization for the contributed chapters that follow. W. G. Overend and M. Stacey now begin to weave the story of the nucleic acids by telling the history and distribution of the sugar components. There follows a guide to the preparation and properties of ribose, deoxyribose, and related compounds, complete with a table giving the optical rotation and melting point of more than 200 derivatives. The purines and pyrimidines are dealt with in a chapter by A. Bendich that includes a good survey of their physical and chemical properties. The classic synthetic work of the 1890–1930 period is made accessible and integrated with modern work in a manner applicable to future problems of synthesis of purine or pyrimidine intermediates, analogs, and coenzymes, for example, those bearing isotopic constituents.

In Chapter 4 the more complex chemistry of the nucleosides and nucleotides limits J. Baddiley more sharply to the past and present. The difficult work that has been done in this area is competently described, and some attempt is made to discuss the principles, possibilities, and limitations of making conversions in these more complicated molecules. Isolation from nature (thrice capitalized: *Nature*) has a somewhat awesome aspect in this chapter; thymine deoxyribose-3-phosphate is called "unnatural" since it has not been isolated, although it is certainly contained in deoxyribonucleic acids (DNA). The biochemistry of the nucleotide coenzymes is well represented, although only briefly; it does not appear that this subject will be taken up elsewhere in the two volumes.

There follow several chapters dealing with methodology in analysis and separation of nucleic acids. In a short one, H. S. Loring describes experiences with the hydrolysis of nucleic acids and some of his own methods for base analyses of ribonucleic acids (PNA) by precipitation and spectrophotometry. Data are given for yeast, tobacco mosaic virus, mitochondrial and microsome, PNA composition. The ion-exchange chromatography of the bases, nucleosides, mono- and poly-nucleotides is discussed with brilliant clarity in a veritable manual of methods by W. E. Cohn. The principles and alternative approaches included should certainly make this useful for those encountering new separation problems. A treatment of paper chromatography of bases and nucleosides by G. R. Wyatt follows; methods of hydrolysis are critically examined, and there is much information about choice of solvent and quantitative technique. This author should receive special praise for his effi-

cient inclusion of an enormous number of helpful clues to simplification and variation, useful facts, and warnings about pitfalls, in a remarkably readable account. A brief discussion by J. D. Smith makes the reader acquainted with the up-to-date electrophoretic separations so useful especially for nucleotides. By way of comparative methodology, a chapter by Dische gives a glimpse into a glass-windowed analytic laboratory wherein one can judge the range, sensitivity, and sources of error of a series of alternative colorimetric methods for determining the sugars, bases, and phosphorus of nucleic acids and nucleoproteins.

A long chapter by Chargaff and another by his colleague F. Magasanik deal with the isolation, purification, characterization, preservation, and denaturation, and with the regularities in composition, of the DNA's and PNA's, respectively. The thorough discussions include most of the reliable available data on analyses of animal, plant, bacterial, and virus nucleic acids. Here at long last is an editor who believes in the retention of individuality, for almost every "long view" in his chapter is flavored with figurative expression or whimsy. To borrow his manner, one might say that every glance upward from his microscope is marked with a genial chuckle or a sly grin.

Evidence is impressive in the section by D. M. Brown and A. R. Todd that the contribution of the organic chemist to biochemistry can be (both figuratively and literally) synthetic as well as analytic. Carrying on where Baddiley left off, these authorities cover the important direct chemical approaches that have refined our knowledge of the intranucleotide linkages. D. O. Jordan gives a clear, well-illustrated picture of the physical properties, shape, size, and organization of nucleic acids, in both the dry and the dissolved state. The important dissociation, optical diffraction, scattering, and flow parameters are considered in themselves and as they are affected by *p*H or ionic strength. Light absorption and dichroism are covered by G. H. Beaven, E. R. Holiday, and E. A. Johnson with inclusion of tables and curves bearing much standard and basic data. Finally, in a comprehensive review of all the depolymerases, hydrolases, phosphatases, deaminases, and oxidases affecting nucleic acids and their components, G. Schmidt provides an impressive reference work.

From one-third to well over one-half of the cited literature references are dated 1950 or later, and another one-fourth are from the preceding 5 years, in the various chapters; there are a total of 300 or more in several cases. Copious cross references have been provided; as in so many books a large part of these are to whole chapter numbers, an inconvenience since only 15 out of more than 600 pages show the number of the chapter at which one is looking.

The completed work cannot fail to be a major source book and basic reference. It seems to have a coherence and integration that are unexpected for a complex of so many sections and retains most of the advantages derived from purifying a large body of literature through the minds of active contributors.

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Radioisotope Conference, 1954. vol. I, *Medical and Physiological Applications.* Proc. Second Conference, Oxford, 19–23 July. J. E. Johnston, Ed. Academic Press, New York; Butterworths, London, 1954. xi + 418 pp. Illus. $10.80; vols. I and II, $16.

The Second Radioisotope Conference was held in Oxford in July 1954. Forty-six papers record current research in which radioisotopes have been utilized for varied problems in the medical, biochemical, and agricultural sciences. The conference was international in participation, and an examination of this volume illustrates the numerous applications of radioisotopes to medical and biochemical problems.

Half of the papers are of interest primarily to those concerned with therapeutic and diagnostic applications of radioisotopes. Six papers illustrate applications of radioisotopes to problems in plant nutrition and plant physiology. The remainder of the papers illustrate the applications of radioisotopes, principally C^{14}, I^{131}, and tritium, to biochemical problems. The research presented in most cases was current, and in some instances the results were only preliminary. Prompt publication of the volume has been achieved, which enhances the value of the papers. In addition, the discussions occasioned by the presentation of each paper have been included and are of considerable interest.

It is my opinion that only a few papers in this volume will be of direct interest to any one person, owing to the wide range and specialized nature of the applications of radioisotopes that have been covered. However, the majority of the articles are readily understandable to the nonspecialist, and as a result, a perusal of this volume may provide one with useful ideas for the application of radioisotopes to new problems in varied fields.

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The Plant Quarantine Problem. W. A. McCubbin. vol. IX of *Annales Cryptogamici et Phytopathologici.* Frans Verdoorn, Ed. Ejnar Munksgaard, Copenhagen (U.S. distr.: Chronica Botanica, Waltham, Mass.) 255 pp. $4.80.

W. A. McCubbin has done an outstanding job of presenting and reviewing the various aspects of plant quarantines, including their biological background, social and economic relationships, legal features, and administration. There is also an over-all appraisal of the plant-quarantine problem and a discussion of quarantines from the international standpoint. A concise historical summary of federal quarantines that have been promulgated on account of plant diseases is given in an appendix.

The subject matter is well organized, clearly presented, and easy to read. The book is arranged and indexed to facilitate ready reference. It is a valuable addition to the reference literature on this subject, particularly since it represents the first time that the entire field of plant quarantines has been covered in one volume.

The author is exceptionally well qualified to discuss all phases of the plant-quarantine problem, having had more than 30 years experience in the enforcement of state quarantines as well as federal foreign and domestic quarantines. During this period he was engaged in both administration and actual enforcement in the field. This background has enabled him to present his subject so that the book not only should be useful as a reference to plant regulatory workers, teachers, scientists, and similar groups but also should be of interest to the layman who is affected by plant quarantines.

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Glass Reinforced Plastics. Phillip Morgan, Ed. Iliffe, London; Philosophical Library, New York, 1954. vii + 248 pp. Illus. $10.

This volume contains 15 chapters, each written by a separate contributor, arranged to cover the various phases involved in the manufacture and use of glass-reinforced plastics. These products constitute a relatively new class of materials, which are finding increasing applications in industry. The coverage includes glass-fiber forms and properties, chemistry of the usable resins, commercial fabrication of the desired shapes, and industrial applications.

Glass fibers offer several advantages