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-