reaction types outlined in the synopsis, presumably to illustrate further the various types of rearrangements under consideration and serve little purpose. The sections on mechanisms are essentially sterile since with few exceptions no consideration is made of the driving force for the reaction. For example, on page 29, the pinacol rearrangement is formulated to proceed by way of two discrete carbonium ions with no indication of the role played by the oxygen in charge delocalization. The discussion is largely one of "arrowisms" and this with only partial regard for the convention that curled arrows represent the direction of electron flow. That is, in this work, both dotted- and solid-line arrows are used simultaneously, the dotted-line arrows to represent movements of groups or atoms and the solid-line arrows to represent the movements of electrons. Not surprisingly, errors arise from the use of this cumbrous and pedantic mode of presentation (see, for example, the decomposition of the carbonium ion II in the above-mentioned pinacol rearrangement). A further serious deficiency is the basically erroneous approach to conformational analysis wherein the route of the reaction of a conformationally flexible compound is attributed to a conformational property of the compound in the ground state rather than to the relative electronic and conformational properties of the possible transition states involved (see, for example, page 37). This is particularly unfortunate in view of the lack of references to the literature and the didactic style of presentation. The sections on applications present, in a generalized form, lists of the various types of possible transformations without any consideration of either limiting or complicating factors.

Nevertheless, the book is of definite interest to an *advanced* student of organic chemistry who may wish to exercise simultaneously his knowledge of chemical French and of reaction mechanisms (the latter necessarily obtained from a more sophisticated source). The volume can also serve as a useful handbook for a practicing chemist who may wish to check on some of the previous experience related to the type of rearrangement or isomerization at hand. Certainly, the amount of recent chemical literature which has been compressed into this volume renders it a valuable contribution to the chemical literature.

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The Nucleic Acids. Volume III. Edited by ERWIN CHARGAFF, Department of Biochemistry, Columbia University, New York, N.Y., and J. N. DAVIDSON, Department of Biochemistry, University of Glasgow, Glasgow, Scotland. Academic Press Inc., 111 Fifth Avenue, New York 3, N.Y. 1960. xvi + 588 pp. 16 × 23.5 cm. Price, $18.00.

Although knowledge of the chemistry and biological importance of the nucleic acids has made rapid advances since 1955, when the first two volumes of this series were published, the editors have felt that a new edition is not yet justified. They have therefore decided to provide a "diagonal supplement," made up of a selection of chapters which would cut across the systematic arrangement observed in the preceding volumes. The topics chosen for Volume III were those that had not received sufficient emphasis before, or that had acquired particular importance since the publication of Volumes I and II.

The first six chapters, 29 to 34, discuss topics related to Volume I, which dealt with the physical and chemical properties of nucleic acids. Sadron critically reviews the literature on deoxyribonucleic acids as macromolecules, with emphasis on the uncertainties involved in interpreting light scattering, sedimentation and viscosity measurements. Shugar provides a comprehensive discussion of the photochemistry of nucleic acids, and includes a list of reviews on photochemistry and radiation biology. Khorana first deals with the nomenclature of polynucleotides, and then provides excellent discussions of the chemical and enzymic syntheses of ribo- and deoxyribopolynucleotides. The review of the chemistry of the nucleic acids of microörganisms, by Belozersky and Spirin, summarizes an extensive literature, but fails to mention soluble ribonucleic acid. Sinsheimer gives an excellent review of the nucleic acids of the bacterial viruses, discussing unsolved problems as well as present progress. He suggests that "the study of the processes of bacterial virus infection offers a particularly favorable route to analysis of the most basic problems of cellular and genetic biochemistry." An equally fine discussion of viral ribonucleic acids is provided by Schuster, who emphasizes the need for caution in regard to the effects of ribonuclease.

Chapters 35 to 40 are related to Volume II, which dealt with the metabolism, cytology and biological roles of nucleic acids. The biosynthesis of purine nucleotides is reviewed by Buchanan, and that of pyrimidine nucleotides by Crosbie. Two chapters are devoted to protein synthesis. Its relationship to nucleic acid, as revealed by studies in cell-free systems, is critically reviewed by Hoagland, with a much-needed warning, that, in studies of the *in vitro* incorporation of amino acids, "the failure to demonstrate the requirement for an intermediate does not establish its inessentiality." The following chapter, in which Gros discusses the biosynthesis of proteins in intact bacterial cells, is in general agreement with the preceding one; such differences as do appear may be merely differences in rate. Handschumacher and Welch provide a detailed and critical review of chemical agents which influence nucleic acid metabolism, with emphasis on antimetabolites; they stress the need for further study of the physicochemical properties of analogs and their corresponding metabolites, and particularly of the active centers of the enzymes involved. In discussing the effect of radiations on nucleic acid metabolism Lajtha focusses attention on intranuclear triphosphorylation as a highly radiosensitive function, and one on which deoxyribonucleic acid synthesis depends.

In general, these reviews are of high quality. It is difficult to judge their completeness without knowing the dates when they were finished; some authors include 1960 literature, while others have very few references later than 1958. In a field that is changing as rapidly as nucleic acid chemistry, mention of the closing date for each chapter would have added considerably to the value of this fine book.

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Röntgenographische Chemie. Möglichkeiten und Ergebnisse von Unterschungen mit Röntgen- und Elektroneninterferenzen in der Chemie. Zweite, erweiterte Auflage. By DR. E. BRANDENBERGER, Professor an der Eidg. Techn. Hochschule und Direktor der Eidg. Materialprüfungs- und Versuchsanstalt, and DR. W. EPPRECHT, Professor an der Eidg. Techn. Hochschule, Mitarbeiter am Institut für technische Physik. Birkhäuser Verlag, Basel, Switzerland. 1960. 272 pp. 17 × 24.5 cm. Price, sFr. 32.—.

This book, the first edition of which appeared 14 years ago, is not a textbook. Therefore no attempt was made by the authors to explain in detail how to make X-ray, electron or neutron beam interference experiments, or how to evaluate or measure the patterns obtained. The purpose of the book is to show what chemical problems can be solved using the above-mentioned radiations, especially X-rays. According to the authors, the book can also be used in biological research. Examples taken from the wide field of solid state chemistry and physics (including metallurgy and ceramics) are numerous.

The book starts with a very brief description of properties of crystals, and then powder, rotating crystal and Laue-patterns are discussed. Application of electron and neutron rays is mentioned and the advantages of each radiation are emphasized. Pictures of some equipment and of some patterns are shown. The next chapters 3, 4 and 5 deal with amorphous and crystallized substances, transition phenomena, analyses of phases and of mixed crystals, and isotope effects, all in the light of X-rays. The ASTM cards are mentioned. The long chapter 6 (p. 96–159) is devoted to the description of the relation between the shape of the X-ray lines or spots and the interior structure of the crystalline material. Thus, various defects, surface properties, refraction, grain size, preferred orientation, stresses, small angle scattering, stacking faults, determination of crystal shape, the appearance of superlattice lines, orientation effects, line broadening, asterism and structures of crystalline surfaces are discussed in this connection. All material is presented in a qualitative manner, without mentioning a