

ulins which are omitted from this subject index. These defects limit the use of this volume as a source for reference.

In spite of this criticism the book of Stauff is a commendable attempt to present the field of colloid science in a modern way. With a few exceptions, all the most important modern theoretical and experimental approaches are presented in this volume. It does not read easily in most of the sections, but it will be appreciated by those advanced postgraduate students and research workers who enjoy theoretical thinking and want to go to the very bottom of the matter. One of the most charming aspects in the new colloid science is the unsettled state of affairs, the many unsolved problems so challenging to the investigator. Professor Stauff has succeeded in showing some new possibilities in solving these problems, although he also had to admit that at this moment there are wide gaps between theories treating idealized systems and reality.

The production of the book is fine, the illustrations are instructive, and the abundant references are conveniently placed at the bottom of the pages where they belong. Only a few misprints were noticed, *e.g.*, in formulas on p. 585 and 589, and in Tables 67.I (p. 469) and 84.III (p. 624).

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**Chromatographie en Chimie Organique et Biologique. Volume II. Applications en Chimie Biologique.** By E. LEDERER, Professor à la Faculté des Sciences de Paris. Masson et Cie., 120, Boulevard Saint-Germain, Paris 6, France. 1960. xiv + 876 pp. 18 × 25.5 cm. Price, broche, 130,00 NF; cartonné toile, 140,00 NF.

The first volume of this work, which is being edited by E. Lederer, dealt mainly with certain applications of chromatography to organic chemistry. The second volume is now concerned in its 16 chapters with different classes of biologically important substances. Under the editor's supervision, 15 authors have contributed to the compilation of this work, which has both author and subject index and a table of contents. The interest of the first volume is thus sustained in the second, which will be a useful reference work for those who use chromatographic methods in biological research.

Each chapter deals with a special group of compounds, *viz.*, sugars; phosphoric acid esters; amino alcohols; amino acids; peptides; amino acid derivatives; proteins, purines, pyrimidines and their derivatives; pigments; fat- and water-soluble vitamins; hormones; antibiotics, etc. For each class of compound much information is given concerning the different techniques which are available, and there are copious tables of  $R_f$  data based on the compounds named and their derivatives and that also relate to many solvents. For example, the presentation shows how the separation of sugars as acetylated sugars or of amino acids as their phenylthiohydantoins can be contemplated. Each chapter gives much necessary technical detail for the systematic separation of the compounds with which it deals, but an adequate idea of the content can hardly be presented in this short review. Where it is known that the absorbent used in column techniques of separation affects the nature of the substances being separated this is wisely stressed. The tables may assist in tentative identification of the structure of compounds being chromatographed both on the basis of  $R_f$  values and of reactions which are more or less specific for the class of compounds in question. Again, it is wisely suggested that such identifications be supported by the elution of the compound in question, the preparing of derivatives or the use of specific reactions or confirmatory measurements based on such techniques as spectrophotometric measurements. All this cautions against too facile identifications based only on a one-solvent system. The bibliography at the end of each chapter, sometimes as much as 400 to 500 titles, will prove to be a useful feature, and these bibliographies have been kept up to date by the inclusion of additional material when the proofs were corrected.

If there are criticisms, it may be that the reader receives a mass of information about techniques applicable to each class of compounds, whereas careful and detailed guidance on which of these it is best to adopt might have been more profitable. Some repetition occurs. For example, chroma-

tography of co-enzyme A appears in three different chapters. The chapter on chromatography of water-soluble growth factors is strangely lacking in reference to those which have been discovered in plants. Also, the chapter on chromatography of organic acids is not as full as their importance in plants merited. Nevertheless, this book will be welcomed by those who need a compendium of the accumulated information in this now large and diverse field.

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**The Chemistry of Heterocyclic Compounds. Volume 14. Pyridine and its Derivatives. Part One.** Edited by ERWIN KLINGSBERG, American Cyanamid Co., Bound Brook, New Jersey. ARNOLD WEISSBERGER, Consulting Editor, Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. x + 613 pp. 16 × 23.5 cm. Price, \$49.00; Subscription price, \$42.00.

The volume of recorded literature in organic chemistry is a source of both pride and despair: pride in the tremendous accomplishment which generations of organic chemists have achieved and despair in the hopelessness of maintaining an adequate picture of the present status of almost any area of organic chemistry. The book under review not only brings this situation into focus but also points a way out of the dilemma. As the title indicates, this book is the first of four parts dealing with pyridine and its derivatives. It is proposed to treat this topic in sixteen chapters and part one consists of two chapters. Chapter I, prepared by R. A. Barnes, is devoted to a discussion of the Properties and Reactions of Pyridine and its Hydrogenated Derivatives. This chapter provides a unifying account of their chemical properties and supplies a sound basis for the understanding and appreciation of the more detailed treatment which is to follow in subsequent chapters. A careful study of this chapter will be most rewarding.

Chapter II deals with Synthetic and Natural Sources of the Pyridine Ring and is written by Frederick Brody and Philip R. Ruby. The classification of synthetic methods with which they are confronted is a difficult matter and has been accomplished in an admirable fashion. Relatively short treatments of each class of synthetic procedures followed by tables indicating the specific transformations which have been carried out makes this chapter particularly valuable. An impression of the magnitude of this task may be gained from the fact that there are one hundred and thirty-two tables, which bring the literature coverage up to the middle of 1956. Eighteen hundred and fifty one references (a number of which refer to patents) are cited. Certainly, this material has been rendered more accessible by these authors and organic chemists must become increasingly more dependent upon treatises of this kind. The authors and publishers have performed a valuable service.

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**Methods in Geochemistry.** Edited by A. A. SMALES, Atomic Energy Research Establishment, Harwell, and I. R. WAGER, F.R.S., Department of Geology and Mineralogy, University Museum, Oxford. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. vii + 464 pp. 16.5 × 23.5 cm. Price, \$13.50.

This book has been written as a survey of newer methods of geochemical analysis but it should be read by and has a value for a much wider audience.

Our knowledge of the composition of the earth's crust, given from early in the century by the monumental works of Clarke and of Washington, was based on standard chemical methods of analysis and was accordingly subject to their inherent limitations. A generation ago geochemistry made a great stride forward with the help of optical spectrography. It is now making what will prove to be a still more impressive step ahead using new methods of analysis that are largely products of the growth of nuclear physics.

The Editors and authors of this book are drawn from a group of investigators associated with Harwell and nearby

Oxford which has been in the forefront of the development of these novel methods. Together they present a composite attitude toward these often complementary and sometimes competing techniques which gives the book a measure of internal unity absent from many of the current rash of edited compendia.

Several of the methods surveyed here have widespread scientific importance because, unlike optical spectroscopy, they are equally applicable to metallic and non-metallic elements and do not require destruction of the sample to be analyzed; some have a rapidity or a sensitivity far beyond conventional chemical methods. Neutron activation, isotope (stable and radioactive) dilution and X-ray spectrographic methods are in these ways furnishing new possibilities for understanding the intimate composition of all sorts of inorganic and biological materials. The excellent chapters reviewing the principles and present status of these methods—by Mapper, Webster, Moorbath and Shalgosky—can be studied with profit both by those who have already had some experience with them and by persons who may wish to appraise their possible value for their own research.

For geochemists there are also good chapters of more restricted application: a discussion of mass spectroscopy as it applies to determinations of the natural isotopic composition of rocks (Mayne), of optical spectroscopy (Taylor and Ahrens) and polarography (Moorbath) as now used in geochemistry; an outline of recent improvements in the standard chemical methods of rock analysis (Vincent); and treatments of methods of sample preparation (Wager and Brown) and chemical separation (Cornish) required in the application of one or another of the new techniques.

Each chapter is accompanied by a bibliography, several of which are sufficiently extensive to represent real contributions to the literature of the subjects they cover. The various topics are clearly expounded and an excellent balance has been maintained between discussion of basic principles, description of practical operational details and presentation of illustrative applications. Though the last are necessarily restricted to such geochemically important questions as trace analysis and determination of the age of rocks, they make clear the ways in which these methods can be applied to other materials. The book itself is very well printed and from this standpoint too is a pleasure to read.

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**Nucleoproteins.** Proceedings of the Eleventh Solvay Conference on Chemistry, University of Brussels, Brussels, Belgium, 1-6 June, 1959. By Institut International de Chimie Solvay, Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. 364 pp. 17 × 25 cm. Price \$10.50.

This book contains more material on the nucleic acids themselves than on nucleoproteins, although there are two chapters on the latter topic.

The first chapter, by J. Brachet, entitled "*Le rôle biologique des acides nucléiques*" (in French) starts with a brief history of work on localization and distribution of RNA and DNA, next gives a discussion of the function of DNA as gene material, and then proceeds to the question of the genetic function of RNA and its role in protein synthesis. Toward the close of the chapter there is a short discussion of the role of DNA in protein synthesis in bacteria and mammalian cell nuclei and a brief resumé of the most probable relationships connecting DNA, RNA and protein synthesis. The chapter is essentially a review of previously known material. It appears to the reviewers that more American workers should have been mentioned in the section on the history of the nucleic acids. The discussion following the chapter does not impress us as being particularly illuminating.

The second chapter on the "Molecular structure of deoxyribonucleoproteins" by M. H. F. Wilkins starts with an up-to-date discussion of the structure of DNA, with the purpose of giving a background for subsequent material on nucleoprotamine and nucleohistone. Nucleoprotamine is considered to represent a DNA double helix with protamine in an extended form wound around the smaller groove of the DNA. It is suggested that nucleohistone consists of a

DNA double helix with the histone in a coiled form running along the major groove, but this idea runs into some difficulty in the discussion following the chapter. It is also suggested that histone might serve as a bridge to connect parallel DNA molecules. The chapter is well written and very interesting. Most of the evidence presented comes from X-ray diffraction studies.

The third chapter by S. Moore on "The constitution of the histones" is well written and informative. Various histone preparations are discussed, including the arginine-rich and lysine-rich varieties. The problem of possible proteolytic degradation of histones during isolation procedures is carefully considered, although a clear-cut solution does not appear to be forthcoming. In the discussion following the chapter some new experiments of Butler and Westenbrink are presented. The chapter could very well serve as an excellent starting point for anyone wishing to begin research on the histones.

The fourth chapter, by C. Sadron (in French) entitled "*Les propriétés physiques de l'acide désoxyribonucléique en solution*" starts, after a short introduction, with a review of some of the fundamental equations applied in studies of viscosity, light scattering, and ultracentrifugation as applied to macromolecules. Considerable emphasis is placed on light scattering. As might be expected, this introductory material gives scarcely sufficient background material for a person not well trained in the physical chemistry of macromolecules, and presumably would be superfluous for those with adequate training. The second part of the chapter is concerned with the application of the above-mentioned physical methods, particularly studies using the ultracentrifuge and light scattering, to the determination of the mass and form of the DNA molecule. A critical evaluation of the limitation of each method is presented. A short discussion of the electron microscopy of DNA particles is also included.

The material in the discussion as well as in the general discussion at the end of the book demonstrates many disagreements among the experts concerning soundness of given methods and the interpretation of results, although no serious disagreements concerning the molecular structure of DNA appear.

Chapter five entitled "Heterogeneity of the nucleic acids and effects of chemical and physical agents" by J. A. V. Butler is informative and well written, in spite of one or two instances that appear to indicate failures in proofreading. Various methods used at present to fractionate DNA into different molecular components are discussed, and the effects on DNA and RNA of nitrogen mustards and irradiation by X-rays are outlined. Most of the chapter is concerned with the physical chemistry of DNA.

The first part of the sixth chapter on "The nucleic acids of microorganisms," by A. N. Belozersky, deals with polyphosphates in bacterial cells and possible RNA-polyphosphate complexes, while the second part deals with analyses for base ratios of DNA and RNA from a number of bacterial species. In the latter section of the chapter, which is of particular interest, it is shown that the base composition of the DNA of bacterial species varies widely, greatest variation occurring between the least related species, but on the other hand that there is only a small variation in base ratios for the RNA's of all species studied.

The chapter is well organized and easily readable, but in places the English is not smooth. More careful editing would have been desirable.

The seventh chapter entitled "The biosynthesis of ribonucleic acid," by S. Ochoa, is a well-organized and very well-written summary of the work of this investigator and his collaborators on the action of polynucleotide phosphorylase in bringing about the synthesis of RNA-like copolymers as well as polymers of single mononucleotides (polyadenylic acid, etc.), starting from the nucleoside diphosphates. In the discussion of primer action, only incorporated primers are mentioned. The suggestion is made of a template-like action of the primer in case the latter is RNA or a high molecular weight complex polynucleotide, but the evidence presented demonstrates only the addition of new nucleotides to the pre-existing chain, a process which would seem to exclude template action. Some additional material is included on other enzymes that can lengthen RNA chains and on Kornberg's system for DNA synthesis. The discussion following the chapter is of considerable interest.