sections in each chapter are devoted to the metals—occurrence, preparation, uses, chemical and physical properties. This is followed by a discussion of the compounds listed above. The last three sections in each chapter pertain to the spectroscopy of the metal and its compounds, the analytical determination, and finally the biological properties.

Twenty-five experts in the various areas contributed the respective sections with complete literature review for most sections until 1955. Tables and diagrams are used liberally throughout the sections.

The physical properties discussed for the metals, for example, include structure and atomic and ionic radii, density and thermal expansion, mechanical and elastic properties, surface properties, dispersion and colloidal properties, viscosity, diffusion, thermodynamic properties, electrode and ionization potentials, electron affinity and electronegativity values and optical and photoelectric properties.

For the compounds, the preparation, physical properties, chemical properties, applications and uses, and analytical determinations are described.

The sections generally speaking are well written, logically presented, and well referenced; however, in most cases, no critical evaluation of the references is attempted in line with the policy followed in the original volumes of Mellor.

This volume is a "must" for all technical libraries.

DEPARTMENT OF CHEMISTRY
TULANE UNIVERSITY HANS B. JONASSEN
NEW ORLEANS, LA.

Organic Peroxides. By ALWYN G. DAVIES, Ph.D., D.Sc., Lecturer in Chemistry, University College, London. Butterworth Inc., 7235 Wisconsin Avenue, Washington 14, D. C. x + 215 pp. 16 × 25 cm. Price, $9.25.

Organic Peroxides. Their Formation and Reactions. By E. G. E. HAWKINS, D.Sc., Ph.C., F. R. I. C., Distillers Company, Ltd., Research and Development Dept., Great Burgh Epson, Surrey, Great Britain. D. Van Nostrand Company, Inc. 120 Alexander Street, Princeton, New Jersey. 1961. xiv + 434 pp. 16 × 25 cm. Price, $12.50.

Reiche's "Alkylperoxyde und Ozonide" stood as the only book on peroxide chemistry from 1931 until the brief survey by Tobolsky and Mesrobian's "Organic Peroxides" in 1954. An up-to-date, comprehensive treatment of this subject was obviously needed.

Now we have two excellent new books on organic peroxides, both of which cover identical ground with only small differences in organization, and both of which are authored by men who are authorities in this field of specialization. Both are executed in an extremely competent fashion and the reviewer was struck immediately with the thought that there was a great need for one of these books, but not for both, and that much effort, both on the part of the authors and, even more important, on the part of the many readers, would have been saved if by some means a single book had appeared. It is a sacred responsibility of authors and publishers alike to guard the time of the potential reader in any scientific field by publishing only those books which will be the very highest quality (which these two are) and which are really needed. There is no referee system among publishers to see that unnecessary duplication will not occur, nor would we want such a system; the ultimate decision must rest with the conscience of the authors. In the present case such unnecessary duplication has arisen, and most readers (and libraries) must make a choice between these two books, since only those doing extensive research in the field of peroxide chemistry will want to read both or to use both for reference purposes.

Both books have chapters covering Hydroperoxides, Dialkyl Peroxides, Peroxy Acids, Peroxy Esters, Diacyl Peroxides and derivatives. Both have selected sections on Autoxidation and on Analysis and the Detection of peroxides. Davies treats the mechanisms of decomposition of peroxides in five separate chapters, while Hawkins covers the same material in a manner integrated with the particular peroxide being discussed. This latter treatment leads to some duplication.

Davies has achieved a more concise treatment, 215 pages with about 1,000 references, as compared to 434 pages with about 1,700 references by Hawkins. The larger number of references in Hawkins results only in part from reference to the same paper in two or more places, and there are about three hundred references in Hawkins' book not mentioned by Davies. To a considerable extent, this results from a rather careful survey of the patent literature and from a bit more emphasis on some of the industrial aspects of peroxide chemistry by Hawkins, which has been done rather sparingly, but critically, by Davies. A rapid survey of the author index of both books indicates that each has a fair number of references not in the other.

The condensation achieved by Davies has been accomplished by the generous use of tables for listing compounds and properties, by a more critical selection of literature, and by a very concise style of discussion. Both books give a full theoretical treatment of the mechanisms of peroxide syntheses and decompositions; more discussion accompanies Hawkins' treatment, but the reviewer feels that Davies' treatment is the more critical. For example, Davies considers the Dakin reaction (p. 155) and proposes a mechanism not found in the literature, while this reaction is not indexed or referred to by Hawkins.

A reader of either book will receive an excellent and thorough introduction to all aspects of peroxide chemistry. Because this will be done with the expenditure of less time by reading Davies' book, this book may be the more valuable to the general student and to the person who is not doing extensive research in the field. For the person in industry working in some aspect of this field, especially along the lines of autoxidation, the somewhat more detailed discussions of Hawkins may be preferable. A person wanting to use such reviews for leading references into some particular aspect of peroxide chemistry will probably want to refer to both.

DEPARTMENT OF CHEMISTRY
STANFORD UNIVERSITY HARRY S. MOSHER
STANFORD, CALIFORNIA

The Chemistry of Nucleic Acids. By D. O. JORDAN, Angas Professor of Physical and Inorganic Chemistry, Univ. of Adelaide, South Australia. Butterworth, Inc., 7235 Wisconsin Avenue, Washington 14, D. C. 1960. ix + 358 pp. 14.5 × 22 cm. Price, $10.50.

As stated by the author, this book places its emphasis on the chemistry and structure of nucleic acids. No attempt has been made to deal with biological function to any significant extent, since a rather voluminous treatise would be required. The value of the latter, in any event, would be questionable because of the rapid pace in the various areas of nucleic acid research. Fortunately, the chemistry rests on more stable ground and the author's attempt is justified. There is an overlap of material both with "The Nucleic Acids" (Editors, Chorgoff and Davidson) and "The Polynucleotides" (Steiner and Beers); however, this is not a serious matter, particularly because Jordan's treatment tends to be more critical.

Chapter I serves as an historical and orientative introduction. Chapter 2 deals with the isolation of nucleic acids. While this material is of value for teaching purposes, it probably cannot serve as a substitute for original literature, where other methods and details are often sought. Chapter 3 covers heterogeneity and fractionation. This is an extremely active area, and unfortunately the material is out-dated to a considerable extent. New and apparently better fractionation procedures have since been devised and are not recorded. Chapters 4–7 cover the chemistry of the nucleic acid components and should be useful to interested investigators. The isolation of purines, pyrimidines, nucleosides and nucleotides is discussed, including various chromatographic methods. The structure and synthesis of nucleosides and nucleotides is also discussed. Finally, the acid–base properties of the nucleic acid components is covered in some detail. The structure of nucleic acids begins on p. 140, Chapter 8, and continues nearly to the end, Chapter 14. The material is covered in a clear and systematic fashion. Briefly it is as follows: The internucleotide bond, Chapter 8; X-ray diffraction, Chapter 9; thermodynamics, and hydrodynamics of nucleic acids, including molecular weight, acid–base properties, viscosity and sedimentation measurements, Chapter 10. The material covered in Chaper 10, which includes much of Jordan's work, is extensive and the discussion is useful since it tends to evaluate results. Chapter 11 deals with denaturation and degradation. Here too the discussion is extensive and enlightening. Chapters 12 and 13 deal with RNA. In these chapters the author's specialty betrays itself, for much pertinent material is omitted, *i.e.*, that dealing with soluble and "messenger" RNA. Chapter 14 contains an adequate discussion of the synthetic polynucleotides. Chapter 15 represents the only attempt by the author to include biological function.

This book is well written and, despite the fact that some parts are already out-dated, it should be owned by every serious student of nucleic acids.

SLOAN-KETTERING INSTITUTE
FOR CANCER RESEARCH LIEBE F. CAVALIERI
RYE, NEW YORK

The Irreducible Tensor Method for Molecular Symmetry Groups. By J. S. GRIFFITH, Fellow of Kings College, Cambridge. Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 1962. ix + 134 pp. 16 × 23.5 cm. Price, $7.50.

Almost every worker in the field of molecular quantum mechanics has at one time or another muttered to himself, "If only there existed tables of coupling coefficients for the construction

of product functions of given symmetry from elementary functions of fixed symmetry." Well, now his prayers have been answered. John S. Griffith has admirably outlined the theory of coupling and recoupling coefficients for groups of finite symmetry and tabulated their values in his handsomely bound book on "The Irreducible Tensor Method for Molecular Symmetry Groups."

During the past few years a number of books have appeared on the market dealing with irreducible tensorial methods in quantum mechanics from one viewpoint or another.[1-3] These have been a welcome addition to the literature as they have given substance to the older matrix manipulation treatments of tensorial operators.[4,5] However, all these books have dealt with systems of spherical symmetry solely, and thus the adoption by molecular quantum mechanicians of the elegant mathematical techniques advocated by these texts has been delayed. Griffith's book should remove this delay with its excellent transcription and exposition of the method of irreducible tensorial sets for non-spherical geometries. It is to be cautioned though that his book is definitely not for beginners: it is addressed to the advanced worker in the field of quantum chemical physics and should be read in conjunction with his fine book on the theory of transition metal ions[6] for greatest gain.

It is a pity that Griffith did not expand his brief treatment of the irreducible tensor method for molecular symmetry groups. Because of its brevity, the book is extremely difficult to follow in a number of places. A more detailed and extensive list of applications is also sorely missed. On the brighter side of things, there are given a number of delightfully elegant derivations of familiar quantities which should please most readers (*e.g.*, the derivation of the spin Hamiltonian for paramagnetic systems) and the organization of the book is wondrous. (The publishers are to be warmly congratulated for the attractive appearance of the book. Their forethought as to its paginal pattern makes the book easy on the eye and a ready reference text. The book's price is a little steep, though.) All in all, J. S. Griffith's book is well worth buying and reading.

(1) M. E. Rose, "Multipole Fields," John Wiley & Sons, Inc., New York, N. Y., 1955; "Elementary Theory of Angular Momentum," John Wiley & Sons, Inc., New York, N. Y., 1957.

(2) A. R. Edmonds, "Angular Momentum in Quantum Mechanics," Princeton University Press, Princeton, N. J., 1957.

(3) U. Fano and G. Racah, "Irreducible Tensorial Sets," Academic Press, Inc., New York, N. Y., 1959.

(4) E. U. Condon and G. H. Shortley, "The Theory of Atomic Spectra," Cambridge University Press, Cambridge, Eng., 1953.

(5) E. Feenberg and G. E. Pake, "Notes on the Quantum Theory of Angular Momentum," Addison-Wesley, Cambridge, Mass., 1953.

(6) J. S. Griffith, "The Theory of Transition-Metal Ions," Cambridge University Press, Cambridge, Eng., 1961.

THEORETICAL CHEMISTRY
MELLON INSTITUTE ANDREW D. LIEHR
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Experimental Cryophysics. Edited by F. E. HOARE, Reader in Physics, University of Leeds; L. C. JACKSON, Professor of Physics, Royal Military College, Kingston, Ontario, Canada; and N. KURTI, Reader in Physics, University of Oxford, Senior Research Fellow, Brasenose College, Oxford. Butterworth Inc., 7235 Wisconsin Avenue, Washington 14, D. C. 1961. xv + 388 pp. 16 × 25 cm. Price, $14.00.

In three hundred and seventy-four pages this coöperative treatise contains an excellent summary of low temperature techniques including the liquefaction of air, hydrogen and helium. It is therefore, natural that there should have been some omissions. Notable among these is the absence of *any* discussion of the theory of the liquid air fractionating column although there is a brief description of fractionating columns for liquid air including the Linde double column (without discussions of tray design or packing materials).

There is no special section on cryostats which this reviewer thinks regrettable, although several types of cryostats are discussed in the different chapters.

The ten chapters along with their authors are listed below: (1) Low Temperature Laboratories and (2) The Mathematics of Gas Liquefaction and Liquefier Design, both by F. E. Hoare; (3) Liquid Air Production and (4) The Production of Liquid Hydrogen and Helium, both by D. H. Parkinson; (5) Ancillary Equipment for the Production of Liquid Hydrogen and Liquid Helium (the dictionary reveals that the leading adjective means subordinate, subservient, auxilliary) and (6) Materials and Methods for the Construction of Low Temperature Apparatus, A. J. Croft; (7) Storage and Transfer of Liquefied Gases by the late A. Wexler; (8) Magnetic Cooling by E. Mendoza; (9) Low Temperature Thermometry by R. P. Hudson; (10) Cryogenic Techniques and Miscellaneous Applications by E. R. Dobbs, L. W. Alvarez, R. W. Hill T. H. Blewitt, R. R. Coltman, Darrell W. Osborne, L. C. Jackson, D. M. S. Bagguley, J. Given, L. Couture, K. V. Osborne, R. Berman, E. R. Dobbs, H. M. Rosenberg.

There are twenty-five appendices including data on thermal conductivities, densities, viscosities, enthalpies and entropies of oxygen, nitrogen, hydrogen and helium as well as a table of Debye heat capacities and energies and some heat capacities of selected elements. That the appendix includes the 1958 Helium (vapor pressure) Temperature Scale (seven pages) will recommend the book to many. In addition there are vapor pressure–temperature tables for helium 3 (^{3}He), hydrogen (normal and equilibrium, liquid and solid), nitrogen and oxygen.

The chapters by F. E. Hoare (liquefier design), the late A. Wexler (storage and transfer), R. P. Hudson (thermometry) and E. Mendoza (magnetic cooling) are outstanding. There is an interesting section on the use of ^{3}He (Darrell W. Osborne) and useful information on construction and silvering of dewars and on vacuum tight seals, etc., by Croft, who wrong lyimplies that the Schriver electrolytic cells for hydrogen require a low voltage. These cells are of the filter press type in series so that they operate on 120 volts.

The editors of this volume are to be congratulated on the results of their efforts to produce an integrated and modern treatise.

LOW TEMPERATURE LABORATORY
THE PENNSYLVANIA STATE UNIVERSITY JOHN G. ASTON
UNIVERSITY PARK, PENNSYLVANIA

Mechanism of Action of Steroid Hormones. Proceedings of the Conference held at Endicott House, Dedham, Massachusetts. Edited by CLAUDE A. VILLEE and LEWIS L. ENGEL, Harvard Medical School, Boston, Massachusetts. Pergamon Press Ltd., Headington Hill Hall, Oxford, England. 1961. xi + 263 pp. 16 × 23.5 cm. Price, $10.00.

Presently, there is a great deal of interest among biologists and biochemists in the problem of the regulation and integration of biochemical processes. Originally, ideas about biological regulation came from physiological studies on higher organisms which indicated the necessity for the maintenance of a constant internal environment. More recently, the behavior of microörganisms has provided relatively simpler systems for the study of the molecular basis of such regulatory phenomena. At the present time, however, even in bacteria, the mechanism of the most basic of such processes, enzyme induction, is barely understood.

The steroid hormones are a diverse group of molecules that influence a number of biological processes in higher organisms. It is, therefore, not surprising that the molecular bases for their actions are at the moment almost totally mysterious.

The readers of the volume reviewed herewith will therefore find only how a number of experienced investigators are attempting to deal with the problem, rather than, as suggested by the title, a final answer.

The two introductory chapters, the first by Engel and the second by Villee, discuss some general problems involved in studying hormone action. Each author indicated that steroids may be thought of as interacting with protein molecules, or as altering the physical state of cell membranes or intercellular boundaries or in a combination of such ways. Villee also adds the possiblity that steroids act by regulating rates of protein synthesis.

In the article by Topper on the effects of progesterone on the enzymic oxidation of galactose, there are several very interesting points. For example, it is shown that the *inhibition* of a particular enzyme (an aldehyde dehydrogenase) results in *stimulation* of another metabolic process, galactose oxidation, because a product of the former reaction inhibits the latter. Studies on the aldehyde dehydrogenase itself indicate that certain hormones stimulate the enzyme while others inhibit its action which illustrates a kind of specificity not previously demonstrated in *in vitro* systems.

The article by Csapo on *in vivo* and *in vitro* effects of estrogen and progesterone on the myometrium clearly illustrates the difficulties in trying to explain physiological phenomena in terms of the effects of hormones on isolated enzymes. In his presentation, the author compares the actions of steroids on uterine contractility when the hormones are applied locally and when they are injected into the animals prior to removal of the organ. That there are significant differences depending on how the hormones are administered indicates very well how the final total action of a hormone must, in fact, reflect its distribution and metabolism as well as its specific local effect.

The paper by Dorfman on androgen action reviews a number of cases where steroid hormones have acted as enzyme inducers and the author proposes that hormones may operate at the level of enzyme induction or repression. These generalizations are documented in the report by Fishman, who discusses the increase in renal β-glucuronidase concentration after administration of testosterone to animals.