

could not be patent protected, does not seem warranted. Also the expression that C-dihydrotoxiferine probably contains the yohimbine skeleton is not justified. The present volume gives a good survey of Bayer's interests and for this reason is worth studying. Its physical appearance is very good and the printing is excellent.

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Advances in Cancer Research. Volume IV. Edited By JESSE P. GREENSTEIN, National Cancer Institute, National Institutes of Health, U. S. Public Health Service, Bethesda, Maryland, and ALEXANDER HADDOW, Chester Beatty Research Institute, Royal Cancer Hospital, London, England. Academic Press, Inc., Publishers, 111 Fifth Avenue, New York 3, N. Y. 1956. ix + 416 pp. 16 × 23.5 cm. Price, \$10.00.

Volume IV of the series *Advances in Cancer Research* reflects quite well the editors' awareness of timely topics and of appropriate authors for their review. This volume successfully continues the pattern, established in earlier volumes, of achievement of the objectives of the editors as stated in introductions to the first two volumes. This is the reflection of the "steady and inevitable march of the tides of our knowledge and increasing understanding" in cancer research and provision of a "recurring stimulus to the work ahead" in addition to providing an annual chronicle of progress.

Though the selections in the present volume are timely, informative, and useful from the viewpoint of the cancer research investigator, they may as a whole be of less interest to chemists than preceding volumes; however, there are a number of chapters in Volume IV that will make its reading well worth while for chemists whether actively participating or merely interested in cancer research. The chapter, *Advances in Chemotherapy of Cancer in Man*, by Sidney Farber and associates, presents problems in clinical studies, surveys the chemotherapy of acute leukemia, and reviews selected chemotherapeutic agents. It is so written that it can serve as an introduction to clinical cancer chemotherapy as well as being useful for experienced investigators. The chapter furnishes a convenient bibliography of general references in addition to those specifically used in the text. This reviewer with his prejudices differs on the historical aspects of a few of the text references. The second chapter of the book, *The Use of Myleran and Similar Agents in Chronic Leukemias*, by D. A. G. Galton, also is concerned with clinical studies with particular emphasis on a limited group of chemotherapeutic agents. Like the first chapter this one provides valuable information for the clinical investigator and for others some insight on problems in clinical chemotherapy investigations.

The chapter, *The Employment of Methods of Inhibition Analysis in the Normal and Tumor-Bearing Mammalian Organism* by Abraham Goldin, presents much of this investigator's studies and ideas on the application to experimental cancer chemotherapy of the principle of inhibition analysis previously developed in microbiological studies. The author suggests that a more detailed study of the tumor-host relationships in the responses to various toxic drugs may indicate ways in which the chemotherapy of cancer can be improved. The two chapters, *Some Recent Work on Tumor Immunity* by P. A. Gorer and *Inductive Tissue Interaction in Development* by Clifford Grobstein are important contributions to this volume. A discussion of aspects of tumor immunity is most timely in view of the upsurge in interest in this subject. The mutual relevance of studies of inductive tissue interaction and of carcinogenesis is apparent if one assumes "that involved in embryonic induction are the origins of reactions and materials which form the basis of stability of structure and function of the adult and also that similar processes may be operating in newly developed subsystems of the adult and that they may be involved in reverse in the adult when adult stability of structure breaks down or is disrupted." These two chapters will pose a problem for most chemists because of their lack of familiarity with the language used. The more venturesome chemists reading these chapters will at least be rewarded with a better idea of the complexities of biological phenomena.

Lipids in Cancer is a chapter presenting a review of lipids

in induced carcinogenesis and spontaneous tumorigenesis, of the lipids of tumors, and lipids in the tumor-host relationship by Frances L. Haven and W. R. Bloor, who have contributed so much to this field. The material reviewed should stimulate greater efforts in this area and is likely to have an increased audience because of interest in the cardiovascular diseases. The remaining two chapters represent specialized aspects of carcinogenesis. A. Lacassagne and associates summarize the results of studies, largely from their laboratories, on *The Relation between Carcinogenic Activity and the Physical and Chemical Properties of Angular Benzacridines*. The carcinogenic activities of a considerable number of benzacridines are conveniently summarized in a lengthy table. Other tables present relationships of carcinogenicity with physical properties and are discussed in the text. *The Hormonal Genesis of Mammary Cancer* by O. Mühlbock is a good survey in this complex area. Studies in rats and mice are discussed with emphasis on the hormonal influence as one of a number of factors involved in mammary cancer.

Volume IV of *Advances in Cancer Research* has been built with the high quality of scientific and physical workmanship observed in earlier volumes. Very few typographical errors were noted. On page 42 the formula for thio-guanine is mislabeled as a pyrimidine. On page 105 in Case 21 it would seem that the dose for urethan is misstated or possibly urethan was inadvertently written in place of myleran. The essential author and subject indexes are provided. A brief check of the latter indicated that an increase in its usefulness, through added cross indexing, might reasonably be requested.

This volume merits a place in the library of the serious cancer investigator and will provide chemists and others a good introduction to a number of important areas of cancer research. This may also be anticipated from future volumes of the series *Advances in Cancer Research* if we are to judge from the first four volumes.

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Thermodynamics and Statistical Mechanics. By A. H. WILSON, F.R.S. Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1957. xv + 495 pp. 18 × 26.5 cm. Price, \$9.50.

This beautifully presented and printed book by the distinguished author of "The Theory of Metals" is in many ways a rather peculiar hybrid of thermodynamics and statistical mechanics, intended, says the author in his Preface, mainly for theoretical physicists, while the notice on the jacket announces as additional possible audience "those experimental physicists and physical chemists who wish to enter more deeply than is customary into the fundamental principles of the subject." How well the author may have succeeded in his appeal to the theoretical physicist will probably be made clear in the reviews which will appear in physics journals. As far as the physical chemist is concerned, whether he considers himself as theoretical or experimental, the usefulness of this book is very debatable.

The book begins with a 3-page List of Important Symbols, Units and Physical Constants. Chapter 1 treats "The Classical Development of Thermodynamics and the First Law." The presentation is highly condensed and contains none of the applications of importance to the physical chemist. Guggenheim's "Zeroth Law" is ignored. Chapter 2 is devoted to "The Classical Development of Thermodynamics and The Second Law." What is presented as Carnot's theorem is the following statement: "There exist two functions of the state S and T , where T is a positive function of the empirical temperature θ only, such that, in any infinitesimal quasi-static change of a body or system of bodies, $dQ = T dS$." Even for theoretical physicists several better presentations of the second law immediately come in mind. The chapter finishes with four brief pages on the thermodynamics of a perfect gas. In Chapter 3 the thermodynamic functions are introduced, Helmholtz' free energy being called free energy at constant volume and Gibbs' free energy or free enthalpy being called free energy at constant pressure. This chapter includes a treatment of equilibrium and its stability in the case of homogeneous sys-

tems. Chapter 4 deals with "The Axiomatic Foundation of Thermodynamics," a subject which usually does not concern or interest the physical chemist. The only references given at the end of this chapter are to a 1921 paper of M. Born and to the 1909 and 1925 papers of Carathéodory whose presentation a very recent paper by Landsberg (*Rev. Modern Phys.*, 28, 363 (1956)) claims to have improved. With Chapter 5 "the logical order of development is broken in order to derive the fundamental formulae of statistical mechanics." This "inelegance," as the author designates this procedure, is handled in 46 concentrated pages which assume that the reader is familiar with quantum mechanics. Chapter 6, in 51 equally concentrated pages, presents "Some Applications of Statistical Mechanics" (Specific Heat of Gases—Crystalline Solids—Systems Obeying Fermi-Dirac and Einstein-Bose Statistics—Radiation). Chapter 7 offers a treatment of the Third Law based largely on the work and the ideas of F. Simon. Chapter 8 gives in 50 pages a thorough treatment of imperfect gases. Chapter 9 handles "The Heterogeneous Equilibrium of a Single Substance" and includes an interesting and detailed study of the properties of helium. The very substantial Chapter 10 on "Electric and Magnetic Phenomena" (75 pages) would alone constitute a useful reference work on topics which texts of chemical thermodynamics usually do not touch: force and energy relations in an electrostatic field, statistical mechanics of polar substances, ferroelectricity, statistical mechanics of paramagnetic bodies; ferromagnetism, antiferromagnetism, superconductivity. Chapter 11 on "Gas Mixtures and Chemical Reactions" is a condensed treatment of what would constitute the major portion of a book on chemical thermodynamics. Section 11.411 entitled "The affinity as defined by De Donder" denotes incomplete comprehension of the method and contains statements indicating similar incomplete comprehension of other procedures (compare this section with the preceding one, 11.41). Interestingly enough De Donder's method is used in section 11.423 to calculate the conditions required for the maximum extent of a reaction. Chapter 12 on "Solutions" may be sufficient to initiate theoretical physicists to the subject, but is far too incomplete to be regarded as useful to physical chemists. The same remark applies to Chapter 13 on "Solutions of Electrolytes and Electrochemical Systems." Chapter 14 is entitled "Further Topics in Solids" and offers interesting treatments of rubber, superlattices in alloys, and some exact solutions of the one-dimensional order-disorder problem.

As a whole it may be concluded that a book of this type rightfully belongs in a Chemistry Department library, but there seems to be no strong reason to urge its addition to the private libraries of physical chemists, although, with the extremely moderate price of \$9.50 for such a large, beautiful and after all very competently written book, the investment is not at all unattractive.

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Organic Synthesis. Volume 1. Open-Chain Saturated Compounds. Volume 2. Open-Chain Unsaturated Compounds. Alicyclic Compounds. Aromatic Compounds. By VARTKES MIGRICHIAN, Senior Research Chemist, Central Laboratory, American Cyanamid Company, Stamford, Connecticut. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1957. Volume 1, xxviii + 833 pp. Volume 2, xiii + pp. 834-1822. 15.5 × 24 cm. Price, \$35.00.

These volumes comprise an extensive documented treatise of classical organic chemistry excluding heterocyclic compounds. Written in textbook style, the work emphasizes the synthetic approach to organic compounds. Many sections are devoted to characteristics and chemical behavior of compounds as well as to analytical techniques. A nine-page discussion of ozonization includes the preparation of ozonides, determination of ozone, properties of ozonides and methods for their decomposition. Organic structural theory, reaction mechanisms and methods of resolution are not discussed.

Approximately 30% of the space is devoted to aromatic

chemistry and most of the remainder to aliphatic compounds. Organic compounds of metalloids and non-metals other than nitrogen and sulfur are treated separately. Although certain of these sections are too brief and out-of-date to be of interest to the specialist (*e.g.*, silicon chemistry, 3 pages; boron chemistry, 2 pages), the section has value in bringing together for comparison some of the chemistry of these elements. A chapter on organometallic compounds of similar size and scope and a separate chapter on the "Grignard reaction" are included. The chapter on alicyclic compounds deals chiefly with methods of ring closure, expansion and modification. It is particularly recommended for its sections on azulenes, tropolones and sterols. Twelve pages are devoted to methods for the modification of sterol structures without change in ring skeleton.

The tremendous task of reducing a large part of Beilstein's Handbook to two volumes and attempting to include important recent developments is not an easy one. The author acknowledges his indebtedness to a host of treatises, monographs and general reviews which made this work possible. Even so, the integration and organization of thousands of facts and references is not without major problems. A few reactions of great breadth such as Friedel-Crafts, Grignard and Diene Syntheses are discussed mainly in separate chapters. That the entire work could not have been so organized seems unfortunate. Much duplication and fragmentation has resulted from the classical subdivision into aliphatic, alicyclic and aromatic compounds coupled with the treatment of most series from the standpoint of chemical behavior as well as synthesis. Frequently, a reaction is discussed in several places. Thus, on page 945 under chemical behavior of unsaturated aldehydes, it is stated that "oxidizing agents even of the mildest type convert only a small portion of unsaturated aldehydes into the corresponding unsaturated acids." An illustration, the conversion of "methylacrolein" to "methylacrylic acid," is given with no reference. However, on p. 957, a general method for the preparation of olefinic acids by oxidation of the corresponding aldehydes is presented along with five references from the period 1862-1899, and finally a detailed procedure for this oxidation is given on p. 258. The more recent work of Goldberg and Linstead in which α -methyl- β -ethylacrolein is oxidized in 60% yield to the corresponding acid is omitted.

The literature before 1925 has been covered more adequately than that of recent years. A reference to *Bull. soc. chim.* (1905) rather than *Organic Syntheses* (1943) for the preparation of β,β -dimethylacrylic acid by the haloform reaction is one of many examples. Only 9% of the 770 papers cited in the chapter on Aromatic Halogen Compounds appeared in the last three decades, and of these, less than a dozen were in American journals. Although the same ratios do not apply to all chapters, the inclusion of questionable work and the omission of recent findings are frequent. Thus, the dihydrohalogenation and decarboxylation of dihalo acids, p. 942, does not include the comprehensive studies of Farrell and Bachman, *This Journal*, 57, 1281 (1935), and the formation of olefinic bromides from the corresponding alcohols does not include the modifications necessary to prevent isomerization [Young and Lane, *This Journal*, 59, 2051 (1937); Goering, Cristol and Dittmer, *ibid.*, 70, 3314 (1948)]. Even the conversion of simple alcohols to halides (pp. 17-21) is considerably out-of-date from the standpoint of molecular rearrangement and its prevention. The emphasis on the older literature leads to errors of fact, as on p. 116, where it is stated that yields of aldehydes by the Bodroux-Tschitschibabin Synthesis do not exceed 25%. The many excellent preparations of all classes of aldehydes in 25-82% yields in the period 1923-1941 and the comparative studies of L. I. Smith, *et al.*, *J. Org. Chem.*, 6, 437, 489 (1941) do not bear this out.

The index includes entries to specific compounds, general classes of compounds and named reactions. Some type reactions, such as decarboxylation, are indexed; others such as dehydration and dehydrohalogenation are not. The indexing of prefixes is almost as general as the indexing of root names. For example, one reference to dimethylnaphthalene is indexed under dimethyl, whereas another is found under naphthalene, dimethyl. Entries to carboxylic acids are divided under four headings: acids, carboxylic acids, aliphatic acids and aromatic acids. There is little duplication or cross indexing. Important items are sometimes omitted. A reader in search of methods for the synthesis