trile[8] (2%) to be present. When this reaction was carried out using acrylonitrile as solvent, the bromodichloromethane and the $CCl_2BrCH_2CH_2CN$ yields rose to 40 and 13.4%, respectively; no 1,1-dichloro-2-cyanocyclopropane was present, and some polyacrylonitrile was formed.

Thus the mechanism of the $C_6H_5HgCX_3$–NaI–olefin reaction appears to be

$$C_6H_5HgCX_3 + I^- \longrightarrow C_6H_5HgI + CX_3^-$$

$$CX_3^- \longrightarrow CX_2 + X^-$$

$$CX_2 + \text{C=C} \longrightarrow \text{C—C}(CX_2)$$

The sodium iodide procedure is a useful variation of the mercurial route[9] to dihalocarbenes. It allows use of $C_6H_5HgCCl_2Br$ and $C_6H_5HgCCl_3$ at room temperature in dihalocyclopropane synthesis, as well as use of $C_6H_5HgCCl_3$ at 80° in much shorter reaction times. The presence of iodide ion and the intermediacy of CX_3^- in these reactions, however, can introduce complications, as the reactions with acrylonitrile show. This general procedure could find useful application in the dihalomethylenation of olefins of limited thermal stability and especially in the preparation of *gem*-difluorocyclopropanes. Our investigations in this general area are continuing.

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(8) M.p. 53–54.5°; identified by microanalysis and infrared and n.m.r. spectra.

(9) D. Seyferth, J. M. Burlitch, and J. K. Heeren, *J. Org. Chem.*, **27**, 1491 (1962), and subsequent papers.

(10) Alfred P. Sloan Foundation Fellow, 1962–1966.

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Book Reviews

Experimental Chemotherapy. Volume II. Chemotherapy of Bacterial Infections. Part I. Edited by R. J. SCHNITZER, formerly Chemotherapy Department, Hoffmann-LaRoche, Inc., Nutley, N. J., and FRANK HAWKING, Division of Chemotherapy and Parasitology, National Institute for Medical Research, London, England. Academic Press, Inc., 111 Fifth Ave., New York 3, N. Y. 1964. xvii + 614 pp. 16 × 24 cm. Price, $23.00.

"Experimental Chemotherapy" is an ambitious, four-volume undertaking, the purpose of which is to present a comprehensive coverage of the entire field of chemotherapy. Volume II of this treatise is Part I of two volumes subtitled "Chemotherapy of Bacterial Infections." This section is devoted to a series of discussions of the broad field of antibacterial chemotherapy, emphasizing the biochemistry of antimicrobial therapy as well as the pharmacology and toxicology of a few specific agents such as the sulfonamides and nitrofurans. Volume III will be concerned with specific antibacterial agents and their modes of action as well as the chemotherapy of fungal, rickettsial, and viral infections.

As with most treatises of this type, a compilation of chapters written by experts in the field under discussion, the results are variable although the individual contributions in this work are generally of quite high caliber. Viewed as a whole, however, this volume is not up to the uniformly high level of the first member of this series [for review, see A. Burger, *J. Med. Chem.*, **6**, 825 (1963)]. Particularly noteworthy are the chapters on nitrofurans by Henry E. and Mary F. Paul and on sulfonamides by L. Neipp. Both are models of clarity in setting forth the pharmacological aspects of these drugs. The excellent chapter by H. J. Rogers might have been entitled "The Mode of Action of Sulfonamides and Some Antibiotics Which Affect Cell Wall Synthesis," rather than the broader title it has since this discussion has been limited to these subjects. It appears from the contents of this volume and the published table of contents for Volume III that much published work on the mechanisms of action of several antibacterial agents will be omitted from this series. This chapter also contains a very clear exposition of structure and function in bacterial and mammalian cells. Finally, Robert Knox has written a stimulating introduction to "Strategy and Tactics in Antibacterial Chemotherapy."

The decision to include the introductory chapter on antibacterial dyestuffs by C. H. Browning is difficult to defend since some important aspects of antibacterial chemotherapy (*e.g.*, steroidal antibiotics or phenols and other disinfectants such as heavy metal compounds) will apparently not be included in this series. The chapter does not do justice to the chosen topic since many antibacterial dyes are not included, and the physical basis for the interaction of dyes with bacterial cells is not fully explored. The chapter by D. J. Kushner, "Microbial Resistance to Harsh and Destructive Environmental Conditions," while informative, seems unrelated to the remainder of the book and could have been omitted without appreciably detracting from the value of the volume as a text on antibacterial chemotherapy.

The editors have intended "to present a reference work useful to investigators . . . concerned with experimental work on new chemotherapeutically active substances," and it is in this respect that the medicinal chemist reading this volume will be most disappointed. There is no attempt to present the chemistry of these substances and too little emphasis on the correlation of structure or physical properties with biological activity. Only clinically useful drugs are discussed, and the data presented on analogs is minimal. Nevertheless, because of the wealth of information collected in this text, it will still be required reading for the medicinal chemist, as well as biologists and physicians or veterinarians, engaged in research in this field.

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The Chemistry and Biochemistry of Fungi and Yeasts. Proceedings of the Symposium on the Chemistry and Biochemistry of Fungi and Yeasts held in Dublin, Ireland, 18–20 July, 1963. Edited by The International Union of Pure and Applied Chemistry. Butterworth Inc., 7235 Wisconsin Ave., Washington 14, D. C. 1963. v + 181 pp. 16.5 × 25.5 cm. Price, $8.50.

The symposium recorded in this volume consisted of fourteen lectures contributed by various international authorities and arranged in three sections under the respective headings of fungal metabolites, the biochemistry of fungi, and the chemistry and biochemistry of yeasts.

The first section contains material that will be generally most familiar to the organic chemist. In it, V. Prelog described the elegant and detailed work carried out by him and his colleagues on

the commercially important antifungal Rifamycins, now known to be ansa compounds, bearing a structural resemblance to the macrolide antibiotics, in which the extremes of a naphthalenoid nucleus are spanned by a many-membered aliphatic bridge. W. B. Whalley similarly gave an account of the detailed investigations of his and A. Robertson's group at Liverpool on the determination of the structure and biosynthesis of the sclerotiorin group of pigments, all of which contain a previously unknown type of benzpyrono nucleus, and represent further examples of biosynthesis by a polyketide pathway. A. J. Birch reviewed research by his and other groups on the mechanism of biosynthesis of gibberellic acid, penicillin, the tetracyclines, mycophenolic acid, novobiocin, and fumagillin, and pointed the way to future commercial exploitation of such data in a fascinating series of speculations on how to manipulate the processes involved so as to obtain improved yields, and, by minor structural modifications, possibly more useful products. In the fourth contribution, A. W. Johnson reviewed recent findings on the structure, partial synthesis, and chemical properties of the vitamin B_{12} coenzyme, a fungal metabolite and the first natural product known to contain a covalent metal–carbon bond (between cobalt and the 5′-carbon of a 5′-deoxyadenosyl residue). If such were needed, this work serves as a further reminder of the burgeoning importance of organometallic aspects in chemistry and biochemistry.

The second section, as befits the venue of the symposium, dealt mainly with problems germane to the peat industry. E. Küster discussed the influence of peat and peat substances on the metabolism of fungi (one surprising result here is that some peat extracts are more effective as stimulants than nutrients in the growth of microorganisms); (Miss) E. K. Henderson described the fungal metabolism of vanillin, ferulic acid, and other aromatic compounds related to lignin, and D. Gottlieb presented a most useful and concise review on the general question of the catabolism of carbohydrates by fungi.

In the third section, attention was focused by several lecturers upon research areas crucial to the best exploitation of yeasts in the brewing and baking industries. A. H. Cook discussed the relevant problems in terms of the synthesis of proteins in yeast and its relationship to the initial growth of yeast cells in fresh wort, the development of the correct fermentative enzyme systems, and the maintenance of the catabolic activities required for alcohol production; and H. Suomalainen did so by relating changes in the chemical makeup of the cells to different phases of development during the industrial propagation of baker's yeast. On the level of molecular mechanisms, G. Ehrensvard reviewed studies with labeled substrates elucidating the extent and precise mode of metabolism of acetate and formate, and the changing enzymic environments, at different phases of growth. Other aspects covered, respectively, by G. A. Maw and D. H. Northcote, included the utilization of sulfur by yeast (chiefly for synthesis of cysterine, cystine, and methionine), and the structure and organization of the three polysaccharides, glycogen, mannan, and glucan, which are extractable from yeast.

The clearly defined scope of this symposium, the high quality and generally close interrelationship of the contributions, and the review nature of many of them, make this a most useful reference volume, particularly for the organic chemist of limited familiarity with the various biochemical fields covered. It has the pleasing format, clear printing, and well-drawn structural formulas of previous volumes recording IUPAC symposia, but, like them, no index.

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Synthesis of Organosilicon Monomers. By A. D. Petrov, B. F. Mironov, V. A. Ponomarenko, and E. A. Chernyshev. Consultants Bureau Enterprises, Inc., 227 West 17th St., New York, N. Y. 10011. 1964. 492 pp. 17 × 25.5 cm. Price, $22.50.

This monograph is a valiant attempt to compile and organize an immense amount of information in selected areas of the organic chemistry of silicon. The authors have reviewed the literature exhaustively. Journal articles, patents, books, and even trade literature are included in the largest bibliography ever gathered together for the subjects treated. They enriched their presentation of the data by including observations and opinions based on their own work even when this is unpublished. The authors worked a long time on the synthesis of monomeric organosilicon compounds and are expertly familiar with their subject matter. Their book is not like any other, both in the subjects covered and in the manner of treatment. The authors wrote a big book (492 pages in the English translation) which has very small print, tiny graphs and figures, and exhaustive tables of data. Anyone with a serious interest in the synthesis of monomeric organosilicon compounds or in the chemical reactions and physical properties of these compounds will find this book invaluable. He will find it well worth his time to read it, even though the effort required to do this will prove to be great.

The monograph was divided into four parts. Part I has one chapter of outstanding merit dealing with the so-called "direct process" for the manufacture of organohalosilanes from organic halides and silicon. Details which apparently were not previously published are given here and the discussion of the process is excellent. It seems that it should be of most value to those interested in the industrial chemistry of organosilicon compounds. Part II is a comprehensive review of the synthesis and the chemical and physical properties of unsaturated silicon compounds. These compounds all have a carbon-to-carbon double or triple bond. A table 40 pages long lists the physical properties of these, and a bibliography of 536 references is included. This reviewer knows of no comparable source of data about such compounds. Part III describes all the known methods for making aromatic or alkylaromatic silicon compounds other than the "direct process." The reactions of these compounds are discussed. Another long table (44 pages) lists their physical properties, and 406 references are listed. Part IV deals with all methods for making organosilicon hydrides, the reactions of these, and their importance as intermediates for the manufacture of a wide variety of organosilicon compounds. This is an excellent review with 675 references.

The closing chapter compares in brief the chemistry of organosilicon, -germanium, -tin, and -lead compounds, and it adds some recent data that were obtained after the other parts of the book were completed.

Somewhere in this monograph, nearly every aspect of organosilicon chemistry is discussed. This monograph is a gold mine of up-to-date information for one who is willing to dig for it. There is no index. The arrangement of the book makes it quite likely that one will have to read in all parts to find relevant data pertaining to just one compound. This reduces the value of the book as a reference source.

Despite some shortcomings such as smallness of print, lack of an index, and sometimes tedious style, this book nevertheless should make an invaluable addition to the library of any chemist with an interest in either laboratory methods or industrial methods of making or using monomeric organosilicon compounds.

This book has no equivalent in the English language and it can be a most useful guide to both Russian and non-Russian literature. The book struck this reviewer as having been written from an optimistic or enthusiastic point of view. Along with the painstaking detail found in each part, the authors convey the feeling that these chemicals are both interesting and valuable even though very little is written about the commercial use of any of them.

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Electronic Charges of Bonds in Organic Compounds. By G. V. Bykov. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1964. vii + 191 pp. 14.5 × 22 cm. Price, $9.00.

As Dr. G. V. Bykov has written in the preface, the book is based on "a sufficiently well-founded hypothesis that the electronic charges of bonds represent a real and substantial feature of the molecules, on which their physical and chemical properties largely depend." In the first chapter the author compares the results of the various methods which have been proposed to calculate the distribution of the π- and σ-electron charges which can be associated with the bonds of a molecule. He observed that quantum mechanical calculations of π- and σ-electronic bond charges are laborious and are practically inaccessible to chemists who have not had a special mathematical training. This is why Dr. Bykov tried to establish semiempirical methods of estimating these charges. The main purpose of the book is to describe these methods and their results.

In Chapters II–VI a set of simple linear relationships are proposed between the electronic bond charges and electronegativities, force constants, interatomic distances, and heats of formation. The theoretical basis of these relations is not clear but their practical interest is tested in two ways. The relation between electron bond