In the reviewer's opinion, the nicest feature of the book is its emphasis on the effects of electron correlation in many-electron systems, a topic which often is glossed over in most books of this type. After a section devoted to zero-potential problems, the hydrogen atom and the standard approximation methods, the author takes up the problem of the helium atom in some detail. The various methods of introducing radial and angular correlation in He are clearly discussed and numerical comparisons are made. The method of configuration interaction is touched upon from this point on throughout the book.

A section on H_2^+ and H_2 introduces the reader to molecular quantum mechanics, with emphasis mainly upon the older methods of handling the H_2 problem. (The diagrammatic representation of H_2 orbitals on page 109, although correctly emphasizing the inner node of the 2s-functions, is otherwise very rough and a little misleading.) Determinantal eigenfunctions for the many-electron problem are introduced at the beginning of Chapter VIII. Perhaps it would have been more natural to present this formalism in the discussion of the excited states of He, but this may be a matter of taste.

The last 32 pages of the book give a generally good, but very brief, description of the quantum theory of polyatomic molecules. The organic molecules, acetylene, ethylene, butadiene, benzene and pyridine, and some simple inorganic molecules, notably H_2O and B_2H_6, are discussed. Ligand field theory and the nature of van der Waals forces are also briefly mentioned in the last few pages of the book.

Two further criticisms of the book should be made for the record. The first concerns the bibliography, which seems to the reviewer always to be virtually non-existent in most British monographs. This book carries on the tradition quite well. The second concerns the cover of the book, which apparently has a tendency to warp badly, at least in a dry climate.

Since much of the book is of a descriptive, qualitative nature, and yet touches on most of the modern aspects of quantum chemistry, it should serve well its intended purpose as an introduction on the undergraduate or first-year graduate student level to this important field.

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Steric Aspects of the Chemistry and Biochemistry of Natural Products. Biochemical Society Symposium No. 19 held at Senate House, University of London on 30 June, 1959. Edited by J. K. GRANT and W. KLYNE. Organized by J. K. Grant. Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1960. 16 × 25 cm. Price, $5.50.

The first paper of this Symposium is an excellent summary by Klyne of the methods available for correlating configurations of organic compounds and establishing absolute configurations. The examples are chosen from naturally occurring compounds or synthetic biologically active materials.

The second paper by Arigoni discusses some stereochemical aspects of the biosynthesis of polyisoprenoids, including a demonstration of the absolute configuration of mevalonic acid. Some of the discussion parallels that which has already appeared in the Ciba Symposium on biosynthesis of terpenes and sterols.

The remaining six papers deal with stereochemical effects in enzyme systems or pharmacological preparations, which are more complex and less well-known than the purely chemical systems in Klyne's paper. A consideration of these papers underlines the comments of Professor Peat, in summing up the Symposium, that although the definition of enzyme structure and function in chemical terms is one of the most fundamental and challenging problems facing chemists and biochemists, our exact knowledge is still very vague, and has not advanced far beyond the pictorial notions of Emil Fischer and Paul Ehrlich. If research is allowed to continue at its present pace, we may expect that by 1975 a symposium similar to this one should be able to show us the complete structure of several enzymes, and to give us a complete explanation of their steric specificities and mechanisms of action.

The chapter by Barlow discusses steric effects of drug action, considering mainly compounds which are imitators of acetylcholine. Pitt and Morton discuss the importance of *cis-trans* isomerization of retinene in the visual process. Webb reviews briefly the steric specificities of hydrolytic enzymes—esterases, glycosidases, peptidases and some miscellaneous types. The classical work by Westheimer and Vennesland on DPN mediated hydrogen transfers furnishes the most important part of Slater's paper on steric factors in oxidation–reduction processes. The last paper by Barker discusses the mechanism of the enzymatic processes involved in the biosynthesis of the pentose sugars, the nucleotides and polynucleotides.

Organic chemists with any interest in the biochemical implications of their science will find the papers in this collection stimulating and rewarding.

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Organic Analysis. Volume IV. Editorial Board: JOHN MITCHELL, JR., I. M. KOLTHOFF, E. S. PROSKAUER and A. WEISSBERGER. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. vii + 429 pp. 16 × 23.5 cm. Price, $13.50.

This volume, like the earlier offerings in this series, concerns itself with a number of entirely separate areas of interest to the analytical chemist. There are chapters on: Determination of Organic Peroxides, by A. J. Martin; Enzyme Analytical Reactions, by John B. Neilands; Gas Chromatography, by Stephen Dal Nogare and Leo W. Safranski; Applications of Nuclear Magnetic Resonance Spectroscopy to Organic Analysis, by Harlan Foster; Crystallographic Methods of Analysis: X-ray Diffraction and Microscopy, by John Krc, Jr.; and Applications of Differential Thermal Analysis to High Polymers by Bacon Ke.

Like the earlier members of the series, the contents of this volume represent a mixture of subjects chosen on the basis of sample composition on the one hand and analytical technique on the other. There is also a more subtle heterogeneity of subject matter in terms of the probable rate at which the various chapters will become obsolete. The chapters on Gas Chromatography and Nuclear Magnetic Resonance particularly will require early revision owing to the rapidity of new developments in these fields. In contrast, the thorough and generally excellent treatment of the Determination of Organic Peroxides will endure for a much longer period.

John Neilands' brief treatment of Enzyme Analytical Reactions will find many interested readers, although most analytical chemists would have preferred a more detailed and complete discussion of the subject. An extensive listing of commercially available enzymes, however, is given as well as a three-page table of known enzymic reactions. The chapter will adequately serve as an introduction to the subject and perhaps as a stimulus to further reading.

The chapter on Gas Chromatography by Dal Nogare and Safranski fills 136 pages without padding or digression. The authors probably have found approximately the right balance between theory and practice for most of their audience. The chapter is well written and provides a clear and comprehensive view of the field. Interest in Gas Chromatography crosses many of the scientific disciplines and this chapter will appeal to a broad cross section of the scientific community.

Harlan Foster clearly has not represented n.m.r. as the universal solution to the organic chemists' structural problems. He has been careful to avoid such a posture and indeed may have presented a somewhat pessimistic view. His final paragraphs are entitled "Appraisal of the Method" which seems entirely appropriate in a discussion of a technique as new as this. He has attempted to describe a complicated field in relatively few pages (about 60) and has succeeded very well. Organic and analytical chemists particularly will find this discussion an easy way to become informed concerning the potentialities of an important new technique.

The chapter on Crystallographic Methods of Analysis presents a great deal of information in highly concentrated

form. The resulting text is not very readable and the novice in this field would be well advised to start elsewhere. There are some ponderous sentences, such as "The crystallization characteristics of substances crystallizing from fusion are primarily a function of the crystallizing crystalline modification," which requires a number of readings for complete understanding. The chapter will be of use primarily as a reference for people already informed in the field.

The chapter on the Application of Differential Thermal Analysis to High Polymers limits itself insofar as discussion and examples are concerned to the high polymer field. This limited scope seems a bit unfortunate to this reviewer since applications in other important areas of organic analysis escape attention. This is not a fair criticism of Bacon Ke since he has defined the scope of his contribution in his title and has provided a very good treatment of his chosen subject. One wonders, however, whether the editors would not have improved the series significantly by arranging to include a broader coverage of Differential Thermal Analysis in the present volume. Substantial duplication will be necessary if the subject is reopened in a subsequent offering.

Volume 4 represents a useful addition to a generally excellent series of books on Organic Analysis. It is recommended reading for all those who wish to keep abreast in this area.

RESEARCH LABORATORIES
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Brookhaven Symposia in Biology. Number 13. Protein Structure and Function. Report of Symposium held June 6–8, 1960. Brookhaven National Laboratory. Office of Technical Services, Department of Commerce, Washington 25, D. C. 1960. ix + 266 pp. 17.5 × 25.5 cm. Price, $2.50.

The stated objective of the Brookhaven Symposia was to bring together workers from diverse disciplines with a common interest in protein structure and its interrelationship to the many functions performed by proteins. From these differing approaches has come a wide range of techniques employed in unveiling structural aspects of proteins. This, as much as the different functional types of proteins dealt with, is the noteworthy contribution of the publication.

Dealing with proteins of such widely varying functions as enzymes, hormones, viruses, antibodies and the structural protein, collagen, the papers can be conveniently divided into two groups for purposes of review. The first group concerns itself with the intramolecular bonds involved in maintaining the configuration of the protein molecule as well as its actual architecture. The second group is more specifically concerned with the relationship of the structure of the protein to its biological function.

In the former group, recent applications of physical-chemical tools have supplied the experimental basis for a majority of the reports. P. D. Boyer devotes a section of his paper on the disulfide groups in proteins to describing the use of nuclear magnetic resonance spectra on solutions of proteins. Both I. M. Klotz and H. A. Scheraga investigated hydrogen bonding, Klotz by using the infrared portions of the spectra, and Scheraga by means of the Linderstrøm-Lang method of deuterium and hydrogen exchange rates. One of the more interesting aspects of the paper by Klotz is his treatment of the role of the "apolar" or "hydrophobic bond" in maintaining protein configuration, which is based on analogy with model systems. The discussions following both of these papers will be of particular interest to the reader.

Three other papers which should be reviewed in this group include reports by P. J. Flory, H. K. Schachman and M. F. Perutz, and are concerned with the actual geometric form of the protein. Each has employed a different physical parameter for his measurements. Flory has used intrinsic viscosity, while Schachman points out the advantages in the use of interference optics and sedimentation equilibrium in the application of the ultracentrifuge for a study of proteins. Perutz reports on the application of three dimensional X-ray analysis to the hemoglobin molecule and details a complete contour map of a protein. A somewhat better correlation of the text and figures would have been helpful since, for the most part, one is not intelligible without the other. This particular presentation of the now-classical work is, however, very well done, outlining the methodology employed, information obtained and the reliability of the method as well as interpreting the results.

In the second group of papers, the emphasis has been placed on those structural aspects of the protein which are important for its biological function. Since the biological role of collagen appears to be structural, the studies of P. H. von Hippel and W. F. Harrington on the functional aspects of this protein were focused on those groups of the molecule which stabilize the protein configuration.

Although the covalent structure of ribonuclease has been established, the locus of enzyme activity or "active site" has not been delineated. W. H. Stein presented the approach of the Rockefeller group to this problem, which has been an attempt to modify the protein chemically in as precise a manner as possible and then observe the effects on enzyme activity. F. M. Richards and P. J. Vithayathil also investigated ribonuclease, but used the ribonuclease fragments which are obtained by digestion with the bacterial proteinase subtilisin, the "S-protein" and "S-peptide." Neither fragment has any enzyme activity itself, but combined they do show enzyme activity. The investigators studied the relationship of the fragments to enzyme activity and concluded that, in a functional sense, the "S-protein" may be the substrate binding site, while the "S-peptide" can act as the catalytic site. By chemical modification of the two fragments, they were able to further delineate the role of the various amino acid residues.

This concept of functional proteins being separable into two sites does not appear to be confined to enzymes. K. Hofmann, who used the same approach of systematic degradation and chemical modification, gave an excellent account of work on pituitary hormones. He points out that the hormone can be divided into an "active site" and an "attachment site." A somewhat similar situation exists for antibodies as well. R. R. Porter, in his report "The Active Fragments of an Antibody," points out that antibodies can be degraded by papain to an "antibody combining site" and an "antigenic site."

W. J. Ray, Jr., and D. E. Koshland, Jr., correlated the kinetics of enzyme activity with chemical modifications of the enzymes phosphoglucomutase and chymotrypsin. They employed a photoöxidation procedure for their chemical modification. Since this procedure is not specific in its effects on amino acid residues, they correlated the kinetics of enzyme inactivation with the kinetics of destruction of amino acid residues. J. M. Sturtevant also reported on chymotrypsin action which he investigated by following the kinetics of the reaction catalyzed by the enzyme. Finally, C. A. Knight has done a fine review of the work on the structure and function of the protein of the tobacco mosaic virus.

In general, although the caliber of the papers is not uniform, a major part of the work is well presented and should interest a wide audience. Represented at the Symposium were the physical chemist, immunologist, virologist, endocrinologist, enzymologist, crystallographer and protein chemist.

The volume contains accounts of original work, much of which has yet to be published elsewhere. Despite the relatively rapid publication, this volume has a complete subject index as well as an index of speakers.

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