One of the problems is the failure, so far, to provide model dihydropteridines of unequivocal structure. Taylor's "5,8-dihydropteridines," on the basis of subsequent information (as annotated in proof), now appear to possess the 4,8-dihydro structure, and Kaufman's dihydropteridine cofactor (somewhat mystifying at the Symposium), through careful enzymatic and tracer studies, now seems to have a quinoid arrangement of double bonds.

This Symposium introduced the first synthetic pteridines to have useful pharmacodynamic activities, the diuretics triamterene and related compounds. These were prepared in the main through modifications and extensions of the Timmis reaction of 5-nitrosopyrimidines with compounds possessing active methylene groups. The chemical papers by Weinstock, Pachter, and Osdene covered a lot of ground, but left unanswered a good many questions about structure–activity relationships. Other papers on synthesis included Schmidt's on new approaches to the formation of the pyrazine moiety, and Weygand's, Korte's, and Wood's contributions to the synthesis and structure of pteridines with polyol- and carbonyl-containing side chains. The alkylation of pteridines (Angier) and the rearrangements of alkylated pteridines (Brown) were interesting contributions. The covalent hydration of pteridines was discussed by Albert and similar addition reactions were mentioned frequently in other connections.

Physical properties received due attention in papers on proton resonance spectra (Phillipsborn) and polarography (Rembold, Komenda).

Finally, mention should be made of the charming peeps behind the scenes provided by Clemens Schöpf in the opening paper on the "Anfänge der Pterin-Chemie."

This volume provides a survey of the pteridine world which is likely to be less ephemeral than the circumstances might suggest.

George H. Hitchings
Wellcome Research Laboratories
Tuckahoe, New York

Interpretation of the Ultraviolet Spectra of Natural Products International Series of Monographs on Organic Chemistry. Volume 7. By A. I. Scott, Professor of Organic Chemistry, University of British Columbia, Vancouver. The Macmillan Co., 60 Fifth Ave., New York, N. Y. 1964. x + 433 pp. 17.5 × 25.5 cm. $12.50.

Excellent books on the use of infrared and nuclear magnetic resonance spectroscopy in organic structure determination have been available for several years; and more recently some on the equally powerful technique of mass spectroscopy have appeared. However, the earliest of the spectroscopic methods to be used in organic structure determination, ultraviolet absorption, has been largely neglected as far as a coherent and complete discussion is concerned. Gillam and Stern's excellent introductory monograph has had to suffice, but it is largely restricted to correlations between structure and the ultraviolet spectra of dienes and unsaturated ketones; and there have always seemed to be a discouraging number of inexplicable exceptions to the rules for predicting the position of maximum absorption. Perhaps real systemization had to wait for the touch of one schooled in conformational analysis and sensitive to the nuances of vicinal effects as well as geometry on ultraviolet absorption. Whatever the reasons for the delay in having a truly comprehensive treatment of ultraviolet spectra and structure in natural products, the gap has been filled by Professor Scott's book.

Most organic chemists will experience a certain amount of shock at the oversimplified treatment of photoexcitation adopted by the author; *e.g.*, "—C=C—C=O $(h\nu) \rightarrow$ —C^{+}—C=C—O^{-}!" Spectroscopists will be horrified. But quick recovery follows as the utility of the simplifications becomes manifest. Once through the introduction, where spectroscopists are told they "need read no further" (they will make a mistake if they don't), the reader will be gratified to find a whole chapter devoted to single chromophores. Among these are several saturated types not ordinarily considered, but now becoming accessible as the familar instrumental limit of about 200 mμ is breached. The absorptions of monoolefins, disulfides, peroxides, ozonides, alkyl halides, and alkynes are treated in addition to that of the familiar carbonyl group. Furthermore, nitrogen-containing simple chromophoric systems are discussed even though some of them are as yet to be found in natural products.

Conjugated chromophores, dienes and unsaturated ketones, aldehydes, lactones, and derived nitrogen analogs are next, and naturally constitute one of the most substantial chapters. Extensive use is made of tables of structures with their maxima and extinction coefficients. Solvent and vicinal effects as well as those of substitution in shifting maxima are thoroughly covered. The influence of single bond *cis–trans* isomerism is cataloged and explained, and interactions of nonconjugated chromophores to produce anomalous bands are not neglected.

Chapter 3 is a real treasure for anyone trying to make structural sense out of the ultraviolet absorption spectra of aromatic compounds. The author convincingly separates the benzenoid absorptions from electron-transfer bands involving substituents. He then provides substituent contributions and remarkably accurate rules for predicting the position of the electron-transfer bands of substituted phenyl alkyl ketones, benzaldehydes, benzoic acids, and benzonitriles. Polynuclear aromatics, aromatic amines, and quinones also receive treatment here.

In Chapters 4–6 are collected for the first time extensive data on all types of heterocyclic compounds. The range is from furans and thiophenes through all types of pyrilium compounds to pyrroles, indoles, carbolinium compounds, pyridines, and polyazines, among the latter being purines, pyrimidines, and pteridines.

Chapter 7 (contributed by Dr. C. J. W. Brooks) is devoted to spectrophotometry in the analysis of natural products and completes the catalog. It fulfills admirably its design of being a reference source for biochemical workers faced with knotty analytical problems. Tables are provided listing compounds, including enzymes, with brief descriptions of methods for their quantitative determination. Many references are provided.

In Chapter 8, the fun begins with the application of the catalog of chromophoric systems and their absorptions to selected natural products. Here the author strikes hard on the discrepancies between "model" and real compound. Steric inhibitions to planarity and "violations" of the rules get the full treatment. Steroids naturally occupy a significant part of the chapter but by no means do they crowd out other systems of interest. (Much of the routine analytical material on steroids is presented in an appendix.) The systems covered range from cyclopentenones (pyrethrolones) to natural quinones, through polycyclic alkaloids to pyrroles and porphyrins.

Chapter 9, the last, really is a continuation of 8, but the molecules are of much more complex structure and the spectra, as expected, more difficult to explain. Here the reader is introduced to and educated in the most sophisticated of interpretations. The discussion abounds with overlapping absorptions, vicinal effects, and the fine details of group interactions.

No chemist working with natural products in the large sense of the term can afford to be without this book. Every student whose work is concerned with organic structure determination in any sense should have it on his shelf; and all, including the spectroscopist, have much to learn from it. Organic chemists owe thanks to Professor Scott for this timely, and outstandingly comprehensive treatment of an important subject. Not only does he teach the use of ultraviolet spectroscopy in natural products work, he also provides a bibliography to most of the important work on natural products done during the last twenty years.

Richard H. Eastman
Department of Chemistry
Stanford University, Stanford, California

Fatty Acids. Their Chemistry, Properties, Production, and Uses. Second completely revised and augmented edition. Part 3. Edited by Klare S. Markley. Interscience Publishers, John Wiley and Sons, Inc., 605 Third Ave., New York, N. Y. 1964. x + 993 pp. 16 × 23.5 cm. $35.00.

The second edition of Dr. Klare S. Markley's "Fatty Acids" is being issued in four parts. Part 3 contains mostly new material. It covers the significant recent research on fatty acids and presents the status of existing problems. As in the preceding volumes, outstanding specialists discuss their areas of special interest.

In "Biological Oxidation of Fatty Acids," Dr. Mahler of Indiana University describes the great strides that have been made since 1947 in solving the riddle of fatty acid oxidation by careful study of the enzyme systems involved.

Dr. Sonntag of National Dairy Products Corporation presents a thorough discussion of nitrogen derivatives—a group that has