NEW BOOKS

Edited by Lou Going

BIOCHEMISTRY by A.L. Lehninger (Worth Publishers Inc., New York, 833 and xiii p., 1970, $16.75)

This text is such a timely and an outstanding treatment of this field that it will probably remain in good use for five years after its first release. A significant testimony to the power of the field and this author who has mastered it so well is the fact that I fell in love with Biochemistry all over again. The book is clearly a biochemistry text for those who are or would become biochemists. It effectively creates an overall awareness of the functioning of a system with its thermodynamic interactions and kinetic factors regulating the "flow" of metabolites and energy. Thus it is better suited to those with secure chemical backgrounds who can fill in "between the lines" and make allowances for some oversimplifications.

The author's long-standing concern for cellular compartmentation has led to a better presentation of microscopic anatomical relationships than is found in other good biochemical texts (such as that by Mahler and Cordes).

In order to integrate the forest of facts, the text does not develop some individual points in the detail seen in other texts, and tends at times to be an outline (somewhat like Karlsson's). The author, more than many others, has arranged the material to tell an exciting interpretive story regardless of the historical sequence in which the facts gradually became known. Nevertheless an adequate sense of the progressive development of our knowledge from past to present to future is manifested throughout the text. Fortunately, it does not then end with an encyclopedic tabulation of body fluids, organs and hormonal actions such as found in satisfactory traditional texts (such as White et al.), but rather closes an intellectual loop back from self-assembly and morphogenesis to regarding the origin of the molecular components of cells mentioned in the first chapters.

The opening sections caused some alarm with a threat of superficiality in regarding the "fitness" of molecules and water for living systems. This was heightened by an unfortunate emphasis on preserving zero order kinetics (Chapter 8) which led to an obscure consideration of "when the enzyme is the rate-limiting factor." A concern for a correct, precise handling of items the first time to avoid the need for reteaching on later contact was reawakened by some misleadingly, oversimplified comments. For instance, sphingolipids seem classed as saponifiable lipids, and the "uncharged polar groups" of amino acids in Chapter 4 denies the training on titration curves in Chapter 2. The unusual format for biosynthesis of phosphoglycerides is partly reflective of the primitive quality of evidence in the field.

Overall, the text provides a clear and strong development of the integrative interrelationships of biochemical systems. The regulatory features described in such a systems analysis approach create concepts that stir imaginations in an indeliby irreversible manner.

W.E.M. LANDS
Department of Biological Chemistry
University of Michigan
Ann Arbor, Mich. 48104

MICROWAVE STUDY OF CHEMICAL STRUCTURES AND REACTIONS, by P. Hedvig and G. Zentai, Eng. translation edited by E.D. Morgan (The Chemical Rubber Company Press, Cleveland, 445 p., 188 illustrations).

To this reviewer the title of this book is an enigma, probably an unfortunate puzzle. Microwave Spectroscopy to the casual browser in a book shop or to the random reader of the book review section in a technical journal would connotate spectroscopy, probably absorption spectroscopy, confined to that portion of the electromagnetic spectrum between 0.1 and 10 cm. If not specifically interested in this limited branch of spectroscopy he might pass over the volume or the reference to it. However, he might exclude further examination of the volume to his loss, for this excellent treatise is not only confined to Microwave Spectroscopy as commonly defined under the restricted definition cited, but actually is concerned, within the major portion of its pages, with topics that are not ordinarily thought of, in this country at least, under the term Microwave Spectroscopy.

The authors, in the opening sentences of their introduction, immediately broaden their scope to include spectroscopy at radio as well as microwave frequencies and they include in this coverage the resonance techniques Electron Spin Resonance, Nuclear Magnetic Resonance, and Nuclear Quadruple Resonance. The section, devoted to Microwave Rotation and Inversion Spectroscopy and, by further extension of the scope to include Debye and Dielectric Spectroscopy, actually occupy only a minor portion of the text.

The Introduction to the volume, only 26 pages, is a very excellent concise description of these five branches of spectroscopy, differentiating each on the basis of origin, theory and potential applications. To the reader interested in such a short statement defining, differentiating and establishing choice of technique for a specific problem, this brief chapter can be highly recommended.

Chapter 2 deals with experimental methods, four describing the techniques employed in each of the five branches of spectroscopy itemized above (Nuclear Magnetic Resonance and Nuclear Quadruple Resonance are combined in this treatment). The author intertwines the theory of each specific branch of spectroscopy with general techniques involved in obtaining data within each, rather than specific descriptions of the operation of individual commercial instruments. A fifth section, inserted into this chapter, deals with dynamic methods, confined almost exclusively to Electron Spin and Nuclear Magnetic Resonance, measurements not made at thermal equilibrium where the Boltzmann distribution defines the population between the spin levels. This section covers, very adequately, adiabatic fast passage, saturation and spin-echo measurements to obtain spin-lattice relaxation time T_1, or pin-pin relaxation tme T_2. Double resonance or decoupling techniques in both electron-proton and nuclear-nuclear spin systems are described to illustrate methods of investing hyperfine interaction in Electron Spin Resonance or for determinations of chemical shifts in high resolution Nuclear Magnetic Resonance.

Chapters 3, 4 and 5 entitled, respectively, "Free Radicals," "Structure Determination and Analysis" and "Reactions," use 297 pages of the 445 page text or just about two thirds of the volume. These three chapters constitute an excellent treatment of resonance spectroscopy, Electron Spin Resonance and High Resolution Nuclear Magnetic Resonance Spectroscopy. Chapter 3 discusses how free radicals can be studied directly by measuring electron spin resonance of their unpaired electrons, treating the theory of electron spin resonance and embellishing the discussion with many interesting and specific examples. The determination of radical concentration and radical structures are treated exhaustively, and detailed examples are cited of the investigations of radicals in the solid, liquid and gaseous state. The chapter is of particular importance to the individual interested in applications of electron spin resonance.

Chapter 4, in a similar manner, demonstrates how high resolution nuclear magnetic resonance spectroscopy has gained considerable and rapid acceptance as a tool for analyzing complex molecular structures. By measurements of the number and position of lines (chemical shifts) in a high resolution NMR spectrum it has become possible to determine the number, nature and steric positions of the

chemical groups in a molecule exactly and accurately by an absolute method. The theory and techniques are illustrated with several examples of determination within the hydrocarbon groups (chemical shifts of the protons). This discussion leads to a review of similar investigations of other nuclei, particularly fluorine phosphorus and boron. Another section of this chapter which is devoted almost exclusively to high resolution stpectroscopy contains excellently illustrated examples of the use of this tool in stereochemical analyses, including differentiation of rotational isomers, *cis-trans* isomerzation and cyclohexane-type stereoisomers with specific illustrations within the area of steroid and polymer chemistry.

Chapter 5 mainly returns to electron spin spectroscopy, treating the investigation of transient radicals in investigations of the initiating centers of radical reactions, the intermediates formed and their concentrations, and the final product and their concentrations resulting from such reactions. The treatment includes theoretical discussions with illustrations of radical reactions involving oxidation reactions and chemical exchange reactions, including electron exchange, electron transfer and proton exchange type reactions. Finally, specific types of chemical reactions are discussed including photolysis and radiolysis, polymerization reactions, catalysis and biochemical reactions.

While this text appears to this reviewer to offer little to the Microwave Spectroscopists as commonly defined, one who is occupied with the investigation of absorption in the region of the electromagnetic spectrum between 0.1 and 10 cm, it should be of interest and is highly recommended to analytical spectroscopists specializing in Electron Spin Resonance investigations of chemical radicals and radical systems, or in the use of High Resolution Nuclear Magnetic Resonance Spectroscopy for purposes of chemical analysis or elucidation of molecular structure.

R.T. O'Connor
USDA, Southern Marketing and Nutrition Research Division,
New Orleans, La. 70119

Basic Laser Raman Spectroscopy, by Jack Loader (Heyden & Son Ltd., New York, Paperback, 105 p.).

The main text of this little volume consists of only 46 pages, almost half of which are occupied with tables, figures, illustrations and illustrative spectra. Thus the running text covers only the equivalent of 23 pages, divided into six short chapters. A text of this length would appear to be inadequate to introduce the subject of Laser Raman Spectroscopy to the novice or to interest the serious research worker in this specialized field. The author, in his Preface says "This small book is intended as an aid to the growing numbers of chemists who are coming into or returning to Raman spectroscopy as the result of the introduction of the laser as a monochromatic light source." To this rather specialized class of chemists, which is not too small and which is undoubtedly growing, this very short, concise introduction to the laser and its use in Raman Spectroscopy might well serve a very useful purpose. Chapter 1, entitled "The Raman Effect" consisting of only three pages of running text, is not much more than a bare outline. The importance of the laser to the analytical spectroscopists using Raman effect (which is emphasized by the author throughout the text) is dramatically illustrated in this brief introduction. In 1928, in a paper first demonstrating the effect before the Royal Society, Sir C.V. Raman showed photographically recorded Raman spectra of carbon tetrachloride, among other solvents. The spectrum of this solvent was recorded using the 4358 Angstrom line of mercury from a 3000 c.p. lamp, a 600 ml vacuum distilled sample and a 25 hr exposure of the photographic plate. By the use of lasers as high monochromatic sources, the complete Raman spectrum of such a solvent can be recorded with a 10 μl sample in less than 20 min, or approximately 1% of the time required by Sir Raman!

Chapter 2, Sample Handling, treats in a somewhat superficial way the precautions to be observed in the use of lasers in general and describes techniques for the handling and care of Raman cells and photomultiplier tubes in three commonly used commercial Raman Spectrometers. Techniques for avoiding problems arising from the measurement of fluorescence and colored liquids, along with techniques for polarization measurements for handling solid samples and for obtaining spectra at high and at low temperatures are treated in very brief discussions.

Chapters 3 and 4 deal with the Calibration of the Spectrometer and Resolution Checks, respectively. Calibration data are given for the helium-neon and the argon lasers and for calibration of the spectrometer with indene. The five different types of carbon tetrachloride or four different types of boron trichloride molecules, arising from the ^{35}Cl and ^{37}Cl isotopes are recommended for check resolution. Raman shifts for the nine modifications of these two compounds are tabulated.

Attention is directed to the spurious Raman lines that can arise in discharge from the plasma in a high power argon ion laser and a four-page table of these spurious lines is presented.

Factors Affecting the Intensity of the Recorded Spectrum are considered in Chapter 5, including the intensity of the incident light, the efficiency of the diffraction grating, and photomultiplier tube and the spectrometer discrimination, the measure of stray light in the monochromator. Chapter 6, Chemical Applications of Laser Raman Spectroscopy, is confined to general applications, particularly to complement infrared absorption measurements, rather than citations of specific applications.

The volume contains a single page of journal references to specific articles dealing wth Raman spectroscopy and three Appendices, one describing commercially available Raman spectrometers which were not included in descriptions in the text; a second, similarly describing a number of commercially available laser sources; and a third, consisting of a library of reference Raman spectra of 19 sol-

(Continued on page 357A)

International Seed Crushers Meet in Copenhagen

Annual congresses of the International Association of Seed Crushers over the years have come to be regarded as the forum for the world's oils and fats producers. This year's meeting, which was held at the Hotel Sheraton, Copenhagen, from June 23 to 25, had an attendance of some 850 delegates and their wives from the Association's 31 nation membership.

The congress was officially opened by Prince Henrik of Denmark, and apart from the important annual review given by the president, J.E.Th.M. Randag (U.K.), there were five other main speakers, during the three days.

Thorkild Kristensen, a former Danish finance minister and now secretary-general of O.E.C.D., spoke on "Future Trends in the Markets for Oilseed Products." Georges Champetier, of the French Academy of Sciences and President of the ITERG (Paris)—Institute des Corps Gras, had as his subject, "Basic and Professional Research in the Oil Industry—The Centers of Professional Techniques." J.R. Jensma of the Unilever Research Laboratories in The Netherlands spoke on "A Plant Breeder's View on Some Oilseed Crops."

Two speakers from the other side of the Atlantic were J.W. Hogan, Vice President, Commodities Division of Ralston Purina Company, St. Louis, and director of the Soyabean Council of America, covering "The Future of the Soyabean Industry" and C.D. Palmby, Assistant Secretary for International Affairs and Commodity Programes, U.S. Department of Agriculture.

In addition, G.S. Kurkjian, (U.K.) president of the Federation of Oils, Seeds and Fats Association Limited, presented a report on the work of his association.

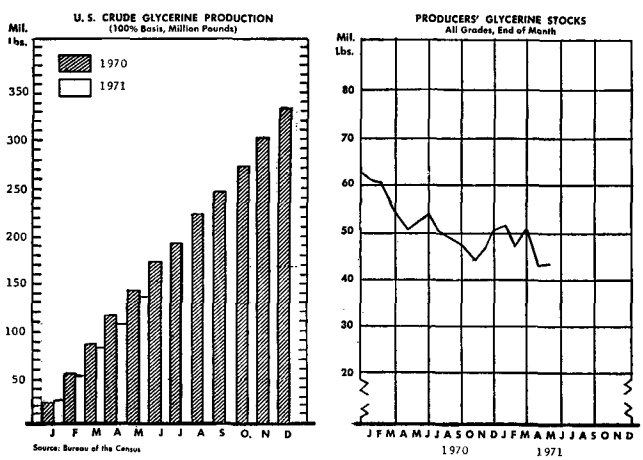
The I.A.S.C. was formed in 1910 to meet the need for a combined approach on the part of European seed crushers to a variety of problems connected with the shipment of oilseeds from overseas and the disposal of the resulting products. Today the association is truly international, covering geographically most of the important producing and consuming countries for oils and fats in the world, and embracing all aspects of the vegetable oil industries.

In recent years congresses have been held in Washington, D.C., London, and now Copenhagen. And it has been agreed that the 1972 venue will be Japan.

Glycerine Production Statistics

According to the U.S. Department of Commerce, production of crude glycerine (including synthetic) for May 1971 totalled 27.6 million pounds, up 3.7 million pounds from April (revised), but down 1.5 million pounds from May 1970.

At the end of May, producers' stocks of crude and refined glycerine totalled 43.7 million pounds, up 0.8 million pounds from April (revised), but down 9.3 million pounds from the end of May 1970.



The April 1971 crude production and crude and refined glycerine stocks figures were revised as follows, in thousand pounds, 100% basis: production, crude, from 24,060 to 23,893; stocks, crude, from 19,602 to 19,340; stocks, refined, from 23,499 to 23,525. These revisions have lowered the total stocks level from 43,101,000 to 42,865,000 pounds and raised domestic disappearance from 2,527,000 to 22,596,000 pounds.

Source: Glycerine Producers' Association, 475 Park Avenue South at 32nd Street, New York, N.Y. 10016.

Armour Chemical Announces Move

Armour Industrial Chemical Company's headquarter office moved from 111 East Wacker to 300 South Wacker, J.H. Gardner, President, announced.

Armour Industrial Chemical Company, a part of Akzona Inc., is a major producer of fatty acids, fatty amines and fatty esters. The company operates manufacturing plants in McCook and Carpentersville, Illinois, Philadelphia, with international plants located in Canada, England, Italy and Japan.

• *Names in the News . . .*

(Continued from page 352A)

Chemical Society. Dr. McCafferty receives the award for his original and significant research on water adsorbed on iron oxide. This work has given new insight into the understanding of iron corrosion. He is currently employed at the National Research Laboratory, Washington, D.C. The award, which commemorates the late Victor K. LaMer, prominent physical chemist who taught at Columbia University, was presented for the first time in 1970 at the 44th National Colloid Symposium, held at Lehigh University.

E.F. BINKERD has been appointed Vice President for research of Armour Food Co., newly organized as a separate operating division of Armour and Company. Mr. Binkerd joined Armour as a research chemist shortly after his graduation with a major in chemistry from Iowa State University in 1942. After moving into the administrative side of research, he advanced to position of manager of food research in 1964 and in 1967 was named director of research. Binkerd is headquartered at the Armour Food Research Center in Oak Brook.

• *New Books . . .*

(Continued from page 346A)

vents, including benzene, carbon disulphide, carbon tetrachloride, chloroform, cyclohexane, ethanol, methanol, etc.

Throughout the text the language is concise and the treatment of the subjects is abbreviated. As if to emphasize the speed at which Raman spectra can be obtained today, the entire text can be read, probably, in about thirty minutes.

R.T. O'CONNOR
USDA, Southern Marketing and Nutrition Research Division,
New Orleans, La. 70119