

It is impossible to give a complete survey of the contents. I might restrict myself to indicating that part of the chapters of these volumes are devoted, not to the description and discussion of enzymes or groups of enzymes, but to more embracing topics as "Theory of Oxidation-Reduction", "Thermodynamics of the Phosphate Bond", "Anaerobic Glycolysis, Respiration, and the Pasteur Effect", "Yeast and Mold Fermentations", "Fermentations by Bacteria", "Carbonic Acid Fixation", "Photosynthesis in Green Plants", "Bacterial Photosynthesis", "Tumor Enzymology", "Enzyme Technology", etc.

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Phosphorus metabolism. A symposium on the role of phosphorus in the metabolism of plants and animals. Volume I. Edited by WILLIAM D. McELROY AND BENTLEY GLASS.
The Johns Hopkins Press, Baltimore, 1951. 762 pages, \$ 10.00.

La fin de la période 1930-1940 représente un tournant dans le développement de nos connaissances du métabolisme cellulaire: les voies de la fermentation alcoolique et lactique ont été élucidées ou à peu près, le rôle du phosphore dans ce processus est compris, la chaîne des transporteurs d'électrons et d'hydrogène est débrouillé et le "cycle de KREBS" commence à s'imposer pour rendre compte du rôle catalytique des acides dicarboxyliques qui avait fait l'objet d'une controverse épique. Le symposium tenu à Madison en 1941 couronne brillamment l'oeuvre de cette décade. Déjà alors une série d'observations ouvraient de nouveaux champs à l'activité des chercheurs, de nouveaux chapitres se dessinaient. Le symposium tenu à Baltimore en 1951, centré sur le métabolisme du phosphore, clef du métabolisme cellulaire, n'a pas ce caractère de couronnement mais il vient en son temps faire le point. L'introduction due à OTTO MEYERHOF fait la liaison entre ces deux ouvrages.

Le symposium est constitué par une série de chapitres commençant par un exposé de l'ensemble du problème considéré: métabolisme des polysaccharides (W. Z. HASSID), métabolisme des hexose-phosphates (L. F. LELOIR), métabolisme des phosphopentoses et trioses (B. L. HORECKER), nature de l'acétate actif (H. A. BARKER), phosphorylations oxydatives (F. E. HUNTER Jr.), métabolisme des coenzymes (A. KORNBERG), pyrophosphates et métaphosphates (G. SCHMIDT), ions inorganiques et phosphorylations (H. LARDY), chimie et thermodynamique de la liaison phosphorée (P. OESPER). Chacune de ces revues est suivie de communications ayant le caractère de contributions personnelles et d'une discussion par les membres de l'assistance. Le dernier chapitre, consacré à l'utilisation de l'énergie de la liaison phosphorée, est une suite de huit communications relatives à la contraction musculaire, la bioélectricité et la bioluminescence, au cycle de l'urée, à la synthèse des protéines, aux transméthylations et à la prise en charge de l'anhydride carbonique. L'ouvrage se termine par un gros résumé de 80 pages, dû à la plume d'un des organisateurs (B.G.), apparemment rédigé après la réunion: il sera particulièrement apprécié par les biochimistes qui ne d'intéressant pas directement aux problèmes discutés mais qui, en raison de leurs tâches d'enseignement ou par louable curiosité, veulent rester dans le mouvement.

Tous ces problèmes ainsi mis au point représentent bien les préoccupations actuelles de la biochimie du phosphore, dans leur enfance en 1940. Leur choix est judicieux et il faut en savoir gré aux organisateurs. Ce symposium, devenu livre presque par la force des choses, est vivant, particulièrement ses discussions où on reconnaît le tempérament des participants; il soutient l'attention d'un bout à l'autre. Sa lecture est assez difficile évidemment: une simplicité forcée ou une schématisation ne serait pas de mise en présence de problèmes en pleine évolution et dont les conclusions ont un caractère nécessairement provisoire.

Les organisateurs ont réussi à publier cet ouvrage moins de six mois après la réunion: c'est un record. On regrettera cependant qu'ils n'aient pas pris la peine d'uniformiser la présentation des figures et surtout des tableaux dont certains, simples photographies de clichés tracés à la main, défigurent réellement l'ouvrage.

C. LIÉBECQ (Liège)

Fouriersynthese von Kristallen und ihre Anwendung in der Chemie, von WERNER NOWACKI.
Verlag Birkhäuser, Basel, Schweiz 1952; 238 S., 120 Abb., broschiert Fr. 30.15,
gebunden Fr. 34.30.

Fourier analysis, as a mathematical discipline, concerns itself with the expression of functions as sums of sinusoidal waves. In the X-ray analysis of crystal structures use is made of sinusoidal electromagnetic waves as measuring rods in the determination of the structure of matter. The physical

nature of the process of X-ray analysis thus leads directly to expression in the mathematics of Fourier analysis.

W. H. BRAGG recognized this fact quite early in his studies of crystal structures. He was followed, somewhat slowly at first but later at an accelerating pace, by many workers. Some of these have modified the Fourier techniques of classical optics in applying them to a new field. Others have searched the mathematical literature for mathematical theorems which could be given a physical interpretation and thus be made useful in a physical application, and still others have worked directly on the mathematical techniques to extend and develop theorems of use to crystal analysts.

Professor NOWACKI's book is concerned with the application of the Fourier techniques of X-ray diffraction analysis to crystals. A crystal is itself a periodic structure and for such structures the Fourier theory takes on a relatively simple and elegant form, the Fourier series, as compared with the more complex formulation, the Fourier integral, which is required for the discussion of non-periodic structures.

In the initial chapter of Professor NOWACKI's book—*Fouriersynthese*—the first seven sections are concerned with mathematical form of the Fourier series in one, two, and three dimensions and of the various projections of part or all of the elementary cell. These sections are also concerned, following LONSDALE, with the way in which the Fourier coefficients—structure factors and amplitudes—are related to the atomic positions. There follow sections on the precision of the determination of atomic coordinates as this is affected by thermal motion, termination of series etc., and of the methods for the refinement of the parameters obtained from Fourier series including a discussion of least squares methods and of differential syntheses. A section then follows on the theoretical methods which have been suggested and used for the absolute determination of intensities. The chapter concludes with a section on the problem of the determination of the phase of the Fourier coefficients.

In the second chapter, under the three headings: *Pattersonsynthese*, *Harkersynthese*, *Buerger-synthese* (*Implikationsdiagramme*), the author has discussed the methods of structure analysis which have become known by these names. He has also reviewed other methods related to the foregoing, such as the methods of YÜ and the "Auslöschungseinheiten" or "diffraction symbols". A table of diffraction symbols is included as a separate booklet in a pocket at the end of the book. The chapter concludes with a valuable summary of the discussions which have been given by BÜRGER, NIGGLI, NOWACKI AND SCHDANOW, of the symmetry properties of crystal and diffraction space.

The third chapter is concerned first of all with the methods used in calculation of Fourier syntheses. Several sections discuss the strip methods, punched card methods, and finally the mechanical and electronic analogue computers. An appendix to these sections includes methods for structure factor computation. The chapter concludes with a discussion of the optical methods for crystal computation and a brief mention of the attempt to use radio micro-waves in such calculations.

This rapid survey of the contents indicates the massive task which the author has undertaken. By writing this book he has relieved his colleagues of the necessity for detailed literature search in this field and for this he deserves all thanks. On the subjects of the first two chapters he has written reviews of the published work in such detail as to give the reader a clear picture of the contents of the original papers. In the last chapter the author has been wise in reducing the detail since a calculation method can only be learned by reading between the lines of the original paper while one is trying to apply the method described therein.

On the content of the book the reviewer has little to criticize. Perhaps an appendix on the basic mathematics of Fourier series would have been of value. A crystallographer who wants to read the textbooks, monographs, and the original literature of Fourier theory needs a gentle guide to help him over the difficulties of point of view which he will meet.

On the philosophy of the book the reviewer can only say that he would have been less tolerant and less impartial than the author. It would have been valuable to the reader to have had available more of the judgement of the author as to the relative merits of the methods and procedures which are so ably presented.

The reviewer has found a few misprints and a few references which have been omitted. These will not however disturb the reader in his perusal of a book which has been well written, well produced. It is well worth the study of any crystallographer, and should be on his reference shelves.

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