with current topics in the field. The editor has attempted to assemble "personal contributions and forward-looking stimulating articles" by eminent scientists in the field.

The first volume appears to conform with these aims. It is not a book to be read to gain a general impression concerning the state of high-pressure research but rather one that provides fairly complete reviews of six subject areas. The contributors are active researchers, and new data are presented and older data are treated in refreshingly different ways. The contributions include a detailed and critical examination of tetrahedral anvil devices; discussions of the physical and chemical effects of shock waves, the effect of pressure on the dielectric and refractive properties of materials, and geophysical high-pressure research; and a theoretical study of the stability of solids under pressure and a review of current optical studies at very high pressures. The authors represent six laboratories in three English-speaking countries. It is hoped that later volumes will continue to reflect the international character of high-pressure research.

The nomenclature is fairly uniform throughout the volume, and the physical make-up of the book is conducive to easy reading. Some lack of uniformity of treatment and symbolism could have been avoided by more vigorous editing, but there seem to be no serious problems in this respect.

On the whole the book is comprehensive and carefully organized. It will be valuable for laboratories conducting research on high-pressure phenomena and for those seeking a more general background in the subject.

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## The B Vitamins

**The Vitamin Co-Factors of Enzyme Systems.** F. A. ROBINSON. Pergamon, New York, 1966. 906 pp., illus. $25.

This book is a rewriting of Robinson's earlier book *The Vitamin B Complex*, published by Wiley in 1951. It takes the same general form as its predecessor. Each of the B vitamins (thiamine, riboflavin, nicotinic acid, pyridoxine, pantothenic acid, biotin, the folic acid complex, and vitamin $B_{12}$) is, as before, discussed with respect to its history, its isolation, its chemical constitution and synthesis, its properties, its estimation by biological, microbiological, and chemical methods, its occurrence in foods, deficiency symptoms and quantitative requirements in animals and man, its toxicity (if any), its metabolism, and its intestinal synthesis. As before, the pharmacological action of the vitamin, as well as its requirements in the nutrition of microorganisms, plants, and insects, is also discussed, and there is in each case a section on structural analogs and one on function. As an updating of the earlier book this one will, I believe, be of considerable interest and value to nutritionists and instructors of courses on vitamin nutrition.

Discussions in the earlier volume of para-aminobenzoic acid, inositol, choline, and miscellaneous water-soluble growth factors have been dropped. A short chapter on lipoic acid has been added. Although the chapters on vitamin $B_{12}$ and folic acid have been very extensively revised, certain other chapters, such as the one on thiamine, have been changed very little, and throughout the book I noted few references dated later than 1960. For example, under thiamine synthesis the sections on the "American method," the "British method," and the "German method" of chemical synthesis are retained. Only a few sentences on the biosynthesis of thiamine have been added to the 1951 account of the chemical synthesis, although this is the more interesting synthesis from the point of view of the biochemist.

Perhaps my chief disappointment is that the author's ambition of reviewing the B vitamins "from the point of view of their significance in enzyme reactions rather than as factors of nutritional importance," which is stated in the preface and which explains the change in title, is largely unfulfilled. The role of the enzyme cofactors derived from the B vitamins seldom receives extensive or detailed treatment and represents only a small proportion of the book.

Let us consider vitamin $B_{12}$ as an example. A list of suggested functions includes several disproven functions and indirect secondary effects caused by a lack of the vitamin (that is, deficiency symptoms) while it omits most of the demonstrated and established molecular sites of action of vitamin $B_{12}$ coenzymes. This list is followed by paragraphs and sections which deal rather indiscriminately with metabolic effects of vitamin $B_{12}$ deficiency (such as lowered $-SH$ concentrations in blood), and with proven molecular-level functions of the coenzyme (such as methionine-methyl synthesis and interconversion of $\beta$-methylaspartate and glutamate). In view of present knowledge as to the roles of the vitamin $B_{12}$ coenzymes, the coverage of dioldehydrase in a ten-line paragraph and mention of methylmalonyl-CoA mutase in about six lines seem very inadequate. At the same time, two pages are devoted to the role of vitamin $B_{12}$ in the synthesis of proteins and nucleic acids, and a paragraph is devoted to the probably nonexistent role of the vitamin in the synthesis of citrovorum factor. Turning to the chapter on thiamine one finds no mention at all of transketolase, even though it appears to be the earliest biochemical lesion that develops in the thiamine-deficient animal. Similar instances of lack of discrimination could readily be pointed out in the cofactor-function sections of the other chapters.

One should hasten to say, however, that a great deal of valuable and important information pertaining to the deficiency symptoms of numerous species is presented. By pointing out many of the metabolic defects that occur in the various B-vitamin deficiencies in experimental animals, the book provides information that goes beyond mere description of external symptoms. One is again made aware of the tremendous gaps that still exist in our knowledge of the total role of even these better-known vitamins at all steps of metabolism in the whole organism. It is evident that there is a great deal of biochemistry yet to be done in tracing metabolic events subsequent to the initial block in a vitamin deficiency, and in understanding the various resultant secondary molecular changes which underlie the picture finally seen in the deficient animal.

I believe this will be a useful and valuable book for the nutritional biochemist to have as a guide to future work on the B vitamins. It would be desirable to have beside it an up-to-date revision of the 1950 *Biochemistry of B Vitamins* by R. J. Williams *et al.*, long out of date.

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