Many tricks used by humans, involving the processing of names of dimensions and values and yielding what Bruner, Goodnow, and Austin call "relational concepts," will need more sophisticated modes of description. It can be expected that the present book will arouse interest and direct activity in these directions. This will be greatly facilitated by the fact that in an appendix the authors present exact descriptions of their algorithms in a precise but simple computer-independent language (the "Iverson language"). The authors are to be commended for their appreciation of the problem of communication between programmers and for coming out with an acceptable solution, building, in the process, one bridge over the gap between psychologists and computer scientists.

R. B. BANERJI
RCA Research Laboratory, Princeton, New Jersey

Uncharted Territory

Vegetation Mapping. A. W. KUCHLER. Ronald, New York, 1967. 478 pp., illus. $15.

The high-quality vegetation maps available in France, Austria, Germany, and Russia are both useful and impressive. Such detail, so important for much biological-planning work, is rarely at hand in this country. It is gratifying, therefore, to see a new American book devoted to the subject which not only details the ecological basis, technical aspects, and various methods of vegetation mapping, but also emphasizes the need for it and explains its possible applications. The same author gave us a most welcome small-scale vegetation map of the U.S. in 1964, with an equally valuable explanation. One hopes that these sparks will impel us to begin to match the vegetation mapping now under way in much of Europe.

Longer than Ellenberg's excellent *Aufgaben und Methoden der Vegetationskunde* (1956), the book goes a great deal further (and in English) in discussing the importance of ecology to mapping, the importance of thinking through in advance the technical problems of mapping, and the various (climatic, physiognomic, floristic, and "comprehensive") approaches. The book contains practical ideas: on maintaining uniformity in procedure yet finding original solutions for the problems peculiar to a particular area; on choosing the proper scale; on using color to maximize ecological-climatic land-use information; and on the merits and weaknesses of systems now in use. It offers an explanation of the superb Gaussen system and a fine discussion on the values of such maps to land managers and planners.

The book is hardly flawless: it is wordy and repetitious and written in parts as though for a high school audience; it is overly preoccupied with climate and with European ecology; and it does not clearly explain "potential natural vegetation." More serious, it says nothing about vegetation maps prepared from the General Land Office Survey notes of the first surveyors; many such maps (for example those by Vestal, Kenoyer, Potzger) portray in considerable detail presettlement and hence "original" vegetation distribution. But the flaws, though not unimportant, pale before the potential usefulness of the book. The analysis of maps and techniques from all over the world (of the 552 bibliographic references, 332 are in foreign languages) is a significant contribution in itself. With this book to provide methodological order, it is possible that the affluent society will produce vegetation maps as good as its road, topographic, soil, and geologic ones and that the eco-bio-geo-cenologist-planner need not always peer hopelessly at the grey stippling of his aerial photographs, wishing he could see beneath.

PAUL D. KILBURN
Principia College, Elsah, Illinois

Chemistry of Earth Metals

Peroxides, Superoxides, and Ozonides of Alkali and Alkaline Earth Metals. IL'YA IVANOVICH VOL'NOV. Translated from the Russian edition (Moscow, 1964) by J. Woroncow. A. W. Petrocelli, Translation Ed. Plenum Press, New York, 1966. 160 pp., illus. $9.

For a comment on the contents of this work, it would be difficult to improve on two paragraphs taken from Petrocelli's preface to the translated edition:

> Professor Vol'nov is eminently qualified to write this monograph since for many years he has been a leading investigator and prolific writer in the field of peroxide, superoxide, and ozonide chemistry. He has succeeded in presenting a lucid and detailed discussion of past work, the present state, and the future potential of this area of unfamiliar oxidation state chemistry.
>
> Of particular interest is Professor Vol'nov's extensive compilation of available thermodynamic, kinetic, and structural data for the alkali and alkaline earth peroxides, superoxides, and ozonides. In addition, he has reviewed the known methods of synthesis, as well as the practical applications for which these compounds are suited.

The volume is an organized publication of the articles by Vol'nov and coworkers, with logical additions of the work of others in appropriate areas. The chemistry of the compounds is well done and well referenced. The references given are a valuable part of the work, and while Vol'nov's preface indicates they will be limited to those from 1950–1962, many older references are included. On the other hand, a milestone in superoxide development, the work of C. A. Kraus and students in this country, is not referenced.

Chemists interested in the mechanism of oxidation and oxidation states of the alkali and alkaline earth metals cannot afford to overlook this work. The picture the author paints of development chemistry, costs of products, and applications is not, however, as complete as he is capable of producing. The research and development chemistry is shown to be heavily Russian, while the costs of products and applications are given for countries other than Russia. The commercial uses of oxycompounds in Russia cannot be so generally known as to be uninteresting to Russian readers, and an account of them certainly would have been a welcome addition to the translated work. If applications for superoxides do not exist in Russia, then nearly a million pounds of KO_2 powder forwarded under lend-lease (1942–45) from this country could have created a stowage problem.

R. R. MILLER
Chemistry Division, Naval Research Laboratory, Washington, D.C.

High-Pressure Phenomena

Advances in High Pressure Research. Vol. 1. R. S. BRADLEY, Ed. Academic Press, New York, 1966. 406 pp., illus. $16.

This series of which R. S. Bradley is editor should serve as a supplement to his recent work *High Pressure Physics and Chemistry*. It is planned that volumes in the series will appear at intervals of a few years and will deal

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.

H. C. DUECKER
W. R. Grace and Company, Clarksville, Maryland

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 β-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.

B. CONNOR JOHNSON
Department of Biochemistry, University of Oklahoma, Oklahoma City