answers are not always forthcoming, but somehow the reader is never successfully involved intellectually in the discussion. But this book only fails where other books have failed before. Perhaps the task is impossible.

The organization of the text seems a bit curious. Putnam says in the preface that the plan resulted from years of teaching the subject but that the construction of each chapter allows the topics to be treated in almost any order. This seeming virtue has one unfortunate aspect, however. The very fact that the chapters stand alone indicates a partial failure to run unifying concepts through the text. Such closely related topics as structure, earthquakes, and mountains are treated in chapters 6, 9, and 15, respectively. Furthermore Putnam properly nominates the concept of the enormity of geologic time as the most important contribution to culture made by geologists, but he discusses this fundamental subject in the very last chapter.

Particularly noteworthy inclusions are a long chapter on petroleum geology and a 25-page section on the life of the past. Conventional topics treated rather lightly include ore deposits and some of the classical concepts of the development of landscapes by stream erosion. In discussing the origin of mountains, Putnam treats convection currents and phase changes but ignores the "un-American" concepts of continental drift and gravitational gliding.

This book, which can be highly recommended to geologists and nongeologists alike, should rapidly make the best-seller list of general geology textbooks and thereby firmly establish the publisher, Oxford University Press, in the field of geology.

BATES MCKEE
Department of Geology,
University of Washington, Seattle

Chemistry

International Encyclopedia of Chemical Science. Edited by A. T. Clifford *et al.* Van Nostrand, Princeton, N.J., 1964. viii + 1331 pp. Illus. $32.50.

Approximately 100 pages at the end of this volume are devoted to four multilingual indices—German, Spanish, French, and Russian—in which scientific words from each language are listed with their English equivalents. Glancing through these lists, one is impressed by the international character of science as indicated by the repeated identity of scientific words in the two languages under comparison. One is also impressed, however, by the fact that little advantage is gained in printing such a list of identities. If the reader, after locating the English equivalent, is supposed to have sufficient command of the language to understand the item in the text, there is little to justify the inclusion of such a list in the volume. Although this list of a limited number of foreign terms may be the reason for calling the encyclopedia an "international" encyclopedia, it does not appear to be a sufficient reason to justify the use of the word "international" in the title.

Perhaps the most useful area covered in this encyclopedia is the effort to provide reasonable definitions or descriptions of reactions, laws, tests, and theories which are named after individuals. Chemistry abounds with reactions and tests named after individuals, and there are times when one does not know where to look for a reasonable description. Some of the descriptions given here are too brief, but they at least provide a lead to the area of chemistry involved so that one can seek additional information in a more authoritative work.

Because I have published a number of papers in the area of stereoisomerism and optical resolution as well as papers on the reactions involved in the synthesis of enantiomorphic forms, I decided to look up some of these subjects in this encyclopedia. Under stereoisomerism one finds "isomerism due to stereochemical differences," which really will not help the uninformed, if they do not know the meaning of "stereo." The heading isomerism is not too clear, but it does refer to conformation. Under conformation there is a reasonable discussion of optical isomerism. The information is in the book, but it certainly is not where most chemists will look for it. Perhaps I should have looked first under optical isomerism; but under that heading there is no reference to either stereoisomerism or conformation, and the definition of optical isomers—"Two or more compounds which have the same chemical composition and the same two dimensional structural formulas"—does not provide sufficient information for the uninformed reader. Racemic mixtures and racemic compounds are not clearly differentiated, and the definition of the latter is not satisfactory.

Some "discoveries" seem to be difficult to "undiscover," and such items as Alabamine and Illinium are given for the early discovery of elements 85 and 61, without any indication about whether the discovery was confirmed by others.

This volume will be useful in a reference library, especially for those who are not specialists in the area concerned, but individuals will probably not make sufficient use of the encyclopedia to justify the purchase of a personal copy.

WALLACE R. BRODE
3900 Connecticut Ave., NW,
Washington, D.C.

Stratigraphy

Geology of Japan. Fuyuji Takai, Tatsuro Matsumoto, and Ryuzo Toriyama, Eds. University of California Press, Berkeley, 1963. x + 279 pp. Illus. $10.

In the preface of this volume, the editors carefully point out that "As a basic foundation for various fields of geology, the stratigraphy is stressed in this book." Eighteen Japanese geologists have contributed to what is, essentially, a comprehensive survey of the stratigraphy and biostratigraphy of Japan. Nine of the 11 chapters are detailed accounts of the Silurian and Devonian, the Carboniferous, the Permian, the Triassic, the Jurassic, the Cretaceous, the Paleogene, the Neogene, and the Quaternary Systems. In most of these chapters the authors cover such topics as the history of investigation, the general distribution of rock types, the fauna and flora, facies and tectonic movements, and paleogeography. One chapter is devoted to pre-Tertiary igneous activity, metamorphism, and metallogenesis. This emphasis on stratigraphy has resulted in a book that is somewhat difficult to read for general geologic background, unless one uses it in conjunction with a more general work such as *Geology and Mineral Resources of Japan* or a geologic map of Japan. The stratigrapher and paleontologist, however, will find this a very successful effort to bring together Japanese research in their fields. Two useful appendices,

one a glossary of geotectonic terms of Japan and the other a list of subgenera, genera, and higher taxa proposed in Japanese publications, help make this book a valuable source of information. The glossary is actually a series of thumbnail sketches that cover the major structural elements of Japan.

In the United States the language problem involved in getting at source material on the geology of Japan has kept our interest to a generally low level; few of us (and I am one of the many who have not) have made the effort to learn Japanese. The contributors to this volume are to be admired for their effort to bring to us, in our own language, material on the geology of Japan.

SEYMOUR O. SCHLANGER
Department of Geology,
University of California, Riverside

Chemical Geology

Organic Geochemistry. Irving A. Breger, Ed. Pergamon, London; Macmillan, New York, 1963. x + 658 pp. Illus. $22.50.

Studies in Analytical Geochemistry. Royal Society of Canada, Special Publications, No. 6. Denis M. Shaw, Ed. University of Toronto Press and the Royal Society of Canada, Toronto, Canada, 1963. xii + 139 pp. Illus. $6.95.

Maturity and balance are the important characteristics that these two collections of geochemical papers have in common. *Organic Geochemistry* is a fat and comprehensive book that roundly summarizes just about every important phase of the field. The 18 authors of its 15 chapters, all leaders in the field, tell what is known of the organic geochemistry of everything from the cosmos to cadavers, with a generally high degree of detachment and completeness. *Studies in Analytical Geochemistry* is a thin sampler of a book making no pretense to comprehensiveness, but comprising an excellent selection of material (six subjects by seven authors) which shows the sweep, applications, and limitations of modern analytical geochemistry. These articles present conclusions drawn from the views and experience of their authors rather than complete summaries of the fields treated, but all are thoughtful and well balanced. A refreshing reserve runs throughout the book and contributes much to its coherence and force. The editor set the tone when he commented that "if careful fieldwork alone cannot reveal all the intricacy of nature, it is not to be expected that our contemporary geochemical techniques will do so either."

The papers in *Analytical Geochemistry* were originally presented at a symposium of the Royal Society of Canada in 1952 and all are reasonably current. The intent and the content of the book are well summarized on the jacket flaps and in the editor's preface, and all chapters include abstracts, but there is no index. *Organic Geochemistry* has an excellent index, but the papers were collected between 1957 and 1962, or later (the most recent reference is to a 1962 paper), the editorial preface does not provide a summary, and only 4 of the 16 articles include individual summaries. Each book, nevertheless, achieves a high degree of success—one as sampler, the other as comprehensive source book. The criticisms of content, which I might make to show that I have read these books, are essentially trivial and in no way detract from their significance as landmarks in chemical geology.

P. E. CLOUD, JR.
Department of Geology and
Geophysics, University of Minnesota

Organic Chemistry

Methoden der Organischen Chemie (Houben-Weyl). vol. 6, pt. 2, *Sauerstoff-Verbindungen*, I, pt. 2. E. Müller, Ed. Thieme, Stuttgart, Germany, ed. 4, 1963 (order from Intercontinental Medical Book Corp., New York). xlviii + 952 pp. Illus. $55.

This is the first review published in *Science* of one of the major German works in the field of organic chemistry, of which 17 volumes have been published. The third edition of Houben-Weyl, a standard reference book for the techniques and instruments concerned with the chemistry of reactions, was used in organic laboratories all over the world. It had been published in 1925 (two volumes), in 1930 and 1941 (one volume each), had become obsolete, and was superseded by several American publications. On the initiative of O. Bayer, a chemist himself and one of the leaders of the German chemical industry, chemists in industry and in academic positions rallied from the German collapse to write a fourth edition of Houben-Weyl. Eugen Müller, an organic chemist with a strong interest in physics and instrumentation, is the editor; he is assisted by a board which consists of Bayer, H. Meerwein, and K. Ziegler. The first tome of the fourth edition was published in 1952.

The general plan of the treatise is shown by the titles of the volumes which have been published, some in more than one part: *General Laboratory Practice* (2 parts); *Analytical Methods; Physical Methods* (2 parts); *General (Chemical) Methods; Halogen Compounds* (2 parts); *Oxygen Compounds* (2 parts); *Sulfur, Selenium, Tellurium Compounds; Nitrogen Compounds* (2 parts); *Phosphorous Compounds*; and *Macromolecular Compounds* (2 parts). The new Houben-Weyl is a monumental accomplishment.

The present volume, *Oxygen Compounds*, part 2, is dedicated to Bruno Hauff. Until his death in 1963, Hauff, the moving spirit of the house that publishes the treatise, had devoted much of his effort to the project. The volume covers methods for the preparation and transformation of the following compounds: alcoholates, phenolates, enolates and chelates of metals (F. Schmidt, E. Bayer); organic derivatives of silicic acid (W. Simmler), boric acid (R. Köster), arsenous, arsenic, antimonous, and antimonic acids (W. Herrmann), and sulfurous and sulfuric acids (F. Sinn and K. Schimmelschmidt); esters of nitrous and nitric acids (A. Berthmann, H. Ratz), hypohalogenous acids (A. Hausweiler), and perchloric acid (K. Schwarzer); β-lactones (H. Kröper); and lactones (H. Kröper).

The names of the authors and their affiliations are indicative of expert treatment, and examination of the chapters shows dedication to detail. It is difficult to imagine that anyone entering the fields discussed would proceed without consulting this volume. The typography and technical preparation of the book are excellent.

A comprehensive treatise covering a large field will of course be based on a systematic plan. If the field is in a state of rapid development, however, and the publication proceeds over