Book Reviews

The Terpenes: The Sesquiterpenes, Diterpenes and their Derivatives, Vol. III. 2nd ed. Sir John Simonsen and D. H. R. Barton. New York: Cambridge Univ. Press, 1952. 579 pp. $10.00.

The increasing importance of the chemistry of the higher terpenes is shown by the necessity for this book. In 1932, the second volume of the first edition of this monograph devoted only 114 pages to the sesquiterpenes—much of this space being taken up by substances of unknown constitution and uncertain identity. In the present volume, covering the literature through 1949 and modestly termed a second edition, the sesquiterpenes are given nearly three times as many pages; a wholly new section on the diterpenes has been added. This field of research is not closed, however, and it is to be hoped that the next 20 years will see the chemistry of the sesquiterpenes placed on as firm a basis as that upon which the chemistry of the monoterpenes rests. A sign that this is occurring is found in the fact that some portions of this work, notably those dealing with humulene and β-caryophyllene, are already obsolete.

Those familiar with Volumes I and II of the present edition need not be told that this volume is concisely and clearly written, and thorough but critical in its coverage of the literature. Such readers will be pleased to note that it contains addenda to the previous volumes (80 pp.) covering the literature on the monoterpenes from 1947 to 1950 (prepared by the senior author and L. N. Owen).

This work is, generally speaking, well organized. Subsections of subchapters are devoted to individual compounds. The main sources, methods of isolation, and the physical properties of each substance are very briefly summarized. Evidence as to the structure of the compound is then presented in detail, with an abundance of structural formulas, followed by a textual summary of the principal derivatives and reactions of the substance. Although the work is obviously not intended to be a handbook, it seems possible that some improvement might be achieved by the use of tabular summaries of the physical properties and derivatives arranged to permit easy comparisons among substances of similar properties.

The authors are particularly to be commended for their critical judgment in the assignment of structural formulas to the compounds. In this respect they show more caution than many of the workers quoted, and one may feel considerable confidence in most of those structures that are indicated as established. It should be remembered, however, that few of these substances have been synthesized by unequivocal methods and that many of the structural assignments rest heavily on the results of dehydrogenation at high temperature. The caution of the authors has not prevented them from using the best formulas available in 1950 to illustrate the oftentimes intricate chemistry of degradation reactions. These formulas are usually clearly identified as tentative and serve as valuable summaries of the work so far done; the clarification achieved by this somewhat less than rigorous approach would seem to be well worth while.

One of the great values of the study of the chemistry of natural products is the respect it breeds for the ability of organic compounds to undergo rearrangement and isomerization. This point is brought out throughout this work, but particularly well in the special article on santonin, by W. Cocker. This chapter is especially recommended to organic chemists in general as an object lesson in stereochemistry, molecular rearrangements, and the dangers of jumping to conclusions on the basis of too much respect for "general reactions." It is also recommended as an outstanding example of the order that can be brought from chaos by clear but highly condensed chemical writing.

This book, with its companion volumes, should be in every institutional library and in the libraries of chemists working with flavoring matters, essential oils, or the resin acids. It seems likely that other chemists, especially those with interests in polycyclic compounds, pharmaceuticals, stereochemistry, or mechanisms of rearrangement will find enough of value here to justify its purchase. The binding, paper, and typography are good. There must be several thousand structural formulas in this book; a few of these contain typographical errors minor enough to cause only temporary confusion.

It is to be hoped that the authors, one of whom is making important contributions to the chemistry of the triterpenes, will find it possible in the near future to extend the scope of this monograph to include that field as well.

JAMES H. BREWSTER
Department of Chemistry, Purdue University

Prehistoric Europe: The Economic Basis. J. G. D. Clark. New York: Philosophical Library, 1952. 349 pp. Illus. $12.00.

Grahame Clark, recently elevated to the Disney professorship of archaeology at Cambridge, has produced his fifth major volume on European archaeology. This large and handsome book, beautifully printed by John Bellows of Gloucester, England, is copiously and instructively illustrated. In it Dr. Clark has, in a nutshell, restored the organic element to European archaeology, concentrating on perishables, particularly wood, bone, horn, bark, bast, leather, matting, basketry, and textiles. Drawing his materials from swamps, bogs, and preliterate art representations on stone, he has compared them with European folk survivals. The result is a coherent and well-rounded picture of the economic life of that subcontinent, particularly its northwestern portion, from the end of the last glaciation to the beginnings of recorded history.

It is furthermore a relief from the atmosphere of most works on the same subject in which attention is largely devoted to flint typology. This shift of emphasis and broadening of sources of evidence are needed now that we are beginning to find out that the classic sequences of flint typology set up by the French school and slavishly followed elsewhere may have overemphasized the importance of selected minor variations of tool styles. Some of these, being largely local, may turn out to make little difference in the end product, as seen in the perishables that Clark has so carefully sought out and restored or reconstructed. Although he has covered but a fraction of the time span so assidulously explored by the French school, the principles derived from his work may add a new breath of life to the results of their painstaking industry.

Clark has made full use of statistical techniques, slighted by many of his colleagues. This is particularly necessary in dealing with the bones of wild and domestic animals in Neolithic and early Metal Age collections. That he has not mentioned radiocarbon dating is not surprising, since the latest date in his bibliography of over 750 titles is 1949. However, his profound acquaintance with the minutely detailed climatic studies of the Dutch and Scandinavians makes this relatively unimportant, within the time and space spans covered. The reviewer's only regret is that the subject had to be limited by the nature of the materials largely to northwestern Europe. It opens a clear and brightly polished window on one corner of the world. If only we could see Turkestan and China in the same brilliant light!

The price, which may deter many potential readers, is not excessive when one sees the beautiful printing, and the wealth of illustrations, which will be used as slides in many colleges for years to come. Costing no more than two and a half bottles of Scotch whiskey, this competing British import can provide stimulation over a much longer period.

CARLETON S. COON
University of Pennsylvania Museum

Symmetry. Hermann Weyl. Princeton, N. J.: Princeton Univ. Press, 1952. 168 pp. $3.75.

This short book on a vast subject is the work of a master. With a few sure and authoritative words he gives us the heart of the matter. There is no book or article quite like this one on the subject of symmetry, and I doubt if any book will be written in the future that will not in some way lean upon this one.

It starts off with the easy and specific matter of bilateral symmetry and shows how right and left reflections have been used in art, and how in biology it is a matter of import to many organisms, including man. There is a pleasant mixture in this chapter, ranging from the embryological origin of left and right in the worm *Ascaris* to the symbolic meanings the left (or sinister) has taken in times past. Next comes an analysis of translatory and rotational symmetry, leading to a chapter on ornamental symmetry. The same pattern is kept, a mixture of art and natural science, and it takes us from the walls of a room in the Alhambra in Granada to the comb of a bee, from the baptistry at Pisa to the Radiolaria of Haeckel. The last of the four chapters goes into the basis of crystal symmetry, symmetry in relativity, in quantum mechanics, and in mathematics.

The book begins with a general description of what is meant by symmetry, and then proceeds through the specific kinds of symmetry to a general mathematical statement of symmetry. This means that as the book progresses it does become more abstract and more difficult for the nonmathematician to follow. But fortunately it contains so much besides mathematics (although the latter is the main point) that it can still be read with profit and enjoyed by someone who has not advanced beyond long division. More than anything else the book gives the feeling of authority—which its substance, as well as all the other things we know about Professor Weyl, substantiates.

This is the work of a mathematician, and there is one aspect of the book that may disturb the natural scientist as it will the art historian. The biologist is interested in the cause and the mechanism or origin of certain symmetries. For instance, Weyl discusses the phyllotaxis of plants, the arrangements of leaves in whorls, but does not touch upon the recent work on the cause of these leaf distributions. Or, in art history, he shows that certain symmetrical patterns are used by the Greeks, or the Minoans, or the Sumerians, but he does not tell, except in an occasional passing reference, where these patterns had their origin and how they can be traced in the history of art. This is not an omission on the part of the author—his book is on the subject of symmetry itself, what symmetry is, and how it may be precisely defined and described. It is the approach that would have satisfied Plato, and in fact Weyl himself says in the beginning of the book that his argument will go "along a road that will finally lead us to a mathematical idea of great generality, the Platonic idea, as it were, behind all the special appearances and applications of symmetry."

JOHN TYLER BONNER
Department of Biology, Princeton University

The Auricular Arrhythmias. Myron Prinzmetal, Eliot Corday, Isidor C. Brill, Robert W. Oblath, H. E. Kruger, *et al.* Springfield, Ill.: Thomas, 1952. 387 pp. Illus. $16.50.

This monograph describes the authors' researches concerning the auricular arrhythmias. It also presents historical reviews and clinical discussions of these arrhythmias. The methods of study and the equipment used are described in an appendix. Their observations have been made with the high-speed cinematograph, the multiple-channel electrocardiograph, and the dual-beam cathode-ray oscillograph.

The authors begin their book with a study of the