Book Reviews

Which Approach?

Organic Chemistry Today. F. W. Gibbs. Penguin Books, Baltimore, Md., 1961. x + 294 pp. Illus. Paper, $1.45.

Elementary Organic Chemistry. Ernest Campaigne. Prentice-Hall, Englewood Cliffs, N.J., 1962. viii + 312 pp. Illus. $10.

The book by F. W. Gibbs, honorary lecturer in the history of technology at University College, London, is designed as a popularization of organic chemistry for the general reader with little or no scientific background, as well as for senior pupils in school or specialists in other fields of science. The text by Ernest Campaigne, professor of organic chemistry at Indiana University, is a traditional "abbreviated course" textbook for the nonchemistry major, which attempts to provide in one semester a reasonably rigorous survey of organic chemistry. The purpose of undertaking a simultaneous review of these two books is to attain some comparison of the adequacy with which a specialist and an informed nonspecialist might approach the subject of organic chemistry for approximately similar audiences.

Both books commence with the customary introductory material that has to do with the nature of organic chemistry, chemical bond types, functional groups, isomerism, and other fundamental concepts. At this point the books diverge radically, and it is legitimate to inquire into the effectiveness of the two approaches. Gibbs's technique, with a very inadequate minimum of introductory groundwork and without any systematic development of nomenclature, is to consider immediately a number of broad and important general topics of organic chemistry: petroleum products, petrochemicals, resins and polymers, coal and coal-tar products, classes of organic compounds containing halogen, sulfur, silicon, and nitrogen, detergents, carbohydrates, proteins, foodstuffs, vitamins, drugs, and dyestuffs. The main emphasis is industrial and practical, and a number of current as well as historically pertinent industrial processes are discussed in considerable detail, making occasionally for quite interesting reading. Numerous equations endeavor to illustrate the topics under consideration, as do also a number of rather inadequately described flow and block diagrams of industrial procedures. The author's lack of systematic organization, failure to develop adequate nomenclature, and headlong approach to the subject, however, tend to negate his effective writing style and lead to a completely helter-skelter account of organic chemistry, filled (to the reader with no background) with confusing trivial names, undefined terms, and disconnected facts. At best in its historical material and at worst in its description of scientific subtleties, *Organic Chemistry Today* provides an awesome and bewildering glimpse into the Big, Wide, Wonderful World of Organic Chemistry, a glimpse which may prove more dazzling than instructive to the reader.

In contrast, Campaigne's brief text is outstanding in its careful organization and concise approach. The contents of the text follow, in abridged form, the traditional approach: saturated, unsaturated and aromatic hydrocarbons, petroleum and rubber, halogen compounds, oxygenated derivatives of the common types, nitrogen and sulfur containing compounds, optical isomerism, carbohydrates and large molecules, both synthetic and natural. Sufficient systematic nomenclature for reasonable understanding of the text is introduced immediately, and numerous general equations clearly illustrate each topic under consideration. The author lists a series of "new terms and concepts" at the beginning of each chapter, a technique of somewhat questionable value since the terms and concepts are quite meaningless until the chapter material has been digested. Study questions at the end of each chapter, however, constitute a useful technique for forcing a review and operational understanding of the chapter contents. The text has several general shortcomings that crop up occasionally. Introductory aspects of reaction mechanisms are handled too briefly to be particularly useful, a number of terms and symbols are used without adequate definition, and some topics are treated in such an abbreviated form that they might better have remained unmentioned. All in all, however, *Elementary Organic Chemistry* is understandably written and logically organized; it offers the beginning student and the serious general reader an opportunity actually to learn a bit of organic chemistry, rather than an opportunity merely to read about it.

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Retrospective Evaluation

The Orientation of Animals. Kineses, taxes, and compass reactions. D. L. Gunn and G. F. Fraenkel. Dover, New York, 1961. x + 376 pp. Illus. $2.

This monograph was first published in 1940 by Oxford University Press. The main body of the Dover edition is a photocopy of the original text. To this the authors have added a brief preface, 16 pages of notes based on studies of orientation published between 1940 and 1960, and a bibliography of 113 entries covering these years. The main text provides a careful analysis and classification of the animal reactions that used to be termed "tropisms." It is, then, concerned with animal behavior in the tradition that derives from Loeb, Jennings, and Mast. In a retrospective evaluation of their work, the authors state: "it seems to have tidied up the basic concepts to such an extent that almost every subsequent contribution in the narrow field that it deals with, namely the mechanisms of simpler orientation reactions, has been discussed in the words and spirit of the definitions and terms that we selected. . . ." This evaluation is entirely just. The analysis of orientation mechanisms continues to command interest. Fraenkel and Gunn can be justly proud of their key influence in stimulating and

providing the conceptual framework for much of this work.

When the book first appeared, it received a quite critical review by S. O. Mast in *Science* [**93**, 619 (1941)]. In their preface to the Dover edition, the authors gracefully acknowledge both the justice of some of his factual comments and the extent of Mast's influence on their thinking. However, Mast was also concerned about anthropomorphic analysis of behavior and about the pernicious use of categories as causal agents ("Negative phototaxis takes it [*Littorina*] inward. . ."). As a general admonition to students of animal behavior, these concerns are as relevant now as they were at any time in the past. However, they are not appropriate comments on this monograph. Despite the fact that the quotation is drawn from their book (page 298), the sense and spirit of Fraenkel and Gunn's analysis seem wholly on the side of the angels in these matters.

The combination of wartime circumstances that made this a rare book as soon as it was published is explained by the authors. Dover is to be congratulated for rescuing an excellent monograph and for making it available at a price that should place it where it belongs—on the bookshelf of every biologist.

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Methods and Techniques

Clinical Research Design and Analysis in the Behavioral Sciences. Eugene E. Levitt. Thomas, Springfield, Ill., 1961. xxii + 199 pp. $8.50.

This book is quite frankly addressed to practitioners and clinicians who need to understand some aspects of research methodology and some of the statistical devices for dealing with research data. The term *behavioral sciences* in the title is somewhat misleading, for the book is really an attempt to discuss, in a general way, some problems in research design and some problems in the philosophy of science. It deals also with methodological considerations and with elementary statistics. The behavioral sciences are involved only in the sense that many examples are taken from areas of the behavioral sciences—and because the author seems to think that clinical research is related somewhat exclusively to areas of the behavioral sciences. As a matter of fact, his general statements about philosophy of science, methodology, and basic statistical techniques apply to many endeavors in the biological sciences, which are also of interest to some clinicians. It becomes, therefore, an effort to inculcate some rigor into the methods of defining research problems and a discussion of several related details—some techniques used in conducting an experiment, the conclusions one can draw from the experiment, and ways of reporting the results of research.

The author, Eugene Levitt, stresses in his preface that the book is a pragmatically oriented document; he calls it a "how-to-do-it-yourself cookbook," a fairly accurate description. Therefore he develops a somewhat arbitrarily concatenated sequence that includes the bits of knowledge and wisdom one accumulates from formal training in statistics, from courses in the philosophy of science, from designing and conducting research, and from efforts to accomplish a research objective. I feel that the accumulation of information presented is fairly extensive and essentially correct but that it is unlikely to provide a great deal of help for a person who has not struggled through some of the experiences described above. Anyone who has given serious thought to the problems discussed in the book and who, because his training has not been systematic and thorough, finds that he has lacunae of fact or understanding may well find that this book helps to fill in some parts of the jigsaw puzzle. However, it is not likely to be very useful to those with little sophistication or prior interest in the quantitative treatment of data, in the formulation of hypotheses, or in the rigorous conduct and interpretation of research.

The first eight chapters are an attempt to introduce some concepts of scientific inquiry, and they contain some information on statistical procedures as well. Chapter 9, a very simplified description of statistics, is limited to material that today is considered extremely elementary and does not go beyond zero order correlations and some tests of the significance of differences. After the discussion of statistics there is a short chapter on drawing inferences and conclusions and another on the mechanics of preparing a research report, which I feel is a bit superfluous.

One can offer no serious criticism of the book in terms of the correctness of its material, but one is a little disenchanted by the simplicity and the elementary nature of much of the discussion. At the same time the superficial handling of some fairly complex problems is disturbing. As I have already indicated, the self-made statistician and the student of behavior who has almost achieved an adequate proficiency in the use of such materials may find the book helpful; the real neophyte or the uninitiated may be somewhat bewildered, or even led to a false sense of confidence.

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Fiber Plants

The Wild Species of Gossypium and Their Evolutionary History. J. H. Saunders. Oxford University Press, New York, 1961. viii + 62 pp. Illus. $2.40.

Botanists familiar with *The Evolution of Gossypium and the Differentiation of the Cultivated Cottons* [Hutchinson, Silow, and Stephens (1947)] will welcome this new book, and they will find it a most useful supplement to the earlier work.

Part 1 consists primarily of drawings of the genus' 19 wild species that have 13 chromosomes. These drawings were made from living material under cultivation at Shambat in the Sudan. The fact that one artist is responsible for 18 of the illustrations makes them more useful for comparative purposes.

Short notes are also included on each of the sections into which the genus is divided cytogenetically. The genome classification of Beasley is followed.

The A genome is represented only by the *africanum* race of *Gossypium herbaceum*. Two African species comprise genome B. The three endemic Australian species make up genome C. The D genome is the largest and most valuable, with eight species and one variety found in Western, Middle, and South America. Five species of southwestern Asia and eastern Africa are assigned to genome E.