index of over 14,000 entries is provided, which greatly enhances the value of the book for reference.

The criticisms raised here are minor enough when one considers the wealth of information contained in the book, the fact that many of the papers are excellent pieces of work which would stand well in the best of textbooks or scientific journals, and the highly interesting nature of most of the material. The estuary is depicted as a complex, dynamic, and rigorous coastal environment, ephemeral on a geological time scale, sensitive to the impact of civilization, and of tremendous importance to mankind. Scientists interested in estuarine work are not the only ones who will find this book valuable. The article on benthos by Carriker, which is an extremely valuable review for freshwater biologists, and the material on formation of estuaries and deposition of sediments, which should be of interest to many geologists, are two examples among many. Upon reading the book scientists of many kinds will sense the excitement and challenge of estuarine research and management. The limitations to present knowledge of this important part of our planet are alarming considering the pressures being exerted by civilization.

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On Mycobacteria

The Bacterial Lipids. JEAN ASSELINEAU. Based on the French edition (Paris, 1962). Hermann, Paris; Holden-Day, San Francisco, Calif., 1967. 372 pp., illus. $11.50.

This volume is another in the series Chemistry of Natural Products, edited by E. Lederer, which forms a "library" of French publications in the field. Seven volumes have been published in the French language, and five of these have later appeared in English versions.

While the title of *The Bacterial Lipids* is very broad, the content proves to be rather narrow. The most valuable section, and that with the most detailed treatment, is the second part, dealing with branched-chain and hydroxy fatty acids. The very great amount of attention given to the lipid constituents of mycobacteria reflects, undoubtedly, the author's lifelong interest in this subject, but makes the book uneven as a general reference on the subject represented by the title.

The first part of the book, which is concerned with general methods of lipid isolation and analysis, is too brief to be of much use except as a source of leading references. Rather, the reader should simply be referred to the excellent series Progress in the Chemistry of Fats and Other Lipids, published by Pergamon Press. The third part deals mainly with phospholipids and glycolipids, and again is slanted toward those numerous unusual constituents of mycobacteria. The last part, on biological properties of bacterial lipids, is too abbreviated (19 pages) to be very meaningful and covers almost exclusively aspects of the immunochemistry of mycobacterial lipids.

The index appears to have some deficiencies. For example, several *O*-methylhexoses are listed in table 41, but only one of them (methylrhamnose) is referenced in the index. The author has made a commendable attempt to bring the revised edition up to date by adding references through 1965.

The general usefulness of this book is hard to assess. Because of the somewhat misleading title, it would be a mistake to urge its adoption as the definitive source for the subject. Were it entitled "The Mycobacterial Lipids," it could be given a more enthusiastic endorsement, for on this more restricted subject the book contains much information that certainly will benefit the researcher whose interest is devoted to these strange and chemically complicated microorganisms.

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Analytical Technique

Programmed Temperature Gas Chromatography. WALTER E. HARRIS and HENRY W. HABGOOD. Wiley, New York, 1966. 323 pp., illus. $11.

At a recent symposium on advances in gas chromatography one of the speakers, addressing himself to a topic in programmed temperature gas chromatography (PTGC), said "it is now easy to know the literature of PTGC." He was referring to the work reviewed here, and his comment was certainly apt. Harris and Habgood have provided a long-overdue and much-needed treatise on PTGC. The literature citations are complete and thorough, and a whole field is now presented under one cover. But the book is much more than a literature review. It is entirely comprehensive in its treatment of theory, and this is one of its strong points. The authors themselves were the first to present a theoretical treatment of PTGC [*Anal. Chem.* **32**, 450 (1960)], and this interest and concern with theoretical aspects are reflected throughout. The work offers a substantially unified and integrated concept of PTGC and presents a considerable amount of new, previously unpublished material. Contrary to the authors' advice to the reader concerning the possibilities of skipping the theoretical chapters, I would advise the would-be practitioner of PTGC to avail himself of the understanding he can obtain therein, thus acquiring the facility to utilize the techniques more effectively. There are many authors who may contribute to the theory of a topic, but there are few who have contributed and also presented it as lucidly as these authors.

In praising the theoretical treatment given in the book, I must be careful not to detract from the treatment of the experimental aspects, for these also are fully and adequately covered. The authors have done well here in resisting any temptation to provide a lab manual. Instead they have sought to examine the experimental parameters and evaluate their effects. There is no need to justify PTGC to the gas chromatographer. In modern separation science PTGC is probably as widely used as any method available. A sufficient number of selected applications are given in chapter 9, however, to convince the neophyte of the efficacy of the method.

The book is not without its faults. In some instances, the authors appear to have misunderstood the writings of some workers they cite, but for the most part the circumstances are minor. In one respect, the authors seem to have underrated a technique; namely, subambient or cryogenic PTGC. In the separation of very volatile substances and fixed gases this method can do as well as, if not better than, isothermal gas solid adsorption chromatography, the method which seems to have current preference. Introduction of samples by on-column injection at cryogenic temperatures can greatly enhance the separation of trace components from large amounts of diluents. The chromatogram of a slowly injected sample shown in the frontis-

piece could undoubtedly be made to look like the conventional programmed temperature chromatogram if the sample were accumulated on the column at a low temperature prior to starting the program.

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The Cell Periphery

The Specificity of Cell Surfaces. A symposium held at Woods Hole, Mass., September 1965. BERNARD D. DAVIS and LEONARD WARREN, Eds. Prentice-Hall, Englewood Cliffs, N.J., 1967. 300 pp., illus. $10.25.

The first section of this unusually broad symposium is concerned with bacterial cell walls and membranes. Those of us who work with animal cells can only envy the mass of biochemical and genetic data that are available for bacteria. However, it is indicative of the complexities of the problem that the structural assembly of the chemical units to form membranes is as little understood in bacteria as in animal cells.

One of the major blocks to understanding membrane structure in animal cells is that, apart from erythrocyte ghosts, few chemical analytical data are available because of the difficulties in obtaining specimens. The second section of the book, which is concerned with animal cell membranes, contains two very useful papers on different isolation techniques. The main difficulty in assessing any method lies in determining the purity of the isolated membrane preparations. Thus, the technique employed by Warren *et al.* provides surface membranes which are contaminated by 500 to 1000 Å of "cytoplasm"; Wallach also discusses this difficulty and describes his search for surface markers. An interesting paper by Revel and Ito takes up the problem of molecular and fine structural arrangements within the membrane. Why do so many electron-microscopists have an apparent mental block in regarding carbohydrates and their charged groups as part of the membrane proper and use the misleading term "coat"? Is a membrane by definition only the trilaminar structure seen by electron-microscopists? The immunochemists have known a great deal about blood-group substances for some time, and this knowledge is summarized in a short, authoritative review by Watkins in the third section of the book; the antigenic groups are sugars. These are very much part of the cell periphery, and if this is inconsistent with electron-microscopic terminology, then it is time this terminology was changed.

Although the subject matter is by no means completely covered—a short review of transport mechanisms would have been in place—this thoughtful and readable text in a field of rapidly increasing interest is recommended.

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Botanists' Reference

A Dictionary of the Flowering Plants and Ferns. J. C. WILLIS. Seventh edition, revised by H. K. AIRY SHAW. Cambridge University Press, New York, 1966. 1289 pp. $18.50.

Willis's dictionary has gained a firm reputation among botanists, agriculturists, horticulturists, and others through six editions and many reprintings extending over nearly 70 years. The seventh edition, revised by H. K. Airy Shaw, of the Kew Herbarium, now replaces (at least in part) the sixth edition, published in 1931.

First published in 1897, in two volumes, under the title *A Manual and Dictionary of the Flowering Plants and Ferns*, the work was a kind of encyclopedic vade mecum for students working in botanic gardens and in the field. Subsequently reduced to one volume, the book is best known as a concise reference covering five main subjects—family names of flowering plants and ferns, important generic names, economic products (with descriptive information for many entries), common and vernacular names, and botanical terms. The telescopic format has always been a particularly attractive and practical feature of the dictionary and is retained in the present edition. It is indeed true that Willis "provided in a convenient and accessible form a range of knowledge gleaned from a vast and scattered literature," as Sir George Taylor, director of the Royal Botanic Gardens, Kew, says in his foreword to the seventh edition.

The decision to restrict the new edition to families and genera and to delete the other subjects was undoubtedly dictated by Airy Shaw's preoccupied interest in angiosperm families and disposition of genera in the scheme of classification, "coupled with a strong sense of the advantages of a work that at least aims to cover one subject fully." This course will no doubt arouse controversy among users of the book.

The 40,000 entries include every published generic name (whether validly published or not), from *Species Plantarum* of Linnaeus (1753) up to the present time, and every published family name since the appearance of *Genera Plantarum* of Jussieu in 1789. Literature citations are not included. Listed also are names of intergeneric hybrids (natural and artificially produced), as in Orchidaceae and some other families, and asexual and graft hybrids and periclinal chimaeras, as for example + *Laburnocytisus,* + *Crataegomespilus,* + *Pyro-cydonia,* and + *Amygdalopersica.* R. E. Holttum deals with the ferns and fern allies, and at least 41 other specialists are acknowledged contributors in selected groups of plants. Also included are keys to the families of flowering plants, based upon Engler's classification, and an outline of Bentham and Hooker's system of 1862–93.

While this reviewer would have preferred a new edition that merely brought the five subjects of older editions up to date, Airy Shaw should be congratulated for his fine accomplishment in producing the present volume. Despite its narrower scope, the use to which my copy has already been put indicates that the seventh edition will live on in the tradition of Willis.

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Solvents

The Chemistry of Non-Aqueous Solvents. Vol. 1, Principles and Techniques. J. J. LAGOWSKI, Ed. Academic Press, New York, 1966. 415 pp., illus. $16.50.

It seems both noteworthy and appropriate that this, the first volume in a proposed series, should be devoted to basic principles and experimental methods without emphasis upon any specific non-aqueous solvents. Almost two-thirds of the book is concerned with the more theoretical aspects of (primarily) solution chemistry; the remainder covers experimental methods appropriate to the study of physical and chemical