Book Reviews

Australian Flora

A Handbook to Plants in Victoria. vol. 1, *Ferns, Conifers, and Monocotyledons.* James H. Willis. Melbourne University Press, Melbourne, Australia; Cambridge University Press, New York, 1962. xv + 448 pp. $8.50.

When we consider a manual's usefulness in identifying the vascular plants of a given area, it is rather surprising that so little scientific recognition is accorded those who prepare such floras. Only those botanists who, in preparing a manual or an annotated checklist, have spent years in painstaking research—in the field, herbarium, and library—can appreciate fully the time, effort, and ability required to produce such a major scientific contribution as Willis's *A Handbook to Plants in Victoria.* Therefore, the author of a flora must derive his satisfaction from work with the ever-fascinating variety of plants in his area, from his sense of accomplishment, and from the gratitude (usually unexpressed) of those who will use his manual for many years—fellow botanists, geographers, foresters, agriculturists, students, and amateurs.

The most pressing botanical need in Australia today is a modern, continent-wide "Flora Australiensis" to replace Bentham and Mueller's long outdated, unavailable, and now most incomplete work of that name (vols. 1–7, 1863 to 1878). It seems unlikely that this most worthy project will be undertaken for many years. Meanwhile, books like this volume and the much-awaited second volume that Willis plans to publish must fill the regional needs in the various Australian states. A. J. Ewart's *Flora of Victoria,* (1930) has long been out-of-print. Futhermore, intensive field work, the immigration and spread of weeds, and the naturalization of ornamental plants have increased the flora of Victoria. Genera have been revised, generic concepts have changed, names have been changed, and misidentifications have been corrected. This handbook, therefore, fills a serious gap.

Willis must be commended for making available to us, as a result of 12 years of careful research, a reasonably priced, compact, up-to-date, authentic handbook to the ferns, conifers, and monocotyledons of Victoria. He is to be congratulated especially for the large amount of information he has packed into a small space. Author, place, page, and date of original publication have been cited for each specific and infraspecific name; in almost all instances the original description has been consulted and the reference checked. Taxonomists who are working with Australian plants will appreciate this feature as well as the pertinent synonymy and the excellent selection of references to published illustrations. Vernacular names, ranges within and beyond the boundaries of Victoria, habitat preferences, and frequency are also given. Descriptions of taxa are omitted, with the exception of the coverage provided in the unusually complete keys to the 60 families, 285 genera, and 943 species. The keys appear to be most usable, with well-selected and adequate contrasting characteristics. Those who prefer strictly dichotomous keys may object to frequent triplets and occasional quadruplets in the family and generic keys. The arrangement of the families follows that of Engler and Prantl; species are arranged according to their position in the dichotomies of the admittedly artificial keys.

I hope the second, larger volume (on the dicotyledons) will be published soon. There we can hope to find a statistical breakdown of indigenous versus naturalized species, genera, and families and lists of the largest families and genera in the flora of Victoria.

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History of Science

Scientific Books, Libraries, and Collectors. A study of bibliography and the book trade in relation to science. John L. Thornton and R. I. J. Tully. Library Association, London, ed. 2, 1962. xiii + 406 pp. Illus. 68s.

This is a bad but useful book. It is a one-volume, standard, bibliographic history of science that has run through two printings (1954, 1956) and is now in its second (revised) edition. It was compiled by a pair of librarians who charmingly confess their lack of training in science, and it appears to be directed toward those without previous experience in history or bibliography. The style of historical writing is that of a library catalog—John Doe, chemist, born at some time and place, studied at sundry universities, died at another time and place, discovered so-and-so, published the following books. And needless to say, the listings are neither complete nor entirely accurate.

Although so much at fault, the book is worthy of much use. Not only does it give the history of scientific literature, period by period, from the time of the medieval manuscript through the 19th century, but it provides as well competent outlines of scientific societies and their journals, bibliographies and their makers, private and public scientific libraries, and the business of specialized publishing and bookselling. Short though the latter sections are, it would be difficult to replace them by any more extensive coverage of such a wide field. We need at least a couple of good books in this area; but since we have only this one, use with care, supplement the diet whenever possible, and give thanks to the authors.

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Undergraduate Textbook

Elementary Solid State Physics. A short course. Charles Kittel. Wiley, New York, 1962. xii + 339 pp. Illus. $8.75.

In this book, Charles Kittel has supplied a much needed textbook for use in a one-term course in solid state physics. The text represents a condensation of his earlier book *Introduction to Solid State Physics* (Wiley, New

York, 1956), and it is written on a level appropriate for students who have had a one-semester course in atomic physics. The author does not presuppose a knowledge of quantum mechanics but briefly presents those portions of wave mechanics necessary for understanding the topics in solid state physics that he covers. The book should be ideally suited for use in an undergraduate course in solids; appropriately, it contains problems at the end of each chapter, which amplify the topics covered.

The emphasis is on the basic phenomena of solid state physics. The discussion of solid state devices is confined to a portion of the chapter on semiconductors, but in that chapter Kittel brings his earlier work up-to-date by including a section on the tunnel diodes.

The book, in outline, proceeds from a general description of crystal structures and the types of binding in solids to the diffraction methods of determining these structures. After chapters on thermal and dielectric properties of solids, almost half of the book is devoted to discussion of the free electron and band models of solids. The applications here are mainly to metals and semiconductors. The remainder of the book is concerned with magnetism, magnetic resonance, and dislocations in solids. The major topics omitted in this book but presented in the earlier one are superconductivity, elastic properties, color centers, excitons, and luminescence.

In summary, this book should be valuable as an undergraduate text, and in addition it should be well suited for independent use by more advanced students who are beginning the study of solid state physics.

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Metallurgy

An Introduction to the Physical Chemistry of Iron and Steel Making. R. G. Ward. Arnold, London; St. Martin's Press, New York, 1962. ix + 238 pp. Illus.

For many years Hermann Schenck's *Einführung in die Physikalische Chemie der Eisenhüttenprozesse* (two vols., 1932–34) served as an introductory treatise for scientists and engineers who were beginning research in this area as well as for those who were more directly concerned with production, and the English translation of Schenck's book (1945) became even more popular in this country. In the intervening time a large amount of research has been done, both here and abroad, in this area, but no book of a similar comprehensive nature and stature has appeared. That Ward's book, *An Introduction to the Physical Chemistry of Iron and Steel Making*, is a more modest effort is indicated by its title and its size.

Ward has set himself an excellent objective. His introductory chapters give a very brief review of the elementary physical chemistry and of the thermodynamics involved; he assumes (as he states) that the reader already has a firm grasp of these subjects. Several early chapters elaborate a bit on basic aspects, especially those pertinent to high temperature (near 1600°C) chemistry; such aspects—for example, the nature of slags, the basicity concept, high-temperature kinetics, and transport-controlled reaction rates—are usually completely ignored in the conventional textbooks on physical chemistry.

The major portion of the book is divided into chapters on the equilibrium and kinetics of the various elements as they pertain to metal, slag, and gaseous phases. These include chapters on carbon-oxygen, sulfur, phosphorus, chromium, manganese, silicon, nitrogen, and hydrogen and a chapter on the blast furnace. Ward has gone about this systematically and selectively, and in general his selection has been good. The material is almost all from the available literature and is orthodox in nature. He has not presented any new material or attempted to provide a new viewpoint on the field as a whole.

In my opinion Ward has done a good but not an inspired job. This book certainly fills an important gap; despite a few loose places it will undoubtedly serve as an excellent introduction for students. Hopefully it will encourage many to inaugurate or continue research in this and related areas, where it is sorely needed.

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Basic Linear Programming

Mathematical Programming. S. Vajda. Addison-Wesley, Reading, Mass., 1961. ix + 310 pp. Illus. $8.50.

The field of mathematical programming is becoming so huge that it is difficult to imagine a book which provides complete coverage of it. In *Mathematical Programming* Vajda does not attempt exhaustive coverage, but seeks instead to guide the reader through the profusion of work on the subject.

Primary emphasis is on linear programming. The number of pages that the author devotes to each of the major divisions of the field will give some indication of the attention he pays to each field: linear programming, 184 pages; parametric linear programming, 4; discrete linear programming, 15; stochastic linear programming, 8; nonlinear programming, 27; and dynamic programming, 6. The extensive discussion of basic linear programming is appropriate because of its importance in understanding the various extensions. However, the book would be much more comprehensive, and its title much more suitable, if it contained more material on stochastic linear programming and dynamic programming, two areas that show promise of dealing effectively with the problems of uncertainty.

Mathematical Programming makes interesting reading; it is clear, informally written, and packed with examples. Historical comments are included where appropriate, both to stimulate the reader's attention and to give credit to those who have made original contributions to the subject. Tables, graphs, and diagrams are used liberally so that the powers of visualization in conveying new concepts will be advantageously utilized. Each chapter ends with a number of exercises adequate to allow the independent reader to test his understanding by comparing his results with the solutions given.

Vajda's technical approach is excellent; he provides a treatment that will give an understanding of important algorithms but avoids the pitfalls of excessive mechanization and mathematical obfuscation. In summary, *Mathematical Programming* is a refreshing change from the "crank-turning" books on linear programming.

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