mental results of liquid ion exchangers (Högfeldt) is excellent; it stresses fundamental phenomena rather than specialized applications, and makes an intelligent and critical evaluation of theory and experiment in this field.

The next two chapters concern themselves with the microscopic examination of particles to determine their diameters (Freeman) and the employment of staining and other precipitation techniques (Goldring). The swelled volume of exchangers is a useful parameter, but since several simple and reliable methods exist, the allocation of an entire chapter to the details of a single methodology (the most cumbersome one) is not worthwhile. The same criticism applies to the discussion of staining and precipitation techniques, which have yet to yield useful information. The following chapter, on selectivity (Reichenberg), attempts to be critical, but the author tends to lose perspective. Ion-exchange equilibria are determined by several effects, and one must make a judicious selection of a suitable system where but a few effects predominate to allow this subject to be discussed at a sophisticated level. The discussion of resin selectivity in dilute to concentrated solutions (Diamond and Whitney) attempts to systematize a mass of data for both simple and complex organic and inorganic ions. The discussions of the authors' own work and of the effects of water structure are good, and the compilations most useful. After cataloguing all of the different influences which can come into play in determining selectivity, the authors proceed to oversimplify to the point where they negate their own rationale. Further, they make a few serious errors, for example, in ascribing the inversion of the selectivity of polystyrenesulfonate exchangers for a homologous series of quaternary ammonium salts as the degree of cross-linking increases to size screening, in spite of the fact that the capacity of the exchangers could be saturated by each ion, individually. The final chapter (Marinsky) interprets ion-exchange phenomena from the theory of coulombic interactions in polyelectrolyte solutions, employing the charged-rod model. All of the significant data are tabulated, and the applicability of the additivity rule is well documented. This chapter makes a serious and meaningful attempt to make use of polyelectrolyte theory, and the discussions are complete and thoughtful.

Volumes of collected chapters by different authors are usually uneven; this one is no exception. All in all, I find serious fault with but 100 out of about 400 pages. The extensive bibliography will be of benefit to research work in this field.

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Troublesome Plants

Weeds of the World. Biology and Control. LAWRENCE J. KING. Leonard Hill, London; Interscience (Wiley), New York, 1966. 564 pp., illus. $18.

The author of the present volume defines weed science as "the study and control of the more aggressive, . . . troublesome, harmful, or otherwise annoying plants to man and to his agriculture." The present volume fills the great need for a general survey of the subject. For the first time all the information from the voluminous literature of the subject has been brought together in one place. The book is abundantly illustrated with line drawings, black-and-white plates, tables, charts, and maps. Although it is not a taxonomic treatment the scientific names of the weeds (without authority citations) are employed.

The coverage of the ecological literature is "reasonably complete" to 1957, but after that date only books and the most important research contributions are listed. The literature on the chemical control of weeds, however, is complete to 1966. An extensive bibliography—including an addendum listing works published while the volume was in press—follows each chapter. Any disadvantage in locating a particular citation is overcome by a complete author index, as well as a separate subject index, at the end of the book. An impressive total of nearly 5000 references are listed.

The first 11 chapters, constituting roughly half the book, contain an encyclopedic and fascinating review of the information about weeds—their history, definitions, and classification; their uses, harmful aspects, and injurious effects on crops; parasitical weeds, the establishment, growth and development, reproduction, and dispersal of weed plants; and their origin, evolution, phytosociology, and geographic distribution. The second part of the book is devoted to weed control, both chemical and nonchemical. The emphasis is on the relationship between biology and control rather than on methods and techniques for specific crops, although a number of tables do list methods for many crops.

The classification and type of action of herbicides and their entry, retention, and movement in plants are well covered. Contact or caustic herbicides, inhibitors of cell growth, "auxin-type" growth-regulating chemicals, inhibitors of chlorophyll formation, and other translocated herbicides such as sodium chlorate and the amides CDAA and CDEA are discussed. General uses of herbicides for control of weeds in field, vegetable, ornamental, fruit, and forage crops, pastures, rangelands, lawns, and sports areas are presented. The use of arboricides in silviculture is touched upon.

All nonchemical methods of weed control are reviewed in the final chapter. Since so many topics are discussed, the author's use of numerals to indicate into which general category (mechanical and fire, biological control, ecological control, or weed seeds) each of the nearly 500 references in the bibliography for this chapter falls should be very useful.

This volume will be a fine library addition for anyone interested in weeds and will be indispensable for the research agriculturist, whether he is working with weeds directly, or indirectly because of their relationship to crop plants.

[*Weeds of the World* is complete in one volume. Announcements that it would be a three-volume work were incorrect.]

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The Fungal Organism

The Fungi: An Advanced Treatise. Vol. 2, The Fungal Organism. G. C. AINSWORTH and ALFRED S. SUSSMAN, Eds. Academic Press, New York, 1966. 823 pp., illus. $27.

In their preface the editors of this book, the second in a series of three, say that the object of the series "is to summarize what is known about fungi as fungi." Indeed one of the contributors accurately describes his own

chapter as a "highly condensed review." Fortunately, very few of the 23 distinguished contributors take this approach. Most of them refer to other summaries and, while giving the essential background, leave themselves space to deal, often in a very illuminating and interesting manner, with the implications of the research they describe. To give one example: in his chapter on dispersal Gregory suggests that the spores of fungi like the giant puffball (*Calvatia gigantea*) may be more significant in promoting genetic exchange between existing mycelia than in starting new mycelia.

The first chapter gives an exhaustive and somewhat repetitive account of fungal protoplasts, and the next five deal with fungal structures ranging from aggregations of yeast cells to the complex fruit bodies of basidiomycetes. The next six chapters are concerned with the mechanisms of morphogenesis in various groups including the Myxomycetes and cellular slime molds. Two chapters on the physiology of reproduction are followed by six on reproduction and inheritance. In this last group the chapters by Emerson on Mendelian inheritance, Roper on the parasexual cycle, and Jinks on extranuclear inheritance are outstandingly good in providing clear, authoritative statements of what the authors consider significant. The last three chapters deal with spore dissemination: release, dispersal, and dormancy and germination. Author, subject, and organism indices conclude this important and useful reference book.

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Point Defects and Dislocations

Theory of Crystal Defects. Proceedings of a summer school held in Hrazany, Czechoslovakia, September 1964. BORIS GRUBER, Ed. Czechoslovak Academy of Sciences, Prague; Academic Press, New York, 1966. 415 pp., illus. $15.

The Summer School of Hrazany, held at the initiative of Frantisek Kroupa, had the great merit of the bringing together of teachers and students from both the eastern and western parts of Europe to discuss problems of defects in crystals. The lectures included such well-known names as Indenbom, Orlov, Hirsch, Howie, Seeger, Kröner, Saada, Sestak, and Kroupa. The main lectures of this summer school now appear in published form.

The emphasis of the school was theoretical and on a "mechanical" or "atomistic" description of defects—primary point defects and dislocations—with little reference to their electronic state or to the physical properties sensitive to it. Within these limitations, the general aim of the school was, I think, reasonably well fulfilled. Some rather specialized papers such as Ludwig's on the dynamics of a crystal lattice with defects, Saada's on stacking faults, Kroupa's on dislocation loops, and Sestak's on glide and workhardening in BCC metals, bring out original material and are of intrinsic interest. It is probably mainly for those special papers that this book will be appreciated. I recommend it to serious students of defects in solids as a useful complement to other references.

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