

25, 27, 77, and 159) are not well reproduced. I noticed only a few typographical errors: "glycosminoglycans" (p. 121, l. 3), "the" for "that" (p. 137, l. 17), and "lead" for "led" (p. 147, l. 9). Also, there are many instances where "sulfate" is preceded by "O-", incorrectly, because the oxygen atom involved is not a part of the sugar moiety, and the etymologically erroneous, alternative spelling ("sulphate") is occasionally thrown in. Only ten percent of the references are more recent than 1980; this, I assume (as the date of the workshop meeting is not given), is a reflection of the delay that so frequently plagues the shepherding of a collected work of this kind into print.

Overall, this work is of high quality and constitutes a valuable addition to the carbohydrate literature.

McGill University
Montreal, Canada

ARTHUR S. PERLIN

Chitin, Chitosan, and Related Enzymes: edited by JOHN P. ZIKAKIS, Academic Press, Orlando, FL, 1984, xxiv + 415 pages + Subject Index, \$39.50, £ 30.50.

This book consists of the papers presented at a joint United States-Japan seminar which brought together 12 Japanese and 12 American scientists, accompanied by a very small number of observers (10 from the U.S.A., 1 from Italy, and 1 from Panama), to discuss several aspects of applied research on chitin. The book offers 24 articles grouped into 5 sections, namely, (1) drug delivery, sustained release, and pharmaceutical; (2) novel applications of chitin, chitosan, and their derivatives; (3) enzymology and genetic enzyme engineering; (4) chemical and physical structure of chitin and chitosan; and (5) biological and physicochemical properties of chitin and its derivatives. The purpose of the book is clearly defined, and discussion is restricted to some of the applicative aspects of chitin. The book does not mention research on the occurrence of chitin in animals and fungi, chitin ecology, and chitinases, and gives very little information on the chemistry of chitin.

The general style of these contributions is that of journal articles, but, in most of the articles, the introductory sections contain obvious and superficial statements. For instance, an article dedicated to chitosanases begins with sentences recalling studies, made on chitosan in 1859, which are absolutely irrelevant, in addition to containing a Table on the potential applications of chitosan (erroneously entitled "Potential applications of chitosanases") which is misleading and distracts from the subject treated. More than one article describes non-rewarding research projects, such as one on the chitinolytic activity of β -D-glucosidase, in which an attempt to modify the method of Reissig *et al.* for the determination of N-acetylglucosamine is described, and another on the spectrophotometric determination of chitin in complex solvents. In both cases, undesirable properties of the sys-

tems prevent the obtainment of encouraging results, and of access to novel research perspectives. The two articles on biotechnological applications are evidently premature for publication in a book; the authors of one of them, in a footnote, informs the reader that "positive results have not been consistently obtained".

On the other hand, several contributions are up to the level demanded for inclusion in a book. Shimahara *et al.*, for instance, explore new methods for isolating less-denatured chitin; Blackwell *et al.* provide a good review on the structure of chitin-protein complexes; Hadwiger describes plant-fungal-pathogen interactions and the related possibility of seed treatment resulting in cost-effective increases in crop yields; and Tokura *et al.* provide a chapter, linking chemistry to medicine, which gives valuable information on the effect of chitin on the activation of macrophages *in vivo*, on the suppression of tumor growth, and on the protection of the host against bacterial infection. Good reviews are also given by Allan *et al.* on novel aspects of chitin applications in medicine, and by Hirano *et al.*, who focus on a number of applications, primarily in the agricultural field.

Today, it is very important to provide this type of partially elaborated information which combines aspects of review articles and laboratory reports. Another example of this elegant style is the chapter by Austin on solvents for chitin. The book is carefully typed but not exempt from errors, ranging from misspelled names of leading scientists (ref. 3, page 222) to references listed in alphabetical order although cited by number (and omission of some, as on page 206). Certain Figures are oversized for the amount of information they provide (*e.g.*, on pages 91 and 185).

Being written by experts, the literature coverage is very good, and certainly the book will find a place in the personal library of the professional scientist. The editor should be commended for having been able to convey to the chitin field some of the money assigned to the cooperative program between the US and Japan, even though a book by a few scientists from only two countries would seem to constitute an underestimate of the world-wide importance of chitin. In fact, more than 200 scientists recently met in Europe and produced a full-coverage book on chitin which will appear in October, 1985.

*Institute of Biochemistry,
Faculty of Medicine
University of Ancona
I-60100 Ancona, Italy*

RICCARDO A. A. MUZZARELLI