have a very comprehensive account of the history of biochemistry that will also guide him or her to recent work by historians on the history of physiology and biochemistry.

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Control of Insect Pests

Theory and Practice of Biological Control. C. B. HUFFAKER and P. S. MESSENGER, Eds. Academic Press, New York, 1976. xxii, 788 pp., illus. $42.50.

This is the third major book on biological control that has been written or master-minded since the middle 1960's by researchers at the University of California. Like the other major books, it is a many-authored volume, and a galaxy of world experts have contributed chapters. Virtually all of the book is concerned with insect pest control by natural enemies. The book also briefly introduces other, wider aspects of the biological control of insect pests, including control by host-plant resistance, cultural controls, and control by autocidal methods as well as integrated control. Only one 14-page chapter discusses the very important subject of the biological control of plant pathogens, and there is no treatment of other subjects, such as the direct biological control of animal pathogens. To call such a book *Theory and Practice of Biological Control* perpetuates the myth that disciplines other than entomology have relatively little to offer to the theory and practice of biological control.

For the entomologist, the book provides a valuable updating of general information on biological control but does not offer much that is new in the way of philosophy or exciting ideas. Thus, except for a valuable chapter by Hagen and others on "The biology and impact of predators," those on philosophy, scope, theory, and empirical bases for biological control are mostly shorter versions of stimulating and provocative chapters on these topics in the two previous major books (*Biological Control*, C. B. Huffaker, Ed., Plenum, 1971, and *Biological Control of Insect Pests and Weeds*, P. de Bach, Ed., Chapman and Hall, 1964). Opportunities have been missed; it would be more valuable, for example, to critically examine the future role of biological control in relation to the vital topic of integrated control (which is discussed in chapter 27) than to deal with integrated control, as the book does, mostly in terms of its independent components.

The book is certainly a tribute to the outstanding work done by entomological protagonists of biological control since it all began in California in the late 1800's, and it also provides evidence of successes in the last 20 years, demonstrating the continued importance of the biological control of pest insects by natural enemies. However, the philosophy and practice of biological control have remained little changed for several decades. The emphasis in the present book on success stories and the absence of critical analyses of inadequacies or apparent failures suggests that the protagonists of biological control still feel they have to defend or at least to vindicate their approach. Yet few people would disagree that biological control is fundamental to the rational control of most insect pests as well as of many other kinds of pests and diseases. We still need an objective analysis of the role of biological control, including appraisals of its strength and limitations and, in particular, some fresh approaches in biological control research. This will be the task of the new generation of young scientists dedicated to this field of endeavor both in California and elsewhere.

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Toxic Effects

Biological Reactive Intermediates. Formation, Toxicity, and Inactivation. Proceedings of a conference, Turku, Finland, July 1975. DAVID J. JOLLOW, JAMES J. KOCSIS, ROBERT SNYDER, and HARRI VAINIO, Eds. Plenum, New York, 1977. xii, 514 pp., illus. $49.50.

This book presents one of the more intriguing phenomena of toxicity, the production of highly reactive intermediates as a result of attempts by the body to inactivate and rid itself of foreign chemicals. When these intermediates react with critical cellular components, the biochemical lesion produced can cause toxicity in the form of morphological and physiological changes. These are most often seen as cancer and organ damage. This collection of papers comes from an international symposium at which most of the major laboratories studying reactive intermediates were represented. Although several books dealing with specific aspects of reactive intermediates have appeared recently, this is the most comprehensive volume available. The coverage, however, varies immensely from chapter to chapter; some chapters are comprehensive reviews of a topic, whereas others deal with very narrow and specific experimental problems. Despite the shortcomings of such a format, the whole is very readable, and the reader is made aware that, despite the seeming completeness of the background information, there are many problems that need to be solved.

The book is divided into seven sections, although the subjects covered in each seem somewhat arbitrarily assigned. The discussions that took place at the symposium are not reported verbatim, but the summaries retain some of the spontaneity characteristic of a scientific meeting.

An excellent start to the book is provided by a section on the role of covalent binding in toxicity and carcinogenesis. In this section, one chapter by Gillette deals with theory and others, by Miller and Miller and by Jollow and Smith, use specific experimental examples to illustrate general concepts. In the section Formation of Reactive Intermediates, the comprehensive coverage in the contributions by Ullrich on the oxidation mechanisms, Schenkman *et al.* on the induction of aryl hydrocarbon hydroxylase, and Gelboin *et al.* on the metabolism of benzopyrene is particularly noteworthy. Similarly, in the section Inactivation of Reactive Intermediates the chapters by Oesch *et al.* on epoxide hydratase and Jerina and Bend on glutathione *S*-transferases and elsewhere in the book the chapters by Sims on polycyclic hydrocarbon expoxides and Brookes on the role of covalent binding in carcinogenicity provide excellent backgrounds to aid in the understanding of chapters concerned with more specific problems of individual drugs and foreign compounds. The chapter by Högberg on the use of hepatocytes in a toxicity study provides some exposure to a model system for which there is great potential. Two chapters, one by Conney *et al.* linking reactive metabolites with mutagenicity and carcinogenicity and the other by Regan documenting cellular repair mechanisms, remind the reader that a demonstrable detrimental change resulting from the initial binding event, not the binding of a reactive intermediate to a cellular constituent, is the true indicator of toxicity.

Overall, the volume blends past problems and the way they were solved with present problems and the way they are being attacked to form an overview of reactive intermediate toxicology that will