Biological Indicators of Environmental Quality

By William A. Thomas, Gerald Goldstein, and William H. Wilcox.
Ann Arbor Science Publishers Inc., P. O. Box 1425, Ann Arbor, Mich. 48106. 254 pages.

This book is a collection of 546 abstracts which provides knowledge about biological responses to environmental quality. More references might have been selected on the same basis as those included; however, coverage of the literature seems to be quite complete. The oldest citation is a 1933 publication by P. W. Zimmerman, W. Crocker, and A. E. Hitchcock, "The Effect of Carbon Monoxide on Plants." There are two publications from 1934: one by Zimmerman and Crocker on the toxicity of air containing sulfur dioxide gas, and the other by W. L. Mallmon and S. Supien on "Pollution Indices of Natural Bathing Places." (Am. J. Pub. Health 24). In the latter publication a streptococcus index was used to characterize the sanitary conditions of bathing beaches. Most publications are from the past decade which reflects our expanding interest in pollution and environmental quality.

The Table of Contents separates the indicators by level of biological organization; i.e., cell-free systems, cellular tissues and organs, organisms, and communities. Within each category there are subdivisions or sections such as major pollutants and the different kinds of biological indicators. With use of both pollutant and biological indicator headings, cross references were developed. Each citation is identified with an accession number and related abstracts are listed at the end of each section. The abstracts are accompanied by an indication of whether they were provided by the author in the original publication, taken from the abstracting journal or especially prepared for the book.

The complete lack of discussion in the book is a disappointment. A statement in the preface is of interest, "As humans, we must not forget at times that a multitude of life forms share the planet with us and that they serve as unique indicators of the habitability of our environment because of their strict dependence on it." Organisms integrate response through time reacting to combined effects of pollutants or stresses. Although not of much benefit to the specialist in specific fields, this book should stimulate interest in biological indicators as scientific tools to assess the quality of the environment.

There are many examples where biological indicators have been first to reveal environmental pollution. Of special interest to this reviewer was the undersurface glazing and bronzing of vegetables in the Los Angeles Basin in 1944 which first drew attention to photochemical oxidants as pollutants. Fourteen years later research on cigar-wraper tobacco in the Eastern United States revealed that ozone was the primary cause and that photochemical oxidants were of economic importance also in the Eastern United States. Biological indicators are an essential part of any assessment of pollution and environmental quality. The book should be especially useful to persons with a developing interest in the assessment of environmental quality. However, the successful use of biological indicators, especially in bioassays, depends on the standardization of all test conditions and careful selection of the test organism. Because there is such a wide variation of response within any species, the varieties or clones within species having a known history are most valuable as biological indicators. -H. E. HEGGESTAD, Chief, Air Pollution Lab., Agricultural Environmental Quality Inst., USDA-ARS, Beltsville, Md.

Mass Spectrometry of Pesticides and Pollutants


The main objectives of this book have been to assimilate into a single volume all of the published data on the use of mass spectrometry for the analysis and identification of pesticides and pollutants, to organize these data into chapters based on their chemical functionality (i.e., phthalates, carbamates, anilides, etc.), and to discuss in detail the use of mass spectra and fragmentation patterns for the analysis of chemical pollutants. The authors have met these objectives well; the book is a comprehensive and well-written volume which will undoubtedly be widely consulted.

The first chapter is devoted to an "Introduction to Mass Spectrometry" and covers such topics as operating characteristics of mass spectrometers, electron impact (EI) and field ionization (FI) spectra, metastable ions, and ion kinetic energy spectroscopy (IKE) which can often be used to differentiate isomers of some pesticides.

Chapter 2, "Other Ionization Processes and Their Application," discusses the utility and application of some special ionization processes in mass spectrometry, including negative ion mass spectra of pesticides and pollutants (as opposed to positive ion mass spectra, which is the principal ionization process used in mass spectrometry). Chemical ionization techniques, and field desorption (FD) spectra of pesticides.

One of the most useful analytical tools yet devised for the analysis and identification of pesticides and pollutants involves the coupling of a gas chromatograph and its separation potential with a mass spectrometer and its potential for structural identification. "Gas Chromatography-Mass Spectrometry (GC-MS)" is the subject of Chapter 3 which discusses the application of GC-MS analysis to pesticides and pollutants along with special techniques, procedures, and mass chromatogram data.

"Other Techniques" are discussed in Chapter 4, including the combination of mass spectrometry with thin layer chromatography and column chromatography, techniques for analysis of mixtures of pesticides and pollutants by mass spectrometry, and the use of derivatives in mass spectrometry. Chapters then follow on the application of these methods and techniques to a number of specific groups of pesticides and pollutants, including halogenated pollutants (polychlorinated biphenyls), polycyclic aromatic hydrocarbons, phthalates, chlorinated aromatic pesticides, carbamates, ureas, anilides, triazines, uracils, organophosphorus pesticides, and many others. Each chapter is well documented with appropriate references and contains mass spectra and fragmentation patterns for many specific compounds.

Unfortunately, the cost of this book will probably preclude its purchase by many scientists. Nevertheless, it is recommended to those researchers who are involved with the application of mass spectrometry to the analysis of pesticides and pollutants. The book should be widely acquired by technical and university libraries.


Models for Environmental Pollution Control


This book is a collection of papers presented at an Advanced Study Institute entitled "Systems Analysis for Environmental Pollution Control" in December 1972. The papers describe the use of mathematical models and systems analysis techniques for environmental pollution control. Resource conservation and development. In this field, decisions are very complex and can result in very great costs. Although these methods will not solve environmental problems, they should help the decision maker evaluate alternative strategies.

Chapter 1, "Introduction" by the editors introduces some of the developments in this field, 20 papers are grouped into six parts. The first part, "Water Pollution Controls," contains six papers on the following subjects: wastewater disposal, regional sewer systems, river basin water quality, simulation techniques, oxygen balance in rivers, and aquatic ecosystems. Part II, "Water Supply and Water Resource Developments," contains four papers: design of water supply systems, economics of canals in Germany, and water management in France and in Italy. The third part, "Air Pollution," has three papers: an overview, a discussion of modeling problems, and one on modeling uses in several German cities. Part IV, "Solid Waste," has four papers: a review paper, two on vehicle routing, and one on regional planning. A single paper on noise control constitutes the fifth part. The sixth part, "Total Environmental Models," has two papers: one combines air, water, and solid waste models; the other compares the control of nuclear materials with environmental pollution control. At the end, a short subject index gives about 240 terms.

Most of the papers do not present a lot of complicated mathematical equations but many use the vocabulary of operations research. In general, the authors have given a good description of the features of the models and also other considerations such as input data, parameter estimation, and limitations. This book seems most suited for those who have some knowledge in one area of pollution control analysis and are interested in examining other areas. Many of the papers have numerous references which could be used to pursue the subject.

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