

## Book review

*General and Applied Toxicology*, Bryan Ballantyne, Timothy Marrs and Tore Syversen (Eds.), MacMillan Reference (UK)/Grove's Dictionaries (US), New York, NY, 2nd edn., 1999, 3 vols., \$575.00, 2199 pp. + subject index 116 pp. + chemical index 38 pp. ISBN: 1-56159-242-0

In the preface of the first edition, the editors wrote:

This textbook is intended to give a comprehensive review of the scientific basis of toxicology and its application and to be used both as a reference volume and a text for educational purposes. Both general and specialist needs are considered, with particular reference to basic principles, definitions, laboratory aspects, interpretation of data, and practical applications of toxicology. Thus, there are sections devoted to basic concepts, techniques, toxicity by specific routes of exposure and by organ systems, special aspects of toxicology, and the increasingly dominant, though sometimes scientifically suspect, area of regulatory toxicology. Environmental topics are covered in several chapters, notably those dealing with air pollution, toxicology of pesticides, toxicology and disasters, and the section on regulatory toxicology in the second volume. Amongst the many objectives of this book during its planning phase were to inter-relate knowledge gained in the toxicology laboratory to its practical applications, and to present topics not normally, or inadequately, covered by other texts.

The original material, according to the editors, has been completely updated and rewritten with new chapters added in several areas such as molecular toxicology, apoptosis, species endocrine disruption, environmental toxicology, mixtures, risk assessment, biomarkers, interactions, education, and even bioterrorism.

The appearance of the book is timely as chemical corporations around the world begin a cooperative venture testing the toxicity of a multitude of chemicals.

Where to begin? As a reviewer, I faced a daunting task; three thick volumes, 101 chapters, 2199 pages of text, 154 pages of indices, 142 contributors, three editors, and many topics beyond the expertise of this simple chemical engineer. If no place else, beginning at the beginning seemed like a good idea. So I begin with Chapter 1, in which the three editors wrote (under the chapter title ‘‘Fundamentals of Toxicology’’):

Toxicology, essentially concerned with addressing the potentially harmful effects of chemicals, is a recognized scientific and medical discipline encompassing a very large number of basic and applied issues. Although only generally accepted as a specific area of knowledge and investigation during this century, its principles and implications have been appreciated for aeons. Thus, the harmful and lethal effects of certain substances,

plants, fruits, insect bites, animal venoms and minerals have been known since prehistoric times.

While these volumes were written for toxicologists, they have several sections of interest to chemical/environmental engineers. I will comment on selected sections.

Neurotoxicology. The author of this chapter discusses the toxic effects of PCBs. One documented event of their toxicity (according to the writer) was the 1968 exposure of 1000 people in Kyushu province in Japan via cooking oil containing several different chlorinated aromatic chemicals including PCBs. However, my recollection of the literature on that topic was the other compounds, not the PCBs, were the problem here.

The toxicity of mercury is discussed in the next section as follows:

The lipophilic methylmercury has been the toxic agent in a large number of poisonings in Japan and Iraq. In 1971 in Iraq 500 people died and 5000 were severely injured after eating seed grain dusted with methylmercury fungicide. The wheat was not intended for eating but for planting. In some areas the wheat crop arrived too late and during a famine the contaminated seed grain was therefore used for human consumption. Several weeks after consumption, the first symptoms, which were loss of sensation in the skin and blurred vision, appeared. Later severe symptoms such as blindness, deafness, loss of coordination and death occurred. The use of this fungicide is now forbidden. In Minimata in Japan an industrial effluent containing mercury was released into the bay and converted by microorganisms into methylmercury. The methylmercury in the sediment was transferred via smaller organisms to fish, which were consumed by the local inhabitants.

However, the major section of this book of interest to chemical/environmental engineers is the approximately 200-page Part Six Environmental Toxicology. The chapters therein are entitled:

- Air Pollution
- Indoor Air Quality
- Aquatic Toxicology
- Wildlife Toxicology
- Soil and Fresh Waters
- Environmental Endocrine Toxicology
- Interactions Between Occupational and Environmental Factors in Toxicology, Hazard Evaluation and Risk Assessment

As one might surmise, given the title of the book and the backgrounds of the authors/editors, the discussion was heavily oriented towards the medical impact of chemicals. The chapter on air pollution came as close to a common environmental treatise as any of the above. The impacts of common air pollution are discussed. The discussion is thoroughly up to date for even PM 2.5 micron-sized particles (impact of small diameter particulate matter on the lungs. But they go into discussion well beyond the mundane health effects, i.e., discussing histopathological effects.

Sprinkled throughout the book are other sections on toxic compounds. For example, the chapter entitled “Toxicology and Disasters” contains a discussion of a wide variety of topics: the 1976 Seveso, Italy accident (dioxin release); the 1984 Bhopal, India disaster (methylisocyanate release); and the 1986 Chernobyl reactor failure. Even the impact of volcano eruption and an airplane crash are covered.

I fear, given space limitation and the severe limits of my medical knowledge, that I have not done these three volumes justice in this review. The books, I feel, will be of significant utility to medical people, but of less interest to industrial hygienists and only of passing interest to chemical/environmental engineers. But those in the latter two groups, who truly want to understand the human impact of modern-day chemicals, will want to consult this treatise.

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