Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (R. F. Bryan, Department of Chemistry, University of Virginia, McCormick Road, Charlottesville, Virginia 22901, USA). As far as practicable, books will be reviewed in a country different from that of publication.

Acta Cryst. (1998). D**54**, 288

Molecular Toxicology. By P. David Josephy. Pp. xv + 368. New York: Oxford University Press, 1997. Price $58.00. ISBN 0-19-509340-2.

Toxicology is definitely no longer a phenomenological science; instead, many advances have been made based on mechanistic models obtained through interdisciplinary research efforts. The elucidation of associated events at the molecular level has become possible primarily through recent achievements in biochemistry, molecular biology, nuclear magnetic resonance and protein crystallography.

This book, authored by P. David Josephy (University of Guelph), and with chapters contributed by Bengt Mannervik (University of Uppsala) and Paul Ortiz de Montellano (University of California, San Francisco), aims at a deeper understanding of the molecular mechanisms associated with toxicological phenomena. The book has emerged from a senior course in biochemical toxicology taught by the author at the University of Guelph and is advertised as an 'ideal textbook for advanced undergraduate and graduate courses in molecular and biochemical toxicology, also serving as a valuable resource for instructors and practicing scientists.' It is not, as the publishers claim, the first text to address this topic. Other books with the same philosophy exist, at least in German, but none with quite so much detail.

The volume contains 20 chapters ranging from 'biochemical background' to 'carcinogenesis' and includes sections on the role of superoxide dismutase, hemoglobin, UDP-glucuronosyltransferase enzymes, glutathione transferase, cytochrome P-450 and the aryl hydrocarbon receptor for the detoxification of both endogenous compounds and xenobiotics. A large part is also devoted to adverse effects associated with small-molecule DNA interactions. Each chapter is extensively referenced.

The book also gives an excellent overview of how nature manages to recognize, metabolize and detoxify endogenous and foreign compounds and what mechanisms are activated to synthesize the necessary bioregulators and to control their actions. As far as possible, the mechanisms are based on three-dimensional structures of the macromolecules involved in the biotransformation. The enormous benefit of the availability of ligand–protein structures resolved to atomic resolution as an aid to understanding toxicological phenomena is quite obvious, as is the need for additional structural information in the future to meet the needs of this vital discipline. In the light of present challenges associated with environmental pollution and food intoxication by natural or synthetic sources, acquiring such structural information might well represent a major interdisciplinary target for the next millenium.

The inclusion of historical facts helps in digesting this otherwise extremely densely packed book. Obviously, the senior students at Guelph have achieved a high level of understanding under the auspices of P. David Josephy. In my opinion, however, this book is more suited for advanced graduate studies than for typical undergraduate study, as a solid background in both chemistry and biochemistry is required to appreciate the wealth of information provided.

The book is not without imperfections. Some of the figures are drawn less than accurately (*e.g.*, the figures on pages 136 and 139 are identical and no caption explains why) and it is sometimes difficult to understand the reaction paths as incoming/leaving groups/molecules are not consistently indicated, and – if the book remains conceived as a textbook – color representations (or at least some sort of highlighting changes within rather complex molecular structures) should be an issue. However, such is the potential value of this pioneering work, that future editions are probably to be expected, so that rather than criticizing the present edition for what I perceive as defects and omissions, I offer my remaining concerns as suggestions for future improvement. It would be desirable to exploit the available structural information to a greater extent; 'ribbon-and-wire' models could usefully be replaced by the more detailed three-dimensional representations, now obtainable from more powerful graphics software, thus allowing for a more precise appreciation of the structural details, including hydrogen bond and other contacts. Another desideratum would be a section on the principles of protein crystallography, so as to allow students to better judge the accuracy of the models presented as mechanistic interpretations. With the structures of ligand–protein complexes readily available from the Brookhaven Protein Data Bank, the authors should provide the corresponding internet addresses (as they did for other fields of interest) along with the four-character structure codes. A few chapters on the toxicity of fungi, snake venoms (structural information is already available on these oligopeptides), cosmetics, polymers, plant and animal poisons and bacterial toxicants could turn this book into a truly valuable reference. A glossary, explaining main key words of biochemistry, molecular biology and protein crystallography would also be highly desirable. Alternatively, the authors might wish to include a few more 'side-bar' sections, though it is more difficult to locate pertinent information spread throughout the text in that way.

Overall, although densely packed with information, *Molecular Toxicology* provides the reader with some spectacular insights into toxicological phenonemena – not only on simple mechanisms but rather on how nature managed to construct and maintain a most complex system to deal with old and new toxicants and, as a side effect, sustain life with all its pleasures.

Angelo Vedani

Biographics Laboratory 3R
Missionsstrasse 60
CH-4055 Basel
Switzerland