BOOK REVIEW

Nondestructive Biomarkers in Vertebrates

Edited by M. Christina Fossi and Claudio Leonzio Lewis Publishers, Boca Raton, 1994. 345 pp. £78. ISBN 0-87371-648-5.

This multiauthor book is divided into 14 chapters, covering various types of biomarkers, systems and species in which they may be measured. The emphasis is on non-destructive biomarkers. The book starts with an introductory overview by the editors. This I found a useful, easily readable and well written introduction to the book. There is a discussion of the biological materials suitable for biomarker analysis and how these are utilized, for example skin, eggs and hair, followed by some of the main parameters which can be measured such as esterases, mixed function oxidases and haemoglobin adducts. However, although the emphasis may be ecotoxicological, many of the biomarkers discussed are relevant to other aspects of biomarker research and development in drug, agrochemical and industrial toxicology.

Some of the parameters and materials introduced in the opening chapter are then discussed more fully in subsequent chapters, starting in chapter two with esterases. This chapter covers the background biochemistry of blood esterases, techniques of measurement and sampling and finally examples of field studies in wild animals such as tree sparrows and field mice. The techniques section has useful information on the effect of storage on activity and species and individual differences in esterases.

The third chapter deals with clinical biochemistry in general. The chapter is divided into clinical enzymology, metabolic products, haematology, clinical endocrinology and diagnostic immunology. Each section is further subdivided into an introductory section, methods and toxicology. In the latter, important examples of the effects of toxic chemicals are given such as the induction of cytochromes P450, the inhibition of haem synthesis by lead and the leakage of enzymes resulting from tissue damage, corticosteroid changes after exposure to PCBs and the immunotoxic effects of various pollutants.

The fourth chapter considers products of the haem synthetic pathway specifically as biomarkers. First, the biochemistry is discussed and then the effect of chemicals on the synthetic pathways and the results of this. For example unsaturated compounds such as ethylene and acetylene lead to aminlaevulinuic acid and porphobilinogen in the urine whereas other compounds such as hexachlorobenzene or lead, result in raised urinary levels of uroporphyrin or coproporphyrin respectively. There is also an extensive section on measurement of porphyrins.

In the fifth and sixth chapters biomarkers of genotoxic responses detectable in blood are discussed. After a brief general introduction, chapter 5 covers techniques used in the detection and estimation of DNA alterations such as adducts, strand breaks, modified bases and surrogate adducts. Chapter 6 looks specifically at cytogenetic and cytometric assays.

Chapter 7 describes haemoglobin adducts as surrogates for DNA adducts with some examples in relation to environmental monitoring.

Chapter 8 specifically deals with integrated cellular biomarkers in fish. After introducing the concepts the chapter deals with pathological reactions in the endocytic-lysosomal system, the endoplasmic reticulum and histopathological changes.

In the ninth chapter biomarkers in egg samples are discussed. After a description of the methods of exposing eggs to chemicals, topics such as particular enzymes systems (esterases and mixed function oxidases) are covered.

The tenth and eleventh chapters consider whales in particular as environmental targets. Thus techniques for taking biopsies in whales are discussed in detail in chapter 10 and chapter eleven specifically considers assessment of organochlorine pollutants in cetaceans using biopsies. Data obtained using this approach is then given.

The final section, comprised of three chapters is more discursive. Thus in chapter 12 the rational basis for the use of biomarkers as ecotoxicological tools is considered. This includes discussion of the dose response relationship and multiple dose concept, sublethal and lethal responses, the persistence of responses, interindividual variability and normal values. In the thirteenth chapter this is extended with specific regard to non-destructive biomarkers in terms of sampling and other techniques and various aspects of the response. The final, fourteenth chapter considers the future of non-destructive biomarkers in terms of scientific and regulatory applications, in studies of protected or threatened populations and advanced and innovative techniques. The whole book is well indexed at the end and each individual chapter is well referenced.

Overall the book is nicely produced and generally readable. I found it contained much very useful information presented in an easily accessible way. I would certainly recommend this book.

John Timbrell
Editor