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Book Reviews

Handbook of Applied Mycology Volume 5: Mycotoxins in Ecological Systems. Edited by Deepak Bhatnagar, Eivind B. Lillehoj and Dilip K. Arora. Marcel Dekker, Inc., New York, 1992. xi + 443 pp.
ISBN 0-8247-8551-7. Price: US$172.50.

The series of Handbooks of Applied Mycology, of which this is the fifth, have arisen from the conviction of the series editor, Dr Dilip K. Arora, that applied mycology is one of the most stimulating and rapidly evolving areas of the biological sciences. It is certainly true that the fungal kingdom is more widely understood and the contribution of fungi to the biosphere is increasingly appreciated. It is also true that some individual species of fungi have proved to be invaluable tools in the study of molecular biology—it was from the yeast *Saccharomyces cerevisiae* that the complete DNA sequence of a chromosome was reported earlier this year.

The title of this volume, Mycotoxins in Ecological Systems, suggests that this is not another monograph simply describing mycotoxins and mycotoxicoses, important though such monographs are. The editors have taken up the challenge of identifying ecological implications of mycotoxin production and declare their ambition that the multidisciplinary contributions to this volume will 'produce a structure for new, relevant hypotheses of the biology of synthesis of toxic secondary metabolites'. There is certainly a wealth of thoughtful and thought provoking material here which will help the reader to critically assess, or even to develop, such hypotheses.

There are sixteen chapters, eleven of which deal directly with the aflatoxins, and each has an extensive bibliography so that the entire work contains more than 1900 references.

Eivind Lillehoj opens the book with a stimulating chapter titled provocatively 'Aflatoxin: genetic mobilization agent. He uses a fairly broad brush to develop the hypothesis that the problems associated with the contamination of foods and animal feeds with aflatoxin have arisen with the development of intensive agriculture based on monoculture, and the elimination of biological diversity. He also provides an overview of the mechanisms of genotoxicity of aflatoxin, involving activation within the target organism, and suggests a possible role for aflatoxin in the activation of viruses and disorders involving immunosuppression.

The following chapters deal with individual aspects in more detail. Thus, Neil Widstrom describes the interactions between maize, insects and the two species of aflatoxigenic fungi, *Aspergillus flavus* and *A. parasiticus* (a third, *A. nomius*, has been described recently), in the context of the production of aflatoxin in the field before harvest. As many countries are imposing increasingly stringent maximum tolerated levels for aflatoxin, 5 $\mu g\ kg^{-1}$ becoming the norm, it is important to understand these interactions in order to develop strategies for reducing the incidence of aflatoxin contamination of major crops such as maize and groundnut. To some extent legislative levels for potentially carcinogenic mycotoxins, such as aflatoxin, are determined by the skills of the analyst, and Fun Chu describes the development and use of immunoassays for the specific detection of the most important mycotoxins.

A number of chapters deal with the most recent understanding of the biological activity of aflatoxins and provide material which is useful in making judgements about the significance of chronic exposure for the health of the human population. This is a particularly difficult issue in the case of aflatoxin because of the complexity and diversity of biotransformation pathways of this molecule by different animals. Even within a single species, diet and other factors may influence the detailed processes by which aflatoxin is activated to molecules responsible for acute toxicity and chronic carcinogenicity.

Four chapters deal with the important issues of biosynthetic processes leading to the formation of secondary metabolites by moulds, specifically with oxidation-reduction reactions in biosynthesis of secondary metabolites; the molecular biology of aflatoxin production; strain instability; and the biosynthesis and regulation of trichothecene production. There are also chapters on aspects of *Fusarium* genetics, cyclopiazonic acid and ochratoxin A.

This is a book that should make the reader think and there are plenty of issues to think about. Keller *et al.* ask how the producing moulds avoid aflatoxin-mediated suicide. If, as it seems, aflatoxin B_1 is not the toxin or the carcinogen, but has to be metabolised to an epoxide, the answer may simply be that *Aspergillus flavus* and its relatives do not carry out these reactions. Just dipping into the book presents observations, such

as the possibility that crucifers may produce compounds that protect against aflatoxin-associated cancer, or that a change in diet from cereals to potatoes amongst poor people may protect them from exposure to mycotoxins. This should stimulate thought and debate about the importance of mycotoxins and it is a pity that the relatively high price may limit the range of readers.

Maurice O. Moss

Pearson's Composition and Analysis of Foods 9th edn. By R. S. Kirk and R. Sawyer. Longman, UK, 1991. x + 708 pp. ISBN 0-582-409101. Price: £49·00.

The ninth edition of this famous and unsurpassable book has been considerably enlarged from the eighth edition (591 smaller pages). The title has been appropriately changed from the original ('Pearson's Chemical Analysis of Foods') 'to Pearson's Composition and Analysis of Foods' to reflect the subtly evolving content of the book, yet its original and dependable ethos (as David Pearson always kept it) has not been lost. The authors express their intention to address a broad readership (in the preface) and this edition is certainly improved by up-dating on EC directives, Codex Alimentarius requirements and to a lesser extent by including changes in standards and methods from BSI, ISO and the Analytical Division of The Royal Society of Chemistry.

A quick peek at the (historically dependable) appendices at the back of the book reveals that most are still there but a new addition is an extensive table of Codex Standards. Also the UK Codes of Practice are listed and the MAFF Food Surveillance Papers. The list of food additives permitted in the UK is now gone but Appendix 8 gives serial numbers of permitted food additives. All the original lists of units and factors are still there, and there is now a new Appendix 13 on Composition of Foods.

The main text of 'Pearson's Composition and Analysis of Foods' is characterised by practical details, diagrams and apparatus. The strength of this book has always been its intrinsic 'usefulness' and indeed it is the only text in existence which combines analytical methods, legislative requirements and food product quality in such a well-balanced and authoritative manner. Of course, this means that explanation is sometimes sacrificed for expediency and we are served with reference methods and worked formulas without understanding how they are derived. An example of this is the formula for calculating the percentage of a sugar mixed with sucrose using optical rotations (p. 195). This differs from the one given in the 8th edition of the book and inspection shows that the ninth edition formula is wrong. For students using these methods it is better to consolidate understanding by calculating from first principles. Generally the 9th edition of Pearson's Composition and Analysis of Foods' is well prepared and remarkably free of editorial mistakes. The authors are to be congratulated on producing this up-to-date, well sought-after and indispensable book. Its' value for money (at £49) is quite remarkable and I thoroughly recommend purchase.

Gordon Birch