

Book Review

Betina, V. 1989: Mycotoxins: chemical, biological and environmental aspects. — 438 pp. Elsevier, Amsterdam, Oxford, New York & Tokyo. ISBN 0-444-98885-8 (Vol. 9), ISBN 0-444-42633-7 (Series). (Bioactive molecules, vol 9:1-438).

Contamination of food and animal feeds by various fungi is a serious problem, causing substantial economic losses. Fruits, vegetables, grains, forage plants, etc. often become unfit for consumption through spoilage or production of toxins. This book treats mycotoxins, toxic fungal metabolites causing mycotoxicoses. Thus, many famous fungal poisons which are better known to the layman, such as amatoxins, phallotoxins, virotoxins and psilocybin, lie outside its scope.

So far, 300 mycotoxins produced by 350 fungal species have been characterized. Most of these fungi belong to the Ascomycotina or Deuteromycotina, the largest genera producing mycotoxins being *Penicillium*, *Aspergillus* and *Fusarium*. The best studied mycotoxins are aflatoxins, produced by some *Aspergillus* species. The most important *Penicillium* mycotoxins include citrinin, patulin, rubratoxins and penicillic acid, and the best-known *Fusarium* toxins are trichothecenes.

The format of the book is clear and practical. The first part gives general information about mycotoxins, and the second part goes deeper into the subject, presenting each group of these toxic metabolites in turn. The chapters begin with a list of contents, offering the reader the possibility of quick and convenient reference, and end with an ample list of the relevant literature.

The first part is divided into six chapters, the first of which is devoted to the taxonomy of mycotoxin-producing fungi. The best known mycotoxins and their producers are also clearly presented in tables. This is followed by a chapter dealing with the biosynthesis of these secondary metabolites. They are formed by a few basic biosynthetic pathways, which are related to the primary metabolic pathways and use the same intermediates. Most of the mycotoxins are formed by the polyketide pathway, but the terpenoid route is also common. Some of the metabolites are derived from amino acids. The possible functions of the mycotoxins in nature, in the metabolism and differentiation of their producers, are discussed.

The third chapter deals briefly with the biological effects of mycotoxins, such as acute and chronic toxicity, cytotoxicity, mutagenicity, carcinogenicity and antitumour properties. The different mycotoxicoses of animals and humans are summarized

in tables, and the effects on mammals, insects, micro-organisms and higher plants are discussed.

The next chapters give an overview of how the mycotoxins interfere with biochemical processes and of the structural features of the compounds responsible and essential for their toxicity and biological activity. The biochemical effects of mycotoxins in the cell can manifest themselves in interactions with cell membranes, DNA, and protein molecules or in interference with or inhibition of energy metabolism, replication of DNA, transcription of RNA, translation and purine metabolism. The most important factors responsible for the activity of the metabolite are its physico-chemical properties, the chemical structure and steric arrangement of its molecules and the presence of bioactive moieties. A chemical classification of mycotoxins is also presented. The mycotoxins can be divided into six groups: macrocyclic lactones, quinones and similar compounds, amino acid and peptide compounds, oxygen-containing heterocycles, alicyclic compounds and aromatic compounds.

The last chapter of the first part of the book deals with environmental aspects of toxigenic fungi and their toxins in agricultural products (cereals, peanuts, fruits, etc.), in animal products (milk, meat, etc.) and in mould-ripened foods and mould fermentations (cheese, soy sauce, miso, etc.). Infection of agricultural products, fungal growth and toxin production may occur in the field and/or in storage. These contaminations are most commonly caused by soil saprophytes such as *Aspergillus* and *Penicillium*. Inhibition of mould growth and detoxification through degradation of mycotoxins are treated very briefly.

The second part deals with the different mycotoxin families. In each chapter one group of these metabolites is considered in detail; the introduction is followed by a presentation of the producing organisms, biosynthesis, isolation and purification procedures, physical and chemical properties; biological actions on animals, humans, micro-organisms, other fungi and plants; modes of action, environmental aspects and possible detoxification methods. The structural formulas of the mycotoxins and the biosynthetic routes are clearly illustrated.

All in all, the book is very informative and will certainly prove useful as a guide to the world of mycotoxins. One of the very few disadvantages is that the indexes give too few page references.

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