

The background of the cover is a dark, textured grey. It is decorated with large, bold, abstract shapes in a vibrant red color. These shapes include a curved band in the upper left, a wide horizontal band across the middle, and a sharp, triangular shape in the lower right corner.

# *Aspergillus*

Biology and Industrial  
Applications

J.W. Bennett  
M.A. Klich

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# ***Aspergillus*: Biology and Industrial Applications**

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## PREFACE

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*Aspergillus* is a genus of asexual (anamorphic) molds, some members of which have sexual (teleomorphic) stages classified among the Ascomycetes. The taxon was first described in 1729 by Micheli, a Florentine priest-mycologist. The conidiophore that characterizes the genus consists of a long hyphal cell culminating in a globe-like spore-bearing structure. Micheli was reminded of the aspergillum, a liturgical device used to sprinkle holy water, hence the name.

Aspergilli are now recognized as some of the most widely distributed and abundant of living things. In addition to the major role they play in the natural world, their metabolic versatility has both positive and negative economic consequences for human commerce. They are major agents of decomposition and decay. The enzymes that facilitate their biodegradative activities can also be harnessed in food fermentations and industrial processes. Some aspergilli cause serious diseases (mycoses) or produce toxic metabolites (mycotoxins). Others are grown in controlled fermentations in order to harvest various small molecules of industrial importance (e.g., citric acid and lovastatin). Examples of medically and industrially important species include: *A. flavus* (aflatoxin production); *A. fumigatus* (etiological agent in aspergillosis); *A. nidulans* (model system for genetic studies); *A. niger*

(citric acid production); and *A. oryzae* (saki and soy sauce production). *A. niger* and *A. oryzae* are both on the U.S. Food and Drug Administration "GRAS list" (generally regarded as safe).

As aspergilli are eukaryotic microbes capable of efficient secretion in liquid culture, modern biotechnologists have reevaluated the potential of these fungi as models for basic science as well as for cloning hosts in industrial fermentations. Advances in molecular biology have provided new approaches to old problems in plant and animal pathology; to selection of high-yielding industrial strains; to identification and control of decay organisms; and to basic studies in taxonomy, ecology, and physiology.

This book arose out of a chapter in an earlier book in the Butterworth-Heinemann Biotechnology Series entitled *Biology of Industrial Microorganisms*, edited by A.L. Demain and N. Solomon, which highlighted the diverse ways in which microorganisms have been used in biotechnology. We are grateful to Arny Demain for suggesting that the chapter on *Aspergillus* be expanded into an entire book. Additional thanks are due to Paul Bayman, Mia Molvray, and Toby Fiebelman for their stimulating discussions seasoned with generous doses of mycological humor. Gauri Radkur and Melissa Thorne gave superb help with revisions and manuscript preparations. Rose Glade provided months of cheerful and competent secretarial assistance. Just 5 days before we completed our editorial work, Ms. Glade was in a serious automobile accident so our pleasure in finishing the book is dampened because she is in the hospital and unable to celebrate with us.

John, Dan, and Mark Bennett provided filial encouragement, and Ed Mullaney could not have been more supportive during the double gestation. Last, but not least, we thank Gwen Mullaney for waiting.

J.W. Bennett  
M.A. Klich

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PART

I

***Aspergillus* as a Model System**

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