
Preface

Fungi are a highly versatile class of microorganisms and their habitats are as diverse. In nature, fungi play a crucial role in a range of degradation processes, enabling recycling of valuable raw materials by wood decaying fungi like the white rot fungus *Phanerochaete chrysosporium*. On the other hand, fungi can be pests to food production like the rice blast fungus *Magnaporthe oryzae*. Furthermore, mankind exploits the enzymatic opportunities of fungi through classical industrial processes as ethanol production by the yeast *Saccharomyces cerevisiae* and heterologous enzyme production by filamentous fungi as *Trichoderma reesei*. All these stimulated an enormous number of studies trying to understand as well as exploit the metabolic capabilities of various fungal species.

One of the game-changing breakthroughs in fungal research was the development of genetic transformation technology. This enabled researchers to efficiently modify the gene content of fungi and study the functional relevance. Interestingly, the first available method (protoplast or spheroplast transformation) evolved from an existing classical method called protoplast fusion, a process which also introduces DNA into a receiving cell however in an uncontrolled way. This publication aims to give an overview of all existing transformation methods used for yeasts and fungi.

Volume I describes in detail the different classical methods as electroporation, protoplast, *Agrobacterium* mediated, lithium acetate and biolistic transformation as well as more recently developed methods. Transformation methods do not describe the whole story; DNA must enter the cell, the nucleus, and finally integrate in the genome, if required also at predetermined positions. Several chapters will update on the current insights in these processes.

Volume II describes transformation-associated methods and tools as cell fusion, repetitive elements, automation, analysis, markers, and vectors; this volume reflects the many relevant elements at hand for the modern fungal researcher.

This publication is meant not only as reference material for the experienced researcher, but also as introduction for the emerging scientist. Therefore, all methods are supported by several illustrative example protocols from various fungal species and laboratories around the world, which will be a good starting position to develop a working protocol for other fungal species being studied.

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