Preface

Medicinal plant biotechnology is a discipline that should be well known and accepted as a sub field under the umbrella of pharmaceutical biotechnology. However, to our surprise we could not identify any recent contribution dealing with medicinal plants and biotechnological techniques on a high comprehensive level that the subject would deserve today. We accepted this lack as a challenge to sort out the needs of the scientific community and to identify valuable topics that must be addressed in order to provide a narrow and well-defined picture of medicinal plant biotechnology.

We identified several experts in the fields of pharmaceutical biology, biotechnology, biochemistry and genetics who were willing to spend their precious time to share their knowledge with us. Many thanks here from the editors, as without the enthusiasm, efforts, and patience of these experts this book would not have been possible.

Biotechnology in general is a fast-moving area, and this development can be recognized in our field of pharmaceutical biotechnology. In this book we have focused on medicinal plants, and have attempted to structure the latest developments into three parts. In Part I, the actual status of medicinal pharmaceutical biotechnology and the cell as a producing unit are outlined. Here, the major questions are: How do medicinal plants and biotechnology fit together, and how must we understand the plant cell as a “biofactory” that can be used in an integrative drug discovery process? It should be mentioned that endophytes as plant-related microorganisms are discussed in Part I because of the upcoming interest in this new genetic and natural product source for the future. Today, although research into endophytes is very much in its early stages, the first reports on the possibilities to use them to produce formerly plant-originated compounds make this group of organisms interesting for both academia and industry.

Whilst academic and industrial needs are different, all authors were able to provide answers for these groups, both of which are confronted with new challenges such as metabolomics, high-throughput screening, and the application of the latest recombinant DNA technologies. Whether these techniques will be transferred successfully into industrial applications is not clear, but the authors in Part I provide an outlook into this exciting future of pharmaceutical biotechnology.
In Part II, we go a step further from the well-organized cell to the nanocosmos, with special focus on genetics and molecular biology. In this part of the book, strategies are discussed to accelerate the drug discovery process based on genetic techniques such as micropropagation, combinatorial biosynthesis, and expressed sequence tag databases. Considerable attention has been paid to optimize the production of natural products of pharmaceutical relevance in cell cultures, and how production can be scaled up in bioreactors. Combinatorial biosynthesis and ways to modify physiologic traits by constructing transgenic plants will provide an idea of future techniques in natural product production. Some of these products are in the later stages of development, and we hope that we might be able to read about them in the next updated edition of this book, in Part III.

Part III deals with the future directions of medicinal plant biotechnology and examines its practical applications in industry. Authors from industry provide insight into their own production facilities, and discuss the problems and limitations. Progress here has, however, been slower than with medical and other areas of research. Because plants are genetically and physiologically more complex than single-cell organisms such as bacteria and yeasts, the necessary technologies in industrial business are developing more slowly. However, exploring ways to use genetic modification better will definitely influence this area, and therefore we must accept that our attempt to structure the latest developments was only an attempt, and that medicinal plant biotechnology must be considered as a complex and integrative discipline.

Our special thanks go to Steffen Pauly and others of the Wiley-VCH publishing team for their professionalism, continuous encouragement and support, which we enjoyed not for the first time in our sustainable relationship.

Special thanks also to the families of both the editors and the authors for their patience and understanding why time was spent on this project, and why they had to tolerate extended periods of negligence. We are not so naïve to believe that dedicating this book to them will compensate the missed time, but it might be a start!

We have no doubt that this book is far from complete and that some areas of interest were not touched and will have to be discussed in the future, in updated editions. However, we are convinced that we were able to provide a good “primer” to start working in medicinal biotechnology and to show how exciting the combination of medicinal plants and biotechnology can be.

Oliver Kayser

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