

Preface

In the 10 years since the publication of the preceding "Pocket Guide to Biotechnology and Genetic Engineering", the developments in biotechnology have further accelerated. This is true for the science, which has generated new methods such as synthetic biology, genome editing or high-throughput sequencing of genomes, generating big data which provide us with ever more detailed perceptions of the living world. New applications in industry have followed suit – in the medical sciences, eminent examples are the therapeutic antibodies, iPS-derived stem-cell technologies or a personalized medicine based on SNP analysis and companion diagnostics; in industrial biotechnology, the emerging concepts of a "bioeconomy" based on renewable resources such as biomass, waste or carbon dioxide provide certainly a megatrend. It goes without saying that a little booklet can only provide short sketches for each of these fields. An updated literature survey attempts to compensate for this shortcoming.

It is my great joy that Professor Claudia Schmidt-Dannert, University of Minnesota, has accepted to join this and future editions as a co-author. This will help to keep the wide information provided in this book as updated as possible in a global setting.

Our sincere thanks go, beyond the individuals mentioned in the preface of the preceding

"Pocket Guide to Biotechnology and Genetic Engineering", to numerous friends and colleagues who have helped again with their professional knowledge. Our particular appreciation goes to Wolfgang Wohlleben, Tuebingen University; Karin Benz, NMI Reutlingen; Ulrike Konrad, Protagen; Karl Maurer, ABEnzymes, Darmstadt; Bernhard Hauer, Georg Sprenger and Juergen Pleiss, Stuttgart University; Ulrich Behrendt, Munich; Dirk Weuster-Botz, Munich Technical University; Joern Kalinowsky, Bielefeld University; Vlada Urlacher, Düsseldorf University, and Frieder Scheller, Potsdam University.

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Stuttgart, Germany and St. Paul, Minnesota,
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Preface to the preceding "Pocket Guide to Biotechnology and Genetic Engineering"

Biotechnology, a key technology of the 21st century, is more than other fields an interdisciplinary endeavor. Depending on the particular objective, it requires knowledge in general biology, molecular genetics, and cell biology; in human genetics and molecular medicine; in virology, microbiology, and biochemistry; in the agricultural and food sciences; in enzyme technology, bioprocess engineering, and systems science. And in addition, biocomputing and bioinformatics play an ever-increasing role. Against this background, it is of little surprise

that few concise textbooks try to cover the whole field, and important applied aspects such as animal and plant breeding or analytical biotechnology are often missing even from multi-volume monographs.

On the other hand, I have experienced during my own life-long studies, and also when teaching my students, how energizing it is to emerge occasionally from the thousands of details which must be learned, to look at a unifying view.

The Pocket Guide to Biotechnology and Genetic Engineering is an attempt to provide this kind of birds-eye perspective. Admittedly, it is daring to discuss each of this book's topics, ranging from "Beer" to "Tissue Engineering"

and "Systems Biology", on a single text page, followed by one page of graphs and tables. After all, monographs, book chapters, reviews, and hundreds of scientific publications are devoted to each single entry covered in this book (many of them are provided in the literature citations). On the other hand, the challenge of surveying each entry in barely more than 4000 characters forces one to concentrate on the essentials and to put them into a wider perspective.

I hope that I have succeeded at least to some extent in this endeavor, and that you will find the clues to return safely from the highly specialized world of science, and its sophisticated terms, to your own evaluation of the opportunities and challenges that modern biotechnology offers to all of us.

This English version is not a simple translation of the original version, which was published in German in December, 2001, but an improved and enlarged second edition: apart from a general update of all data, it contains three new topics (Tissue Engineering, RNA, and Systems Biology).

At this point, my thanks are due to some people who have essentially contributed to this book. Above all, I wish to acknowledge the graphic talent of Ruth Hammelehle, Kirchheim, Germany, who has done a great job in translating scientific language into very clear and beautiful graphs. Marjorie Tiefert, San Ramon, California, has been more than an editor: she has caught and expressed the original spirit of this book. My thanks also to the publisher, in particular to Romy Kirsten. Special thanks are due to the many colleagues in academia and industry who have contributed their time and energy to read through the entries in their areas of expertise and provide me with most useful suggestions and corrections. These were: Max Roehr, University of Vienna; Waander Riethorst, Biochemie GmbH, Kundl; Frank Emde, Heinrich

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In spite of all efforts and patient cross-checking, it would be a miracle if no unclearness or errors exist. These are entirely the author's fault. I would be most grateful to all readers who will let me know, via the web address www.itb.uni-stuttgart.de/pocketguide, where this book can be further improved.

Rolf D. Schmid
Stuttgart, New Year 2002/2003