Genetically Engineered Food

Methods and Detection
Second, Updated and Enlarged Edition

Edited by
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Preface

The first edition of this book was published in 2003. At that time one could not foresee its success, because admission of genetically engineered food into Europe had been suspended for several years. Since the lifting of the moratorium, however, applications, especially for admission of genetically engineered plants to be used as either food or feed, have again increased, showing that this is still a dynamic field of applied molecular biology.

The era of molecular biology entered a new phase thirty years ago with the construction and successful transformation of the first recombinant DNA molecule (Cohen SN, Chang AC, Boyer HW, Helling RB. Construction of biologically functional bacterial plasmids in vitro. Proc Natl Acad Sci USA 1973; 70:3240–3244). This event marked the birth of genetic engineering which enabled very thorough analysis of cellular functions and provided the tool for targeted manipulation of the genetic material of cells and organisms. Supported by the development of the efficient chain-termination method for DNA sequence analysis (Sanger F, Nicklen S, Coulson AR. DNA sequencing with chain-terminating inhibitors. Proc Natl Acad Sci USA 1977; 74:5463–5467) and the polymerase chain reaction method for targeted amplification of DNA segments of choice (Mullis K, Faloona F, Scharf S, Saiki R, Horn G, Erlich H. Specific enzymatic amplification of DNA in vitro: the polymerase chain reaction. Cold Spring Harb Symp Quant Biol. 1986; 51:263–273), genetic engineering of prokaryotic organisms and, later, of eukaryotes became a task easily performed in many laboratories. The potential of genetic engineering for food production was very soon recognized and the first genetically engineered food organisms, the famous "Flavr Savr" tomato with delayed ripening, was constructed and approved in the United States of America in 1994. Many other plants followed, for example rape, maize, and soy beans. The development of this new breeding technique initiated in Europe the introduction of new legislation needed for harmonization of legislation concerning free trade, for protection of public health and consumer rights, and for consideration of environmental aspects. This legislation has been as dynamic as the science behind genetic engineering – for example, the famous "Regulation (258/97/EC) concerning novel foods and novel food ingredients" established only in 1997 was replaced by "Regulation (EC) No 1829/2003 on genetically modified food and feed" to encompass food produced with the aid of genetic engineering. To enforce this legislation, detection methods had to be developed enabling unambiguous identification of foods produced with

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the aid of genetic engineering. Today, these methods must be capable of quantitative determination of amounts of genetically engineered ingredients at levels of 0.9% of the entire amount of the ingredient. This is necessary to guarantee that the accepted level of contamination of food with technically unavoidable genetically engineered material is not exceeded.

Because of the success of the first edition of this book, we have used the same structure in the second edition. Current applications and future potentials of this breeding technique are discussed in Part 1. Part 2 covers the current state of legislation in Europe; the framework it sets for application of this technique is presented. Methods developed for detection of foods produced with the aid of genetic engineering are highlighted in Part 3.

The book is by no means comprehensive. The focus of detection methods is clearly on detection of DNA. Issues of food safety and consumer acceptance are deliberately not dealt with. Whereas food safety is not a specific issue for novel foods but an issue for food in general, consumer acceptance of genetically modified foods is a very controversial topic of debate, and often the arguments in that debate are all but scientific. It is my feeling as editor that covering the consumer-acceptance issue would obstruct consideration of the scientific data presented in the book.

Last but not least, I wish to acknowledge the excellent cooperation of all the authors in updating their contributions to this second edition and to thank Waltraud Wuest, Wiley-VCH, for her support during the entire production phase of this edition.

Knut J. Heller
Kiel, June 2006

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