Part I Plant Biotechnology from Inception to the Present

1 **Overview of Plant Biotechnology from Its Early Roots to the Present** 3
Ara Kirakosyan, Peter B. Kaufman, and Leland J. Cseke

2 **The Use of Plant Cell Biotechnology for the Production of Phytochemicals** 15
Ara Kirakosyan, Leland J. Cseke, and Peter B. Kaufman

3 **Molecular Farming of Antibodies in Plants** 35
Rainer Fischer, Stefan Schillberg, and Richard M. Twyman

4 **Use of Cyanobacterial Proteins to Engineer New Crops** 65
Matias D. Zurbriggen, Néstor Carrillo, and Mohammad-Reza Hajirezaei

5 **Molecular Biology of Secondary Metabolism: Case Study for *Glycyrrhiza* Plants** 89
Hiroaki Hayashi

Part II Applications of Plant Biotechnology in Agriculture and Industry

6 **New Developments in Agricultural and Industrial Plant Biotechnology** 107
Ara Kirakosyan, Peter B. Kaufman, and Leland J. Cseke

7 **Phytoremediation: The Wave of the Future** 119
Jerry S. Succuro, Steven S. McDonald, and Casey R. Lu

8 **Biotechnology of the Rhizosphere** 137
Beatriz Ramos Solano, Jorge Barriuso Maicas, and Javier Gutierrez Mañero

9 **Plants as Sources of Energy** 163
Leland J. Cseke, Gopi K. Podila, Ara Kirakosyan, and Peter B. Kaufman

Part III Use of Plant Secondary Metabolites in Medicine and Nutrition

10 **Interactions of Bioactive Plant Metabolites: Synergism, Antagonism, and Additivity** 213
John Boik, Ara Kirakosyan, Peter B. Kaufman, E. Mitchell Seymour, and Kevin Spelman

11 **The Use of Selected Medicinal Herbs for Chemoprevention and Treatment of Cancer, Parkinson's Disease, Heart Disease, and Depression** 231
Maureen McKenzie, Carl Li, Peter B. Kaufman, E. Mitchell Seymour, and Ara Kirakosyan

12 **Regulating Phytonutrient Levels in Plants – Toward Modification of Plant Metabolism for Human Health** 289
Ilan Levin

Part IV Risks and Benefits Associated with Plant Biotechnology

13 **Risks and Benefits Associated with Genetically Modified (GM) Plants** 333
Peter B. Kaufman, Soo Chul Chang, and Ara Kirakosyan

14 **Risks Involved in the Use of Herbal Products** 347
Peter B. Kaufman, Maureen McKenzie, and Ara Kirakosyan

15 **Risks Associated with Overcollection of Medicinal Plants in Natural Habitats** 363
Maureen McKenzie, Ara Kirakosyan, and Peter B. Kaufman

16 **The Potential of Biofumigants as Alternatives to Methyl Bromide for the Control of Pest Infestation in Grain and Dry Food Products** 389
Eli Shaaya and Moshe Kostyukovsky

Index 405