

# Contents

1	<b>Downstream Processes for Plant Cell and Tissue Culture . . . . .</b>	1
	Ozlem Yesil-Celiktas and Fazilet Vardar-Sukan	
2	<b>Agrobacterium rhizogenes-Mediated Transformation in Medicinal Plants: Prospects and Challenges . . . . .</b>	29
	Dipasree Roychowdhury, Anrini Majumder and Sumita Jha	
3	<b>Scutellaria: Biotechnology, Phytochemistry and Its Potential as a Commercial Medicinal Crop . . . . .</b>	69
	N. Joshee, A. Tascan, F. Medina-Bolivar, P. Parajuli, A. M. Rimando, D. A. Shannon and J. W. Adelberg	
4	<b>Microbial Endophytes: Progress and Challenges . . . . .</b>	101
	Dnyaneshwar Rathod, Mudasir Dar, Aniket Gade, Ravi B. Shrivastava, Mahendra Rai and Ajit Varma	
5	<b>The Role of Biotechnology in <i>Cannabis sativa</i> Propagation for the Production of Phytocannabinoids . . . . .</b>	123
	Suman Chandra, Hemant Lata, Ikhlas A. Khan and Mahmoud A. ElSohly	
6	<b><i>Epilobium Sp.</i> (Willow Herb): Micropropagation and Production of Secondary Metabolites . . . . .</b>	149
	Deliu Constantin, Ana Coste and Tămas Mircea	
7	<b>Photoelicitation of Bioactive Secondary Metabolites by Ultraviolet Radiation: Mechanisms, Strategies, and Applications . . . . .</b>	171
	Hélio Nitta Matsuura, Fernanda de Costa, Anna Carolina Alves Yendo and Arthur Germano Fett-Neto	

<b>8</b>	<b>Advances in Microspore Culture Technology: A Biotechnological Tool for the Improvement of Medicinal Plants . . . . .</b>	191
	Alison M. R. Ferrie	
<b>9</b>	<b>Implications of Cellular Heterogeneity on Plant Cell Culture Performance . . . . .</b>	207
	Rohan A. Patil and Susan C. Roberts	
<b>10</b>	<b>Biosynthetic Potential of Hairy Roots for Production of New Natural Products . . . . .</b>	241
	Yuriy Sheludko and Iryna Gerasymenko	
<b>11</b>	<b>Molecular Biology and Biotechnology of Quinolizidine Alkaloid Biosynthesis in Leguminosae Plants . . . . .</b>	263
	Somnuk Bunsupa, Kazuki Saito and Mami Yamazaki	
<b>12</b>	<b>Metabolomics in Medicinal Plant Research . . . . .</b>	275
	Kandan Aravindaram and Ning-Sun Yang	
<b>13</b>	<b>Antioxidants in Medicinal Plants . . . . .</b>	295
	Indra D. Bhatt, Sandeep Rawat and Ranbeer S. Rawal	
<b>14</b>	<b>Metabolic Engineering and Synthetic Biology for the Production of Isoquinoline Alkaloids . . . . .</b>	327
	Yit-Lai Chow and Fumihiko Sato	
<b>15</b>	<b>Jasmonate-Responsive Transcription Factors: New Tools for Metabolic Engineering and Gene Discovery . . . . .</b>	345
	Tsubasa Shoji and Takashi Hashimoto	
<b>16</b>	<b>Metabolic Engineering of Plant Cellular Metabolism: Methodologies, Advances, and Future Directions . . . . .</b>	359
	Rafael Zárate, Nabil el Jaber-Vazdekis and Robert Verpoorte	
<b>17</b>	<b>Use of Metabolomics and Transcriptomics to Gain Insights into the Regulation and Biosynthesis of Medicinal Compounds: <i>Hypericum</i> as a Model . . . . .</b>	395
	Matthew C. Crispin and Eve Syrkin Wurtele	
<b>18</b>	<b>Multivariate Analysis of Analytical Chemistry Data and Utility of the KNApSAcK Family Database to Understand Metabolic Diversity in Medicinal Plants . . . . .</b>	413
	Taketo Okada, Farit Mochamad Afendi, Akira Katoh, Aki Hirai and Shigehiko Kanaya	

<b>19 Genomic and Transcriptomic Profiling: Tools for the Quality Production of Plant-Based Medicines</b> . . . . .	439
Nikolaus J. Sucher, James R. Hennell and Maria C. Carles	
<b>Index</b> . . . . .	457