

Contents

Contributors	vii
Foreword	xiii
Preface	xv
 Section 1 Plant Immune Response Pathways	
1 Innate Immunity: Pattern Recognition in Plants	3
Delphine Chinchilla and Thomas Boller	
2 Microbial Effectors and Their Role in Plant Defense Suppression	33
Dagmar Hann and Thomas Boller	
 Section 2 Genome-Wide Analyses of Microbial Effectors and Effector Evolution	
3 Comparative Genomics and Evolution of Bacterial Type III Effectors	55
Ralf Koebnik and Magdalen Lindeberg	
4 The Effectors of Smut Fungi	77
Gunther Doehlemann, Kerstin Schipper, and Regine Kahmann	
5 Evolutionary and Functional Dynamics of Oomycete Effector Genes	101
Mireille van Damme, Liliana M. Cano, Ricardo Oliva, Sebastian Schornack, María Eugenia Segretin, Sophien Kamoun, and Sylvain Raffaele	
 Section 3 Microbial Effector Functions: Virulence and Avirulence	
6 Suppression and Activation of the Plant Immune System by <i>Pseudomonas syringae</i> Effectors AvrPto and AvrPtoB	123
Gregory Martin	
7 Rust Effectors	155
Sébastien Duplessis, David L. Joly, and Peter N. Dodds	

8 Dothideomycete Effectors Facilitating Biotrophic and Necrotrophic Lifestyles	195
Thierry Rouxel and Pierre J.G.M. de Wit	
Section 4 Effector Trafficking: Processing/Uptake by Plants and Secretion/Delivery by Microbes	
9 Effector Translocation and Delivery by the Rice Blast Fungus <i>Magnaporthe oryzae</i>	221
Thomas A. Mentlak, Nicholas J. Talbot, and Thomas Kroj	
10 Entry of Oomycete and Fungal Effectors into Host Cells	243
Brett M. Tyler	
Section 5 Emerging Effectors—Symbionts, Nematodes, Insects, Metabolites	
11 Roles of Effector Proteins in the Legume–Rhizobia Symbiosis	279
Silvia Ardisson and William James Deakin	
12 Mutualistic Effectors: Architects of Symbiosis	295
Jonathan M. Plett and Francis Martin	
13 Nematode Effector Proteins: Targets and Functions in Plant Parasitism	327
Marie-Noëlle Rosso, Richard S. Hussey, Eric L. Davis, Geert Smant, Thomas J. Baum, Pierre Abad, and Melissa G. Mitchum	
14 Effectors in Plant–Insect Interactions	355
Jorunn I.B. Bos and Saskia A. Hogenhout	
15 Fungal Secondary Metabolites: Ancient Toxins and Novel Effectors in Plant–Microbe Interactions	377
Jérôme Collemare and Marc-Henri Lebrun	
Index	401