Contents

Acknowledgments ix
Contributors xi

Chapter 1 Automatic Systems for Capturing the Normal and Abnormal Behaviors of Honey Bees 1

James Devillers and Hugo Devillers

Chapter 2 Computational Modeling of Organization in Honey Bee Societies Based on Adaptive Role Allocation 27

Mark Hoogendoorn, Martijn C. Schut, and Jan Treur

Chapter 3 Illustrating the Contrasting Roles of Self-Organization in Biological Systems with Two Case Histories of Collective Decision Making in the Honey Bee 45

Brian R. Johnson

Chapter 4 Models for the Recruitment and Allocation of Honey Bee Foragers..... 67

Mary R. Myerscough, James R. Edwards, and Timothy M. Schaerf

Chapter 5 Infectious Disease Modeling for Honey Bee Colonies 87

Hermann J. Eberl, Peter G. Kevan, and Vardayani Ratti

Chapter 6 Honey Bee Ecology from an Urban Landscape Perspective: The Spatial Ecology of Feral Honey Bees 109

Kristen A. Baum, Maria D. Tchakerian, Andrew G. Birt, and Robert N. Coulson

Chapter 7 QSAR Modeling of Pesticide Toxicity to Bees 135

James Devillers

Chapter 8 Mathematical Models for the Comprehension of Chemical Contamination into the Hive 153

Paolo Tremolada and Marco Vighi

Chapter 9 Agent-Based Modeling of the Long-Term Effects of Pyriproxyfen on Honey Bee Population 179

James Devillers, Hugo Devillers, Axel Decourtye, Julie Fourrier, Pierrick Aupinel, and Dominique Fortini

Chapter 10 Simulation of Solitary (Non-*Apis)* Bees Competing for Pollen 209

Jeroen Everaars and Carsten F. Dormann

Chapter 11 Estimating the Potential Range Expansion and Environmental Impact of the Invasive Bee-Hawking Hornet, *Vespa velutina nigrithorax* 269

Claire Villemant, Franck Muller, Quentin Rome, Adrien Perrard, Morgane Barbet-Massin, and Frédéric Jiguet

Index 289