## TABLE OF CONTENTS

# Section 1: A Dog's World: Chemical Sensing through Olfaction

- 1. Introduction: Canine, the Original Biosensor Lauryn E. DeGreeff
- 2. Comparing the Olfactory Capabilities of Dogs with Machines Designed to Detect Odors

Kenneth G. Furton and David Winialski

- 3. Sensitivity and Selectivity in Canine Detectors

  Lauryn E. DeGreeff, Melissa Singletary, and Lucia Lazarowski
- 4. Chemical Information in Olfactory and Sensor Array Systems Kevin J. Johnson and Adam C. Knapp
- 5. Insect Olfaction in Chemical Sensing Debajit Saha

### **Section 2: Understanding the Canine Biosensor: Fundamentals**

6. Neurobiological, Cognitive, and Behavioral Bases of Canine Olfactory Capabilities in Detection

Melissa Singletary and Lucia Lazarowski

- 7. Understanding the Dynamics of Odor to Aid in Odor Detection Lauryn E. DeGreeff and Michele Maughan
- 8. Towards the Development of a Human Scent Model Brian Eckenrode, Paige Riley, Allyson Dailey, and Robin Couch
- 9. How Science Supports and Law Influences Forensic Canine Utilization in the United States: Considerations for Human Scent Evidence (Trailing) and Human Remains Detection Canines

Craig Schultz, Jan J. Topoleski, Brian Eckenrode, Christopher Tipple, Wynn G. Warren, and Mark Rispoli

### Section 3: Fostering an Effective Sensor: Training and Evaluation

- 10. Training the Sensor: Impacts of Learning on Canine Detection and Performance Edgar O. Aviles-Rosa, Mallory T. DeChant, and Nathaniel J. Hall
- 11. Training Considerations for Operational Performance: Train the Handler, Train the Dog, Train the Team Bradley Gillespie

12. When Does Handler Perception Become Canine Detection? How Applied Behavior Analysis and Ethology Can Improve Handler Interpretation of Canine Behavior

Ann Waterbury and Craig A. Schultz

- 13. Considerations for Testing the Capability of Operational Detection Dogs Fay Porritt, Nina Cracknell, Victoria Ratcliffe, Kevin Elliker, Bethany Hutchings, Lorna Irish, Ella Birch, Hannah Robbins, Natasha D'Souza, Edward Croft, Emma Hobbs, and Nicola Sibbald
- 14. Considerations in Vapor Generation and Delivery for Canine Testing and Training

  Matthew Mullen and Braden C. Giordano

#### **Section 4: The Canine Biosensor in Practice**

- 15. Dogs as Detectors for Hidden Digital Storage Devices: A Pilot Study from the National Police of The Netherlands Stèphan J. Petersen and Adee Schoon
- 16. The Use of Dogs for the Detection of Human Remains Lorna Irish and Natasha Dilkie
- 17. Canine Detection of Blood Evidence LaTara Rust, Katie D. Nizio, and Shari L. Forbes
- 18. Using Trained Dogs in Rape and Assault Cases Adee Schoon, Annemieke van Dam, and Dick Staal
- 19. Role of Dogs in Detection of Human Diseases

  Adee Schoon, Patrick Hilverink, Danielle de Jonge, and Rune Fjellanger
- 20. Canine Detection Teams to Support Oil Spill Response Surveys Edward H. Owens and Paul C. Bunker
- 21. Broader Perspectives: Case Studies of Detection Canines in the Field *Lauryn E. DeGreeff*.