

Contents

CONTRIBUTORS	ix
FOREWORD – RITA R. COLWELL	xv
ACKNOWLEDGMENTS	xvii
INTRODUCTION – The Rapidly Evolving Discipline of Microbial Forensics	xix
<i>Steven E. Schutzer, Bruce Budowle, Roger G. Breeze, Paul S. Keim, Stephen A. Morse</i>	

PART 1 INVESTIGATIVE GENETICS

Section A Criminal

CHAPTER 1 The Kameido Anthrax Incident: A Microbial Forensics Case Study	5
<i>Arnold F. Kaufmann, Paul S. Keim</i>	
CHAPTER 2 Microbial Forensic Investigation of the Anthrax-Letter Attacks	15
<i>Paul S. Keim, Bruce Budowle, Jacques Ravel</i>	

Section B Civilian

CHAPTER 3 Food-Borne Outbreaks: What's New, What's Not, and Where Do We Go from Here?.....	29
<i>Thomas A. Cebula, W. Florian Fricke, Jacques Ravel</i>	
CHAPTER 4 Genotype and Geography: The Global Distribution of Bovine Tuberculosis	43
<i>Noel H. Smith</i>	
CHAPTER 5 Tracing Meat Products through the Production and Distribution Chain from Farm to Consumer.....	59
<i>Ronan T. Loftus, Ciaran Meghan</i>	
CHAPTER 6 Microbial Forensics of RNA Viruses: Foot-and-Mouth Disease Virus	75
<i>Consuelo Carrillo</i>	

CHAPTER 7	Forensic Plant Pathology.....	89
	<i>Jacqueline Fletcher, Neel G. Barnaby, James P. Burans, Ulrich Melcher, Forrest W. Nutter, Jr., Carla Thomas, Francisco M. Ochoa Corona</i>	
PART 2	EMERGING INFECTIONS	
CHAPTER 8	Influenza Forensics.....	109
	<i>Robin M. Bush</i>	
CHAPTER 9	Keeping Track of Viruses	137
	<i>Catherine L. Murray, Thomas S. Oh, Charles M. Rice</i>	
CHAPTER 10	Microbial Forensic Analysis of Trace and Unculturable Specimens.....	155
	<i>Mark W. Eshoo, John Picuri, David D. Duncan, David J. Ecker</i>	
CHAPTER 11	Molecular Microbial Surveillance and Discovery in Bioforensics	173
	<i>Evan Skowronski, W. Ian Lipkin</i>	
PART 3	BIOSECURITY	
CHAPTER 12	Assessment of the Threat.....	189
	<i>Jenifer A.L. Smith</i>	
CHAPTER 13	Select Agent Regulations.....	199
	<i>Stephen A. Morse, Elizabeth Weirich</i>	
CHAPTER 14	Biosurety in the Post-9/11 Era	221
	<i>Ronald Schouten, Gregory B. Saathoff</i>	
CHAPTER 15	Forensic Public Health: Epidemiologic and Microbiologic Investigations for Biosecurity.....	239
	<i>Ali S. Khan, Nicki Pesik</i>	
PART 4	SUBJECT AREAS	
CHAPTER 16	Forensic Analysis in Bacterial Pathogens	259
	<i>Richard T. Okinaka, Karen H. Hill, Talima Pearson, Jeffrey T. Foster, Amy J. Vogler, Apichai Tuanyok, David M. Wagner, Paul S. Keim</i>	
CHAPTER 17	Rickettsia and Coxiella.....	277
	<i>Robert F. Massung, Gregory A. Dasch, Marina E. Ereemeeva</i>	

CHAPTER 18	Forensics and Epidemiology of Fungal Pathogens	297
	<i>David M. Engelthaler, S. Arunmozhi Balajee</i>	
CHAPTER 19	Ricin Forensics: Comparisons to Microbial Forensics	315
	<i>Jeffrey T. Foster, Robert L. Bull, Paul S. Keim</i>	
CHAPTER 20	Forensic Aspects of Biologic Toxins	327
	<i>James D. Marks</i>	
PART 5	METHODS	
CHAPTER 21	Use of Host Factors in Microbial Forensics	357
	<i>Steven E. Schutzer</i>	
CHAPTER 22	Collection and Preservation of Microbial Forensic Samples.....	379
	<i>Jenifer A.L. Smith</i>	
CHAPTER 23	Sampling for Microbial Forensic Investigations.....	393
	<i>Sushil K. Sharma, Hazel Bailey, Jack Melling</i>	
CHAPTER 24	Toxin Analysis Using Mass Spectrometry	405
	<i>Rudolph C. Johnson, Suzanne R. Kalb, John R. Barr</i>	
CHAPTER 25	Electron Beam-Based Methods for Bioforensic Investigations.....	421
	<i>Joseph R. Michael, Luke N. Brewer, Paul G. Kotula</i>	
CHAPTER 26	Proteomics Development and Application for Bioforensics	449
	<i>Karen L. Wahl, David S. Wunschel, Brian H. Clowers</i>	
CHAPTER 27	High-Throughput Sequencing	461
	<i>Jennifer Parla, Melissa Kramer, W. Richard McCombie</i>	
CHAPTER 28	Genomics	479
	<i>W. Florian Fricke, Thomas A. Cebula, Jacques Ravel</i>	
CHAPTER 29	Design of Genomic Signatures for Pathogen Identification and Characterization.....	493
	<i>Tom Slezak, Shea Gardner, Jonathan Allen, Elizabeth Vitalis, Marisa Torres, Clinton Torres, Crystal Jaing</i>	
CHAPTER 30	Nonbiological Measurements on Biological Agents	509
	<i>Stephan P. Velsko</i>	

CHAPTER 31	Inferential Validation and Evidence Interpretation	527
	<i>Stephan P. Velsko</i>	
CHAPTER 32	Microbial Forensic Investigations in the Context of Bacterial Population Genetics	545
	<i>Paul S. Keim, Talima Pearson, Bruce Budowle, Mark Wilson, David M. Wagner</i>	
CHAPTER 33	Population Genetic Considerations in Statistical Interpretation of Microbial Forensic Data in Comparison with Human DNA Forensic Standard	561
	<i>Ranajit Chakraborty, Bruce Budowle</i>	
CHAPTER 34	Biorepositories and Their Foundations—Microbial Forensic Considerations.....	581
	<i>Terrance Leighton, Randall Murch</i>	
PART 6	NATIONAL LEVEL CAPABILITIES	
CHAPTER 35	A U.S. Research Strategy for Microbial Forensics: From Genesis to Implementation	605
	<i>Peter T. Pesenti</i>	
CHAPTER 36	The National Bioforensic Analysis Center.....	619
	<i>James P. Burans</i>	
CHAPTER 37	Microbial Forensics in Australia—The Australian Federal Police Perspective	627
	<i>Paul E. Roffey, James Robertson</i>	
CHAPTER 38	Validation of Microbial Forensics in Scientific, Legal, and Policy Contexts	649
	<i>Randall S. Murch, Elizabeth L. Bahr</i>	
PART 7	MICROBIAL FORENSICS CURRICULA AND TRAINING	
CHAPTER 39	Microbial Forensics: Educating the Workforce and the Community	667
	<i>Steven E. Schutzer, Bruce Budowle, Paul S. Keim</i>	
CHAPTER 40	So You Really Want to Be an Expert Witness? A Primer for the Occasional Expert Witness	681
	<i>Rockne P. Harmon</i>	
CHAPTER 41	Microbial Forensics, What Next?	693
	<i>Paul S. Keim, Stephen A. Morse, Steven E. Schutzer, Roger G. Breeze, Bruce Budowle</i>	
INDEX		697