

BOOK REVIEW

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Review of: *Microbial Forensics*

REFERENCE: Breeze RG, Budowle B, Schutzer SE. *Microbial forensics*. 1st ed. Burlington, MA: Elsevier Academic Press, 2005.

In today's world, with an ever increasing focus on bioterrorism events, a useful guide for the characterization of biological agents is critical to the success of containing disease outbreaks and tracing the sources of terrorists' biological weapons. The list of contributors to this text is extensive and the following is a brief summary of the chapter topics:

Chapter 1 presents an overall view of bioterrorism and the scope of the forensic and law enforcement problems associated with biological agent attacks. It also discusses the relevant quantities required to infect a person and the different modes for disease transmission. This is important for assessing which agents are considered high risk and therefore, deserving of greater attention and research resources. In addition, an overview of agency guidelines, brief descriptions of the tools used for biological agent identification, databasing issues, bioinformatics and the need for a strong education in this emerging field of forensic science are all described. Chapters 2–4 provide relevant background information for classical models of bacterial and disease transmission, basic virology, and a good description of the different assays for detecting viruses. Included in chapter 4 is an interesting synopsis of an attempted murder case where a victim was intentionally infected with the HIV virus by an ex-boyfriend (State of Louisiana vs. Richard Schmidt).

Chapter 5 is dedicated to the review of bacterial pathogens that attack humans and plants and contains some useful illustrations. Fungal pathogens and their potential role in bioterrorism attacks that could affect crops of economic importance are evaluated in chapter 6. Chapter 7 discusses some symptoms and treatments of biology-based toxins such as botulism and clostridium. Broad descriptions of how to distinguish between natural vs. intentional outbreaks of certain disease pathogens, the benefits and limitations of molecular strain typing, the difficulties with individualizing RNA viruses that have a high mutation rate and a rapid rate of evolution, global mapping resources, biosafety level classifications and safe handling practices for the laboratory are included in chapters 8–11.

Chapters 12–16 should be considered introductory chapters and the concepts that are most intriguing include biological signature programs, protein structure modeling, the use of bioinformatics,

and the case scenarios. There is some overlap in content from chapter to chapter; however, this allows one to select any given chapter from the book and utilize it for training purposes as a stand-alone reading resource. Chapter 13 is especially fascinating as it discusses non-DNA-based methods for creating biological signatures and includes helpful photos, illustrations, and a discussion of forensic applications. Also included is an excellent explanation of signature libraries and such characterization techniques as energy-dispersive X-ray microanalysis (EDX), various forms of spectrometry (BAMS, ToF-SIMS, AMS), and microscopical methods for analysis (SEM, PIXE, STIM). The final two chapters provide an overview of standard forensic quality control practices for laboratories that plan to incorporate biological agent identification as part of their procedures and the status of legal acceptance of these types of evidence in the courts.

Overall, this text provides a solid review of current microbial identification practices and is a useful guide for forensic scientists, attorneys, and researchers alike. In forensic science, classification schemes to group similar items followed by the individualization of a piece of evidence can link it back to its source. For human identity testing, forensic techniques such as fingerprinting and DNA analysis are often sufficient to provide an identity statement (e.g., this person is the one and only source of the sample). For trace materials evidence and many biological agents, oftentimes, an evidentiary item may be linked back to a certain manufacturer or source but cannot be individualized. In those circumstances, classification into a group is still important for the evidence as it eliminates that item from belonging to many other possible groupings.

Microbial forensics is an extremely broad area for research and the potential number of infectious disease agents for human and nonhuman hosts is staggering. Instituting guidelines and consolidating relevant biological and forensic information into a single volume is a good starting point for forensic students, research practitioners, and attorneys alike. This text is well written but at a level appropriate for any individual with a basic understanding of molecular biology and protein chemistry (senior level or graduate level programs). The authors and editors are to be commended for such an ambitious undertaking and for providing the forensic community with a handbook on microbial genetics.

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