Small scares

Agents of Bioterrorism: Pathogens and Their Weaponizationby Geoffrey Zubay *et al.*

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Reviewed by Joan B Rose

Terror is defined as an emotional reaction resulting in fear, shock, horror and/or panic, the antithesis of feeling secure. The events of September 11, 2001 created a national sense of terror that was unprecedented in the United States. For those who study medicine, microbiology, infectious disease and community health, the 2001 anthrax mail attacks likewise created the first national feeling of terror associated with a biological agent. Thus, as we enter an era where alerts, screening, national security and fear are a part of our consciousness, *Agents of Bioterrorism: Pathogens and Their Weaponization* is a timely compilation of work on biological agents of concern and their potential use as weapons. As the lead author Geoffrey Zubay states, the word “bioterrorism” is one that has yet to make it into mainstream printed dictionaries but that derives from a historical perspective, being associated with the development of biological weapons programs initiated in 1940s. This historical perspective is clearly one of the major strengths of this book.

The book is divided into 13 chapters and 4 appendices, and covers viral (viral encephalitis, Ebola, hantavirus, influenza, SARS and smallpox) and bacterial agents (anthrax, botulism, cholera, plague, *Salmonella* infection and tularemia). Each chapter includes background on the history of each pathogen, its transmission cycle and the disease it causes—including pathogenesis, molecular biology, clinical diagnosis and response, weaponization, treatment and vaccinations. For most organisms these historical sections are rich in their discussion of the first identification of the organism and many of the epidemics that plagued our civilizations.

The book begins with an introduction to terrorism and to some of the terrorist events that have shaped the United States in the past decade. Chapter 2 focuses on viral encephalitis, and the main point here seems to be the importance of diagnosing the correct agent. Subsequent chapters deal with botulism, tularemia and the Ebola

virus. This last section gives a good description of the virus’s natural history; however, Ebola’s suitability for weaponization is questionable given its decay rate, a point that is not elaborated upon. The section on the Ebolapox illustrates the risk associated with the ability to produce recombinant variants.

Chapter 6, on influenza, was written before all the hoopla about bird flu began. However, a fairly good accounting of the history of flu is presented in a relatively concise manner. It is clear that such epidemics in animal populations, including bird flu and the jump to humans suggests that greater attention to baseline global reporting of both animal and human health status is necessary.

The most extensive chapter in the book (and rightly so) focuses on anthrax. The long history of the anthrax bacterium as a biological warfare agent is reviewed and the status of its threat—both as an ingested and inhaled agent—is well covered. A special mention should be made of the sections in the book addressing the ID₅₀ or LD₅₀ for anthrax, botulism and tularemia, which are specific and quantitative and thus provide very valuable data.

The 2003 SARS event is also well covered, although more on coronaviruses in general might have been in order in this chapter. Plague and smallpox, two diseases of particular historical significance, are the focus of the next chapters. I found especially intriguing the discussion of public health responses to plague. It seems that in the modern world, the issue of how we can use confinement and quarantine as a measure to control disease spread deserves further analysis and attention. In addition, the discussion on the vaccination strategies for smallpox demonstrates that the disease spread and the control of transmission remain equally debated.

Although the book’s introduction notes that the ideas and some of the content originated from a class, it is not clear why certain organisms were included and why some were not. In addition, the chapters do not seem to be ordered in any particular logical manner (for example, into viruses versus bacteria; from agents most likely or frequently used as weapons to those less likely; from most virulent to least; or even alphabetically).

The appendices focus mainly on drug discovery and vaccines. It is clear from these sections that it is crucial to maintain strong microbiology programs to support the identification of new agents, new approaches for genetic characterization and continued improvement in the understanding of disease mechanisms as means for combating new variants of global risks, such as SARS and avian influenza, as well as new biological weapons. The listing of resources will be particularly valuable for those just beginning their inquiries into this field.

In summary, this well-written but uneven book should be valuable for those in microbiology who want to get a broad perspective on bioterrorist agents. It is a fascinating phenomenon that the more we study a risk, the more that risk changes. We improve our understanding, decrease uncertainty and identify vulnerabilities but also identify approaches to manage and mitigate the risk. As the authors state in a bold heading, “The Literature on Bioterrorism Should Not be Censored.”

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