

Geoffrey Zubay, ed.. *Agents of Bioterrorism: Pathogens and Their Weaponization*.
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The end of the twentieth century was characterized by an increased threat in terms of biological weapons. This looming specter had dual potential forms: a weapon of mass destruction (WMD) in a large-scale war, or small-scale terrorist attacks against an ill-prepared civilian population. For assorted reasons too complex to discuss here, both types were, for the most part, targeted at industrial countries, particularly the United States. At the close of the twentieth century, there was a slow and steady increase in the number and range of publications relating to bio-warfare, pathogens and terrorism. Events such as the First Gulf War (1990-11) and the nerve gas attacks on the Tokyo subway system (1995) appeared to suggest a terrifying bioterrorist endemic narrowly averted. The general consensus amongst the authors of these new publications, and amongst experts in the field, was that a major bioterrorist attack would occur presently, and furthermore, biological warfare would be a major characteristic of the new century. With the terrorist attacks of September 11 and the anthrax mail incidents in Florida, New York City and Washington D.C. shortly thereafter, the growing threat of bioterrorism ap-

peared to be in the slow process of realization. This threat received much attention in various media, including a growing number of academic publications in the crossover genre of biological pathogens and terrorism. Such academic works often took different approaches: some volumes studied the history of biological pathogens; others examined the future use of biological agents in terrorism. *Agents of Bioterrorism* combines these two structures of scholarship in a novel fashion. Such an approach sets new and increasingly high standards of scholarly publication, even if it is, on occasion, overly ambitious and unsuccessful.

Geoffrey Zubay, Professor of Biology at Columbia University and the book's editor, has chosen a strict structure with which to pursue the overall aims and narrative of this well-researched work. His structural approach is, thus, one brief introductory chapter on "Terrorism and Fear: How to Cope," followed by twelve chapters focusing on individual viruses and bacteria. Chapters are further divided into sub-sections of history, molecular biology, pathology, clinical presentation, diagnosis, weaponization and defenses. A

major asset of these chapters is the diversity of approach and fresh writing style of the impressive graduate student authors; however, this is hampered by the rigidity of the overall chapter structure. Molecular biology is the keystone of each chapter's structure, content and overall focus. The spread and distribution of a disease is discussed effectively in terms of human physiology and biology, and genetic structure; but it is rarely discussed in terms of geographical or population dissemination, thereby missing an opportunity to make an obvious and important link with bioterrorism. In addition, an over-emphasis on molecular biology makes for difficult reading if the reader is unfamiliar with the language, syntax and structure of this subject. An extensive but overly scientific glossary does not lend assistance in the basic comprehension of fundamental concepts and definitions. Despite the quotation on the rear cover, this publication is not easily accessible to "students, policymakers, scientists, and the general public." This is not necessarily a criticism, rather it is a truth universally acknowledged of most academic publications, namely that fully appreciating scholarship of this standard requires fairly extensive knowledge of the topic.

In the preface, the editor provides a brief introduction to the range and scope of the publication and the Centers for Disease Control and Prevention (CDC) classification system for pathogens, and relates bioterrorism to the post-September 11 world. Zubay asserts strongly, "One good thing that has come out of all this concern [in relation to bioterrorism] is an awakening to the realization that research on infectious diseases has fallen behind the needs of a burgeoning population and a world in which globalization has eliminated boundaries that once appeared to limit the spread of pestilence" (p. viii). In the first chapter, the editor provides an overall introduction to bioterrorism, discussing the difficulty of using certain biological pathogens for terrorism, reasoning that their use requires training, they are sometimes slow to disseminate and take effect, and are mi-

nor in comparison to naturally occurring diseases, infections and pathogens. With such an interesting and provocative point to discuss, it is unfortunate that it is not examined in any subsequent chapters. Zubay also argues against the censorship of bioterrorist-related research and material in a somewhat naive and simplistic fashion: "I believe that good scientists far outnumber scientists with evil intentions, and that by and large good scientists are smarter" (p. 4).

A major influence on the success of any academic anthology is the standard of individual authors. It is a rare and treasured volume that maintains a consistently high standard of authorship and, unfortunately, this publication falls somewhat short of this demanding criteria. However, it must be said that a number of central chapters did succeed on their own terms and as an effective contribution to the volume as a whole. One author, Rian Balfour, must be highly commended for two extremely successful chapters that provide backbone and a core basis to this book. Balfour's chapter on "Botulism" contributes an interesting and engaging section, which is clear in purpose and overall structure. This chapter concisely introduces the pathogen in terms of overall history and historical use in biowarfare. It also makes effective use of data tables and diagrams in the molecular biology section--sometimes a picture really is worth a thousand words! Balfour's second chapter, on the "Influenza Virus," is one of the first chapters to provide a real and meaningful criticism of the CDC pathogen classification system, particularly of the relatively low classification of the influenza virus. He argues "the characteristics of the virus do indeed render it a likely, but highly ignored, germ weapon threat. A pathogen that kills more people than the human immuno-deficiency virus (HIV), claimed the lives of 40 million people in less than two years, and routinely mutates into highly lethal forms should be considered a potential bioweapon" (p. 79). Balfour also produces an excellent historical over-

view and discusses weaponization in a highly engaging fashion.

Other chapters of note for their meritorious endeavors are James Hudspeth's "Tularemia," Rohit Puskoor and Geoffrey Zubay's "Ebola Virus," Anuj Mehta's "Anthrax," and Barbara Chubak's "Plague." In chapter 4, Hudspeth provides a meaningful discussion on the risk factors in relation to tularemia and bioterrorism. In addition, this chapter has a longer and more detailed section on weaponization with an engaging emphasis on practical aspects, including casualty estimates. Puskoor and Zubay's chapter on the ebola virus is written in an exceptionally comprehensive and readable fashion and makes effective use of the overall chapter structure. It further categorizes and approaches weaponization from all angles, including casualty estimates, infectivity and decay rates, assorted uses, and genetic engineering; in addition, defenses are discussed in relation to biowarfare. In his discussion of anthrax, Mehta opens with an absorbing introduction and risk assessment of the pathogen. Mehta continues this standard of excellence with a six-page discussion of anthrax as a biological weapon from World War I up to the events of September 2001, and an eleven-page discussion of weaponization. This is a key chapter, with an interesting range of arguments and details. Finally, Chubak's chapter on plague is another well-written and comprehensive section, giving detailed historical, sociological and cultural background alongside the usual medical and biological context. This section also analyzes the rising role of the government and newly established medical practices in preventing biological epidemics, stating: "Plague was a punishment for the failure of the government to uphold its fundamental duty, as established with the Black Death, to protect its subject from disease" (p. 202).

Agents of Bioterrorism is a detailed, comprehensive and, for the most part, engaging publication that contains one major flaw: bioterrorism,

the key topic and subject, is lacking in significant emphasis and inclusion in most chapters. Bioterrorism-related sections of individual chapters, i.e. weaponization and defenses, are the most brief and sparsely analyzed section. For the most part they read as if tagged on to the chapter end in place of a meaningful conclusion, and with little connection to the previous content. In addition, the readability of this volume is further hindered by the over-emphasis on quantity of information over quality of analysis and context, and by the repetition and sameness across certain chapters. Furthermore, this publication is let down by the standard of its four appendices entitled "Drug Discovery and Biodefence," "The Search for Vaccines," "Personal Biodefences" and "Information Resources on Bioterrorism." The appendix on personal biodefenses is particularly uninformative and superfluous, including advice on the purchase of a portable radio and flashlight along with a plentiful supply of spare batteries. Finally, as with all multiple-author publications, this volume suffers from assorted levels and standards of writing and narration—some chapters work better than others. In overall terms, though, this publication does have some successes and some of the individual contributors have interesting things to say; unfortunately, it fails to realize its full potential and promise.

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