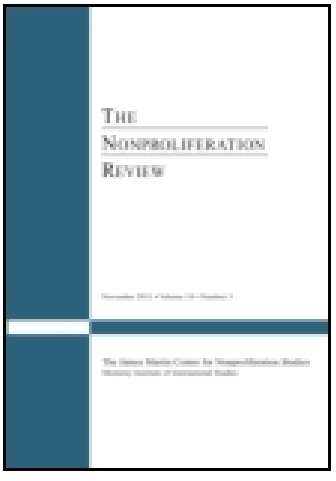

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Beyond Technology

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BOOK REVIEWS

BEYOND TECHNOLOGY

The Social Dimension of the Biological Weapon Threat

Gregory D. Koblentz © 2014

Phantom Menace or Looming Danger? A New Framework for Assessing Bioweapons Threats, by Kathleen M. Vogel. Johns Hopkins University Press, 2013. 374 pages, $30

KEYWORDS: Biological weapons; biotechnology; terrorism; intelligence

Kathleen Vogel has authored one of the most important books written about biological weapons in recent years. As a Cornell University associate professor in the Department of Science and Technology Studies, Vogel tackles head-on the conventional wisdom regarding the biological weapon (BW) threat, successfully challenging assumptions that have gone largely unexamined by the broader biodefense community regarding their possession by states and non-state actors. She also uncovers some deeper organizational and social forces that have shaped US intelligence and threat assessments since the end of the Cold War. Thus, this book is a must-read for scholars and practitioners in the field of international security, not just those with an interest in biodefense or intelligence. (In the interest of full disclosure, we are both members of the Scientists Working Group on Biological and Chemical Weapons at the Center for Arms Control and Nonproliferation in Washington, DC.)

Vogel's core argument is that the United States has consistently overemphasized the importance of the material aspects of biological weapons and neglected the social and organizational enablers of this threat. Vogel traces this misplaced emphasis on material factors to a deeply embedded narrative about biotechnology, which she calls the "biotech revolution frame." Frames are explanatory structures used to understand and describe a problem. According to Vogel, the biotech frame is characterized by several key assumptions: the importance of codified knowledge and material end products, the accessibility of biological materials, the global diffusion of biotechnology, and the inexorable march of biotechnology. The biotech frame leads to a deeply pessimistic assessment of the BW threat. According to the biotech frame, publicly available articles and websites contain all of the knowledge needed to create a biological weapon, the ingredients necessary to produce a biological weapon are readily available around the world, producing a biological weapon does not require advanced skills, and every advance of biotechnology can be readily misused to develop new and improved biological weapons.

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What is striking is just how pervasive the conventional wisdom is about this unconventional threat. As Vogel documents, the biotech frame has dominated the official discourse on BW and biodefense policy since the end of the Cold War. The think tank, policy, and academic literatures on BW are rife with examples of the biotech frame. And it's bipartisan: you can find numerous examples of officials in the William Clinton, George W. Bush, and Barack Obama administrations invoking it. Although a handful of other academics such as University of Maryland's Milton Leitenberg, Massachusetts Institute of Technology's Jeanne Guillemin, and Harvard University's William Clark have raised doubts about the severity and significance of BW threats—particularly bioterrorism—none have done so with Vogel's theoretical sophistication, detailed case studies, and piercing analysis.[1]

Vogel doesn't just critique the conventional wisdom, she provides a convincing and comprehensive alternative. Her alternative paradigm, the biosocial frame, is based on insights and concepts from the field of science and technology studies (STS), which highlights the historically contingent and socially constructed nature of biotechnology. Compellingly, she couples abstract theoretical frameworks and concepts with in-the-weeds empirical evidence. Although the STS literature can be esoteric, laden with jargon, and difficult to read, Vogel avoids these pitfalls with clear writing, careful use of STS terminology, and judicious application of these concepts to real-world cases.

The biosocial frame emphasizes the importance of know-how and tacit knowledge, the temporal and spatial dimensions of research, the gradual assimilation of incremental technological advances, and the multiplicity of biotechnological trajectories for assessing biotechnology and biological weapons. According to Vogel, "Analysts using the biosocial frame strive to unpack the know-how, laboratory practices, and local context that underpin science and technology." According to the biosocial frame, critical knowledge is not easily captured in written form and this knowledge and the skills to apply it in a laboratory can only be acquired through apprenticeships and hands-on experience. Furthermore, this knowledge is often the product of an interdisciplinary team and dependent on local laboratory conditions, and therefore cannot be readily generated or applied outside of its specific configuration of scientists and infrastructure. In contrast to the easy and automatic translation of scientific discoveries into material products suggested by the biotech revolution frame, the biosocial frame emphasizes the evolutionary, incremental nature of life sciences research. Furthermore, the progress of research and adoption of technology is subject to social and organizational pressures. As a result, the trajectory of a technology is not fixed but is, instead, variable. Overall, the biosocial frame argues against the technological determinism of the biotech frame's view that biotechnology is an unstoppable force, immune to social influences and organizational obstacles.

Vogel illustrates the explanatory power of the biosocial frame in two case studies—on synthetic genomics and the former Soviet biological weapon program—that draw on her impressive academic and professional experiences. Vogel earned a Master's degree in chemistry and a PhD in biological chemistry from Princeton University. This academic training provided her with direct observation of the disconnect between science as an idealized process and the messy reality of laboratory research. Prior to joining the Cornell faculty, Vogel served as William C. Foster fellow in the Department of State's Office of

Proliferation Threat Reduction in the Bureau of Nonproliferation and also served stints at the Cooperative Monitoring Center at Sandia National Laboratories and the James Martin Center for Nonproliferation Studies at the Monterey Institute of International Studies. Her professional experiences provided her with first-hand knowledge of the problems posed by brain drain and pathogen security in the former Soviet Union.

Vogel's deep understanding of chemistry and biology come through clearly in her case study on synthetic genomics, which focuses on the work of Eckard Wimmer's lab to synthesize poliovirus and the J. Craig Venter Institute's synthesis of the "phiX" bacteriophage. As the biotech frame would anticipate, these scientific feats quickly turned the field of synthetic biology into the next BW threat. Once Wimmer and Venter had demonstrated that *de novo* synthesis of viral agents was possible, others assumed that a synthetically engineered variola (smallpox) virus was right around the corner. Vogel's careful analysis of the Wimmer and Venter labs' work demonstrates that, absent their particular, specialized skills and knowledge, their techniques are not easily applicable to other viral pathogens, as suggested by the biotech frame. She describes, in great detail, how interdisciplinary teams of highly skilled and experienced scientists labored for years on these experiments, the success of which was due more to their tacit (or experiential) knowledge and local laboratory practices and culture than to the sophistication of their gene synthesis equipment.

Vogel successfully mines her extensive knowledge, gained through field visits and interviews with former Soviet BW scientists, of the Soviet plan to mass produce *Bacillus anthracis* at a plant in Stepnogorsk to illustrate the social and organizational challenges to developing biological weapons. In 1982, the Stepnogorsk plant, part of the massive Biopreparat network of clandestine offensive BW facilities, was charged with formulating and producing a new version of the Soviet anthrax weapon devised by the Ministry of Defense. The military duly transferred an extensive collection of classified technical reports on the anthrax weapon to Stepnogorsk. The biotech frame would predict that, given the appropriate knowledge and sufficient resources, this task should have been relatively straightforward. Stepnogorsk's scientists, however, could not replicate the military's results in its facilities. Instead, the military's "recipe" had to be completely reworked to become compatible with Stepnogorsk's infrastructure. This required the military to transfer to Stepnogorsk sixty of its own BW scientists whose tacit knowledge could not be codified in the technical reports. These experienced military scientists were then integrated with the Stepnogorsk personnel into interdisciplinary teams that operated across functions (such as research, development, and production), in contrast to the traditional Soviet penchant for hierarchy and compartmentalization. The limiting factor for the development of this new biological weapon was not hardware, but software in the form of tacit (as opposed to codified) knowledge, organizational design, and management practices. And the experience at Stepnogorsk was not an aberration. George Mason University's Sonia Ben Ouagrham-Gormley has described a similar phenomenon at other Soviet BW facilities.[2]

Vogel also skillfully uses the biotech and biosocial frames to explain how an Iraqi source codenamed Curveball tricked the US intelligence community into believing that Iraq had a mobile BW program prior to 2003. Despite the now-extensive literature on the 2003 Iraq weapons of mass destruction (WMD) intelligence fiasco, Vogel's book makes an important contribution. Through interviews with former intelligence analysts and

managers, Vogel peels back the onion and reveals the inner workings of how the intelligence community assesses proliferation threats. Her analysis shows how the biotech frame influenced the types of experts and information that were privileged in assessing biological weapon threats and even dictated the organizational structures and management practices used to conduct such assessments.

More interestingly, Vogel describes how the biotech frame was embedded into the CIA's organizational structure on bioweapon threats, contributing to management practices that rewarded generalists and current intelligence over specialists and in-depth research. By the early 2000s, the CIA had consolidated all of its WMD experts into a single unit called Weapons, Intelligence, Nonproliferation, and Arms Control (WINPAC) in the Directorate of Intelligence, and these analysts had become increasingly segregated from regional experts and the collectors in other parts of the agency. WINPAC analysts "fixated on the technical, material details in Curveball's and other human source reporting" and "privileged codified, classified knowledge" and employed "assumptions about an abstract technological trajectory for Iraqi bio[logical] weapons development." As a result, WINPAC developed a reputation as the primary authority on WMD issues, based on its technical acumen. Meanwhile, WINPAC's actual expertise was being undermined by management practices that encouraged analysts to be generalists and to focus on quickly producing short intelligence reports (current intelligence) instead of conducting long-term, in-depth research (strategic intelligence). According to Vogel, "WINPAC analysts largely functioned as kind of a 'WMD beat reporter,' gathering new intelligence information and reporting it to policymakers according to set deadlines and without subjecting it to more in-depth investigation or methodological considerations." Although other CIA officials from the Directorate of Operations with experience in vetting human sources challenged WINPAC's analysis of Curveball's information, the biotech frame had become so internalized within the agency that the skeptics were overruled by managers who viewed WINPAC's analysts as the "real" experts on Iraq's biological weapons. The biosocial frame helps explain not only why technical analysts disregarded contradictory evidence (which was not based on the "hard" technical data they were conditioned to prefer) but also why CIA managers privileged authority based on technical expertise.

Based on her finding that the biotech frame has exercised an inordinate level of influence on the intelligence community, Vogel concludes that the intelligence community "needs to reexamine the frameworks, expertise, social ordering, values, and taken-for-granted organizational practices that guide the production" of BW threat assessments. She also provides a service to policy makers and practitioners by outlining a practical way to integrate STS approaches into intelligence analysis. Vogel advocates the conduct of strategic sociotechnical assessments, which emphasize in-depth research utilizing classified and open sources by multidisciplinary teams that examine the social and technical aspects of weapon development and proliferation. While this type of approach to threat assessments would better address some of the deeper causes of the Iraq WMD intelligence failure than other intelligence reforms that deal merely with the symptoms of the problem, it is not a silver bullet. The major limitation of applying the biosocial frame to threat assessment is that it requires much more fine-grained data than is usually available to intelligence analysts operating in real time. It is possible in

retrospect, with the benefits of captured documents and/or interviews with former weapon scientists, to understand how social and organizational factors impeded a bioweapon program. These intangible factors, however, such as how well an organization is designed to capture and transmit tacit knowledge, the influence of social or cultural norms on laboratory disciplines and practices, and the impact of management practices on multidisciplinary teamwork, may very well be invisible to the participants inside of a program, let alone outside observers.

Vogel's inclusion of social factors into biological weapon threat assessment highlights just how "complex, difficult, and contingent" the development of such weapons are. Her book presents a persuasive case that the biosocial frame is an important corrective to our excessive preoccupation with the material and technical aspects of biological weapons. These findings are an important antidote to the oft-repeated claims that globalization and advances in biotechnology enable "do-it-yourself" terrorists to develop biological weapons capable of causing mass casualties. Ultimately, incorporating the biosocial frame into bioweapon threat assessments would produce more nuanced analysis and humbler analysts. The biosocial frame also offers important insights for other contentious policy debates, such as the proper balance between prevention and preparedness in US biodefense strategy, and how to conduct oversight of dual-use research of concern. One of the purposes of Vogel's book is "to introduce new lines of inquiry and new ways of thinking about and responding to security problems." Her application of STS concepts to bioweapon threat assessment, and her formulation of the biosocial frame fully meet that goal.

NOTES

1. Milton Leitenberg, *Assessing the Biological Weapons and Bioterrorism Threat* (Carlisle, PA: U.S. Army War College, 2005); Jeanne Guillemin, *Biological Weapons: From the Invention of State-Sponsored Programs to Contemporary Bioterrorism* (New York: Columbia University, 2006); and William R. Clark, *Bracing for Armageddon? The Science and Politics of Bioterrorism in America* (Oxford: Oxford University Press, 2005).
2. Sonia Ben Ouagrham-Gormley, "Barriers to Bioweapons: Intangible Obstacles to Proliferation," *International Security* 36 (Spring 2012), pp. 80–114.