Biological Weapons and Security Dilemmas

by David Malet and Herman Rogers

Technological advancements throughout history have had significant effects on international politics and conflict strategies. Some inventions, such as the compound bow and the strategic bomber, were designed specifically for combat purposes. Others, such as the stirrup and the sextant, were innovations intended for commerce that inevitably changed the nature of military competition. The advent of "Weapons of Mass Destruction"—most of which originated from scientific developments unrelated to national defense—has also produced dramatic changes in warfare.[1]

The best-known example of this occurred during the Cold War, as both superpowers engaged in nuclear stockpiling rather than bearing the cost of maintaining fully mobilized conventional forces. The resulting reliance on strategies of brinksmanship and deterrence arguably prevented the resumption of great power warfare in the decades following World War II. However, this trade-off created the perpetual risk that any miscalculation would produce Armageddon. As both sides sought security through larger arsenals, each side became more threatening to the other, resulting in a seemingly inescapable security dilemma.[2] The perceived necessity of maintaining a nuclear second-strike capability resulted in the spiraling of attempted strategic advantage into the strategic stalemate of mutual assured destruction (MAD). It also led to proliferation concerns as other actors attempted to create their own nuclear deterrents.

At the same time, a less familiar but perhaps equally consequential security dilemma arose out of bioweapon proliferation. The competition in biological arms led to the Biological Weapons Convention (BWC) of 1972 that formally restricted research into offensive technologies. The convention permitted "defensive" research, however, which involved experimentation with the same offensive pathogens and microbes. Superpowers, rogue states, and other actors trapped in the security dilemma actually intensified their work in this area, taking advantage in particular of the introduction of genetic engineering that emerged at almost precisely the same time. Although the Cold War has long since ended, these developments are instructive for understanding the repercussions of biodefense programs in the post–9/11 era.

In this article, we argue that current efforts by the United States to develop

David Malet is an Assistant Professor of Political Science at Colorado State University and director of the Center for the Study of Homeland Security at Colorado State University.
Herman Rogers is a B.A. candidate at Colorado State University.

biodefense programs carry the risk of producing further threats. First, as in the case of the BWC, other regimes viewing themselves as potentially in competition with the United States are likely to interpret continuing defensive research as a threat that requires their own unconventional arsenals to provide an asymmetric advantage. Second, as much of the research and development of biotechnology involves dual-use samples and equipment, numerous private sector firms and contractors that do not receive adequate security checks will have access to sensitive biomaterials. Finally, as demonstrated by the 2001 anthrax attacks, continuing research into bioweapons creates opportunities for the technologies to leak from secure government facilities. Rather than biosecurity, the new international environment is one likely to be characterized by a continuation of "bioparanoia."

The Pursuit of Bioweapons

World War I was the first modern conflict to demonstrate the destructive power of chemical, biological, radiological, and nuclear (CBRN) weapons. By the end of the war, the death and debilitation caused by chemical weapons caused sufficient widespread international revulsion to produce a determination to limit the use of unconventional arms in any future conflicts.[3] The 1925 Geneva Protocol saw nearly every country agree to establish a ban on chemical warfare and, although no states were known to have had bioweapon programs in place at that time, bacteriological warfare was preemptively banned as well.

However, and possibly because of the awareness that rival powers were at least considering their development, a number of states introduced bioweapon programs during the interwar years. Japan committed the most egregious violations of the international accords, engaging in large-scale testing of bioweapons on both civilians and prisoners of war. The Allied Powers developed their own armaments as well.

Both the United States and the Soviet Union continued their programs after the war ended.[4] The Soviet Union maintained a massive bioweapons program known as *Biopreparat*. At its height, *Biopreparat* employed 60,000 personnel and produced massive quantities of deadly toxins. The Soviet program also developed advanced inter-continental ballistic missiles that would disseminate biological material over surface areas large enough to infect the populations of cities.[5]

Concerns about the destructive capabilities of such technologies and the potential for accidents led to the establishment of the BWC, which also coincided with the era of détente and the beginnings of arms reduction efforts. However, the definition of a biological weapon in the Convention was open to wide interpretation. Both superpowers exploited the Convention loophole permitting purely defensive research, thereby demonstrating the inherent peril of any biodefense program: the inability to distinguish between biological agents intended for harm and those intended for security.

The development of prophylactics and treatments for diseases requires samples of those very infectious agents for their manufacture. There can be no vaccines for smallpox or anthrax without first obtaining the viruses and spores. Discovering how

these might be manipulated, for example through genetic engineering to make them more drug-resistant, first requires the manipulation of the samples to produce that very effect. The logic of the security dilemma, as with nuclear arms, forced defense researchers on each side to presume that their counterparts would exploit the latest technological developments and that further research would be necessary so long as the conflict persisted.

The fall of the Soviet Union lifted some of the curtains of secrecy surrounding *Biopreparat*, as did the defection of its First Deputy Director Ken Alibek. Later operations to sterilize the facilities in Uzbekistan revealed an extensive stockpile of pathogens and aggressive efforts to exploit advances in genetic engineering to develop untreatable agents. Similarly, the late 2001 anthrax attacks, dubbed "Amerithrax" by the Federal Bureau of Investigation because the spores originated in a Department of Defense research facility, demonstrated that the United States had maintained programs that created expertise in "weaponizing" biological agents.

This research has continued despite the end of the Cold War—in a period in which the only apparent potential biological threat to the United States was Saddam Hussein's Iraq. Indeed, although several states are reputed to have continuing bioweapon programs, no state currently acknowledges engaging in research with offensive uses for the technology.[6] It was the Amerithrax incident, combined with concerns over the potential development of CBRN capabilities by Al Qaeda, which led to the creation of the current "BioShield" program to prevent future attacks.[7] The centrality of this concern was evident in President George W. Bush's formulation of the "Axis of Evil," a phrase referring to rogue states with their own CBRN programs who might potentially serve as proliferation conduits to non-state actors.[8]

ALTHOUGH SEVERAL STATES ARE REPUTED TO HAVE CONTINUING BIOWEAPON PROGRAMS, NO STATE CURRENTLY ACKNOWLEDGES ENGAGING IN RESEARCH WITH OFFENSIVE USES FOR THE TECHNOLOGY.

Why Biological Weapons?

What utility do biological weapons provide? As there is no evidence of their effective use in modern warfare, why should states, insurgencies, or terrorist groups expend resources and political capital to obtain them? Security dilemmas and resultant bioparanoia explain why various actors fear falling victim to a "microbe gap" with their antagonists, but biological weapons nevertheless offer a different set of characteristics than nuclear arms.

Nuclear weapons are purely "offensive weapons." Large arsenals of nuclear weapons are presumed to increase security by offering second-strike capability and thereby serving as effective deterrents. They do not have any inherent defensive capabilities. Biological weapons blur this distinction because the development of

adequate defenses requires first that offensive weapons be created and tested. Political scientist Robert Jervis' formulation of the security dilemma for nuclear and conventional weapons ("…when the defense has the advantage, status-quo states can make themselves more secure without gravely endangering others.") does not appear to hold for biological armaments.[9]

The distinction is critical because although nuclear weapons have been the *sine qua non* of state power for sixty-five years, as Thomas Preston notes, biological weapons have the potential to rival nuclear weapons in terms of the number of casualties produced. Yet it is easy to underestimate the deadliness of silent, invisible pathogens used as bioweapons despite the high lethality produced by even small quantities of these materials. This underestimation stems from the variance in two respects between the more familiar nuclear arms and seemingly more exotic biological armaments: assured destruction and controllable precision.[10]

ASSURED DESTRUCTION IS HIGHLY UNLIKELY WITH BIOLOGICAL WEAPONS, NOT BECAUSE THEY TYPICALLY WOULD NOT CAUSE ANY DISCERNABLE PHYSICAL WRECKAGE, BUT BECAUSE THEY ARE POTENTIALLY DEFENSIBLE.

Assured destruction is highly unlikely with biological weapons, not because they typically would not cause any discernable physical wreckage, but because they are potentially defensible. Preventative measures against biological weapons include vaccinations, treatments, stockpiles, quarantines, and effective medications.[11] For example, an anthrax attack in the United States could be quarantined, and antibiotics and immunizations disseminated.

Another dangerous aspect of biological weapons that reduces the likelihoodness of their use is that biological weapons are living weapons. That is, they can spread from population to population, reproduce, and engage in adaptive behavior, making them vastly different than conventional weapons. Viruses and simple organisms also experience rapid genetic drift due to the short life spans of individual microorganisms and high levels of mutability, with the result that even engineered pathogens are unlikely to achieve intended effects with precision. The mutated bioweapons could therefore be essentially harmless, or deadly enough to overcome vaccinations and other presumably reliable prophylactics, resulting in highly undesirable cases of blowback.

One apparent example of the deadliness of unintended pathogen scatter occurred during the first half of the twentieth century with an outbreak of tularemia in Stalingrad during World War II. Subsequent studies indicated that the besieged Soviet civilian population and troops had been afflicted by a purposive outbreak engineered by the Red Army in a desperate attempt to halt the German offensive.[12] Since then, there have been no obvious instances of biological attacks used as desperation tactics. Even Iraq, for all of its purported investment in CBRN capabilities, did not respond to the decimation of its military or strikes intended to

topple the regime in any of its wars against either international forces or internal threats, despite its willingness to use chemical weapons against the latter.

Rogues, Cults, and Terrorists

If pathogens make poor weapons of war, why do states continue to pursue biological weapons programs? The continuation of biological weapons programs into the twenty-first century is attributable to several factors. First, as the Amerithrax investigations indicated, the United States and several developed states have ongoing biological programs producing "offensive" biological agents for the sake of biodefense. Potential rival states are similarly compelled to develop their own bioweapon programs to produce defenses against the capabilities of the established powers.

Also, the technological advances accompanying the so-called "Revolution in Military Affairs," coupled with the sheer scope of American defense spending, have produced conventional US forces so advanced that the only way to attempt to check them is through asymmetric means. As a former Indian military chief of staff explained, those planning to engage the United States militarily "should avoid doing so until and unless they possess nuclear weapons."[13] However, because of the difficulty in developing nuclear weapons, and the potentially easy acquisition of naturally-occurring pathogens, biological weapons provide an ideal alternative. In many cases, CBRN arsenals are the quickest way that states and non-state actors can legitimize their authority among constituents. It is little wonder that biological weapons are often referred to as the "poor man's nuclear bomb."[14]

And yet, states are still subject to deterrence through the same threats of massive retaliation issued at the height of the Cold War. One possible response by rogue states could be the clandestine transfer of CBRN material to non-state actors, a concern cited as significant enough to justify preemptive war against Iraq and continued engagement with flawed regimes in Pakistan.[15] The underlying assumption behind this threat is that terrorists want CBRN weapons and sympathetic states would be willing to share them either in support of their cause or so that non-state actors are blamed for attacks masterminded by governments that could maintain plausible deniability. This presumes that authoritarian regimes would trust actors outside of their direct control with sensitive material, and furthermore, trust them to follow their established foreign policy objectives. This strategy would probably leave such rogue states more vulnerable than empowered, and they are therefore unlikely to proliferate to non-state actors.[16]

It is nonetheless apparent that several non-state actors unencumbered by the burdens of statecraft have attempted to acquire biological weapons. Deadly groups such as the Aum Shinrikyo apocalyptic cult—best known for its 1995 sarin nerve agent attacks on the Tokyo subway system—and Al Qaeda number are among this list. In 1990 and 1995, Aum Shinrikyo attempted to disperse liquid anthrax from vans and high-rise office buildings to infect passersby. Fortunately, the slurry was too thick to be aerosolized and contained an innocuous strain of anthrax, one that ironically

immunized those coming in contact with it. Aum also attempted to weaponize already lethal strains of the Ebola virus but lacked the technical experience and equipment to carry out such a procedure. The group therefore turned to chemical agents that were less difficult to manipulate. Al Qaeda has also attempted to obtain and weaponize deadly strains of anthrax and smallpox but has apparently remained unsuccessful. The failures of these well-funded transnational organizations to produce biological agents indicates the high degree of difficulty for such actors to harness even natural biological weapons, let alone sophisticated engineered viruses.[17] As Ayman al-Zawahiri, a co-founder of Al Qaeda put it, "despite their extreme danger, we only became aware of [biological weapons] when the enemy drew our attention to them by repeatedly expressing concern that they can be produced simply."[18]

Bioparanoia

Despite evidence to the contrary, the United States has continued to presume the probability of a significant biological attack against the nation and is not only continuing its decades of research into biological weapons, but devoting even more significant new resources to defending against future attacks. The BioShield Act of 2004, for example, increased biological defense—and, unavoidably, offense—expenditures by over 50 billion dollars.[19] The rationale for this investment was the interest of homeland security, newly defined in the wake of the Al Qaeda and Amerithrax attacks of late 2001.

It is sensible to develop counters to potential threats so long as the resources exist to do so, but it is also important for decision-makers to recognize that biological threats do not exist in a vacuum. As noted, much of the bioweapon development of the past century has been spurred on by military competition and responses to the logic of the security dilemma, and current potential "undeterrable" threats have shown little capacity to mount a serious challenge in this arena. Given mounting defense and homeland security expenditures in the past decade, to say nothing of growing federal budget deficits, why continue work in CBRN development that risks international opprobrium when other priorities seem more pressing?

The 2001 anthrax attacks, although not etched as firmly in the public consciousness as the fateful events of 9/11, were nonetheless highly significant in demonstrating the exposure of major industrialized states to low-cost asymmetric attack within their own borders and how infrastructure—in this case, the United States Postal Service—could be exploited as a conduit of bioterrorism. In analyzing the mailings conducted in September and October 2001, it is important to recognize the unique position of Bruce Ivins, the Department of Defense research scientist who was ultimately named by the Federal Bureau of Investigation (FBI) as the sole perpetrator of the attacks. Ivins was neither in the employ of a foreign state or terrorist organization nor a member of a domestic doomsday cult, but truly typified the "lone wolf" actor of increasing concern to counter-terrorism officials. Ivins obtained the virulent spores and the capacity to weaponize them precisely because

of his position within the US biowarfare research program. The existence of biological weapons research, ostensibly for purely defensive purposes, was directly responsible for the most effective incident of bioterrorism in history – based purely on leaked material and governmental expertise.

Ultimately, Ivins could be traced because of the recognized properties of the Ames strain of Anthax used in the Fort Detrick lab where he was employed. But the expansion of BioShield since Amerithrax combined with the ethos of an era of outsourcing has further devolved research and development to a network of contracted small research labs, most of which do not enjoy the oversight of primary federal bioweapons facilities. In many of these private labs, research is conducted by personnel who have not undergone full background checks, as there are no uniform mandated screening procedures for employees in the private sector. Given that many of these facilities are located in or near major metropolitan centers, the threat of another deliberate leakage or an accidental release is potentially catastrophic. As with the nuclear industry—as seen in the mishaps at Chernobyl and Three Mile Island—it is almost inevitable that some of these 15,000 workers could make consequential mistakes.[20]

One of the most publicized events of this type was the misplacement of three plague-infected mice that disappeared from a high security lab in Newark, New Jersey. The FBI scoured the lab for any trace of the mice, but nothing was found. No answers were ever provided, leaving the surrounding community understandably frightened.[21]

Another example of "loose bugs"—as opposed to the potential threat of former Soviet loose nukes that has attracted hundreds of millions of dollars in threat reduction spending—occurred at the bioweapon facility at the University of Maryland. In this particular case, mice were also being tested for the effects of various plague strains, and the frozen remains of the mice disappeared. No account of the location of the mice could be established and subsequent federal investigations were also inconclusive. Another troubling incident in an academic facility setting took place when Texas A&M University staff were exposed to and infected by Q fever—a bacterial infection that can affect the lungs, liver, heart and other parts of the body—in April 2006. It is important to note that these incidents were self-reported, whereas other known cases were initially covered-up by lab officials. With large amounts of funding and contracts at stake and the lack of similar levels of oversight as those at Fort Detrick, where Ivins was still able to remove significant quantities of deadly spores undetected, these facilities are potentially dangerous sources of proliferation. Most facilities also do not enjoy high levels of security, making them vulnerable to attacks by criminal or terrorist entities seeking illicit

IN A VERY REAL SENSE, THE UNITED STATES' PREOCCUPATION WITH BIOLOGICAL THREATS APPEARS SET TO BECOME A SELF-FULFILLING PROPHECY.

material.[22] In a very real sense, the United States' preoccupation with biological threats appears set to become a self-fulfilling prophecy.

Conclusion: What the Doctor Ordered?

The history of the technological development of biological weapons and defense programs by leading industrial states has, like that of nuclear weapons, been based on response to perceived threats rather than a desire to actually use pathogens as strategic weapons. Even Imperial Japan, which made the most aggressive use of bioweapons in modern history against non-combatants, did not use them against its wartime enemies. Like Saddam Hussein's Iraq, it suffered direct attacks against its territory, but did not resort to germ warfare as a last ditch defense. Subsequently, nuclear arms provided far more effective and reliable deterrents and were evidently better regulated by international accords such as the Nuclear Non-Proliferation Treaty than were biological weapons by major conventions. This is in part because bioweapons production is difficult to verify because the same technology is also used for purely defensive research, dual-use civilian purposes, and because research can more readily be farmed out to small subcontractors.

With the Cold War period of escalation over, the United States and Russia nonetheless continued "defensive" research in the name of countering the threat posed by rogue regimes and millennialist non-state actors. Doing so, however, has actually created the venues for bioweapon proliferation to these actors and bioweapon appropriation by unpredictable lone wolf researchers. The costly and apparently self-defeating nature of the continued drive for offensive or dual-use biotechnologies in the absence of a credible security threat appears more attributable to lingering paranoia from twentieth century security dilemmas than to an evolution of US strategic interests in the twenty-first century.

The dual-use nature of biotechnology is another significant cause for concern. Development of defenses require refinements of offensive capability; technologies developed for civilian medical or agricultural purposes have been easily adapted to the production of deadly infectious agents or engineering vectors to create entirely new genetic cocktails for weaponized diseases. Much of this work is conducted at least partially in the private and academic sectors without the full oversight of the federal government and there are already troubling indications of the potential for these developments to escape both oversight and the intent of policymakers. Although developed in the name of science, it is not evident that there is adequate direction of these endeavors by those responsible for either bioethics or for directing defense, foreign, or homeland security policies. Rather than being vital components of national welfare, particularly in the area of public health, current biodefense programs actually appear to pose the greatest risk for the use of Weapons of Mass Destruction against the United States and deserve substantial reconsideration.

NOTES

[1] There is no universally accepted definition of so-called WMDs. They are better understood as consisting of the various types of weapons usually associated with the category: chemical, biological, radiological, and nuclear.
[2] Robert Jervis, "Cooperation Under the Security Dilemma," in *Classic Readings and Contemporary Debates in International Relations*, 3rd edition, ed. David Tatom, Drake Bush, and Rebecca Green (Belmont: Thompson-Wadsworth, 2006), 272-80.
[3] John Mueller, "Changing Attitudes towards War: The Impact of the First World War," *British Journal of Political Science* 21, no. 1 (January 1991): 1-28. Available at: http://www.jstor.org/stable/193753 (accessed March 2010); Lynn Klotz and Edward Sylvester, *Breeding Bio Insecurity* (Chicago: The University of Chicago Press, 2009), 13-14. World War I was the first war in which chemical weapons were employed strategically and on a large scale. Mustard gas and many other chemicals killed thousands of people and left a million maimed for life.
[4] Klotz, *Breeding Bio Insecurity*, 2. The Japanese in World War II used experimental weapons of cholera, plague, and other bacterium in Manchurian water wells, airplane sprays, and injections of pathogens directly into prisoners. The result would be the deaths of tens of thousands of defenseless Chinese victims.
[5] Thomas Preston, *From Lambs to Lions: Future Security Relationships in a World of Biological and Nuclear Weapons* (Lanham: Rowman and Littlefield Publishers, Inc., 2009), 191.
[6] John D. Steinbruner, "Biological Weapons: A Plague upon All Houses," *Foreign Policy* 109 (Winter 1998): 85-96. Available at: http://www.jstor.org/stable/1149464 (accessed March 2010); Preston, 181-214. There are at least 17 countries suspected of erecting bioweapon research programs, two of which include Iran and Iraq, distinct threats to US security.
[7] Preston. Letters containing *B. anthracis*, a virulent strain of anthrax, was sent to the senate offices of two U.S. Senators and five media organizations. Out of the letters sent, twenty-two people were infected with the anthrax bacteria, eleven cases of cutaneous, skin-infecting, anthrax and eleven cases of inhalation anthrax. Out of all cases, only five victims afflicted with inhalation anthrax were fatal.
[8] The White House, *State of the Union Address* (Washington, 2002). Available at: http://georgewbush-whitehouse.archives.gov/news/releases/2002/01/20020129-11.html (accessed March 2010).
[9] Jervis, 272-80.
[10] Preston, 251-53.
[11] Preston, 252.
[12] Klotz, *Breeding Bio Insecurity*, 56.
[13] Preston, 4.
[14] David Malet, "The Modern Prometheus at War: Biotechnology and International Security" (paper presented at the annual conference of The International Studies Association, February 2010).
[15] Rachel Whitlarkand Amir Stepak, "Unconventional Ties? States, Non-State Actors, and Weapons of Mass Destruction" (paper presented at the annual conference of the International Studies Association, February 2010).
[16] Ibid.
[17] Preston, 233.
[18] Klotz, *Breeding Bio Insecurity*, 85.
[19] Ibid, 126-27.
[20] Ibid.
[21] Chris D'Amico, "UMDNJ facility loses two plague-infected dead lab mice," *New Jersey The Star Ledger*, February 7, 2009. Available at:
http://www.nj.com/news/index.ssf/2009/02/dead_lab_mice_lost_from_umdnj.html (accessed March 2010).
[22] Klotz, *Breeding Bio Insecurity*.

HEMISPHERES

The Tufts University Journal
of International Affairs

Presents
its 34th Issue
on the Theme of
Development and Inequality

Hemispheres is an annual academic journal of international affairs. Since its creation in 1976, *Hemispheres* has been committed to publishing distinguished research, theses and case studies that reflect the changing and diverse world in which we live.

The articles contained in the journal reflect the diverse views of undergraduates from across the United States and around the globe.

For more information go to:
http://ase.tufts.edu/hemispheres/index.html