AIR WAR COLLEGE

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BIODEFENSE AND DETERRENCE:

A CRITICAL ELEMENT IN THE NEW TRIAD

by

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Biography

Colonel Patrick J. Owens is a student at the Air War College, Maxwell AFB, Alabama. Colonel Owens was commissioned in 1986 from Purdue University. He is a master navigator with more than 2,700 flying hours in various versions of the KC-135, EC-135 and EC-18B. Colonel Owens served as a KC-135 instructor navigator during Operation DESERT STORM. He has had flying assignments in Strategic Air Command, Air Mobility Command, and Air Force Materiel Command. His staff experience includes the U.S. Military Delegation to the NATO Military Committee, NATO Headquarters, Brussels Belgium, Headquarters Twenty-First Air Force, and 21st Expeditionary Mobility Task Force, McGuire Air Force Base, New Jersey. Colonel Owens was the Commander, 816th Global Mobility Squadron, and Commander, 821st Air Mobility Squadron, McGuire Air Force Base, New Jersey. Prior to his assignment to the Air War College, Colonel Owens was the Deputy, Global Division, Operations and Plans Directorate, United States Transportation Command, Scott AFB, Illinois.

"Armed with a single vial of a biological agent, small groups of fanatics, or failing states, could gain the power to threaten great nations, threaten the world peace. America, and the entire civilized world, will face this threat for decades to come. We must confront the danger with open eyes, and unbending purpose."

- President George W. Bush, February 11, 2004[1]

I. Introduction

Even as the United States continues to prosecute the Global War on Terror and engage in on-going warfighting and nation-building operations in Afghanistan and Iraq, the issue of deterrence has reasserted itself upon the collective consciousness and lexicon of U.S. national security leadership and homeland security officials. Concerns about a rising China, a resurgent Russian, and unfriendly and dangerous regimes in North Korea and Iran, as well as a stockpile of aging nuclear weapons in the U.S. arsenal has once again brought deterrence to the fore.

It would appear that much of the deterrence discussion is focused on either the use of nuclear weapons or the U.S. response to nuclear proliferation. On 8 February 2008, Stephen Hadley, National Security Advisor to President George W. Bush, addressed the Center for International Security and Cooperation at Stanford University. Mr. Hadley's remarks addressed the President's Nuclear Posture Review, the resultant "New Triad," weapons of mass destruction (WMD), and terrorism. They focused largely on the need to prevent the proliferation of nuclear weapons and materials and deter potential adversaries in possession of these weapons.[2]

This and similar statements from senior U.S. officials demonstrate that even 17 years after the end of the Cold War-era, the U.S. defense establishment still associates "deterrence"[3]

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[1] President George W. Bush, "Homeland Security Presidential Directive-10: Biodefense for the 21st Century," http://www.dhs.gov/xabout/laws/gc_1217605824325.shtm.(accessed 4 Feb 2009).

[2] Steven Hadley, "Remarks to the Center for International Security and Cooperation," Stanford University, Stanford, CA, *8 February 2008), http://www.gnep.gov/pdfs/NSC_speech02082008.pdf (accessed 6 February 2009).*

[3] The Department of Defense Dictionary of Military and Associated Terms, "deterrence" is defined as 'the prevention from action by fear of the consequences. Deterrence is a state of mind brought about by the existence of a credible threat of unacceptable counteraction. Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms, http://www.dtic.mil/doctrine/jel/doddict/ (accessed 6 February 2009).

almost exclusively with nuclear weapons and the United States' overwhelming advantage in nuclear weapons quantity and capability. In 2001, Congress directed the Department of Defense to conduct the Nuclear Posture Review "to lay out the direction for American nuclear forces over the next five to ten years."[4] The review resulted in the establishment of a New Triad, which expanded the triad concept beyond that of the classic mix of manned bombers, intercontinental ballistic missiles, and submarine-launched ballistic missiles.

The New Triad includes the following capabilities:

- Offensive strike systems (both nuclear and non-nuclear);
- Defenses (both active and passive); and
- A revitalized defense infrastructure that will provide new capabilities in a timely fashion to meet emerging threats.[5]

The establishment of this New Triad demonstrates that the United States security and defense establishment has moved beyond the rather simplistic, classical deterrent triad of the Cold War. The New Triad seeks to add conventional and nuclear defensive capability, "targeting" the offensive nuclear capability of peer competitors or rogue nuclear states. While this is a laudable effort, the New Triad is only a start, especially as it relates to the deterrence of an adversary's use of biological weapons. In order to credibly deter or defeat an adversary's biological threat or attack, it is imperative that the U.S. revise the New Triad by adding biodefensive capability to its current suite of capabilities.

Though the anthrax attacks of October 2001 have been attributed to U.S. Army researcher Bruce Ivins, who committed suicide before his indictment,[6] it is likely that potential U.S. adversaries watched those events with interest to observe the effects of the attack and the

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[4] Department of Defense, *Nuclear Posture Review Report (Forward)*, 9 January 2002, http://www.fas.org/sgp/news/2002 01/npr-forward.html (accessed 31 October 2008).
[5] Ibid.
[6] Judith Miller, "Bioterrorism's Deadly Math," *City Journal* (Autumn 2008): 5. http://www.city-journal.org/ Printable.php?id=3092 (accessed 7 January 2009).

limitations of the national response. The threat is real—U.S. intelligence estimates caution that terrorist groups are attempting to increase their biological capability by recruiting knowledgeable scientists.[7] This fact, combined with the rapid, worldwide march forward in the field of biotechnology, makes it critical to examine the nation's posture in this area in an increasingly complex national security environment.

This paper will argue that the United States needs to move beyond the kinetic strike (both nuclear and conventional) aspects of deterrence to look at the problem in a more holistic manner, specifically addressing the matter of deterring or defeating a biological attack. The United States will need to develop its biodefensive and "bioforensic" capabilities in order to convince potential aggressors that they cannot successfully coerce the United States by threatening a biological attack. If attacked, the United States must have the ability to withstand the attack, identify the attacker, and respond appropriately. If the United States is unable to successfully deter or respond to an attack, it will set a dangerous precedent and send a message to adversaries and "would be" aggressors that the U.S. is subject to coercion through the threat of biological warfare.

In presenting the argument, this paper will first review the effects of the anthrax attacks of 2001, examine current deterrence arguments, and discuss the role of nuclear weapons and the New Triad. It will then discuss the likely operating environment and biological threat in the 2035 timeframe in order to arrive at biodefense imperatives for the United States as it moves beyond classic, "old triad" thinking and deterrence concepts in order to sufficiently deter or defend against a looming and growing biological warfare threat.

[7] Commission on the Prevention of WMD Proliferation and Terrorism, *World at Risk*, (New York, NY: Vintage Books, 2008) 11.

II. The Anthrax Attacks of 2001

Dramatic advances in biotechnology will make the development and weaponization of biowarfare agents much easier and less expensive for rogue nation states and non-state actors. Given the relative ease of developing and hiding biowarfare capability, it is quite possible that potential future adversaries will attempt to weaken, coerce or deter the United States through the threatened or actual use of biological weapons. The post-9/11 anthrax attacks served as the clarion call as to the potentially deadly and disruptive force of a biological attack on the United States.

The post-9/11 anthrax attacks, in which letters containing anthrax spores were mailed to several media offices and two United States Senators, demonstrated the powerful adverse effects of even a small, premeditated biological attack against the United States. Anthrax-laden letters mailed between 18 September and 9 October 2001 resulted in the infection of 22 victims, of which five died.[8] The movement of these letters through the United States Postal Service (USPS) system and the contamination and closure of post offices in Trenton, New Jersey and Washington, D.C., "caused the American public to question the very safety and security of their mail…the psychological impact on a large portion of the United States was significant."[9]

This event also included an economic component, both for the USPS and their major direct mail marketers. Twenty-three facilities suffered a degree of contamination requiring some level of facility cleaning, millions of protective gloves and masks were purchased and distributed, and thousands of post office employees were placed on either a Ciproflaxin or Doxycycline antimicrobial prophylaxis treatment protocol.[10] "Decontamination alone, including

[8] Thomas G. Day, "The Autumn 2001 Anthrax Attack on the United States Postal Service: The Consequences and Response," *Journal of Contingencies and Crisis Management*, vol. 11 no. 3 (September 2003): 110.
[9] Ibid.
[10] Ibid., 113-114.

at the Hart Senate Office Building in Washington, took over three years and cost some $200 million."[11]

The USPS also suffered a significant decline in mail volume in the first month after the attack as major mailers sought assurances regarding the safety of the system and customers demonstrated a reluctance to receive and read their mail.[12] Based on internal projections, lost revenue to the USPS in the wake of 9/11 and the subsequent anthrax attack was estimated at $500 million for the three weeks ending 2 October 2001 and resulted in a great deal of speculation as to the economic viability of a key government service provider already facing economic problems.[13] The financial cost in terms of lost sales by direct mailers is unknown.

While the post-9/11 anthrax attacks were costly and had an appreciable adverse affect on the American public, the welcomed lack of a replication of this attack in the United States has dimmed the collective memory and consciousness of the public as to the potential risks of biological warfare or bioterrorism. The resultant complacence in the matter of biosecurity is not shared by those in the homeland security and biodefense arenas. Recent interviews of Aum Shinrikyo cult members, who released nerve gas in the Tokyo subway in 1995, by former Secretary of the Navy Richard Danzig reveal that the cult came close to making a benign strain of anthrax lethal through genetic modification.[14] Aum's failure in the mid-1990's should not be looked upon as a victory given the fact that biotechnology "techniques that were theoretical just a decade ago can now be performed by high school chemistry students."[15] In light of the rapidly advancing science of biotechnology and its potential misuse against the United States and its

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[11] Judith Miller, "Bioterrorism's Deadly Math," *City Journal* (Autumn 2008): 5. http://www.city-journal.org/Printable.php?id=3092 (accessed 7 January 2009).
[12] Day, "The Autumn 2001 Anthrax Attack on the United States Postal Service: The Consequences and Response," 113.
[13] Rick Brooks and Kathy Chen, "Anthrax Crisis Could Have Financial Toll On a Post Office Already Facing Problems," *Wall Street Journal*, 17 October 2001, A28.
[14] Judith Miller, "Bioterrorism's Deadly Math," 7.
[15] Ibid.

overseas interests and personnel, it is necessary to explore current and future deterrent strategies to minimize the possibility of a catastrophic biological attack.

III. Deterrence Revisited

"Deterrence" is a frequently but easily misunderstood term which should be defined at the beginning of any discussion. The Department of Defense defines deterrence as, "The prevention from action by fear of the consequences. Deterrence is a state of mind brought about by the existence of a credible threat of unacceptable counteraction."[16] This definition strikes at the central theme of deterrence—it is inherently psychological and depends entirely on a potential adversary's belief in the credibility of the threat and of the threatening party's willingness to carry out the threat if deterrence fails. What makes deterrence so complex, lies not in the capability of the entity attempting to deter, but in the audience, which having the "will and capability to comply with the issued demand…must understand, believe, and fear the deterrent threat to the extent that it chooses to comply. "[17]

Though the concept of deterrence goes back as long as does warfare, it gained prominence in political-military affairs and thinking due to the ascendancy of the nuclear weapon and the development of the means to deliver the weapon over long distances. The United States was focused almost exclusively on the Soviet Union and its nuclear weapons systems between the end of World War II and the Soviet Union's collapse in 1991. Consequently, the notion of deterrence from the standpoint of the U.S. defense establishment, as well as academia, was tied most directly to the United States' nuclear capability and credibility.

[16] Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms, http://www.dtic.mil/doctrine/jel/doddict/ (accessed 6 February 2009).
[17] Keith B. Payne, *The Great American Gamble*, (Fairfax, VA: National Institute Press, 2008) 17.

In addition to fielding a potent nuclear force, the United States sought to build substantial conventional capability and partner with its North Atlantic Treaty Organization (NATO) allies to give itself a measure of credibility and non-nuclear options in its bi-polar struggle with the Soviet Union. Despite the efforts to build conventional force strength in Europe, the U.S. nuclear arsenal maintained primacy for "with nuclear weapons in the background, it was difficult for a distinctive body of conventional deterrence theory to develop."[18]

The strong, Cold War linkage between nuclear weapons and deterrence is demonstrated in Organski and Kugler's landmark work, *The War Ledger*, in which the authors state, "In deterrence theory it is terror that deters but nuclear weapons that are the source of that terror. Appropriately, therefore, nuclear weapons are called 'deterrents.'"[19] Creating such a synonymous relationship between these words strikes at the primacy of nuclear weapons as the deterrent weapon of choice and is evident in the rather narrow definition of the Cold War triad, which focused solely on nuclear weapons and their various means of delivery to the target.

In general, the Cold War nuclear deterrence between the United States and the Soviet Union "worked" because both parties possessed a degree of nuclear symmetry and parity, understood each other's threats, believed in their mutual intent to engage in nuclear conflict if their vital interests were attacked, and decided that the costs of a nuclear exchange outweighed the prospective benefits of their actions during the Cold War.

In *The Great American Gamble*, Keith Payne declares the "balance of terror" as an outdated Cold War artifact:

> …it was the combination of Western cultural norms and the specific conditions of the Cold War that gave birth to the supposedly universal and timeless tenets of the balance of terror; yet in most cases those Cold War conditions no longer

[18] Lawrence Freedman, "Deterrence," in *Foundations of Strategy Reader, AY09,* ed. Eliece Lindsay-Isome et al. (Maxwell AFB, AL: Air University, 2008), 358.
[19] A.F.K Organski and Jacek Kruger, "*The War Ledger*, (Chicago, IL: University of Chicago Press, 1980) 151.

> exist. Correspondingly, most of the deterrence concepts, strategic force metrics, and terms of art that continue to dominate the U.S. strategic debate, in fact, have little or no meaning.[20]

With the end of the Cold War nearly two decades in the past, the United States no longer has a clear strategic adversary to deter with its global military capability, both nuclear and conventional. The United States, despite its continued nuclear superpower status, is subject to asymmetric attack or threat of attack by a state or non-state actor that perceives it can do so with catastrophic affect and with relative impunity. Assuming that the United States chooses to maintain its commitment to not using biological warfare agents offensively, the U.S. would be forced to decide how to respond, in an unlike manner, to a biological threat or attack.

The devastating effects of 9/11 were most significant in that they signaled the catastrophic and asymmetric effects that a small group of individuals, a non-state actor in this case, can achieve with a devious plan and a minimum of funding. The attacks of 9/11, because they resulted in such a large loss of life and such a tremendous impact to the economy and collective psyche of the United States, signaled a sea change in how the United States perceived its own security. Prior to 9/11, even with the knowledge of the unsuccessful terrorist car bombing attack made on the World Trade Center by Ramzi Yousef in 1993, Americans felt safe from foreign attack on their own soil. It took the massive and cataclysmic destruction of the symbolic and iconic "twin towers" to change Americans' self-perception of their physical security. It also provided conclusive proof that there are indeed those who are intent on inflicting massive destruction on the American people.

As terrible as the events of 9/11 were, they might have been worse. Investigations after 9/11 revealed that "several Al Qaeda terrorists including Mohammed Atta looked into employing

[20] Payne, *The Great American Gamble*, 336.

a crop duster aircraft prior to settling on the September 11 hijacking of U.S. airliners and subsequent attacks on the World Trade Center towers and the Pentagon."[21] Had Al Qaeda been able to employ a crop duster dispersing high quality inhalation anthrax over Washington, D.C. or a similarly sized metropolitan area, casualties may have climbed into the hundreds of thousands.[22]

Given the operating environment that became all too apparent on 9/11, the United States will continue to be challenged by greater complexity in arriving at its deterrent and defensive choices and postures. The questions are many. What role, if any, do nuclear weapons play in deterring the use of biological weapons against the United States? What role does a comprehensive defensive capability play in deterring potential biowarfare or bioterrorist aggressors? What capabilities does the U.S. need to deter these potential adversaries? If attacked, what capabilities should the U.S. develop and deploy to monitor, detect, and act to nullify and/or prevail against a biological attack?

In *The National Security Strategy of the United States of America*, President George W. Bush states the strategy is founded on two pillars: 1) the promotion of freedom, justice and human dignity, and 2) confronting the challenges of our time by leading a growing community of democracies.[23] The United States must maintain its freedom of action if these pursuits are to continue to serve as the pillars of the U.S. national security strategy. Given the United States' post-World War II dominance and its military primacy, especially since the collapse of the Soviet Union, the United States has had great freedom of action in the use of its diplomatic, informational, military and economic instruments of power. Biological warfare or bioterrorism

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[21] Barry R. Schneider,"U.S. Biodefense Readiness: Thoughts after September 11th," in *The Gathering Biological Warfare Storm,* eds. Jim A. Davis and Barry R. Schneider (Westport, CT: Praeger Publishers, 2004), 2.
[22] Ibid.
[23] George W. Bush, *The National SecurityStrategy of the United States of America*, March 2006, 4.

have the potential to significantly affect U.S. freedom of action. Credible asymmetric threats, such as the threat posed by biological weapons, for which the U.S. has no good counteraction, have the potential to hold U.S. citizens or deployed military members at risk, thus potentially deterring the United States from taking action it deems necessary in pursuit of its national interests.

The United States must determine the combination of capabilities it will need to deter and defend against biological weapons whose use may be threatened or employed against its territory or personnel. Clearly, the value of nuclear weapons in countering the dynamic threat posed by biological weapons must be visited as part of this discussion. To dismiss nuclear weapons as strictly the vestiges of the Cold War would be less than prudent.

IV. Nuclear Weapons and The New Triad

With the arrival of a new Presidential administration, the United States has the opportunity for a wholesale reevaluation of its nuclear deterrent and defensive posture. In the post-election press, much has been made of the state of the United States nuclear weapons stockpile to include a Wall Street Journal interview with the current commander of United States Strategic Command. There is an open and contentious debate as to whether the United States should "recapitalize the fleet" of nuclear weapons through the Reliable Warhead Replacement Program.[24] Ostensibly, the purpose of recapitalizing this "fleet" is to maintain a credible

[24] According to the National Nuclear Security Administration, the Reliable Replacement Warhead (RRW) is a redesigned nuclear warhead that will allow the Department of Energy's National Nuclear Security Administration (NNSA) to achieve President Bush's vision of providing a credible nuclear deterrent with the smallest nuclear weapons stockpile needed for national security purposes. RRW will: assure long-term confidence in the reliability of the nuclear weapons stockpile, enhance security and prevent unauthorized use, improve the safety of the nuclear weapons stockpile, help to develop a nuclear weapons infrastructure that is more responsive to future national security needs, enable a reduced stockpile size, decrease the likelihood that an underground nuclear test will be needed, utilize and sustain critical nuclear weapons design and skills. Cited from http://nnsa.energy.gov/news/1145.htm (accessed 4 February 2009).

deterrent option against potential adversaries and even to keep up with our allies, the United Kingdom and France, who are modernizing their nuclear weapon arsenals.[25]

Many are questioning the role of nuclear weapons in an increasingly complex security environment. Some, to include prominent, former national security leaders, are calling for the United States to give up nuclear weapons. In an October 2007 piece in the Wall Street Journal, George P. Shultz, William J. Perry, Henry A. Kissinger and Sam Nunn wrote, "Deterrence continues to be a relevant consideration for many states with regard to threats from other states. But reliance on nuclear weapons for this purpose is becoming increasingly hazardous and decreasingly effective."[26] Shultz and his co-authors argue that the United States should lead negotiations and establish protocols to reduce and eventually eliminate nuclear weapons in total. Wolfgang K. H. Panofsky, a physicist who worked on the Manhattan Project, argues, "the United States, now the world's unchallenged conventional military power, can address almost all its military objectives by nonnuclear means."[27]

Before considering nuclear disarmament, United States national security leaders should continue to ask themselves fundamental questions as to the role of nuclear weapons in today's (and tomorrow's) security environment. While they may not serve the same function they did during the Cold War, nuclear weapons may serve another function today, and as importantly, tomorrow. The *2006 National Military Strategy to Combat Weapons of Mass Destruction* explicitly states the U.S. position with regard to nuclear operations to deter or defeat a WMD threat or event: "Offensive operations may include kinetic (both conventional and nuclear) and/or non-kinetic options (e.g., information operations) to deter or defeat a WMD threat or

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[25] Gen Kevin Chilton, interview by Melanie Kirkpatrick, *Wall Street Journal*, 21 November 2008.
[26] George P. Schultz et al, "A World Free of Nuclear Weapons," *Wall Street Journal*, 4 January 2007. http://online.wsj.com/article/SB116787515251566636.html (accessed 6 February 2009).
[27] Wolfgang K. H. Panofsky, "Nuclear Insecurity," *Foreign Affairs*, September/October 2007. http://www.foreignaffairs.org/20070901faessay86507/wolfgang-k-h-panofsky/nuclear-insecurity.html (accessed 6 February 2009).

subsequent use of WMD."[28] In publishing this statement, the U.S. is making it clear that it would consider nuclear options against an aggressor with intent to release biological agents.

More recent policy statements reinforce the U.S. position with regard to nuclear deterrence of WMD. *National Security and Nuclear Weapons in the 21st Century,* co-signed by Secretary of Energy Samuel Bodman and Secretary of Defense Robert Gates in September 2008, indicates that senior officials still see the U.S. nuclear arsenal as a means to "deter adversaries from aggression, especially deterring the use of nuclear weapons or other WMD against the United States, its deployed forces, allies or friends."[29] With regard to sponsors of violent extremists and non-state actors, the paper plainly states "Some violent extremist groups seek WMD for use in their acts of terrorism. U.S. policy is to hold state sponsors of terrorism accountable for the actions of their proxies."[30] Secretary Gates reinforced this policy when he stated, "Our nuclear arsenal also helps deter enemies from using chemical or biological weapons. In the first Gulf War, we made it very clear that if Saddam used chemical or biological weapons, the United States would keep all options on the table. We later learned this veiled threat had the intended deterrent effect as Iraq considered its options."[31]

John S. Foster and Keith B. Payne, in an article for the *Forum on Physics and Society,* posit that "the ongoing development and deployment of new nuclear weapons in Russia and China and the spread of mass destruction weapons to rogue states make effective deterrence as important now as it was during the Cold War, and nuclear weapons are likely to continue to be

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[28] Chairman of the Joint Chiefs of Staff, *National Military Strategy to Combat Weapons of Mass Destruction,* (Washington, DC: 13 February 2006) 23, http://www.defenselink.mil/pdf/NMS-CWMD2006.pdf (accessed 7 February 2009).
[29] Samuel W. Bodman and Robert M. Gates, *National Security and Nuclear Weapons in the 21st Century*, (Washington, DC), September 2008, 13.
[30] Ibid., 6.
[31] Robert M. Gates (address, Carnegie Endowment for International Peace, Washington, DC, 28 October 2008). http://www.defenselink.mil/speeches/speech.aspx?speechid=1305 (accessed 30 November 2008).

critical to effective deterrence."[32] They go on to attack Panofsky's assertion concerning the adequacy of conventional weapons for military objectives, arguing that deterrent value and capability, not the achievement of military objectives, should be the central issue in discussing the future of the nuclear forces of the United States.[33]

Perhaps not fully understanding of the expanding threat of non-nuclear WMD and the unparalleled deterrent value of nuclear weapons, some proponents of nuclear disarmament advocate that the United States "must establish as official policy the limited purpose of U.S. nuclear forces: to prevent the use of nuclear weapons by others. Other purposes are no longer realistic or necessary for the United States."[34] If the U.S. were to take such unilateral action, it would cause the nation to assume a degree of risk in regard to adversaries considering an attack using WMD. Doing so would essentially amount to removing the biggest arrow from the U.S. quiver when contemplating preemptive or post-attack options.

Foster and Payne aptly summarize their position with regard to the maintenance of nuclear weapons, stating, "the question is not whether we (in the United States) "want" to rely on nuclear weapons for deterrence. It is whether we are willing to accept the risk of deterrence failure that would be introduced by our inability to threaten some adversaries' highly-valued targets that may be essentially impervious to non-nuclear weapons and/or our inability to threaten nuclear escalation in response to severe provocation…the move to reliance on non-nuclear weapons to hold enemy targets at risk would carry the increased risk of deterrence failure and the probability may not be low."[35]

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[32] John S. Foster and Keith B. Payne, "What Are Nuclear Weapons For?" *Forum on Physics & Society*, vol. 36 no. 4 (October 2007): 1.
[33] Ibid., 1.
[34] Ivo Daalder and Jan Lodal, "The Logic of Zero: Toward a World Without Nuclear Weapons, "*Foreign Affairs*, November/December, 2008. http://www.foreignaffairs.org/20081001faessay87606/ivo-daalder-jan-lodal/the-logic-of-zero.html (accessed 6 February 2009).
[35] Foster and Payne, "What Are Nuclear Weapons For?" 3.

While advocates of nuclear disarmament and a nuclear-free world continue to discuss and publish their positions regarding the need for U.S. leadership in this cause, the fact remains that U.S. nuclear weapons systems possess the ability to cause "predictable, rapid, and certain destruction of the target, and therefore are capable of inflicting unacceptable damage."[36] This capability is as yet absent in any other U.S. weapon system, and it is unlikely that any such weapon will be developed in the near future. Therefore, nuclear weapons will likely continue to play an important role in the U.S. deterrence posture, to include the deterrence of biological attacks against U.S. interests.

While acknowledging the significance of nuclear weapons as a deterrent capability, the U.S. acknowledged the need to expand the options available to the President to deter and defend against catastrophic threats to national interests. As a result of the Nuclear Posture Review of 2001, the United States introduced the New Triad, which expanded the triad concept beyond that of the classic mix of manned bombers, intercontinental ballistic missiles, and submarine-launched ballistic missiles.

The New Triad includes the following capabilities:

- Offensive strike systems (both nuclear and non-nuclear);
- Defenses (both active and passive); and
- A revitalized defense infrastructure that will provide new capabilities in a timely fashion to meet emerging threats.[37]

Secretary of Defense Gates described the New Triad as consisting of: "First, our strike capabilities, including our traditional nuclear deterrent and conventional capabilities; second, defenses, including limited ballistic missile defenses; and finally an infrastructure to support the

[36] Francisco Galamas, "Biological Weapons, Nuclear Weapons, and Deterrence: The Biotechnology Revolution," *Comparative Strategy*, 27:4,316.
[37] Department of Defense, *Nuclear Posture Review Report (Forward)*.

two. The goal of the New Triad is to reduce our emphasis on nuclear weapons for deterrence and provide the President more non-nuclear options and responses to potential crises."[38]

The *2008 National Defense Strategy* speaks clearly to the fundamental changes that have taken place with regard to the United States' deterrence strategy. It acknowledges the fact that the U.S. was focused solely on the Soviet Union's nuclear capability in a bi-polar and global struggle—preventing a thermonuclear war was the measure of success in that endeavor. The strategy goes on to state that the game has fundamentally changed. The days of the bi-polar struggle against one adversary focused on one type of weapon have long since passed. The global information grid, the decreasing cost of technology, and the increased availability of technological tools have together opened the window of opportunity for both rogue nations and transnational terrorists to develop and employ weapons of mass destruction.[39]

The passive defense and the revitalized defense infrastructure attributes of the New Triad add a new aspect of deterrence in that they may contribute to deterrence by denial,[40] a concept more applicable to the current and future environment than it was to the Cold War construct. For instance, for a non-state actor (i.e., a terrorist group) that for various reasons is unconcerned with or believes itself invulnerable to retaliation would not be deterred by U.S. military capability (either nuclear or conventional)—therefore, deterrence by retaliation would likely not succeed. However, if that group is convinced that biological defenses are credible and that an attack would not be successful, they may choose not to execute the attack. This illustrates a successful example of deterrence by denial.[41] It is this type of renewed examination of U.S. deterrence

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[38] Gates, address, Carnegie Endowment for International Peace.
[39] Department of Defense, *National Defense Strategy,* (Washington, DC: June 2008), 11.
[40] Deterrence by denial communicates the intolerable difficulties opponents will face in attempting to carry out their plans and their likely inability to realize their goals if they do so. From Keith B. Payne, *The Great American Gamble, 368.*
[41] Christopher F. Chyba, "Toward Biological Security," *Foreign Affairs*, vol. 81 is. 3 (May/June 2002) via EBSCOhost.

options that will be needed to formulate effective policy options and systems acquisition to defend U.S. interests in the future operating environment.

V. The Future Operating Environment

Before discussing the particulars of the biological threat, it is instructive to examine the characteristics that have been ascribed to the world in the year 2035 timeframe. While no one institution or document, including this paper, can claim to have arrived at the "ground truth" in characterizing the environment for such a distant time horizon, a review of various studies is beneficial in ascertaining some common themes in the literature, as they may pertain to the United States' relative power and ability to contend with threats to its national security.

Relative Decline in U.S. Power

The convergence of the exponentially increasing pace of technological change, globalization, and ideological challenges to its core beliefs and practices will threaten the ability of the United States to protect its citizens, overseas personnel, and national interests in general. The conventional military capabilities of the United States, regardless of their relative strength against other nation-states, will be less capable of providing protection to the United States and its citizens and less capable of affecting the strategic calculations of non-state actors who have no geography, citizenry, or infrastructure to defend. Potential adversaries learned from the United States success in Operation DESERT STORM—taking on United States conventional forces in an open terrain, force-on-force scenario will not yield victory. Ever-adapting enemies have in the past and will continue to utilize the diffusion of information and technology to circumvent U.S. conventional capabilities and reach favorable outcomes by alternate means.

National power is relative, ever-changing, and in the case of the U.S., likely declining given the global availability of communications, educational, and technological resources; the changing role of the nation-state and transnational actors; and the rise of emerging powers such as China, India, and a potentially resurgent Russia. In its recently published *Global Trends 2025*, the National Intelligence Council clearly indicates that it expects the United States to be a "less dominant" power in the future, stating, "even in the military realm, where the U.S. will continue to possess considerable advantages in 2025, advances by others in science and technology, expanded adoption of irregular warfare tactics by both state and non-state actors, proliferation of long-range precision weapons, and growing use of cyber warfare attacks increasingly will constrict U.S. freedom of action."[42]

The abstract of the *Blue Horizons II* study, commissioned by the United States Air Force Chief of Staff, offers a synopsis which is quite consistent with much of the thought about the future environment, stating "future enemies will be motivated by resources, fear, and hate; empowered through education, and enabled through technology and globalization to directly challenge the United States. The enemy will be different—the targets they present in 2030 will be more difficult to find, harder to hit, more widely distributed and more dangerous."[43]

China and Russia

Despite their seemingly divergent arcs, China and Russia will likely remain as prominent nation-states in the world order. Both nations are significant players with which the U.S. must continue to interact and engage due to their past and potential capabilities in the areas of science and technology, both in military and non-military application.

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[42] National Intelligence Council, *Global Trends 2025: A World Transformed,"* (Washington, DC: US Government Printing Office, November 2008) xi.
[43] Col John Geis et al, "Blue Horizons II: Future Capabilities and Technologies for Air Force 2030," (draft Occasional Paper No 6X, Air University, 2008) 2.

By most accounts, China is the one nation with the most potential to assert itself as a global power and improve its economic, diplomatic and military power vis-à-vis the United States. *Global Trends 2025* states that "if current trends persist, by 2025 China will have the world's second largest economy and will be a leading military power."[44] Joint Forces Command's long-term assessment, *Joint Operating Environment 2008*, refers to China's rise as the "most significant single event on the international horizon."[45] One significant aspect of this rise is due to the fact that "China is investing significantly in human and physical capital. Indeed, skilled Chinese engineers, technicians, and scientists are deeply involved in scientific discovery around the world, and in building the infrastructure upon which its future prosperity and global integration might be built."[46] In its *2008 Annual Report to Congress*, the U.S. - China Economic and Security Review Commission confirmed China's early success in its technological and economic objectives, reporting that "China's trade surplus in advanced technology products is growing rapidly, while the United States is running an ever-larger deficit in technology trade. China also is pursuing a strategy of creating an integrated technology sector to reduce its dependence on manufacturing inputs...(additionally) China seeks to become a global power in aerospace and join the United States and Europe in producing large passenger aircraft."[47]

While China is clearly a rising power, its neighbor to the north, Russia is a nation intent on reestablishing its identity and standing as a world power. While Russia will be forced to contend with its aging population, it will still have the potential to harness its natural resources, especially its energy resources, to contribute to its military capability and retain its position in the world order. Its nuclear and biological warfare programs are well-documented and peerless

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[44] National Intelligence Council, *Global Trends 2025*, 29.
[45] United States Joint Forces Command, *The Joint Operating Environment 2008: Challenges and Implications for the Future Joint Force*, (Suffolk, VA: 25 November 2008), 24.
[46] Ibid, 28.
[47] U.S. - China Economic and Security Review Commission, *2008 Annual Report to Congress*, (Washington, D.C., November 2008) 5, http://www.uscc.gov/annual_report/2008/annual_report_full_08.pdf (accessed 11 Feb 2009).

outside of the United States. Former Secretary of State Condoleezza Rice has referred to Russia's program as "the most sophisticated BCW (biological and chemical weapons) program in the world."[48] As detailed in Ken Alibeck's book, *Biohazard*, the former Soviet Union disguised its biological warfare program under the guise of a company, Biopreparat, and there is little evidence available as to what has become of Russia's biological programs.[49]

While Russia has come upon new-found wealth due to its petroleum and natural gas exports, there is little evidence that its wealth is being used to improve the quality of life of the majority of the populace or recapitalize its brittle infrastructure.[50] While underfunding these areas, it is highly likely that Russia will maintain its "crown jewel"—the strategic nuclear forces. "With their vast and increasingly capable nuclear arsenal, the Russians remain a superpower in nuclear terms, despite their demographic and political difficulties."[51]

The Advancement and Diffusion of Technology

Increasingly available and cheap technology will continue to give high-powered computing and information-sharing access to people worldwide. Information that was in the past only available to those who had direct access will continue to be digitized, catalogued, and uploaded to the Internet for review and use by any interested party. This rapidly evolving phenomenon will only increase with the ever-increasing speed, miniaturization, and storage capacity of personal computers.

The United States Army Training and Doctrine Command's *2008 Future Technology Seminar Report* concluded "Technologies focused on communications, computing, sensing, and electronics will fully establish the global information grid, making virtually all human

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[48] Condoleezza Rice, "Opening Remarks," in *The New Terror: Facing the Threat of Biological and Chemical Weapons*, ed. Sidney D. Drell et al. (Stanford, CA: Hoover Institution Press, 1999), 399.
[49] Ken Alibek, *Biohazard* (New York, NY: Random House, Inc., 1999), x-xi.
[50] Theodore C. Hailes et al, "Resurgent Russia in 2030: Challenge for the USAF," (draft Occasional Paper No XX, Air University, 2008) 6, 34.
[51] United States Joint Forces Command, *The Joint Operating Environment 2008*, 32.

knowledge accessible to nearly every person on the planet."[52] "If the pace of technical advances holds true, greater technological change will occur over the next twenty years than occurred in the whole of the twentieth century. In many ways the world of 2030 will be nearly as strange as the world of 2000 would have been to an observer from 1900."[53]

Declining Power of the State

The power of the nation-state to control activities within its borders, a hallmark of the twentieth century, is in jeopardy in the twenty-first century. "The old political boundaries of nation-states are being made obsolete by an alliance of commerce and technology."[54] In the Industrial Age, the centralized and controlled economies and political systems based on industrialization and the movement of goods and services, combined with relatively limited and expensive international transportation and telecommunications networks conspired to ensure the primacy of the nation-state. The changes brought on by the aforementioned technological advances will allow liked-minded parties to connect, conduct business, and exchange ideas in unprecedented ways.[55]

At the same time as individuals and small groups gain relative power and access to information, there is a high potential for a continued downward spiral for failed and failing states. These nations, beset by a host of political, economic, environmental, and social ills, often do not have the combination of resources and intellectual capital to recover from a virtual death spiral. "Such countries will continue to present strategic and operational planners serious challenges, with human suffering on a scale so large that it almost invariably spreads throughout

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[52] United States Army Training and Doctrine Command, "The Future Operational Environment, Mad Scientist Future Technology Seminar, " (Portsmouth, VA, 19-21 August 2008).
[53] United States Joint Forces Command, *The Joint Operating Environment 2008*, 23.
[54] Walter B. Wriston, *The Twilight of Sovereignty*, (New York, NY: Charles Scribner's Sons, 1992), 11.
[55] Thomas L. Friedman, *The World is Flat: A Brief History of the Twenty-first Century*, (New York, NY: Farrar, Straus and Giroux, 2005), 176.

the region, and in some cases possesses the potential to project trouble throughout the world."[56] To complicate matters, the regions of the world with the greatest number of failed or failing states, "Asia, Africa, and Latin America will account for virtually all the population growth over the next 20 years."[57] The United Nations Population Fund reports that by 2050, the "population of the 50 poorest countries will more than double to reach 1.7 billion. Almost all of the net increase in population is occurring in the urban areas of developing countries, and in many of them, the number of people living in poverty is rising,"[58] thus exacerbating their already difficult conditions and contributing to the total of disenfranchised and disaffected individuals and groups.

It is elements arising from these individuals and groups that may take advantage of or pose a threat to their particular, hobbled nation-state. As empowered individuals or transnational organizations whose primary allegiances fall outside of their geographic home, they may "seek to operate beyond state control and acquire the tools and means to challenge states and utilize terrorism against populations to achieve their aims. These unconventional transnational organizations possess no regard for international borders and agreements."[59] The *National Defense Strategy 2008* aptly expands on the challenges posed by extremist groups by stating that "although driven by transnational ideology, our adversaries are, in fact, a collection of regional and local extremist groups. Regional and local grievances help fuel the conflict, and it thrives in ungoverned, under-governed, and mis-governed areas."[60]

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[56] United States Joint Forces Command, *The Joint Operating Environment 2008*, 35.
[57] National Intelligence Council, *Global Trends 2025*, vii.
[58] United Nations Population Fund, Populations and Poverty, http://www.unfpa.org/pds/poverty.html (accessed 10 February 2009).
[59] United States Joint Forces Command, *The Joint Operating Environment 2008*, 36.
[60] Department of Defense, *National Defense Strategy*, (Washington, DC: June 2008), 8.

VI. The Biological Threat

"It's true that the century so far has seen much less bloodshed. But the other side of the coin is that the technologies are so much more powerful today. If something did go wrong, things could spiral out of control very quickly. With bioengineering, for example, it feels a little like all ten billion of us are standing in a room up to our knees in flammable fluid, waiting for someone—anyone—to light a match."[61] So goes the fictional, year 2019 conversation between the imaginary Molly and futurist Ray Kurzweil, in Joel Garreau's *Radical Evolution*.

In *Radical Evolution*, Garreau discusses the potential that the confluence of information, computer, biological, and nanotechnologies has to significantly alter the essence of human existence in the not too distant future. Not feigning certain knowledge of the future, he describes four alternate scenarios that humanity may traverse in the midst these profound changes: Heaven, Hell, Prevail, and Transcend. Each scenario has its own particular elements, warning signs, and uncertainties.[62]

Garreau's methodology in *Radical Evolution* is instructive. It illuminates the different possibilities and invites the reader to make his own assessment of the likelihood of any one scenario. It also acknowledges the fact that no one can predict with any accuracy where scientific research and development will lead. Biotechnology is the ultimate dual-use technology—the vast majority of research done to ostensibly improve, lengthen, and enhance human life can also be used to negatively alter or destroy human life. With this in mind, many who devote their time and studies in the field of biodefense are gravely concerned about the proliferation of the biological warfare and bioterrorism threats.

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[61] Joel Garreau, *Radical Evolution*, (New York, NY: Broadway Books, 2005), 100.
[62] Ibid., 12-13.

International Agreements and Proliferation

Biological weapons are defined as "disease-causing microbes (chiefly bacteria and viruses) and toxins (poisonous substances produced by living creature) that have been harnessed for the purpose of incapacitating or killing humans, livestock, or crops."[63]

"Biological weapons are illegal. Pathogens and poisons have long been the subject of international opprobrium and efforts to control or eliminate them. The use of chemical and biological weapons is banned under the 1925 Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases and of Bacteriological Methods of Warfare, also known as the Geneva Protocol."[64]

By its own international commitments, the United States will not engage in the offensive use of biological weapons. It unilaterally renounced all biological methods of warfare in 1969 and signed the Biological Weapons Convention in 1972. As a signatory to the convention it "undertakes never in any circumstances to develop, produce, stockpile or otherwise acquire or retain:

1) Microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective, or peaceful purposes;

2) Weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict"[65]

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[63] Commission on the Prevention of WMD Proliferation and Terrorism, *World at Risk*, (New York, NY: Vintage Books, 2008), 8.

[64] Gregory D. Koblentz, "Biological Warfare and International Security," (Paper prepared for delivery at the 2002 Annual Meeting of the American Political Science Association, August 29 – September 1, 2002), 12.

[65] Malcolm R. Dando, *Preventing Biological Warfare: The Failure of American Leadership* (New York, NY: Palgrave, 2002), 6.

As a signatory to the Biological Weapons Convention, it can be safely concluded that the U.S. will not in the future pursue the use of offensive biological weapons as a deterrent or retaliatory counter to biological weapons deployed against it and attributable to an adversary. Therefore, the United States will need to rely on either other offensive capabilities or biodefensive capabilities to deter or prevail against a biological attack.

While the United States is not pursuing biological weapons, there is evidence to support that others state actors are or have done so in the recent past. "Today, several important countries—Egypt, Israel, and Syria among them—remain outside the Biological Weapons Convention. The U.S. State Department has also expressed concern that some parties to the treaty, such as Russia, China, North Korea, and Iran, may be pursuing offensive biological weapons programs in secret"[66] Nation-states that are active in the research and/or development of biowarfare agents may further contribute to potential proliferation due to either dubious relationships with non-state actors or via inadequate measures to secure the facilities where research is conducted.

Concerns regarding the proliferation and possible near-term use of biowarfare agents are central themes of *World at Risk: The Report of the Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism.* "It is more likely than not that a weapon of mass destruction will be used in a terrorist attack somewhere in the world by the end of 2013. The Commission further believes that terrorists are more likely to be able to obtain and use a *biological* weapon than a nuclear weapon."[67] This report, commissioned by Congress as a result of 9/11 Commission recommendations, is direct in its findings. It is notable in that it identifies a fundamental distinction between the United States' aggressive actions to prevent the

[66] Commission on the Prevention of WMD Proliferation and Terrorism, *World at Risk*, 9-10.
[67] Ibid., xv.

proliferation of nuclear material and technology versus its failure to work as diligently in the area of biological weapons.

> The nuclear age began with a mushroom cloud—and from that moment on, all those who worked in the nuclear industry in any capacity military or civilian, understood they must work and live under a clear and undeniable security mandate. But the life sciences community has never experienced a comparable iconic event. As a result, security awareness has grown slowly, lagging behind the emergence of biological risks and threats.[68]

The United States population and leadership, despite the anthrax attacks of 2001, have simply not grasped the extent of the threat because previous attacks have failed to produce catastrophic results in terms of loss of life and human suffering. At the same time, the United States has demonstrated through its policy and obligations that it recognizes the current and future destructive potential of biological agents.

Attributes of Biological Weapons

Due to their size and physical properties, biological weapons are inherently an offensive weapon. A very small quantity of a bioagent can be aerosolized and spread clandestinely by the perpetrator in the target area. Once dispersed, the perpetrator can leave the area without fear of detection or capture. Due to the incubation period, the affects of bioweapons are not realized until people begin to feel ill and enter into public health care facilities. Furthermore, the nature of the public health crisis—indeed, the establishment of the occurrence of a biological attack may be delayed until the public health care system can characterize the agent and correlate the reported cases.

These attributes, along with their low cost of production and the difficulty of detecting biological weapons labs and programs may make them attractive to nations or groups that do not have the technical expertise or funds to pursue other forms of weaponry. "This is reflected in the

[68] Ibid., xvii.

findings of a 1969 United Nations study that estimated that cost of causing civilian casualties per square kilometer was $2,000 with conventional weapons, $800 with nuclear weapons, $600 with chemical weapons and only $1 with biological weapons.[69] The biological labs that can produce agents so cheaply have an especially "small footprint and their dual-use nature makes detection of a bio weapons program particularly challenging."[70]

Biotechnological Horizons

To be sure, the attributes of biological weapons are great cause for concern today, but scientific advances in the life sciences and exponential gains in computing power per dollar will certainly yield not only heretofore unimaginable developments in medical science and treatment, but the potential for exceptionally stealthy and deadly biological weapons in the future.

Dr. George Poste, the Director of Arizona State University's Biodesign Institute and the former chairman of a Secretary of Defense bioterrorism task force, puts it bluntly, "The threat of biological warfare is real and growing—the genie is out of the bottle."[71] "The globalization of biotechnology industries is spreading expertise and capabilities and increasing the accessibility of biological pathogens suitable for disruptive attacks."[72]

The progress of the industry in the area of genetic engineering is particularly concerning. "Scientists have developed automated machines that can synthesize long strands of DNA coding for genes and even entire microbial genomes. By piecing together large fragments of genetic material synthesized in the laboratory, scientists have been able to assemble infectious viruses.[73] The manipulation of genes to create new pathogenic characteristics (increased survivability, infectivity, virulence, drug resistance) is central to genetic engineering in the biological warfare

[69] Koblentz, "Biological Warfare and International Security," 15.
[70] United States Joint Forces Command, *The Joint Operating Environment 2008*, 9.
[71] Dr. George Poste (Biodesign Institute), interview by author, 1 December 2008.
[72] National Intelligence Council, *Global Trends 2025*, 70.
[73] Commission on the Prevention of WMD Proliferation and Terrorism, *World at Risk* , 12.

or biological terrorism context. Organisms with altered characteristics are the "next generation" biological weapons.[74]

"Chemical and biological threats may eventually merge as we understand more about small, "manufacturable" molecules that can subtly alter human behavior."[75] "Biological warfare will be more than "bugs" (biological agents) in the future. By discerning the circuit diagram of every cell in the body, future chemical weapons will be much less crude. We need a much expanded definition of what biodefense represents."[76]

One aspect of technological advancement that has the potential to increase the availability and lethality of biological weapons is nanotechnology. "Nanotechnology concerns the ability to understand and manipulate the environment at the nano-meter scale."[77] As previously mentioned, technology convergence will likely increase current threats. "The ability to combine several technologies can make this threat far more difficult to anticipate and control. Consider nano devices as a vector for the spread of a bio-engineered virus…or a bioagent that remains dormant until activated by some form of directed energy or electromagnetic weapon."[78]

The United States Army Training and Doctrine Command's *Future Operating Environment Future Technology Seminar 2008 Report* offers some insights into future bioweapons that may be tailored to specific targets and groups:

- Synthetic biology with custom logic will be used to bring down communication and transportation networks, and select media.
- Deadly biological agents will be introduced into targeted ethnic and religious groups that will be difficult or invisible to detect.

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[74] Davis and Schneider, *The Gathering Biological Warfare Storm*, 165.
[75] David Franz, "Bioterrorism Defense: Controlling the Unknown," in *Weapons of Mass Destruction and Terrorism*, eds. Russell D. Howard and James J.F. Forest (West Point, NY, Combating Terrorism Center, McGraw Hill Contemporary Learning Series, 2008), 189.
[76] Dr. George Poste (Biodesign Institute), interview by the author, 1 December 2008.
[77] United States Army Training and Doctrine Command, "The Future Operational Environment," 5.
[78] Ibid, 9.

- Deadly biological plant viruses will be used against agriculture crops of targeted groups or nations, crippling the food supply.

- Deadly biological agents introduced to animal feed and grain supply diminishing cattle, chicken, sheep, and fish farms.[79]

Testimony from biotechnology experts and a review of the technical literature point to the same conclusion--new and highly modified forms of biological warfare agents will have an increased potential to be produced, weaponized, and utilized in the next 20 to 30 years. The confluence of ever-expanding biotech research, computing technology, and the explosion in the proliferation and availability of information will provide unprecedented capability to individuals, non-state actors, and nations, regardless of their motivation and intent. In the area of biotechnology, it will be more difficult than ever to distinguish the "haves" from the "have nots." This will vastly complicate national security implications for the United States.

VII. Biodefense Imperatives

In 2004, President George W. Bush, acknowledging the "unique and grave threats to the safety and security of the United States and our Allies,"[80] published *Homeland Security Presidential Directive (HSPD)-10, "Biodefense for the Twenty-first Century,"* which states that a demonstrated military capability to defend against a biological weapons…strengthens our forward military presence in regions vital to U.S. security, *promotes deterrence*, and provides critical reassurance to critical friends and allies."[81] The Bush administration is estimated to have spent an estimated $50 billion since the 2001 anthrax attack to counter bioterrorism.[82] Despite those expenditures, an article written by Pulitzer Prize-winning journalist Judith Miller in late

[79] Ibid, 8.
[80] President George W. Bush, *"Homeland Security Presidential Directive-10: Biodefense for the 21st Century."*
[81] Ibid.
[82] Judith Miller, "Bioterrorism's Deadly Math," *City Journal* (Autumn 2008): 5. http://www.city-journal.org/ Printable.php?id=3092.

2008 contends that a yet unpublished Department of Homeland Security "net assessment" focusing on the current state of biodefense judges that while the U.S. is "far better prepared for a bioterrorist attack, we (the U.S.) remain vulnerable and, in some ways, may even be losing ground."[83]

John Caves, Senior Research Fellow at the Center for the Study of Weapons of Mass Destruction at the National Defense University, puts the argument for extending the U.S. deterrence posture beyond nuclear weapons succinctly: "…the United States cannot be confident that what worked against the Soviets would work against the more diverse adversaries we face in the post-Cold War world, so we need to augment "classic deterrence" with deterrence based on our ability to defeat any WMD attacks that are launched (which can occur as a result of pre-attack interdiction, defense during the attack, and effective consequence management post attack."[84]

Due to the wide array of future potential adversaries and methods that may be employed to attack the United States with biological weapons, it is imperative that the United States expand its suite of deterrent capabilities to include an effective biodefensive posture, which combined with the other elements of the New Triad, has the capability to deter a potential aggressor from attempting an attack. If this capability does not deter the aggressor, the same capability can be used to minimize the impact of a biological warfare or bioterrorism event through early detection and consequence management.

Biodefense capability serves as a complimentary deterrent capability. Given the United States' overmatch capability in nuclear, conventional, and special operations, a potential adversary may elect not pursue a biological attack option if that adversary knows or believes that

[83] Ibid.
[84] John Caves, e-mail to author, 21 November 2008.

U.S. biodefense capability can detect and defeat the effects of the attack, allow the U.S. to positively attribute the attack to an adversary, and give the U.S. the ability to quickly respond using any of its suite of overmatch capabilities to eradicate the adversary threat. This level of biodefensive capability removes the asymmetric advantage of the offensive that would otherwise be accrued to the adversary.

To achieve this biodefensive posture, Dr. Poste has identified a set of key capabilities he refers to as a '3-legged stool,' consisting of early detection, forensic attribution, and the rapid mobilization of therapies and vaccines against any agent.[85] While each of these capabilities is important in its own right, they are all needed to establish a truly effective biodefensive and deterrent posture. Because they are mutually dependent, the loss of any one of these capabilities would significantly detract from the deterrent value of the U.S. biodefensive capability.

The matter of early detection begins the time-critical chain of biodefensive capabilities. *Homeland Security Presidential Directive (HSPD)-10, Biodefense for the 21st Century*, acknowledges, "Early warning, detection, or recognition of biological weapons attacks to permit a timely response to mitigate their consequences is an essential component of biodefense."[86] Like Dr. Poste, Dr. Karen Wood, Program Manager at the Defense Advanced Research Projects Agency (DARPA), counts standoff detection as critical capability to an effective biodefense posture, stating, "We don't have anything that's good enough yet."[87] Dr. Wood does not hesitate to acknowledge the problems and is working diligently to find solutions to current detection deficiencies. She currently manages a program known as the Threat Agent Cloud Tactical Intercept and Countermeasure (TACTIC) Program. The purpose of the program "is to provide the United States military with the capability to protect the warfighter from CWA/BWA

[85] Dr. George Poste (Biodesign Institute), interview by the author, 1 December 2008.
[86] Bush, *Homeland Security Presidential Directive (HSPD)-10, Biodefense for the 21st Century*.
[87] Dr. Karen Wood (Defense Advanced Research Projects Agency) interview by the author, 3 December 2008.

(chemical warfare agent/biological warfare agent) threat clouds on the battlefield. The goal of the program is to provide a system that can rapidly detect and identify the presence of a typical threat cloud and provide a countermeasure to that cloud that will kill it before it reaches the intended target."[88] From a deterrent standpoint, Dr. Wood believes, "If we had a capability like TACTIC, where they (the enemy) knew we could neutralize the threat, it simply wouldn't make sense to pursue (a biological attack)."[89]

The early detection aspect will also be critical beyond the tactical battlefield, which in the future operational environment will likely assume decreased importance as adversaries seek to bypass the U.S. military to secure political objectives by directly attacking the U.S. homeland. The current BioWatch program, which "monitors the air over major cities for biological releases"[90] is a step in the right direction, but it has been identified as lacking in its rapid detection capability because as "the sniffers'" filters must be checked manually and transported to labs for diagnosis, detecting the germs can take up to 36 hours."[91] Future networked systems will need to be wholly automated and will need to be "pointed" based on current intelligence if the U.S. is to quickly detect and react against a biological attack. This will be no simple task. As Dr. Poste states, "Creation of an information architecture to integrate the information coming from a network of sensors will be a big challenge."[92]

Once a biological attack has been detected, it will be critically important to identify the source of the attack. The ability to attribute the attack to a particular entity is absolutely indispensible if the United States is to have any credibility in deterring an attack or deciding on

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[88] Defense Advanced Research Projects Agency, Strategic Technology Office, "Threat Agent Cloud Tactical Intercept and Countermeasure (TACTIC), " http://www.darpa.mil/sto/chembio/tactic.html (accessed 7 February 2009).
[89] Dr. Karen Wood (Defense Advanced Research Projects Agency) interview by the author, 3 December 2008.
[90] Office of Press Secretary, The White House, "BioDefense Fact Sheet, 28 April 2004, http://www.whitehouse.gov/news/releases/2004/04 print/20040428-6.html (accessed 14 November 2008).
[91] Miller, "Bioterrorism's Deadly Math."
[92] Dr. George Poste (Biodesign Institute), interview by the author, 1 December 2008.

how to react with respect to an adversary after the fact. Likewise, since biological weapons are well-suited to covert use, the ability to identify and interdict an attacker in the pre-attack phase would qualify as the best case scenario.

In either case, the advances in biotechnology will allow technicians to use "immunosignatures" to identify a particular individual's exposure to any number of biological agents. In this way, authorities would be able to identify those who have been working in a laboratory to develop or weaponize biological agents. Put simply, immunosignatures serve as an individual's biological "fingerprint." For instance, an individual who lives in Arizona and has developed antibodies for the strain of Valley Fever there can be differentiated from an individual who has developed antibodies for the particular strain of Valley Fever that exists in California. This technology, which is currently in the advanced research stage, has great potential for allowing forensic attribution.[93]

Concurrent with post-attack forensic attribution, the United States would be required to commence a rapid and intensive mobilization of therapies and vaccines against biological agents. According to Dr. Poste, the transformational event will be the way in which the biotechnology industry develops vaccines. The U.S. will need the ability "to take the 'bug,' sequence its genes, look at those genes to see what protein they are coding for, and then produce a vaccine rapidly. Right now, we have to grow the bug. We are still using methods from the 1850s developed by Pasteur. It takes months to produce a vaccine."[94]

Undoubtedly, the technical challenges that come with Dr. Poste's "3-legged stool" concept are daunting, but the commitment must be made now to harness the technical leadership and collective thinking across American government, research and developmental institutions,

[93] Ibid.
[94] Ibid.

think tanks, and universities to arrive at workable solutions to minimize the risk to the U.S. and its interests.

Along with the research and development efforts, there are compelling reasons to seek other avenues to minimize the chances of a catastrophic attack. Dr. David Franz, Vice President and Senior Biological Scientist at the Midwest Research Institute and former commander of the U.S. Army Medical Research Institute of Infectious Diseases advocates international cooperation and engagement in the biosciences as an avenue for achieving national security in the midst of the biotechnology revolution. His theory is that by developing international networks of scientists and working cooperatively on life-science problems, greater transparency will be gained as to capabilities and intent, and support for the malevolent use of biotechnology will be undermined.[95]

Mr. Caves uses the term "deterrence by approbation" to explain a similar philosophy, "the thrust of which is that whatever can be done to strengthen the international norm against the development, possession, and use of biological weapons (and other WMD) can serve as a deterrent to adversaries who are concerned about how their actions are viewed by their constituencies. Even Al Qaeda and its ilk have constituencies that they seek to appeal to and upon whom they depend for support."[96]

VIII. Recommendations and Conclusion

Recommendations

Over the next 30 years, the convergence of advancing science, computing power, and information technology will allow for exponential gains in the field of biotechnology. As the

[95] Dr. David Franz (Midwest Research Institute), interview by the author, 2 December 2008.
[96] John Caves, e-mail to author, 21 November 2008.

United States will not have the ability to stem the proliferation of this inherently dual-use technology, nor the ability to deter its harmful use through "traditional" means of deterrence in an increasingly complex future operating environment, the following measures should be taken by the U.S. in order to deter, and if needed, defeat potential bioterrorism or biological warfare threats to the U.S. and its interests:

1. Maintain the current functions and national security policies associated with the New Triad. U.S. nuclear capability remains an unmatched deterrent, with no weapons of similarly rapid and powerful effect on the horizon.
2. Augment the New Triad by further developing biodefense capabilities to produce a "deterrence by denial" effect to dissuade attack by an adversary that would otherwise be undeterrable; the '3-legged stool' capabilities include early detection, forensic attribution, and the rapid mobilization of therapies and vaccines against any agent.
3. Develop and expand international political and scientific interaction and engagement to foster "deterrence by approbation," strengthening norms against the use of biological weapons, thus denying potential adversaries from achieving their political objectives regardless of success at the tactical level.

Conclusion

This paper examined the rapid advances in biotechnology and the potential of its use by adversaries against the United States in the 2035 timeframe. The dual-use nature of biotechnology makes it exceptionally difficult to regulate and monitor for possible nefarious use. The relatively low expenses associated with establishing a biowarfare program and the ease with

which such programs are kept covert will enable potential adversaries, both state and non-state, to harness the power of biotechnology in an attack on the United States or its interests.

Despite the current and projected advances in biotechnology, and the resulting potential threat to national security, the United States defense establishment has focused its attention largely on the concept of deterrence as it relates to nuclear weapons. Nuclear weapons will remain the *sine qua non* of U.S. deterrence policy for the foreseeable future. The rapid, certain and catastrophic damage caused by nuclear weapons will be unequalled by any other weapon in the foreseeable future. At the same time, the relatively straightforward strategic relationship between the U.S. and the Soviet Union during the Cold War is unlikely to be duplicated with any adversaries over the next few decades. As such, the U.S. must expand the nature of its deterrence posture. Although the establishment of the New Triad, which goes beyond the classic, Cold War triad, is a step in the right direction in deterring aggressive actions by adversaries, it does not adequately address methods to deter or defeat a biological attack on the United States.

The post-9/11 anthrax attacks demonstrated the powerful effects and high costs inflicted by a very small quantity of bioagent. Anthrax-laden letters mailed within the United States resulted in the infection of 22 victims and the death of five of those victims. The attack also resulted in the contamination of 23 post office facilities and the Hart Senate Office Building in Washington, D.C. The cost of decontamination and the lost revenue to the United States Post Office was estimated in the hundreds of millions of dollars. Despite the short-term impacts and the fear induced by the American public, the memory of the attack has largely faded, even as the potential for a future, more deadly attack grows.

The risk of a future biological attack against the U.S. is increased by a number of factors attributed to the future operating environment. It is likely that the U.S. will wield relatively less power in an era where the convergence of information access, exponential technological change, and globalization empower previously isolated individuals and groups whose values run counter to those of the United States. China and Russia, though trending in different directions, are likely to be formidable near-peers who have the scientific and research base needed to develop and maintain robust weapons programs. Russia will remain a nuclear power which once harbored the world's most extensive biological warfare program. China is a rising economic power with a desire to assert itself as a major military player. It is making the investment in its human capital to become a world leader in science and technology, thus enabling its potential martial prowess. In general, information access, globalization, and transnational forces will challenge the primacy of the nation-states, especially those whose problems are exacerbated by a lack of resources to address their urgent problems. These factors will conspire to complicate the security environment for the United States.

Biotechnological advances will have a profound effect on the capability of mankind to alter organisms at the most basic level. The ability to manufacture material at the molecular level may result in new weapons which will likely require new definitions of biological weapons and biodefense. Future bioweapons may include agents that may be targeted toward specific genetic traits or races, as well as bioagents that may be administered to lie dormant until activated by another means. In addition to direct biological attacks on humans, alternate attacks may include bioagents that attack infrastructure systems and critical food supplies.

While the U.S. has made significant strides in biodefense initiatives since the anthrax attacks of 2001, much work remains to be done as biotechnological science advances around the

world. U.S. deterrence policy and biodefense programs must be expanded to deny the ability of aggressors to, in the words of Secretary Gates, "hold other nations hostage, and to deny them the ability to project power."[97] In the increasingly complex security environment of the 21st century, the U.S. can afford no less.

[97] Robert M. Gates (address, Carnegie Endowment for International Peace, Washington, DC, 28 October 2008). http://www.defenselink.mil/speeches/speech.aspx?speechid=1305 (accessed 30 November 2008).