



# Bioviolence: A Growing Threat

**By Barry Kellman**

**Biological technologies that were once at the furthest frontiers of science will — in the next decade — become available to anyone with a modicum of scientific training. An international law expert proposes a global security fix.**

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A looming danger confronts the world—the threat of *bioviolence*. It is a danger that will only grow in the future, yet we are increasingly failing to confront it. With every passing day, committing a biocatastrophe becomes a bit easier, and this condition will perpetuate for as long as science progresses.

Biological warfare is as old as conflict, of course, but in terms of the objectives of traditional warfare—gaining territory or resources, compelling the surrender of an opposing army—biological weapons weren't very effective. If the objective is to inflict mass death and panic on a mixed population, however, emerging bioweapons offer remarkable potential. We would be irresponsible to presume that radical jihadists like al-Qaeda have ignored said potential.

### What's New in Bioviolence?

*Bioviolence* refers to the many ways to inflict disease as well as the many people who might choose to do so, whether heads of states, criminals, or fanatics. Fortunately, doing bioviolence is technically far more difficult than using conventional explosives. Natural pathogens like anthrax are difficult to weaponize. Smallpox remains unavailable (presumably); plague is readily treatable; Ebola kills too quickly to ignite a pandemic. But emerging scientific disciplines—notably genomics, nanotechnology, and other microsciences—could alter these pathogens for use as weapons. These scientific disciplines offer profound benefits for humanity, yet there is an ominous security challenge in minimizing the danger of their hostile application.

For example, highly dangerous agents can be made resistant to vaccines or antibiotics. In Australia, scientists introduced a gene into mousepox (a cousin of smallpox) to reduce pest populations—it worked so well that it wiped out 100% of affected mice, even those that had immunity against the disease. Various bacterial agents, such as plague or tularemia (rabbit fever), could be altered to increase their lethality or to evade antibiotic treatment.

Diseases once thought to be eradicated can now be resynthesized, en-

abling them to spread in regions where there is no natural immunity. The polio virus has been synthesized from scratch; its creators called it an "animate chemical." Soon, it may be resynthesized into a form that is contagious even among vaccinated populations. Recreation of long-eradicated livestock diseases could ravage herds severely lacking in genetic diversity, damage food supplies, and cause devastating economic losses.

Perhaps the greatest biothreat is the manipulation of the flu and other highly contagious viruses, such as Ebola. Today, scientists can change parts of a virus's genetic material so that it can perform specific functions. The genomic sequence of the Spanish flu virus that killed upwards of 40 million people nearly a century ago has been widely published; any savvy scientist could reconstruct it. The avian flu is even more lethal, albeit not readily contagious via casual aerosol delivery. A malevolent bioscientist might augment its contagiousness. The Ebola virus might be manipulated so that it kills more slowly, allowing it to be spread farther before its debilitating effects altogether consume its carrier. A bit further off is genetic manipulation of the measles virus—one of the great killers in human history—rendering useless the immunizations that most of us receive in early childhood. Soon, laboratory resynthesis of smallpox may be possible.

Advanced drug delivery systems can be used to disseminate lethal agents to broad populations. Bio-regulators—small organic compounds that modify body systems—could enhance targeted delivery technologies. Some experts are concerned that new weapons could be aimed at the immune, neurological, and neuroendocrine systems. Nanotechnology that lends itself to mechanisms for advanced disease detection and drug delivery—such as gold nanotubes that can administer drugs directly into a tumor—could also deliver weaponized agents deep into the body, substantially raising the weapon's effectiveness.

Altogether, techniques that were on the frontiers of science only a decade or two ago are rapidly mutating

as progress in the biological sciences enables new ways to produce lethal catastrophe. Today, they are on the horizon. Within a decade, they will be pedestrian. According to the National Academies of Science, "The threat spectrum is broad and evolving—in some ways predictably, in other ways unexpectedly. In the future, genetic engineering and other technologies may lead to the development of pathogenic organisms with unique, unpredictable characteristics."

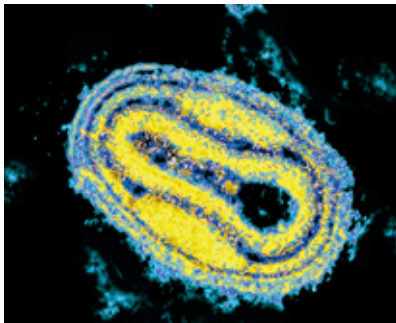
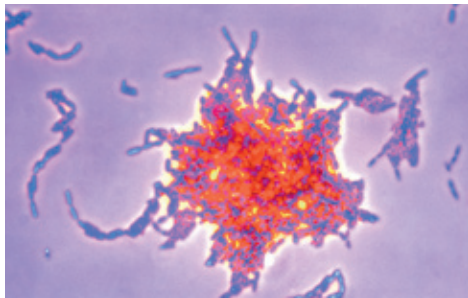
For as far into the future as we can possibly see, every passing day it becomes slightly easier to commit a violent catastrophe than it was the day before. Indeed, the rapid pace of advancing science helps explain why policies to prevent such a catastrophe are so complicated.

### Bioviolence Jihad?

Some experts argue that terrorists and fanatics are not interested in bioviolence and that the danger might therefore be overblown. Since there have been no catastrophic bioviolence attacks, these experts argue, terrorists lack the intention to make bioweapons. Hopefully, they are correct. But an enormous amount of evidence suggests they are wrong. From the dawn of biology's ability to isolate pathogens, people have pursued hostile applications of biological agents. It is perilous to ignore this extensive history by presuming that today's villains are not fervent about weaponizing disease.

Not a single state admits to having a bioweapons program, but U.S. intelligence officials assert that as many as 10 states might have active programs, including North Korea, Iran, and Syria. Moreover, many terrorist organizations have expressed interest in acquiring biological weapons. Whatever weight the taboo against inflicting disease might have for nation-states, it is obviously irrelevant to terrorists, criminals, and lunatics. Deterrence by threat of retaliation is essentially meaningless for groups with suicidal inclinations who are likely to intermingle with innocent civilians.

Al-Qaeda and affiliated Islamic fundamentalist organizations have



Committing bioviolence is a difficult challenge. Natural pathogens like anthrax (left) are difficult to weaponize. Smallpox (center) remains unavailable, and the Ebola virus (right) kills too quickly to ignite a pandemic. But emerging scientific disciplines—notably genomics, nanotechnology, and other microsciences—could soon alter these pathogens for use as weapons, says Kellman.

overtly proclaimed their intention to develop and use bioweapons. The 11th volume of al-Qaeda's *Encyclopedia of Jihad* is devoted to chemical and biological weapons. Indeed, al-Qaeda has acknowledged that "biological weapons are considered the least complicated and easiest to manufacture of all weapons of mass destruction."

Al-Qaeda is widely reported to have acquired legal pathogens via publicly available scientific sources. Before 9/11, al-Qaeda operatives reportedly purchased anthrax and plague from arms dealers in Kazakhstan, and the group has repeatedly urged followers to recruit microbiology and biotechnology experts. Following the Taliban's fall, five al-Qaeda biological weapons labs in Afghanistan tested positive for anthrax. Documents calculating aerial dispersal methods of anthrax via balloon were discovered in Kabul, along with anthrax spore concentrate at a nearby vaccine laboratory.

According to a lengthy fatwa commissioned by Osama bin Laden, jihadists are entitled to use weapons of mass destruction against the infidels, even if it means killing innocent women, children, and Muslims. No matter that these weapons cannot be specifically targeted. "[N]othing is a greater duty, after faith itself, than repelling an enemy attacker who sows corruption to religion and the world." According to the fatwa, "No conditions limit this: one repels the enemy however one can."

The sentiment might be reprehensible,

but it is certainly not irrational. Even the most passionate terrorists must realize that conventional attacks are not bringing the West to its knees. The 9/11 strikes, the bombing of the Madrid and London subways, and numerous smaller attacks have all put civilization on edge, but history marches inexorably forward. A few thousand people can be killed, yet Western armies still traverse the world, and Western economies still determine winners and losers. From this perspective, the stakes must be raised. Bioviolence is perhaps the most dire, easiest means to execute existential danger.

### What Might Bioviolence Accomplish?

Envision a series of attacks against capitals of developing states that have close diplomatic linkages with the United States. The attacks would carry a well-publicized yet simple warning: "If you are a friend of the United States, receive its officials, or support its policies, thousands of your people will get sick." How many attacks in how many cities would it take before international diplomacy, to say nothing of international transit, comes to a crashing halt?

In comparison to use of conventional or chemical weapons, the potential death toll of a bioattack could be huge. Although the number of victims would depend on where an attack takes place, the type of pathogen, and the sophistication of the

weapons maker, there is widespread consensus among experts that a heightened attack would inflict casualties exceedable only by nuclear weapons. In comparison to nuclear weapons, bioweapons are far easier and cheaper to make and transport, and they can be made in facilities that are far more difficult to detect.

The truly unique characteristic of certain bioweapons that distinguishes them from every other type of weapon is contagion. No other type of weapon can replicate itself and spread. Any other type of attack, no matter how severe, occurs at a certain moment in time at an identifiable place. If you aren't there, you are angry and upset but not physically injured by the attack. An attack with a contagious agent can uniquely spread, potentially imperiling target populations far from where the agents are released.

A bio-offender could infect his minions with a disease and send them across borders before symptoms are obvious. Carriers will then spread it to other unsuspecting victims who would themselves become extended bioweapons, carrying the disease indiscriminately. There are challenges in executing such an attack, but fanatical terrorist organizations seem to have an endless supply of willing suicide attackers.

All this leads to the most important characteristic of bioviolence: It raises incomparable levels of panic. Contagious bioviolence means that planes fly empty or perhaps don't fly at all. People cancel vacation and

travel plans and refuse to interact with each other for fear of unseen affliction. Public entertainment events are canceled; even going to a movie becomes too dangerous. Ultimately, bioviolence is about hiding our children as everyone becomes vulnerable to our most fundamental terror: the fear of disease.

For people who seek to rattle the pillars of modern civilization and perhaps cause it to collapse, effective use of disease would set in motion political, economic, and health consequences so severe as to call into question the ability of existing governments to maintain their citizens' security. In an attack's wake, no one would know when it is over, and no government could credibly tell an anxious population where and when it is safe to resume normal life.

While it is difficult to specify when this danger will strike, there should be no doubt that we are vulnerable to a rupture. Just as planes flying into the Twin Towers on September 11, 2001, instantly became a historical marker dividing strategic perspectives before from after, the day that disease is effectively used as an instrument of hate will profoundly change everything. If you want to stop modern civilization in its tracks, bioviolence is the way to go. The notion that no one will ever commit catastrophic bioviolence is simply untenable.

### What Can We Do?

How can we confront these growing dangers? First, we must appreciate the global nature of the problem. Perpetrators from anywhere can get pathogens from virtually everywhere. Bioresearch labs that once were concentrated in about two dozen developed states are proliferating, expanding the risk that lethal agents could be diverted and misused. The knowledge needed to weaponize pathogens is available on the Internet. An attack can be prepared through easy networks of transnational communication. Once a bioweapon is prepared, terrorists or other perpetrators from anywhere can slide across national boundaries and release disease anonymously. Once released, a contagious agent

would spread without regard for boundaries, race, religion, or nationality. Public health responses would have to be internationally coordinated. New modes of international legal cooperation would immediately be needed to investigate the crime.

Thus, bioviolence dangers shrink the planet into an interdependent neighborhood. It makes no sense for any particular country to try to insulate its homeland from these dangers. No missile defense system will protect us from bioviolence. Improved border security will not keep disease at bay. National efforts to enhance medical preparedness have virtues, but these defenses can be readily circumvented. To prevent bioviolence requires policies that focus on humanity as a species and that are implemented everywhere with centralized governance. Anti-bioviolence policies must be global.

Yet, advancing anti-bioviolence policies is what the international community does worst. Bioviolence dangers are unnecessarily high because national and international anti-bioviolence strategies are gap-ridden, often incoherent, and not globally observed. As a result, we are all virtually naked in the face of unacceptable dangers. No other threat presents such a stark contrast between severity of harm and a failure of leadership to reduce risks.

Most important, existing institutional arrangements are inadequate. In sharp contrast to most other global security challenges, there is no responsible international authority that defines relevant prohibitions and responsibilities, implements policies over time, or evaluates whether obligations are being fulfilled. With regard to global bioviolence prevention policies, there's nobody in charge. No one is responsible; no one is accountable.

The absence of authority is profoundly dangerous. Bioviolence prevention and preparedness requires a sizable orchestra, made up of various instruments, to play complicated music in harmony. Today, there is not a bad "conductor", there is no conductor at all. The result is cacophony. Simply stated, bioviolence is the dark side of globalization, yet interna-

tional alarms of bioviolence ring nowhere!

We need a comprehensive national and international strategy for bioviolence prevention. [See box: "Five Strategies for Preventing Bioviolence," page 30.] Policies should be pursued within an integrated approach that enables each policy to gain strength from all the others. Such policies are potentially available and effective, but they demand progressive changes in our global order.

### The Security Mission

Global bioviolence prevention and preparedness policies are imperative, but also imperative is recognition that the world faces natural disease horrors. Where mass public health challenges are daily phenomena, the risks of terrorists using pathogens must be weighed against more tangible natural threats. Simply stated, it is illegitimate to insist that every nation adopt policies for preventing human-inflicted disease without acknowledging the silent genocide of natural disease that is responsible for millions of deaths.

But neither is it legitimate to view bioviolence dangers as distractions from efforts to combat natural disease and therefore to put off beneficial measures until those afflictions are defeated. To do so frustrates forward movement on cost-effective initiatives that could help build an international security architecture for advancing science and health.

Thus, bioviolence prevention must be a facet of a broad international commitment to:

1. Prevent the spread of disease (e.g., through public-health measures).
2. Enhance protection against and cures for disease (e.g., through vaccination and drug therapies).
3. Supervise the conduct of biological science.
4. Criminalize unauthorized or improper use of pathogens.

From this foundation should flow a policy commitment to the growth of bioscience as a global public good. Policies to encourage its worldwide spread deserve vigorous support.

This governance mission should, therefore, be conceived as a global

## Scenario “Dark Winter”: A Simulated Bioattack

In 2001, the Center for Strategic and International Studies and the Johns Hopkins Center for Civilian Bio-defense Strategies sponsored a simulation named “Dark Winter” to cast some light on the possible impact of a biological attack on the United States.

The exercise took place at Andrews Air Force Base and counted such participants as former Senator Sam Nunn in the role of the “president,” CIA Director James Woolsey, presidential adviser David Gergen, and now infamous *New York Times* writer Judith Miller.

The fictionalized outbreak began December 9, 2002, with a small intentional release of smallpox in Oklahoma City, infecting roughly two dozen people, and two other suspected outbreaks in Pennsylvania and Georgia. The role-players quickly found that even a small bioattack could spread quickly, cause confusion and panic, and become impossible to contain. A single carrier of smallpox can infect 10 to 20 people, creating wave after wave of outbreaks.

The number of possible smallpox cases projected by the end of the fourth wave (February 6) in the scenario was 3 million, with a third of those cases ending in death. Vaccine stocks were depleted, leading to widespread rioting, forced restrictions, a collapse of interstate commerce, and martial law.

Among the lessons learned from the exercise:

- A biological weapons attack with a contagious pathogen could cripple the United States.
- The less prepared the government is to deal with such a challenge, the more civil liberties will be threatened.

- State and federal relations would be greatly strained, as legal and jurisdictional issues sow confusion.

- Public health expertise, vaccines and drug stockpiles, and R&D to facilitate rapid disease control all require greater public investment.

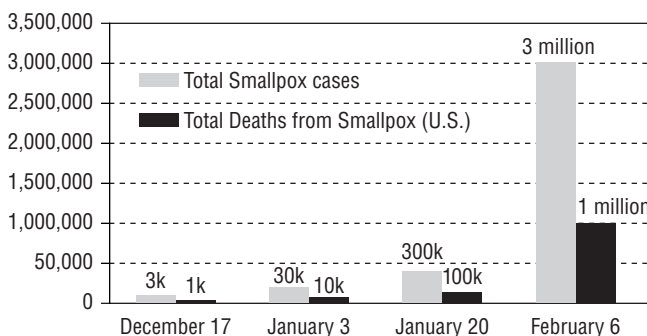
“You often don’t know what you don’t know until you’ve been tested,” Nunn reported to Congress after the exercise, “and it’s a lucky thing for the United States that—as the emergency broadcast network used to say—‘this is just a test, this is not a real emergency.’ But Mr. Chairman, our lack of preparation is a real emergency.”

—Patrick Tucker

Sources: The University of Pittsburgh Medical Center for Biosecurity, Web site [www.upmc-biosecurity.org](http://www.upmc-biosecurity.org).

*Washington Post*, Reuters, AP, July 24, 2001.

### Potential Smallpox Cases Projected in the Dark Winter Scenario



Source: ANSER Homeland Security Institute and Center for Strategic and International Studies

covenant. As bioscience goes forward as a fundamental pillar of human progress, all nations must undertake common responsibilities to prevent bioviolence even as the burdens associated with those responsibilities are differentiated according to wealth and capability. From everyone according to their abilities—to all for the benefit of all.

### The United Nations' Importance

The United Nations represents the best venue for a new governance platform that can accommodate the need for an integrated global strategy against bioviolence. Only the United Nations has the necessary in-

ternational legitimacy, and only the United Nations can integrate the many sectors—health, law enforcement, science, military, emergency preparedness—that must devote expertise and resources.

A primary consideration here is to minimize any bureaucratic reshuffling. There is certainly no need to modify or replicate existing capabilities. Many relevant governance tasks are already addressed by one or more international organizations. For example, the World Health Organization should continue to be responsible for addressing the health implications of a pandemic, whether natural or malevolent. Interpol should continue to be responsible for

addressing bioviolence's law enforcement implications. Indeed, the UN's role should be only to coordinate the performance of these tasks.

Broadly viewed, the United Nations should be able to undertake three functions:

First, a specific UN agency should stimulate bioscience development by incorporating security concerns into the fabric of scientific undertakings and by assisting countries in using bioscience in ways that are consistent with policies for preventing bioviolence. Because science, development, and security can and must be mutually reinforcing, this agency's primary responsibilities would be to promote and distribute knowledge

# Five Policies for Preventing Bioviolence

## 1. Deny illicit access to pathogens and biological research laboratories.

Scientists who work with lethal material or equipment that a malevolent actor could misuse must do their work according to global standards of care.

Of course, policies must not unreasonably impede science. Yet since bioscience carries an inexorable potential for catastrophe, scientific research should advance according to minimally burdensome standards that appreciate those activities' potential for abuse. Standards should be obligatory; those who would comply but lack the capacity to do so should receive assistance.

## 2. Improve information gathering and analysis to detect illicit bioviolence preparations.

Global intelligence and law enforcement authorities should have sufficient knowledge and authority to detect and interdict—at least effectively respond to—catastrophic bioviolence. It is imperative, therefore, to develop interlinked databases on the location of pathogens of concern, laboratories that handle or store such pathogens, transfers of pathogens and equipment, and any incidents of concern.

## 3. Strengthen national biocriminal laws and police capabilities.

Policies should promote international police training on detection and interdiction of biovio-

lence preparations, including authorizing law enforcement to execute necessary responsibilities and enabling them to attribute responsibility for wrongful use/release of pathogens. Enhanced bio-forensic methods play a key role in this.

## 4. Enhance disease resistance and public-health response globally.

Strengthening national and international capabilities to protect against, detect, and quickly respond to disease outbreaks could improve consequence management of a bioattack, reduce opportunities for terrorists to accomplish their objectives by using disease, and promote global cooperation on the broad array of anti-bioviolence policies.

## 5. Devise and implement effective bioweapons nonproliferation policies.

International bio-nonproliferation strategies are critical to bioviolence prevention. The U.S. government should advocate obligatory mechanisms to distinguish allowable biodefense programs (to guard against potential bioattacks) from illegal programs. The international community might create a new investigative body that could devise objective criteria for what constitutes a biothreat, but that could also look at situations on a case by case basis.

—Barry Kellman

and build capacity to fulfill obligations, especially in developing nations.

Second, a UN office should coordinate activities among the relevant international/regional organizations, professional networks, and expert bodies. For example, three major international organizations focus on health (World Health Organization,

Animal Health Organization, and the Food and Agriculture Organization); Interpol and Europol both focus on law enforcement; a large array of organizations focus on conveyance of dangerous items (e.g., International Maritime Organization, International Civil Aviation Organization). This UN office should be a steering mechanism to engage each of these orga-

nizations' specialized expertise and to identify synergies.

Third, a Security Council Committee should be authorized to investigate bioviolence preparations as well as respond and coordinate assistance to a bioviolence attack. Situations that call for investigation or response arise rarely, but they carry disproportionate significance for international peace and security. The Security Council Committee should not advance programmatic agendas, but it should be able to wield expertise and political muscle in volatile situations. Its primary mission would be to enable the international community to sustain global order in the face of a bioviolence challenge.

Ever since someone harnessed a new technology to create a weapon with more devastating effects, there has been a link—a double helix—between the progress of science and the pursuit of security. This is inevitable. These dangers of bioviolence do not argue for relinquishing scientific progress, but they disprove notions that new challenges can be effectively addressed with yesterday's policies.

At bottom is a condition unique to this historical era: Scientific progress is intertwined with escalating malevolence threatening human security. Progressing capabilities improve our lives and yet, inextricably, enable truly harmful weapons against humanity. Here are the challenges to international peace and security at the beginning of the third millennium. Failing to do the right thing in response to these challenges could have dire consequences for all humanity. □



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—*Preventing Biological Terror and Crime* (Cambridge University Press, 2007).

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