Biological Warfare

A Tale of Terror and Hope

By Elsa Barron

The world shudders in remembrance of the events of September 11th, 2001, and the subsequent impact they have had on feelings of security in the United States and around the world. However, very few remember the string of terrorist attacks beginning just one week later, when letters laced with anthrax were mailed to dozens of members of Congress. Bioterrorism has had a long history, and even though it is rarely discussed, it is an issue of rising significance. Biological warfare is a method deeply entrenched in world history and even in modern politics. While this type of violence is uniquely dangerous and devastating in many ways, it is also unique because research to build up defense against biological warfare not only mitigates the effects of attacks but also can help resolve some of the world's largest health epidemics.

Biological weapons have different properties than many other weapons of modern warfare. For example, unlike traditional guns and bombs, biological weapons can be used covertly with ease. Even most chemical weapons must be delivered in a direct manner (through ingestion, contact, or close inhalation) and have quick and visible effects on their victims. In contrast, biological weapons can be released at a distance or through various manners of infection pathways, including anything the victims might eat or come into contact with. Biological weapons can also be spread from person to person *after* they have been released. Often, the perpetrator of biological warfare can remain completely anonymous. The delay between dissemination of the agent and actual symptoms in its victims, or the incubation period, allows the combatant or terrorist days to seek safe cover (Khan and Sage). Even if the pathogen is traced back to its release point, it may still be impossible to identify or find the perpetrator of the attack.

Additionally, a single biological attack can be extremely efficient in terrorizing and killing large populations of people. People fear the gross destructive capacity held by nuclear

weapons, which can easily wipe out an entire city and devastate its surrounding area. What is surprising is that a biological attack could have almost as widespread results. Similar to nuclear weapons, biological weapons can be carried by intercontinental ballistic missiles (ICBMs). In fact, "a single SS-18 intercontinental ballistic missile equipped with multiple warheads filled with a strategic biological agent would be sufficient to cover a city the size of New York, killing at least 50 percent of the population" (Alibek 3). That is a devastating prediction, and society's awareness of and apprehension about biological warfare is not nearly proportional to its threat.

Not only are biological weapons destructive, they are also easily accessible. The materials and tools to genetically alter diseases are available to even the most basic biological researcher. Even diseases that have been eradicated are present in weapons arsenals. Countries such as the Soviet Union have developed smallpox specifically for warfare purposes (Alibek 2). The ominous truth is that most diseases are not difficult to acquire. Concerns of pathogen theft were raised during the Ebola outbreak in 2014, which has some basis in events during Ebola outbreaks of the 1990s. The same Japanese group that set off sarin gas in Tokyo's subway system in 1995 sent a medical team to the Democratic Republic of the Congo in 1992 to provide health aid in an Ebola outbreak, a strange break of character for the terrorist organization. Amy Smithson provides an alternate explanation in her report *Ataxia* explaining that "their real purpose, however, was to collect Ebola virus" (Maron). The efforts of the Japanese group were a failure but nevertheless demonstrate the devastating potential threat any natural disease outbreak might cause if not handled by the right people. Dangerous biological organisms are accessible to both large states and small groups simply as a consequence of their presence in the natural world. Clearly, biological weapons offer distinct advantages over conventional weapons as a method of destruction, especially when fighting in non-standard conditions or when attempting to remain

covert. The secrecy, accessibility, and versatility of biological weapons makes them a dangerous asset to those seeking to do harm.

The advantages of biological weapons have been recognized and used in the past. The use of some forms of these agents is thought to go back all the way to 600 B.C., with the use of cadavers and carcasses to infect an enemy (Riedel 400). As technology developed, bodies were placed on catapults, but their general use remained the same: to weaken or kill an enemy with contagious disease. One of the most infamous examples of biological weapon use in American history was against Native Americans. During the French and Indian War, British forces suggested using smallpox strategically and provided smallpox-laced blankets to Native Americans. There are few nations that can claim to have never used biological weapons at some point in their past.

However, use of biological weapons is not limited to the distant past; they have been used much more recently in history. In response to the devastation of biological and chemical warfare in World War I, the "Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases and of Bacteriological Methods of Warfare," or the Geneva Protocol of 1925, was signed. One hundred and eight nations signed the agreement, but the "protocol did not address verification or compliance, making it a 'toothless' and less meaningful document" (Riedel 401). Even immediately after its creation, many countries that signed the document created biological weapons development programs. In World War II, over 10,000 prisoners are estimated as casualties in Japanese biological experimentation, and in the Korean War, the United States was accused of using biological weapons and admitted to having the capability to do so (Riedel 401-402). The use of biological weaponry continues to remain a problem even

today. Countries desperate for victory are often willing to employ vicious strategies and ignore international protocol to promote their own aims.

A major step forward for biological weapons regulation came in 1972 with the Biological Weapons Convention (BWC). The BWC is a treaty that bans "the development, stockpiling, acquisition, retention, and production of biological agents and toxins and weapons, equipment, and delivery vehicles [for these biological agents/toxins]" (Archy). The BWC has more teeth than the Geneva Protocol of 1925, as it allows for states to work multilaterally to address issues of non-compliance. There is also a mechanism for filing complaints with the U.N. Security Council and invoking a Security Council investigation. The BWC is periodically reviewed by its member states and is an important document for defining international standards of conduct during war.

However, there are many remaining challenges for the BWC that have not been fully addressed and reduce its effectiveness. One overarching issue is a lack of enforcement of new BWC regulations. For example, adding to the initial bans in the treaty, three additional stipulations were added in 1991: a need to declare legislation pertaining to biological weapons, declare offensive and defensive biological research programs since 1946, and declare vaccine production facilities (Archy). Member states have consistently failed to address these new regulations and have failed to report activity and research. While there is a mechanism for non-compliance complaints and enforcement, it is not being used effectively in regards to BWC infractions, and biological weapons development programs have actually increased since its creation. The global infrastructure the BWC creates for implementing repercussions for countries that offend the terms of the treaty is clearly weak and ineffective, as no country has been prosecuted for their biological programs.

As biological weapons programs are expanding, they are also becoming more powerful thanks to new genetic technologies. Scientific advances provide incredible opportunities for new solutions to human frailty. However, new technology is a double-edged sword that can easily be manipulated for less-than-honorable aims. For example, “the CRISPR gene-editing system has been flagged as the latest example of possible dual-use technology” (Dando). CRISPR is a genetic mechanism that allows for the deletion of genes, insertion of new genes, or editing of existing genes using a scissor-like protein and DNA repair. While CRISPR was developed for use in curing genetic-based diseases, this is not its only potential use. For example, scientists fear that the gene editing software could be used to genetically modify the Ebola virus to spread through air. Naturally, it is only transmitted through direct contact (Maron). The BWC has no verification system at this time to determine the research and development of biological technology in different countries (Dando). Additionally, these major issues such as advances in science and technology have no place for discussion in the BWC (Jenkins). New genetic technology should be a top-priority consideration for the international community in regards to biological weapons, as it has the ability to greatly increase their danger. However, there is a deep lack of knowledge and discussion on this front.

It is not all despair when it comes to new genetic technology, however. The same genetic advances such as CRISPR can also be used to create vaccines with more speed and effectiveness in order to combat biological attack. Currently, the production of a vaccine, from initial idea to development, to testing, to approval, and finally to release into the medical market can take up to a decade, but “to halt a deadly airborne disease outbreak, that would need to be cut to as little as 90 days” (Farmer). New genetic technology increases the feasibility of a new development in this time frame, providing hope that a population could be resilient even after a biological attack.

So, how prepared is the United States to respond to an attack of such nature? Unfortunately, not very. In 2010, "a report from a bipartisan commission on the proliferation of weapons of mass destruction had given the country an 'F' for readiness against a bioterrorism attack" (Ridge and Lieberman). In the 1990s, Donald Trump was an advocate for better preparation for a bioterrorist attack, but since his inauguration as president there is little he has done to advance this specific issue. One of the largest obstacles to a strong biodefense program is the lack of a singular leader or agency given the responsibility to focus on this issue. The bipartisan Blue Ribbon Study Panel on Biodefense issued 87 recommendations over a year ago for the U.S. to improve its biodefense program (Ridge and Lieberman). Unfortunately, without leadership to take on these challenges, there is underwhelming progress being made on the national level. Despite leadership challenges, there was some progress made in the early 2000s in regard to legislation on this topic. Regulations were made protecting food supplies from biological tampering, and to allow for vaccine stockpiling (Hyder). These are important advances, but more is required of the United States in terms of direct research and development. In 2005, the U.S. passed a provision for the creation of the Biomedical Advanced Research and Development Authority (BARDA) (Hyder). BARDA specifically promotes research on vaccines and drugs that can counter biological attack. Research is the most significant step toward becoming adequately prepared for the threat of biological warfare, and BARDA is an essential step forward for U.S. policy.

The great hope of the biodefense narrative is that the same research that prepares a nation against biological attack can also prepare it to respond to natural disease outbreaks. One reality of infectious disease outbreaks is that they are much more likely to occur in regions of poverty due to factors like overcrowding, poor sanitation, and lack of access to medical care. Like many

other disciplines, the medical field responds most strongly to the demands of the affluent. However, biodefense research provides motivation for more affluent nations to invest in research that can be applied globally to natural disease outbreaks that are occurring even now. The Centers for Disease Control (CDC) is directly involved in evaluating U.S. strategies and research in the field of biodefense, with a particular focus on the role of public health in these programs. The recommendations of the CDC Strategic Planning Workgroup acknowledge that

> tools developed in response to terrorist threats serve a dual purpose. They help detect rare or unusual disease outbreaks and respond to health emergencies, including naturally occurring outbreaks or industrial injuries that might resemble terrorist events in their unpredictability and ability to cause mass casualties (Khan and Sage).

Unlike other areas of defense research, biodefense research can be incredibly effective in responding to crises of peace as well as war, making it an even more worthy pursuit of the U.S. and other countries.

International collaboration is another necessity and advantage of biodefense work. The Biological Weapons Commission (BWC) is an initiative that does not operate in a vacuum, but rather is integrated into other global health initiatives. There are many advantages to this overlap, because

> when global initiatives interconnect like this, it reinforces *all* of the initiatives. The Global Health Security Agenda, for instance, brings over 55 countries together to

> strengthen countries' capacities to prevent, detect, and respond to infection disease threats, whether natural, deliberate, or accidental (Jenkins).

International collaboration of this scale is absolutely unheard of in other sectors of national defense. Generally, it is irrational to collaborate with a potential enemy on a defense strategy. However, when it comes to biodefense, international collaboration is key to discovering the best scientific advances and fostering a world free of the scourge of disease outbreak. International collaboration facilitated by biodefense is a major force for eradicating disease and creating trust across nations.

Biological warfare is a part of human history and remains a current fear. Biological weapons are applicable in unique situations, effective, and difficult to combat. The U.S. and many other countries are currently not prepared well to respond to a biological attack. It is imperative to engage in biodefense research, as it will not only protect citizens from attack but also natural disease outbreaks, particularly in regions of poverty. Bioterrorism is not just a hypothetical threat. According to a 2017 U.S. national security report, Pyongyang is "pursuing chemical and biological weapons which could also be delivered by missile" ("North Korea"). This is a threat that the global community must consider in conjunction with nuclear threats and address with equal caution and fervor. While it is appropriate to fear biological attack, biodefense is not an entirely negative field: biological research can bring about solutions to global health epidemics and raise the standard of living for some of the world's most vulnerable. The field of biodefense is truly a tale of terror and hope.

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