

Building a Better Biologist: Codes of Conduct,
Biological Weapons and the 2008 Negotiation Process

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PWR 1: The Rhetoric of Editorials

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At the heart of the Hippocratic Oath is a solemn promise to do no harm, even when the tools of surgery can hurt just as easily as they can heal. Unfortunately, such a fundamental code of conduct remains out of reach for biologists, many of whom are facing ethical dilemmas posed by the increasing use of their research in designing biological weapons. The knowledge of biology, genomics and informatics has exploded in recent years, and this rapidly changing scientific landscape is where scientists and policymakers should be most concerned. Such knowledge has the power to save millions of lives through innovative new treatments, but it also provides the tools necessary to kill millions through the introduction of tailor-made viruses with incredible fatality rates. How do we stop this dual-use of basic biological research and prevent such a dystopic future? One possible method is creating codes of conduct that would codify fundamental principles of laboratory ethics while increasing the number of biologists aware of the growing threat of dual-use. Unfortunately, adding such a code to the Biological and Toxin Weapons Convention, the current arms control agreement passed in 1972, has been difficult. The treaty does not enforce any of its provisions since it has no verification protocol, instead opting for a more general prohibition. That prohibition has failed – biological weapons were continually developed by the Soviet Union after the treaty's entry into force, and terrorists such as Aum Shinrikyo have deployed them as well. Unfortunately, efforts to reform the treaty have been regularly thwarted by the United States, such as in 2001 against verification and in 2005 against codes of conduct themselves. However, the international popularity of the latter reform is so strong that they are returning for one final meeting in 2008. Such changes to the BTWC are incredibly overdue.

Due to the revolutionary changes biology has experienced in recent years, there is a mounting fear that biological weapons will be created through dual-use research. One answer to

this problem is the promulgation of codes of conduct to mitigate these risks. Thus, in order to enforce these instruments, the United States must take advantage of the widespread international agreement on their necessity at the 2008 Meeting of Experts and conclude with a clear and definite code for biologists to strengthen the BTWC and prevent any further collapse of the international talks. This is the only meeting to discuss this issue until after 2011. If the United States and the world fail to agree on such a simple reform, they may very well not get another chance for years, and the entire ban on biological weapons could be in jeopardy.

Contexts

The current environment for biological weapons, and the need for strong codes of conduct, stem directly from the massive developments in biology over the last decade. Starting in the late 1980s and early 1990s, the Human Genome Project (HGP) represented an enormous leap in the understanding of the human body (Roberts et al 1195). As Francis Collins, one of the original founders of DNA, said, "... it's a transformative textbook of medicine, with insights that will give health care providers immense new powers to treat, prevent and cure disease" (qtd. in "An Overview"). For the first time, biologists had a complete look at the code that determined everything from hair color to perceptibility for disease. The HGP, though, was merely the culmination of the lengthy study of genetics. Starting with the discovery of DNA in 1953, geneticists heavily researched methods of detecting genes and interpreting them ("The Discovery"). Driven by technological advances, especially in the 1980s, scientists realized they could sequence the entire strand one base-pair at a time (Baldi and Hatfield 3). That technological revolution has not stopped today; the Genetic Revolution and its links with bioinformatics continue to reshape human's understanding of the foundations of life.

It is within this context of change that biological weapons are becoming a greater threat to the world. Stephen Block looked into the situation in 1999 as part of JASON, "an independent scientific advisory group" that consults on US defense ("JASON"). He summarizes this point: "Rapid advances in molecular biology make it necessary to contemplate new BW threats" (*Living Nightmares* 43). That view was later one of the central points of the highly-influential 2003 CIA report entitled "The Darker Bioweapons Future." It predicted that biological weapons will become stronger and more effective in just the next few years (1). It connects that development with the massive technological revolution taking place in biology: "The genomic revolution is pushing biotechnology into an explosive growth phase. Panelists asserted that the resulting wave front of knowledge will evolve rapidly and be so broad, complex, and widely available to the public that traditional intelligence means for monitoring WMD development could prove inadequate to deal with the threat from these advanced biological weapons" (1). Codes of conduct must be considered within an environment where change is rapid and the threat of these weapons continues to escalate dramatically.

While biological weapons may be banned, the science behind them is often identical to research necessary to treat disease, creating issues of dual use. Dual use research is knowledge generated by biology labs that can be used for both an acceptable purpose, such as a new method of slowing cancer, and an unethical one, such as increasing the strength of a biological weapon pathogen (Atlas and Dando 276). The largest problem with dual use is enforcement – there is little ability to control how scientists use their research. In an interview, Stanford University biologist Stephen Block said, "Even if you stopped all publishing [today], there is enough literature to produce a nasty weapon" (Block Personal Interview). This lack of enforcement does not just worry biologists, but intelligence agencies as well. The CIA's report states, "The experts

emphasized that, because the processes, techniques, equipment and know-how needed for advanced bio agent development are dual use, it will be extremely difficult to distinguish between legitimate biological research activities and production of advanced BW agents" (2).

Without the ability to detect the weapons before they are used, dual use research is an important component of understanding the current environment of biological weapons production and how codes of conduct can mitigate some of the risks associated with it.

These dual use issues, along with the explosive growth in knowledge regarding genetics, have created an environment for biological weapons that is very different than for other weapons of mass destruction. At their core, nuclear and biological weapons are fundamentally different problems. Nuclear weapons require enormous resources, rare expertise and unique materials that are extremely difficult to find and extract. This is the opposite for biological weapons: the knowledge to produce them is widely available and there are significantly more people capable of producing them (Block Personal Interview, US CIA). Three authors in *JAMA* summarize, "The cost of this technology is significantly less than that associated with the development of nuclear or even chemical weapons" (Kadlec, Zelicoff, and Vrtis 356). For these reasons, biological weapons are emerging as a critical concern in international security circles. The CIA's report states that nuclear and biological weapons are fundamentally different, and different approaches will be needed to counter them (2). Furthermore, the tone of the report indicates that the CIA sees the threat from biological weapons to be equal to or greater than nuclear weapons. Such an alarming finding is further corroborated by a recent survey of senior US policymakers and experts by the Center for Strategic and International Studies. That survey showed that a majority of respondents believed that biological weapons were at least as risky as biological weapons, with many listing dual use and the genetic revolution as their top reasons (4). Since

biological weapons are so different than their atomic cousins, it is important that the United States approach the problem with a more suitable diplomatic strategy.

While much of the discussion has focused on future threats, the fear of a biological attack is not imaginary, as such attacks have already happened on several occasions. Former New York Times reporter Judith Miller did an in-depth investigation regarding biological weapons and published her findings in the book *Germs*, which greatly increased awareness of a host of recent attacks from salmonella poisoning in Oregon to secret government programs (Miller). One of the major programs was in the Soviet Union, which began shortly after the Soviets signed the BTWC to ban biological weapons. Shockingly, the Soviets believed that the treaty was nothing more than a "worthless piece of paper" (qtd. in Davis 2). The Biopreparat, as it was called, had nearly 60,000 workers. More harrowing though was the accidental release of Anthrax on Sverdlovsk near one of the laboratories, which killed 100 people (Block, "The Growing Threat," 31). While the size of the Soviet Union's program scared many observers of international security, the more worrisome stories have been the actual release of bioagents by Aum Shinrikyo in Tokyo. In that case, thousands were injured when they deployed sarin nerve gas in a subway during rush hour (Block, "The Growing Threat," 35). Block believes that the only reason why they were not successful was because the group was "anti-science" and not due to some technical restriction (Personal Interview). Due to the serious number of close calls and several actual releases over the last few decades, the belief that these weapons are tangible and a significant threat has gained credence.

Understanding the negotiations of the past and the current negotiations over codes of conduct requires a full understanding of the range of issues affecting biological weapons. The enormous revolution in scientific knowledge created by the HGP has led to some of the most

novel cures ever created. However, that same technology has the power to create some of the most lethal viruses in the world – the risk of dual use that has been increasingly feared. While the alarming warnings from biologists like Stephen Block and government agencies such as the CIA have increased awareness of the threat, so have actual attacks such as the one by Aum Shinrikyo. Especially now, after 9/11 and sudden focus on terrorism, biological weapons are one of the primary concerns of analysts. Due to their cheap costs, these weapons are more likely to be created than nuclear weapons, especially for cash-strapped terrorist networks. As Block puts it, "There is an inevitability to [the use of these weapons]" (Personal Interview). It is this threat that has raised the profile of bioweapons among senior US policymakers, to the point where biological weapons are perceived to be as large a threat as nuclear ones. For the 2008 Meeting of Experts, the negotiators are facing this context, both with their governments and with the people of the world.

The Convention

The Biological and Toxin Weapons Convention is the main arms control agreement that prohibits biological weapons. First agreed to in 1972, it entered into force in 1975 and has been in effect ever since, today enjoying the signatures of 171 nations. The treaty is an extension of the Geneva Conventions of 1925, which were passed in response to the enormous casualties from poison gas in World War I ("The Biological and Toxin Weapons"). While the conventions represented the first arms control agreement against biological weapons, the BTWC is the first global arms control agreement in history ("Can the Line" 1). The treaty is composed of ten titles, the most important of which is Title I – also known as the General Use Criterion ("The Biological and Toxin Weapons"). It bans "[...] 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 other peaceful purposes [...]" (United Nations Convention 1). This line is the legal definition of dual use and is similarly controversial. How can one develop peaceful countermeasures to biological weapons without creating technologies that lead to the weapons themselves? The answer is that no nation can, and thus this line remains one of the hardest for international observers to agree on. In addition to Title I, the treaty enforces its provisions by allowing each state party to send a resolution to the UN Security Council for a decision and also specifically encourages the transfer of information regarding biological weapons between parties for peaceful purposes (United Nations Convention 2). Together, the treaty is a compact agreement banning biological weapons.

The BTWC, however, does not have a strong verification mechanism to enforce its provisions. The treaty was negotiated and agreed to in the early 1970s, during the heart of the Cold War. Neither side wanted to open their military installations to the other for inspections (especially the Soviets, due to the aforementioned secret biological weapons program). Therefore, the only enforcement mechanism was through the UN Security Council, where both the United States and the Soviet Union hold a veto. Due to this design, the treaty has never been truly enforceable, since both countries could easily stop any attempt to punish a breach of the convention (Kadlec, Zelicoff, and Vrtis 353). The issue of verification rose to prominence in the 1990s with the discovery of the Soviet program (Kadlec, Zelicoff, and Vrtis 351). Multiple groups have attempted to add such a protocol to the original treaty, including the VEREX (Verification Expert) committee and the Ad Hoc Group (Kadlec, Zelicoff, and Vrtis 353). The work of the Ad Hoc Group culminated in 2001 with a provisional protocol, but failed for reasons that will be discussed shortly. Regardless of these attempts, the treaty has been undermined

since its inception and verification remains the most important part of the convention under discussion.

Codes of Conduct

The international community has focused on codes of conduct for several years now, and covering their fundamentals is important for the current negotiations. Codes of conduct are "Educational or advisory codes that aim to provide guidelines for action, raise awareness of issues, and foster moral agency" (Rappert 146). One thing Rappert notes is that the term could probably be better delineated between codes of ethics, conduct and practice; however, this paper will continue to use codes of conduct as an all-encompassing general term. The concept of a fundamental code is not new to professional organizations. The best known code of conduct is the Hippocratic Oath, which at its very core demands that doctors do no harm. The original code is dated from the 4th century BC ("The Hippocratic Oath"). While the oath is one of the most famous codes of conduct, other professionals are similarly sworn in with their own versions. The American Bar Association passed the "ABA Model Code of Professional Responsibility" in 1983 (1). The American Psychology Association first published a code of conduct in 1953 (Amer. Psychology Assoc.). While there are codes of conduct in a wide variety of disciplines, there is still no code of conduct specifically addressing the issue of biological weapons or dual use, or even for biologists more generally (Rappert). In fact, this option has only been given prominence in the last decade since the collapse of the 2001 negotiations (Rappert 145). Codes of conduct are new to the discussion of counter-proliferation efforts, but such codes are certainly not new to scientists or professionals in other fields.

The debate over codes of conduct has continued for some time, and there are many

proposals on how such a code should be designed. One of the most influential examples was in an editorial by Margaret A. Somerville and Ronald M. Atlas in *Science*. Their nine-point code of conduct covers an array of biological issues. Their first point is that biologists should do no harm (echoing the Hippocratic Oath) by refusing to take part in any research that "is intended to facilitate or that has a high probability of being used to facilitate bioterrorism or biowarfare [...]" (Somerville and Atlas 1882). As such, they have made dual use paramount in their code. One of their most controversial aspects, though, was point three, in which the authors wrote, "Call to the attention of the public, or appropriate authorities, activities (including unethical research) that there are reasonable grounds to believe are likely to contribute to bioterrorism or biowarfare" (Somerville and Atlas 1882). This particular claim was questioned in letters that *Science* later published. Lewyn Li at Columbia University believed that such a requirement would be ineffective since the federal government pays for most biological research. Thus, the code should focus more on international authorities (Li 1012). While there has been much debate on their code, it has generally been well received. As this example shows, codes of conduct for biologists should include a highly prioritized decree warning against dual use in research.

The benefits of a code of conduct, such as the one discussed above, are numerous. One of the most important benefits is the idea of a "web of verification" that would reduce the risk of biological weapons research. The CIA report notes this by saying that "a living sensor web" could create an environment where biologists look over each other and their institutions for signs of impropriety (2). This web comes directly from a code of conduct that would finally give biologists a standard by which to judge projects and each other in research. Building such a web is not just supported by government agencies, but scientific societies. The Royal Society, the premier science organization in the United Kingdom, writes in a position paper that "In the UK a

series of checks and balances exist at the different stages of the work to reduce the possibility of the misuse of scientific research. Collectively these steps create a web of prevention" (The Roles 5). They argue that a code of conduct would strengthen each of these checks, and thus reduce the risk of dual use research. Beyond a web of verification, there are benefits for individual biologists. The first paragraph of the Royal Society's position paper notes that "The process of producing codes raises awareness amongst the target groups and fosters discussion on the potential for misuse [...] it should also increase the number of individuals aware of the issues of concern" (The Roles 1). The issue of awareness is one of the most critical; as Nature wrote in an editorial endorsing codes of conduct, "a social scientist [...] described discussions with 600 biologists in the United Kingdom, most of whom were blissfully unaware of issues of 'dual use' that learned societies, biological weapons convention negotiators and others have been fretting about for years" ("Rules of Engagement" 2). Therefore, the codes have a publicity value as well. Related to this issue is the educational benefit of teaching a code of conduct and making new scientists aware of the larger issues of biological weapons (Rappert 146 and Royal Society, Issues, 1). Since a code of conduct would be part of any laboratory training, the issues of dual use would be brought up early. Between the web of verification, publicity and educational benefits, codes of conduct provide an enormous amount of value for the biological sciences.

Past Negotiations

The reason the United States must support codes of conduct in 2008 is a direct result of its behavior in previous negotiations. While the BTWC has been revisited numerous times since its inception, no meeting was more contentious than the Fifth Review Conference in 2001. That conference was to consider methods of adding a verification method to the original convention as

designed by the Ad Hoc Group ("United Nations Office at Geneva"). Negotiations for the conference were steady until the United States, in a last-minute change of policy, decided to leave the talks (Tucker). According to Jonathan Tucker of the Monterey Institute, the US rejected the protocol "[...] on the grounds that the Protocol would be ineffective at preventing cheating yet would impose undue burdens on the U.S. biotechnology and pharmaceutical industries and on U.S. government biodefense programs" (Tucker 1). As discussed earlier, verification is one of the biggest shortcomings of the original convention. The collapse of these negotiations, therefore, was a major blow to the BTWC and its prospects for the future. Little did the United States know that just two months after abandoning the negotiations, the country would be hit by the combination of 9/11 and the anthrax letter scare. In fact, the US position became so untenable that President Bush specifically reiterated that "The United States is committed to strengthening the Biological Weapons Convention (BWC) as part of a comprehensive strategy for combating the complex threats of weapons of mass destruction and terrorism" (US White House). This statement was a significant shift in policy from just two months before. Furthermore, the president endorsed a plan to use codes of conduct as one of the ways to strengthen the convention (US White House). After another year of consultations, the state parties agreed to begin yearly meetings to discuss the different issues of enforcing the BTWC ("United Nations Office at Geneva"). While the United States killed efforts to add verification to the BTWC, a changed strategic landscape brought about a shift in policy, one supporting a variety of reforms including codes of conduct.

The yearly meetings were held from 2003-2005, with the final meeting focused on finalizing codes of conduct – a goal it failed to accomplish. From the UN Office of Geneva press release: "The Meeting of Experts convened to discuss, and promote common understanding

and effective action on [codes of conduct]" (Report 1). Instead of passing the reform, the participants merely talked about them. In fact, the official press release is replete with mentions on how the participants "discussed" the issue. The important phrase is effective action – the meeting was nothing more than a large conversation. From the same press release: "Participants debated the overall benefit of codes of conduct [... and] Experts discussed the relative merits [... and] participants discussed how limiting the scope of a code or codes to scientists alone would exclude decision makers" (Report 1). Such an outcome is unfortunate, considering that many prominent institutions including the Royal Society supported the meeting and its agenda (Issues for discussion). The obstacle at this meeting, like the Fifth Review Conference, was the United States. US Ambassador Donald Mahley said that while he supported the general idea of codes of conduct, creating a universal one was "not practical" ("Code of Conduct"). It was this debate over codes of conduct that again destroyed the momentum of the negotiation process, leaving the treaty dangerously unamended for another year. The United States again failed to negotiate reforms, forcing the 2005 Meeting of Experts to conclude with a desire for more discussion rather than clear action.

The 2005 meeting led into the Sixth Review Conference in 2006, and while the United States was not as vindictive in these negotiations, very little progress was made on any of the points under consideration. The meeting was so ineffective that *Science's* final coverage of the event began with the line, "At least nobody slammed the door shut" ("Little Progress" 1673). That was unfortunate, since these meetings every five years are supposed to move the treaty forward. *The Economist's* post-conference editorial lambasted the United States for not taking investigations more seriously ("Can the line"). On a more positive note, codes of conduct were discussed at the meeting as a possible replacement for the failed verification protocol, and they

seemed to pick up some of the momentum they had lost in 2005. While the results of the meeting were minor, there was an agreement to hold more intersessional meetings, with one of the topics to be discussed being codes of conduct ("United Nations Office at Geneva"). *The Economist's* editorial encouraged nations to push for these standards, because it could strengthen the treaty while being commercially advantageous ("Can the line" 2). The conference was able to function, but it failed to pass codes of conduct yet again, although recommended continued discussion.

2008 Meeting of Experts

The international community will continue those discussions at the 2008 Meeting of Experts, hopefully finalizing an agreement on codes of conduct. The 2008 meeting is the second one of the 2007-2010 Intersessional Process, and will be held from August 18 to August 22 in Geneva. While there are several issues the meeting could address, the chairman of the meeting, Georgi Avramchev, has decided that the meeting will focus on codes of conduct. In a speech given in front of the biological sciences community at the Second International Forum on Biosecurity, he said that codes of conduct would be one of the two main issues brought before the meeting (Avramchev, "Bringing Biologists on Board" 4). More importantly, the rhetoric used indicates a strong desire to get the scientific community involved; just consider the title of the speech, "Bringing Biologists on Board." The chair has also structured the meetings around the goals of increasing education on biological weapons. In his April letter to state parties, Avramchev states that he will devote a three hour session to each of the following: oversight of science, education and awareness raising, and codes of conduct (Avramchev, "To the Permanent," 24 Apr. 2008, 2). It is important to note that while there is increased emphasis on

action at this meeting by the chair, such action has no guarantee to take place without US support. The 2008 Meeting of Experts will focus much attention on discussing and hopefully passing a code of conduct for biologists.

While the meeting will focus on this important topic, the bigger question is why should the international community pass this reform now, so many years after it was first introduced. The answer is that there is a rare momentum to pass it by a wide array of actors, from international organizations to state parties. At the end of the 2006 Review Conference, many of the state parties called for promulgating codes of conduct, including Norway, Japan, Pakistan, the Vatican and Chile (Pearson and Dando). Importantly, many international organizations have accepted invitations to attend the event, including many who have never attended previous ones. These include several international unions of scientists and engineering groups as well as the journal *Nature* (UN OG, "List of Organizations," 1). In all, there are 7 international organizations and 27 scientific organizations invited and attending the meeting. This is a major difference from the 2007 Meeting of Experts, in which no scientific organizations were invited at all (UN OG "List of Participants" 33-34). Scientists have taken a larger interest in the meeting as well, which will be described in a moment. There is a wide agreement that codes of conduct are necessary, a consensus that has been rare in biological weapons negotiations, and the international community must seize this opportunity to pass a needed reform.

Another major reason for the timing of this issue is the structure of the meetings for the next several years. According to the chair of the 2008 meetings, the 2009 meeting will cover surveillance and detection and the 2010 meeting will consider assistance to governments (Avramchev, "Bringing Biologists on Board," 3). In other words, this will be the only meeting before the Seventh Review Session in 2011 that will consider codes of conduct. Due to the

momentum on this issue, there is simply no way that this reform will pass then if it has not been entirely agreed to at the meeting of experts this year. That would mean a delay of three years or more, something that the BTWC can ill afford as it attempts to again legitimize itself as an arms control agreement. As the history of these negotiations have shown, getting any sort of consensus has been a major barrier to strengthening the convention. Therefore, if the international community were to lose this opportunity to progress forward with wide support, it could seriously endanger the treaty, making it almost irrelevant against the continual increase in biological knowledge. When the actual meeting takes place, the United States will have the power to decide if this reform is passed. As in the 2005 meeting, the United States' tone has a powerful effect on the outcome of these discussions. Therefore, the administration must get serious about the threats of a biological attack and support codes of conduct. This year's meeting provides a rare consensus on an important reform, and the US must take advantage of the momentum before the international community loses focus.

In a welcome change, the momentum for the talks does not originate entirely with the international community, but with scientists as well. In one of the most influential editorials written on the subject, *Nature* called for a large debate regarding codes of conduct slightly before the 2005 meeting. While the editorial was poorly timed – scientists can hardly be expected to generate an opinion on such a complex topic in a week – the editorial is a milestone in "Bringing Biologists on Board" as the chairman of the 2008 meeting calls it. The editorial compares codes of conduct to drivers' licenses and states that the two are not so dissimilar ("Rules of Engagement" 2). The editorial ends with a call for scientists to get involved: "Codes of practice have so far attracted little attention in the biology community. But in a world threatened by terrorism, governments are taking more interest in such codes, and scientists would do well to

engage in a constructive discussion about what role they might play" ("Rules of Engagement" 2). With time to consider the proposals, scientists are moving more toward accepting the idea of codes of conduct. Biologist Stephen Block believes that while codes of conduct will not stop proliferation, they can be used as an educational tool to teach about the issues of dual use (Personal Interview). With scientists warming to the idea of regulation, there are fewer groups opposed to the promulgation of codes of conduct at the 2008 Meeting of Experts.

Conclusions

Codes of conduct are not a solution to biological weapons proliferation. In fact, they do little to stop the most likely source of these weapons – terrorists. However, their value is far wider than simple prevention. Biologists are often unaware of the dangers of dual use, the idea that research has multiple applications and can just as easily be used to heal as to harm. Codes of conduct will raise awareness while creating a fundamental standard for all biologists to use. The timing of the 2008 Meeting of Experts to discuss this issue is well placed to be successful. With the chairman fully engaged on the issue, and many scientific bodies attending and supporting the meeting, there is a unique interest in seeing this vital reform pass. For the world, the codes could not come at a more important time. The revolution in biology precipitated by the Human Genome Project has led to fantastic new cures, but also the means to create some of the deadliest weapons ever conceived. Unfortunately, the original arms control agreement to stop the spread of these weapons, the Biological and Toxin Weapons Convention, has failed to be reformed in more than a decade, greatly lowering its relevance in stopping rogue states and terrorists from using them. The history of the negotiations on that treaty demonstrates that the United States is often the country behind such failures, such as its last minute refusal to accept verification in

2001 and its refusal to accept a universal code of conduct in 2005. However, the United States will be granted a second chance in 2008, when the issue returns with wider support, especially from scientists. The US must work to enforce codes of conduct at this critical juncture, since the BTWC is weakening every year with the new developments in genomics and bioinformatics. The Hippocratic Oath has prevented many of the ethical issues for doctors that are currently being faced by biologists. The world can, and hopefully will, benefit when the United States supports code of conduct and begins the transition to a more secure world. It is time to dull the two-edged blade of biological research and stop the proliferation of what the CIA report calls, "these engineered biological agents [...] worse than any disease known to man" (1).

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