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Background paper

The Problem of Biological Weapons*

Every major technology---metallurgy, explosives, internal combustion, aviation, electronics, nuclear energy---has been intensively exploited not only for peaceful purposes but also for hostile ones. Must this also happen with biotechnology-- certain to be a dominant technology of the coming century?

Such inevitability is assumed in "The Coming Explosion of Silent Weapons" by Commander Steven Rose (*Naval War College Review*, Summer 1989), an arresting article that won essay awards from the US Joint Chiefs of Staff and the Naval War College:

The outlook for biological weapons is grimly interesting. Weaponers have only just begun to explore the potential of the biotechnological revolution. It is sobering to realize that far more development lies ahead than behind.

If this prediction is correct, biotechnology will profoundly alter the nature of weaponry and the context within which it is employed. During World War II and the cold war, the United States and the Soviet Union developed and field-tested biological weapons designed to attack people and food crops over vast areas. During the century ahead, as our ability to modify fundamental life processes continues its rapid advance, we will be able not only to devise additional ways to destroy life, but will also be able to manipulate it---including the processes of cognition, development, reproduction, and inheritance.

A world in which these capabilities are widely employed for hostile purposes would be a world in which the very nature of conflict had radically changed. Therein could lie unprecedented opportunities for violence, coercion, repression or subjugation. Movement towards such a world would distort the accelerating revolution in biotechnology in ways that would vitiate its vast beneficial application and could have inimical consequences for the course of civilization.

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Is this what we are in for? Is Commander Rose right? Or will the factors that have prevented the use of biological weapons thus far survive into the coming age of biotechnology? After all, despite the fact that the technology of devastating biological weapons has existed for decades, their only use in war appears to have been that by the Imperial Japanese Army in Manchuria, more than half a century ago.

The longstanding norm against any use of biological weapons serves not only to constrain the actions of the majority who are influenced by it, but also to enhance the deterrence of any who may be disposed to flout it. Whether and under what circumstances Iraq would have used the biological weapons it was attempting to develop before its Gulf War defeat in 1991 is unknown. But if Iraq had done so, the very fact of violating such a basic and longstanding norm of international behavior would have widely been seen as justification for drastic reprisal.

A similar history of restraint can be traced for chemical weapons. Although massively used in World War I and stockpiled in great quantity during World War II and the cold war, chemical weapons---despite the hundreds of wars, insurgencies, and terrorist confrontations since their last large-scale employment 80 years ago---have seldom been used since. Their use in Ethiopia, China, Yemen, and Vietnam (if one includes harassing agents), and against Iranian soldiers and Kurdish towns are among the very few exceptions. Indications that trichothecene mycotoxins had been used in Laos and Cambodia in the 1970s and 1980s proved to be illusory.

Instead of the wave of chemical and biological terrorism some feared would follow the lethal sarin gas attacks perpetrated by the Aum Shinrikyo Cult in Japan in 1994 and 1995, there has been only a sudden epidemic of "biohoaxes" and several relatively minor "biocrimes", undoubtedly stimulated by recent official and media attention to the potential for CBW terrorism. Two years after the Aum attack in the Tokyo subway, the FBI Section Chief for Domestic Terrorism told the Congress that "our investigations in the United States reveal no intelligence that state sponsors of terrorism, international terrorist groups, or domestic terrorist groups are currently planning to use these deadly weapons in the United States."

Whatever the reasons---and several have been put forward---the use of disease and poison as weapons has been extremely limited, despite the great number of wars and bitter insurgencies that have occurred since the underlying technologies of the weapons became accessible. Human beings have exhibited a propensity for the use, even the veneration, of weapons that bludgeon, blast, or cut, but have generally shunned and reviled weapons that employ disease and poison. We may therefore ask if, contrary to the history of other major technologies, the hostile exploitation of biotechnology can be averted.

The factor that compels our attention to this question is the possibility that any major

turn to the use of biotechnology for hostile purposes could have consequences qualitatively very different from those that have followed from the hostile exploitation of earlier technologies. Unlike the technologies of conventional or even nuclear weapons, biotechnology has the potential to place mass destructive capability in a multitude of hands and, in coming decades, to reach deeply into what we are and how we regard ourselves. It should be evident that any intensive exploitation of biotechnology for hostile purposes could take humanity down a particularly undesirable path.

Whether this happens is likely to depend not so much on the activities of lone misanthropes, hate groups, cults or even rogue governments as on the policies and practices of the world's leading states.

In the United States, there was abrupt and remarkable change---from nearly thirty years of being deeply engaged in the development and production of biological weapons to the dramatic and unconditional US renunciation of biological weapons declared by President Nixon in November 1969 and the US renunciation of toxins three months later. Today the former offensive biological weapons program of the United States and the logic behind its abolition are largely forgotten, although there are valuable lessons to be learned from both.

During World War II, research, development, and pilot-scale production of biological weapons was centered at Fort (then Camp) Detrick, in Maryland. Large-scale production was planned to take place at a plant near Terre Haute, Indiana, built in 1944 for the production of anthrax and the filling of anthrax bombs. Equipped with twelve 20,000-gallon fermentors, it was capable of producing fill for 500,000 British-designed 4-pound anthrax bombs a month. Although the United Kingdom had placed an order for anthrax bombs in 1944 and the plant was ready for weapons production by the following summer, the war ended without anthrax having actually been produced.

Contrary to the view that biological weapons are easy to develop, by the end of the war Fort Detrick comprised some 250 buildings and employed approximately 3,400 people, some engaged in defensive work but many in the development and pilot production of weapons. Several years after the end of the war, the Indiana plant was demilitarized and leased to industry for production of antibiotics. It was replaced by a more modern and flexible biological weapons production facility constructed at Pine Bluff Arsenal, in Arkansas, which began production late in 1954 and operated until 1969.

A major effort of the 1950s was encompassed under Project St. Jo, a program to develop, test, produce, and deploy anthrax bombs to Europe for possible use against Soviet cities. In order to determine quantitative munitions requirements, 173 releases

of non-infectious aerosols were secretly conducted in Minneapolis, St. Louis and Winnipeg---cities chosen to have the approximate range of conditions as regards climatology, urban and industrial development, and topographic features that would be encountered in the major potential target cities of the USSR. The weapon to be used was the E133 cluster bomb, holding 536 biological bomblets, each containing 35 milliliters of a liquid suspension of anthrax spores and a small explosive charge fused to detonate upon impact with the ground, thereby producing an infectious aerosol to be inhaled by persons downwind. In later years anthrax was abandoned as a standardized US lethal biological agent and replaced with a lethal strain of tularemia, a much less persistent and more predictable agent. Other agents---the bacteria of brucellosis, the rickettsia of Q fever, and the virus of Venezuelan Equine Encephalomyelitis, all more incapacitating than lethal, as well as fungi for the destruction of rice and wheat crops---were also introduced into the US bioweapons stockpile, along with improved munitions for high-altitude delivery and spray tanks for delivery of agent by low-flying aircraft. According to recent published accounts, these developments culminated in a major series of biological weapons field tests using various animals as targets, conducted at sea in the South Pacific in 1968.

Soon after Richard Nixon became President, he ordered a comprehensive review of US biological weapons programs and policies---which had been unexamined and unanalyzed by policy makers for fifteen years. Each relevant government department and agency was instructed to consider a range of options and to present its own evaluation. In November 1969 the President announced that the United States would unilaterally and unconditionally renounce biological weapons. The US stockpiles were destroyed and the facilities for developing and producing them were dismantled or converted to peaceful uses. US biological programs were ordered confined to defensive purposes, strictly defined. President Nixon also declared that, after nearly 50 years of US recalcitrance, he would seek ratification of the 1925 Geneva Protocol, prohibiting the use in war of chemical and biological weapons. He also announced US support for an international treaty proposed by the United Kingdom, banning the development, production, and possession of biological weapons, leading to the Biological Weapons Convention of 1972.

It is important to note that these US decisions went far beyond the mere cancellation of a program. They renounced, without prior conditions, even the option to have biological and toxin weapons. What was the underlying logic?

First, it had become evident through the results of our own biological weapons program that deliverable biological weapons could be produced that would kill people, livestock, and crops over large areas.

Second, it was realized that our biological weapons program was pioneering a technology that, although by no means easy to create, could be duplicated with

relative ease, making it possible for a large number of states to acquire the ability to threaten or carry out destruction on a level that could otherwise be matched by only a few major powers. Our biological weapons program therefore risked creating additional threats to ourselves with no compensating benefit and was undermining prospects for combating the proliferation of biological weapons.

The clear policy implication was that we should convincingly renounce biological weapons and seek to strengthen international barriers to their development and acquisition. The US renunciation of biological weapons was seen as a major step away from a universal menace. As President Nixon expressed it in November 1970, "Mankind already carries in its own hands too many of the seeds of its own destruction."

The 1972 Biological Weapons Convention (BWC) entered into force in 1975. It is the first worldwide treaty to prohibit an entire class of weapons. The BWC now has some 140 states parties, with the most important holdouts in the Middle East. Unlike the Chemical Weapons Convention (CWC) of 1993, it has no organization, no budget, no inspection provisions, and no sanctions---only a pledge by states never to "develop, produce, stockpile or otherwise acquire or retain" biological agents or toxins "of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes" or "weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict."

While the United States renounced biological weapons and abided by the BWC, the Soviet Union did not. According to recent statements by officials of the former Soviet program, it was believed that the US renunciation of biological weapons was a hoax, intended to hide a secret offensive program. Aware of the major US investment in biological weapons during the cold war and of the dynamic US lead in microbiology and biochemistry, the Soviet Union continued its preparations to be able to employ biological weapons on a large scale.

An example is the facility built for the production of anthrax bombs in the early 1980s at Stepnogorsk in what is now the independent Republic of Kazakhstan. Recently dismantled under the US Cooperative Threat Reduction Program, in cooperation with Kazakhstan, it was equipped with ten 20,000-liter fermentors, apparatus for the large-scale drying and milling of the agent to a fine powder, machines for filling it into bombs, and underground facilities for storage of the filled munitions. According to its cold war director, Stepnogorsk conducted numerous developmental and test runs but never produced a stockpile of anthrax weapons. Nevertheless, there is no doubt that its purpose was to provide a capability to commence production on short notice if ordered to do so.

According to the Russian Federation's 1992 declaration of past biological weapons

activities, presented to the United Nations under the voluntary confidence-building agreement among States Parties to the BWC, work on the mass production and dispersion of biological agents was done at Sverdlovsk (now Ekaterinburg), Zagorsk (now Sergiyev Posad), and Kirov between the mid-1960s and 1975. At the Sverdlovsk facility, an accidental release of anthrax in April 1979 is known to have killed nearly 70 people downwind and to have killed sheep in villages out to a distance of 50 kilometers.

Field testing of aircraft and missile delivery systems for biological agents was conducted on Vozrozhdeniye island in the Aral Sea. In a 1998 interview with a Moscow newspaper, the general in charge of Russian biological defense is quoted as saying that activities at the test site in the 1970s and 1980s were "in direct violation of the anti-biological treaty."

The former Soviet facilities at Ekaterinburg, Sergiyev Posad, and Kirov remain closed to foreigners. US-Russian-British discussions that had achieved agreement on the principle of reciprocal visits to each other's military biological facilities as a means of resolving ambiguities have foundered and are in abeyance. Continuing suspicions, together with the general deterioration in US-Russian relations, hamper joint efforts to avert a long-term threat to both. While it was the two cold war superpowers that did most to bring biological weapons into existence, only the United States, under Nixon, fully understood that its best interest was in credible renunciation.

At present, we appear to be approaching a crossroads---a time that will test whether biotechnology, like all major predecessor technologies, will come to be intensively exploited for hostile purposes or whether instead our species will find the collective wisdom to take a different course. An essential requirement is international agreement that biological and chemical weapons are categorically prohibited. With the BWC and the CWC both in force for a majority of states, including all the major powers---and despite the importance of expanding the membership of both treaties still further---the international norm is unambiguously established.

During its first two and a half years of operation, the CWC with its staff of approximately 200 trained inspectors, conducted some 350 inspections of declared chemical weapons-related facilities and sites and certain industrial facilities---including inspections of 34 chemical weapons storage sites holding some 8,000,000 chemical munitions slated for internationally verified destruction, mainly in the United States and the Russian Federation.

What can international treaties like the CWC accomplish? First, they define an agreed norm, without which arms limitation cannot succeed. Second, they act to keep compliant states compliant when they are under pressure to encroach at the limits, potentially eroding the overall norm. Third, their procedures for declaration and

on-site monitoring and inspection pose the threat of exposing noncompliance and coverup, creating a disincentive for potential violators. In particular, exposure by an international treaty organization makes it politically more difficult for compliant states to ignore violations and more likely they will take measures to terminate them and punish the violators.

In Geneva, negotiations are underway to strengthen the BWC. There is broad agreement that there should be mandatory declarations and on-site measures, administered by a standing organization. The United Kingdom and some other European states favor the adoption of declaration and inspection procedures similar to those in operation under the CWC, while others, including the United States, have so far argued for less rigorous measures.

The prohibitions embodied in the BWC and the CWC are directed to the actions of states, not individuals. Recently, interest has developed in the possibility of a convention to create international law that would hold individuals criminally responsible for acts that are prohibited to states by the biological and chemical weapons conventions. Such a convention, which would be patterned on existing conventions that criminalize aircraft hijacking, nuclear theft, and other crimes that pose a threat to all, would make it an offense for any person, regardless of official position, to order, direct or knowingly render substantial assistance in the development, production, acquisition, or use of biological or chemical weapons. A person who commits any of the prohibited acts anywhere would face the risk of prosecution or of extradition, should that person be found in a state that supports the proposed convention. International law that would hold individuals criminally responsible would create a new dimension of constraint against biological and chemical weapons. Such individuals would be regarded as *hostes humani generis*—enemies of all humanity. The norm against chemical and biological weapons would be strengthened; deterrence of potential offenders, both official and unofficial, would be enhanced; and international cooperation in suppressing the prohibited activities would be facilitated.

What we see here---the non-use of biological weapons; the opprobrium in which they are generally held; the international treaties prohibiting their development, production, possession, and use; the initiation of mandatory declarations and on-site inspection under the CWC and negotiations to strengthen the BWC with similar measures; and the possibility of an international agreement to make biological and chemical weapons offenses international crimes, subject to universal jurisdiction and applicable even to leaders and heads of state---suggests that it may be possible to reverse the usual course of things and, in the century about to begin, avoid the hostile exploitation of biotechnology. Doing so will require wide understanding that the problem of biological weapons rises above the security interests of individual states and poses an unprecedented challenge to all.