Chapter 3
Weighing the US Proposals to Criminalize Offensive Bioweapons Activities, Improve Global Disease Surveillance, and Institute Scientific Codes of Ethics

The Bush administration announced initiatives at the 2001 Biological and Toxin Weapons Convention (BWC) Fifth Review Conference intended to move individual nations to build up their domestic capacities to prosecute biocrimes, to detect and respond quickly to disease outbreaks, and to create professional codes of conduct for scientists working with dangerous pathogens. This chapter treats this set of proposals in turn. After the US government's proposals are briefly recapitulated, the discussion proceeds to a mixture of background information and the points that the representatives of the US pharmaceutical and biotechnology weighed. Each section of this chapter ends with a brief statement from the industry experts that captures their views and recommendations to improve these initiatives.

CRIMINALIZATION OF OFFENSIVE BIOLOGICAL WEAPONS ACTIVITIES

One of several alternatives that the Bush administration proposed to a multilateral, legally binding BWC monitoring protocol was that individual BWC members criminalize offensive biological weapons activities. In tandem, the US government proposed that BWC members enhance bilateral extradition agreements with each other to prevent their citizens from being prosecuted abroad.[1]

The need for criminalization of offensive biological weapons activities arises because the BWC's prohibitions against the production, procurement, and use of biological weapons refer primarily to the actions of states. Only vaguely does the BWC address the issue of individual responsibility.[2] Yet, the threat of biological weapons usage by terrorists requires a coordinated international effort to deter and penalize the actions of individuals. Unifying international standards for criminal misconduct would punish all individuals, regardless of nationality, who attempt to acquire or use these weapons of mass destruction.

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[1] US Department of State, "New Ways to Strengthen the International Regime Against Biological Weapons," fact sheet, 19 October 2001, 3-4. Available at http://www.state.gov/t/ac/bw/fs/2001/7909.htm.

[2] Article IV of the BWC requires each state to prohibit activities on its territory, "in accordance with its constitutional processes," that are prohibited to states under the Convention. This language implies, though by no means mandates, that states must hold their citizens responsible for violating the BWC's provisions. Matthew Meselson and Julian Robinson, *A Draft Convention to Prohibit Biological and Chemical Weapons Under International Criminal Law*, The Harvard Sussex Program on CBW Armament and Arms Limitation, 1 November 2001. Available at http://www.fas.harvard.edu/~hsp/crim01.pdf.

Previous Steps Toward Criminalization

The BWC's 145 members have long recognized the need to further bolster compliance by integrating the treaty's legal prohibitions into national legal systems.[3] Although the BWC requires states to "take any necessary measures to prohibit and prevent" BWC violations under their jurisdiction,[4] this imprecise phrasing leaves ample room for interpretation as to exactly what is required. Moreover, the BWC's language stands in sharp contrast to the clear requirement in the Chemical Weapons Convention that member states adopt penal legislation for those who violate the treaty's prohibitions.[5]

A decade after the BWC entered into force, successively stronger and more explicit proposals began surfacing to reinforce the BWC's domestic legal status. In 1986, the Second Review Conference noted the importance of "legislative measures…designed effectively to guarantee compliance with the provisions of the Convention."[6] The Third Review Conference called upon each BWC member to make an annual voluntary data submission to the United Nations about activities that were pertinent to treaty compliance. Among the information to be provided was an annual questionnaire describing their national legislation, as well as any new amendments that had been made in the past year.[7] In 1996, the Fourth

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[3] There are 145 states parties to the BWC, not including Taiwan, which ratified the convention before the United States recognized the People's Republic of China as the sole government of China. Authorities in Taiwan have indicated that they will continue to abide by the terms of the treaty. US State Department, Bureau of Arms Control, fact sheet, "Parties and Signatories of the Biological Weapons Convention," 14 February 2002. Available at http://usinfo.state.gov/topical/pol/terror/01101809.htm

[4] Fully, Article IV of the BWC reads:

> Each State Party to this Convention shall, in accordance with its constitutional processes, take any necessary measures to prohibit and prevent the development, production, stockpiling, acquisition, or retention of the agents, toxins, weapons, equipment and means of delivery specified in article I of the Convention, within the territory of such State, under its jurisdiction or under its control anywhere.

Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons. Available at http://www.stimson.org/cbw.

[5] Article VII.1(a) of the CWC states: Each state shall "prohibit natural and legal persons anywhere on its territory or in any other place under its jurisdiction as recognized by international law from undertaking any activity prohibited to a State Party under this Convention, including enacting penal legislation with respect to such activity." Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction. Available at http://www.stimson.org/cbw.

[6] United Nations, *Final Document of The Second Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons Convention and on their Destruction*, Document BWC/CONF.II/13/11, 26 September 1986.

[7] Data related to the "Declaration of legislation, regulations, and other measures" was to be submitted to the United Nations Department of Disarmament Affairs. United Nations, *Final Document of The Third Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons Convention and on their Destruction*, Document BWC/CONF.III/22/Add. 2, 27 September 1991. Other confidence-building measures asked for states to declare their past activities in offensive or defensive biological weapons research, report unusual disease outbreaks, and identify all high containment facilities within their territory. For more on BWC confidence-building measures, see Marie Chevrier, "Doubts About Confidence: The Potential and Limits of Confidence-Building

Review Conference specifically called for states to pass penal legislation, stipulating that any nation that did not yet have such laws in place enact them "immediately."[8]

A handful of states have reacted to these increasingly forceful calls by passing or attempting to enact such legislation. A 1987 New Zealand law provides for "imprisonment for a term not exceeding 10 years for manufacturing, stationing, acquiring, possessing or having control over any biological weapon."[9] The United States criminalized possession of biowarfare agents without proper authorization for specific prophylactic, protective, or other peaceful research purposes in 1989.[10] France has adopted prison terms of five to seven years for "the offenses of developing, producing, possessing, stockpiling, buying and selling of biological and toxin-based weapons."[11] Canada's *Biological and Toxin Weapons Convention Implementation Act*, introduced in Parliament in the fall of 2001, is patterned after the BWC's broad prohibitions and establishes a domestic inspectorate to monitor compliance.[12]

Otherwise, the international drumbeat for domestic criminalization laws has apparently been to little avail. According to data that BWC members voluntarily submitted from 1997 through 2001, a majority of the BWC members providing such data—twenty-seven out of forty-five—had "nothing to declare" or "nothing new to declare" regarding penal legislation. A whopping ninety-eight BWC members failed to even submit any data whatsoever during this time period.[13]

Measures for the Biological Weapons Convention," in *Biological Weapons Proliferation: Reasons for Concern, Courses of Action* (Washington, DC: Henry L. Stimson Center, October 1995), 53-75.

[8] United Nations, *Final Document of The Fourth Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons Convention and on their Destruction*, Document BWC/CONF.IV/9, 6 December 1996.

[9] New Zealand Ministry of Foreign Affairs and Trade, *New Zealand Nuclear Free Zone, Disarmament and Arms Control Act 1987*, 8 June 1997. Available at http://rangi.knowledge-basket.co.nz/gpacts/public/text/1987/an/086.html.

[10] See the Biological Weapons Antiterrorism Act of 1989, Public Law 101-298, 22 May 1990. In 2001, the provisions of this statute were expanded and strengthened in title VIII, section 817 of the Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism (USA PATRIOT ACT) Act of 2001, Public Law 107-56, 26 October 2001.

[11] United Nations Security Council, *Report Submitted by France to the Counter-Terrorism Committee Pursuant to Paragraph 6 of Security Council Resolution 1373 (2001) of 28 September 2001*, Document S/2001/1274, 27 December 2001, 11.

[12] Canada, House of Commons, Bill C-55 (first reading), 37th Parliament, 1st sess. Available at http://www.parl.gc.ca/37/1/parlbus/chambus/house/bills/government/C-55/C-55_1/90173b-10E.html.

[13] Graham Pearson and Nicholas Sims, "Article IV: National Implementation," in *Strengthening the Biological Weapons Convention: Key Points for the Fifth Review Conference*, Graham S. Pearson and Malcolm Dando, eds., 2002. Available at http://www.bradford.ac.uk/acad/sbtwc/key5rev/5thArtIV.pdf.

Views of the Industry Experts

The Bush administration advanced its criminalization proposals with the argument that individual states could pass dissimilar pieces of legislation and still effectively enforce international compliance with the BWC. Undersecretary of State John Bolton claimed that "it is not necessarily the case that one size fits all," and posited that if individual states took action, it would ostensibly avoid "slugg[ing] through seven more years of negotiation."[14] In some respects, the industry experts viewed this proposal as a step forward, but in others, they did not. The criminalization of offensive biological weapons activities makes such fundamental sense that most people, upon hearing that such laws are not in place globally, are hard-pressed to believe that such a gaping hole in the international legal system exists in this day and age. Put another way, domestic laws criminalizing activities that could threaten countless lives, not to mention the economic well being and stability of governments, are long overdue. However, the industry group saw the effectiveness of a criminalization initiative as dependent in large part on how it is executed, and therein lies the major deficiency of the US approach. Fortunately, this shortcoming can be corrected.

Given the years that have passed since proposals first began circulating for BWC members to enact such penal legislation, the prospects of moving toward the Bush administration's goal of establishing a comprehensive regulatory regime via a lattice work of national laws and extradition agreements would appear rather grim. A web of dissimilar national legislation—some more stringent while others more lenient—could well complicate international efforts to pursue and punish those who violate the BWC.[15] Bioterrorists could conduct their nefarious deeds in countries with statutes that do not empower law enforcement authorities to investigate and prosecute biocriminals vigorously.

The industry experts believed that a determined move to negotiate and enact uniform penal legislation, applicable to all individuals under international law, is far preferable to an approach that could yield glacial progress and a potpourri of laws. The Harvard-Sussex Program has developed a Draft Convention on the Prevention and Punishment of the Crime of Developing, Producing, Acquiring, Stockpiling, Retaining, Transferring, or Using Biological and Chemical Weapons. Accordingly, any person who commits any of the prohibited acts anywhere would risk prosecution or extradition if the person were found in the territory of a state that joins the criminalization convention.[16]

The US government has joined numerous treaties criminalizing other types of heinous crimes, such as airline hijacking and sabotage (1970 and 1971), hostage taking (1979), and theft of nuclear

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[14] US Department of State, International Information Programs, "Bolton Briefing on the Biological Weapons Pact," transcript of press conference, 20 November 2001. Available at http://usinfo.state.gov/topical/pol/terror/01112003.htm.

[15] "International Criminal Law and Sanctions to Reinforce the BWC," *The CBW Conventions Bulletin* no. 54 (December 2001): 1-2.

[16] Meselson and Robinson, *A Draft Convention*, 2001.

materials (1980). Such crimes are deemed "particularly dangerous or abhorrent to all regardless of the nationality of the accused or the place where the alleged crime was committed."[17] Crimes involving biological weapons fall under the same category. The industry group concluded that the US government and the international community should embrace a much stronger uniform criminalization regime to prevent and punish offensive biological weapons activities.

IMPROVING GLOBAL DISEASE SURVEILLANCE

Among several other proposals, the US government called upon the BWC's membership to support the strengthening of capabilities of the World Health Organization (WHO), the Office of International Epizootics, and the Food and Agriculture Organization (FAO) to detect human, animal, and plant disease outbreaks in a timely manner. The Bush administration asked that states also support the investigation and disease outbreak mitigation capabilities of WHO by quickly providing aid (e.g., medical assistance) in the event of an emergency.[18]

Disease surveillance is a phrase that describes the capability to detect disease outbreaks, whether natural or intentional, as well as the emergence of entirely new pathogens, the appearance of known pathogens in new geographic areas, or the reemergence of new antibiotic-resistant strains of old disease foes.[19] Infectious disease can spread across manmade borders effortlessly, so surveillance requires a multi-tiered approach. This section first outlines the efforts that the WHO's Department of Communicable Disease Surveillance and Response spearheads to coordinate disease surveillance at the institutional, national, and international levels.[20] Then, some of the challenges of disease surveillance are discussed, using the US program as an example. Finally, the industry group offers its thoughts on the US proposals.

The World Health Organization's Roadmap for Better Disease Surveillance

At the heart of successful disease surveillance is the ability to collect samples correctly and use the appropriate laboratory analysis techniques to identify the pathogen causing the disease outbreak.

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[17] Matthew Meselson, "International Criminalization of Chemical and Biological Weapons," [American Academy of Arts and Sciences] *Bulletin*, (Winter 2001). Available at http://www.amacad.org/blvlivn2/blvlivn2_28c.htm.

[18] States are asked to identify in advance what type of aid they would provide. US Department of State, "New Ways to Strengthen the International Regime Against Biological Weapons," 9.

[19] According to WHO, over thirty new communicable diseases have been identified in the last two decades alone. World Health Organization, "WHO Opens an Office in Lyon (France) to Help Developing Countries Detect and Control Epidemics and Emerging Diseases," press release, 8 February 2001. Available at http://www.who.int/inf-pr-2001/en/pr2001-06.html.

[20] The US Centers for Disease Control and Prevention are a primary partner with WHO, providing support and resources for these efforts. Dr. David L. Heymann, Executive Director for Communicable Diseases, World Health Organization, statement to the Senate Committee on Foreign Relations, 107th cong., 1st sess., 5 September 2001.

Sometimes, the microscopic culprit is unexpectedly different from what might be indicated by patients' symptoms and other evidence observable to the naked human eye—possibly a new disease entirely. However, a lack of basic infrastructure and trained personnel hampers sampling and analysis efforts, particularly in developing countries. WHO is tackling the global disease surveillance challenge with a three-pronged effort, building institutional, national, and international capacities.

Institutionally, WHO partnered in 1997 with the US Centers for Disease Control and Prevention (CDC) to create the Training in Epidemiology for Public Health Intervention Network, a non-profit organization that creates, supports, and networks programs that educate individuals in epidemiology and public health practice.[21] WHO also helps countries link their laboratories to speed the analysis and interpretation of sample data. Disease surveillance requires not only the detection of an outbreak, but also the generation of a swift response. To that end, WHO opened an office in Lyon, France in 2001 that will both train laboratory technicians from developing countries and work to enhance the interconnectivity of national laboratories.[22]

On a national level, WHO is helping states put the appropriate laboratory and communications infrastructure into place to aid disease surveillance. Once laboratories identify a disease, that information needs to be reported to a coordinating authority, most often a Department or Ministry of Health. WHO provides states with standardized information as a baseline so that they can build from proven practices and standards. WHO supplies a "Communicable Disease Surveillance Kit" that includes three basic documents to steer countries in a common, constructive direction: 1) the WHO Protocol for the Evaluation of Epidemiological Surveillance Systems; 2) WHO Recommended Surveillance Standards; and, 3) the WHO Guidelines for the Safe Transport of Infectious Substances and Diagnostic Specimens.[23]

From this common foundation, WHO then stresses that states should tailor their national surveillance plans to their individual circumstances. For example, WHO encourages countries to identify their own list of diseases that merit particular concern and prioritize monitoring for those diseases. Coordination of existing health assets in line with those priorities reduces costs and improves the

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[21] Currently more than twenty such programs operate worldwide. Regional meetings bringing participants in the programs together for conferences have been held in Africa, Asia, the Americas, and the Middle East. World Health Organization, "Integrated Disease Surveillance," fact sheet. Available at http://www.who.int/emc/surveill/index.html. See also, http://tephinet.org.

[22] The first class of technicians began their two-year training in April 2001. The group will be trained in the diagnosis and treatment of epidemic diseases frequently found in developing countries (e.g., cholera, yellow fever), as well as emerging diseases such as Marburg and Ebola. The course also discusses the monitoring and treatment of the increasing number of antimicrobial resistant infectious agents appearing in both developed and developing nations. Students will also be instructed in the use of various technologies to speed information sharing and communication. World Health Organization, "WHO Opens an Office in Lyon ," press release.

[23] World Health Organization, "Public Health Surveillance," slide show. Available at http://www.who.int/emc/slideshows/National_system/sld001.htm.

sustainability of the system, while at the same time allowing health authorities to identify any gaps that need to be addressed.[24]

Using this approach, some nations, including developing countries, have already seen the benefits of improved disease surveillance.[25] Moreover, some regional networks have also been formed to connect designated health authorities, permitting rapid communication so that countries near to an outbreak can take necessary precautions.[26]

Recognizing the importance of a global approach, WHO is bracing its institutional and national efforts with an international system dubbed the Global Outbreak Alert and Response Network. Begun in 2000, this network links seventy-two existing infectious disease laboratory networks and institutions worldwide, pooling their skills, information, and resources to deal with the threat of an outbreak.[27] Drawing from the network's assets, WHO has launched effective international responses to outbreaks in Afghanistan, Bangladesh, Côte d'Ivoire, Egypt, Ethiopia, Gabon, Guinea, Kosovo, Saudi Arabia, Sierra Leone, Sudan, Uganda, and Yemen.[28]

Challenges Facing Disease Surveillance

While WHO has done a yeoman's job strengthening disease surveillance capabilities worldwide, many stumbling blocks remain. Even the United States, which supposedly has ample resources, advanced technology, and skilled personnel, has had its own share of difficulty maintaining an effective disease surveillance system. From border to border, national surveillance programs have to be capable of reliably

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[24] Ibid.

[25] With the partnership of international organizations and nongovernmental organizations, Sudan launched its early warning and response network in 1999. Equipped with one hundred field radios and two e-mail connections, the network has ninety-one health workers trained in epidemiology and laboratory detection. Previously, response to an outbreak of a relapsing fever took 6 months during which time 400,000 cases developed and over 2,000 people died. In 2000, with the network's help, a similar relapsing fever outbreak was reported and contained within two weeks, resulting in 154 cases and eight deaths. "Early Warning and Response Network (EWARN), southern Sudan," *Weekly Epidemiological Record* 4, no. 77 (25 January 2002): 26.

[26] For example, the European Union has an Early Warning and Response System that connects the national health authorities of its member states. World Health Organization, Department of Communicable Disease Surveillance and Response, *Report of a Global Meeting on Communicable Disease Surveillance, Including Epidemic-Prone and/or Vaccine-Preventable Diseases*, Document WHO/CDS/CSR/NCS/2002.4, 25 January 2001.

[27] For example, one of the tools the global network accesses is the Global Public Health Intelligence Network (GPHIN) developed by HealthCanada for WHO in 1996. An automated system, GPHIN searches open source information from around the world looking for reports that might indicate a sudden surge in certain symptoms or other indications of possible disease events. See http://www.who.int/emc/global_outbreak_network.htm. The Global Outbreak Alert and Response Network also moves beyond surveillance and includes provisions for rapid response, another point in the US proposals. World Health Organization, Department of Communicable Disease Surveillance and Response, *A Framework for Global Outbreak Alert and Response*, Document WHO/CDS/CSR/2000.2. Available at http://www.who.int/emc-documents/surveillance/docs/whocdscsr2002.pdf.

[28] Further discussion can be found at http://www.who.int/emc/global_outbreak_network.htm.

and rapidly identifying hundreds of diseases, contending with a daily influx of tourists, business travelers, and immigrants, any of whom enter the country infected with a nonindigenous disease.

As in many other countries, US public health authorities and policy makers welcomed the advent of antibiotics, which rendered many formerly virulent illnesses conquerable. Yet, this positive development had unforeseen consequences. Experts have argued that the success of controlling diseases in recent decades has led to shrunken public health budgets, as policymakers witnessed modern medicine conquer disease after disease.[29]

After decades of neglect, in September 1999, concerns over bioterrorism sparked an injection of much-needed funds and attention into US disease surveillance system.[30] The CDC awarded $41 million to state health departments and a handful of larger US cities to enhance local capabilities to recognize a covert bioterrorist attack. Decades of neglect cannot be undone in a year or two, however. The CDC continues to highlight on its priority list the need to upgrade laboratories and other means of disease surveillance.[31]

The CDC's National Center for Infectious Diseases is the focal point of infectious disease surveillance activities. On a weekly basis, state laboratories send the CDC bacterial and viral isolates. Depending upon the jurisdiction, hospitals and laboratories may also be obligated to notify health authorities of the occurrence of certain diseases. Normally, a private local laboratory or hospital channels a disease notification report to the local health department, which may take action before or as the report is forwarded to the state health department and perhaps on to the CDC.[32]

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[29] See National Research Council, Institute of Medicine, *Chemical and Biological Terrorism: Research and Development to Improve Civilian Medical Respons*e (Washington, DC: National Academy Press, 1999). A January 1999 survey found that nearly 50 percent of local health agencies lacked high-speed connections to the Internet and 46 percent did not have the technical ability to send broadcast faxes. The same survey also found that 35 percent of the health departments covering areas with fewer than 25,000 inhabitants had no e-mail capabilities, and 30 percent had no Internet access whatsoever. Without safe and rapid communications links to the laboratories with requisite knowledge, the chances of recognizing and managing a bioterrorist incident effectively all but vanish. Michael Fraser, "Information Technology and Local Health Departments," presentation to the National Association of City and County Health Officials, Dearborn, Michigan, July 1999.

[30] The states and cities selected for the initial grants can be found in a CDC press release. See Centers for Disease Control and Prevention, "States Receive $40 Million for Stronger Public Health Preparedness for Bioterrorism," press release, 15 September 1999; Center for Civilian Biodefense Studies, "CDC Releases Close to $41 Million for Biodefense," *Biodefense Quarterly* 1, no. 2 (September 1999): 1–2.

[31] US Department of Health and Human Services, "HHS Initiative Prepares for Possible Bioterrorism Threat," fact sheet, 16 August 2001. Available at http://www.hhs.gov/news/press/2001pres/01fsbioterrorism.html.

[32] Scott F. Wetterhall, "Surveillance Systems," in *Proceedings of the Seminar of Responding to the Consequences of Chemical and Biological Terrorism*, Office of Emergency Preparedness (Washington, DC: US Public Health Service, Department of Health and Human Services, 11–14 July 1995), 1-104-5. The list of nationally notifiable diseases can be found at http://www.cdc.gov/epo/dphsi/infdis.htm.

For quite some time, relatively few US laboratories outside of the CDC and the US Army Medical Research Institute of Infectious Diseases even had the biosafety capacity to work with highly contagious and lethal diseases. Therefore, they would refer difficult, unknown cultures up the chain, with the hospital or private laboratory sending the unidentified samples to the local public health laboratory, which would pass the cultures on to its state counterpart. Since many state public health laboratories lacked the capacity to test for some of the more exotic, infrequently seen diseases, they in turn had to bump such cultures to the CDC or the Army's experts. With delays for the re-tests, several days, sometimes weeks, may pass before laboratory technicians unravel the mystery of what is causing a disease outbreak.[33] During a prolonged identification process, many lives could be lost.

Finally, the anthrax-letter attacks of 2001 exposed a problem with personnel training in the United States, as physicians prescribed highly potent antibiotics for individuals who were unlikely to have been exposed to anthrax.[34] Until the fall of 2001, many health professionals did not readily think that certain symptoms could be indicative of exposure to a biowarfare agent. For example, a physician in Pennsylvania's Allegheny County tested how alert his on-duty colleagues were to the stigmata of the smallpox, which had not been seen in the United States for decades. Of seventeen physicians quizzed, only one of the two infectious disease specialists who participated correctly connected the symptoms—including the virus' distinct blistering pattern—to smallpox.[35] Again, awareness has certainly been heightened since the fall of 2001, but still the training to recognize unusual infectious diseases is vital to effective disease surveillance.

Views of the Industry Experts

If man is to outmaneuver intentionally caused or natural disease outbreaks, effective disease surveillance has to become a global priority. Similar to the approach they took in chapters 2 and 4 of this report, the US industry experts commended WHO's multi-tiered—institutional, national, international—strategy to improve disease surveillance. Problems as complex as disease surveillance, BWC inspections, biosafety, biosecurity, and research oversight demand sophisticated approaches that leave no stone unturned.

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[33] Interviews with Amy E. Smithson, physician (29 May 2000); registered nurse/chief, EMS division, state department of public health (3 February 2000); physician, hospital department of emergency medicine (24 March 1999).

[34] Charles Ornstein, "Cure May Be Health Hazard; Many Doctors Bend to Pressure from Patients Who Want Antibiotics After Anthrax Scares," *Los Angeles Times*, 17 October 2001; Daniel Haney, "Doctors likely to prescribe antibiotics for questionable flu-like ills, just to be safe," *Associated Press*, 30 October 2001.

[35] Raymond DeMichiei, as quoted in Jonathan D. Silver, "Local Doctors Fail Their Test on Diagnosing Germ Terrorism," *Pittsburgh Post-Gazette,* 13 February 2000. Seven emergency department physicians and eight inpatient practitioners also participated in Dr. Michael Allswede's mini-survey. They were told that the patients initially had cold-like symptoms, but several days later experienced nausea, diarrhea, and a facial rash that moved to the torso. Shown photographs of people with blistering smallpox, the physicians were still stumped, considering lupus, toxic shock syndrome, and dozens of other diseases, but rarely the variola virus. The last natural case of smallpox occurred in Somalia in 1977.

Asking other nations to improve disease surveillance by supporting WHO and its sister animal and plant health agencies is certainly a good idea, as is the concept of identifying in advance what assistance a nation will provide to a country stricken with a pandemic. Proposals of this nature were first introduced decades ago. The principle of lending aid to a nation suffering the ramifications of a biowarfare attack is enshrined in the BWC.[36]

Such proposals sound like empty rhetoric unless concrete action is taken. Like they did with several of the other US initiatives, the industry experts felt the US proposal to improve global disease surveillance was lacking in substance. Therefore, they looked to WHO, the Office of International Epizootics, and the FAO for more constructive actions. Of the US government's uninspired proposal, the industry group concluded that Washington was advocating baby steps, when giant steps are needed.

INSTITUTING ETHICS CODES FOR SCIENTISTS

One of the proposals that the US government put forward at the BWC Review Conference asked the members of the treaty to institutionalize a code of conduct for their scientists who work with dangerous pathogens. The objective would be to have such scientists pledge not to conduct any activities for hostile purposes or in armed conflict. Governments could work through professional societies or organizations to integrate this oath into existing ethics codes or to build codes from scratch.[37]

Few people would have difficulty concluding that scientific activities purposefully directed at turning human, plant, or animal diseases into weapons of war cross the line of morally acceptable behavior. Biological warfare has long been condemned as morally reprehensible.[38] Yet, in decades past, many scientists have worked "gladly on military projects, . . . convinced their cause was right and their foe was evil."[39] In recognition of this fact, sporadic efforts have been made to have the scientists

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[36] Article VII states: "Each State Party to this Convention undertakes to provide or support assistance, in accordance with the United Nations Charter, to any Party to the Convention which so requests, if the Security Council decides that such Party has been exposed to danger as a result of violation of the Convention." Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction.

[37] US Department of State, "New Ways to Strengthen the International Regime Against Biological Weapons," 5.

[38] Modern efforts to ban the use of this type of weapon in war date back to the 1925 Geneva Protocol, which preceded the BWC by half a century and prohibits the use of germ and poison gas weapons. Note that scientists who are conducting research aimed at improving defenses against biological weapons—Article I of the BWC allowing the retention of biowarfare agents for "prophylactic, protective or other peaceful purposes"—are in a particular quandary since the boundaries between defensive and offensive research can be paper thin. For an illuminating discussion, see Marc Lappe, "Ethics in Biological Warfare Research," in *Preventing a Biological Arms Race*, Susan Wright, ed. (Cambridge, Mass.: MIT Press, 1990),78-99. Also, Jane M. Orient, "Chemical and Biological Warfare: Should Defenses Be Researched and Deployed?" *Journal of the American Medical Association* 262, no. 5 (4 August 1989): 644-8.

[39] Robert Sinsheimer explains that scientists are pulled by allegiances to their nations, to the international fellowship of scientists, and to the human race. Robert L. Sinsheimer, "Scientists and Research," in *Preventing a Biological Arms Race*, 71, 73. Examples include US scientists who worked on the Manhattan Project in World War II to develop the atomic bomb, not to

themselves, without whom horrific weapons could not be created, take a more active role in halting the development of arms. The tool most often discussed for such purposes is a scientific code of ethics. The logic behind this proposition is as follows:

> Some modalities of warfare—nuclear and biological weapons—would seem to have the potential for unprecedented catastrophe and for the destruction of the very cathedral of knowledge, which scientists have striven to create. They represent a perversion of the greatest accomplishments of cumulative generations of scientific endeavor and insight. Their use—and their development certainly makes possible their use—would make meaningless the lives of every scientist of every time. . . .Biologists need to take steps now to avoid the militarization of their achievements. If history is any guide to the future, waiting to protest the use of novel weapons in a future conflict will be of no avail.[40]

The pages that follow review the status of efforts to establish scientific codes of conduct, distinguishing between various approaches to this type of activity. Intermingled with this status review is a discussion of the advantages and drawbacks of ethics codes.

An Overview of Scientific Codes of Conduct

According to a survey on scientific ethics codes published in 2002 by the Stockholm International Peace Research Institute, not that many professional scientific societies appear to have established codes of conduct. Of the seventy-one international scientific organizations found in an Internet search, eleven had a code of ethics available online. Just 12 percent of the 267 national or regional scientific organizations had posted an ethics code on their website. Moreover, only two of the ethics codes stipulated any specific ethical boundaries regarding chemical or biological weapons work.[41] Another survey, conducted for the International Council for Science, found 115 ethical standards governing scientific research. This study differentiated between fourteen types of standards (e.g., oaths, manifestos,

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mention the top American scientific talent employed in the now-defunct US biological and chemical weapons programs. Similarly, tens of thousands of Soviet scientists worked in the USSR's nuclear, biological, and chemical weapons programs. Discussions of why British and South African scientists worked on biological and chemical weapons can be found, respectively, in Brian Balmer, "Killing 'Without the Distressing Preliminaries': Scientists' Defense of the British Biological Warfare Program," and Chandre Gould and Peter Folb, "The Role of Professionals in the South African Chemical and Biological Warfare Programme," *Minerva*, 40, no. 1 (2002): 57-75 and 77-91. On the point of scientists being coerced to perform weapons work, see Rita R. Colwell and Raymond A. Zilinskas, "Bioethics and the Prevention of Biological Warfare," in Raymond A. Zilinskas, ed., *Biological Warfare—Modern Offense and Defense* (Boulder, Colo.: Lynne Rienner, 2000), 231.

[40] Sinsheimer, "Scientists and Research," 74, 76.

[41] Note that the survey covered only Internet sites employing the English language. Also, some of the codes may have more general-purpose statements asking their adherents not to use science for hostile purposes. Additional scientific organizations also may have established codes of ethics. Jacqueline Simon and Melissa Hersh, "An Educational Imperative: The Role of Ethical Codes and Normative Prohibitions in CBW-Applicable Research," *Minerva* 40, no. 1 (2002): 52, 54.

codes, guidelines, pledges) that thirty-nine international and seventy-six national scientific organizations had issued in twenty-three areas of science.[42]

In some scientific disciplines, the concept of a code of conduct is well established. Perhaps the best-known code of ethics is in the Hippocratic oath of the medical profession, whose members also belong to national and international medical associations espousing first-do-no-harm ethical principles.[43] Ethics codes have been around for a long time in other branches of science, but seem to have lost whatever luster they may have had when they were originally created. These codes do not appear to be an essential reference point for scientists.[44]

One of the reasons that ethics codes may not be influential is that they are not particularly well publicized. The industry experts provided an on-the-spot demonstration of this, since the majority of the group conceded they were unaware of the specifics of the ethics code espoused by the main US professional society in their discipline, the American Society for Microbiology.[45] Instead of being popularized among a professional society's membership, nowadays such codes may sit on the shelf after initial committee drafting or occasional review.[46]

Another reason that ethics codes may not play a more prominent role in the conduct of science traces back to how scientists are educated. At college, the time students spend with scientific mentors and peers appears to be especially fertile for imparting ethical principles.[47] Unless colleges and universities emphasize instilling proper behavioral codes in students, giving them a framework for the ethical dilemmas they will face, an important opportunity is missed to put them on a sound ethical and

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[42] The scientific organizations involved in these efforts were from twenty-three countries on six continents. See Kathinka Evers, *Standards for Ethics and Responsibility in Science: An Analysis and Evaluation of the Content, Background, and Function*, a study performed for the Standing Committee on Responsibility and Ethics in Science and the Standing Committee on Freedom in the Conduct of Science, as referenced in *Annual Report 2001: Standing Committee on Responsibility and Ethics in Science* (Paris: International Council for Science, 2001), 2.

[43] The Hippocratic Oath states: "I will neither give a deadly drug to anybody if asked for it, nor will I make a suggestion to this effect." Lappe, 84-5.

[44] Heinz C. Luegenbiehl, "Codes of Ethics and the Moral Education of Engineers," *Business & Professional Ethics Journal* 2, no. 4 (Summer 1983): 41-61.

[45] Most participants had vague knowledge that the American Society for Microbiology had an ethics code, but beyond that, they could make no comment.

[46] Simon and Hersh, "An Educational Imperative: The Role of Ethical Codes and Normative Prohibitions in CBW-Applicable Research," 44.

[47] "Most ethical precepts are acquired by informal exchanges with mentors and fellow students." Lester G. Paldy, "A Code of Ethics on Arms R&D for Scientists and Engineers," paper presented at the Sixth ISODARCO Beijing Seminar on Arms Control, October/November 1998, 5.

professional footing.[48] For boundaries in the life sciences, this is especially true, since scientists have to know of the existence of behavioral norms against biological weapons if they are to honor them.[49]

Proponents of scientific ethics codes argue that they "would have a strong impact on a community that prides itself on peer review and ethical behavior."[50] Moreover, advocates say that a widely accepted ethics code would influence scientists to resist pressure from their governments to do weapons work. Ideally, protections for those who might blow the whistle on illicit weapons work would go hand-in-hand with the establishment of ethics codes.[51] The industry experts discussed this latter point, some noting that the existence of a code might encourage whistle blowers to reveal covert weapons programs. Finally, instituting codes of conduct helps to burnish the public image of science and generate support for research.[52]

Professional codes of ethics also vary in form from laudable albeit general conduct statements to very specific prohibitions. The code espoused by the American Society for Microbiology, which in its proposal the US government mentioned as a model platform from which to build, is general in nature. This code does not include any particular guidance regarding research with possible application to biological weapons or other types of arms. Rather, members of the American Society for Microbiology are to "aspire to use their knowledge and skills for the advancement of human welfare" and "shall not commit scientific misconduct, defined as fabrication, falsification, or plagiarism."[53] Many scientific

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[48] "Researchers must be given the tools to make decisions in this ambiguous environment. These tools can include ethical guidelines or the integration into science curricula of discussions and material which provides students with (a) an awareness of the ethical issues involves, and (b) with the intellectual tools to make ethical decisions." Jacqueline Simon, "Ethics and the Application of Genetic Technology to Warfare," paper presented at The Mind Challenges Genes Conference, 1 July 2001, 1-3. Available at http://projects.sipri.se/cbw/berlin.pdf.

[49] On this point, see Jean Pascal Zanders, "Introduction," *Minerva* 40, no. 1 (2002): 6.

[50] Paldy, "A Code of Ethics on Arms R&D for Scientists and Engineers," 7.

[51] In his discussion of whistle blowers, Paldy gives examples of defectors, such as Vladimir Pasechnik and Ken Alibek, who gave first-hand accounts of the former Soviet germ warfare program, and Vil Mirzayanov, who unveiled the USSR's advanced chemical weapons work. Paldy, "A Code of Ethics on Arms R&D for Scientists and Engineers," 5. Alibek's tale is told with Stephen Handelman in *Biohazard* (New York: Random House, 1999). For Mirzayanov's personal account of the Soviet chemical weapons program and the consequences he suffered for blowing the whistle on it, see Vil S. Mirzayanov, "Dismantling the Soviet/Russian Chemical Weapons Complex: An Insider's View," in *Chemical Weapons Disarmament in Russia: Problems and Prospects*, (Washington, DC: Henry L. Stimson Center, October 1995), 21-33.

[52] Paldy, "A Code of Ethics on Arms R&D for Scientists and Engineers," 7.

[53] The code of ethics for the American Society for Microbiology, approved by the society's governing council in 2000, is composed of five guiding principles and six rules of conduct. These excerpts are the ones most relevant to the topic at hand, an ethical ban on bioweapons work. The American Society for Microbiology has established a review process for possible breaches of its code of ethics. The code of ethics is available on the society's website, but accessible only to members. The society's website can be found at http://www.asm.org.

organizations instruct their members to go about their affairs with honesty and integrity and to serve their fellow citizens through the positive use of their knowledge and skills.[54]

Another approach to a code of conduct plays into the general worry that ethics-minded scientists have about the possible harmful application of their work. Although scientists are not omniscient—they cannot know in advance the outcome of some experiments or all future applications of their work—scientists can undertake to deliberately and specifically consider the implications of their work.[55] The Life Sciences Network of New Zealand has embraced this approach in a statement about principles of conduct.[56]

Finally, an ethics code can be worded to forego work on weapons in general or biological weapons in particular. The 1984 Uppsala Code of Ethics incorporates a pledge not to use science for purposes of war.[57] Right to the point at hand, the Australian Society for Microbiology's code of ethics obligates its members "not to engage knowingly in research for the production, or promotion of biological

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[54] For instance, the code of the Institute of Electrical and Electronic Engineers (IEEE) says: "Members shall, in fulfilling their responsibilities to the community: Protect the safety, health, and welfare of the public and speak out against abuses in these areas affecting the public interest." Paldy, "A Code of Ethics on Arms R&D for Scientists and Engineers," 3. See also, Luegenbiehl, "Codes of Ethics and the Moral Education of Engineers," 47.

[55] "When Einstein deduced the equivalence of matter and energy he could not plausibly have anticipated that his equations would find expression in the atomic bomb. Nor could Scheele, the discoverer of chlorine gas, have conceived of its military application." Sinsheimer, "Scientists and Research," 72

[56] The principles of conduct of the New Zealand Life Sciences Network, Inc. state:

> Biotechnologists should use the principle of precaution. This principle implies that in scientific research and the application of its results (as far as can be foreseen at that moment) the start point should be that one should not progress unless one can make plausible that no harmful or irreversible consequences will occur, that the risks can be sufficiently estimated, and that the possible side effects are justified for the community by the purpose and the expected advantages of the application.

New Zealand Life Sciences Network, *Code of Conduct.* Available at http://www.lifesciencesnetwork.org/pb/about/code_ethics.asp.

[57] The Uppsala Code of Ethics for Scientists states: "Scientific efforts shall therefore not aim at applications or skills for use in war or oppression.... Scientists who form the judgement that the research which they are conducting or participating in is in conflict with this code, shall discontinue such research, and publicly state the reason for their judgement." Bengt Gustaffson et al., "Focus On: The Uppsala Code of Ethics for Scientists," *Journal of Peace Research* vol. 21, no. 4 (1984), 312. The 1988 Buenos Aires Oath, written by Anonymous, similarly asks that scientists examine the consequences of their work to assure that it is "truly in the bests interests of society and peace." Lappe, "Ethics in Biological Warfare Research," fn. 11. In this vein, one scholar proposes having the International Council of Scientific Unions disperse to all scientific bodies a generic no-weapons-work code. The suggested language for such a code is: "Scientists, engineers, and scientific and technical professionals should not participate in any research and development or scientific or technical support activity in violation of international arms control agreements to which their nations are signatories." Paldy, "A Code of Ethics on Arms R&D for Scientists and Engineers," 4.

warfare agents."[58] The Biologists Pledge also includes specific prohibitions not to work on biological weapons.[59] Other scientific organizations have simply forsworn work on all mass destruction weapons.[60] Even governments have begun to issue specific, thou-shalt-not-engage-in-bioweapons-work policies. In what is apparently a first-of-its-kind measure for a government, the Government of Queensland, Australia adopted a "best practice" code that applies to all government agencies and government-funded entities and should be observed by private research centers, laboratories, hospitals, companies, and universities.[61]

Views of the Industry Experts

Taking all of this into account, the industry experts candidly discussed the nonproliferation utility of scientific codes of ethics. On the positive side, several of the industry experts agreed that a code of ethics might encourage whistleblowers to call attention to prohibited or questionable work. They also saw ethics codes as helping to build public trust in scientific endeavors, which, although a benefit, is not germane to BWC compliance.

Although one individual in the group strongly backed the concept of moving forward with establishing codes of conduct, the rest of the experts were much less enthusiastic. Their comments were mostly of the "it wouldn't hurt" variety, but they doubted that a conduct code would stop them were they intent on proliferating biological weapons. The experts concluded that a conduct code did not constitute

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[58] This particular prohibition is final item on the Australian Society for Microbiology's twelve-item code of ethics. Australian Society for Microbiology, "Code of Ethics." Available at http://www.theasm.com.au/docs/ethics/default.asp.

[59] When the Council for Responsible Genetics and the Coalition of Universities in the Public Interest circulated this pledge in 1987, 1,000 signed up that year. The pledge states: "We, the undersigned biologists and chemists, oppose the use of our research for military purposes. . ..We believe that biomedical research should support rather than threaten life. Therefore, we pledge not to engage knowingly in research and teaching that will further the development of chemical and biological warfare agents." Appendix K in *Preventing a Biological Arms Race*, 412; see also, Paldy, "A Code of Ethics on Arms R&D for Scientists and Engineers," 3.

[60] On 16 July 1995, the fiftieth anniversary of the Trinity nuclear test, the International Network of Engineers and Scientists for Global Responsibility opened for signature its Appeal to Engineers and Scientists. The third item of this appeal states: "I pledge not to take part in the development and production of weapons of mass destruction and of weapons that are banned by international conventions." International Network of Engineers and Scientists for Global Responsibility, Standing Committee on Ethical Questions, 1995. Available at http://www.inesglobal.org/ines3.html. The Western States Legal Foundation, Natural Resources Defense Council, Los Alamos Study Group, and Tri-Valley CARES co-sponsor an oath that states: "I pledge never to participate in the design, development, testing, production, maintenance, targeting, or use of nuclear, biological, or chemical weapons or their means of delivery; or in research or engineering that I have reason to believe will be used by others to do so." An online "signing" form can be found at http://www.lasg.org.

[61] Noting that Australia is a signatory to the *Biological and Toxin Weapons Convention* (1972), and has played a major role in securing international compliance with the Convention, we will not use biotechnology (or any other technologies) to develop biological weapons for use in human warfare or terrorism, and will not assist any other organisations, persons or countries to develop, produce, duplicate, stockpile or utilise such weapons.

Code of Ethical Practice for Biotechnology in Queensland, 1st ed., (Brisbane: Department of Innovation and Information Economy, 2001), iii, 12. Available at http://www.diiesrq.qld.gov.au/publications/biotechnology/coe.pdf.

much of a barrier, especially in the absence of any specified, enforced consequences for rule breakers. Rather than look to codes of ethics to inhibit biological weapons proliferation, the industry experts came down strongly on the side of establishing mandatory biosafety, biosecurity, and research oversight standards accompanied by noncompliance penalties and a robust BWC inspection process, as other segments of this report relate.