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Biological Weapons and “Bioterrorism” in the First Years of the 21st Century

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INTRODUCTION

In a sequence of recent papers I have reviewed the experience of biological weapons in the twentieth century,¹ and presented an analysis of the degree of threat posed by these weapons in the period 1995 to 2000, in distinction to the portrayal of that threat, most particularly in the United States.² The present paper describes the events of the last few years, which will determine much of what will occur in the near future.

The purpose of this paper is to review three processes that are providing the context in which biological weapons issues are evolving. Two of these have already taken place. The first is the destruction in 2001 by the United States of any possibility of achieving a negotiated Verification Protocol to the Biological Weapon Convention, following a full ten years of international diplomatic effort between 1991 and 2001. The discussion of this subject is informed by interviews conducted between 2000 and 2002 with several policy principals in the United States and in other countries. The second is the emphasis on the threat of bioterrorism that became a significant national political concern in the United States since the second half of 1995, but which has been enormously magnified by the September 2001 events, as well as the subsequent distribution of expertly prepared powdered anthrax through the US postal system. These two events and/or processes had profound effects on the international regime controlling biological weapons. The second of these, the frequently exaggerated anticipation of "bioterrorism," produced the third process: an enormous expansion in the U.S. biodefense program, the consequences of which risk catalyzing a major expansion in both global interest and capabilities in the area of biological weapons and warfare.

PART I: THE US DESTRUCTION OF THE VERIFICATION PROTOCOL TO THE BIOLOGICAL WEAPONS CONVENTION; JULY AND NOVEMBER/DECEMBER 2001

The elaboration of a Verification Protocol to the Biological Weapons Convention (BWC) essentially began in 1991. At the Third BWC Review Conference, the European countries sought a rigorous and intrusive on-site inspection regime for the BWC, more or less analogous to that which was being elaborated for the Chemical Weapons Convention (CWC) at the same time. US opposition led to the compromise “VEREX” (Verification Experts) exercise. That effort occupied 1992 and 1993. It was followed by five years of the Ad-Hoc Group (AHG) negotiations, beginning in 1995. The States that most impeded progress during that period were Iran, Russia, and the United States. Taken all together, the achievement of a Protocol was delayed for ten years, with a major factor in that delay being US government policies.³ On July 25, 2001, the US government delivered the final deathblow to the entire effort.

At least since the middle of 1999, the U.S negotiating position on the BWC Verification Protocol had been driven by restrictions desired by the US Department of Defense, the Department of Energy, and the CIA in order to protect against the exposure of biodefense activities taking place in the US. As the negotiating text of the Verification Protocol got weaker – ironically, largely in response to US demands -- if a text would ever have been approved and submitted to the US Senate, it would have faced the anticipated argument that it offered no benefits at all. Senate opposition would have been expected on this ground, as well as for the alleged protection of US pharmaceutical interests. As others have pointed out, the ability to obtain US Senate ratification of arms control treaties negotiated and signed by the United States in recent years has been very difficult. At the beginning of the second Clinton administration, more than half a dozen treaties were awaiting Senate action. By the end of that administration, passage of only one had been obtained, the Chemical Weapons Convention, while the Comprehensive Test Ban Treaty had been acted upon but it had been rejected by the Senate (with arguments being presented related to verification issues.) The others, minor treaties, were not brought to the Senate at all.

PhRMA, the major US pharmaceutical manufacturers industry association, was vociferously opposed to intrusive inspection measures. Their European industrial counterparts however, were not hostile at all. In the case of the Chemical Weapons Convention, the U.S. chemical industry was entirely and actively in its favor, and the US military leadership, the Joint Chiefs of Staff, were convinced to support its ratification. And even in those circumstances, US Senate opponents attached a multitude of unilateral US provisions to the CWC Treaty ratification. Neither of these two circumstances held for the BWC Verification Protocol. In the Geneva Ad-Hoc Group negotiations, all of the Western European allies of the US sought a rigorous Verification Protocol, and opposed the US positions. Yet, the US kept pushing for continued dilution of inspection provisions, and the other Western nations successively compromised their own positions in order to convince the US to come along.

US intra-administration politics on the Biological Weapons Convention during the two Clinton administrations, from 1993 to 2000, were a disaster. The chief US delegate in Geneva for those eight years, Ambassador Donald Mahley, had served in the Reagan and previous Bush administrations in positions concerned with BW policy. Senior officials in the Reagan administration had disapproved of the BWC itself, not to speak of the forthcoming Verification Protocol. In addition, Acting Assistant Secretary of State, Edward Lacey, when he returned to serve in the Clinton Administration, had also served in the previous Bush Administration. Both basically opposed any Verification Protocol, and most certainly did not favor an intrusive one. They never altered their positions. Congressional testimony by senior administration officials in September 2000 was striking in the strength of open hostility to a BWC Verification Protocol. From Dr. Susan Koch, Deputy Assistant Secretary of Defense for Threat Reduction Policy, Office of the Secretary of Defense:

“...we do not believe that the Protocol being negotiated will be able to provide the kind of effective verification that exists in other arms control treaties. That is, it will not provide a high degree of confidence that we could detect militarily significant cheating. We therefore recognize that this Protocol will not "solve" the problem of biological weapons proliferation, even among the BWC States Parties who opt to join.”

From Ambassador Mahley, Special Negotiator for Chemical and Biological Arms Control, Department of State:

“As you know, the United States has substantive requirements for attributing effective verifiability to a treaty. It involves being able to make a judgement of high confidence in detecting a violation before it can become a military significant threat. I have already noted that a small program can become a threat. Likewise, the inherent "cover for an illicit program in legitimate activity makes differentiation much more imprecise. The United States has never therefore, judged that the Protocol would produce what is to us effectively verifiable BWC.”⁴

Nevertheless, in other portions of these same statements to the US Senate in 2000, both Mahley and Koch still maintained the value of the Verification Protocol for US interests. Ambassador Mahley's July 25, 2001 statement closely mirrored a position that had been expressed six years earlier by another senior ACDA official, Dr. Edward Lacey:

“...our own analyses indicate that the BWC cannot be made more effective by adding verification measures known to us. The small size and complex structure of microorganisms, and the dual-purpose nature of many items used in biological production, make verification of a ban on biological weapons problematic, to say the least...Our concerns about the verifiability of the BWC are the primary reason the United States delegation opposed the proposals for specific verification regimes made at the September 1991 review conference. But it should also be noted that the United States opposes any measure that would limit our ability to pursue a biological defense program or unduly burden American industry.”⁵

The way in which policy on the Verification Protocol was established, and the way in which it was implemented during the Clinton administration, had major defects. The new administration took office at the end of January 1993, and by September 1993 had carried out a Non-Proliferation Policy Review, which was described by President Clinton in an address to the United Nations General Assembly. A new policy on the BWC Verification Protocol, in distinction to that of the previous Bush administration, was part of that overall review, but was expressed only in a cursory statement. Its details remained to be elaborated, and the VEREX process was still taking place. The Bush administration had favored only confidence-building measures (CBMs), and investigations only of outbreaks of disease and of allegations of use. It opposed any

site visits. The new Clinton administration eventually supported clarification visits and facility investigations. Problems then arose in the US intra-governmental debates on the details of the Geneva Ad-Hoc Group negotiations. More significant however, was the fact that the most senior administration policy makers, "the Principals," did not see to it that their policy preferences were actually implemented.

Secretary of State Warren Christopher and his successor, Secretary of State Madeleine Albright, were uninterested in the subject. The subject was also not a significant priority for either of President Clinton's National Security Advisers, Anthony Lake or Sandy Berger. During Lake and Christopher's tenure, US domestic political considerations led to the policy decision to first focus on obtaining US Senate ratification of the Chemical Weapons Convention, before attempting to negotiate US interagency disputes on a BWC Verification Protocol. Obtaining ratification of the Chemical treaty moved very slowly and was not achieved until the last moment in April 1997. Although President Clinton oversaw a nominal shift in US policy on the BWC Protocol and publicly addressed it again in 1998, his attention to the issue was marginal, and he never imposed his policy preferences on the substantial bureaucratic opposition in his own administration. He never established the circumstances that would have made it mandatory for opposing mid-level bureaucrats to accede to his stated interest, and neither were they removed or replaced for opposing his stated policy preferences. This was in fact a rather typical occurrence in the Clinton administration on major foreign policy issues, and it was not peculiar to policy on the BWC Verification Protocol. In the absence of that leadership, even the Director of the US Arms Control and Disarmament Agency, John Holum, took the position of his agency staff rather than the President's nominal position. All of this led not only to years of US bureaucratic deadlock, but to even more egregious actions.⁶

Since mid-1999, Ambassador Mahley, the chief US negotiator in Geneva, had told major US allies that he sought a total and basic change in the mandate for the negotiations, in direct contravention of official administration policy at the time. He argued that the entire effort was a misguided affair, and that the US government should

go to the 5th BWC Review Conference, scheduled to be held in November 2001, and ask for a new negotiating mandate for the Protocol based on entirely different negotiating principles. For several months prior to the change in administrations, the US delegation at the Ad Hoc Group (AHG) was the only one to oppose the submission of a draft Protocol by the AHG Chairman, a move strongly favored and even urged by our European allies. The US delegation abstained from virtually any substantive contribution to the proceedings at the AGH meetings just before and just after the US Presidential elections in November 2000.

With the change in administration, Ambassador Mahley, the head of that delegation, chaired an interagency review of US policy on a BWC Verification Protocol. The outcome was predictable. By mid-March, it was known that senior officials in the new administration would not support a Verification Protocol. On April 23, the first press reports appeared stating that the Bush Administration had decided to reject the draft Protocol.⁷ In mid-May, Ambassador Mahley and US Assistant Secretary of State Avis Bohlen traveled to major European capitals to inform the major allies of the United States of the US decision not to support the Verification Protocol, and to seek their support.⁸ The European reaction was a simultaneous EU diplomatic démarche to both the US and the Russian governments, urging them to support the BWC Verification Protocol. The European démarche to the US read in part:

“The European Union has already accepted a lot of compromises in order to meet the concerns of the USA, especially on the declaration of biodefense programs and facilities, on the declaration of production facilities other than vaccines ones, as well as on the provisions related to the conduct of on-site activities.”⁹

The EU démarche had no effect on the US decision. As for Russia, it was known that the Defense Ministry opposed the Protocol, and that even the Foreign Ministry opposed it as well, but that the Russian government would support it if the US did and a Protocol was achieved, so as not to place Russia in a prominent position of opposition. Russian proposals during the years of Ad-Hoc Group meetings had been retrogressive, demanding the establishment of lists of proscribed agents and thresholds of permissible

materials, proposals that were opposed by virtually all other states. In addition, at the April Ad-Hoc Group meeting, seven countries in the Non-Aligned group – China, Cuba, Indonesia, Iran, Libya, Pakistan and Sri Lanka – had tabled their opposition to the compromise text for a Verification Protocol produced by the Ad-Hoc Group Chairman. India was also hostile to the Verification Protocol. It is possible that positions hostile to a Verification Protocol taken by at least some of these states were designed to protect offensive BW programs.

Nevertheless, it was the US that decided to abort the process. Ambassador Mahley's address to the AHG on July 25, 2001 announced the US position:

“...the mechanisms envisioned for the Protocol would not achieve their objectives,...no modifications of them would allow them to achieve their objectives and ...trying to do more would simply raise the risk to legitimate United States activities....[B]ecause the difficulties with this text are...inherent in the very approach used in the text, more drafting and modifications of this text would in our view, still not yield a result we could accept.”

The United States was “...unable to support the current text, even with changes as an appropriate outcome of the Ad Hoc Group efforts.”¹⁰ The US would not negotiate any further on the basis of the 210 page draft Verification Protocol proposed by the Chairman of the Ad Hoc Group, and now claimed to believe that the principles on which all the past years negotiations had been based was flawed. An official of the US National Security Council in Washington stated:

"The protocol does not stop the threat posed by the spread of biological weapons, or deter cheaters, or enhance verification,"....But the protocol's requirement that states declare facilities in which weapons are made and permit them to be inspected "does put our bio-defense activities and proprietary commercial interests at risk."¹¹

Neither the Nuclear Non-Proliferation Treaty nor the Chemical Weapons Convention have prevented nations from cheating in recent years, nor can they do that with certainty in the future. Nevertheless, the US government does not propose to withdraw from them; in fact, it was a major supporter of both and a strong member of both of those treaty regimes. Only the year before, in testimony to the US Senate,

administration spokesmen, including Ambassador Mahley, had pointed out the utility of the proposed Verification Protocol despite its inability to provide certain disclosure of cheaters.¹² Complaints that the Protocol's Verification mechanisms were not foolproof were disingenuous. As others have pointed out, "no one argues for lax police enforcement on the grounds that crime, like cheating, is always with us." The additional complaint of administration officials, "that they had virtually no chance to affect the protocol that was drafted by the chairman of the negotiating group in Geneva. The draft was circulating less than six weeks after President Bush took office," was additional hypocrisy. As already indicated, in the proceeding months, the United States was the only country that urged the negotiating chairman not to release his compromise text at all. In addition, US diplomats scarcely uttered a word in the two previous negotiating sessions.

The negotiations collapsed. Six other nations: China, Russia, India, Pakistan, Cuba, and Iran all opposed the AHG Chairman's compromise text and demanded various modifications to it.¹³ They essentially opposed the compliance measures portion of the protocol. Back in the 1994 Special Conference that had established the Ad-Hoc Group, China, India and Iran had argued that the conditions were not yet suitable for negotiating a Verification Protocol. Problems had been expected from precisely each of them, but with the totally destructive US move they could all portray themselves as having nothing but the best of intentions and being totally cooperative. The EU nations simply gave up overnight, and no thought was given to going ahead without the US. The logic seemed to be that without the US, Russia would not join; without Russia, China would not; without China, India would not; and without India, Iran would not. With all that to contemplate, the EU states presumably did not care to have to fight about export control regimes, plus having to absorb the majority of the inspections. The Ad Hoc Group was to have agreed on a report of its efforts to be forwarded to the Review Conference, but that proved impossible. Cuba and Iran demanded that the report attribute blame for the collapse of the AHG's work to the United States, then to "one delegation," and finally to "a delegation." The United States and the Western European group refused. The Non-Aligned Group (NAM) then

required that the statements of all states be appended to the report. The West again refused, and requested that the report be put to a vote. The NAM refused to permit a vote to take place. No compromise was achievable, and no report approved.¹⁴

Nominally, the mandate of the Ad-Hoc Group remained, and the next 5 year Review Conference of the Biological Weapons Convention would take place in mid-November 2001.¹⁵

One more surprise was to follow. New York Times reporters had learned of the Bush administration's decision to scuttle the BWC Verification Protocol at about the same time as people in the interested policy community in Washington. But they had also learned of something else. The Biological Weapons Convention permits research, but no development, production, or testing of the weapons specific to distributing biological agents. However, the treaty does not refer to "offensive" or "defensive" research or how to distinguish between them. Within the burgeoning US biodefense program, the reporters had learned of several projects which straddled the distinction, and possibly even overstepped the boundary of permissible activities, although there was no recognized definition of that boundary. Nevertheless, if it came to be judged that such a boundary had been crossed, the United States would be in technical violation of the Biological Weapons Convention, of which it was one of the three treaty depositaries. One of the projects, to build and test a model of a former Soviet BW weapon, was being carried out by the US Central Intelligence Agency. Other projects involved the use of two large aerosol test chambers, of 70 and 155 cubic meters in size, in which simulants were being tested, but in which it was planned to test pathogens as well. The Australia group uses a threshold "trigger" of 1 cubic meter for an aerosol chamber for the purpose of export limitations, and the proposed BWC Verification Protocol had proposed 5 cubic meters as a reporting trigger. It then developed that the US had not declared any of these disputable BW R & D programs in its BWC/CBM declarations between 1997 and 2001. The New York Times reporters delayed publication of what they had learned about the controversial projects until after Ambassador Mahley delivered the coup de grace to the Verification Protocol in Geneva on July 25, 2001. In the event, they actually delayed publication until September 4,

2001.¹⁶ The implications were obvious. Whether prior publication could actually have averted the new administration's decision is questionable, but it would have made it more difficult.

The more significant question is how, in the United States, the research boundaries dealing with biological weapons could have been pushed into questionable territory. The answer may be simple. The Central Intelligence Agency took upon itself weapon assessment tasks that should have been the responsibility of Department of Defense facilities, and it pushed its project aggressively. Oversight within the government was poor, and some of the disputable projects were not even reported to National Security Council officials. Those that were reviewed did receive approval : in the mood that prevailed, it was known that the President and other senior officials were generally anxious for action on the issue, and there were few naysayers. A single courageous legal official did raise explicit objections. Few doubt that the United States has a solely defensive BW program, but one thing seems almost equally certain : if the US found the same projects taking place in Russia, Iraq, or Iran or any of several other countries, it would consider them to be part of an offensive BW program. (This subject is discussed in greater detail in Part 5 of this study).

On October 10, US Assistant Secretary of State Avis Bohlen, in an address to the First Committee of the UN General Assembly stated that there had been no change in US policy since July:

“Last July, we made clear that we could not support the protocol, because the measures that were proposed to enforce the ban against the possession and development are neither effective or equitable, and given the inherent properties of biological products it seems all but certain that they can never be made so. This continues to be our view. But in addition, the events of September 11 have reinforced our view that the priority focus must be on use. The international community must here and now state our abhorrence of use...

“The possibility that BW might be used on a massive scale must now, after September 11, be regarded as less remote than before. This possibility ‘must give new urgency to our efforts to combat the threat of biological weapons - and by weapons I mean here biological agents used with lethal intent. A first step must be to strengthen the norms against use of biological weapons, to make

clear and doubly clear that this form of terrorism, like all others, is unacceptable. We believe that the international community, which has in Security Council resolutions 1368 and 1373 so clearly stated its resolve to combat terrorism by all means at its disposal, must equally clearly state that any use of biological weapons - whether by state, an organization or an individual - would be a crime against humanity to which the international community will respond. We must also make clear that transfer of BW and other toxins to those who would use them in is similarly unacceptable'.¹⁷

Of course, the Geneva Protocol already forbids the use of BW, and articles 5 and 6 of the BWC provide mechanisms for states to press for investigations of BW use. Following the events of September 11, 2001 it was much easier for the US to obtain international diplomatic support for proposals it sought to substitute for the Verification Protocol. Without those events having taken place the US, after having destroyed the Verification Protocol, would have found scant diplomatic support from other nations for restating the same ideas that it favored eleven years earlier: investigation of the use of biological weapons and of unusual outbreaks of disease, strengthened export controls, and amplified CBMs.

The US again carried out bilateral consultations with its EU allies in October. In Washington, US officials had apparently already determined three objectives: the termination of the Ad Hoc Group, the termination of the mandate that had been given to the Ad Hoc Group to negotiate a binding Verification Protocol, and as a coda, the removal of the Chairman that had guided the diplomatic negotiations through the ten years of the VEREX process and the Ad Hoc Group deliberations. However, in their discussions with their European counterparts in October 2001, the US team, again of Bohlen and Mahley, still indicated that the US could continue to support the Ad Hoc Group. The US changed this position very soon afterwards, but did not communicate the change to the Europeans.

On November 1, US President Bush released a statement claiming 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."¹⁸ Among seven itemized proposals included in the

statement two were particularly notable: "Establish an effective United Nations procedure for investigating suspicious outbreaks [of disease] or allegations of biological weapons use," and "Establish procedures for addressing BWC compliance concerns." These had been, of course, prime objectives of the procedures developed in the BWC Verification Protocol. The irony would be even more pointed given what was to follow.¹⁹ Public relations "spin" had become integrated into US Presidential policy statements.

The United States government completed the destruction of the BWC Verification Protocol in November 2001. US Under Secretary of State John Bolton spoke on November 19. The strongest part of his rather brief presentation was to accuse Iraq, North Korea, Iran, Syria, and Libya of maintaining offensive BW programs, and being in violation of the BWC Treaty to which they were states parties.²⁰ These were certainly not new accusations: they had appeared in official US government reports or testimony since 1988, although their presentation in an international diplomatic context was certainly unusual. In fact, that led some observers to assume that the actual purpose of making the charges at the BWC Review Conference was to produce an acrimonious debate leading to deadlock. Moreover, Bolton also stated that the US government believed that additional countries were also violating the BWC, but that the US was not prepared to identify them, but would speak to them privately. Finally, despite the explicit accusations, the US government would not invoke Article 5 or Article 6 procedures of the BWC so as to resolve and/or end the alleged violations. Towards the end of his official statement, Bolton ironically suggested that

"To preserve international unity in our efforts to fight against terrorism and WMD proliferation we need to work together and avoid procedural or tactical divisiveness during the Review Conference that may hinder reaching our mutual goal of combating the BW threat."

During the following days of debate the US proposed phrasing for the Final Declaration of the Review Conference that noted that a number of state parties to the BWC were not in compliance. If true it was certainly merited; but the US has never in the past 13 years openly presented the evidence for these claims to the international diplomatic community. The countries that had been named by US Under Secretary Bolton of

course all denied the accusations. If they are in non-compliance they will scarcely proceed to take the unilateral measures that the US suggested would be helpful to prevent further BW proliferation. In addition, other non-aligned or states sympathetic to them will find denunciation of the US a useful curtain behind which they too can sit on their hands and do nothing to impede BW proliferation.²¹ Bolton left his most explicit statements to the effect that the US would not participate in a further negotiation on the Verification Protocol to a press conference which followed his formal presentation to the Review Conference.

In the very final hour of December 7, the last day of the conference, Bolton and the US delegation delivered the coup de grace: it tabled a non-negotiable proposal that "The Conference takes note of the work of the Ad Hoc Group, and decides that the Ad Hoc Group and its mandate are hereby terminated, and replaced with the process elaborated in paragraphs 1 and 2." These paragraphs called for annual meetings until November 2006 with no authority to negotiate any measures, only to "consider and assess progress by States Parties in implementing the new measures adopted at the Fifth Review Conference," i.e., those suggested by the United States. Not a single other government present at the Review Conference was prepared to accept that US position. The United States had made no mention of terminating the AHG in any of the various Western Group meetings that took place during the Review Conference right up to the final day. The US delegation concealed its final act from its European allies to the very end. Even at a Western Group meeting which took place on the morning of December 7, the US delegation did not mention the paper that it would circulate some hours later. The Europeans had no knowledge of the final US position until they heard it presented during the plenary meeting.

The Review Conference was adjourned immediately after the US tabled its resolution. States parties would meet again in November 2002. There was no diplomatic cost to the United States as a result of the debacle. There was no reason to expect any modulation in the US position before November 2002, nor to expect any outcome at that time significantly different than occurred in November 2001. Most

significant of all, although the US had argued that the preeminent issue was compliance by member states to the provisions of the BWC, and that compliance was its main concern, none of the proposals that the US had offered dealt in any way with compliance short of a nation actually using BW. At a meeting in Washington D.C. on January 11, 2002 Under Secretary Bolton reiterated absolute US government opposition to the Verification Protocol, as well as the claim that the preeminent US concern was BWC Treaty compliance. Bolton also explicitly stated that the primary reason for US government rejection of the Verification Protocol was to protect the US biodefense program from intrusion.²² The contradiction -- as well as the priorities of the US government -- were thus clear and explicit. As the Review Conference opened, Elisa Harris, the National Security Council director for chemical and biological weapon issues for the eight years of the preceding Clinton administration, commented that

"...if the review conference ends after three weeks with no tangible manifestations of decisions that would help address the biological weapons problem...it will represent a very serious blow to the whole regime prohibiting biological weapons, and I think it will send a very bad signal to proliferators that the international community lacks the will to enforce compliance with this agreement"²³

That was exactly what happened, and solely due to US government actions. Despite its claimed concern for Treaty compliance, the US was not prepared to accept the only mechanism available to address the issue. The US biodefense program took precedence.

As to what could be expected in November 2002 at the renewed Review Conference, there were a range of alternative outcomes;

1. Once again, no Final Declaration is achieved. This leaves the AHG and its mandate in effect, but without a practical means of achieving consensus, even on more AHG meetings. This is a likely outcome given the obstacles to getting US, European, and NAM agreement on any constructive outcome.
2. A Final Declaration that abolishes the AHG and terminates its mandate but provides for experts groups to discuss the US and other proposals and to report to annual meetings of states parties. This is a possible outcome, given the US determination to kill the AHG and its mandate; the Europeans and moderate NAM interest in achieving

“something” from the Review Conference; and the hard-line NAM opposition to legally-binding measures.

3. A Final Declaration that retains the AHG but replaces the protocol-related element of the mandate with a narrower charge to consider the US and other more modest proposals to strengthen the BW. This is an unlikely outcome, as it would require the US to shift position on continuation of the AHG.

4. A Final Declaration that leaves the AHG and its mandate intact and is similar to what was in the drafting committee at the adjournment of the Review Conference in November 2001 (i.e., annual meeting of states parties at which decisions would be made on whether to convene experts groups on specific issues). This is quite unlikely, as it would require the US to abandon its position from December 2001.

5. No Review Conference session takes place, as it is postponed once more.²⁴

On April 15, 2002, the European Union’s General Affairs Council, the Foreign Ministers of the fifteen member states, adopted a series of resolutions. One of these was to “Reinforce, where needed, the multilateral instruments, in particular by: ...Working for the successful conclusion of a reconvened 5th BWC Review Conference in November 2002.” What this “successful conclusion” will mean in real terms remains to be seen.

At the end of April 2002, the British government released a study intended to facilitate discussions in November. It noted that

“...the Protocol would have delivered significant benefits for transparency, monitoring and deterrence in key dual-use areas capable of misuse....It would as such help to deter and investigate suspected non-compliance, whether concerning the activity of a particular facility, an alleged use of biological weapons or a suspicious outbreak of disease....”

It also stated that “The UK would have preferred stronger measures for ensuring compliance and transparency.”²⁵

The document also made two important categorical statements, the first on deterring CBW use, and the second on current BWC treaty non-compliance:

“The UK believes that it is also essential to deter CBW use by assuring a potential aggressor of three related outcomes: CBW use will not be allowed to secure political or military advantages; it will, on the contrary, invite a proportionately serious response; and those at every level responsible for any

breach of international law relating to the use of such weapons will be held personally accountable.”

“Compliance with the BTWC is an issue the international community cannot avoid; if the Convention is to remain credible, there needs to be concerted determination to deal with the problem of non-compliance in an effective and sustainable manner. The UK and other BTWC State Parties cannot shirk their responsibilities on this matter.”²⁶

None of the “three related outcomes” stipulated by the British government were applied to Iraq at the time of its extensive use of chemical weapons against Iran between 1983-84 and 1988, and it is notable that the British government did not suggest any specific ways for the international community to manifest its “concerted determination to deal with the problem of non-compliance in an effective and sustainable manner.” Nothing could be a less promising indicator that anything like that can be expected than by the defection of Russia, France and China between 1996 and the present time on maintaining the United Nations Security Council resolutions regarding Iraq’s continuing and blatant violation of the provisions requiring it to divest itself of its WMD programs, including biological weapons. (The events of September to November 2002, and the achievement of UNSC Resolution 1441 on November 9, 2002, mandating the return of UNMOVIC to Iraq is not covered here.)

One of the areas that the UK document recommended “for immediate action” was the “establishment of an effective and legally binding process for investigation into suspected non-compliance with the Convention, to include misuse of facilities, unusual outbreaks of disease believed to be connected to a violation of the convention, and alleged use of BW.” This suggestion, however, as does the earlier and partially similar US one, depends on having the United Nations Secretary-General carry out such investigations. That would likely introduce the question of UN Security Council approval, the issue of veto rights of the permanent five members, and the requirement for agreement by the investigated party. Since all this is substantially less than was provided for in the draft Verification Protocol, it seems unlikely to be accepted by many states if unaccompanied by the rest of the edifice of that framework. The United States is additionally wary of allowing investigation of the “misuse of facilities” under United

Nations auspices for the same reason that it opposed the broader Protocol, the safeguarding of US biodefense facilities.

At a meeting in Geneva in early September 2002, two months before a reconvened BWC Review Conference was to take place, the US handed its European allies another surprise. Undersecretary of State Bolton explained that “our approach to the RevCon has evolved,” the US was dropping all its own “new proposals” that it had offered after removing itself from the negotiations on a BWC Verification Protocol. It was therefore also not interested in any adaptations of these included in the UK Green Paper. As for the Review Conference, the US told the Europeans, it “. . . prefers a very short RevCon, if any. US definition of a ‘very short RevCon’ is one with the sole purpose and outcome of agreeing to hold a RevCon in 2006 . . . The US does not support follow-on meetings between November 2002 and 2006 Review Conferences, . . . if the RevCon is very short, the US would not ‘name names.’ We would do so in a longer RevCon.” And concerning the Ad Hoc Group mandate, if the RevCon was short, the US would not address the issue: in a longer RevCon the US would seek the end of the AHG and its mandate.²⁷ The US reportedly asked for a conference of ten minutes duration, in which no substantive discussions would take place. It also asked for agreement to be reached in advance on what the RevCon would cover, otherwise it would risk failure and “complete ineffectiveness.”²⁸ US diplomatic language was virtually Swiftian, stating that it supported the BWC, and that its positions favored multilateral arms control.²⁹

The negative European reaction was so pronounced that even the U.S. Dept. of State took notice. After a U.S. emissary visited several European capitals the U.S. suggested that the Europeans make a proposal for it to consider. It was not an EU wide effort, but several major European allies did so. After clearing their suggestions with the US, they passed them to Ambassador Toth. Toth drafted a single page “Draft Decision of the Fifth Review Conference” of the BWC, which was also cleared with the US. It was explicit to all that this was the maximum that the US would accept. It was distributed to all States Parties of the BWC on October 31, and the Review Conference opened on November 11, 2002. There could be no Plenary session discussion of the document.

Ambassador Toth “asked member states to move beyond past disagreements and to adopt this proposal as the only realistic outcome possible for the Conference. Toth expressed his view that the mission of the Conference now was to focus on agreeing to this more limited measure and not on the unrealistic goal of an agreed Final Declaration.”³⁰ The document, which was agreed to, read as follows:

“Decision of the Fifth Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) Weapons and on Their Destruction

1. The Conference decides to hold three annual meetings of the States Parties of one week duration each year commencing in 2003 until the Sixth Review Conference, to be held no later than the end of 2006, to discuss, and promote common understanding and effective action on:
 - i. the adoption of necessary national measures to implement the prohibitions set forth in the Convention, including the enactment of penal legislation;
 - ii. national mechanisms to establish and maintain the security and oversight of pathogenic microorganisms and toxins;
 - iii. enhancing international capabilities for responding to, investigating and mitigating the effects of cases of alleged use of biological or toxin weapons or suspicious outbreaks of disease;
 - iv. strengthening and broadening national and international institutional efforts and existing mechanisms for surveillance, detection, diagnosis and combating of infectious diseases affecting humans, animals and plants;
 - v. the content, promulgation, and adoption of codes of conduct for scientists

2. All meetings, both of experts and of States Parties, will reach any conclusions or results by consensus.
3. Each meeting of the States Parties will be prepared by a two week meetings of experts. The topics for consideration at each annual meeting of States Parties will be as follows: items i and ii will be considered in 2003; items iii and iv in 2004; item v in 2005. The first meeting will be chaired by a representative of the Eastern Group, the second by a representative of the Group of Non-Aligned and Other States, and the third by a representative of the Western Group.
4. The meetings of experts will prepare factual reports describing their work.
5. The Sixth Review Conference will consider the work of these meetings and decide on any further action.”³¹

The document was accepted on November 14. Nominally, the mandate of the Ad Hoc Group remained alive on paper, although it is questionable if the Verification Protocol will ever be revived. The Foreign Ministers of the UK and Germany, and the US representative to the Review Conference, all expressed themselves to be eminently satisfied. The US statement emphasized however that efforts to control BW proliferation would be pursued by the United States, “with greater success in other venues” than in “that single forum” of the BWC.³² Whether the statement agreed to will have any value at all will depend on what States Parties will do between and in preparation for the annual sessions. There is no restriction on the activities that they may choose to pursue, even collaborative verification exercises. As for the issue of BWC treaty compliance and non-compliance, the US repeatedly states that that is the very core issue to be concerned about regarding biological weapon proliferation and that the treaty “must be carefully and universally enforced among all signatories . . . This has been our aim in particular with the Biological Weapons Convention.”³³ Compliance and non-compliance most definitely are the core concern. But the US saw to it that there would be no discussion of that for the next four years, and no mechanism to achieve

such enforcement. Identifying the BWC violators – “naming names” – is certainly desirable, and as an earlier section in this study indicates the US has been doing that since 1988. Without a mechanism for verification and the enforcement of compliance, the exercise becomes ineffectual rhetoric and a US self-indulgence, simply brushed aside by those named no matter how correct and deserved the “naming” may be.

The result of the US diplomatic maneuvers at the final summer 2001 Ad-Hoc Group meeting of member states of the BWC and at the November-December 2001 BWC review conference was to scuttle ten years of efforts to arrive at verification provisions for the BWC at least approximate to those for the NPT and the CWC, the international non-proliferation regimes dealing with nuclear and chemical weapons. There would continue to be no international mechanism to monitor compliance precisely when the international regime was under pressure from – if the US government were correct – BW proliferation and noncompliance with the BWC by some of its treaty members, as well as the risk of the spread of BW capabilities to non-state actors. Nevertheless, the most senior policy makers in the Bush administration that were responsible for dealing with the subject not only opposed a BWC treaty verification protocol, they were basically opposed to the BWC altogether, a position they had held since the mid-1980s during the Reagan administration. In addition, there were new questions about the boundaries of rapidly expanding biodefense research programs combined with advances in molecular biology and biotechnology. These subjects are discussed in the sections of the study that follow.

PART II. SEPTEMBER 11, 2001 – THE FIRST SUCCESS IN MASS CASUALTY TERRORISM

On September 11, 2001, individuals apparently associated with Al Qaeda, the organization founded and directed by a Saudi, Osama Bin Laden, hijacked and then took over the flight controls of four large passenger aircraft in the United States.³⁴ Two of those aircraft were deliberately flown into the two 110 floor towers of the World Trade Center in New York City. The perpetrators could not have known what the consequences of the aircrafts' impact would be, as the World Trade Center towers had been designed to withstand the impact of a Boeing 707 jet aircraft, and in fact they each survived the impact forces of the larger Boeing 767s as well. They presumably hoped for the same outcome that their colleagues had hoped for in the bombing carried out in 1993, when 1,500 pounds of a urea-nitrate mixture, a more sophisticated explosive than an ammonia-nitrate mixture, were detonated at the base of one of the World Trade Center towers. At that time, the perpetrators hoped to topple one of the towers into the second, and thereby topple both of the towers. On September 11, the temperatures produced by unimpeded burning of nearly full loads of jet fuel led to the weakening of the steel columns supporting the mass of the buildings above the floors into which the aircraft had crashed, and both of the 110 floor tall towers collapsed in almost perfect vertical synchrony, the increasing mass pushing straight down into the floors below, ending in the total demolition of both towers.³⁵ The structural collapse of the buildings was due to the effects of fire. Only small portions fell on several adjacent smaller buildings, causing their destruction. Luckily, sufficient time elapsed for nearly 90 percent of the occupants of the buildings to be evacuated before both collapsed. The loss of life is now estimated as 2,799 people, including the 147 occupants of the two aircraft.³⁶ (If one adds the third aircraft that crashed into the Pentagon, the headquarters of the U.S. Department of Defense in Washington, DC, and the fourth aircraft that crashed in a Pennsylvania field, the total number of people that died is 3, 023, excluding the 19 hijackers.)

The third aircraft was purposely crashed into the Pentagon, housing the US Department of Defense. Due to the massive construction of the building, and its low-

lying construction, only 184 people lost their lives, including the 59 in the aircraft. In the fourth aircraft, passengers informed by cell telephone of what had already occurred, decided to fight the hijackers at the cost of their lives. The aircraft crashed into a field in Pennsylvania, and whatever its intended target was fortuitously escaped destruction.

These cataclysmic events produced, among other reactions in the US, one that did not necessarily have a direct, logical connection to what had taken place. It had two related parts. Within days there occurred an enormous outburst of speculation about the subsequent likelihood of chemical and biological terrorism as “next” to occur, with an overwhelming emphasis on biological terrorism. This frequently was combined with the suggestion that the next act that would be carried out by the Al Queda group in the United States would involve chemical and biological terrorism. The speculation was led, perhaps predictably, on the very next day, September 12, by former US Secretary of Defense William Cohen.

“Americans must now think the unthinkable – that the next terrorist attack could well involve a contagious agent carried to our soil or airspace in a briefcase or bottle. We face opponents who are working diligently....”³⁷

Another good example was provided by statements in two summary reports of Wilton Park conference held respectively in March and October 2002. The summary of the March 2002 report stated

“The 11 September 2001 terrorist attacks in the United States changed fundamentally threat perceptions regarding the use of weapons of mass destruction by terrorists; the unlikely has become credible . . . Indiscriminate use of CB weapons now seems plausible as assumptions regarding terrorists self-restraint or political constraints on their actions have been abandoned post-11 September.”³⁸

Despite an essential change in the October 2002 conference summary, the basic message remained the same:

“While it may be the case that the level of CBW threat has not altered post 9/11 . . . the existence of a non-state grouping which poses a global threat and which is prepared to inflict mass casualties has increased concern about CBW.”³⁹

Neither statement addressed the key variable: was there any indication that the group in question or any other had any actual capability to carry out a serious chemical or biological attack. Nevertheless, even seasoned specialists working in the field of chemical and biological weapons who had previously taken the position that terrorist groups would be very unlikely to be able to produce and carry out an attack with biological agents so as to produce mass casualties, now expressed the opinion that perhaps that judgment should be reassessed (Julian Perry Robinson and Jonathan Tucker are examples).

The essential question then was: should that assessment be revised? Had September 11 introduced considerations that should alter the previous assessment? This section of the study examines the first of three subjects:

- Whether the September 11 aircraft hijackings by themselves can be interpreted as increasing the subsequent likelihood of biological terrorism
- The available evidence to indicate whether the Al Queda group had obtained or developed any biological agents
- The apparently unrelated anthrax events in the United States in September and October 2001

The remaining two are discussed in the sections of the paper which follow.

The September 11 events demonstrated three things:

1. As became apparent after the US military forces had destroyed the Taliban, Al Queda had successfully co-opted the sovereign government of an entire country, Afghanistan. It was a relatively complex and coordinated organization, disposing of substantial resources, multiple international centers of operation, long-range recruitment and planning, years of preparation and training, all able to be brought to bear at a single moment for a joint operation.
2. By the very means of destruction chosen, the use of aircraft as a very large cruise missiles, it indicated that the group had not used the four or five years to produce chemical or biological weapons. However, it was clear at the same time that the group did not limit itself to a single mode of attack. The 1993 World Trade Center bombings,

as well as the August 1998 attacks on the US embassies in Kenya and Tanzania, had used truck bombs. The October 2000 attack on a US destroyer in a Yemeni port, and an earlier attempt to do the same, used a waterborne equivalent of a truck bomb. US authorities also suspected that there could have been or still were Al Qaeda plans to use additional truck bombs within the United States. It was known, from Philippine court documents, that the concept of crashing a small aircraft filled with powerful explosives (C-4) into the US CIA headquarters had already existed within the group by 1995. Finally, there was the post-September 11 discovery that the group was interested in learning how to use small crop spraying aircraft, and perhaps purchasing one. That led to the immediate supposition that this indicated an intention to use such aircraft for the aerial dispersion of chemical or biological weapons over US domestic targets. On-line aerosol dispersion is a standard form of delivery for either C or B agents, although crop-dusting aircraft are neither easy to fly nor directly suitable for the role. In a press conference on October 11, President Bush stated the following:

“Let me give you one example of a specific threat we received. You may remember recently that there was a lot of discussion about crop-dusters. We received knowledge that perhaps an Al Qaeda operative was prepared to use a crop-duster to spray a biological weapon or a chemical weapon on American people. And so we responded. We contacted every crop-dust location, airports from which crop-dusters leave. We notified crop-duster manufacturers to a potential threat. We knew full well that in order for a crop-duster to become a weapon of mass destruction required a retrofitting and so we talked to machine shops around where crop dusters are located.”⁴⁰

The wording is suggestive, but imprecise, and from the statement alone, one cannot tell if the “received knowledge” is something more specific than the information that members of the group were interested in purchasing such an aircraft.

3. It also demonstrated that the group had absolutely no limits whatsoever to the number of people that it could be killed—whether or not mortality was itself the primary motivations—for any particular act. Had one of the World Trade Center towers fallen into the second, as the perpetrators presumably hoped, and had both then toppled over

into the buildings of the surrounding financial district, deaths could have exceeded 100,000.

The sum of all of those demonstrated factors is very considerable. Nevertheless, none of them pertain directly to the variables involved in being able to successfully produce or disperse a biological (or chemical) agent, except for the interest in crop-spraying aircraft, whose actual intended purpose still remains unexplained. They demonstrated ruthlessness, determination, organization, an interest to attack and destroy targets of great symbolic national significance, and possibly also to kill very large numbers of people. As indicated, none of these characteristics are directly germane to the ability to produce biological agents or weapons. One should also note that the indicator of willingness to kill very large numbers of people was already passed, both in 1993 and 1995. The World Trade Center bombers in 1993 had exactly the same intention, or wish, as those who carried out the September 11, 2001 events. The only difference was that the first and simpler attempt in 1993 failed, while the second one in September 2001 succeeded. It is also clear that the Japanese Aum group in 1995 had no upper threshold to the number of people that they might have envisioned killing. Some of their own descriptions of their intentions were nothing short of apocalyptic. These stated that they hoped to precipitate, through a convoluted series of events, a US nuclear attack on Japan by their initial use of nerve gas in Japan on Japanese civilians, which they would then blame on the United States. Although the conception is totally irrational, and would never have taken place as they conceived it, it certainly indicates no particular qualms about limiting intended deaths.

PART III. AL QUEDA AND BIOLOGICAL AGENTS OR WEAPONS?

What in fact would change the estimate of the likelihood of potential BW terrorism? First, evidence that Al Queda or another group had actually begun working with biological agents. Second, if unequivocal evidence becomes available demonstrating the collaboration of the Al Queda group with the government and security agencies of Iraq. There have heretofore been no examples of states with biological (or chemical) weapons capabilities extending assistance in those areas to terrorist groups that they support or collaborate with. However, both Iraq and the Al Queda group have amply demonstrated that they do not operate on the basis of precedent. The possibility therefore must at least be anticipated, although the discovery of definitive evidence of Iraqi collusion in such an activity would result in the most dire consequences for Iraq.

In his Presidential Statement of November 1, 2001, President Bush said "...we know that the scourge of biological weapons has not been eradicated...Rogue states and terrorists possess these weapons and are willing to use them," and in his 2002 State of the Union message, President Bush said that Iraq could give weapons of mass destruction to terrorists. This remark was directly criticized by Paul Pillar, the US National Intelligence Officer for Near East and South Asia. Pillar said that the President should not have said that, since there was no evidence of this having ever occurred in the past.⁴¹ If that remains the case, the situation remains exactly the same as that described in the previous Centro Volta volume, Bioterrorism and Biosecurity.⁴² That paper demonstrates that there had been little or no acquisition of biological weapons by non-state actors or "terrorist" groups in the entire 20th century, and argues that it will still remain difficult for such groups to obtain or manufacture BW in the near future.

What little information there is available concerning Al Queda and biological weapons appeared in two stages: first soon after September 11, 2001, and second, once US forces had been able to carry out detailed examinations of Al Queda facilities on the ground in Afghanistan in February 2002. In the first instance there was the information already provided, in addition to the interest in crop-spraying aircraft

discovered to have existed among the individuals who carried out the September 11, 2001 events, and the possibility that such aircraft might have been envisaged as a BW dispersal mechanism. Several press reports then referred to an ostensibly leaked satellite photo showing “animal corpses,” “dead animals,” “dead dogs,” in the vicinity of Al Queda training camps in Afghanistan, suggesting that this demonstrated Al Queda testing of biological agents. The US Central Intelligence Agency has explicitly denied that its satellites have recorded any such images:

“Dozens of rabbits and dogs have been found fatally poisoned near Bin Laden’s Jalalabad training camps, according to a foreign intelligence agency. Although US officials adamantly deny that their own satellites spied any such thing, in June, CIA Director George Tenet warned, ‘Terrorists who fly no national flag are trying to acquire chemical and biological weapons’.”⁴³

This leaves the strong implication that the information was provided by Israeli sources, and the stronger implication that it is disinformation. There would be no way of distinguishing if the “dead dogs” had been exposed to chemical rather than biological agents, and the resolution of a satellite photo that could distinguish dogs from rabbits would have to be an inch or two, which is beyond the theoretical capability of any satellite photograph, aside from the question of what resolution Israeli photo reconnaissance capabilities have attained. Another reporter who claims to have seen the satellite photograph stated that it was impossible to distinguish what the animals were.⁴⁴

On October 9, 2001, “British Foreign Office Minister Ben Bradshaw,” speaking to the Australian Broadcasting Corporation television network is reported to have said, “We know that the al Qaeda network has been trying to get hold of biological and chemical weapons for the last 10 years. We believe they’ve probably got some. What we’re not sure about is whether they’ve got a delivery mechanism.”⁴⁵

The substance behind this statement is not currently known. Should it refer to the testimony of Ahmed Ressam in the US embassy bombings trial that has been previously reported, it would refer to training that Ressam reported having been given in

the early 1990s in Bin Laden training camps to use cyanide, and it would include no content dealing with biological weapons.⁴⁶ However, on October 12, 2001, US Vice President Richard Cheney virtually repeated the UK minister's phrase, saying that "We know that he [Bin Laden] has over the years tried to acquire weapons of mass destruction, both biological and chemical weapons." He also said that the "United States had copies of the manuals that they [al Qaida] used in their training camps to train their people with these things."⁴⁷ As best as is known, these manuals describe how to handle poisons safely.⁴⁸

The remaining relevant information was interesting, ambiguous, and, in the end, totally contradictory. In his November 19, 2001 statement at the BWC Review Conference, US Under Secretary of State Bolton included the following in his remarks:

"...we are concerned by the stated intention of Usuma Bin Ladin and his Al Queda terrorist organization to use biological weapons against the United States. While we do not yet know the sources of the recent anthrax attacks against us, we do know that some of the September 11 terrorists made inquiries into renting crop dusters, almost certainly to attack other cities...We are concerned that he could have been trying to acquire a rudimentary biological weapons capability, possibly with support from a state. While the United States is not prepared, at this time to comment on whether rogue states have assisted a possible Al Queda biological weapons program..."⁴⁹

In contrast, George Tenet, the US Director of Central Intelligence, included the following statement in February 2002 testimony to the US Senate,

"...we know that Al Queda was working to acquire some of the most dangerous chemical agents and toxins. Documents recovered from Al Queda facilities in Afghanistan show that Bin Laden was pursuing a sophisticated biological weapons research program"⁵⁰

The "documents recovered" that CIA Director Tenet refers to presumably do not refer to the descriptions of BW delivery techniques that two senior Pakistan's nuclear physicists supplied to Al Queda, as these blackboard sketches are neither useful or realistic. It is possible that these "documents," or perhaps some of them, have in fact been publicly identified. The home of the Pakistani nuclear physicist reportedly also contained "...the

results of a massive internet search on anthrax vaccines, a report titled 'Bacteria: What You Need to Know,'...a report titled 'Iraqi Anthrax Troops,' and a New York Times article on Plum Island."⁵¹ Another uncorroborated press report in February 2002 stated that

"Al Queda...appears to have targeted ex-Soviet (biological) weapons scientists for recruitment. According to US intelligence reports, some Russian experts traveled to Kandahar for job interviews with unidentified Qaeda leaders. Intelligence officials believe that the Russians turned down the chance to work for Bin Laden, however, and by all accounts Al Qaeda's efforts to make or acquire bioweapons have gone nowhere"⁵²

An earlier Newsweek item in December 2001 was even more sensational, reporting that "...one or more Russian scientists were working inside Afghanistan with Queda operations....The renegade Russians were helping Al Queda to develop anthrax."⁵³ Despite the reference to "US intelligence reports," this press item was described by a US government specialist as "journalistic invention." On February 25, 2002, Gen. Tommy R. Franks, the commander of US military forces in Afghanistan, reported that following the examination of over 110 sites in Afghanistan

"...the United States has yet to find evidence that Al Qaeda was able to create a chemical or biological weapon at any of its camps, command centers, or caves in Afghanistan...We have seen evidence that Al Qaeda had a desire to weaponize chemical and biological capability, but we have not yet found evidence that indicates that they were able to do so."⁵⁴

After the months and even years of suggestions which all appeared to be tending in the same direction, several very contradictory assessments were provided by US government officials within days of each other in the last weeks of March 2002. Perhaps unavoidably, within a day or two there was a slight caveat. On March 19, Assistant Secretary of State Carl Ford, the Director of the US Department of State's Bureau of Intelligence and Research, testified to the US Senate on the proliferation of biological weapons. His testimony included several paragraphs on non-state, or terrorist, groups.

“What is the potential access of international terrorist groups and capability to produce and employ CBW?

“Terrorist interest in chemical and biological weapons has been growing and probably will increase in the near term. The threat is real and proven. The ease of acquisition or production of some of these weapons and the scale and terror they can cause, will likely fuel interest in using them to terrorize. The transport and dispersal techniques also are manageable and can be made effective easily, as seen recently in using the mail as a delivery system to spread anthrax.

“Many of the technologies associated with the development of chemical and biological agents, have legitimate civil applications. The increased availability of these technologies, particularly if a group is already in the United States and therefore not subject to many of the controls in place that monitor and limit the export of these technologies, coupled with the relative ease of producing chemical or biological agents, makes the threat very real.

“In addition, the proliferation of such weapons raises the possibility that some states or rogue entities within these states could provide chemical or biological weapons to terrorists. It remains unlikely that a state sponsor would provide such a weapon to a terrorist group. But an extremist group with no ties to a particular state (but which likely does have friends in state institutions) could acquire or steal such a weapon and attempt to use it.”⁵⁵

The statement is remarkable for its generality, imprecision, and weakness. There is no mention of any specific group. Al Qaeda is not mentioned.

On the very same day “US government officials” reported that “although Al Qaeda researched chemical and biological weapons, there is no indication that it ever acquired or produced them.”⁵⁶ However, the only substance mentioned was cyanide. The report added that “Among the documents found in Qaeda sites were ...scientific writings on poisons, diagrams of chemical agents and research on germ warfare vaccines.” There is every likelihood that, as in the case of nuclear-related material, the “research” was routine journal papers obtainable in libraries and on web sites. A copy of the notorious “The Poisoner’s Handbook” was found (sold at US gun shows and gatherings of right-wing militants) and another official correctly noted: “It’s nonsense.”⁵⁷

Three days later, a New York Times press item reported

“The United States has discovered a laboratory under construction near Kandahar, Afghanistan, where American officials believe Al Qaeda planned to develop biological agents, officials said today.

“According to a confidential assessment by the United States Central Command, the laboratory was intended to produce anthrax. The assessment was presented to senior American officials in recent days and is based on documents and equipment found at the site.

“No biological agents were found in the laboratory, which was still under construction when it was abandoned. American intelligence officials still believe that Al Qaeda would need assistance from foreign governments to mount an effective program to make weapons of mass destruction....

“...in addition to documents found at the site, some unused equipment was also uncovered.

“American officials did not describe the evidence in detail but said that it included medical equipment and supplies that would be useful for legitimate research but could also be used to produce biological agents.

“Officials also said there was no evidence of pathogens at the Kandahar location. But the evidence, which included documents, indicated that Al Qaeda was interested in producing anthrax.”⁵⁸

In December 2001, a computer file belonging to Dr. Ayman al-Zawahri, the Egyptian co-head of Al Qaeda, was found to contain an April 1999 memorandum which noted that “the destructive power of these [chemical and biological] weapons is no less than that of nuclear weapons,” and lamented that “despite their extreme danger, we only became aware of them when the enemy drew our attention to them by repeatedly expressing concern that they can be produced cheaply.”⁵⁹ This was followed by a May 7, 1999 computer file recording that Al Qaeda had set aside \$2,000 to \$4,000 for “start up” costs of experiments by an elderly Egyptian chemical engineer, Midhat Mursi (called Abu Khabab) who belonged to the Al Qaeda organization in Afghanistan. Unless US government officials supply additional information, one could, as a first approximation, guess that the “documents” may refer to these items or those referred to previously. As for the “unused equipment....medical equipment...”, it could have included centrifuges, autoclaves, culture media, an incubator, etc. This seemed to fit well with a report in the British newspaper Observer several months earlier that “The only evidence of a

biological weapons laboratory was the discovery last December of an abandoned, half finished building containing medical equipment near the Taliban's former power base of Kandahar in southern Afghanistan. This had been reported previously."⁶⁰ In November 2001, CNN had reported that an Al Qaeda front organization named "Wafa" had procured laboratory equipment, allegedly from the United Arab Emirates and from the Ukraine, for the Al Qaeda site at which Abu Khabab reportedly worked.⁶¹ Finally, on March 25, a press briefing by US Secretary of Defense Rumsfeld and Army Chief of Staff General Myers explained that an informant had "led us to that particular site."

"There was a lab in Kandahar where we did find some equipment that was indicative of perhaps manufacturing anthrax. Not all the equipment you would need was there, but there was some of the equipment. Looked like some of it had been tried to have been destroyed....Most equipment like that is dual use....There was a dryer. There was an autoclave. There's some other..."⁶²

One therefore had the statements by General Franks and INR director Ford on one side, and the New York Times report and General Myers on the other. It is particularly notable – and very ironic – that US officials could decide on this apparently extremely fragmentary evidence that what they had was a facility intended for BW production, and anthrax in particular, while having only months before rejected the BWC Verification Protocol as unverifiable.

In the months that followed there were several additional reports relevant to Al Qaeda and biological weaponry, but they did not appear to alter the conclusions reached from the information that had already been available in the spring of 2002. On September 13, 2002 U.S. Department of Defense officials provided the press with a briefing that was described as "a more limited version of a classified presentation that Defense Secretary Donald H. Rumsfeld and senior aides have made to NATO allies and to legislators on Capitol Hill." It described equipment and documents found by British forces in a "laboratory, near Kandahar, Afghanistan. The equipment consisted of "a centrifuge for separating liquids and an oven in which slurried agents could be dried."⁶³ The "oven" was also referred to as a "dryer," and the equipment, it was argued, supported the contention that "Al Qaeda intended to use (it) to make biological and

chemical weapons.” It is highly unlikely that the same equipment would be suitable for producing both biological and chemical documents. The “documents” that were found at the site indicate that Al Qaeda was gathering basic literature on CBW agents, but these do not alone support the additional claim that was made by DOD officials, that the Al Qaeda intended to produce the categories of agents that were itemized, or that the site would be capable of doing so.

On September 25, 2002 the National Security Advisor to President Bush, Condoleezza Rice, stated that “We know too that several of the detainees, in particular some high ranking detainees, have said that Iraq provided some training to Al Qaeda in chemical weapons development.”⁶⁴ Within two days presidential spokesman Fleischer⁶⁵, and Secretary of Defense Rumsfeld⁶⁶ had expanded or transformed Rice’s “chemical weapons development” into “chemical and biological agent training,” with no indication that the underlying information base was any different for any of the statements. Finally, on October 7, 2002, CIA Director George Tenet, in a letter to Senator Robert Graham, the Chairman of the US Senate’s Intelligence Committee, wrote that “We have credible reporting that al-Qa’ida leaders sought contact in Iraq who could help them acquire WMD capabilities. The reporting also stated that Iraq has provided training to al-Qa’ida members in the areas of poisons and gases and making conventional bombs.”⁶⁷ Notably, the operative word used was “poisons” rather than “biological weapons,” and very likely refers to Tenet’s reference for many years to “toxins,” which in all likelihood denotes ricin. After an additional six months, one was therefore left with no information that appeared to be appreciably different than the fragmentary and ambiguous reports that had been available early in the spring of 2002.

Comments by specialists in the months immediately after September 11 were by and large very tentative. Gordon C. Oehler, former director of the US CIA’s Nonproliferation Center

“called the chemical and biological threat “a grave concern.” But he said that any such attack by al Qaeda would probably be no more effective

than the crude sarin gas attack staged by Aum Shinrikyo [in Japan, in 1995].”⁶⁸

Jonathan Tucker commented that

“It would be a long and fairly challenging process to acquire the capability for mass destruction on the level of what we saw with the World Trade Center. There have been reports that some of Osama Bin Laden’s people have been experimenting with some kind of poisons, but while they might be able to acquire small quantities, they would need substantial quantities for large-scale attack.”⁶⁹

The irony of the current situation is that during the twelve months preceding September 11, 2001, a very substantial number of the specialists frequently quoted by public media sources had begun to express the position presented in the previous paper on BW in the 20th century. That even continued to a substantial degree after September 11, despite the pressure of the full blast of renewed media attention to the potential of bioterrorism. An excellent treatment of the problem in the New York Times of October 2, 2001, which emphasized the successive difficulties that would have to be overcome by a terrorist group in order to carry out any significant attack with biological agents, additionally quoted several authorities who either served or are currently serving the US government:

- Dr. David Franz, former director of USAMRIID: “People don’t understand how difficult it is to pull off a biological attack.”⁷⁰
- Dr. C.J. Peters, formerly a senior virologist at USAMRIID: For a chemical or biological attack with mass casualties, “You have to have a state or the equivalent.”⁷¹
- Dr. Margaret Hamburg, former Assistant Secretary of Health and Human Services, on October 9, 2001, “The risk [of BW terrorism] hasn’t changed, or our vulnerability; just our perception.”⁷²
- Dr. Steven Block, chair of a Defense Science Board Summer Study several years ago that dealt with BW, and a very strong proponent of the biological and bioterrorist weapons “threat;” “A crop-duster is likely to do a very bad job.” Dr. Block also noted “that fears rooted in unrealistic appraisals of the germ threat can greatly magnify an assault’s effectiveness. ‘A bad job may be all that’s necessary to sow disruption and panic’ even if the attack itself produces ‘a mere handful’ of fatalities or serious infections.”⁷³

This was a remarkable statement from someone who always spoke of the BW threat in the direst terms, including the more advanced potentials of genetic engineering. A similar opinion was suddenly offered by another analyst, Dr. Alan Zelicoff of Sandia Laboratories, who had also been given to very high-end assessments:

“The chance of a large (bioweapons) attack that affects tens of thousands or hundreds of thousands is very small. But is that what the terrorist cares about? Inducing enough disease to produce panic or disrupt life is probably enough. I would posit that one or two cases of pulmonary anthrax in downtown Washington would achieve that goal.”⁷⁴

The reference to “one or two cases” is astonishing, and the implication, which other commentators have stated explicitly, that so small a number of cases would cause civilian panic and loss of confidence in the government is totally implausible given the quite opposite evidence that was clearly shown following the September 11, 2001 events.

In its basic essentials, the situation remained essentially the same as it had been before. In July 2000, the senior national security official in the US government oversight body, the General Accounting Office, testified to Congress in a context that focused on biological and chemical terrorism, that government efforts to combat terrorism “have been based on vulnerabilities rather than an analysis of credible threat...agencies initiatives appear at odds with the judgment of the intelligence community,” suggesting a failure to distinguish between “what is conceivable or possible and what is likely in terms of the threat of a terrorist attack.”⁷⁵

It is notable that several of the more competent of the post-September 11 assessments of the likelihood of BW use by terrorist or non-state actors also pushed such an event off ten years into the future, when relevant technology and knowledge would have diffused to an even greater degree than currently is the case. This stands in contrast to the many predictions that were offered in the years following 1995, claiming that bioterrorism would occur by the year 2000. It is, however, difficult to

imagine any other eventual outcome if groups such as Al Qaeda continue to exist in the decades ahead, and most particularly if they are told that “The terrorists didn’t use biological or nuclear weapons, and next time they well could. A future enemy assault could kill not 6,000 people on American soil, but 600,000.”⁷⁶ Nothing could more provoke their interest and attention.

By early 2003, the question of whether Al Qaida had made any farther advance in the development of biological weapons was reintroduced for several reasons. In testimony to the US Congress on February 6, 2002, CIA Director George Tenet had stated, “. . . we know that al-Qa’ida was working to acquire some of the most dangerous chemical agents and toxins. Documents recovered from al-Qa’ida facilities in Afghanistan show that Bin Ladin was pursuing a sophisticated biological weapons research program.” However, on February 11, 2003, one year later, the language was slightly more specific.

“We continue to receive information indicating that al-Qa’ida still seeks chemical, biological, radiological, and nuclear weapons. The recently disrupted poison plots in the UK, France and Spain reflect a broad, orchestrated effort by al-Qa’ida and associated groups to attack several targets using toxins and explosives. These planned attacks involved similar materials, and the implicated operatives had links to one another. I told you last year, Mr. Chairman, that Bin Ladin has a sophisticated BW capability. In Afghanistan, al-Qa’ida succeeded in acquiring both the expertise and the equipment needed to grow biological agents, including a dedicated laboratory in an isolated compound outside of Kandahar.”⁷⁷

At the same time, discussions with two sources with access to classified information indicated that there had been no essential change from the previous year, and that the phrasing in the 2002 statement was the more accurate one.⁷⁸ The compounds referred to in the incidents mentioned by Tenet continue to appear to have been cyanide and ricin, and the “materials,” in the possession of terrorist groups, in so far as documentation is concerned, appears to be papers taken from internet web sites in Western Countries. The difference lay in three key words—“program” vs “capability” among them—and the problem of divining whether the intelligence community had

obtained additional substantive information in the intervening year, or whether the different use of words did represent any real difference in assessment.

On February 7, 2003, US government officials raised the level of threat of a terrorist incident to “orange,” and it was reported that “Intelligence officials continue to believe that an attack would involve poisonous chemical or biological agents, or possibly a small radiological device, or ‘dirty bomb.’”⁷⁹ Nevertheless, by the time that this was reported, it had been learned that the information on which the alert had been made was spurious. In the words of Rep. Porter Goss, chairman of the House Intelligence Committee, “There is no justification, there’s no more specificity than there was February 7 . . .”

In September 2002, US officials began to link Ansar al-Islam, an al Qaeda affiliated group, with the production of ricin. After the fall of the Taliban in Afghanistan, the members of the group had crossed through Iran and occupied an enclave of previously Kurdish controlled territory in the northeastern corner of Iraq, along the border with Iran, “US officials have said Ansar has conducted small-scale experiments with biological poisons and crude chemical weapons, for possible use in attacks.”⁸⁰ When the Ansar al-Islam camp was overrun by US and Kurdish military forces on March 30, 2003, General Richard Myers, Chairman of the US Joint Chiefs of Staff, described the site as having “been used to manufacture ricin.”⁸¹ Two days later, a US military spokesman speaking from the nearby town of Biyar, reported that “chemical and/or biological samples” had been obtained, and were being shipped to the US for analysis.⁸² Commentators have warned of the desirability of providing multiple samples for analysis to laboratories in different countries should US troops find any chemical or biological samples inside Iraq.

On March 1, 2003, a senior Al Qaeda figure Khalid Sheik Mohammed was arrested in Rawalpindi, Pakistan, at the home of a fugitive Pakistani bacteriologist. Handwritten notes and computer hard drives were seized in the home, once again showing interest in producing biological agents but not suggesting actual production or

even full capacity to proceed, through the manufacture of botulinum toxin and salmonella, and the use of cyanide appear to have been postulated. The press report of these reported discoveries was contradictory in places, but recruitment of named scientists was discussed, production steps were outlined, and equipment, such as that found in Afghanistan, was described. Among the items found was “a direction to purchase” *Bacillus anthracis*. Nothing so far translated implies access to the most dangerous microbial strains or to any advanced processing or delivery methods.⁸³

Mohammed also told his interrogators that a Malaysian named Yazid Sufaat “...took the lead in developing biological weapons for al Qaeda until he was arrested by Malaysian authorities.”⁸⁴ Sufaat was arrested in 2001. He reportedly obtained a bachelors degree “in biological sciences,” with a “clinical laboratory concentration” from California State University in Sacramento in 1987. He then served as a laboratory technician in the Malaysian military, and in 1993 established a company in Malaysia “to test the blood and urine of foreign workers and state employees for drug use.”⁸⁵ In the course of recent years, his company and possibly another owned by his wife, appear to have been involved in financial transfers and the purchase of ammonium nitrate for producing explosives on behalf of units affiliated with al Qaeda operating in the Southeast Asian countries of Indonesia, Malaysia and the Philippines. There are tentative suggestions that Sufaat was not able to procure an appropriate strain of anthrax for use as a pathogen, raising the possibility of the same difficulty faced by the Aum Shinrikyo group in Japan, which was only able to obtain the veterinary vaccine strain of anthrax. While incriminating as to intent, disclosed materials at this writing suggest that al Qaeda was not responsible for the anthrax attacks in the United States in 2001.

PART IV. THE ANTHRAX EVENTS IN THE UNITED STATES IN THE FALL OF 2001

The most significant question of interest to the concerns raised in this study is whether the US anthrax incidents are a significant indicator of what may be expected with increasing frequency in the future, or whether they are in fact one more essentially anomalous event. If we very briefly recapitulate the experience of recent decades the following are the key data points:

- (1) As best is known, there has never yet been an instance of state supported BW terrorism.
- (2) The 1984 US Rajneesh Salmonella event: successful use of an incapacitant, purpose was local and application local. The mechanism used was application to food, and the laboratory culturing of the agent was carried out by a very small number of individuals in relatively primitive facilities.
- (3) Japanese Aum Shinrikyo efforts between 1990 and 1994 to produce anthrax and Botulinum toxin: conceptions of the perpetrators were much more grandiose, as were the efforts, facilities and expenditure. Nevertheless total failure, including effort to purchase professional assistance, both in Japan and in other countries.
- (4) A forthcoming book, Means, Motives, and Mayhem: Assessing Acquisition and Use of Unconventional Weapons by Terrorists (edited by John Parachini, to appear in 2003 and published by the RAND Corporation) examines 15 case studies of specific international terrorist groups (PKK, IRA, Hizbollah, Tamil Elam and so on) for which there existed a record of allegations in the public media of either interest in or use of chemical or biological weapons. The result of these detailed and extensive investigations of each individual case demonstrated virtually zero evidence of effort to produce any biological agents. Evidence regarding the Al Queda group seems to indicate only interest (and should the US government release the details of information discussed further below, possibly the purchase of some laboratory equipment).

Should it develop that the US anthrax incidents were perpetrated by an "insider," a well trained professional, with access to facilities, strains, vaccination, etc., --as now seems increasingly likely, and strongly suggested by official US agencies--then it is possible to suggest that in the absence of such a perpetrator having carried out these events there might not have been another "bioterrorist" event for perhaps a decade or more, in any

case for an indeterminate period into the future. Given that the events have occurred however, no matter by what manner, most analysts assume that they will bring the next similar event to pass sooner than would otherwise have been the case.

The anthrax events began at the end of September and continued into October 2001. As of this writing – more than a year later in November 22, 2002 – the basic questions of “Who, How, Why” remain unanswered. It is unknown if they are related to the aircraft attacks, but it is apparently the official US government position that they are not. It became publicly known that a substantial portion of the U.S. government investigation focused on an American virologist who had worked at USAMRIID for two years. He had then worked for a private defense contractor, SAIC, supervising biodefense contracts, some at a classified level. In that capacity he had developed a relationship with one of the last remaining professionals who had played an important role in the pre-1969 US BW program. Both his position and that relationship had apparently afforded him access to classified information on BW production processes and technology, until his security clearances were revoked. He also had access to US government facilities that worked with the AMES strain and that produced dry powder anthrax. Repeatedly questioned by the FBI he had nevertheless not been charged. In November 2002, an FBI spokesman offered the following comment

“What we do have and what we do know is that the anthrax was mailed here in the United States; we know it was mailed from 10 Nassar Street, Princeton, New Jersey, from a mailbox. We know the flow of the mail flow, we know the dates that the letters were sent, and it would appear to many of us that have worked this investigation, that it's much more consistent with someone being an American-born, and having some level of familiarity with the Princeton-Clinton New Jersey areas versus a foreign operative coming into the US and being able to successfully conduct such an attack.”⁸⁶

According to data compiled by the US Center for Disease Control, letters mailed through the US postal system produced 22 confirmed cases of anthrax, five of which resulted in deaths in a period of 8 weeks. The quality of the anthrax samples varied. Some apparently were crude, but the samples that were sent to US Senators Daschle and Leahy, reportedly of several grams, were prepared so that most of the particles

were under five microns in size and additionally were also treated to facilitate easy aerosolization. The quality of the anthrax spores in these two envelopes also differed to some degree but were of an extremely high concentration and purity.⁸⁷

The envelopes containing the anthrax were mailed to media organizations and to two members of the US Senate. The mechanics of postal processing machinery combined with the pore size of ordinary mailing envelope paper led to the exposure of postal workers, as well as to cross contamination of mail. This resulted in some 19 buildings or facilities in the Washington D.C. area possessing levels of anthrax contamination, described as "medically insignificant" and too small to lead to human infection. However, one of the Senate office buildings remained closed for months until it could be decontaminated, and two large central postal distribution centers, one in the Washington, DC area and the second in Connecticut remain closed and are still in the process of decontamination. The largest number of people infected were postal employees. So far, the method chosen by the perpetrators for distribution of the anthrax does not appear to have been intended, or capable of, producing mass casualties.

At this time only the advanced technical quality of some of the agent is known, and the means of its distribution to date.⁸⁸ The perpetrator or perpetrators remain unknown. To date only four envelopes containing anthrax have been recovered, although there was at least one other, and possibly more. The anthrax strain contained in all the envelopes was the same: one of the known variants of the Ames strain. It is a strain that only became available to the US biodefense program in the early 1980s. Due to its potency, it became the standard strain for use in animal model efficacy studies during the development of new anthrax vaccines. As best as is known, somewhere between 15 and 20 laboratories in the UK, US, Canada and probably Israel have possessed or worked with the Ames strain. There is now a major effort to distinguish small differences in the genomes of the Ames cultures possessed by these different laboratories in order to identify the culture most closely resembling that used in the attacks.⁸⁹ Some of the results of this research was published but appears to have

been inconclusive, although it was reported that the anthrax in the envelopes had been produced in the last two years.

The proximity in time of the anthrax distribution to September 11 was initially strongly suggestive. In addition, the knowledge, equipment and working conditions necessary to produce a high quality, dry powder anthrax led several specialists to favor the likelihood of state support for the production of the anthrax. That, as well as some technical characteristics of the preparation, produced substantial suspicion that Iraq was the most likely state to be implicated. This position was summed up in US Congressional testimony by Dr. Richard Spertzel, the former Head of Biological Weapons inspections for UNSCOM between 1994 and 1998.

“I have maintained from the first descriptions of the of the material contained in the Daschle letter that the quality appeared to be such that it could be produced only by some group that was involved with a current or former state program in recent years. The level of knowledge, expertise, and experience required and the type of special equipment required to make such quality product takes time and experimentation to develop. Further, the nature of the finished dried product is such that safety equipment and facilities must be used to protect the individuals involved and to shield their clandestine activity from discovery.

“...I do not believe science will identify the laboratory or country from which the present anthrax spores are derived. The quality of the product contained in the letter to Senator Daschle was better than that found in the Soviet, US or Iraqi BW program, certainly in terms of the purity and concentration of spore particles.. . .

“Iraq certainly knows how to produce 100 percent pure spores. That is a technique that they developed in a two-step fermentation process which is capable of giving them the kind of concentrations that we are seeing in the Daschle letter.

“...Although Iraq claims a low concentration in its final liquid product, such low levels can not be substantiated and the process used by them is capable with slight tweaking to produce the levels seen in the Daschle letter. Iraq used bentonite in its production of *Bacillus thuringiensis* spores as recovered in 1994 by UNSCOM; however, Iraq through TSMID, its procurement arm for its BW program, also sought a supply of pharmaceutical grade silica in 1988 and 1989. Although suggestive evidence indicates Iraq was able to obtain such material we did not obtain definitive evidence to prove this acquisition. Iraq was also interested in obtaining other materials that would make a good additive for weapons-grade material. Iraq, unlike the Soviet and US programs, did not mill its dried product; rather the Iraqi BW team learned the

method of obtaining a readily aerosolizable small particle product in a one step spray drying procedure.

“...we know from actual evidence in 1994 of a related agent, bacillus thuringensis, a biopesticide, that they demonstrated their capability of producing a small particle using a spray dryer without milling. In that case, they used Bentonite as the additive.”⁹⁰

Later in 2002, having gone back and searched UNSCOM records, Spertzel provided additional details: the Iraq had used silica gel to aid in the dispersability of wheat smut spores, that they had also investigated its use of a carrier for the aflatoxin produced in their BW program, and that UNSCOM had reported that Iraq had procured 10 tons of another commercial silica compound for use in its chemical weapons program.⁹¹ Finally, a classified US Dept. of Defense document dating from 1991 reportedly stated that “Iraq had imported approximately 100 metric tons” of yet a third commercial silica product between the years 1982-3 and 19991. Oddly, in August 2001, a UN sanctions panel overrode US objections and allowed Iraq to import another 25 metric tons of the same compound that they had earlier reportedly acquired the 100 tons.⁹² The UN oil-for-food program had not listed the item on its proscribed Goods Review List.

It is clear from UNSCOM's investigation that the Iraqi BW program was extraordinarily thorough in searching the research and patent literature of Western states that had maintained offensive BW programs. Whether they were able to carry out that effort on their own, or whether they were assisted in such an effort by another government, or by private consultants, is unknown.

A major argument against the responsibility for the anthrax events being a state run program, particularly by Iraq is the idiosyncratic distribution of the anthrax mailings. The ineffective samples sent to the New York media, the mailing to the publication office of the trashiest US tabloids in Florida, and then the mailings to Democratic Party Senator Daschle and even more so to his colleague Senator Leahy, all suggest a particular animus, and in the latter cases a knowledge of domestic US political issues, none of which are plausible concerns of the government of Iraq.

It has been indicated earlier that there have heretofore been no examples of states with biological (or chemical) weapons capabilities extending assistance in those areas to terrorist groups that they support or collaborate with. However, as also indicated, neither Iraq nor the Al Queda group operate on the basis of precedent. Whatever the evidence eventually demonstrates to have been the case: direct state action, state assistance to a terrorist group, or an act carried out by a domestic US group or individual, the anthrax events will be seen as having passed another threshold.⁹³

However US government officials have made clear that they believe the perpetrator or perpetrators to be US nationals, and almost certainly ones with experience in and access to the US biodefense program and facilities.⁹⁴ US officials went so far as to veto an effort made by France to have the UN Security Council condemn the anthrax incidents, on the grounds that it was likely that the perpetrators were US citizens, and that the issue was therefore "a domestic criminal matter."⁹⁵ In mid-December 2001 it became known that Dugway Proving Ground in Utah, one of the major facilities in the US biodefense program, had been producing small quantities of Ames strain anthrax for nearly two decades.⁹⁶ It had also been producing dry powder versions of anthrax simulants, as well as weapon-grade dry powder anthrax. (Further details are in Part V.) It additionally became known that at least one contractor to the US Central Intelligence Agency had also been working with the Ames anthrax strain, but again, allegedly had made no dry powder.⁹⁷ On April 4, there was the first media suggestion that the US biodefense program has been withholding information from the anthrax investigation:

"...federal investigators say...that the US military is not telling them everything about secret anthrax research programs....military and intelligence agencies have withheld a full listing of all facilities and all employees dealing top-secret anthrax programs...investigators say the criminal investigation has come up now against some closely held military secrets which are slowing down the pursuit for the anthrax killer."⁹⁸

In November 2002 it was disclosed that the US FBI was attempting to reproduce the dry powder anthrax with the characteristics that were found in the envelopes

sent to Senators Daschle and Leahy, as a part of its criminal investigation.⁹⁹ It is not apparent why this procedure is necessary, or why it would be a necessary or even useful adjunct to that investigation. At a minimum, it also raises questions regarding possible infringement of the BWC. Presumably, it is considered justified by assuming law enforcement to be included under the “other peaceful purposes” allowed for “biological agents” under Article I of the BWC.

A crude net assessment of the anthrax events to date produced the following summary:

- Total number of anthrax cases, in five states (New York, New Jersey, Florida, Connecticut, Washington D.C.) – 22
- Mortality from inhalational anthrax – 5
- Surviving cases of inhalational anthrax – 6
- Cases of cutaneous anthrax – 11
- Individuals exposed, by evidence of antibody response; data never released (a guess: 50 to 100 among postal sorting workers; several hundred in Senate office building)
- Dispersion method – at least five mailed letters.
- False anthrax alarms and hoaxes – as of November 6, 2001: According to FBI testimony to the US Senate, 4,000 in the US and an additional 3,000 worldwide. On November 7, 2001, Gov. Ridge referred to 10,000 such events, apparently referring to the US alone.
- False alarms and hoaxes worldwide: affecting aircraft, government ministries and facilities, etc. (In December 2002, a global total of all hoaxes was reported during a conference as having reached 77,000 instances, but it has been impossible to verify this number).
- Economic cost of responding to hoaxes and false alarms by local and federal authorities in the US alone – possibly in the range of \$100 million (?)
- Cost of disruption and dislocation of official and economic activity, decontamination, etc. – certainly substantial. No final estimate is yet available. However, as of the end of 2002, estimates were that the total would exceed “hundreds of millions of dollars for the clean up alone.” The cost for decontamination of the US Senate Office Building was \$42 million, and the prospective cost for the decontamination of the three most effected US postal facilities is now estimated at over \$150 million.¹⁰⁰
- Level of media attention (TV, radio, press) – massive

- Anticipated costs for future preventive measures in the US Postal System alone -- 5 billion¹⁰¹
- Degree of public overreaction – enormous
- Media release of information on the mechanics of producing aerosolizable biological agents (information that was previously unobtainable on the frequently alluded to “web”) – very significant and with potentially damaging consequences, not reversible.
- Increment in US mortality several years from now due to increased prevalence of antibiotic resistant strains resulting from unwarranted and uncontrolled public use of antibiotics in response to anthrax scare. Survey studies indicate that approximately 4 percent of US inhabitants (or roughly 11 million people) obtained prescriptions for or purchased antibiotics in response to the anthrax scare. The great likelihood is that a majority of these probably also used the antibiotics in an unprescribed manner.¹⁰² (Estimate of current US mortality due to drug resistant infections range from 14,000 (US/CDC, 3/27/00) to 20,000 (WHO, 7/2000) per year).

This summary of the anthrax events to date indicated that the public health effects, in the narrow terms of the occurrence of a disease, illness, and death, were small and were by and large adequately dealt with by the public health system. Contrary to the prediction of recent years, cases of the disease were recognized by the medical community despite virtually zero past experience. The auxiliary effects outside of the public health system however, have been enormous. Whether or not US government and media response was inappropriate and inordinate, a limited amount of pathogenic material ineffectively disseminated had produced massive political and psychological consequences, and economic expenditures in the billions of dollars.

Two related questions remain: was the government and public response to the events reasonable, and to what degree should previous estimates of the future likelihood of BW terrorism be changed as a result of the US anthrax events. There was no way to know how much anthrax the perpetrators had, whether there was an offshore “pipeline” that might deliver more, whether the events would escalate to more serious forms of mass casualty release mechanisms, or whether, as now seems the case, the incidents had ended with the known cases. As a result of the massive and frequently misleading media attention that was given to the anthrax events, a public opinion poll taken on November 8, 2001 – roughly one month after the anthrax events began –

showed that Americans considered bioterrorism to be the most urgent public health problem facing the country.¹⁰³

One can compare the anthrax events to more serious public health challenges and mortality levels, as was done in regard to the potential for bioterrorism in general in the previous paper.¹⁰⁴ Twenty-two people fell ill, of whom five died, in a US population of 275 million. Active prophylaxis definitely prevented other cases, although the number appears to be relatively small. One study estimated that nine people out of the 5,000 Florida media employees and postal workers in Washington, DC and New Jersey who were given antibiotics were prevented from getting inhalational anthrax. However, that study made no estimate of the number of inhalational anthrax cases that were prevented by distribution of antibiotics to the people in the US Senate Office Building, the group that was most severely at risk. Estimates are that some 500 people in the Hart Building were exposed to hundreds of times the human lethal dose. Some specialists therefore believe that all those exposed in the Senate office building would have succumbed to inhalational anthrax if not for immediate treatment with antibiotics, and therefore clearly some larger number than nine additional cases were prevented, more in the order of 500 or so.¹⁰⁵

By way of comparison, annual US mortality due to influenza is 30,000 people per year, (rates appear to vary between 20,000 – 80,000 per year) and 700,000 people worldwide died of Hong-Kong influenza at the end of the 1960s. More than 750,000 cases of sepsis occur annually in the United States, and of those, 215,000 die.¹⁰⁶ Weight-related illnesses – obesity – kill 300,000 people per year in the United States or 800 per day.¹⁰⁷ Four hundred and forty thousand people per year in the US die from tobacco-related health conditions.¹⁰⁸ HIV/AIDS now infects more than 40 million people worldwide, and killed over three million last year. The level of antibiotic resistance in common food-borne bacteria continues to rise dramatically.¹⁰⁹ Malaria kills 3,000 people per day, over 1 million per year, in Africa alone.¹¹⁰ On top of all these, the United States has been suffering shortages since the summer of 2001 of the standard vaccines against basic childhood diseases such as measles, mumps, rubella, meningitis

and pneumonia, a situation which is expected to continue through the year 2002. These vaccines have been depended upon for decades to prevent millions of childhood deaths per year.¹¹¹ Compared to these numbers, one has to conclude that despite the extraordinary quality of the anthrax that was prepared, the level of real danger to public health that was posed remained trivial because of the ineffective distribution mechanism used by the perpetrator.

Enormously increased expenditures to combat bioterrorism have universally been applauded for several years on the grounds that they would bring benefits to the field of public health and disease prevention in general, through enhanced epidemiological disease surveillance, laboratory and research programs, and the development of vaccines and pharmaceuticals. However, that widespread assumption was called into question during a conference on global infectious diseases held at the US National Academy of Sciences in April 2002. Counter-bioterrorism expenditures might produce benefits by “spillover” to the public health arena, but they could turn out “to actually hinder containment of the growing global problem of infectious diseases,” by drawing a limited pool of research talent away from work on the major national and international public health killers.¹¹² New funding initiatives for bioterrorism prevention announced by the US National Institutes of Health (and discussed in Part 5 of this study) suggest precisely that is likely to occur. Even in the current situation, only two of approximately 300 candidates for doctoral degrees in molecular biology at the Harvard Medical School in 2002 were studying malaria.¹¹³

The same consequence also appears to be developing in the United States itself. In 1997, two years after the disclosure of both the Iraqi and the 1972 to 1993 covert USSR BW program, US expenditure for domestic preparedness against biological attack was \$137 million. Within two years of the September 11 2001 and the US anthrax events, this sum had reached six billion dollars for the fiscal year 2003-2004.¹¹⁴ Nevertheless, US state and city public health officials claimed that they would have to divert staff and curtail tuberculosis and cancer screening services in order to simply comply with the federal government’s smallpox vaccination program.¹¹⁵ And Dr. Muin

Khoury, Director of the Office of Genomics and Disease Prevention of the Centers for Disease Control and Prevention stated in February 2003 that “Public health is in disarray, and this emphasis on terrorism is eroding the public health infrastructure even more.”¹¹⁶

The major questions at the core of the anthrax events remain unanswered a year and a half after they took place:

- Who produced the anthrax, and how much of it did they have?
- Were these events the result of state assisted terrorism, most likely with the production of the anthrax entirely in the hands of a state, with the finished product being passed to the perpetrators? Alternatively, technical advice, equipment, and oversight might have been provided by a state to a group although this seems much less likely.
- Or was the anthrax produced entirely by the perpetrator or perpetrators, and if so, what kinds of professional training and capabilities did they have, and in what kind of facility was the work done?
- Was the anthrax produced and distributed by an individual or group in the United States, unrelated in any way to the September 11, 2001 events?¹¹⁷

In October 2002 a US White House official was quoted expressing the opinion that even if the party responsible for the anthrax events were not found, that he was “. . . not sure the provenance in the end mattered, because it showed how vulnerable we were to an attack.”¹¹⁸ It was a very mistaken judgment because one of the theories regarding the possible perpetrators motives were that his motivation may have been precisely to provide that demonstration. Determining the expectation of similar attacks in the future therefore depends crucially on the identification of the perpetrator.

In the short term, the critical question is who is behind the current anthrax incidents. The implications and the likelihood of similar subsequent events depend highly on the answer. Should it be the work of a state, or of one or more highly skilled US professionals using professional government facilities, the expectation of a repetition drops drastically. That is particularly so if the perpetrator is, as is now increasingly suggested, a highly trained US professional. In that case, if this had not been done

now, by a person with those kinds of capabilities, there might have been a very long time to the "next" BW event since the failed Aum events in 1990-94, and when it came, it might have been either as crude as in the past, or entirely a failure again.

In the long term, the most serious threat remains the proliferation of state-sponsored programs. Particularly if the events in the United States demonstrate that unassisted terrorists have broken the precedent against biological weapons use, one consequence might be that states may feel emboldened to engage in such warfare, perhaps at first in small covert operations. Research and development will be stimulated, led by the major states, the United States and Russia, with the rationale of anticipating possible threats. That is the subject of the following and last section of this study.

V. THE QUESTION OF OFFENSIVE/DEFENSIVE DISTINCTIONS IN BIOLOGICAL WEAPONS-RELATED RESEARCH, AND THE POTENTIAL STIMULUS TO BW PROLIFERATION BY EXPANDED RESEARCH PROGRAMS

The word “research,” or any specific reference to “offensive” or “defensive” in a research context, does not appear in Article I of the Biological Weapons Convention. That reads as follows:

“Each State Party to the Convention undertakes never in any circumstances to develop, produce, stockpile or otherwise acquire or retain:

(1) 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;

(2) Weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict.”¹¹⁹

However, the word research did appear in the provisional treaty draft that had been drawn up by the UK and that had been presented to the negotiating states on July 10, 1969.¹²⁰ Even earlier in a working paper on microbiological warfare that the UK submitted to the states negotiating in Geneva, the UK stated:

“The Convention would also need to deal with research work. It should impose a ban on research work aimed at production of the kind prohibited above, as regards both microbiological agents and ancillary equipment. It should also provide for the appropriate civil medical or health authorities to have access to all research work which might give rise to allegations that the obligations imposed by the Convention were not being fulfilled. Such research work should be open to international investigation if so required and should also be open to public scrutiny to the maximum extent compatible with national security and the protection of industrial and commercial processes.”¹²¹

The word “research” was, however, omitted by the United States and Soviet diplomats who drafted the text of the treaty that was eventually accepted. The key terms at issue then become “...prophylactic, protective or other peaceful purposes,” and “for hostile purposes.”

While at the Stockholm International Peace Research Institute (SIPRI) in 1970, I prepared a study that examined the question of whether there were characteristics that could distinguish between military and civilian research and between offensive and defensive research in areas that related to biological weapons. The study was presented as a background paper for the Tenth International Microbiology Congress of the International Association of Microbiological Societies in Mexico City in August 1970.¹²² Having had some laboratory research experience, I came to the conclusion that it was perhaps possible to draw such distinctions, but that one's conclusions were in large part guided by a knowledge or suspicion of the overall nature of the national program in which an individual piece of research was embedded. I referred to this as "the intent" of the national program in question, a phrase that has subsequently been commonly used in many other discussions of the same problem. The circular nature of that conclusion significantly undercut its value.

In 1992, the introduction to a New York Academy of Sciences volume, The Microbiologist and Biological Defense Research: Ethics, Politics and International Security, stated:

"Perhaps most crucial for any biological defense research project is clear demonstration of its defensive intent; this is vital since an outsider may find it difficult to differentiate between research and development (R&D) undertaken for defensive and offensive purposes.....The distinction between research and development is critical to interpreting the provisions of the BWC because the treaty does not specifically mention research, offensive or defensive, but does proscribe offensive development while permitting development for peaceful purposes....The general criterion for distinguishing between offensive and defensive research is *intent*, which at best is a problematic issue....Is biological defense research sufficiently "transparent" that an outsider can readily ascertain its defensive intent?"¹²³

And a year later, the American Society of Microbiology, in its statement on "Scientific Principles to Guide Biological Weapons Verification," although using "development" and "research" interchangeably, reiterated the same theme: "The ASM has indicated that verifying offensive biological weapons development activities is very difficult because of the potential dual nature of research in the biosciences. Effective verification rests with

determining intent of ongoing activities in R&D.”¹²⁴ When an international law specialist, Richard Falk, noted in 1984, that offensive and defensive research were distinguished only by intent, and not by substance, and that this both invited and concealed abuse, Tom Dashiell, a former Fort Detrick Special Projects Officer, then serving in the Department of Defense, administering the buildup of the US biodefense program during the Reagan Administration (which is discussed below), responded that a better definition of defensive biological research “would be extremely difficult – if not impossible – to develop.”¹²⁵

If one also, on careful examination, concluded that any piece of basic research could have major “offensive” implications (as, for example, in the recent mouse pox study¹²⁶), one was left with the argument that the only distinguishing characteristics of a BW program occurred at the point at which weapon development began. But many have even argued – and acted on – the claim that some degree of weapon development was permissible within a defensive program (as in the case of one of the recent disclosures in the United States.) That pushes one even farther away from research, and leaves the only definitive determinants as production, quantities and weapons.

A useful way to sharpen this issue is to quote from two contrasting US government policy statements. A very brief US Department of Defense press statement on January 8, 2002 on Nuclear, Biological and Chemical Warfare Defense answered the question, “Is the US still developing biological weapons to use against our enemies?” The answer provided began: “As required by executive order, the US government ceased all offensive biological research in November 1969....”¹²⁷ However, the original 1969 US policy decision is worded rather differently. The operative paragraph of National Security Decision Memorandum 35 of November 25, 1969, reads as follows:

“The United States bacteriological/biological programs will be confined to research and development for defensive purposes (immunization, safety measures, et cetera). This does not preclude research into the offensive aspects of bacteriological/biological agents necessary to determine what defensive measures are required.”¹²⁸

The analytical study which supported the US policy decision also included a very important relevant paragraph. In response to the question “Should the US maintain only an RDT&E program,” it replied

“There are really two sub-issues here: (1) should the U.S. restrict its program to RDT&E for defensive purposes only or (2) should the U.S. conduct both offensive and defensive RDT&E? While it is agreed that even RDT&E for defensive purposes only would require some offensive R&D, it is also agreed that there is a distinction between the two issues. A defensive purposes only R&D program would emphasize basic and exploratory research on all aspects of BW, warning devices, medical treatment and prophylaxis. RDT&E for offensive purposes would emphasize work on mass production and weaponization and would include standardization of new weapons and agents.”¹²⁹

An excellent thesis which examined US government policy process in 1969-1972 that resulted in the joint decisions to renounce and dismantle the US offensive BW program, negotiate the BWC, and sign the Geneva Protocol, was only able to add a single footnote by way of further amplification.

“There is much debate over what constitutes offensive and defensive research and development in the field of biological weapons. The development of munitions filled with biological agents, delivery vehicles for these munitions, open air field testing of live biological agents, enhancement of the pathogenicity of organisms, and development of production and storage techniques for biological agents constitute offensive program activities which cannot be easily justified under a defensive research program.”¹³⁰

The US policy statement in NSDM 35 cut away the problem – for the US – of whether a piece of research is “defensive” or “offensive”: “offensive” “research” is permitted. On what basis then does the United States government make the assessment that another nation’s BW program is offensive or defensive? In its research phase? On evidence of “development”? If so, what aspect of “development,” since the US considers it permissible to develop an individual munition to test it for “defensive” purposes? But this presents yet another even more basic problem, as there are no definitions with precisely defined boundaries accepted at an international diplomatic level that clearly separate “research” from “development.”¹³¹ On evidence of “testing”? If so, how extensive a testing program, since the US considers it permissible to carry

out various degrees of testing for defensive purposes? On evidence of serial or volume production? If so, at what level of production, since small quantities of agent have been produced for defensive purposes? As noted by Howlett and Simpson in 1991, “Small amounts may need to be retained if defensive equipment is to be developed.”¹³² None of these questions has ever been answered.

The following presentation is somewhat unorthodox. Brief descriptions will be given of a half dozen or so aspects that bear on this issue. Hopefully, at the end of the exercise, the issue will be somewhat more clarified, if not more comprehensible.

(a) Who Has An Offensive BW Program

Since 1988 the US government has repeatedly identified nine nations by name as maintaining offensive biological weapons programs. In the last four years, it has increased the number to thirteen, but has not named the additional four nations.¹³³ As indicated in an earlier section of the paper, the US government made a particular issue at the 2001 BWC Review Conference of alleged non-compliance with the BWC by treaty member states. However, the US government has never disclosed the evidence to support its charges of BWC non-compliance, or to support its charges that particular nations maintain offensive BW programs. It has also never utilized Articles 5 or 6 of the BWC that provide for procedures under the treaty framework to investigate issues of non-compliance. A study prepared by an analytic center of the US Department of Defense in 2001 included a list of “Selected Countries with BW Capabilities.” The explanatory comments for individual countries were still full of ambiguous and caveated terms such as “can,” “may,” “likely,” “believed to be” – a common occurrence in public versions of US government assessments for the past twenty years.¹³⁴ The remarks associated with two quite important countries, both of which are also nuclear weapon states, made no explicit mention of offensive-related activities. In one case, they referred only to “biological warfare defense research.” If that is the case, the two countries in question should not have been in that compilation at all. Most, if not all, NATO member states as well many others have defensive BW programs, and they are

neither listed nor discussed, nor should they have been. What was the validity of the selection of nations in the compilation?

On May 6, 2002, Under Secretary of State Bolton repeated earlier US charges that “Cuba has provided dual-use biotechnology to other rogue states. We are concerned that such technology could support BW programs in those states.” He continued: “The United States believes that Cuba has at least a limited offensive biological warfare research and development effort.”¹³⁵ No evidence was offered for the charge. The exact same single sentence, with one additional qualifying word, had been presented in testimony to the US Senate on March 19, 2002, by Carl Ford, US Assistant Secretary of State for Intelligence and Research.¹³⁶ A New York Times report of Bolton’s presentation expanded the charge by claiming that “The Bush administration has accused Cuba of producing small quantities of germs that can be used in biological warfare...other administration officials say the united States now believes that Cuba has been experimenting with anthrax as well as a small number of other deadly pathogens that they declined to identify.”¹³⁷ US Secretary of State Powell qualified the charges by saying “We didn’t say it (Cuba) actually had some (biological) weapons, but it has the capacity and capability to conduct such research.”¹³⁸

The statements are astonishing only in their inadequacy. “Capacity and capability” tells one nothing about whether a nation has an offensive BW program. If it did, it very likely would have to be applied to every country in Europe. The United States has been “experimenting with anthrax” continuously since 1969, as have the UK, Israel, and other states. The United States, as will be explained below, has also been producing “small quantities of germs” – in fact, anthrax – since 1969, and has been “experimenting” not with a “small number of other deadly pathogens,” but with many dozens of them for the past 30 years. Within days another unidentified US administration official offered that Cuba has “a number of projects that are what could be dual-use things, but they’re probably not....I don’t know of any tangible stuff that shows yes, they are making anthrax (or anything else).”¹³⁹ What was it that distinguished the Cuban “experimenting” from the US biodefense program? If the US

charges are not valid, they would undermine decades of US government initiatives which publicly identified governments (except for Israel) that undertook programs to develop any of the categories of WMD, and to curtail those programs.

In a television address on May 10, Cuban President Castro denied the US charges and stated that “The doors of our institutions are open. Cuba has nothing to hide.”¹⁴⁰ It was a rare opportunity that should immediately have been taken up, and not allowed to go to waste. In an ideal world, either the Organization of American States or the EU should have offered to send teams within 24 hours to every institute that Cuba has reported within the BWC framework. In October 1996, in a submission to the Fourth BWC Review Conference, Cuba provided a document which listed nine major institutes dealing with molecular genetics, tropical medicine, pharmaceutical research, veterinary research and so on. It stated, however, that “the information compiled in this paper cannot be regarded as exhaustive, but reflects...the work accomplished by a group of the most representative institutions.”¹⁴¹ It is very possible that these same institutions are listed by Cuba in its BWC Confidence-Building Measures submissions. During his visit to Cuba, President Carter visited the Center for Genetic Engineering and Biotechnology, one of these nine institutes. Unfortunately, he was apparently not accompanied by any appropriately trained technical personnel, nor has there been any report as to the degree of thoroughness with which he may have toured the facility. However, were Cuba to actually be pursuing an offensive BW program, it is unlikely that these are the facilities in which it would be taking place. A report in the Washington Times/Insight Magazine included a quotation which it attributed directly to a leaked US Department of Defense report: “According to sources within Cuba, at least one research site is run and funded by the Cuban military to work on the development of offensive and defensive biological weapons.”¹⁴² Elsewhere the report identifies a newly built annex to the Luis Diaz Soto Naval Hospital, which is situated within a military compound in Havana, as the suspect site. If US officials requested the ability to visit such a facility, Cuba would unquestionably demand the reciprocal right to visit a US

military facility, a request that the US government would certainly not be willing to grant it.

Official Chinese government positions on these questions are rarely, if ever, heard, but it appears as if Chinese government officials believe that the United States has been maintaining an offensive BW program. On one informal occasion at the Ad Hoc Group meetings, one of their officials remarked that offensive and defensive activities were so close that there was basically no difference.¹⁴³ Long Zhou, the Deputy Director of the Arms Control and Disarmament Department of the Chinese Ministry of Foreign Affairs, offered a similar opinion at a meeting in Beijing in April 2001: “Defensive BW research can easily be offensive.” This is certainly not a unique position: In 1984, Dr. M. Schaechter, then head of the American Society of Microbiology, commented on some US Army biodefense projects that “The difficulty the Army has is that in claiming they are working on defensive matters, they have to do the same work as on offensive matters.”¹⁴⁴ Even earlier, in 1969, when the US still maintained offensive programs in both BW and CW, when a US Department of Defense official was asked to specify the proportion of offensive work in the US CBW R&D program, he replied: “It is difficult to quantify specifically how much exploratory development work is offensive in nature, since much of this work contributes equally to the defensive or the offensive effort.”¹⁴⁵

Nevertheless, a few scattered references to this issue by Chinese military and technical authors show a degree of superficiality and confusion that is puzzling for a large country with sufficient technically qualified personnel and an enormous embassy in Washington, DC, whose staff are able to work freely in an open society. General Pan et al. write that “The US announced that it was giving up development of offensive biological weapons in 1969, but it continued to carry out biological weapons research,” and that “although the United States promulgated that from 1969 they would not use biological weapons, they maintained a latent capability in biological warfare carrying out biological defense research at USAMRIID.”¹⁴⁶

Another obtuse and serve-all-purpose assessment written by a member of

China's Institute for Chemical Defense in Beijing additionally included a totally fabricated statement attributed to a senior US Department of Defense official:

"The United States policy management system at the highest levels has yet to change with regard to CB weapons. There has yet to be seen a weakening in financial support and R&D. In November 1998, Hans Mark, the US DOD Research and Engineering director, looking 20 years into the future, discussed the aforementioned matter of important weapons research. He pointed out that the United States needs to research offensive biological and chemical weapons, to vanquish those who would use chemical and biological weapons in future wars against the United States and its allies."¹⁴⁷

Dr. Mark's interview appeared in the November 1998 issue of *Jane's Defence Weekly*, and included no mention whatsoever of US biological or chemical weapons research, neither offensive nor defensive. Apparently the military and technical "experts" advising the Chinese Ministry of Foreign Affairs tell the Ministry that the US maintains an offensive BW program. In the negotiations that led to the drafting of the BWC Verification Protocol, China expressed strong interest that the US be made to declare all its biodefense activities and facilities.

Cuba has of course been accusing the United States of using biological weapons on numerous occasions against humans, plants and animals inside Cuba for decades since 1969, and continues to repeat these claims until the present day.¹⁴⁸ These charges are almost universally considered to be fraudulent. Nevertheless, by definition, any nation accused of using BW must be maintaining an offensive BW program. The former East German government charged West Germany in 1968 with maintaining an offensive BW program at a time when West Germany almost certainly did not, and when it was forbidden by post-WWII international agreements drafted by the Western European Union from maintaining any programs involving any weapons of mass destruction.¹⁴⁹ These charges are also considered fraudulent. However, in June 2001, a group in Germany, named the "Sunshine Project," charged that the biological weapons defense research projects carried out by the German Armed Forces' medical research laboratories had crossed over from the defensive to the offensive side. It made this argument on at least four grounds:

1. The insertion of an antibiotic resistance gene into a Tularemia strain;
2. That all work on vaccines is “dual use” and includes “offensive” capabilities – if the possessor of the vaccine were itself to use B weapons;
3. That research on Botulinum toxin had included preparatory details on how to produce large quantities of the substance;
4. That by holding samples of various weaponizable pathogens, German military research laboratories thereby maintained “stocks” of agents that could be produced in large quantities for offensive weapons purposes.¹⁵⁰

The second and fourth of these arguments are unquestionably tendentious and not valid. However in April 2002, an official of the Sunshine Group persisted, being quoted that “the first thing any government or other organization that intends to develop or use the weapons would need is a vaccine for its own troops.”¹⁵¹ The first and third are problematical and disputable and depend on the detailed reasons for their having been part of the research in question. In the case of the Tularemia experiments, the gene that had been inserted reportedly conferred resistance to tetracycline and chloramphenicol.

As it turned out, the Sunshine Group making these charges could not have been more mistaken in their understanding of what was taking place in the German laboratory, and why. Two genes were involved, not one, one for each of the antibiotic resistance capabilities. However, neither was added by the German laboratory. The Tularemia strain had been obtained from the Swedish Defense Research laboratory, a major research center on Tularemia. It already contained both the antibiotic resistance markers, as well as a gene for a green fluorescent protein used in research procedures, when it was transferred to Germany.¹⁵² No one would conceive or claim – or ever has – that the Swedish laboratory was doing offensive BW work. The chloramphenicol gene was there as a holdover from earlier cloning procedures, and in its present form was only a partial gene, and may no longer confer antibiotic resistance. Tetracycline resistance is present to retain the plasmid for the fluorescent protein in the bacterium, as it will lose the plasmid if not cultured in the presence of tetracycline. In addition, the antibiotic resistance genes are in the plasmids, and not incorporated into the bacterial

chromosomes, and they are unstable. If one were interested in antibiotic resistance for biological weapon purposes, it should preferably be introduced into the bacterial chromosome so that it stays there.

It is clear that the antibiotic resistant plasmids had been added as cloning markers for experimental purposes, a frequent choice for that purpose due to the simplicity of the subsequent selection process among the bacterial progeny. There had been no intention of producing an antibiotic-resistant pathogen. In addition, tetracycline and chloramphenicol are not the preferred antibiotics for treating Tularemia. Those are rather Streptomycin, Gentomycin, Doxycycline, and several others. The addition of the gene marker had been intended as a research tool, and not in order to develop an antibiotic-resistant weapon strain of Tularemia. In a subsequent publication, the Sunshine Group authors themselves noted that “The use of antibiotic resistance marker genes is now a widely used method in molecular biology. Likewise, many other legitimate civilian biomedical research projects involve transfer of genes that may be considered as conferring ‘military traits’.”¹⁵³ But they continue to want to argue both ends of the question, and though most recently claiming, in contrast to their original charges, that “it is only basic research,” and that “an aggressive intention by the Bundeswehr can surely be excluded,” they bemoan that the German Defense Ministry has “still not been able to bring itself to destroy these controversial bacteria” and that “the development of vaccines should immediately be halted.”¹⁵⁴

The general context exemplified by the above charges is spelled out explicitly by Nixdorff and Bender in discussing “modifications of microorganisms of bioweapons significance.”

“Since the advent of genetic engineering, four categories of manipulations or modifications of microorganisms and their products have been the subject of discussion: 1. the transfer of antibiotic resistance to microorganisms; 2. modification of the antigenic properties of microorganisms; 3. modification of the stability of the microorganisms toward the environment; and 4. the transfer of pathogenic properties to microorganisms.

“All four kinds of manipulations are possible and are being carried out daily in research laboratories. Some of the most intensive research concerns the

elucidation of the mechanisms of pathogenesis. This work is essential for combating infectious diseases. It is hoped that the production of more effective vaccines with less side effects, better diagnostics and new therapeutic drugs will result from this research. At the same time, it is feared that the advances in biotechnology can be misused to develop and produce biological weapons.”¹⁵⁵

As if to demonstrate the point, in April 2002, the same German Sunshine Project released a list of sixteen studies involving genetic engineering being carried out under German Ministry of Defense funding. One of these was the “Development of a recombinant Dengue-vaccine based on attenuated Vaccinia viruses (MVA) as vectors.”¹⁵⁶ Contrary to the Tularemia example, in this instance the group made no claim that the research project was “offensive” in character. As will be noted below, the use of Vaccinia as a vector to stimulate immune response is a common technique, but it has produced disputed interpretations elsewhere, which resulted in charges that BW directed research with Vaccinia was being used as a laboratory proxy for smallpox (Variola).

(b) Distribution and Reclassification of Declassified US BW Reports

Another insight into the dilemma of the categorization as well as the subsequent utilization of a particular piece of research comes from the recent US decision to withdraw from distribution and even to reclassify a substantial number of research reports that had been produced during the pre-1969 years during which the US maintained an offensive BW program. The research reports had been declassified in past decades and had been freely available at minimal cost from a US government technical report distribution agency, to foreign as well as to domestic purchasers.¹⁵⁷ How and why these reports should ever have been declassified in the first place is a mystery. They most certainly should never have been released at all. They are not “basic science,” but frequently technical production and process information, including the detailed processes for producing some of the most dangerous BW pathogens that exist. Their previous declassification and release makes no more sense than would the release of detailed specifications for producing a nuclear weapon. A further irony is that some of these reports were declassified in the mid-1980s, during a period in which

Department of Defense officials in the Reagan administration were simultaneously expanding the US biodefense program, and proclaiming very determined views about the inutility of the Biological Weapon Convention because of its alleged unverifiability.

In any case, the reports were released, and in 2002, there was an effort to at least prevent their further distribution through US government sources.¹⁵⁸ Without knowing anything about the original guidelines, rationales, or thinking behind the original vetting of these studies, their release years ago implies that someone, whether with or without much thought, considered that permissible. Yet it is absolutely certain that the reports which had been released would directly and substantially assist the development of any nation's offensive BW program.

(c) The US Central Intelligence Agency and its Involvement in the US Biodefense Program

An additional insight into the offensive-defensive dilemma is, oddly enough, the discovery that the US Central Intelligence Agency has taken on a significant role in the US biodefense program in the last few years. The past record of the CIA in CBW-related programs has always been problematic and frequently crossed the line into illegal ventures, even under existing national policy guidelines and US treaty obligations at the time that they took place. During the years that the US maintained an offensive BW program, the Special Operations Division (SOD) at Fort Detrick supported research and products destined for the potential use by the CIA. These included the development of CBW agents for assassination programs, and a covert program of anti-human, anti-crop, and anti-animal agents code-named NK-NAOMI.¹⁵⁹ In 1975, it was discovered that the CIA had disobeyed the 1969 US Presidential orders to destroy all US BW stocks, and had retained a large catalogue of pathogens and toxins for its own use, albeit in relatively small amounts.¹⁶⁰

The CIA's ventures in the area of "biodefense" in the past 4-5 years have been carried out aggressively, and several of these projects are discussed further in a section that follows. The CIA was responsible for the project which reproduced a Soviet-era BW bomblet, a BW dispersion system, and it seems also for contracting for various

other studies dealing with anthrax.¹⁶¹ The CIA has also been the co-stimulator of the research program planned by the Genome Institute of the US Department of Energy.

“Biodefense” is not a CIA mission, but it is one that the agency has clearly abrogated to itself under the dubious rationale that it was the agency’s responsibility “to protect the country.” That may very well be the case, but the CIA does not therefore also take over the tasks of the US Coast Guard. Biodefense is the mission, all or in part, of a sufficient number of other US government agencies and facilities, which are perfectly capable of carrying out whatever tasks are necessary:

USAMRID (DOD)	(ECBC) (DOD)
Dugway (DOD)	DTRA (DOD)
The Center for Disease Control (CDC)	Department of Energy (DOE)
Walter Reed Army Institute of Research (DOD)	laboratories
Naval Medical Research Institute (DOD)	Department of Agriculture
DARPA (DOD)	Environmental Protection Agency
Edgewood Chemical Biological Center	and now, even the National Institutes of Health (NIH)

The CIA can obtain any information regarding biological agents that it needs in order to carry out its legitimate activities in the sphere of US national security from these other US agencies or organizations. It has no need to and should not be carrying out either basic or applied research in the area of biological weapons, either directly or through contractors. That contention is validated by an April 2002 government statement in testimony to the US Senate:

“An area of significant multi-agency homeland security collaboration is in genetic sequencing of microbes with possible terrorist implications. The effort is being coordinated through OSTP’s Interagency Microbe Project Working Group. All agencies (NSF, NIH, CDC, DOE, DARPA, USAMRIID, CIA, and Agriculture) doing genetic sequencing are participating and agreeing on what should be sequenced, to what level and quality, and who will do the sequencing. This is a real success story as multiple agencies are pooling their resources to attack a part of the bioterrorism threat.”¹⁶²

If anyone is likely to overstep US international treaty obligations not to engage in offensive BW programs, there is a good chance that it would be the CIA, or include the

CIA. Notably, the biodefense facilities that the US government failed to report in its annual submission of Confidence Building Measures under the Biological Weapons Convention in recent years were those in CIA-contracted and in DOE laboratories.

Generically, the record of intelligence agencies and their involvement with national offensive biological weapons programs is notoriously bad. The USSR's original offensive BW program was organizationally controlled by its intelligence agency at its inception and for some time afterwards. Iraq's BW program was also initiated under the jurisdiction of its intelligence agency and it is still controlled by that agency. It is believed that the same holds for Iran's current BW program. Finally there are the transgressions of the CIA itself between 1969 and 1975. National intelligence agencies should have nothing to do with defensive BW programs. To the degree that they do, it is almost immediately ground for suspicions regarding the activities that are taking place, only the least of the reasons being that they will be secret.

(d) Soviet-era and Russian BW-Related Research: Defensive or Offensive

This author has been engaged in a research project for several years which demonstrates without any question whatsoever that the USSR had maintained an offensive BW program of enormous and unprecedented magnitude (see fn. #35 in the previous paper). The discussion in the section that follows should not be misunderstood to suggest anything different. It does however demonstrate that difficulty in assessing the character of a particular piece of research when knowledge of the overall program in which it is embedded is absent.

In testimony to the US Senate, and on numerous other occasions, Dr. Ken Alibek, the former Deputy Director of the portion of the USSR's BW program that was carried out in the Biopreparat organization, has charged that research on viral agents being conducted at the State Research Center of Virology and Biotechnology, VECTOR, in Koltsovo, was being done for offensive BW purposes. He charged that "chimeras" of vaccinia and Venezuelan equine encephalomyelitis (VEE) had been constructed, and that the use of vaccinia was a proxy for variola: once the technique had been established, VEE-smallpox combinations would be made for weapons purposes.¹⁶³

Officials of VECTOR admitted to having made a recombinant vaccinia which included structural genes of VEE, but they claimed this had been done for a legitimate and in fact quite common reason, to produce a new vaccine for VEE. Existing live VEE vaccines (TC-80 or 320, or CM-27) were based on poorly attenuated VEE strains which produced a relatively weak immune response as well as attendant side effects, while available inactivated VEE vaccines did not produce side effects but supplied an even weaker immune response.¹⁶⁴ When queried directly, Alibek maintained his original charge and said that he did so because he knew that these experiments had been devised as part of the Soviet-era offensive BW program when he still held his position as Deputy Director of that program, and that the VEE vaccine development story had been the “cover story” for work intended to further smallpox BW development.¹⁶⁵ Another scientist who had worked at Vector, Dr. Sergey Popov referred to this particular Soviet-era project as the “Hunter Program.”¹⁶⁶

It is impossible to resolve the dispute on the basis of the two contradictory claims alone. Although it seems reasonably certain that a Soviet R&D project of this nature did exist, it is not known what point was reached in the program, and very significant questions have been raised by US researchers regarding its technical feasibility. However, it is most certainly the case that vaccinia, as well as dozens of adenoviruses have been used for years now in research laboratories worldwide as “vectors,” as they are both exceedingly good at getting inside cells and/or producing a strong immune response. The methodology is widely used in cancer research and in devising gene therapies.¹⁶⁷ The very same technique is also being used for transcellular transport without stimulating an immune response: “In labs across the US and Europe dozens of geneticists are working to create stealthy viruses that can deliver artificially engineered payloads into cells without detection by the immune system.”¹⁶⁸

Although some of this research is involved in efforts to produce vaccines, including for some of the hemorrhagic fever viruses for which no vaccines exist, and could therefore be considered to be within the “biodefense” sector, much of it is taking place entirely within the civilian medical research sector. It is therefore frequently not

even a matter of “defensive” or “offensive” BW-related work. As in the Russian case, however, analogous research efforts are also being carried out in Western BW defense facilities in order to develop new vaccines. Very similar work in Russia, at Vector, and in Germany, at the Institute of Virology in Marburg, have used the Vaccinia T7 system as the “vector” in efforts to produce a vaccine against Ebola.¹⁶⁹ In theory, this would permit one to make an “Ebola-smallpox chimera,” just as the previously referred to study using a Vaccinia vector to produce an anti-VEE vaccine could be claimed to permit the production of a “smallpox-VEE” chimera. In the 1980s, Dr. Joel Dalrymple working at USAMRIID also used Vaccinia as a vehicle for gene expression in efforts to develop a vaccine against Hanta virus, as well as against the Rift Valley Fever virus, and the protective antigen protein (PA) of anthrax toxin.¹⁷⁰ Of even greater interest is that Dr. Dalrymple traveled to Akademgorodok, the “Science City,” in Novosibirsk, USSR, to discuss this work. Vector, the institute which Dr. Alibek alleges carried out orthopox “chimera” research for weapons purposes, is situated some 20 km from Novosibirsk, and scientists from Vector attended Dr. Dalrymple’s presentation. In addition, they would have known of his published work on the subject.

In other examples, a February 2002 press item reported that work at “Porton Down” in the UK included:

- “modifying a smallpox virus with anthrax genes” [most certainly vaccinia, incorrectly referred to as “smallpox”]
- and introducing genetic modifications into the genomes of the pathogens responsible for bubonic plague, tularemia, gas gangrene and typhoid.¹⁷¹

A more accurate and meaningful description of the research referred to is that

“Since 1993 CAMR [Centre for Applied Microbiological Research] and Porton Down have been working on a new acellular plague vaccine. This is a combination of two purified y.pestis antigens (F1 and Vi) [envelope proteins] that are produced as recombinant proteins (rF1 and rVi) in E.coli. The UK’s 2001 CBM return also refers to this vaccine work: ‘Genetically engineered vaccines against plague, anthrax and Botulinum toxins have now been devised and these vaccines have transitioned to the development phase. These vaccines can be produced in a harmless strain of the bacterium E.coli, and can therefore be produced without cultivating dangerous pathogens...A programme to evaluate current vaccinia strains, with a view towards

identifying ways of non-invasive delivery of these vaccines has continued over the past year. Immunisation with these vaccines should include a protective response against smallpox. These vaccines will also be used as vectors to deliver other vaccine antigens. Programmes have also continued to devise improved vaccines against tularemia and melioidosis....work is underway to produce attenuated strains of the bacteria which might be used as vaccines...we aim to identify protective sub-units from these bacteria.”¹⁷²

Analogous work with the “gas gangrene” perfringens toxin and vaccinia was published as early as 1991.¹⁷³

If one sums up the various examples described in this section, one sees that one has the very same technique and frequently using the genomes of the identical pathogens that were at one time or another in recent decades weaponized, produced and stockpiled as BW agents being utilized in work:

- within the former USSR’s offensive BW program;
- within Russia’s current defensive BW program, as well as within the current defensive BW programs in the UK and the US;
- and entirely within the civilian medical research sphere.

Add to this that the current US biodefense program is reproducing experiments and constructs that were made under the USSR’s offensive BW program, and that current medical research includes attempts to reconstitute the strain of influenza responsible for the 1918-21 influenza pandemic, as well as that other civilian medical research involves inserting bits of myelin into viral or bacterial genomes as part of research into autoimmune dystrophy diseases – a technique which was also developed in the USSR’s offensive research program, and which is discussed further at the end of Section 5 of this study – and you have a complex that certainly appears impossible to disentangle or differentiate at the research level looking solely at the isolated research project.

(e) The Extent of the Current US Biodefense Research Program

On September 4, 2001, the New York Times carried a report of three projects within the US biodefense program that had been secret and not known to the US public

or to the international diplomatic community. In fact, two of the projects had not been known to the responsible individual in the US National Security Council with oversight of chemical and biological weapons issues for the US government. In addition, details of these and other projects subsequently disclosed had not been reported by the United States in its CBM submissions to the BWC, although they should have been reported under the criteria for those submissions. The three projects were:

(1) The attempt to reconstruct a Soviet-designed BW bomblet, and to test its dispersion characteristics, reportedly using a simulant (Project Clear Vision).

(2) The production of a genetically modified strain of anthrax to include the cereolysin gene as well as antibiotic-resistant characteristics (Project Jefferson). This was again a duplication of work that had been carried out during the USSR's offensive BW program, and to test if it overcame the anthrax vaccine used by the US government. It is of particular interest that USAMRIID had earlier decided that it did not want to repeat this Soviet-era work precisely because of its possible illegitimacy.

(3) The attempt to purchase all the necessary components and to construct a small BW production site, and to see if this could be achieved covertly, without the effort coming to the attention of other governments, US agencies, or international agencies (Project Bacus). The facility was then to produce a simulant agent. The purpose of the entire experiment was to see whether detectable signatures would be produced during the procurement, construction, or production phases, or whether the whole process could be achieved without anyone's notice, covertly.¹⁷⁴ The simulant produced was not milled, and respirable particle sizes were obtained by another method.¹⁷⁵ The first project was contracted for by the US Central Intelligence Agency, the second by the US Defense intelligence Agency (DIA), and the third by the Defense Threat Reduction Agency (DTRA) in the US Department of Defense. Only the first project reached the attention of the US National Security Council, and led to an interagency review process. It was nevertheless approved as being permissible and "defensive," over the minority objections of a legal advisor in the US Department of State.¹⁷⁶ The Department of Defense gave final approval for the production of the genetically modified anthrax in

mid-October 2001.¹⁷⁷ All of these projects are justified under the rubric of “threat analysis” or “threat assessment,” phrases which could of course be extended to justifying any project. They additionally probably explain how the Central Intelligence Agency has been able to make its way into the BW defense program.

Two additional significant disclosures followed. The first of these had not been classified, but was known only to a limited technical community. Around 1992, two aerosol test chambers came into operation at the US Army’s Edgewood Arsenal in Maryland, for “studying explosive and non-explosive means for delivery of dangerous microorganisms as aerosols.” Simulants were studied first; the dispersion of pathogens was to follow.¹⁷⁸ These had apparently previously been explosive test chambers for chemical munitions that were readapted for use with biological agents. One was 70 cubic meters in size; the second was 155 cubic meters in size. A third aerosol test facility was instituted at the Nevada Test Site, perhaps in 1998 or early 1999. This too was retrofitted from an existing explosive test chamber that had been used, in this case, for conventional explosives. Its size and research program are unknown. None of these had been reported by the United States on its BWC/CBM declarations.¹⁷⁹ The Australia Group uses an export control “trigger” of 1 cubic meter for an aerosol test chamber, and the BWC Verification Protocol would have required the reporting of any aerosol test chamber of 5 cubic meters or larger, as well as any aerosol test chamber used for explosive aerosol testing.

The second disclosure was that the United States had continued producing dry powder anthrax of small particle size at Dugway Proving Ground since 1969.¹⁸⁰ The anthrax was reportedly irradiated while wet, therefore killing it before drying and milling and being used for experimentation.¹⁸¹ Quantities produced reportedly reached hundreds of grams on some occasions, and were reportedly used for various tests. However if the anthrax is killed before any further use, it is not clear why a simulant, or the non-pathogenic Sterne strain, or any “plasmid-cured” pathogenic anthrax strain (one from which the plasmids conferring toxicity have been removed by genetic techniques), could not have been used instead of pathogenic strains. In addition, challenge testing

of newly developed anthrax vaccines in animal model trials, for which the Ames anthrax strain had become the standard, is done using wet anthrax.

As indicated previously, there is also now the first indication within the investigation of the US anthrax incidents that the US Department of Defense or the CIA have not yet disclosed all their current programs involving anthrax. In summary, it became clear that in its submissions under the Confidence Building Measures of the BWC that the United States reported only biodefense projects carried out within the US Department of Defense and its contractors, but did not report all of these. In addition it did not report any biodefense projects carried out within the US Department of Energy or the US Central Intelligence Agency. For the future, it will remain to be seen if the US will also omit reporting of projects carried out in the US Department of Agriculture, the US National Institutes of Health, and after November 2002, the US Federal Bureau of Investigation. There are already reasons to suspect that it may not. The US government is apparently relying on the fact that the CBM form A2, which is to provide information on national biodefense programs, only requests information for facilities which have “a substantial proportion of its resources devoted to the national biological defense research and development programme.” In the Assessment report of a meeting of British and US military officials held in London on November 30, 2000 it was noted that “Legal restrictions on the (US) DOD at several levels impact the ability to conduct research on, develop, and employ non-lethal capabilities . . . The principal treaties and agreements governing the development and use of NLW are broadly discussed in Tab C [these included the BWC and the CWC amongst others] It is interesting to note that in the US these [relevant treaties, including the BWC] do not apply to the Department of Justice (DOJ) or Department of Energy.” The report goes on to suggest as one of the “Recommended Actions; US . . . If there are promising technologies that DOD is prohibited from pursuing, set up MOA (Memoranda of Agreement) with DOJ or DOE.”¹⁸² The notion that the CWC or the BWC would apply only to one cabinet level agency of the US governments, the Department of Defense, and not to the entire government and any of its actions is of course ludicrous.

A third disclosure, that the US FBI was also going to produce dry powder anthrax of the quality that had been made by the perpetrator of the anthrax mailings in the US in September-October 2001 as a part of the forensic investigation of these events, came in November 2002. Following that disclosure, the US Dept. of Defense provided written responses to questions from the Washington Post which queried its interpretation of the justifiability of these various activities under the BWC. The Dept. of Defense stated that its personnel “may use live biological agents in a number of research settings: for vaccines and treatment; protective clothing and containment; alarms and detection; and decontamination,” and that the Department of Defense “. . . does not set quantitative thresholds for the agents or toxins in its possession,” but that “. . . these quantities are generally small.”¹⁸³

International response to these disclosures was quite limited, particularly as the weeks which followed were overwhelmed by the post-September 11 events. As of October 2001, it was reported:

“European states, which have staunchly supported the protocol, have remained silent about the reports. According to a European official, the European Union has not yet officially discussed the recent disclosures. But another European official said that many Europeans are concerned about the revelations, which the official said are ‘going to make it much easier for others to claim that work they are doing is legitimate biodefense work.’ The official added, ‘If the U.S. administration had seen such work underway in other countries, then it would be the first to point the finger that this is questionable. And what this does is makes the gray areas grayer still between offense and defense and that doesn’t help.’ The official said that Western governments would bring up this point privately despite assurances from Washington that its programs are ‘legitimate and permitted under the convention.’”¹⁸⁴

Brief statements in defense of the legitimacy of the US biodefense program were made in the Geneva negotiations by the representatives of Germany and of Australia, and “criticism, “ of the most oblique and mild character, was made by Iran and China. (This study does not address the development of anti-material BW agents, by the US or by any other nation, such as might degrade fuels, rubber, electric installation, etc. The use of such agents would almost certainly violate the

BWC. They have nevertheless been the subject of research for many years.)

In mid-July 2002, Dr. R.V. Swamy, identified as the “chief controller of India’s Defense Research and Development Organisation (DRDO), an umbrella organization for 51 military laboratories,” announced at a news conference that India had “...tested some biological and chemical agents. We do not produce biological weapons but in order to produce safeguards against them we need substances in small amounts and no convention stops us from doing that.”¹⁸⁵ The statement was interesting for several reasons. When India ratified the Chemical Weapons Convention in 1996, it declared existing chemical weapon production facilities as well as prior chemical agent production. This had been surprising because in the years before 1996, Indian diplomats had claimed that the Indian government had never even considered obtaining chemical weapons. India, of course, also has nuclear weapons. Of the countries that have obtained nuclear and chemical weapons, very few did not also have offensive biological weapon programs at one time or another. The Indian government conducted a policy review in 1971 of whether or not to obtain biological weapons; however the outcome of this review is not known. It was almost exactly the same time in which India also conducted its review on the question of nuclear weapons.

If one looks at the current US biodefense program overall, and setting aside projects on detection, vaccines, decontamination, and other protective measures, there is sufficient information available to provide an understanding of those portions that might be considered problematic. At the end of 2001, Anna Johnson-Winegar (Deputy Assistant to the Secretary of Defense for Chemical and Biological Defense) called for research programs that would focus on:

- modeling and simulation (of pathogen releases);
- transport and diffusion of BW agents in a central urban environment, including inside a closed building;
- transmissibility of secondary and tertiary spread, including studies using animal models, and tissue culture models;

- redoing estimates of the LD/50s and ID/50s that had been arrived at in the 1950s and 1960s of pathogens.¹⁸⁶

The similarity of these renewed study requirements to a research program that outlined US BW vulnerabilities during the period of the US offensive BW program is striking:

“Rationale for Vulnerability Testing. In the beginning and continuing throughout the BW Program, there was a paucity of scientific and engineering knowledge and principles related to the vulnerability of the US and/or its personnel to BW attacks both covert and overt. Vulnerability testing was required to provide information on the agents likely to be used, means of disseminating agents, sizes of areas that could be attacked, environmental effects on agents, obstructive effects of building and terrain on agents, ability to detect and identify agents and areas of the US and its forces most likely to be attacked, the extent of damage possible, and data to devise physical and mathematical models to be used as substitutes for live, open air testing.”¹⁸⁷

Clearly, both in the currently projected US research program described above, and in the “Vulnerability Testing” that was carried out during the years in which the US maintained an offensive BW program, it is inescapable that the exact same information arrived at for defensive purposes could equally be applicable to offensive use. Such studies are already well under way: the aerosol test chambers at the Edgewood Chemical and Biological Center in Maryland and Sandia National Laboratory in California are being used to study “Source Term, Dose Response and Agent Viability.”

“Recognizing the gap in adequate understanding and modeling of CB aerosol sources, of the physiological effects of the agents on the general populace and of the viability of threat agents in the environment, the CBNP began development of models that provide additional capability to the CBNP transport codes and tools for assessing the effectiveness of response architectures and augmenting the fidelity of real time predictive capabilities used to guide response actions during a crisis. Three key technical elements are necessary to perform such an assessment:

- Source term models of material released—the dispersal method, the agent type, the amount of agent and its state (gaseous, particulate or both), the size distribution and how the source varies over time
- Dose response models—the effects of various levels of exposure on the public

- Agent viability models—the agent’s survivability and potency as a function of environment and time

“This work will explore and document agent dispersion immediately after release (i.e., the source term). This description of the agent source term is a necessary input to dispersion models that predict agent transport and fate.”¹⁸⁸

This research program includes explosive dissemination testing, and is apparently to include studies on pathogens.

In studies that dealt with an entirely different subset of research work pertinent to BW, the US Department of Energy’s “Chem/Bio Nonproliferation Program” (CBNP) in 1997 included two closely related groups of studies, the first of which would seek the structural attributes of toxins produced by human pathogens, while the second sought the DNA sequence based attributes of human disease pathogens.

Structural Attributes of Toxins Produced by Human Pathogens

Determine structures for:

- Lethal factor and edema factor of *B. anthracis*
- A and B toxins of *C. Botulinum*
- Inactive mutants of enterotoxin A and B
- Enterotoxin C produced by *S. aureus*
- *Streptococcus pyrogenic* factor A

Identify structure of target molecules of:

- Botulinum A/B
- Pyrogenic factor A

Sequence-based Attributes of Human Disease Pathogens

Sequencing virulence plasmids of pathogenic organisms

- In FY97, provide finished sequences for plasmids containing the virulence factors for *B. anthracis* and *Y. pestis*

Sample sequencing of *B. anthracis* and *Y. pestis*

- 1 X coverage of entire genomes in FY 97

Utilization of sequence information

- Searching for genes that influence virulence and antibiotic resistance
- Strain to strain and species to species comparisons

Source: “DOE Chem/Bio Nonproliferation Program [CBNP] Overview,” February 6, 1997.

These studies have continued. “Expression Studies of Virulence Factors in

Yersinia pestis” at Lawrence Livermore National Laboratories in 2000 sought “to uncover new virulence genes,” Sequencing of Yersinia pseudotuberculosis, also at Livermore, would “allow reconstruction of the pathogenicity evolution in Yersinia,” and as is now well known, the Institute for Genomic Research was to determine the complete genome sequence of the Ames strain of Bacillus anthracis.¹⁸⁹ Such studies are likely to increase markedly in the next few years with the sharp increase in US funding. However, the mission statement of the agency in the US Department of Energy which sponsors this research claims that its purpose is to “prevent...the proliferation of chemical and biological weapons.”

“The mission of the Chemical and Biological National Security Program at DOE’s National Nuclear Security Administration (NNSA) is to develop, demonstrate, and deliver technologies and systems that will help prevent the spread of chemical and biological weapons. Furthermore, this program will help the nation prepare for, recognize, and respond to chemical or biological attacks on the civilian population. NNSA’s nonproliferation mission has been expanded to explicitly include preventing the proliferation of chemical and biological weapons of mass destruction.”¹⁹⁰

There is absolutely no apparent relationship between any of the above studies, whose clear and explicit purpose is to elucidate the mechanisms of biological agent virulence and pathogenicity, and a national effort to “prevent...the proliferation of chemical and biological weapons.”

As troubling as these projects may sound superficially, the crucial questions are:

- Were similar projects carried out in offensive BW programs, for example in the Soviet BW program (since genome sequencing was not yet practicable in the pre-1969 US and UK programs)? If so, in what way, if any, do these current US research efforts differ from those that were done within an offensive BW program?
- To what degree are exactly analogous studies carried out in general civilian medical research funded by non-defense related agencies or surrogates for defense agencies such as the US Department of Energy?

Such questions have never been answered, neither in past years, nor at the present time. The answers may be extremely difficult to formulate, but it is also clear that except in the rarest instances has anyone been interested in formulating them except in

the broadest and most general terms, by justifying the research efforts, collectively or individually, as being “defensive” and permissible. As if on cue, to ensure that the problem would be further entangled, the US National Institutes of Health announced its new program of \$1.2 billion on “Bioterrorism” research on March 14, 2002: “The NIH unveiled its plans to explain the mesh of basic laboratory research and clinical studies for battling the most worrisome bioterrorism agents: anthrax, smallpox, plague, tularemia, viral hemorrhagic fevers and botulism....particularly studies focusing on the immune system.”¹⁹¹ Of the six major research categories in the “NIH’s anti-bioterrorism agenda,” two were:

- “Microbial biology including unraveling the genetic structure of each bioterrorism agent, to understand how the bugs cause disease;”
- “Developing the very tools needed to do such research, including more high containment laboratories and animal models of the diseases.”

Similar issues arose once before in the United States, not as an abstract theoretical exercise, but in 1986-1989, an earlier period which had witnessed an increase in US government funding for BW defense research. The entire cumulative expenditure for the period between 1977 and 1986 was approximately \$346 million, which is a relatively limited sum compared to the amounts involved at present; nevertheless it included sizable year-by-year increases.¹⁹² Interestingly, one of the issues debated in this period was a 1984 US government request to build a new large-sized BL-4 aerosol test chamber at the US Army’s Dugway Proving Ground.¹⁹³ This proposal was rejected by the US Senate. However, following the US Army’s submission of an Environmental Impact Statement which covered the entire Biological Defense Research Program, the construction or adaptation of new aerosol test chambers clearly went ahead at other sites, including facilities of the US Department of Energy. These are the aerosol test chambers referred to earlier, which were retrofitted in the 1990s. The Senate debate regarding the aerosol test chamber appears to have dealt primarily with the question of operational safety considerations should it be constructed, that is, that disease agents tested in them should not escape into the

surrounding community.¹⁹⁴

However, the issue of whether testing in such facilities was consistent with US treaty obligations under the BWC, or the differentiation of “offensive” or “defensive” work, did get introduced. US Senator James Sasser stated that the facility and its projected work program raised “important questions with regard to the potential capabilities for testing and producing offensive lethal biological and toxin weapons.”¹⁹⁵ US Secretary of Defense Casper Weinberger replied that the aerosol test chamber would not be used to develop offensive biological weapons and that the US Department of Defense did not intend to violate the BWC Treaty. He added, however, that “To ensure that our protective systems work, we must challenge them with known or suspected Soviet agents.”¹⁹⁶ One of the questions posed in the terms of reference for a US Army Science Board study in July 1987, which was prompted in part by the reactions to the Dugway BL-4 facility episode, was “Is the Army engaged in offensive BW activities?”¹⁹⁷ Rather oddly, this question was answered in the report only by an analysis of what “public attitudes” on the question were, and how those might be ameliorated. Beyond that, it was stated only that members of the study group who had been given classified briefings could perhaps answer the question.

In 1988, the US Army reannounced plans to build the aerosol test facility at Dugway Proving Ground. This prompted a joint hearing by three US Congressional subcommittees.¹⁹⁸ A press report noted the following enlightening summary of testimony to the committees:

“Witnesses at the hearing agreed that the primary distinction between permitted and prohibited germ warfare research is the researcher’s intention. If it is intended for defensive purposes, it is allowed: otherwise, it is banned, they said.”¹⁹⁹

It is a position that would most certainly be contested by any state asking for clarification of another state’s BW program under Articles 5 or 6 of the Biological Weapons Convention, not least the United States.

One effort to examine the 1980 to 1986 US biodefense research program was

carried out by Charles Piller and Keith Yamamoto. Since Piller and Yamamoto were suggesting that US biodefense research at the time was suspect for having overstepped into the area of offensive work, or, at best, was serving both offensive and defensive purposes at the same time, their analysis is a useful example of the conclusions that can be drawn when one entertains suspicions about “intent”. They examined 329 research projects funded by the US DOD “biotechnology” program between 1980 and 1986.²⁰⁰ They specify, however, that these 329 projects did not represent a synoptic survey of relevant DOD-funded work, as they were limited by the research project summaries that they were able to obtain, which did not include “several key avenues of research noted in alternate DOD sources.” Of these 329 projects, they selected “eighty-six studies that seemed most explicitly ‘offensive’ in nature.” They noted a major effort in studies examining ways to defeat vaccines, although any biodefense research manager would immediately and obviously respond that one must know that one’s own protective vaccines are viable, and that there are not simple ways in which the vaccines could be overridden by an attacking pathogen.

Piller and Yamamoto summarized their examination of the 86 studies in the following table.

Potential Offensive Application of 86 DOD Biotechnology Projects

Potential Offensive Application	Number	Percentage
BW agents that defeat vaccines	23	27
BW agents that inhibit diagnosis	14	16
Supertoxins	17	20
Aerosol delivery of BW agents	5	6
Biological vectors for BW agents	19	22
Novel BW agents	51	59
Drug-resistant BW agents	3	3
Highly specific ethnic weapons	0	--
Biochemical (hormone) weapons	1	1
Increased toxin production capability	15	17

They then looked at the four major stated defensive goals of these 86 studies, and listed the “logical applications of the DOD’s studies to an offensive program....the offensive applications that might lurk beneath the four major defensive stated goals:

Vaccine development

Novel BW agents
Defeat vaccines
Increased toxin production
Supertoxins

Diagnostics/ultrasensors

Biological factor delivery
Novel BW agents
Defeat vaccines

**Toxin, antigen isolation/
characteristics**

Novel BW agents
Defeat vaccines
Increased toxin production
Supertoxins
Biological vector delivery

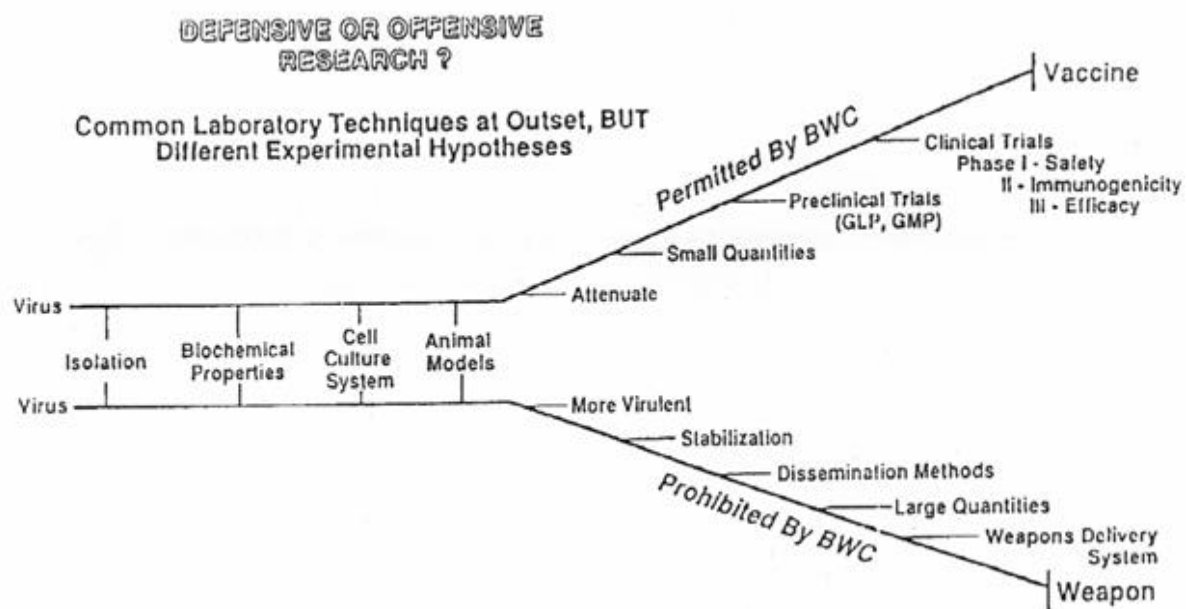
**Development/use of antibodies
Therapeutics**

Novel BW agents
Defeat vaccines
Inhibit diagnosis

Piller and Yamamoto’s book does not contain sufficient detail to enable one to understand what criteria the authors used in making their determinations of “potential offensive application,” and despite repeated requests, it has proven impossible to obtain a more detailed understanding from them at this time. Their study can be seen in either of three ways: the conclusions that can be drawn when overall BW program “intent” is suspected; the dual utility of a particular experiment, depending on the overall purpose of the national BW program in which it is embedded; or the relative simplicity of “cover stories” for offensive BW work masquerading as a defensive program.

In contrast, Colonel David Huxsoll, a former director of USAMRIID, presented a scheme in 1989 testimony to Congress that attempted to explain the differences between offensive and defensive research, as well as between the development of vaccines and other defenses and biological weapons. It appeared to be a simple

scheme, but it explicitly accepted that a substantial portion of early research would serve both purposes.²⁰¹ Huxsoll's diagram appears to be a schematic representation of the paragraph in the 1969 NSSM 59 analysis discussed above.



“From the outset, defensive research is based on different postulates and hypotheses than is research directed toward offensive ends, and the rationales for data collection and analysis are different.

“At the basic research level, the laboratory techniques used would be very similar, but the objectives are markedly different. Beyond the basic research level, there is a marked divergence in the type of work that would be done.

“If a vaccine were to be produced, one would pursue ways of crippling, weaken, or lessening the virulence of the agent in question so that it could be used in humans without fear of inducing disease; in fact, it may be completely inactivated, a killed vaccine.

“A vaccine would be produced under stringent guidelines of the Food and Drug Administration regulations and would have to receive FDA approval before use. This type of work is permitted by the Biological Weapons Convention.

“If, however, the goal were to create a weapon, the opposite objectives would be pursued. Efforts to enhance virulence or toxicity and to produce enormous quantities of agent far larger than those required for vaccine production would be undertaken. In addition, the issues of stability, dissemination, and weapons delivery systems would have to be addressed. These activities are clearly prohibited by the Biological Weapons Convention.”

In questioning by the Senate Committee staff, however, Dr. Huxsoll appeared also to reply on the presence of BL-4 facilities and “program intent” as two key discriminanda. “Intent” is, of course, inferred by an outside observer, and is the troublesome variable we have repeatedly run into. In addition, Huxsoll explicitly places research to produce more virulent agents, stabilize agents, and on “Dissemination Methods” as “Prohibited By the BWC.” As we have just seen, aspects of at least two of these, and “Dissemination Methods” most clearly, are already taking place or are planned for inclusion in the current US biodefense program. Given his position as director of USAMRIID at the time, Huxsoll’s schematic description in 1989 had to be cleared through the US Department of Defense prior to its presentation in testimony to the Senate. If the US Department of Defense has now changed its position as to what should be categorized as “offensive” or “defensive,” the question is of course why. In 2002, a current senior researcher in the US biodefense program used terms almost exactly the same as Huxsoll’s in 1989: that any research designed to “harden” the pathogen, to increase its virulence, to development adjuvants and additives, all of these concerned weaponization and had offensive implications. Additionally, all this work should remain classified.²⁰² This may explain why such work was taken up by DOD contractors, the US Department of Energy, and the CIA and is not done at USAMRIID, which, by policy choice, does not do classified research. During the BWC Fifth Review Conference in November-December 2001, Brazil proposed that special attention be given to ambiguous programs, “...and apply, when necessary, consultation and inspection procedures.” The Brazilian proposal was not included in the draft final declaration of the conference.²⁰³

First we have had the question of whether one can distinguish between research that is “offensive” or “defensive – and even whether this is a meaningful question if “research on offensive aspects is permitted for defensive purposes.” We have also seen that “threat analysis” allows one to produce any potential theoretical development of a putative attacker in order to test it (“to test a bullet proof vest one has to have the bullet”). There is then one additional question. To what degree does research that is carried out in the medical research sector, under non-defense auspices and funding, but

which is the same, analogous to, or applicable to research that is carried out in a BW program, either defensive or offensive, differ from the latter in any significant way? There are many examples that could be provided. Only a few are indicated below.

(1) Vaccinia is widely used as a “vector” to introduce many different kinds of recombinant genetic material intended for therapeutic or research purposes into mammalian cells. Such Vaccinia recombinants are nothing less than Alibek’s “chimeras,” which he identifies as an unquestionable part of the USSR’s offensive BW program, as well as his reason for suspecting the present continuation of “offensive research” in the same Russian institutes that carried out the pre-1992 research.

(2) A 1996 review of immunotoxin research states that “The use of immunotoxins in the therapy of cancer, graft-vs-host disease, autoimmune diseases, and AIDS has been ongoing for the past two decades.”²⁰⁴ The most commonly used toxic moieties for making immunotoxins are the bacterial toxins, *Pseudomonas* exotoxin or diphtheria toxin, or the plant toxins, ricin or abrin.

(3) The US National Institutes of Health (NIH) has been funding research on plague and plague toxins, the study of basic pathogenicity, and of bacterial toxin genes. As already noted, substantial microbiological research is concerned with elucidating the mechanisms of virulence.

(4) The three critical protein components of the toxin responsible for the lethality of anthrax are the lethal factor, the protective antigen and the edema factor. The structure of the lethal factor was identified in 2001, under research funded by the US NIH and the UK Medical Research Council. The structure of the edema factor was identified early in 2002, under research funded by the NIH, the American Heart Association, and the American Cancer Society. Other research on the mechanism of action of anthrax toxins has been funded by NIH.²⁰⁵

(5) One of the most troubling paths in the USSR’s offensive BW program was the research by Dr. Sergey Popov on recombinant bacterial mediated myelin autoimmunity,

carried out at the two premier Biopreparat institutes, first at Vector, in Koltsovo, and then at Obolensk. However, medical researchers who work on multiple sclerosis regularly try and induce autoimmunity in animal models using virtually the same technique. With the pathology induced in the animal model, the researcher aims to reverse or intervene in the course of the disease. Microbial “vectors” have again been used in these studies, and in one study, Theiler’s virus (TMEV) was used to introduce a 30 amino acid peptide to produce the experimental autoimmune condition in the research animals.²⁰⁶ Popov had used the bacterial vector *Legionella*.

(6) Research to produce a vaccine against the HIV virus has for years spliced various HIV genes into *Salmonella*.²⁰⁷ In addition, the University of Pennsylvania Institute for Human Gene Therapy has devised a combination of selected non-pathogenic portions of the HIV and Ebola viruses that were used to test a gene therapy package against cystic fibrosis. The testing model involved aerosol delivery of the recombinant to mice.²⁰⁸

(7) There are research projects attempting to reconstitute the 1918 global pandemic influenza strain.

(8) A substantial number of research projects have included the insertion of cytokine genes into poxviruses.²⁰⁹ This is therefore very similar to the “worst case” BW-related extension of the Australian mousepox experiment which has so widely been seen as the perfect example of extremely dangerous research with BW relevance.

(9) There is extensive research within the pharmaceutical industry to develop methods to stabilize drugs for aerosol delivery, that is, via a small atomizer, for human use. Examples of the drugs include toxins, chimeric toxins, immune system modulators, and bioregulators.²¹⁰

Discussion

The purpose of the fifth and last section of the study has been to probe whether one could distinguish between research that was intended to serve an offensive BW

program and that which served a defensive BW program. What are the implications of the information that has been reviewed here? Where does the combination of research paths in civilian medical research, in biodefense, and in offensive research programs, reviewed in the preceding pages take us? Was the effort useful, or no more than a repetition of the obvious to specialists? And if the answer is that one cannot distinguish between offensive and defensive research, where is the dividing line between an offensive BW program and a defensive one? What are the critical indicators?

If we look back at the material gathered on the preceding pages, it could be reorganized into two parts. In “Part A” one could take Alibek’s claims of “chimeras” as BW agents, and set against them a panoply of research in the civilian sector, and in both offensive and defensive research programs:

- Vaccinia-Ebola and Vaccinia-Hanta virus combinations used in an effort to produce vaccines against Ebola and Hanta viruses, and similar work with HIV bacterial recombinants;
- The research being done at the UK biodefense facility;
- “Stealthy virus” research, and immunotoxin research;
- Work on plague toxins and on anthrax proteins;
- Popov’s work at Vector and Obolensk in the Soviet BW program, and the same techniques used in medical research in autoimmune disease research;
- Reconstitution of a critical influenza strain;
- Insertion of cytokine genes into pox viruses.

In “Part B” one could take Huxsoll’s 1989 diagram, and use that as a model to apply to various portions of the current US biodefense program:

- The three formerly secret biodefense projects (and others that may exist);
- The size of the US aerosol test chambers, and the nature of the experimentation being carried out in them;
- The new Department of Defense and Department of Energy research programs;
- The Piller and Yamamoto analysis of the DOD biodefense studies in the 1980s;
- The continued production of small amounts of dry-powdered anthrax since 1969.

It was earlier concluded that it was essentially impossible to distinguish whether the individual items in the “Part A” research, if examined in isolation, were offensive or defensive, civil or military. Part B, however, appears much more informative and suggestive. Nevertheless, the problem remains that there are really no internationally recognized boundaries between “offensive” and “defensive”. As noted previously, a 1969 British draft for a presumptive Biological Weapons Convention did contain language dealing with research, but that component was set aside by the US and Soviet drafters. The existing language in Article One of the Treaty in regard to “prophylactic, protective or other peaceful purposes” is simply at too great a level of abstraction to resolve these issues. Everything is left to an individual nation’s claims as to which technical aspects of offensive systems and their operation it must examine in the course of developing an adequate defense. Too much is a matter of argumentation and possibly self-serving interpretation (as was demonstrated in the case of the three US covert biodefense projects.)

If one switches to the other end of the extreme, were one to find BW agents in bombs or shells, or dedicated production facilities with capacities measured in tons, the answer would be obvious, as it was in regard to the USSR and to Iraq. One specialist suggested that if 50 or 100 pounds of agent were found, that would certainly be a definite indicator of an offensive program. Some specialists with long experience in BW programs believe that the first indicators of an offensive BW program become apparent in the development phase. For some portions of the activities that would fall into the “development” category, that is probably the case, but there could even be problems here, depending on which studies were categorized as “development.” For example, at some point in actual vaccine testing, animal model exposure must be done with both wet and dry formulations of agent, in the same ways that one would expect personnel to be exposed. Is the production of the dry agent “development”? Iraq’s development of an aerosol dispenser pod for jet aircraft was assessed by UNSCOM as an unquestionable part of its weaponization program: the dispenser pods accompanied a program that included large-scale production and storage of agents and the accompanying weapon systems. However, a solicitation for contracts for the US Army’s

Edgewood Chemical Biological Center (ECBC) Research and Technology Directorate called for the contractor to “perform theoretical and experimental work necessary to develop and operate dissemination devices for aerosol materials including powders, liquids, and microbiologicals.”²¹¹ It is questionable whether international agreement could be obtained for the point of distinction between “research” and “development.” One plausible suggestion is that experimentation on the marriage of an agent with a munition would cross that line of distinction, presumably including any weapon test using a simulant. But what did the US and UK use as criteria in the early Trilateral visits to former Soviet BW institutes? Did the US and UK make their judgments on the basis of what was visually seen, equipment and facilities, or did they use other intelligence to critically inform their judgments? And what were the criteria used in judgments publicly released by the United States in the 1980s and ostensibly based on remote satellite reconnaissance photographs?²¹²

One piece of interesting testimony was provided by one of the US participants in the Trilateral visits to Russian facilities in 1993. The US and UK team had visited three sites that were “mobilization capacity” facilities, intended for BW production in the mobilization period prior to an anticipated war. Some aspects of these sites were certainly suggestive of offensive capabilities – the massive fermentation capacity, as well as particular test chambers – while other portions could be interpreted as “dual use” equipment with civilian purposes. The fourth site visited was a research facility: no production, no stockpiling, no weapons. Everything seen was in the research phase, but did include static and dynamic test chambers. Nevertheless, in a visit to only two floors of a multi-story building, at a facility which included several dozen buildings, one very experienced US member of the visiting team decided that he was looking at laboratories that were part of an offensive BW program. And the decisive cue was the overall layout of the sequence of laboratories. The viewer felt able to come to a decision of “offensive” – and on the basis of laboratory design organization.²¹³

One should add here the verification problem that arises with the possibility of dual use of commercial vaccine production units that produce inactivated vaccines.

There would be little or no difference in the external characteristics of a facility producing an inactivated vaccine of a pathogen, in which an unattenuated pathogen is inactivated subsequent to growth, and one in which the pathogen was being grown for weapon use. The indicators would be, most critically, the volume of production, as the amounts required for vaccine production are very much less than for military use, as well as any subsequent processing, such as drying, milling, and so on.

In the case of Iraq, one can look at the example of the Al-Hakam facility which Iraq had declared to UNSCOM as a factory for producing single-cell protein. It was obvious that Iraq's claim was dubious:

"The Hakam site was constructed in great secrecy, at a remote desert location, with extensive security and military fortifications. The site included sophisticated air filtration systems (using HEPA filters) on some buildings, for both incoming and outgoing air. These features all implied a use inconsistent with the facility declaration.... Yet these indicators were only circumstantial and Iraq maintained its assertion that the site was intended solely for the production of single cell protein animal feed."²¹⁴

These indicators were about as suggestive and incriminating as could possibly be, nevertheless, short of obtaining official Iraqi records or admission of BW production at Al-Hakam, or identifying pathogens from sampling within the production building, UNSCOM arrived its determination that Al-Hakam was a BW production site only by the accretion of interrelated lines of evidence. Ironically, a significant portion of such evidence was a clear record of persistent Iraqi lying in the face of evidence.

Also relevant to the questions discussed here are the restrictions that UN Security Council resolutions placed on Iraq's subsequent ability to carry out defensive BW-related research:

"Iraq is...totally prohibited from conducting any type of military biological research, even defensive, without first submitting to UNSCOM, and receiving approval for, a plan of activities. This prohibition covers any research by military personnel, in military facilities, administered by military organizations, or biological activities that are classified or secret.... Unlike the chemical and nuclear monitoring regimes, there are no strictly prohibited objects, beyond the general phrase 'biological weapons...stocks of agents...and all related sub-

systems.”²¹⁵

There was also no intention that Iraq should be able to continue any BW-related work in “civilian” medical research or public health facilities. That was the explicit purpose of UNSC Resolution 715, which established the long-term monitoring system that was designed to prevent the reconstitution of any Iraqi WMD programs, in any facility, through the use of dual purpose technology.

In a 1994 analysis that dealt with the conversion of research facilities that had been integral parts of the former USSR’s offensive BW program several basic requirements were set out:

- an absolute end to all offensive work;
- the termination of administrative control by national military or security agencies or their proxies. The transfer of management of such institutions to civilian ministries or branches of government;
- the termination of funding by military agencies;
- transparency: the ending of secrecy and closed facilities.²¹⁶

It is not clear whether all of these four conditions are relevant to the questions under consideration here, which do not concern explicit demilitarization and conversion of facilities but rather routine ongoing peacetime biological defense research programs. The above are all “non-specific” conditions, and do not address the nature of particular lines of research. It is clear that national defensive BW programs will be primarily based in facilities that are part of and are funded by Ministries or Departments of Defense. Such ministries also maintain major extramural funding programs as part of their defensive BW research programs which support program-oriented research in academic and commercial institutions. In the US, we additionally see very significant portions of the BW defense research program being situated in the Department of Energy, as well as yet other portions under the jurisdiction of the Central Intelligence Agency. At the same time, the US National Institutes of Health has embarked on a major expansion of essentially overlapping work. In contrast, in the UK, CAMR, the Centre for Applied Microbiological Research moved out of the BW domain, took on a

public-health mission while retaining a substantial portion of its earlier work, and most recently has been increasingly drawn back into it.

Several individuals with long experience in the biodefense programs of their own countries – the UK, US, Sweden and Russia – however, expressed the opinion that transparency was the key factor in removing questions about whether a BW program was offensive or defensive: the ability to display the site to any international visitor and to say “Here is the site, and here is what we are doing.”²¹⁷ Ken Alibek, in commentary on the work being done on recombinant pathogens in the US biodefense program – work analogous to the recombinant work that he has repeatedly identified as being offensive in character in the USSR and Russia – stated “that the work had to be done openly if done at all. It can’t be classified....If the secret research was essentially disclosed...the United States would be accused of cheating on the germ treaty.”²¹⁸ Obviously, then, one of the best ways to cause problems is to carry out secret BW-relevant research by or under the aegis of an intelligence agency rather than in the customary national BW defense programs. And as seen earlier in this section, one conclusion that it was relatively easy to arrive at was that BW defense programs should be kept clear of national intelligence and security agencies. However, some biodefense research carried out in more typical national BW defense programs is also maintained at classified and secret levels.

When US and other international assistance programs were devoted to assist the conversion of former Soviet BW facilities, a corollary of these considerations came into play. Obviously one would not want funds supplied to facilitate conversion to find their way into supporting continued offensive programs.²¹⁹ The same concern has broader implications as well. Any government, international organization, or research institute that funds work in another country, whether that country has already been identified as being of BW proliferation concern or not, should in theory examine the projects that it supports to be certain that support is not being given to the infrastructure of a BW program. However, given the discussion in the preceding pages describing the intertwining of civilian and military, offensive and defensive BW relevant research,

arriving at such certainty is obviously not an easy task. For example, it is known that Russian scientists have been training PhD level molecular biology students at the Pasteur Institute in Tehran for the past half dozen years. The Russian scientists are members of the staff of institutes belonging to the Russian Academy of Sciences. However, several other Russian scientists who appear to have had closer links to the former Soviet BW program are known to be working elsewhere in Iran.²²⁰ The United States has since 1988 identified Iran as maintaining an offensive BW program. US officials have also publicly raised the issue of Iranian researchers being trained in Cuban biotechnology and molecular biology institutes, and have explicitly pressured Cuba to terminate that exchange program. Are these two Iranian training programs innocuous, and the same that might be obtained in any US graduate school? Possibly. But what if on completion of their studies, the doctoral students take their knowledge and join a national offensive BW program? Iraq, after all, sent many of the researchers destined to take on important positions in its BW program to get their advanced degrees in the UK or in Germany before returning home to join Iraq's BW program. The issue is similar to that of the Bushehr nuclear power reactor that Russia is building for Iran despite US protests. The reactor is not considered to have direct proliferation consequences – unless the core were to be diverted. US opposition to the project is based on the training that will be provided to Iranian nuclear physicists, which could then be applied in a nuclear weapons program.

In the course of this series of papers, of which this can be considered the third, several major points have been argued:

- that the threat assessment, most particularly regarding “BW terrorism” – the potential for BW use by non-state actors – has been greatly exaggerated. The US anthrax events in September-October 2001, and the demonstration of other capabilities by the Al Queda organization, has made it even easier to continue that exaggeration.
- The portrayal that was chosen by the US government and by important public figures to describe the alleged threat has very likely served to stimulate rather than

to inhibit interest in BW by other states and non-state actors. It now appears that this did in fact occur; the Al Qaeda group being one case identified so far.

- If one accepts these arguments, then the attention, policy focus, and resources devoted to anticipating a potential BW terrorist event in the US have been disproportionate and inappropriate, particularly in comparison to a long list of existing public-health conditions with mortality levels in the tens and hundreds of thousands of people per year, year after year.
- The final consideration is the title of this last section of the paper: that the major increase in biodefense R&D in the US and elsewhere will ultimately also serve to increase the wrong kind of interest in BW. Many will claim that the increase in biodefense research is an absolute necessity. If so, it is not an unalloyed good, and the ultimate cost should at least be recognized.

It has been repeated endlessly for nearly two decades that the rapid advances of molecular genetics and biotechnology as well as the global diffusion of knowledge and the relevant professional training would facilitate the proliferation of biological weapons.²²¹ With this went the insistence that the spread would include diffusion to non-state actors. So far that spread has actually been quite limited: the inception of the national BW programs that are known all apparently predate the past 15 years, and the capability has almost without exception not yet appeared in the possession of non-state actors. The perpetrators of the recent preparation and distribution of anthrax in the United States may be the significant break in precedent. Depending on who the responsible party turns out to be, however, it appears likely to turn out to be a state-supported effort in functional terms. It appears extremely probable, however, that the enormous upsurge in research effort on BW relevant pathogens, most particularly in the United States, on top of the generic structural factors mentioned above, will provoke and direct renewed interest in BW on the part of states. As this is a prediction, confirming evidence obviously cannot be given at this time. At the most elementary level other nations will easily be able to justify secret programs, following the example of

the United States. But the stimulus to interest in BW will be broader than that, provoked by continuous general discussion as well as by specific weapons-relevant research efforts and the new knowledge generated by those studies.

References and Notes

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⁵⁹ Alan Cullison and Andrew Higgins, "Forgotten Computer Reveals Thinking Behind Four Years of Al Qaeda Doings," Wall Street Journal, December 31, 2001.

⁶⁰ Peter Beaumont and Ed Vulliamy, "Britain Accused on Terror Lab Claim; Story of Find in Afghan Cave 'Was Made Up' to Justify Sending Marines," Observer, March 24, 2002.

⁶¹ CNN Report, Untitled, November 13, 2001.

⁶² Pentagon Briefing, March 25, 2002.

⁶³ Judith Miller, "Lab Suggests Queda Planned to Build Arms, Officials Say," New York Times, September 14, 2002.

⁶⁴ "Rice on Iraq, War and Politics." PBS/TV, Online Newshour, September 25, 2002.

⁶⁵ "White House spokesman Ari Fleischer said yesterday, 'We have solid reporting of senior-level contacts between Al Qaeda and Iraqi officials going back a decade, and as Condoleeza Rice said, of chemical and biological agent training'" Since Fleischer refers directly to the Rice statement, there is every likelihood that his addition of the "and biological" was gratuitous and in error. In addition, from other information on Iraqi "agent training," it may not include Rice's "weapon development."

Karen De Young, "Unwanted Debate on Iraq-Al Qaeda Links Revived," Washington Post, September 27, 2002.

⁶⁶ "On Thursday Mr. Rumsfeld said 'We have very reliable reporting of senior level contacts going back a decade, and of possible chemical and biological agent training.'" Rumsfeld inserted the caveat of "possible," and added that the report of such "training" came from only one source."

Eric Schmitt, "Rumsfeld Says U.S. Has 'Bulletproof' Evidence of Iraq's Links to Al Qaeda," New York Times, September 28, 2002.

⁶⁷ "CIA Letter to Senate on Bagdad's Intentions," New York Times, October 9, 2002.

⁶⁸ Vernon Loeb and John Ward Anderson, "Al Qaeda May Have Crude Chemical, Germ Capabilities," Washington Post, September 27, 2001.

⁶⁹ Jean Marbella, "Terrorist Escalation Raises New Threats: United States Girding for the Possibility of Other Forms of Attack; Biological, Chemical Arms; Vin Laden has Voiced Support for Using Wide Range of Weaponry," Baltimore Sun, September 24, 2001.

⁷⁰ William J. Broad, "Experts Call for Better Assessment of Threats; A Deadly Weapon, but Difficult to Deploy," New York Times, October 2, 2001.

⁷¹ David Brown, "Biological, Chemical Threat is Terms Tricky, Complex," Washington Post, September 30, 2001.

⁷² Dr. Margaret Hamburg, PBS-TV, "The News Hour with Jim Lehrer," October 9, 2001.

⁷³ Broad, op. cit.

⁷⁴ Brown, op. cit.

⁷⁵ Joby Warrick, Joe Stephens, "Before Attack, US Expected a Different Hit; Chemical, Germ Agents Focus of Preparations," Washington Post, October 2, 2001.

⁷⁶ Sam Dillon, "A Forum Recalls Unheeded Warnings," New York Times, October 3, 2001; Robert Wright, "America's Sovereignty in a New World," New York Times, September 24, 2001.

⁷⁷ "The Worldwide Threat in 2003: Evolving Danger in a Complex World," DCI's Worldwide Threat Briefing, February 11, 2003. In another unclassified CIA report to Congress in December 2002 a sentence read "Documents and equipment recovered from al-Qaida facilities in Afghanistan show that Bin Laden has a more sophisticated biological weapons research program than previously discovered." Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, July 1 through December 31, 2001.

⁷⁸ Personal communication, February 2003.

⁷⁹ Dana Priest and Michael Powell, "Handling of Last Alert Spurs Lawmaker's Ire," Washington Post, February 14, 2003. See also Daniel Klaidman and Evan Thomas, "Anatomy of the Threat," Newsweek, February 24, 2003.

The February 12, 2003 Homeland Security Information Bulletin stated

"Al Qa'ida and affiliated groups continue to enhance their capabilities to conduct effective mass-casualty chemical, biological, radiological, and nuclear (CBRN) attacks. Presently, al Qa'ida and associated groups possess at least a crude capability to use chemical, biological, and radiological agents and devices in their attacks. Several al-Qa'ida-affiliated cells have attempted to carry out attacks in Europe with easily produced chemicals and biological toxins. While these attacks are best suited for assassinations and small-scale dispersal, they can potentially cause hundreds of casualties and widespread panic if used in multiple, simultaneous attacks."

Al Qa'ida Chemical, Biological, Radiological and Nuclear Threat and Basic Countermeasures, Homeland Security Information Update, National Infrastructure Protection Center, Information Bulletin 03-003, February 12, 2003.

⁸⁰ Daniel Williams, "Islamic Militants Harassing Iraqi Kurds; Group in North Backed by Iran and Bolstered by Al Qaeda, Opposition Leaders Say," *Washington Post*, September 5, 2002.

⁸¹ C.J. Chivers, "Allies Hunt for Clues on Al Qaeda," *New York Times*, March 30, 2003.

⁸² PBS-TV Newshour, April 1, 2003. Only the previous day, a BBC reporter, speaking from the site of the Ansar al-Islam compound, claimed that no discovery of ricin or a facility for its manufacture could be found. (BBC World News, March 31, 2003.) Press reports noted, however, that one single room at the site had been swept clean by American troops. It is a perfect demonstration of the weakness of relying on individual media items without subsequent corroboration.

⁸³ Barton Gellman, "Al Qaeda Near Biological, Chemical Arms Production," *Washington Post*, March 23, 2003.

⁸⁴ Susan Schmidt and Ellen Nakashima, "Moussaoui Said Not to be Part of 9/11 Plot," *Washington Post*, March 28, 2003.

⁸⁵ Mark Fineman and Bob Drogin, "Terror: In Malaysia a Jailed Cal State Graduate Helps Unravel Al Qaeda's Southeast Asia Network," *Los Angeles Times*, February 2, 2002; Jack Kelley, "Malaysia Site of September 11 Plotting, FBI Report Says," *USA Today*, January 30, 2002.

⁸⁶ Tom Carey quoted by ABC.net, November 19, 2002

⁸⁷ Definitive, official descriptions of the attack material (midpoints of particle-size distribution, widths of particle-size distribution, purity, numbers of intact spores per gram, numbers of fragmented spores per gram, presence or absence of additives, identities of additives if present, etc.) have not yet been made public and leaked unofficial descriptions have varied widely and incompatibly.

⁸⁸ William Broad and David Johnston, "Anthrax Sent Through Mail Gained Potency by the Letter," *New York Times*, May 7, 2002, and "The Deepening Anthrax Mystery" [Editorial], *New York Times*, May 11, 2002.

⁸⁹ Timothy Read et al., "Comparative Genome Sequencing for Discovery of Novel Polymorphisms in *Bacillus anthracis*," *Science/Express*, May 10, 2002), Deborah Mackenzie, "Anthrax Attack Bug 'Identical' to Army Strain," *New Scientist*, May 9, 2002; and Nicholas Wade, "Analysis May Yield Clues to Origins of Anthrax Mail," *New York Times*, May 10, 2002.

⁹⁰ Dr. Richard Spertzel, Testimony to Senate Committee on Governmental Affairs, March 1, 2002.

⁹¹ Guy Gugliotta and Gary Matsumoto, "FBI's Theory on Anthrax is Doubted; Attacks Not Likely Work of 1 Person, Experts Say," *Washington Post*, October 28, 2002.
In contrast see Scott Shane, "Anthrax Powder from Attacks Could Have Been Made Simply; Single Maker a Possibility, Scientists Now Theorize," *Baltimore Sun*, November 3, 2002.

⁹² Bill Gertz, "UN Allowed Iraqi Purchase of Agent Usable for Weapons," *The Washington Times*, November 6, 2002. (The tonnage figure was subsequently reported by AP News and CNN)

⁹³ Congressman Henry Hyde, in introducing a Congressional Hearing in December 2001, mirrored these alternatives, largely avoiding, however, the alternative of a US professional perpetrator.

"The threshold question regarding the source of the anthrax is whether it is of a type that could have been produced by an individual or a group working alone. In other words, could someone like the Unabomber or al-Qaeda have produced this anthrax without the involvement of a state? If the answers to that question is no, we confront the prospect that a nation with a biological weapons program either knowingly decided to unleash this poison on the American people or has so little control over its biological weapons that they were able to fall into terrorist hands."

A state program may therefore be implicated and have been of instrumental assistance, but not in the way Congressman Hyde preferred to consider and not the state he cared to suggest.

Several sources on the status of the US anthrax investigations as of early March 2002 are:

- Dan Eggen and Joby Warrick, "FBI Still Lacks Identifiable Suspect in Anthrax Probe; Investigators Continue to Focus on People Connected to Labs That Had Strain Found in Letters," *Washington Post*, February 26, 2002.
- Dan Eggen, "FBI Director Defends Pace of Anthrax Investigation," *Washington Post*, March 2, 2002.
- Dr. David Perlin, "Too Slow on Anthrax" [Letter to the Editor], *New York Times*, March 1, 2002
- Jack Dolan, "Anthrax Probe Remains Slow Go; Experts Speculate on FBI's Thrust," *Hartford Courant*, March 4, 2002.

⁹⁴ Antonio Regalado, et al., "FBI Hones in on Military Labs in Hunt for Sources of Anthrax," *Wall Street Journal*, February 12, 2002; Judith Miller and William Broad, "FBI Has a 'Short List' of Names in Its Anthrax Case, The US Says," *New York Times*, February 26, 2002. See also:

- Mark Schoofs and Gary Fields, "Aftermath of Terror, Anthrax Probe was Complicated by Muddled Information, FBI Says," *Wall Street Journal*, March 25, 2002.
- "The Anthrax Trail," *Wall Street Journal*, March 26, 2002.
- Steve Fainaru, "Officials Continue to Doubt Hijacker's Link to Anthrax," *Washington Post*, March 24, 2002.
- Steve Fainaru and Ceci Connolly, "Memo on Florida Case Roils Anthrax Probe; Experts Debate Theory Hijacker Was Exposed," *Washington Post*, March 29, 2002.

⁹⁵ "Russia, Iraq, and Other Potential Sources of Anthrax, Smallpox and Other Bioterrorist Weapons," Hearing before the Committee on International Relations; House of Representatives, One Hundred Seventh Congress, First Session, December 5, 2001, Serial No. 107-56. Dr. Spertzel provided more detailed information on the capabilities of Iraq's biological weapons program in testimony to the US Senate Committee on Governmental Affairs on March 1, 2002.

⁹⁶ "Anthrax: US Blocks U.N. Plan to Condemn Incidents." [to be completed]

⁹⁷ Scott Shane, "Anthrax Matches Army Spores," *Baltimore Sun*, December 12, 2001; News Release, No Title, Dugway Proving Ground, December 12, 2001; Rich Weiss and Joby Warrick, "Army Working on Weapons Grade Anthrax," December 13, 2001; Scott Shane, "Military Lab in Utah Says Powder is All Accounted For," *Baltimore Sun*, December 13, 2001; "CIA Works With Anthrax," Press Statement, undated; but December 17, 2001.

⁹⁸ Brian Ross, "No Suspects, Few Clues. FBI Believes Anthrax Sender Could be U.S.," ABC News Today, and ABC World News Tonight (TV), April 4, 2002. See also, Mark Hosenball, "A Sophisticated Strain of Anthrax," *Newsweek*, April 8, 2002.

⁹⁹ Dan Eggen, Guy Gugliotta, "FBI Secretly Trying to Re-Create Anthrax from Mail Attacks," Washington Post, November 2, 2002; Mike Nartker, "Anthrax: Experts Praise New FBI Investigation Tactic," Global Security Newswire, Nov. 11, 2002; Michael Rigert, "Anthrax Use Questioned in Dugway Investigation," Tooe (Utah) Transcript Bulletin, November 14, 2002.

¹⁰⁰ Scott Shane, "Cleaup of anthrax will cost hundreds of millions of dollars. Months of tests to find safe way to kill spores raised price, experts say," Baltimore Sun, December 18, 2002; and Scott Shane, "Anthrax Fighters Await Outcome," Baltimore Sun, December 27, 2002.

¹⁰¹ Eight irradiation machines have already been purchased, at a cost of \$320 million, and 292 postal facilities will be fitted with automated PCR systems, among other precautionary measures. Ellen Nakashima, "USPS Sees New Way to Spot Biohazards: Device in Mail Sorters Could Detect Anthrax Without a Lab," Washington Post, March 9, 2002.

¹⁰² Robert J. Blendon et al., "The Impact of Anthrax on the American Public," Medscape General Medicine, 4:2 (April 17, 2002).

¹⁰³ Gallup Poll, Storrs, Connecticut, Roper Center for Public Opinion, November 8, 2001.

¹⁰⁴ Milton Leitenberg, "An Assessment of the Threat...", Centro Volta 2000, *op. cit.*

¹⁰⁵ Sheryl Gay Stoltenberg, "Anthrax Protection: Antibiotics Found to Have Helped Limit Anthrax Infections," New York Times, March 8, 2002.

¹⁰⁶ Jane E. Brody, "New Hope for Taming Deadly Septic Shock," New York Times, March 5, 2002.

¹⁰⁷ Sally Squires, "National Plan Urged to Combat Obesity; Weight-Related Illnesses Kill 300,000 Americans Annually, Surgeon General Says," Washington Post, December 14, 2001.

¹⁰⁸ "Cigarettes Cost U.S. \$7 Per Pack Sold, Study Says," New York Times, April 12, 2002.

¹⁰⁹ Jane Brody, "Studies Find Resistant Bacteria in Meats; Organisms May Spread Illness to Humans, Foiling Antibiotics," New York Times, October 18, 2001.

¹¹⁰ Fienie Grobler, "Malaria Sweeps Africa: 3,000 Die Every Day," Daily Mail and Guardian (undated, April 2002); Karl Vick, "Aid Group: Malaria Drug Need is Ignored, Africans Still Rely on Inferior Therapy," Washington Post, February 14, 2002.

¹¹¹ David Brown, "Severe Vaccine Shortage Termed 'Unprecedented;' Kids' Defenses Against 8 Diseases Affected," Washington Post, April 20, 2002.

¹¹² "US Bioterror Effort Brings Uncertainty to Global Disease Fight," Reuters Medical News, April 16, 2002.

¹¹³ Franklin Huang and Matt Stremlau, "Disease Researchers Neglecting World Poor," Los Angeles Times, April 30, 2002.

¹¹⁴ President Bush's 2003 State of the Union speech, January 28, 2003: "I ask you tonight to add to our future security with a major research and production effort to guard against bio-terrorism, called Project Bioshield. The budget I send you will propose almost six billion dollars to . . . " See also Rick Weiss, "NIH Braces for Slower Funding Growth, President May Apply Brakes on 14% to 15% Annual Increase and Trim it to 2%," Washington Post, February 2, 2003.

¹¹⁵ Lawrence Altman and Anahad O'Connor, "Health Officials Fear Local Impact of Smallpox Plan," New York Times, January 5, 2003.

¹¹⁶ Kristen Philipkoski, "Russia's Irksome Bioweapons Stock," Wired News, February 24, 2003.

¹¹⁷ Another consequence of the anthrax events was the announced resignation of the Director of the US Center for Disease Control in March 2002; he had major contributions to increasing the capacity of the CDC precisely on the area of the much larger public health threats that the US public faced; David Brown, "CDC Chief Kaplan to Resign Next Month," Washington Post, February 22, 2002.

¹¹⁸ Glenn Kessler, Peter Slevin, "Cheyney is Fulcrum of Foreign Policy," Washington Post, October 13, 2002.

¹¹⁹ "Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction," in Arms Control and Disarmament Agreements: Texts and Histories of the Negotiations, 1990 edition, Washington, DC: United States Arms Control and Disarmament Agency, pp. 133-137.

¹²⁰ The UK draft language read as follows:

"Article II. Each of the Parties to the Convention undertakes

- (a) not to produce or otherwise acquire, or assist in or permit the production or acquisition of
 - (i) microbial or other biological agents of types and in quantities that have no independent peaceful justification for prophylactic or other purposes;
 - (ii) ancillary equipment or vectors the purpose of which is to facilitate the use of such agents for hostile purposes;
- (b) not to conduct, assist or permit research aimed at production of the kind prohibited in sub-paragraph (a) of this Article."

ENDC 255, July 10, 1969. Reprinted in Documents on Disarmament, 1969, US Arms Control and Disarmament Agency, pp. 324-326.

¹²¹ Disarmament Conference Document, ENDC/231, August 6, 1968.

¹²² Milton Leitenberg, "Research and Development in (C)BW: On the Distinguishability of Basic vs. Applied, Civil vs. Military, Offensive vs. Defensive. An Example of the Interrelations of Scientific Research and Weapons Development." An updated version of this paper was included as a chapter in a book-length examination, Studies of Military R&D and Weapons Development, prepared for the Ministry of Foreign Affairs of Sweden in 1984, as background material for a United Nations Secretary-General's study of military R&D.

¹²³ Raymond A. Zilinskas and Tazewell Wilson, "Introduction," pp. xi-xii, in The Microbiologist and Biological Defense Research: Ethics, Politics and International Security, Annals of the New York Academy of Sciences, ed. Raymond A Zilinskas, vol. 666, 1992.

¹²⁴ "Scientific Principles to Guide Biological Weapons Verification," American Society of Microbiology, May 21, 1993.

Reference to intent in fact became something of a cliché, as in the remark made in 1984 by a former director of research at Fort Detrick, Dr. William Beisel, that "It all comes down to intent...with technology plus intent you can do great good or great harm."

¹²⁵ R. Jeffrey Smith, "The Dark Side of Biotechnology: Experts Say That Recent Scientific Achievements Threaten an International Treaty Banning Biological Warfare," Science, (June 15, 1984), pp. 1215-1216.

¹²⁶ Elizabeth Finkle, "Engineered Mouse Virus Spurs Bioweapons Fears," *Science*, 291, (January 26, 2001) p. 585.

¹²⁷ "Nuclear, Biological, and Chemical Warfare Defense," Office of the Special Assistant for Gulf War Illnesses, Medical Readiness, and Military Deployments, US Department of Defense, January 8, 2002.

¹²⁸ National Security Decision Memorandum 35, "United States Policy on Chemical Warfare Program and Bacteriological/Biological Research Program," November 25, 1969.

¹²⁹ "US Policy on Chemical and Biological Warfare and Agents: Report to the National Security Council," Submitted to the Interdepartmental Political-Military Group in response to NSSM [National Security Study Memorandum] 59, November 10, 1969, p. 26.

¹³⁰ Forrest Russel Frank, "U.S. Arms Control Policymaking: The 1972 Biological Weapons Convention Case," PhD Dissertation, Stanford University, California, November 1974, p. 239.

¹³¹ The US National Science Foundation (NSF) uses the following definitions:

Basic research: Basic research has as its objective a fuller knowledge or understanding of the subject under study, rather than a practical application thereof. As applied to the industrial sector, basic research is defined as research that advances scientific knowledge but does not have specific commercial objectives, although each investigations may be in fields of present or potential interest to the reporting company.

Applied research: Applied research is directed toward gaining knowledge or understanding necessary for determining the means by which a recognized and specific need may be met. In industry, applied research includes investigations directed to the discovery of new scientific knowledge having specific commercial objectives with respect to products or processes.

Development: Development is the systematic use of the knowledge or understanding gained from research toward the production of useful materials, devices, systems, or methods, including design and development of prototypes and processes.

National Science Foundation, *Science and Engineering Indicators – 1989*, p. 89.

The US Department of Defense also has RDT&E definitional categories, but these have no application beyond US DOD decision-making for acquisition and procurement. The most relevant of these are:

Research: Includes all effort directed toward increased knowledge of natural phenomena and environment and efforts directed toward the solution of problems in the physical, behavioral and social sciences that have no clear direct military application.

Exploratory Development: Includes all effort directed toward the solution of specific military problems, short of major development projects.

It is possible that some combination of these could be adapted for international diplomatic use, but that is difficult to envision.

¹³² Darryl Howlett and John Simpson, "Dangers in the 1990s: Nuclear, Chemical and Biological Weapons and Missile Proliferation," in Disarmament: Topical Paper 6: Confidence Building Measures in the Asia Pacific Region, New York: United Nations Department for Disarmament Affairs, 1991, p. 38.

¹³³ The named countries, as well as those identified in a 1993 Russian government report, have been reviewed in earlier papers. See Milton Leitenberg, Biological Weapons Arms Control, CISSM PRAC Paper #18, May 1996, as well as the papers referenced in footnotes 1 and 2.

¹³⁴ The Counterproliferation Imperative. Meeting Tomorrow's Challenges, A Report of the Center for Counterproliferation Research, National Defense University, November 2001, p. 38.

¹³⁵ John R. Bolton, "Beyond the Axis of Evil: Additional Threats From Weapons of Mass Destruction," Heritage Foundation Lectures, no. 743, May 6, 2002.

¹³⁶ Ford's testimony to the US Senate Committee on Foreign Relations read: "The United States believes that Cuba has at least a limited developmental offensive biological warfare research and development effort."

¹³⁷ Judith Miller, "Washington Accuses Cuba of Germ-Warfare Research," New York Times, May 7, 2002.

¹³⁸ David Gonzalez, "Carter and Powell Cast Doubt on Bioarms in Cuba," New York Times, May 14, 2002; Mark Fineman, "Carter Doubts Claim of Cuba Bioterror," Los Angeles Times, May 14, 2002.

Notably, both headlines in two of the best newspapers in the United States, misrepresent the original US charge: it referred neither to "Bioarms," nor to "Bioterror."

¹³⁹ Kevin Sullivan, "Carter Says He Was Told US Had No Proof Cuba Shared Bioweapons Data. State Dept. Officials Claim Contradicted," Washington Post, May 14, 2002.

(The Washington Post headline is a misrepresentation. Carter stated only that he had asked about possible Cuban information-sharing "for terrorist purposes," and not regarding its own BW program.)

¹⁴⁰ "Castro's Response to Statements Made by US on Biological Weapons," Havana AIN (Internet Version-www), LAP200020511000011, May 11, 2002. See also, "Castro Sees 'Sinister' Move in U.S. Biowar Charge," (Reuters Dispatch), New York Times, May 10, 2002,; "Biological Weapons: U.S. Should Present Evidence of Cuban Threat," Dallas Morning News, May 9, 2002; and David Gonzalez, "Castro Says Carter Can Inspect Biotechnology Centers," New York Times, May 13, 2002,

¹⁴¹ "Background Paper on New Scientific and Technological Developments Relevant to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction," BWC/CONF.IV/4, October 30, 1996, pp. 1-5.

¹⁴² Martin Arostegui, "Fidel Castro's Deadly Secret – Five BioChem Warfare Labs," Insight Magazine (Washington Times), 14:26 (July 20, 1998).

¹⁴³ Personal communication, May 2001.

¹⁴⁴ Wayne Biddle, "Proposed Installation Raises Questions and Fears: Just What Germs Would the Army Grow in Utah," New York Times, December 16, 1984.

¹⁴⁵ Department of Defense appropriations for 1970. Part 5: Hearings before a Subcommittee of the Committee on Appropriations, US House of Representatives, 91st Congress, 1st Session, Washington, DC, 1969, p. 589.

¹⁴⁶ Pan Zhenqiang, Xia Liping, Wang Zhongchun, eds., Guoji Caijun yu Junbei Kongzhi, [International Disarmament and Arms Control], Beijing: Chinese National Defense University Press, December 1996, pp. 52, 182. References 90 and 91 were kindly supplied by Eric Croddy.

¹⁴⁷ Chen Jisheng, "21 Shiji Huasheng Wuqi ji Junkong Fazhan Fenxi" [Analysis of Chemical and Biological Weapons in the 21st Century and Arms Control Developments], Fanghua Yanjiu, no. 1, 2000, p. 44.

¹⁴⁸ The Cuban allegations have also been extensively reviewed elsewhere. See Raymond A. Zilinskas, "Cuban Allegations of Biological Warfare by the United States: Assessing the Evidence," Critical Reviews in Microbiology, 25:3 (1999):173-227, and Milton Leitenberg, "Biological Weapons, International Sanctions and Proliferation," Asian Perspective, 21:3 (Winter 1997):7-39.

¹⁴⁹ "Details on Bonn's Bug Warfare Plans," *Democratic German Report*, 17:24 (December 23, 1968), pp. 186-187.

The reader who is interested in comparing these charges with descriptions of Germany's defensive BW program in approximately the same period will find several useful sources: the section on "West Germany," pp. 218-219 in Volume II, CB Weapons Today. The Problem of Chemical and Biological Warfare, Sipri, Stockholm: Almqvist & Wiksell, 1971, and Roland Metzner, "The Bundeswehr NBC Defense and Development Institute," Military Technology, #4, 1978, pp. 50-51.

¹⁵⁰ Jan van Aken, "Biologische Waffen: Forschungsprojekte der Bundeswehr," Sunshine Project, June 2001.

¹⁵¹ "Germany Increases Biological Weapon Defense Funding," Reuters Medical News, April 5, 2002.

¹⁵² Personal communication, March 2002.

¹⁵³ Jan van Aken and Edward Hammond, "Some Thoughts on Biodefense Research," INESAP Information Bulletin, no. 19 (March 2002):11-14.

¹⁵⁴ Dirk Eckert, "Expansion of Defensive Bioweapons Research: The Bundeswehr is Also Using Genetic Engineering," Hanover Telepolis, April 10, 2002.

¹⁵⁵ Kathryn Nixdorff and Wolfgang Bender, "Biotechnology, Ethics of Research, and Potential Spin-off," INESAP Information Bulletin, no. 19 (March 2002), pp. 19-22.

¹⁵⁶ "Genetic Engineering in German Biodefense Research," Sunshine Project Germany, April 2, 2002.

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- Andrew Pollack, "Scientists Ponder Limits on Access to Germ Research," New York Times, November 27, 2001.
- William J. Broad, "US Sells Papers on Making Germ Weapons," New York Times, January 13, 2002.
- Scott Lindlaw, "Bush May Censor Germ-Warfare Guides; The US Has Been Selling the Documents, Which Demonstrates How to Manufacture Weapons," Philadelphia Inquirer, January 14, 2002.
- Steven Aftergood, "Do Declassified Bioweapon Documents Pose a Threat," Secrecy News, # 6 (January 15, 2002).

¹⁵⁸ William J. Broad, "US is Tightening Rules in Keeping Scientific Secrets, Terrorist Threat Cited; Chemical and Germ Weapons Data Withdrawn – Some Researchers Are Wary," New York Times, February 17, 2002; David Enrich, "Extra Care Taken in Declassifying Documents; Pentagon Standards Tougher After Sept. 11," Washington Post, March 29, 2002.

¹⁵⁹ Foreign and Military Intelligence: Book I, Final Report of the Select Committee to Study Governmental Operations with Respect to Intelligence Activities, US Senate, 94th Congress, 2nd Session, April 1976, pp. 388-389.

¹⁶⁰ Intelligence Activities: Senate Resolution 21. Volume I: Unauthorized Storage of Toxic Agents, Hearings Before the Select Committee to Study Governmental Operations with Respect to Intelligence Activities, United States Senate, 94th Congress, 1st Session, September 1975, pp. 1, 189-199.

¹⁶¹ Rick Weiss and Susan Schmidt, "Capitol Hill Anthrax Matches Army's Stocks. Five Labs Can Trace Spores to Fort Detrick," Washington Post, December 16, 2001.

It appears that CIA programs in this area have always been pushed aggressively: a notorious and early instance, although not one with international treaty implications, was the 1953 experiments with LSD

in project MK:ULTRA that led to the death of a CIA staffer. Ted Cup, "Bad Chemistry: The Haunting Legacy of a CIA Scientist and His Unwitting Victims – Where Patriotism and Madness Meet," The Washington Post Magazine, December 16, 2001.

¹⁶² "Statement of Robert E. Waldron, Assistant Deputy Administrator for Nonproliferation Research and Engineering, National Nuclear Security Administration, US Department of Energy, Before the Subcommittee on Emerging Threats and Capabilities, Committee on Armed Services, United States Senate," April 10, 2002.

¹⁶³ Dr. Ken Alibek, Testimony to the Joint Economic Committee, US Senate, May 20, 1998.

¹⁶⁴ Personal communication, November 7, 1998, and July 2002.

¹⁶⁵ Personal communication, November 1998.

It is not altogether clear what the rationale behind production of such a molecular genetic "chimera" of two pathogens would have been, as against simply combining the two independent pathogens and delivering them simultaneously. One suggestion has been that it would provide a mechanism to enclose a more lethal but non-contagious pathogen inside the genome of a less lethal but more contagious pathogen to obtain the combination of high contagiousness and high lethality. However, this explanation does not fit the two organisms involved in the alleged event. Another suggested notion was to escape disease identification by automated detection and identification devices. However, rapid identification devices did not exist at the time that the supposed "chimera" development took place (and they are only now in development, 15-20 years later). In addition, the strategic rationale that Alibek has described for the potential circumstances in which Soviet military planners conceived of using these agents offered little reason to be concerned with whether the attacked party could identify the disease agent rapidly or not. Nevertheless, as indicated, the project almost certainly did exist.

¹⁶⁶ Sergey Popov, Interview with PBS TV NOVA program "Bioterror," November 17, 2001.

¹⁶⁷

- B. Moss, "Use of Vaccinia Virus for the Development of Live Vaccines," in Genetically Altered Viruses and the Environment, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 1985, pp. 291-298,
- G. Thomas et al., "Expression and Cell Type-Specific Processing of Human Preproenkephalin with a Vaccinia Recombinant," Science, vol. 232 (1986):1641-1643.
- B. Roizman, and F.J. Jenkins, "Genetic Engineering of Novel Genomes of Large DNA Viruses," Science, vol. 229 (1985):1208-1214.
- Dale Short and Kathleen Blount, "Microscopic Missiles: Revamping Viruses to Demolish Disease," UAB (University of Alabama-Birmingham) 22:1 (Winter 2002):3-9.
- O.I. Serpinski et al., "Design of Orthopoxvirus Recombinant Variants by Foreign Gene Insertion into an Intergene Region of Viral Genome," Molecular Biology [Russia], 30:5(1996):1055-1065.

¹⁶⁸ W. Wayt Gibbs, "Bioterrorism: Innocence Lost. Is Enough Being Doing to Keep Biotechnology Out of the Wrong Hands?" Scientific American, January 2002, pp. 14-15.

¹⁶⁹ A. Lucht et al., "Development of Monoclonal Antibodies to Ebola Virus,"

¹⁷⁰ "In Memoriam: Joel M. Dalrymple," p. ix, in The Microbiologist and Biological Defense Research: Ethics, Politics and International Security, Annals of the New York Academy of Sciences, ed. Raymond A Zilinskas, vol. 666, 1992, and Laurence K. Altman, "Vaccine for Hanta Virus Found Safe in Early Test," New York Times, May 23, 1995.

¹⁷¹ Severin Carrell, "Porton Down Makes New Plague and Pox," Independent, February 10, 2002.

"Porton Down" is essentially a misnomer, as there are two separate research establishments at the site – the Centre for Applied Microbiological Research (CAMR) under the UK Department of Health, and the Chemical and Biological Defence Sector of DERA (Ministry of Defence, Defence Evaluation and Research Agency) at which most of the work referred to is taking place.

¹⁷² Personal communication, February 2002.

¹⁷³ A. M. Bonnet et al., "Recombinant vaccinia viruses protect against *Clostridium perfringens* a-toxin," Viral Immunology, 12 (1991):97-105.

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- Judith Miller, Stephen Engelberg, William J. Broad, "U.S. Germ Warfare Research Pushes Treaty Limits: Pentagon Says Projects Are Defensive, and is Pressing Ahead," New York Times, September 4, 2001. See also Chapter 12 in Germs by Miller, Engelberg, and Broad (2001), pp. 287-299.
- Vernon Loeb, "US Seeks Duplicate of Russian Anthrax: Microbe to be Used to Check Vaccine," Washington Post, September 5, 2001.

Since this project was carried out by initiated and professional DTRA staff members, it would simulate an effort of a small national program. However, according to Germs, it was concluded that "a nation or bioterrorist" could carry out the project without producing any signature. There would be no validity to the conclusion that this was so for a "bioterrorist."

¹⁷⁵ Personal communication, 2002.

¹⁷⁶

- Judith Miller, "When is Bomb Not a Bomb? Germ Experts Confront US," New York Times, September 5, 2001.
- Elisa D. Harris, "Research Not to be Hidden," New York Times, September 6, 2001.

¹⁷⁷ "US Approves Development of Enhanced Anthrax," Arms Control Today, 31:9 (November 2001).

¹⁷⁸ Chemical and Biological National Security Program 2000, FY 2000 Annual Report, US Department of Energy, 2000.

¹⁷⁹ "US Declarations Under the BWC CBMs Do Not Mention the US Bio-defense Projects Disclosed by the New York Times on 4 September 2001," SIPRI CBW Forum website, Stockholm, Sweden, September 2001.

¹⁸⁰ Scott Shane, "Anthrax Matches Army Spores," Baltimore Sun, December 12, 2001; Scott Shane, "Army Confirms Making Anthrax in Recent Years," Baltimore Sun, December 13, 2001.

¹⁸¹ Personal communication, April 2002.

¹⁸² "US/UK Non-lethal Weapons (NLW) Urban Operations Executive Seminar, Assessment Report," November 30, 2000, London. Most of the discussion at this meeting pertained to chemical "non-lethal" agents, however an appendix stipulated the Biological Weapons Convention as one of the legal instruments pertaining to the considerations being discussed. Quoted from Barbara H. Rosenberg, "Defending Against Biodefense: The Need for Limits," Disarmament Diplomacy, #69 (February-March 2002)

¹⁸³ Gugliotta and Matsumoto, October 28, 2002, op. cit.

¹⁸⁴ Seth Brugger, "International Reaction to Secret U.S. Bio-Weapons Research Muted," Arms Control Today, 31:7 (October 2001). See also Menno Steketee, "US Building Biological Bomb in Grey Area," Rotterdam NRC Handelsblad, September 6, 2001; "US Anthrax Plan Worries Russians," Associated

Press, September 5, 2001; "US Military Produces Anthrax for Defensive Purposes," Press Center Russia, on NTV, September 6, 2001; and "Cuban Television Reacts to NY Times Article on Biological Weapons," Havana Cubavision, September 5, 2001.

¹⁸⁵ "Indian Safeguard Against Nuclear, Biochemical Attack Developed," [Agence France Presse], The Daily Star (New Delhi), July 12, 2002; "Indian Scientists Reveal Nuclear, Germ Tests," Washington Times, July 13, 2002.

¹⁸⁶ Dr. Anna Johnson-Winegar, Deputy Assistant to the Secretary of Defense for Chemical and Biological Defense, seminar presentation at the National Defense University, Washington, DC, 2001. Similarly a Dept. of Defense workshop that surveyed the state of the art for simulation models of the effects of the release of biological or chemical agents assessed ongoing work in seven areas: intelligence integration and source term; transport, dispersion, fate and terrain; weather (atmospheric dynamics); dose-response; population epidemiology; agriculture and biota; and materiel. Under "transport, dispersion, fate and terrain," it asked, "What happens to the agent after release, through dilution, transformation, deposition, re-suspension, and terrain-related processes?" Precisely the same questions would be asked if the simulations were made in the context of an offensive BW program as in a defensive one. Madhu Beriwal and Peter B. Merkle, Defense Threat Reduction Agency CB Modeling and Simulation Futures Workshop, May 2001.

¹⁸⁷ Biological Testing Involving Human Subjects by the Department of Defense, 1977, Hearings before the Committee on Human Resources, United States Senate, 95th Congress, 1st Session, 1977, p. 110.

¹⁸⁸ Chemical and Biological National Security Program, FY00 Annual Report, US Department of Energy, pp. 175-177.

¹⁸⁹ Chemical and Biological National Security Program, FY 00 Annual Report, op. cit., pp. 115-117, 123-126.

¹⁹⁰ "Chemical and Biological National Security Program: A DOE Mission," in Genomes to Life: Neutralizing the Biological Threat, November 2001. It is likely that the aerosol test chamber reportedly situated at the Nevada Test Site is the one being used for the Sandia National Laboratory studies.

¹⁹¹ "NIH Plans Bioterrorism Research," Associated Press, March 15, 2002; "NIAID Unveils Bioterrorism Research Agenda," NIH Press Release, March 14, 2002, and Responding Through Research: The Counter Bioterrorism Research Agenda of the National Institute of Allergy and Infectious Diseases (NIAID) for CDC Category A Agents, February 2002.

¹⁹²

- Department of Defense Safety Programs for Chemical and Biological Warfare Research, Hearings, Committee on Governmental Affairs, United States Senate, 100th Congress, 2nd Session, July 1988, pp. 206, 284-287.
- Bill Richards and Tim Carrington, "Military Science: Controversy Grows Over Pentagon's Work on Biological Agents. Army Says Work is Defensive, but Critics Fear Research Presages Germ Warfare. The Attraction of Big Money," Wall Street Journal, September 17, 1986.
- Seth Shulman, "Funding for Biological Weapons Research Grows Amidst Controversy. Some Biologists Fear that Military Funding Will Skew Research Priorities," Bioscience 37:6 (June 1987):372-375.
- Charles Piller, "Biological Warfare: Lethal Lies about Fatal Diseases," The Nation, October 3, 1988, pp. 271-274.

¹⁹³ Wayne Biddle, "Proposed Installation Raises Questions," op. cit.

¹⁹⁴ Melissa Hendricks, "Germ War: Designing Disease," Washington Post, January 1, 1989.

(It is possible that memory of the large “Dugway sheep kill” in 1968, caused by an accident during open-air chemical tests, may also have contributed to safety concerns by members of the US Senate.)

¹⁹⁵ Senator Sasser, Letter to Senator Mack Mattingly, Chair of the Senate Appropriations Committee Subcommittee on Military Construction, cited in Charles Piller and Keith R. Yamamoto, “The U.S. Biological Defense Research Program in the 1980s: A Critique,” p. 145, in Susan Wright, ed., Preventing a Biological Arms Race (Cambridge, Mass: The MIT Press, 1990).

¹⁹⁶ Charles Piller and Keith R. Yamamoto, Gene Wars: Military Control Over the New Genetic Technologies (New York: William Morrow, 1988), p. 139.

¹⁹⁷ Final Report of the Ad Hoc Subgroup on Army Biological Defense Research Program, Army Science Board, Department of the Army, Washington, DC, July 1987.

¹⁹⁸ “Biological Warfare Testing,” Joint Hearing, Committee on Foreign Affairs, Committee on Interior and Insular Affairs, Committee on Armed Services, US House of Representatives, May 3, 1988. See also, “Preliminary Report of the Majority Staff of the Senate Subcommittee on Oversight of Government Management on DOD’s Safety Programs for Chemical and Biological Warfare Research, May 11, 1988 and United States General Accounting Office, “DOD’s Risk Assessment and Safeguards Management of Chemical and Biological Warfare Research and Development Facilities,” Statement for the Record by Eleanor Chelimsky, before the US Senate Committee on Governmental Affairs, GAO/T-PEMD-88-10, July 27, 1988.

¹⁹⁹ R. Jeffrey Smith, “Administration Defends Germ War Test Facility; Critics See Possible Political Repercussions, Question Utility in Developing Defenses,” Washington Post, May 4, 1988.

²⁰⁰ Piller and Yamamoto, Gene Wars, *op. cit.*, pp. 129-138. See also Susan Wright, ed., Preventing a Biological Arms Race, *op. cit.*, particularly chapters 5-8. These charges regarding the 1980-1986 US biodefense program were reiterated in April 2002 by Francis Boyle, Professor of International Law at the University of Indiana. He stated that he had read two of the old DOD contracts that had been given to researchers at the University of Indiana, and “They were clearly biological warfare contracts, and the tip-off on any of these contracts is they call for the development in the contract of an aerosol delivery device. That is how biological warfare agents are delivered, by air.” Francis A. Boyle, “Faculty Lecture on Bio/Warfare/Terrorism/Weapons,” Verbatim Transcript, April 18, 2002.

²⁰¹ Col. David Huxsoll, Testimony, in Hearings: Global Spread of Chemical and Biological Weapons, Committee on Government Affairs, US Senate, 101st Congress, 1st Session, May 1989, pp. 199-203.

²⁰² Comment at conference in Washington, DC, July 2002.

²⁰³ Iris Hunger, “BWC Conference Fails: What Needs to be Done Next,” INESAP Information Bulletin, no. 19, March 2002, pp. 7-10.

²⁰⁴ Gerald R. Thrush et al., “Immunotoxins: An Update,” Annual Review of Immunology, vol 14 (1996):49-71.

²⁰⁵ Nicholas Wade, “Experts Dissect Last Layer of Anthrax Toxin,” New York Times, April 2002. Identity of the funding agencies was ascertained from the publications of Liddington (lethal factor), Drum et al. (edema factor), and Collier and Young (toxin action).

²⁰⁶ S.D. Miller, “A Virus Induced Molecular Mimicry Model of Multiple Sclerosis,” Abstracts of the 41st Interscience Conference on Antimicrobial Agents, 2001. See also D.J. Theil, et al., “Viruses Can Silently Prime For and Trigger Central Nervous System Autoimmune Disease,” Journal of Neurovirology, 7:3

(June 2001):220-227. This research used a recombinant vaccine virus as a nonspecific inducer of multiple sclerosis.

²⁰⁷ Jon Cohen, "Longtime Rivalry Ends in Collaboration," Science, Vol. 295 (February 22, 2002), pp. 1441-1442.

²⁰⁸ Stephen Mihm, "Attaching Good Genes to Bad Viruses," New York Times, December 9, 2001.

²⁰⁹ A. Ramsey et al., "A Case for Cytokines as Effector Molecules in the Resolution of Virus Infection," Immunology Today, 14 (1993): 155-157.

²¹⁰ "Background Paper on New Scientific and Technological Developments Relevant to the Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and On Their Destruction," BWC/Conf.IV/4Add.1, November 21, 1996. Contribution by Sweden, p. 4.

²¹¹ Executive Summary, Solicitation Number DAAD13-02-R-0016, US Army Robert Morris Acquisition Center (RMAC), 2002.

²¹² See the discussion in Milton Leitenberg, Biological Weapons Arms Control, CISSM, Project on Rethinking Arms Control, Paper #16, May 1996, pp. 69-79. The relevant material in that publication is not repeated here.

²¹³ Personal communication, April 2002.

In the case of three large subjects touched on in Part 5 of this study – the Soviet BW program, the Iraqi BW program, and the general subject of verification, inspection, BW site signatures, and so on – I have not repeated material included in earlier publications.

²¹⁴ Stephen Black, "UNSCOM and the Iraqi Biological Weapons Program: Implications for Arms Control," Politics and the Life Sciences, (March 1999), p. 65. See also UNSCOM, Report: Disarmament, Report to the Security Council, January 25, 1999; Tim Trevan, Saddam's Secrets: The Hunt for Iraq's Hidden Weapons, London: Harper Collins, 1999; and Milton Leitenberg, "Deadly Unknowns About Iraq's Biological Weapons Program," Asian Perspective, 24:1 (2000):217-223.

²¹⁵ Black, "UNSCOM and the Iraqi Biological Weapons Program," op. cit., p. 64.

²¹⁶ Milton Leitenberg, "The Conversion of Biological Warfare Research and Development Facilities to Peaceful Uses," in SIPRI Chemical and Biological Warfare Studies, Vol. 15, Control of Dual Threat Agents: The Vaccines for Peace Programme, ed. Erhard Geissler and John P. Woodall, Stockholm, 1994, pp. 77-105.

²¹⁷ Personal communications, April 2002..

²¹⁸ Ken Alibek, quoted in Miller et al, Germs, 2001, p. 310.

²¹⁹ "Biological Weapons: Effort to Reduce Former Soviet Threat Offers Benefits, Poses New Risks," GAO-NSIAD-00-138, April 28, 2000, US General Accounting Office, Washington, DC.

²²⁰ Judith Miller and William J. Broad, "Bioweapons in Mind, Iranians Lure Needy Ex-Soviet Scientists," New York Times, December 8, 1998.

²²¹ Excellent reviews of the relevant technical advances are found in the series of Background Papers on "Scientific and Technological Developments Relevant to the (BWC) Convention...." which have been submitted by member states at success BWC Review Conferences. See, for example,

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- BWC/CONF.I/5, February 8, 1980;
 - BWC/CONF.I/6, February 29, 1980;
 - BWC/CONF.IV/4, October 30, 1996;
 - BWC/CONF.IV/4/Add.1, November 21, 1996;
 - BWC/CONF.IV/4/Add.2, November 25, 1996;
 - BWC/CONF.V/4/Add.1, October 26, 2001;
 - BWC/CONF.V/7, November 15, 2001.