

Terrorism, War, or Disease?

Unraveling the Use of Biological Weapons

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STANFORD SECURITY STUDIES

An Imprint of Stanford University Press

Stanford, California 2008

CHAPTER TEN

U.S. Efforts to Investigate and Attribute the Use of Biological Weapons

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On several occasions over the past half century, the U.S. government has had to address the issue of biological weapons use. In two of those instances, during the Korean War and in Cuba repeatedly since the 1960s, the United States itself was the target of allegations of having used biological weapons. In another case, that of Yellow Rain, the U.S. government was the accuser against the Soviet Union and its allies in Southeast Asia and Afghanistan. And in a fourth, the 2001 mailings of *Bacillus anthracis* spores in Florida, New York, and Washington, DC, U.S. citizens were the victims. In each of these cases, U.S. officials have confronted different aspects of the biological weapons attribution problem.

This chapter begins by discussing the existing legal basis for U.S. efforts to attribute the use of biological weapons. It then turns to each of the cases noted above, focusing in particular on how the United States investigated the allegations, including the strengths and weaknesses of the U.S. approach to each. It concludes by considering lessons from these experiences for future efforts to identify, characterize, and attribute the use of biological weapons.

Legal Underpinnings of U.S. Attribution Policy

Following the use of chemical weapons by Iraq, and allegedly Iran, in the 1980s, the U.S. Congress passed legislation requiring the president to make a

formal determination, and to report to the Congress, in cases where there is evidence of the possible use of biological or chemical weapons by a foreign government against either another country or its own population. As outlined in the Chemical and Biological Weapons Control and Warfare Elimination Act of 1991, the president is required to make this determination within 60 days of receiving "persuasive" information indicating "the substantial possibility" that a foreign government has made "substantial preparations to use or has used" biological or chemical weapons. The law lists various factors that are to be considered in making a use determination, including physical and circumstantial evidence; information from the alleged victims, witnesses, and independent observers; the availability of the weapons concerned to the purported user; official and unofficial statements bearing on the issue; and the willingness of the purported user to permit an investigation by the United Nations Secretary-General or other legitimate outside parties.

The law also requires the president to terminate U.S. foreign assistance (except humanitarian and agricultural items), arms sales, and licenses, and to deny U.S. credits and certain national security exports to foreign governments that the president determines have used biological or chemical weapons. If the foreign government does not both end the use and allow verification by the UN or other international observers, the president is required to impose additional sanctions that affect multilateral development bank loans and U.S. bank loans or credits, imports, exports, diplomatic relations, and aviation to and from the United States. The United States has not made a use determination under these provisions since they first became law in October 1991.¹

Internationally, U.S. efforts to investigate and attribute the use of biological weapons can draw on a variety of procedures developed under the Biological and Toxin Weapons Convention (BWC), the Chemical Weapons Convention (CWC), and by the United Nations, as Jonathan Tucker writes in Chapter 12 in this volume. Under Article VI of the BWC, any state party has the right to lodge a complaint with the United Nations Security Council if it believes that another state party is in violation of its obligations. Each state party is obligated under Article VI to cooperate in carrying out any investigation that the Security Council may undertake. The United States has never invoked Article VI and lodged a formal complaint against another state party, although it apparently considered doing so early in the Yellow Rain investigation.

Under Article V of the BWC, states parties undertake an obligation to consult one another and to cooperate in solving any problem that may arise in relation to implementation of the Convention. Although these consultations can be undertaken on a bilateral or multilateral basis, successive review conferences for the treaty have focused on elaborating procedures for carrying out such consultations multilaterally. The United States has never invoked these multilateral Article V procedures but, as discussed below, it has been the subject of a consultative meeting pursuant to a request by Cuba, another state party to the BWC.

Because the Chemical Weapons Convention applies to toxins, its very detailed procedures for investigating allegations of use are relevant to at least some concerns in the biological weapons area. They include procedures under Article IX for short-notice challenge inspections of allegations of use and under Article X for an investigation of requests for assistance from State Parties threatened or attacked with toxins or chemical weapons. Neither of these provisions has ever been invoked by the United States or by another state party against the United States since the CWC's entry into force in April 1997.

Finally, as discussed in the Tucker chapter, broad authority to investigate allegations of the use of biological weapons also resides in the United Nations. Under Article 99 of the UN Charter, the secretary-general has the right to bring any matter that threatens international peace and security to the attention of the UN Security Council. This provided the legal basis for the UN's efforts in 1981 and early 1982 to investigate the U.S. Yellow Rain allegations. Because of the inconclusive nature of those investigations, however, the United States and other countries sought more specific authority, under Resolution 37/98D of December 1982, for the UN Secretary-General to investigate, with the assistance of qualified experts, any allegations of biological or chemical weapons use brought to him by any UN member state. This authority has never been used by the United States to investigate the use of biological weapons.²

Allegations of U.S. BW Use in the Korean War

For a brief period in the spring of 1951 and on repeated occasions in early 1952, China, North Korea, and the Soviet Union accused the United States of carrying out biological warfare (BW) attacks in China and North Korea.³ The

descriptions of the U.S. attacks bore a close resemblance to publicly available information about Japan's use of biological weapons during World War II, alleging, for example, the use not only of anti-personnel agents such as *Bacillus anthracis*, *Vibrio cholerae*, and *Yersinia pestis* but also the dissemination of various plant and animal diseases using insects, arachnids, and small rodents. Some of the charges also linked U.S. BW activities with those of Japan in another way, claiming that the U.S. weapons were being produced with help from General Ishii and other Japanese war criminals of Unit 731 whom the United States had shielded from prosecution.⁴

Two international commissions were utilized by North Korea and China to investigate the attacks: the International Association of Democratic Lawyers and the International Scientific Commission for the Investigation of the Facts Concerning Bacteriological Warfare in Korea and China. After visiting North Korea and China, both commissions issued reports affirming the allegations against the United States, although neither ever conducted a field investigation of its own. Instead, both received testimony and samples from alleged attacks and accepted them as fact, with no independent confirmation. In addition, neither commission sought to determine whether the diseases being reported could be attributed to natural causes, although they were endemic in the areas in which North Korean and Chinese troops were moving or operating.

The United States did not respond to the first round of BW charges in 1951, which it later characterized as a "minor campaign" designed to justify the breakdown of sanitation and medical facilities in North Korea.⁵ But if the 1951 accusations were viewed as largely meant for domestic consumption, the new round of charges in 1952 were seen as part of a broader, world-wide hate campaign against the United States.⁶ "Propaganda of this type is itself a horror weapon," wrote one U.S. official in August 1952. "It is an attack not only against the United States, but against the very structure of human civilization."⁷

The new charges were quickly denied by top U.S. civilian and military officials, including the Secretary of State, the Ambassador to the United Nations, the U.S. Commander of UN Forces in Korea, and the Chairman of the U.S. Joint Chiefs of Staff. In early March 1952, Secretary of State Dean Acheson stated "categorically" and "unequivocally" that the charges were false, arguing that they were designed to cover up the Communist countries' own inability to care for the health of their citizens. In the same statement, Acheson also called for

an impartial international investigation by a body such as the International Committee of the Red Cross (ICRC).⁸ One week later, Acheson sent a formal request to the ICRC, pledging to give the agency's investigators full access to all information available on the UN side. Neither North Korea nor China ever responded directly to the ICRC's requests to conduct such an investigation.

In June 1952, the United States took the BW issue to the UN, submitting a Security Council resolution that called upon the ICRC to investigate the charges and report back. In another Security Council resolution submitted the following month, the United States declared that the BW charges were clearly false, since the accusing governments had refused to allow an impartial international investigation. Both resolutions received overwhelmingly affirmative votes, but were vetoed by the Soviet Union.⁹

Having been thwarted by Moscow in the Security Council, the United States tried another tack; in the UN Political Committee in early April 1953, it called for the establishment of a commission of investigation. The day before the U.S. proposal, the Soviet Union offered to drop the BW charges if the United States abandoned its effort to secure a UN investigation. The United States, however, refused the Soviet offer, and its proposal for a commission of investigation was approved by the UN General Assembly later that month. Yet, like the ICRC, the UN commission was unable to carry out its charge because North Korea and China would not cooperate.¹⁰

In addition to seeking an international investigation, the United States also considered a number of other options for countering what it saw as a Communist propaganda effort. Much of the analysis of the charges and discussion of possible U.S. responses was done in the Psychological Strategy Board, an interagency body comprising the Under Secretary of State, the Deputy Secretary of Defense, and the Director of Central Intelligence (or their designated representatives). One option proposed in March 1952 was for the President to offer to provide North Korea and China, either directly or through the ICRC, teams of medical workers equipped with vaccines and other supplies to combat the alleged outbreaks. Such an offer, it was argued, would place the Communists in an untenable position, as they would be forced either to refuse the aid and thus be seen as condoning the suffering of their citizens, or to accept the aid and undercut their own efforts to portray the United States as a ruthless aggressor.¹¹ Another recommendation the Board made in August 1952 was to consider filing

an international libel action against the Soviet Union in the World Court or the United Nations.¹² In April 1953, a senior White House aide to President Dwight Eisenhower proposed the creation of an "American Committee of 100 Against Soviet Germ Warfare Lies." This committee, which would include eminent scientists, jurists, and others, would establish affiliated chapters around the world and would work with the U.S. government to refute the charges on scientific grounds and expose the Communist lies.¹³

These U.S. proposals were clearly designed for propaganda purposes. In the end, however, none were implemented, perhaps because of concerns that to do so would only keep the Communist BW propaganda campaign alive. Many U.S. missions abroad had expressed this concern in April 1952 in response to a Department of State circular on the impact of the germ warfare charges in various regions.¹⁴ The United States also never released a detailed scientific rebuttal, which, as Leitenberg discusses in Chapter 6 in this volume, could have shown that the disease agents and insects in the photographs offered as evidence of the charges were misidentified or were harmless, that the diseases were endemic in the areas in question, and that none of the bacteria involved in the claims could be carried by insects. The closest the United States seems to have come is to produce, in the summer of 1952, a package entitled "The Truth about BW," which contained copies of letters, messages, and texts of speeches by officials from the U.S. and other governments, comments from reputable scientists and the press, and other relevant materials.¹⁵

Whether a report refuting the scientific evidence or even an international investigation could have definitively identified both the "nature and extent" of the epidemics in North Korea and China and "the real cause," as Secretary Acheson put it in his letter to the ICRC in March 1952, is, nevertheless, an open question.¹⁶ Nearly fifty years after the Korean War, documents from the Russian Presidential Archives revealed that North Korea had fabricated at least some of the evidence, with assistance from the Soviet Union and China.¹⁷ This included creating false areas of exposure and infecting prisoners with naturally occurring plague and cholera bacteria. An international investigation might well have identified the causative agents present in North Korea and China. But conclusive evidence that the outbreaks were natural in origin and had been falsely attributed to the United States only became available many years later with the publication of the Soviet documents and with the analysis of isolates from

alleged anthrax victims, which showed that the strain was indigenous to Asia and not from the U.S. BW program.¹⁸ Nevertheless, none of the three countries has ever withdrawn the charges, and North Korea continues to reiterate them publicly.¹⁹

Cuban Biological Weapons Allegations Against the United States

Since 1964, Cuba has accused the United States of having caused more than twenty disease outbreaks among its population, livestock, and plants.²⁰ With one exception, all of the charges were made after widely publicized hearings in the U.S. Congress in 1975 revealed that the Central Intelligence Agency (CIA) had a secret program in the 1960s to develop biological agents and delivery systems for use in assassinating foreign leaders, and that Cuban President Fidel Castro had been one of the targets of the CIA effort.²¹ Many of Cuba's BW allegations were first raised in a speech by Castro in July 1981 that also discussed the assassination attempts.²² In the succeeding quarter-century, Cuba has never lodged a complaint with the UN Security Council, as it could do under Article VI of the BWC, and it has invoked the Article V consultative procedures only once, in conjunction with its 1997 *Thrips palmi* charges. The United States has ignored most of the Cuban allegations, responding only to *Thrips palmi* and an earlier dengue hemorrhagic fever (DHF) charge.²³

In his speech in July 1981, Fidel Castro linked the CIA to a DHF epidemic that was then spreading through Cuba. The United States responded immediately that the charges were "totally without foundation," pointing out that it had just approved an emergency request from the Pan American Health Organization (PAHO) for the shipment of 300 tons of pesticide to help eliminate the mosquitoes that carried the disease.²⁴ Two months later, the deputy U.S. representative to the United Nations publicly reiterated these points, declaring that Castro knew the real origins of the disease, since Cuban health officials had previously told PAHO, U.S. diplomats in Havana, and others that it had been introduced into Cuba by Cuban troops returning from Angola.²⁵

Following further Cuban DHF accusations in the fall of 1984, the United States sent a brief diplomatic note to the Cuban government "vigorously" protesting the Cuban "falsehoods." A much more detailed U.S. note was sent

in April 1985 after receiving Cuba's response. In it, the United States rebutted Cuba's claims that DHF had appeared in Cuba before any other country, that no Southeast Asian or African country with whom Cuba had relations had experienced the disease at the time of Cuba's outbreak, and that the disease could not have been brought into the country by Cubans. The United States also pointed out that a former Cuban Ministry of Health official had reported that President Castro himself had admitted in a private meeting with leaders of Cuba's mosquito eradication program that the government had not paid sufficient attention to the disease and was thus responsible for the epidemic. The U.S. note echoed this theme, arguing that the epidemic had spread because of Havana's failure to promptly and effectively eradicate the mosquitoes after the disease was brought into the country by Cuban forces returning from Southeast Asia or Africa. The United States took the unusual step of releasing the texts of these diplomatic exchanges in December 1985 after the Cuban-backed Sandinista government in Nicaragua reiterated the Cuban DHF charges.²⁶ The United States never, however, requested an isolate or any other physical evidence from the 1981 outbreak from Cuba, nor did it take any other steps to try to characterize the event or attribute its source.²⁷

The *Thrips palmi* case began in December 1996 with a diplomatic note from Cuba expressing concern over the release of an unknown substance from a Department of State narcotics crop eradication plane during an authorized overflight of the island two months earlier. The U.S. response in February 1997 stated that the pilot had released smoke to alert a Cuban commercial airliner flying below him to the presence of the Department of State plane. In May 1997, after Cuba submitted a report to the UN Secretary-General accusing the United States of intentionally releasing *Thrips palmi* during the October overflight, the United States issued a statement "categorically" denying the Cuban charges and describing them as "deliberate disinformation." The United States also reiterated publicly its earlier explanation for the release of smoke from the Department of State aircraft and described changes that had been made to the plane's aerosol spraying system that rendered it incapable of releasing Thrips.²⁸

The United States elaborated on its position at the BWC consultative meeting convened at Cuba's request in August 1997, providing both an oral presentation and a package of supporting photographs and other documents. The U.S. presentation focused on two issues: the configuration and actions of the U.S.

aircraft, and the nature of *Thrips palmi* and related plant pests. For the first issue, the United States used photographs and diagrams of the plane as well as copies of its maintenance and fuel records to show that the plane's aerosol spray tank had been reconfigured to carry extra fuel and was therefore incapable of dispensing insects or an aerosol. It also provided a detailed explanation of how and why smoke had been released from the Department of State plane's underbelly, pointing out that smoke generators are standard equipment in such aircraft and that it was used in this particular instance to signal the U.S. plane's position so as to ensure the safety of both the U.S. plane and the Cuban airliner flying below it. For the second issue, the United States used scientific data on the natural spread of Thrips in the countries surrounding Cuba prior to 1996, and on how Thrips and similar plant pests can travel long distances on air currents and in ships or planes, to refute Cuban claims that the Thrips infestation could not have been natural in origin and therefore must have been started by the United States.²⁹

One technical issue that was not addressed by the United States in its presentation at the consultative meeting was the feasibility of dispersing live insects or their eggs from an aerosol spraying system that had been designed to release liquids. The United States also never requested an independent investigation on Cuban soil of the Thrips charges, or insisted that Cuba provide samples of the insect to an impartial authority. Genetic sequencing of samples collected by international inspectors or provided by Cuba would have revealed whether the Cuban outbreak had been caused by the same variety of Thrips that already was circulating in the Caribbean and was naturally occurring.³⁰

U.S. Yellow Rain Allegations Against the Soviet Union and Its Allies

The United States began to pursue reports of chemical and biological attacks in Southeast Asia and Afghanistan in 1978, but it was not until early in the Reagan administration that Yellow Rain became a prominent issue.³¹ It emerged at the same time as reports of an anthrax outbreak near a military facility in the Soviet city of Sverdlovsk, and amidst growing U.S. concerns that the Soviet Union was maintaining an illegal biological weapons program in violation of the BWC. All three countries from which the Yellow Rain reports

emerged—Laos, Cambodia, and Afghanistan—had Soviet troops or advisors on their soil. All three countries accused by the United States in the Yellow Rain attacks—Laos, Cambodia, and the Soviet Union—denied the charges.

The initial U.S. field investigation in Southeast Asia was carried out by two officials at the U.S. embassy in Bangkok, who in June 1979 interviewed 22 refugees from alleged chemical attacks in Laos. In September, four U.S. Army medical personnel were sent to Thailand. They concluded, based on 38 additional interviews, that unidentified chemical agents had been used, but a sample they brought back tested negative for known chemical agents. Then in mid-1981, a leaf and stem obtained from an alleged attack area in Cambodia the previous March reportedly tested positive for tricothecene mycotoxins.³² Secretary of State Alexander Haig announced the discovery in West Berlin in September 1981 and attributed the mycotoxin attacks to the Soviet Union and its allies.³³ Two months later, Richard Burt, the Director of Politico-Military Affairs at the Department of State, announced that the United States had a “smoking gun,” four separate pieces of physical evidence containing mycotoxins.³⁴

In January 1982, President Ronald Reagan determined (in National Security Decision Directive 18) that the United States would intensify its public-information campaign at the UN to expose Soviet chemical and biological weapons use. He also agreed to consider taking the Yellow Rain issue to the UN Security Council as provided under Article V of the BWC and, as an ultimate step, withdrawing from the treaty.³⁵ In the end, the latter two steps were never taken, but it is noteworthy that they were even considered.

Throughout 1982, the United States pressed its case against the Soviet Union and its allies for using mycotoxins in Southeast Asia and Afghanistan, elaborating the charges in the Haig Report in March, in President Reagan’s speech at the UN Special Session on Disarmament in June, and in the Shultz Report in November. Both the Haig Report and the Shultz Report were declassified versions of Special National Intelligence estimates on Yellow Rain that had been prepared by the intelligence community. Three types of evidence were outlined in the U.S. reports to support the charges: reports from refugees, defectors, and various individuals who had conducted investigations in the areas concerned; scientific evidence derived from samples from the environment and alleged victims; and other information from documentary and intelligence sources.

(This evidence is discussed in detail in the two Yellow Rain chapters that appear elsewhere in this volume.)

For much of the early 1980s, the U.S. investigation in Southeast Asia was ad hoc and informal, involving a Foreign Service officer and a defense attaché in the Bangkok embassy and a handful of medical personnel from non-governmental organizations (NGOs). Because of Thai sensitivities, U.S. personnel were precluded during the early 1980s from collecting evidence of Yellow Rain attacks during the week, and were forced to visit refugee camps and obtain samples on their own time on weekends. The U.S. Embassy provided no financial or other support for their effort, having never been told that the investigation was a priority.³⁶ In November 1983, a joint State/Defense chemical and biological weapons team finally was sent to Thailand to investigate full time. As Meselson and Robinson relate in their chapter, the new team found the information on the use of Yellow Rain “too incomplete or implausible” to reach any conclusions.

In Washington, overall management of the Yellow Rain investigation was the responsibility of low or mid-level intelligence analysts—from the U.S. Army Foreign Science and Technology Center, the U.S. Army Medical Intelligence Information Agency, the Department of State’s Bureau of Intelligence and Research, and the Central Intelligence Agency—instead of senior policy officials. As a result, much more attention was focused on intelligence collection than on ensuring a scientifically and therefore politically credible case.³⁷

In a memo on the Yellow Rain investigation written over a year before the Haig announcement, a senior Army medical officer emphasized the need to examine not only alleged victims but also controls, to establish baseline data. The memo pointed out that this would require separate laboratory and epidemiological studies for each group as well as separate interview questionnaires.³⁸ Much of this, however, was not done. Biomedical control samples were taken from healthy individuals with little attempt to match the age, sex, ethnicity, environmental exposures, or diet of alleged victims. Environmental control samples were not collected at the same time of year or in the same area as those from alleged attacks.³⁹ Interviews were conducted only with alleged victims or others said to have knowledge of attacks. Often the interviewees were pre-selected by translators or leaders in the refugee camps. U.S. and other in-

interviewers made clear that they were looking for information about attacks and asked leading questions.⁴⁰ Only after the arrival of the joint State/Defense team in November 1983 were appropriately matched control samples obtained, proper interview methods used, and reports of alleged attacks double-checked and cross-checked for reliability.

The policy community's lack of attention to the Yellow Rain investigation also meant that turf battles within the intelligence community over who was in charge were not resolved. This led not only to confusion but also to critical delays in providing guidance and support to the field in the early years of the investigation. The Army medical team that visited Thailand in September 1979 had recommended that a formal questionnaire be developed for use in interviewing refugees. A request for a questionnaire also followed later from the two-person team in the U.S. embassy in Bangkok. More than a year passed, however, before this was provided.⁴¹ Despite requests for guidance, formal protocols outlining how to collect and handle samples were never provided to the team in the field.⁴²

The U.S. investigation also suffered from persistent shortages in personnel and funding. This had serious implications for the most important element of the U.S. investigation, the collection and analysis of samples from alleged attacks. Until November 1983, the collection effort was the responsibility of the two U.S. embassy officials in Bangkok working part-time, supplemented by NGO personnel. Because there was no funding for the embassy team's work, the two officials had to "borrow cars, beg rides in the country, and use jungle buses and oxcarts" to get to the refugee camps.⁴³ They had to convince commercial airline pilots to transport the samples back to Washington in airplane cockpit refrigerators. Some samples were lost due to breakage; the reliability of others was called into question because of concerns about deterioration in transit. Once a sample reached the United States, an average of 79 additional days passed before it was analyzed. Delays were a particular problem in government labs, which had neither sufficient administrative personnel to process samples nor adequate funding for the analysis. In 1983, a CIA advisory panel reviewing the arrangements for handling samples called for increased personnel and funding, but this was never implemented.⁴⁴

Personnel and funding shortfalls also affected the U.S. investigation in an-

other way. Until the arrival of the State/Defense team in 1983, the U.S. investigation in Southeast Asia was handled by people who had no background in chemical or biological weapons or in forensic investigations. Moreover, neither the people in the field nor the analysts in Washington had any training in epidemiology.⁴⁵ This lack of expertise may help explain some of the other U.S. missteps, such as the decision to rely upon one outside lab for most of the sample analysis, instead of dividing each sample and having it analyzed by at least two labs;⁴⁶ the failure to obtain professional review of the consistency and accuracy of any of the labs chosen to analyze samples; and, perhaps most astonishing, the decision to destroy all of the Yellow Rain samples in the 1980s.

One other weakness in the U.S. Yellow Rain investigation must also be noted: the inability to validate the chain of custody of many of the samples. As far as is known, all six of the environmental samples that the United States said tested positive for mycotoxins were provided by alleged victims.⁴⁷ But the United States had no means of verifying the validity either of the samples themselves or of the information about where they had been obtained. Chain-of-custody questions also arise for the period the environmental samples were in storage in Bangkok and in transit to the United States. The only sample from Afghanistan said to test positive for mycotoxins, a gas mask acquired in Kabul, was also reported to have chain-of-custody problems.⁴⁸

As this discussion and the more detailed analyses in this volume's other chapters on Yellow Rain have shown, much of the original U.S. government evidence for the use of mycotoxins in Southeast Asia and Afghanistan has been discredited by subsequent information from other U.S. government sources, foreign governments, and independent experts. The reports of alleged attacks have been called into question because of methodological problems in the interviews with refugees as well as doubts about the reliability or interpretation of defector information. The scientific evidence at the heart of the U.S. case has also been gravely weakened by the discovery that the yellow material in environmental samples from alleged attacks was actually the feces of Southeast Asian honeybees, by the absence of confirmatory analysis from other labs for the biomedical samples the United States said tested positive for mycotoxins, and by the failure to collect and analyze appropriate control samples in order to rule out natural sources for the mycotoxins. The documentary and publicly

available intelligence information concerning Soviet research on mycotoxins and the activities of Soviet advisors in the countries concerned has been shown to be largely circumstantial.⁴⁹

In 1986, a Defense Science Board Study reportedly warned that there was no evidence to support the U.S. charge of toxin warfare in Afghanistan, although it stood by those for Southeast Asia.⁵⁰ In 1994, an assessment of the U.S. investigation in Southeast Asia by three Army scientists characterized the Yellow Rain evidence as “weak, unconfirmed, and based on classified sources not releasable to the public.” The U.S. investigation, they concluded, was “a prime example of how not to conduct an investigation of allegations of chemical warfare.”⁵¹ In 2005, a Department of State Case Study on Yellow Rain concluded that “while the evidence most strongly supports the hypothesis that chemical/toxin attacks occurred in Southeast Asia and Afghanistan, the scientific evidence is not strong enough to answer with certainty questions regarding the composition of the agent, the intent of use, or whether the agent originated in the former Soviet Union.”⁵² In short, the U.S. identification of mycotoxins as the lethal agent, the U.S. characterization of the illnesses reported in Southeast Asia and Afghanistan as the result of intentional attacks, and the U.S. attribution of these mycotoxin attacks to the Soviet Union and its allies have all been undermined.

The Dissemination of Anthrax Spores in the U.S. Mail

In the fall of 2001, shortly after the terrorist attacks in New York and Washington, seventeen people became ill and another five died following exposure to *Bacillus anthracis* spores that had been put in letters and sent through the U.S. mail.⁵³ Based on the distribution of the victims, it is clear that at least seven letters with anthrax bacteria were mailed; five were sent to various media outlets—American Media, Inc., in Florida, and the *New York Post*, ABC News, NBC News, and CBS News in New York—on September 18, 2001, and two others to the U.S. Senate—Senator Thomas Daschle and Senator Patrick Leahy—on October 9. Of these, only the letters to NBC News, the *New York Post*, and the two senators were recovered. All of the letters contained the Ames strain of anthrax bacteria. But there appeared to be a difference between the material in the two sets of letters. The *New York Post* material was “clumpy and rugged,” according

to Major General John Parker of the U.S. Army Medical Research and Material Command, while the material in the Daschle letter was “fine and floaty.”⁵⁴

The characterization of the Daschle material as “floaty” quickly led to reports that the anthrax spores had been treated with chemical additives and had been produced using sophisticated technology. This view was reinforced following the discovery of the Leahy letter, whose anthrax spores also aerosolized easily. In late October 2001, White House Chief of Staff Andrew Card said: “This anthrax has been milled. It may have additives to it.”⁵⁵ Army officials announced they had found silica in the material.⁵⁶ The *New Yorker* reported that an “anti-cling” substance had been added.⁵⁷ CNN claimed that an “unusual coating” had been found on the spores.⁵⁸

All of these reports proved to be wrong. In the fall of 2002, the Federal Bureau of Investigation (FBI) reportedly told Congress that no additives had been found in the anthrax spores and that the particles were not a uniform size.⁵⁹ Four years later, in an article in a peer-reviewed microbiology journal, a member of the FBI investigative team wrote of “the widely circulated misconception” that the anthrax spores had been produced using additives and sophisticated engineering techniques like those found in military BW agent production. The author stated that the powder in the letters was “comprised simply of spores purified to different extents,” and suggested that differences between the media letters and the Senate letters may have reflected different handling conditions, such as compaction, friction, and humidity.⁶⁰

Immediately following AMI photo editor Robert Stevens’s death from inhalation anthrax in October 2001, most U.S. public-health and law-enforcement officials did not even believe that the anthrax spores had been intentionally disseminated. As Leonard Cole discusses in Chapter 2 in this volume, public-health officials took samples from Stevens’s house and began to trace his movements because they assumed that there was a natural explanation for the exposure. At this stage, the FBI confirmed that it was assisting, but made it clear that there was no criminal investigation. “We’re out there following them just in case anything is found,” a Florida FBI spokeswoman said.⁶¹ Only after tests confirmed the presence of anthrax spores on Stevens’s office keyboard and in a sample taken from an AMI mail supervisor’s nose was a criminal investigation begun.

In public, law-enforcement officials cautioned against linking the case,

dubbed “Amerithrax” by the FBI, with international terrorists or those responsible for the 9/11 attacks.⁶² But privately, because the mailings happened so soon after the attacks on New York and Washington, the FBI actively pursued such a link, searching both the Florida apartments and the cars used by the 9/11 hijackers for traces of anthrax bacteria, but none were found.⁶³

Having failed to find a link between the Amerithrax case and either Al-Qaeda or a foreign government such as Iraq, law-enforcement authorities began to consider a new hypothesis, that the letters could have been the work of a domestic extremist group rather than overseas terrorists. White House Press Secretary Ari Fleischer expressed a similar view in late October 2001, noting that the anthrax spores sent to Senator Daschle’s office could have been produced “by a PhD microbiologist and a sophisticated laboratory.”⁶⁴ In mid-November, the FBI released copies of the letters that had been sent to NBC, the *New York Post*, and Senator Daschle as well as a behavioral profile of the person believed to be responsible for the attacks. The profile described the likely perpetrator as an adult male, probably with a scientific background, who had access to laboratory equipment and *Bacillus anthracis* spores and the knowledge and expertise to refine them.⁶⁵

From outside the government, scientist Barbara Hatch Rosenberg concurred with the FBI profile and went on to suggest that the source of the spores, or of the information and materials to make them, had been a U.S. government or contractor laboratory. She also argued, controversially, that U.S. government officials had known for some time that the mailings were “an inside job,” but had been reluctant to admit it. Later, Rosenberg suggested that the FBI actually knew who the perpetrator was but had not made a move because the individual had information damaging to the U.S. government.⁶⁶

But there are also other possible explanations for the absence of an arrest. The FBI clearly did not want to find itself with another Richard Jewell-type situation on its hands (Jewell was the janitor who was wrongly accused of the bombing at the 1996 Olympics in Atlanta, Georgia.) Former CIA agent Vincent Cannistraro underscored this point in August 2002, noting that some within the FBI were convinced that they were on the right track, but did not want to “come up with a janitor theory that’s wrong again.”⁶⁷

Another possible explanation is that law-enforcement authorities needed to be certain that they could successfully prosecute the case. In the same August

2002 statement in which he identified BW expert Steven Hatfill as a “person of interest,” Attorney General John Ashcroft emphasized that, although progress was being made, “the ultimate plateau that’s necessary is for us to cross the threshold which provides a basis for prosecutable facts.”⁶⁸

Over the course of the Amerithrax investigation, the FBI employed many traditional investigative techniques to try to determine the perpetrator behind the letters. Many of these were broad in scope, aimed at obtaining further information. This included releasing copies of the letters, as was done in the Unabomber case; tracking purchases of the types of centrifuges and milling machines that would have been needed to produce the anthrax spores;⁶⁹ tracing the origins of the paper, envelopes, tape, and ink used in the mailings;⁷⁰ examining thousands of photocopiers to try to identify the one used to copy the letters;⁷¹ comparing the handwriting in the letters with Secret Service, FBI, and Capitol police databases;⁷² tracking purchases of the antibiotic Cipro in pharmacies near where the letters were mailed;⁷³ sending out 500,000 flyers to households in those areas;⁷⁴ and e-mailing a request for help to the more than 40,000 members of the American Society for Microbiology.⁷⁵ Other steps were more focused, targeting specific individuals or facilities that could have produced the spores. This included investigating personnel at U.S. biodefense and contractor labs who had been vaccinated against anthrax and who had access to the bacteria;⁷⁶ polygraphing people at two U.S. Army labs—the U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID) in Maryland and Dugway Proving Ground in Utah—who had worked with anthrax bacteria;⁷⁷ seeking samples from the labs that possessed the Ames strain;⁷⁸ and searching the homes of more than two dozen U.S.-based BW experts.⁷⁹

The FBI also took a number of other steps that were much less familiar to its investigators, involving the relatively new field of microbial forensics. This included, for example, securing a high-containment laboratory for storing samples from the letters and other samples safely and without cross-contamination;⁸⁰ working with scientists from more than 90 outside labs to develop new tests and protocols for exploring the genetic structure of the anthrax spores;⁸¹ and contracting with some 19 government, commercial, and university labs for assistance in analyzing the attack material.⁸² This research effort reportedly has revealed at least three important pieces of information: that the anthrax bacteria in the letters was cultured no more than two years before it was mailed; that

the water used in the culture media came from the northeastern United States;⁸³ and that the attack material most closely matches bacteria from a U.S. Army lab, specifically USAMRIID.⁸⁴ But whether the mailings were carried out by someone linked to USAMRIID is unclear, as officials there have said that their bacteria came originally from the U.S. Department of Agriculture (USDA), that other labs also likely received the Ames strain from USDA, and that USAMRIID lacked the technology to produce BW agent powder like that used in the attacks.⁸⁵ The Army lab at Dugway Proving Ground reportedly made a *Bacillus anthracis* paste using the same Ames strain identified in the mailings, as well as a powder preparation, but it is unclear which strain was used for the latter.⁸⁶

Despite these efforts, the FBI has been unable to bring the Amerithrax case to a close, prompting criticism not only from outside the government but also from within the very agencies that have been at the forefront of the U.S. investigation. Public-health officials have pointed to a culture clash between the law-enforcement and public-health communities from the outset of the investigation. As one senior official from the Centers for Disease Control and Prevention (CDC) described it: "Public health wants the risk removed by identifying it and stopping transmission. Their [the FBI] view is that the goal is to identify the perpetrators, capture and prosecute them. Our standards are scientific. Theirs are to collect evidence."⁸⁷

There has also been confusion about who, exactly, is in charge. In congressional testimony in the fall of 2001, Health and Human Services Secretary Tommy Thompson acknowledged that no one person was in charge of responding to a domestic chemical or biological attack. Thompson's comments prompted Senator Fred Thompson to observe that, "The good news is that there are many agencies working on all of these issues. The bad news is that there are many federal agencies working on all of these issues."⁸⁸

Another problem area, particularly in the early weeks of the investigation, has been communication, both with the public and between government agencies. The FBI has said that all of the appropriate agencies were warned about the extremely virulent nature of the anthrax spores in the Daschle letter almost immediately after it was opened in October 2001.⁸⁹ But others say that a lack of communication between the Army, which first examined the material, and the CDC prevented public-health officials from realizing that postal workers, not just congressional staff, were also at risk.⁹⁰ FBI agents also have com-

plained about communication problems between agencies. "The CIA and FBI are sometimes seen as rivals," an FBI linguistic forensics expert said in October 2002. "My anxiety is that the FBI agents assigned to this case are not getting full and complete cooperation from the U.S. military, the CIA and witnesses who might have information."⁹¹

Mistakes have been made both by public-health officials and by the law-enforcement community. Public-health officials were slow to diagnose the initial Florida AMI cases as inhalation anthrax (believing them to be pneumonia) and slow to recognize that the anthrax cases in Florida and New York were linked. This almost certainly affected the initial FBI approach to the investigation.

Many believe that the law-enforcement community waited too long before turning to outside BW experts for help. In August 2002, almost a year after the attacks, former U.S. bioweaponer Bill Walters pointed out that he and his colleagues had yet to be consulted by the FBI. "I read where they haven't left a stone unturned," Walters complained. "There's about eight of us stones that are still unturned. It's a joke."⁹² One possible explanation for the delay in contacting some experts was offered by William Patrick, another former U.S. bioweaponer, who says that the FBI told him that they delayed consulting him for four months because he was a suspect.⁹³

Perhaps most seriously, law-enforcement officials were slow to pursue certain potential leads. Samples were not sought from laboratories that possessed the Ames strain until four months after it was identified as the strain that was used in the letters.⁹⁴ In addition, little effort seems to have been made to locate a letter or other forensic evidence in the AMI building until over ten months after AMI photo editor Stevens died. In late August 2002, the FBI announced plans to return to AMI to collect additional samples using new techniques. An FBI official stated at the time that while previous sampling had focused on public health, this time the focus would be on furthering the criminal investigation. "Last year we were in the building for a different reason," FBI Special Agent Hector Pesquera said in August 2002. "It was not as comprehensive an investigation as the one we are planning. . . . It was more of a public health . . . investigation. This investigation will be scientifically driven for a criminal investigation."⁹⁵

More than five years after the most lethal biological attack ever on U.S. soil, the perpetrator still has not been apprehended. In late 2001, several hundred

FBI agents were working the Amerithrax case, together with the U.S. Postal Inspection Service and state and local law-enforcement authorities.⁹⁶ By September 2006, only 17 FBI agents and 10 postal inspectors were still devoted to the anthrax investigation.⁹⁷ Many would agree with former FBI official Christopher Hamilton: "No matter what anybody says, if it is five years out, and we are not even seeing any smoke from the investigation, then I would say definitely that this case is cold."⁹⁸ The FBI has countered that the failure to make an arrest does not mean that it does not have a suspect in sight. "There are in my experience a lot of instances where we might know or have a good reason to believe who committed a criminal act, but we may not be able to prove it," Secretary of Homeland Security Michael Chertoff said in September 2006. "So when you say something is not solved, you should not assume from the fact that there is no criminal prosecution we don't have a good idea of what we think happened."⁹⁹ But whether the United States will ever successfully attribute the anthrax case and prosecute those responsible is still very much an open question.

Concluding Observations

In each of the cases discussed in this chapter, one or more attribution issues were left unresolved. In Korea, it was not even possible to determine conclusively which diseases were involved, as the countries concerned did not allow the ICRC or any other independent body to investigate. Whether an investigation at that time would have concluded that evidence had been fabricated intentionally by the accusers and that the outbreaks had a natural origin is unclear. In Cuba, the identification of the causative agents was never at issue, but the failure of either side to pursue a meaningful investigation of the scientific evidence has allowed Cuba to continue to characterize the outbreaks as intentionally caused by the United States. In the case of Yellow Rain, perhaps the most widely trumpeted allegation of use, mismanagement of the investigation in the early 1980s led to flawed judgments concerning the identification of the agent, the characterization of the reported illnesses, and the attribution to a source. Without further information from the countries involved, we may never know with certainty whether anything other than riot control agents really was used in Southeast Asia and Afghanistan more than a quarter century ago. Finally, notwithstanding FBI claims, the resources devoted to the Amerithrax

investigation have been scaled back, and many question whether the perpetrator ever will be brought to justice.

A number of lessons can be derived from these cases for future efforts to investigate and attribute the use of biological agents. Allegations of use by their nature arise during international or internal armed conflict or when there are deep antagonisms between the parties involved. This was true in Korea, where North Korean and Chinese forces were fighting the U.S.-led UN force; during the Yellow Rain controversy, in which the United States was allied with anti-Communist forces; and in the case of the Cuban BW allegations, which took place against a backdrop of long-standing hostility between Havana and Washington. Even the anthrax bacteria mailings occurred at the outset of what would soon be described as a war on terror. This observation underscores the importance of impartial international investigations of allegations of use between countries, and of national investigations subject to independent scrutiny. Even if the particular allegations are not definitively resolved, the willingness of the parties to support a serious investigation will be viewed as evidence of the credibility of the case.

Allegations of use often have some plausibility, given the historical context in which they occur. Historian Kathryn Weathersby has suggested that during the Korean War, Chinese commanders, aware of both the U.S. BW program and of U.S. efforts to shield Japanese Unit 731 scientists and officers from prosecution, may have mistakenly linked U.S. overflights with subsequent outbreaks of disease. By the time further investigation had absolved the United States, Chinese and other officials had gone public with the charges. Evidence was fabricated, therefore, both to support their claims and to cover up their countries' public-health failures.¹⁰⁰ Martin Furmanski and Mark Wheelis have made a similar argument with respect to Cuba, noting that senior Cuban officials may have believed that some of the disease outbreaks there had been caused by the United States, given previous U.S. efforts to overthrow Castro and revelations of CIA interest in using BW agents or toxins in some of those efforts.¹⁰¹ In the case of the Yellow Rain reports, U.S. officials were similarly inclined to believe that Moscow was responsible, given their view of the Soviet Union as an evil empire, their concerns about the Soviet BW program, and the presence of Soviet troops or advisors in all of the countries concerned. U.S. officials went public with the Yellow Rain charges over the objections of intelligence analysts

and before they had been corroborated adequately. This observation underscores the importance of not making accusations prematurely and of not doing so publicly without a strong technical case, including corroborating scientific and other evidence that will withstand outside scrutiny.

Reports of BW use generally end up having a natural explanation. Retrospective analyses of both the Korean War and Cuban disease outbreaks support the conclusion that they were both natural in origin, as U.S. officials argued at the time.¹⁰² As for Yellow Rain, Meselson and others have proven that the yellow material found in the environmental samples from Southeast Asia was pollen deposited by honeybees. They also have suggested that the mycotoxins detected in a small number of environmental and biomedical samples may have resulted from laboratory contamination, and that in some cases, refugee reports of illness following attacks may have reflected the use of riot control agents. This observation underscores the importance of considering alternative hypotheses and of pursuing rather than disregarding evidence that is at odds with established positions, even at the risk of having to acknowledge being wrong.

Finally, allegations of use that are not supported by adequate evidence are unlikely to gain broad acceptance. Neither of the two international commissions that examined the Korean War charges did an actual investigation or attempted to determine whether the illnesses were natural in origin, even though many of the diseases were endemic in the regions concerned. In the case of the Cuban allegations, no scientific or epidemiological data was ever presented by Cuba to support its claims of a U.S. role. As far as is known, the United States also never requested such evidence from Cuba in order to refute the charges. By comparison, a large body of evidence—reports from alleged attacks, environmental and biomedical samples said to contain mycotoxins, and information on the purported Soviet role—was released by the U.S. government in the early 1980s to support its Yellow Rain allegations. But much of that evidence has collapsed in the face of other information from U.S. and foreign government sources and from outside experts. Although the anthrax case is still open, U.S. law-enforcement authorities have made clear that their ability to prosecute the case successfully depends on sound scientific evidence. This observation underscores the importance of meeting established standards of scientific proof, with detailed information on the symptoms of victims and on the likelihood of

natural occurrence of the disease. It requires meeting agreed standards for the collection, handling, and analysis of samples, as well as the analysis of samples by more than one lab. And it requires other confirmatory evidence, such as munitions or intercepts.

These lessons from the U.S. experience are relevant not only to U.S. policymakers but also to officials in other countries who may need to identify, characterize, and attribute the use of biological weapons in the future.

Notes

Acknowledgements: I am grateful to Len Cole, Stephen Cunnion, Martin Furmanski, Milton Leitenberg, Matthew Meselson, Julian Perry Robinson, and Mark Wheelis for their comments on earlier drafts of this chapter. I also want to thank Milton Leitenberg for sharing his documents on the Korean War and Cuban allegations and Rebecca Katz for providing a copy of her Yellow Rain dissertation.

1. P. L. 102-182. U.S.C. 5601-6. *Legislation on Foreign Relations Through 1996*, vol. II, p. 1394.
2. The only biological weapons allegation investigated under this authority was in 1992, when Azerbaijan claimed that Armenia had used cyanide, a toxin, against Azeri villages. This is discussed in Chapter 12 by Jonathan Tucker in this volume.
3. Except where noted, this section draws on information contained in Chapter 6 by Milton Leitenberg in this volume.
4. The Communist charges are discussed in A. M. Halpern, *Bacteriological Warfare Accusations in Two Asian Communist Propaganda Campaigns*, RAND RM-796 (Santa Monica, CA: Rand Corporation, 1952). Japan's BW activities are discussed in Chapter 8 in this volume by Jeanne Guillemin.
5. Ernest A. Gross, Deputy U.S. Representative to the United Nations, "Security Council Statement of July 1, 1952," *Department of State Bulletin*, July 28, 1952, 154. The United States also may not have wanted to call further attention to its handling of General Ishii and other Japanese BW scientists.
6. See, for example, U.S. Department of State, Office of Intelligence Research, "Communist Bacteriological Warfare Propaganda," Special Paper 4, June 16, 1952.
7. Memorandum from George A. Morgan, Acting Director, Psychological Strategy Board, "Staff Study—Preliminary Analysis of the Communist BW Propaganda Campaign with Recommendations," July 25, 1952, p. 2.
8. The British may have been the source of the ICRC suggestion. See "Memorandum of Conversation, by the Deputy Assistant Secretary of State for Far Eastern Affairs (Johnson)," Washington, DC, March 3, 1952, reprinted in *Foreign Relations of the Unit-*

ed States [FRUS] 1952–1954, vol. XV: *Korea, Part I* (Washington, DC: U.S. Government Printing Office [U.S. GPO], 1984), 74.

9. The top State Department official for UN affairs predicted the Soviet veto in a memo proposing action in the Security Council. See “Memorandum by the Assistant Secretary of State for United Nations Affairs (Hickerson) to the Deputy Secretary of State (Matthews),” Washington, DC, May 20, 1952, reprinted in *FRUS 1952–1954*, vol. XV: *Korea, Part I* (Washington, DC: U.S. GPO, 1984), 210–11.

10. Some have attributed this lack of cooperation to Chinese doubts about the impartiality of the UN and the ICRC. See Martin Furmanski and Mark Wheelis, “Allegations of Biological Weapons Use,” in Mark Wheelis, Lajos Rozsa and Malcolm Dando, eds., *Deadly Cultures: Biological Weapons since 1945* (Cambridge: Harvard University Press, 2006), 445, note 44.

11. U.S. Department of Defense, Office of Public Information, “Propaganda Campaign on Biological Warfare,” Memorandum for Mr. William Korn, Psychological Strategy Board, March 21, 1952.

12. Psychological Strategy Board, “Staff Study,” 7.

13. The White House, “Letter from C. D. Jackson to President Dwight Eisenhower,” April 21, 1953.

14. Memorandum from Howard R. Penniman to Mallory Browne, Psychological Strategy Board, “Preliminary Estimate—Communist Charges of Germ Warfare,” April 8, 1952.

15. U.S. Department of Defense, Office of the Secretary of Defense, Assistant for Special Security Programs, Director of Administration, “Report on Chemical and Biological Warfare Readiness,” July 1, 1952, p. 1.

16. “Red Cross to Investigate ‘Germ Warfare’ Charges,” *Department of State Bulletin*, March 24, 1952, 453.

17. The United States realized that evidence was being fabricated but could not have known the scope of the effort. See U.S. Department of State, “Communist Bacteriological Warfare Propaganda,” 19–20.

18. Furmanski and Wheelis, “Allegations,” 260–61.

19. See U.S. Department of State, “North Korea Persists in 54-year-old Disinformation,” November 9, 2005, <<http://usinfo.state.gov/media/Archive/2005/Nov/09-262154.html>>, accessed May 30, 2006.

20. Except where noted, this section draws on information contained in Chapter 7 in this volume by Raymond Zilinskas.

21. U.S. Senate, Select Committee to Study Governmental Operations with Respect to Intelligence Activities, *Foreign and Military Intelligence*, Book I, 94th Cong., 2nd Sess., Report No. 94-755, April 26, 1976, pp. 360–63; and U.S. Senate, Select Committee of Study Governmental Operations with Respect to Intelligence Activities, *Alleged Assassination*

Plots Involving Foreign Leaders, 94th Cong., 1st Sess., Interim report No. 94-465, pp. 71–85.

22. Raymond A. Zilinskas, “Cuban Allegations of Biological Warfare by the United States: Assessing the Evidence,” *Critical Reviews in Microbiology* 25, no. 3 (1999): 176.

23. After Cuba charged the United States with sending balloons with BW cultures over Cuba in 1964, the Department of State considered the possibility of requesting an investigation by the World Health Organization or other appropriate international body if the Cubans continued to pursue the allegations. The White House, “Cuba,” Memorandum from Gordon Chase for Mr. Bundy, June 8, 1964.

24. “Epidemic in Cuba Sets Off Dispute with U.S.,” *New York Times*, September 6, 1981.

25. Later analysis of samples from nearby Jamaica suggested that the Cuban epidemic may have been caused by Cuban military personnel returning from Vietnam, not from Angola. Milton Leitenberg, *The Problem of Biological Weapons* (Stockholm: Sweden, Swedish National Defense College, 2004), 82–83.

26. U.S. Department of State, “Case Study of Cuban Hypocrisy: The 1981 Dengue Epidemic in Cuba,” Special Report No. 133, December 1985. Two U.S. scientific papers attached to the April note were not released publicly.

27. Requests by WHO and others for sera from Cuban dengue patients were repeatedly denied. Leitenberg, *The Problem of Biological Weapons*, 82.

28. U.S. Department of State, Office of the Spokesman, “Cuba: No Use of Biological Weapons,” May 6, 1997.

29. U.S. Delegation, “Documents in Support of United States Presentation Regarding Cuban BW Allegations,” August 25, 1997; and Donald A. Mahley, “U.S. Presentation on Cuban Allegations,” August 25, 1997.

30. Zilinskas, “Cuban Allegations,” 216–17.

31. Except where noted, this section draws on information contained in Chapter 4 by Matthew Meselson and Julian Perry Robinson and Chapter 5 by Rebecca Katz in this volume.

32. The tricothecene results were in a report marked “Preliminary Report” and contained warnings that more verification was needed. Personal communication with Stephen Cunnion, April 14, 2007. Cunnion, a retired Navy research epidemiologist and disease outbreak investigator with CBW experience, was a member of the joint State/Defense investigative team and was in Southeast Asia from 1984 to 1986.

33. Given the nature and amount of evidence, some intelligence analysts opposed going public. But according to Rebecca Katz, once Haig spoke, there was “political pressure to prove that not only were the attacks taking place but that the causative agent was a mycotoxin.” Rebecca Katz, “Yellow Rain Revisited: Lessons Learned for the Investigation of Chemical and Biological Weapons Allegations,” dissertation, Princeton University, 2005, pp. 56, 57, 59.

34. U.S. Senate, Subcommittee on Arms Control, International Operations, and Environment, Committee on Foreign Relations, *Yellow Rain*, Hearing, 97th Cong., 1st Sess., November 10, 1981, p. 16.
35. The White House, "United States Chemical and Biological Weapons Arms Control Policy," *National Security Decision Directive Number 18* (declassified October 29, 1999), January 4, 1982, pp. 1–2.
36. Katz, "Yellow Rain Revisited," 48, 66.
37. Katz, "Yellow Rain Revisited," 68.
38. Katz, "Yellow Rain Revisited," 63–64.
39. Peter S. Ashton et al., "Origins of Yellow Rain," Letter, *Science*, October 28, 1983, p. 366.
40. Thomas D. Seeley et al., "Yellow Rain," *Scientific American* 253, no. 3 (September 1985): 129–30.
41. Katz, "Yellow Rain Revisited," 64–66.
42. The State/Defense team ended up writing their own collection manual and had to ask colleagues elsewhere in the government for protective masks and clothing to use when collecting samples. The only equipment the team was provided officially were large (approximately 18 X 18 inch) mylar bags poorly suited for sample collection. Personal communication with Stephen Cunnion, April 14, 2007.
43. Katz, "Yellow Rain Revisited," 48.
44. Katz, "Yellow Rain Revisited," 49, 67, 74–75, 81–84.
45. One of the most active NGO medical personnel had earlier worked briefly researching protective equipment at Fort Detrick. Katz, "Yellow Rain Revisited," 49, 261, 264.
46. Labs in other countries allied to the United States could have been used for this purpose.
47. Elisa D. Harris, "Sverdlovsk and Yellow Rain: Two Cases of Soviet Noncompliance?" *International Security* 11, no. 4 (Spring 1987): 63.
48. Katz, "Yellow Rain Revisited," footnote 6, pp. 253–54.
49. In contrast to the other evidence, relatively little of the intelligence information has been released. For an early analysis of the publicly available intelligence, see Harris, "Sverdlovsk and Yellow Rain," 67–68, 85. See also Jonathan B. Tucker, "The Yellow Rain Controversy: Lessons for Arms Control Compliance," *Nonproliferation Review*, Spring 2001.
50. Lois Ember, "New Data Weakens U.S. Yellow Rain Case," *Chemical and Engineering News*, June 9, 1986, p. 23.
51. David C. Stark, James F. Hertzog, and Maria B. Filinska, "Appendix G: Assessment of Investigations of Alleged CW Use in Laos and Kampuchea," in *Chemical Weapons Convention Verification Technology Research and Development: Assessments of Inves-*

- tigations of Alleged Use of CW (1970–1993)* (Aberdeen Proving Ground, MD: Edgewood Research, Engineering and Development Center, May 1994), G-2.
52. U.S. Department of State, Bureau of Verification, Compliance and Implementation, "Case Study: Yellow Rain," October 2005, p. 2.
53. Except where noted, this section draws on information contained in Chapter 2 by Leonard Cole in this volume.
54. Center for Counterproliferation Research, *Anthrax in America: A Chronology and Analysis of the Fall 2001 Attacks*, Working Paper (Washington, DC: National Defense University, November 2002), 47. This report contains excerpts from statements by government officials and other experts and from press reports on the investigation.
55. *Anthrax in America*, 49.
56. *Anthrax in America*, 50; Gary Matsumoto, "Anthrax Powder—State of the Art?" *Science* 302 (November 28, 2003): 1494.
57. Peter J. Boyer, "The Ames Strain," *New Yorker*, November 12, 2001.
58. Matsumoto, "Anthrax Powder," 1493–94.
59. Matsumoto, "Anthrax Powder," 1494. The absence of additives or special coatings also was reported in the *Baltimore Sun* in April 2003. See Scott Shane, "Tests Point to Domestic Source Behind Anthrax Letter Attacks," *Baltimore Sun*, April 11, 2003.
60. Douglas J. Beecher, "Forensic Application of Microbiological Culture Analysis to Identify Mail Intentionally Contaminated with *Bacillus anthracis* Spores," *Applied and Environmental Microbiology* 72, no. 8 (August 2006): 5309.
61. *Anthrax in America*, 22.
62. *Anthrax in America*, 26, 29.
63. *Anthrax in America*, 24, 50.
64. *Anthrax in America*, 48.
65. Federal Bureau of Investigation, "Amerithrax: Linguistic/Behavioral Analysis," November 9, 2001, <<http://www.fbi.gov/anthrax/amerithrax.htm>>.
66. *Anthrax in America*, 70–71, 96–97.
67. *Anthrax in America*, 113.
68. *Anthrax in America*, 119.
69. Eric Lichtblau and Megan Garvey, "Loner Likely Sent Anthrax, FBI Says," *Los Angeles Times*, November 10, 2001.
70. Mark Schoofs, Gary Fields, and Maureen Tkacik, "The Anthrax Probe Ranges Far and Wide as Investigators Scour Tips, Trash for Leads," *Wall Street Journal*, December 11, 2001.
71. Marilyn W. Thompson, "The Pursuit of Steven Hatfill," *Washington Post*, September 14, 2003.
72. Schoofs et al., "The Anthrax Probe."
73. *Anthrax in America*, 40.

74. *Anthrax in America*, 93.
75. Laurie Garrett, "A Lack of Teamwork," *Newsday*, July 23, 2002.
76. *Anthrax in America*, 73, 84.
77. *Anthrax in America*, 106.
78. *Anthrax in America*, 98.
79. *Anthrax in America*, 109.
80. Mark Schoofs and Gary Fields, "Anthrax Probe Was Complicated by Muddled Information, FBI Says," *Wall Street Journal*, March 25, 2002.
81. *Anthrax in America*, 110.
82. Scott Shane, "Distinct Signature Found in '01 Anthrax," *Baltimore Sun*, July 4, 2004.
83. Lois Ember, "Anthrax Sleuthing," *Chemical and Engineering News*, December 4, 2006.
84. Debora MacKenzie, "Anthrax Attack Bug 'Identical' to Army Strain," *New Scientist*, May 9, 2002.
85. Associated Press, "Match of Anthrax Points to Multiple Possible Sources," December 16, 2001. There are multiple reports that USAMRIID distributed Ames to the other labs that possess it but no reports specifying other labs to which USDA might have sent it. Moreover, even if USAMRIID did not produce the powder itself, it would have had an aerosol preparation on hand for use in its vaccine studies.
86. Scott Shane, "Anthrax Matches Army Spores," *Baltimore Sun*, December 12, 2001; and Scott Shane, "Army Confirms Making Anthrax in Recent Years," *Baltimore Sun*, December 13, 2001.
87. Quoted in Garrett, "A Lack of Teamwork."
88. *Anthrax in America*, 37.
89. *Anthrax in America*, 45.
90. Patricia Thomas, *The Anthrax Attacks* (New York: The Century Foundation, 2003), 30.
91. *Anthrax in America*, 130.
92. *Anthrax in America*, 113.
93. *Anthrax in America*, 102.
94. FBI Director Robert Mueller has said that further sampling was not done sooner because scientific procedures had to be developed that could demonstrate a match between the samples and the attack material that would hold up in court. Josh Meyer and Megan Garvey, "Science Could Help to Crack Anthrax Case," *Los Angeles Times*, March 3, 2002.
95. *Anthrax in America*, 121.
96. Schoofs et al., "The Anthrax Probe."

97. Federal Bureau of Investigation, "Amerithrax Fact Sheet," September 2006, <http://www.fbi.gov/anthrax/amerithrax_factsheet.htm>.
98. Eric Rosenberg, "5 Years After Deadly Terror of Anthrax, Case Grows Cold," *Houston Chronicle*, September 16, 2006.
99. Allan Lengel and Joby Warrick, "FBI is Casting a Wide Net in Anthrax Letters," *Washington Post*, September 25, 2006.
100. Kathryn Weathersby, "Deceiving the Deceivers: Moscow, Beijing, Pyongyang, and the Allegation of Bacteriological Weapons Use in Korea," Cold War International History Project, Winter 1998. Furmanski and Wheelis have made a similar argument. See Furmanski and Wheelis, "Allegations," 279–81; and M. Furmanski, "Misperceptions in preparing for biological attack: an historical survey," *OIE Scientific and Technical Review* 25, no. 1 (April 2006): 58–59.
101. Furmanski and Wheelis, "Allegations," 267–68, 280; and Furmanski, "Misperceptions," 59–60.
102. Furmanski and Wheelis argue for broader efforts to resolve allegations of use retrospectively using political tools such as Article V and scientific tools such as genetic sequencing. Furmanski and Wheelis, "Allegations," 282; and Mark Wheelis, "Investigation of Suspicious Outbreaks of Disease," in Raymond Zilinskas, ed., *Biological Warfare: Modern Offense and Defense* (Boulder: Lynne Rienner Publishers, 2000), 105–17.