

Scientific impossibility: Did FBI get their man in Bruce Ivins?

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Bruce Ivins was a cold-blooded murderer, a deranged psycho-killer, who in the fall of 2001, cooked up a virulent batch of powdered anthrax, drove to Princeton, N.J., and mailed letters loaded with the lethal mix to five news organizations and two U.S. senators.

At least, that's what the FBI says.

The letters infected 22 people, killing five, including two Maryland postal workers.

The sixth victim of the madness was Ivins himself, a 62-year-old biodefense researcher at the U.S. Army Medical Research Institute of Infectious Diseases, who committed suicide rather than face charges.

Case closed? Neatly wrapped up? Not so fast.

Married for 33 years and a father of two with a 35-year career as a civilian microbiologist at Fort Detrick in Frederick, Ivins, a devout Catholic, worked as a senior research scientist and an expert in animal models of anthrax. In 2003 he received the Army's Decoration for Exceptional Civilian Service for work on an anthrax vaccine an assignment the FBI now says provided a motive for the attacks.

Ivins apparently was obsessed with the investigation. According to the FBI, on Sept. 7, 2007, he sent an e-mail to himself, claiming to have figured out who mailed the anthrax letters. "I should have it TOTALLY nailed down within the month," he wrote. "I should have been a private eye."

Ivins, who did not name anyone in the e-mail, died on July 29, 2008, at Frederick Memorial Hospital after overdosing on prescription Tylenol with codeine. The FBI says he killed himself. The presence of the drug was determined from a blood sample. No autopsy was ordered.

Before his death, he was under 24-hour police surveillance, which included interrogations about his research and work habits, searches of his home and office, and intense questioning of family members and co-workers. Friends say that the FBI offered Ivins' son \$2.5 million and a sports car to hand over evidence implicating his father in the attacks.

The month before Ivins' death, the federal government agreed to pay \$5.8 million to another former Fort Detrick researcher, Steven Hatfill, for "improperly identifying him as a suspect in the case."

When he learned the FBI was going to charge him with the crime after clearing Hatfill, Ivins swallowed a bottle of Tylenol.

Rush to judgment In exclusive interviews with The Examiner, two former directors of the bacteriology division at Fort Detrick challenged the science underlying the case against Ivins. They argue it would have been impossible for Ivins to have produced the powdered anthrax in the contaminated letters in the time frame proposed by the FBI the two weeks following the attacks on the World Trade Center and Pentagon on Sept. 11, 2001.

The BSL-3 (biosafety level 3) suite where Ivins worked at the Institute was composed of a series of laboratories and an office where access was restricted to trained personnel who were required to log in and out.

“Knowing the layout of the BSL-3 suite, the implication that Bruce could have whipped out [anthrax mixture] in a couple of weeks without detection is ridiculous,” says Gerald P. Andrews, director of the bacteriology division and Ivins’ supervisor from 2000 to 2003.

The first anthrax letters were mailed to the New York offices of ABC, NBC and CBS, the New York Post and the National Inquirer in Boca Raton, Fla., on Sept. 18, 2001. The second letters were mailed to Sens. Tom Daschle (D-S.D.) and Patrick Leahy (D-Vt.) on Oct. 9.

Infectious disease specialist W. Russell Byrne, who preceded Andrews as the division’s director, said he “never believed Ivins’ could have produced the preparations used in the anthrax letters working in the bacteriology division area of Building 1425.”

Departmental policy prohibits Institute employees from speaking with the media. But one researcher, speaking anonymously, told The Examiner: **“It would have been impossible for Ivins to have grown, purified and loaded the amount of material in the letters in just six days. It simply could not be done.”**

Claire Fraser-Liggett, professor at the University of Maryland School of Medicine and director of the University of Maryland Institute for Genome Sciences, asked, “What would have happened in this investigation had Dr. Hatfill not been so forceful in his response to being named a person of interest. What if he, instead of fighting back, had committed suicide because of the pressure? Would that have been the end of the investigation?”

The smoking flask Fraser-Liggett’s genetic analysis of the anthrax spores in the letters led to a flask of hybrid anthrax bacillus (known as RMR-1029) created and managed by Ivins at Fort Detrick a preparation the Justice Department says is the murder weapon.

“The key breakthrough was the science that then focused their attention laserlike onto that flask and the person who had control of that flask and the person who made the spores in that flask,” U.S. Attorney Jeffrey Taylor claimed in laying out the evidence against Ivins on Aug. 6, 2008.

The DNA evidence linking the dry anthrax spores in the contaminated letters to the “wet” anthrax spores in the flask of RMR-1029 is not in dispute. “The part that seems still hotly debated is whether there was sufficient evidence to name Dr. Ivins as the perpetrator,” Fraser-Liggett says.

Ivins kept the one-liter flask of RMR-1029, but some 300 people within the Institute also had access to the flask, according to those familiar with operations there. Before 1999, the preparation was stored in a separate containment area, about 100 yards from the main building. At that time, “access was more vague, because the flask wasn’t under Ivins’ direct custodial control,” Andrews says.

Ivins also shared samples of RMR-1029 with researchers at other facilities.

“Another lab might take a couple of milliliters of that spore preparation and create a daughter preparation,” Andrews says. “How many [samples] Ivins gave out I have no idea, but he did it through official channels, and there is a chain of custody records that indicates which labs got RMR-1029 and how much of the material they got.”

It was those “daughter preps” that ultimately led Fraser-Liggett to Ivins’ flask. Her team at the Institute for Genomic Research began DNA sequencing of the spores in the four anthrax-loaded letters recovered after the 2001 attacks. The team spent two years analyzing 20 different samples of *B. anthracis* to create a group of tests capable of genetically fingering the distinctive variety of anthrax found in the letters.

They screened nearly 1,000 samples of *B. anthracis* collected from labs around the world. “The results identified only eight samples that contained all four of the genetic mutations,” she says. “Each of those could be traced back to this one flask at USARMRIID-RMR-1029.”

“I have complete confidence in the accuracy of our data,” Fraser-Liggett says, but she concedes it fails to prove Ivins is guilty.

One reason for doubt is the sheer volume of powdered anthrax Ivins is alleged to have grown. Nearly 1 gram per contaminated letter would have required months of intensive labor and hundreds of agar “plates,” on which the spores are grown, Byrne says.

“This number of plates is impossible to handle inconspicuously,” says George Mason University professor and former Soviet bioweapons researcher Sergei Popov. “It would be impossible to cover up these activities.”

Prosecutors insist Ivins carried out the work secretly at night and on weekends.

That scenario is patently impossible, Andrews says. “You can’t just throw a flask up in the air and have dry weaponized spores come down. One preparation may take between three and five days Day 1 to prepare the materials and start seed cultures, Day 2 to inoculate the spores, Day 3 to harvest, centrifuge and purify the spores. And those are the wet spores,” he says, which then need to be dried into a powder. And that would take at least another day.

“So for 10 envelopes, 100 preparations would be required to make all the mailed material at three to five days for each preparation,” he says. “Months of continuous spore preparation without doing any other work and avoiding detection? It’s ridiculous.”

Taylor also insists Ivins had access to a lyophilizer a sophisticated machine used to dry anthrax.

Andrews mocks the suggestion that Ivins produced the fine powdered anthrax by freeze-drying the newly harvested spores in the lab’s lyophilizer. “The only lyophilizer available was a speed vac,” he says. “That’s a low-volume instrument that you can’t even fit under a hood” used to contain toxic vapors and debris.

Even with the proper equipment, mass producing a sufficient volume of spores remained dangerous. It had the potential to contaminate not only the person doing the work, but also the lab environment. “Certainly if you had makeshift equipment you wouldn’t be able to pull it off without making a mess,” Andrews says.

Popov said that the only way the FBI scenario works is if someone else provided the spores to Ivins. “What if somebody fermented the spores for him?” he asks. “What’s in favor of this hypothesis is the presence of silica in the spores. This is a signature of a large-scale fermentation process.”

In other words, the evidence points to a high-volume, mechanized operation and not to a lone madman cackling over agar plates at night in an empty lab.

Lack of evidence The anthrax-laced letters contained no traces of DNA. There is no evidence indicating Ivins visited Princeton, N.J., at the time the letters were mailed no fingerprints or hair samples from the “smoking mailbox,” no time-stamped photos at New Jersey automated teller machines or convenience stores, no gas receipts.

Apart from the flask of RMR-1029, the case against Ivins is this: He was depressed, working long nights and weekends in September 2001, and had the time to drive to New Jersey.

Ivins' therapist, Jean Duley, who had a history of drug and alcohol-related charges, treated him for six months. She told authorities he threatened to kill her and his co-workers after learning he faced indictment. He was committed for a few days and released five days before his death.

“Dr. Ivins had a history of mental health problems and was facing a difficult time professionally in the summer and fall of 2001 because an anthrax vaccine he was working on was failing,” Taylor said in August. “He was very concerned, according to the evidence, that the vaccination program he was working on may come to an end.”

For more than a year, Ivins and other institute researchers had been working out the kinks on a 30-year-old anthrax vaccine suspected of causing serious health problems in Gulf War vets. He also was working on a next-generation vaccine for which he already had secured two patents. But in the fall of 2001, the Pentagon's vaccine program for 2.4 million troops faced fierce opposition by lawmakers including Daschle, pushing to end the program.

Taylor insists Ivins was the “sole culprit” and wanted “to create a situation, where people all of a sudden realized the need to have this vaccine.”

If that was indeed the anthrax killer's motive, it worked.

Ivins' innocence could rest on weird science. The single most important piece of scientific evidence that raises doubt on whether Bruce Ivins was the mastermind behind the anthrax attacks could very well prove his innocence.

The high silicon content of the spores and the presence of a bacterium *B. subtilis* in two of the recovered letters are significant scientific factors that have yet to be satisfactorily explained.

The FBI says that the silicon in the spores accumulated naturally during the growth process important to its case against Ivins, who co-workers say did not have knowledge of the specialized techniques used to weaponize anthrax spores by coating them in silicon.

Silicon creates an electrostatic charge between particles that helps the lethal powder disperse more readily.

“The silicon is probably the most important scientific evidence that would lead anybody to question whether Bruce was capable of making these spores,” says Gerald P. Andrews, Ivins' former boss.

Andrews and George Mason University professor and former Soviet bioweapons researcher Sergei Popov believe the silicon was purposely added, due to unnaturally high levels of the mineral in the spores.

Also unexplained is the presence of a unique genetic strain of the bacterium *B. subtilis* in the anthrax letters.

“Why wasn't this unique *B. subtilis* strain looked for in Bruce's lab or any other lab in the BSL-3 suite?” Andrews asks. “It may, in fact, serve as a marker for where those preparations were really made.”

So far, FBI scientists have failed to produce a powdered anthrax equivalent to the toxic mix that Ivins is alleged to have turned out in the course of a few late nights and weekends in the lab at Fort Detrick.

“The only opinions that I would place any confidence in would have to come from individuals who have made the stuff, in the same quantity of the letters,” said infectious disease specialist W. Russell Byrne. “And then I would ask them to go into B3 in building 1425, work there for a couple of weeks and reproduce what they say

Bruce did. That's the only way I could, in good conscience and in the spirit of objective scientific inquiry, believe them."

Bruce Edwards Ivins • Born: April 22, 1946 in Lebanon, Ohio. • Died: July 29, 2008 in Frederick, Md. • Family: Married for 33 years to Diane Ivins (homemaker, day care provider and former president of Frederick County's Right to Life). Two grown children, Andrew and Amanda • Work: Senior biodefense researcher at the United States Army Medical Institute of Infectious Diseases at Fort Detrick in Frederick • Education: B.A. (1968); M.A. (1971) and Ph.D. (1976) in microbiology, University of Cincinnati • Hobbies: Played keyboards and sang in a folk group at St. John the Evangelist Catholic Church in Frederick; founded the Frederick • Jugglers, who performed at nursing homes, schools and festivals. • Volunteer work: Frederick County Chapter of American Red Cross • Political party: Democrat