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THE AMES STRAIN

How a sick cow in Iowa may have helped to create a lethal bioweapon.

BY PETER J. BOYER

On the evening of October 12th, a group of scientists and academics at Iowa State University's veterinary college, in Ames, Iowa, gathered in one of the school's laboratories for a procedure involving the university's collection of *Bacillus anthracis*, the bacteria that causes the disease anthrax. The school's anthrax collection was noteworthy both for what was known about it and for what was merely speculated. What was known was that over the years Iowa State's veterinary microbiologists had accumulated more than a hundred vials containing various strains of anthrax, some dating back to 1928. In 1978, a fondly remembered professor named R. Allen Packer had uncorked one of the fifty-year-old vials and, after a couple of tries, was able to coax the bacillus back to life. The experiment, a testament to the remarkable durability of anthrax spores, had lent a certain distinction to the collection.

What was speculated about the Iowa State anthrax was even more compelling. One week earlier, on October 5th, a Florida photo editor named Bob Stevens, at American Media Inc., had died of anthrax, the first bioterror fatality in what has come to be known as "the homeland." Early news reports suggested that the F.B.I. had traced the anthrax to a laboratory in Ames, from which the bacteria had perhaps been stolen or otherwise obtained by terrorists.

The reports of an Ames connection to the anthrax terrors caused much excitement in Iowa, and the College of Veterinary Medicine was suddenly fielding scores of calls from reporters wanting to know about the deadly "Ames strain" of anthrax. The trouble was, nobody at the school knew anything about an "Ames strain"—whether it was the strain of anthrax infecting the mail, whether the Iowa State lab had ever possessed it, or even whether there was such a thing as an "Ames strain." None of the vials were identified as "Ames," but then the labels were cryptic, some bearing only numbers or dates.

The scientists and teachers at Iowa State's veterinary school had not been incautious with their anthrax specimens, but neither had they been obsessed with security. The school's anthrax collection had been stored in cabinets in the teaching laboratory, the doors of which were routinely locked at night. In the context of the academy, this relative casualness was not unusual, especially in the heart of the farm belt, where science was employed as a plowshare rather than as a sword. When an associated laboratory nearby, run by the United States Department of Agriculture, had outgrown its building space a few years earlier, it had moved some of its work on anthrax and mad-cow disease to a rented space in an Ames strip mall. But all of that was before the Florida incident.

On October 10th, Governor Tom Vilsack ordered law-enforcement officers to stand guard over the Iowa State laboratory and at the state's other labs with anthrax (including the Agriculture Department's lab in Ames and labs at the University of Iowa). The Iowa State anthrax collection was beginning to seem like more trouble than it was worth, and the college's dean, Norman F Cheville, after consultation with the lab's director and a school health-and-safety group, decided to do something about it.

Around 5:30 P.M. on October 12th, college staff members wearing biosafety gloves removed the anthrax specimens from the laboratory cabinet and placed them in an autoclave, a steam sterilizer about the size of a filing cabinet. The scientists knew that an hour or so in the autoclave would do the trick, but they let the machine run all night. At eight-

CHRISTOPH NIEMANN

The discovery that the anthrax was natively American widened the range of suspects.

LA PAGINA # 67 NO SE ENCUENTRA DISPONIBLE

"Still, it would be a great mistake to abandon your work on the perpetual-motion machine."

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thirty the following morning, the bacilli, although certainly dead, were placed in an incinerator for good measure. Some of the biologists and academics who attended the destruction felt a trace of regret. "We said to each other, 'This is kind of sad we have to destroy this,'" Dr. Jim Roth, an assistant dean for international programs at the school, recalls. "Especially the cultures we'd had since 1928."

Less than two weeks later, Tom Ridge, the director of Homeland Security, announced at a Washington press conference that investigators had identified the anthrax that had been sent through the mail as belonging to the Ames strain. It now seemed likely that there was an Iowa State connection to the Ames strain, and that the original culture of the Ames isolate was sterilized and incinerated with the rest of the veterinary school's collection. Jim Roth had wondered about that possibility, and the school had contacted the F.B.I. and the Centers for Disease Control before killing the specimens. Both agencies approved the destruction. "They may be having some second thoughts about that, but it's too late now," Roth says.

In its way, the uncertainty about the Iowa State anthrax reflects the larger puzzlement facing federal officials as they have tried to work out the provenance of the anthrax that killed Bob Stevens and at least three others. As investigators try to determine who is behind the bioterror, alternating between theories that its source is foreign or domestic, state-sponsored or freelance, Dr. Roth and his colleagues in Iowa have tried to unravel the problem of the origins of the Ames strain.

What they do know is that it all began with a sick cow, probably somewhere in a pasture in the western part of Iowa, probably in 1979. In all likelihood, a farmer encountered his stricken beast after it was already dead, and had not been witness to the sudden fever, the clumsy staggering, the trembling, and, finally, the convulsions that preceded the animal's death. Anthrax seizes and consumes its victims quickly. The farmer might have suspected anthrax, a diagnosis probably confirmed by his veterinarian immediately upon encountering the carcass. In most ways, the beast would have looked good, even healthy, except for the blood streaming from its nostrils, ears, and rectum.

The recommended procedure in Iowa, as elsewhere, is not to disturb the carcass of an animal killed by anthrax. Veterinarians almost never perform an autopsy, because opening the beast's body would expose the bacteria to air, triggering the organism's self-preservation mechanism. *Bacillus anthracis* is a spore-forming bacterium, which is to say that, when faced with an environmental challenge, it forms a kind of shell, allowing it, acornlike, to lie dormant for years, even decades. When Professor Packer opened that 1928 vial of anthrax at Iowa State, the jellylike medium inside the tube had turned hard and crusty, but the anthrax spores inside were still alive. (Packer had put the anthrax in a fresh medium, sealed it back up, and left instructions for some future Iowa State microbiologist to try to revive it again in 2028.)

The stricken Iowa cow had probably contracted anthrax by consuming spores that had settled into the Iowa soil, perhaps after an anthrax outbreak in 1950-52, caused by feeding contaminated bonemeal to livestock. The spores from those afflicted animals had gone to ground, until they were ingested, probably with a clump of grass, by the cow in 1979. Once inside the warm, moist environment of the cow's digestive system, the spores came back to life, releasing their bacteria, which grow at phenomenal rates—each organism replicating itself every fifteen to twenty minutes. As the bacteria grew, they excreted a toxin that, in essence, caused the animal's immune system to go into hyperdrive, leading to shock and near-instant death.

The veterinarian would have disposed of the carcass immediately, either by burning it or, if it could be moved without rupture, by burying it after covering it with quicklime. In either case, before disposal, the vet salvaged a specimen from the diseased animal, either cutting off an ear and sealing it in a bag or drawing blood from the cow's jugular. The vet would have sent that specimen to the nearest state veterinary diagnostic center, which in this case was almost certainly the lab at Iowa State's College of Veterinary Medicine.

Iowa State microbiologists would have seen under the microscope big, rod-shaped bacteria that turned blue when introduced to an identifying substance called a Gram stain. Further biochemical tests would have proved positive for anthrax. At that point, a subculture would have been grown and sent down the street to the Department of Agriculture's National Veterinary Services Laboratory for confirmation. The original culture was probably put in a vial, which somehow found its way