TITLE: The Bioterrorism Scare
SOURCE: The American Scholar v73 no2 p35-45 Spr 2004

BHUM04112475
BRDG04117396
BBRD04114206
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Since the fall of 2001, when America embarked on a “war on terrorism” and federal officials started warning us about the next plague, here are some events that have not happened: a U.S. epidemic of sudden acute respiratory syndrome (SARS), a widespread anthrax outbreak, any smallpox attack, the discovery of hard evidence of a biological weapons program in Iraq. Yet the talk about “biopreparedness” continues. Some people in Washington want the Centers for Disease Control and Prevention to be transferred from the Department of Health and Human Services to Homeland Security. There is even a professional journal, Biosecurity and Bioterrorism, devoted to learned discussions of the topic. Is it sound public policy to rush to protect the country against the threat of attack with germs that could cause an epidemic? Does the bio in biosecurity mean that we should turn our public health into a matter of civil defense? Or have we Americans been sold a bill of goods?

Throughout history, the responses to both actual communicable disease and the threat of it have been guided by the metaphor of the stranger as the spreader of contagion. Allegations that epidemic disease was caused by foreigners are ancient. Thucydides reported that his contemporaries, in the fifth century B.C., attributed the Plague of Athens to Ethiopians. Later on, such thinking was refined to impute causation specifically to enemy foreigners. Many Europeand and American authors still believe that the Black Death entered western Europe after the Mongols, besieging the city of Kefe (or Kaffa, now Feodosiya in Ukraine) in 1346, catapulted into the European-held city the corpses of comrades who had died of plague. When the siege was lifted, the theory goes, the disease reached Genoa aboard ships. Although Kefe clearly experienced plague in 1346, the story of its source is almost certainly apocryphal: Xenopsylla cheopis, the flea that usually carries the plague bacillus, has affinity only for warm bodies and will desert a corpse within hours of death. But the myth’s persistence attests to the readiness of some, even centuries later, to believe that epidemics were caused by enemies.

Similarly, Londoners believed that the Great Pdlague of 1665 was brought by the Dutch, with whom England was then at war (echoes of that belief appear in both Defoe’s Journal of the Plague Year and Samuel Pepys’s Diary), although there is no evidence that plague in fact came to England from Holland. The great influenza pandemic of 1918-19, which killed more than 20 million people—possibly as many as 40 million—in a world at war, was attributed to various enemies. In fact, the name by which we remember this epidemic, “Spanish Flu,” seems to have been a compromise acceptable to the warring parties (Spain was neutral in the war). And in a telling instance, very shortly after Germany broke its pact with the Soviet Union and invaded its former ally, Hitler used the term Pestherd—“plague focus”—to refer to Russia, accusing the Soviets of infecting Europe with Jewish “bacilli.” It was the metaphor of foreign culpability for disease turned inside out, Hitler imputing pathogenic properties to Jews and creating a new enemy by alleging that it was Russia that had spawned them. More recently, Tanzanians attributed the high death rate from AIDS in their

Kagera province to HIV infections brought by Idi Amin's Ugandan troops, who crossed the border into Tanzania in the late 1970s. "It made sense, then," Laurie Garrett writes in The Coming Plague, "to assume that the new disease came from old enemies." When West Nile encephalitis made its Western hemisphere debut in New York in 1999, epidemiologists received calls from the FBI; they (and the CIA, too) were concerned that it might be the work of foreign bioterrorists.

The Stranger Spreading Germs shows up often in literature and film. Alessandro Manzoni's 1821 novel, I Promessi Sposi, attributes the advance of plague in 1629 to the German army, then campaigning through the valleys of northern Italy in the Thirty Years' War. In the novel, foreigners, particularly the French, come under suspicion in plague-ridden Milan, where they are accused of "daubing" plague-inducing substances on walls or sprinkling plague powders on the streets; those found guilty of such felonious behavior are tortured to death. In F. W. Murnau's classic silent film Nosferatu, plague arrives in Bremen by sea, brought from the East by the odious Other, the undead Nosferatu. In 1922, just after the carnage of World War I and the far greater mortality of the Spanish Flu pandemic, Murnau depicted Evil as the man who was beyond death, the inscrutable and indomitable being who brings pestilence from the benighted Ausland.

Sometimes, of course, epidemics have come from the enemy foreigner. Clearly, Cortés was able to conquer Mexico because of smallpox. The disease appeared among the Taino on Hispaniola in 1518, brought by Spaniards who had colonized the island; later, it would contribute to the Taino's extinction. By 1519 smallpox was in Cuba. Cortés, who was secretary to the governor of Cuba, left to take Tenochtitlán from the Aztec chief relief expedition against the Aztecs after they repulsed Cortés's initial sallies, brought smallpox to the Aztecs. The disease, to which the Aztecs were immunologically naïve, so diminished their numbers that Cortés had only to finish them off. Smallpox thence spread southeward, killing the Incan emperor Huayna Capac and then his son in 1524-25, and plunging their people into civil war. Francisco Pizarro had little more to do to vanquish the Incas than march into Cuzco.

It is unlikely that the Spaniards infected the American natives deliberately—and the Aztecs, at least, seemed to interpret the devastation as evidence of divine disfavor, not treachery on the part of Spain. But in the French and Indian War, in the early 1760s, smallpox does seem to have been spread deliberately. During the conflict known as Pontiac's Rebellion, Sir Jeffrey Amherst, the British commanding general, approved a plan to distribute smallpox-contaminated blankets "to innoculate the Indians" besieging Fort Pitt, at the fork of the Ohio River. That epidemic smallpox occurred in the Ohio Valley at the time is an established fact.

Around the same time, the Polish army considered producing cannon shells filled with the saliva of rabid dogs, in an attempt to poison the air the enemy breathed. Later, during World War I, the German biological warfare program sought to create animal epidemics—epizootics, in the lingo of epidemiology—that would diminish their enemies' ability to fight. German agents deliberately infected their neutral trading partners' livestock and animal feed with the agents of glanders (principally an equine disease) and anthrax. Romanian sheep were infected with both microbes in 1916 before export to Russia; more than two hundred Argentine mules intended as dray animals for Allied forces died after being inoculated with both bacteria; French cavalry horses were infected with glanders; and attempts were made to contaminate animal feed in the United States. During World War II, the Third Reich avowedly eschewed use of biological warfare, but one report holds that Colorado beetles were dropped by German airplanes on potato crops in southern England. The U.S. Army claims that the retreating Wehrmacht contaminated a reservoir in Bohemia with sewage, presumably to produce disease in the advancing Soviet army.

The best documented, and most successful, deliberately caused human epidemic was set by the infamous Unit 731 of the Japanese Imperial Army, stationed in conquered China during World War II. In addition to numerous heinous medical "experiments"—tortures, really—the unit dropped plague-carrying fleas on eleven Chinese towns. The number of Chinese who died of plague was probably about seven hundred. Unit 731 also produced cholera. In fact, Japanese soldiers, whom the unit had failed to warn or prepare, died in large numbers after entering Chinese areas seeded with Vibrio cholerae. Some historians put the total number of deaths attributable to the unit's intentional contaminations, including others involving anthrax and typhoid, in the thousands.

In connection with humans deliberately causing epidemics, the smallpox germ, variola virus, is the one we hear most about. It enjoyed a five-hundred-year career as a natural epidemic pathogen, from roughtly the late fifteenth century until the late twentieth. Then smallpox was eradicated from the earth. Variola killed several hundred million people in the first half of the twentieth century alone—a public-health menace to be reckoned with. No doubt because of its fearsome reputation, it is the subject of a great number of speculative scenarios about how it might be resurrected as an epidemic scourge.

In fact, though, none of those scenarios is even remotely likely. First, not many people have access to viable smallpox stocks. Second, the disease that variola virus produces is fairly easy to diagnose. Third, vaccination will prevent disease even in already-infected contacts of smallpox cases, and vaccine stocks are reasonably large nowadays. The hubbub about smallpox has had the effect of sharpening physicians' diagnostic skills (indeed, so much so that instances of overdiagnosis produce false alarms) and expanding the supply of available vaccine. At this point, standard public-health procedures, including case diagnosis, contact investigation, and immunization of possibly infected individuals, would be adequate to prevent an outbreak in the unlikely event that some individuals were deliberately infected.

Anthrax is the second most popular topic of bioterrorism conversation. We have seen intentional anthrax infection—the much-ballyhooed postal anthrax events that took place in the fall of 2001. Three characteristics of that outbreak are of note: very few people became ill; very, very few died; and it was almost certainly not produced by a stranger.

Environmental studies in mailrooms indicated that many hundreds of people were probably exposed to anthrax spores that fall, yet only twenty-two people got sick. And of those twenty-two, half had cutaneous anthrax, the rarely-life-threatening skin form of the disease. Only five fied. In the jargon of epidemiology, anthrax turned out to be neither very infectious nor very pathogenic. That experience should tell us that spraying anthrax spores from crop dusters or releasing them from aerosol cans into the subway is highly unlikely to make many people ill.

Speculation about subway attacks stems from a real event in March 1995, when the Japanese religious cult Aum Shinrikyo released the nerve toxin sarin in the Tokyo subway system. Twelve people died. Two subsequent attempts to release toxins in the Tokyo subways were foiled. Note that Aum was using a gas, which does not have to be sprayed; it diffuses by itself. This is not how germs are disseminated, and it is a distinction worth bearing in mind. And even that ignores the more central question of likelihood. Large-scale poisonings are not easy to carry out well.

The light death toll from mailed anthrax was a result of the low pathogenicity of the bacteria—half the cases were not pulmonary and were therefore unlikely to be fatal—and the comparative treatability of anthrax disease once detected. Do five deaths constitute a public-health crisis? Along with his colleagues, Victor Sidel, Distinguished

Professor of Social Medicine at Albert Einstein College of Medicine in New York, has noted that a fraction of our nation's expenditure on biopreparedness would pay for effective treatment of tuberculosis for all of the two million people who get TB each year in India, thereby preventing close to half a million deaths a year. Half a million deaths because commonly available antibiotics are not affordable—now there's a public-health problem.

The other microbe that is on the lists of virtually all the bioterrorism watchers is the plague bacillus. It is true that Unit 731 produced plague outbreaks in China by dropping infected fleas on towns. But at that time plague was a recurring problem in Asia: a ferocious epidemic struck Manchuria in 1910, and another occurred in 1921. (It still is a problem: a large outbreak caused many deaths in India as recently as 1994.) By contrast, despite the presence of Yersinia pestis, the plague bacterium, in wild rodents in the Western Hemisphere, there has never been an extensive epidemic of human plague in this country. Even when plague epidemics moved out of Asia through much of South America, circa 1900, the U.S. saw only a small outbreak in San Francisco's Chinatown. The reason is not that Americans are immune to plague; it is that the urban arrangements that we have been accustomed to for the past two hundred years are inhospitable to the rat-flea-bacillus ecosystem. Such reforms as garbage removal, pest control, and better housing explain why plague disappeared from eastern Europe in the early 1700s and has never troubled as seriously here. Since epidemics of plague are unlikely, should we then worry that terrorists will produce isolated cases? Perhaps, but garden-variety antibiotics are very effective at treating the disease and interrupting transmission. There is no potential for the next catastrophe there.

Other pathogens have been mentioned as possible bioweapons—for example, the agents of tularemia, botulism, and Q fever. These organisms are not generally transmitted from person to person, so they carry little or no outbreak potential. Hemorrhagic fever viruses are sometimes transmitted by mosquitoes or by the bite of infected animals. It has never been shown that they can be manipulated into transportable weapons and then elude standard mosquito- and animal-control programs.

All in all, there is little evidence that terrorists are more likely, or better able, to use microbes as part of their armamentarium than ever before. If there were evidence, would editorialists in the nation's most prestigious medical journal need to argue, as they did in the context of the purported smallpox threat, that public-health decisions should rely on "theoretical data"? Consider the ratio of known success to attempts at bioterrorism.

Jessica Stern reports in The Ultimate Terrorists that the Aum Shinrikyo cult drove three trucks set up to spray botulinum toxin through Tokyo in 1990, but no cases of botulism resulted. Judith Miller, William Broad, and Stephen Engelberg report in their book, Germs, that Aum sprayed anthrax spores from the roof of its building in Tokyo in 1993. This apparently killed some birds, but no humans got sick. Aum members also reportedly tried to procure Ebola virus in the 1990s from what was then Zaire, but if they were able to get the virus, they were unable to produce any cases of Ebola.

In the 1960s, a Japanese researcher purposely contaminated food with Salmonella typhi, producing outbreaks of typhoid fever and dysentery, but no deaths. In 1970, four Canadian students got sick after eating food that had been deliberately contaminated with pig ringworm ova. A neo-Nazi group in the U.S. stockpiled the typhoid bacterium in 1972, with the intent of contaminating the water supplies of midwestern cities. They failed. In 1984, members of the Rajneeshee cult contaminated ten Oregon salad bars with Salmonella typhimurium, which causes diarrhea. Federal investigators located 751

cases of salmonellosis, but no deaths occurred. In 1996, twelve people in Texas developed dysentery after eating doughnuts or muffins purposely contaminated with shigella bacteria by a disgruntled lab worker. Again, no deaths.

Presumably, these initiatives represent only a small subset—the known ones—of all attempts to cause mayhem by deliberately introducing germs into a population. Indeed, one systematic study uncovered twenty-nine such attempts to use germs to harm others, although a large proportion seemed to have been perpetrated by single individuals whose aims were against other individuals rather than the population. No doubt there are still more instances, unknown because they were unsuccessful. And yet we can enumerate on the fingers of one hand the deadly epidemics that have in fact been caused deliberately. In the creation of epidemics, the gap between intention and the deed itself is a wide one.

Americans began looking at new infectious diseases as a grave social menace in the early 1990s, and that anxiety resonated loudly after the publication of Laurie Garrett's Coming Plague in 1994. In a sense, the relatively recent worry about bioterrorism is a spin-off of the past decade's concern about the "coming plague." In reality, the intensity of even naturally occurring new epidemics never matches that anticipation.

Our most recent experience with so-called emerging infections has been SARS. It appeared suddenly in southern China in late 2002, the causative virus probably having entered the human population through people who had substantial contact with domestic animals. Although SARS affected more than 8,000 people worldwide and killed more than 700, it was a negligible problem in the U.S. (eight cases, no deaths) and produced no more than a mild epidemic in most other countries: despite the high case-fatality ratio (people diagnosed with SARS had about one chance in ten of dying from the disease), only in China, Hong Kong, Singapore, and Canada were there more than five SARS deaths. Only nineteen countries saw more than a single SARS case. In all the affected areas, the outbreak was brought under control within about six months of its onset.

Two aspects of the SARS experience are important. First, though it is easy to acquire the virus by inhaling respiratory secretions from a SARS sufferer, it also turns out to be easy to prevent or control and outbreak. The key is to use standard infectious-disease-control measures, including case finding and reporting, active surveillance at points of entry to the country, isolation of possible cases, and recommendations against travel to heavily affected regions. None of these measures requires cutting-edge technology; all have been used in controlling communicable disease for well over a century.

Second, SARS made news partly because it was not the expected epidemic. For six months before the advent of SARS, Americans had been worrying very publicly about smallpox. Urged toward apprehension by the federal government, we had alarmed ourselves about the possibility that the long-defunct disease would be reborn in the hands of bioterrorists. The administration made ready, in mid-2002, to vaccinate half a million armedservices personnel and half a million health-care workers. The former plan it came close to accomplishing; the latter was abandoned because so many health-care workers refused to show up for vaccination. All of it repeatedly made the headlines and the evening news reports. Yet what happened in the end was not smallpox, or smallpox prevention; it was SARS. Had our faces not already been turned toward epidemic disease and our anxieties about infection elevated, had the news hours not been hungry for new news after a month of relentless coverage of the Iraq war, SARS might not have made such big headlines.

The lesson we should learn from our experience with SARS is that if we are vigilant about spotting new disease outbreaks and equally vigilant about applying public-health

programs to curtail their spread, we can limit them, although we cannot ward them off completely. We cannot make life risk-free. Had we dealt with AIDS and West Nile encephalitis the way we dealt with SARS (which, of course, may return in the future and therefore requires continued vigilance), their course might have been different. West Nile, ending only its fifth season in the U.S. as I write, is already virtually a national epidemic; AIDS went national within six or seven years of its appearance. But in its initial season, 1999, in New York City, West Nile virus caused forty-six cases of encephalitis and seven deaths: not negligible, but a public-health problem more minor than Lyme disease (and far less extensive, in New York, than asthma or lead poisoning). AIDS began with a handful of cases—there were only a few hundred in 1981, the first year it was recognized—and the U.S. might have kept the toll fairly small had we had the political nerve to do something about it at the time. The point is that, at the outset, none of these "plagues" were cataclysmic. Epidemics do not work that way. Errant microbes do not find their way into the human ecosystem and wipe out most of the population unannounced. The Andromeda Strain is fantasy.

The crystal ball with which we divine epidemic mayhem is no clearer now than it used to be, and no clearer than the vision with which we try to foresee the coming plague. No one can dispute, after the events of September 11, 2001, that some people wish us harm. However, that harm is not likely to come from bioterrorism. To worry that the Middle Easterner, the Arab, or any Muslim—however the Stranger is configured—will use germs to attack us would be to pretend that we can indeed foresee great epidemics. For two reasons, that is certainly not the case.

First, humans, even ill-tempered and badly behaved humans, have never been able to use germs or weapons to the terrible degree of mortal effect that nature always has been able to use germs. Just four communicable diseases—malaria, smallpox, AIDS, and tuberculosis—killed well over half a billion people in the twentieth century, or about ten times the combined tolls of World Wars I and II, history's bloodiest conflicts. Even today, with good vaccines and effective antibiotics to stop them, infectious diseases kill about 10 million people each year.

The worst catastrophes the world has seen have been not the genocides, however gruesome, but the cataclysmic disease outbreaks. When a few million people are killed by design with Zyklon B, the machete, or the machine gun, it is a horror and an outrage; it shakes our moral faith. But the Black Death killed a third of Europe's population in just four years in the mid-1300s. Smallpox wiped out entire tribes of American natives after Europeans arrived in the 1500s. Plague killed over 50,000 in Moscow alone in just a few months in 1771. The Spanish Flu killed between 20 and 40 million in sixteen months in 1918-19.

And that suddenness is the second point. Prevision is of little help against epidemic disasters. Each of the disasters I just mentioned, and every other great epidemic of history, was unimaginable until the moment it began. But neither is prescience necessary: each epidemic, even the ones that turned out to be most terrible, began slowly, percolated a while, and could have been stopped with conventional public-health responses had anyone acted in time. SARS reminded us of that.

Whether or not the Stranger is an enemy avowedly bent on terror, casting him in the role of microbial evildoer has the perilous effect of distracting us from realizing two truths: the disheartening one that the epidemic crystal ball is always cloudy, and the uncomfortable one that it is usually social circumstances that make epidemics possible and public-health funding that stops them.

Worrying about the germ-bearing Stranger, we forgo the upkeep of a workaday public-health apparatus in favor of fabricating modern wonders. The CDC now operates what it calls a "war room." From there, it can coordinate activities around SARS, West

Nile virus, and other infections, as well as bioterrorism—if t can be found—using high-tech communications equipment. The war room is in an "undisclosed location." Once, CDC officials knew they were running a public-health agency. Now, apparently, they must act as if they are in charge of national defense.

After the U.S. Department of Health and Human Services scotched the 2002 plan to vaccinate health-care workers, the CDC announced it would continue its effort to vaccinate police officers and firefighters, despite numerous reasons to stop: several deaths directly attributable to the vaccine; several more possibly attributable; evidence that people who might be predisposed to heart disease (something like 10 or 15 percent of the middleaged population) can be harmed by the vaccination; certainty that people with HIV infection (a sizable percentage of the adult population in some big-city neighborhoods) must not be vaccinated; and of course the complete absence of natural smallpox infection anywhere in the world for the past twenty-five years.

Federal grant money, under President Bush's multimillion-dollar Project BioShield program, has been allocated to technologic innovation for bioterrorism prevention. By 2003, according to The Chronicle of Higher Education, the National Institutes of Health were supporting almost seventy extramural research projects on anthrax alone. The NIH has funded two new National Biocontainment Laboratories and new facilities at Regional Biocontainment Laboratories, most at major universities, to the tune of $360 million in start-up costs. The University of Pittsburgh just lured the top staff of the Center for Civilian Biodefense Strategies away from Johns Hopkins by offering to set up a Center for Biosecurity with a $12 million endowment. The University of South Florida recently received $5 million in federal grant money for its Center for Biological Defense, which has projects like "Photocatalytic Air Disinfection" and "Aquatic Real-time Monitoring System (ARMS) for Bioterrorism Events." And Auburn University received a million-dollar federal biopreparedness grant for something called a Canine Detection Center.

When Harvard received a $1.2 million federal grant in 2002 to set up a program for detecting "events possibly related to bioterrorism" by electronically linking 20 million patient-care records from around the country (an endeavor called syndromic surveillance), the grant was a mere drop in the bucket: Congress soon allotted $420 million to Homeland Security for a larger linked health-monitoring network. A consortium led by the New York Academy of Medicine then developed software for syndromic surveillance. The new software allows public health officials to monitor what are called "aberrant clusters health events"—translation: more than the expected number of cases of some symptom that might be related to a disease that might be produced by an organism that might be in the possession of terrorists. Syndromic surveillance works fine if someone knows what to look for. But it is of no help at all with the unexpected. When there really was bioterrorism in the U.S.—the anthrax attacks in fall 2001—linked databases were useless; it took a smart clinician to figure out that anthrax was around, and old-fashioned shoe-leather epidemiology quickly worked out which people had been affected. West Nile virus, ditto. A friend who is an official of a local health department tells me that the syndromic surveillance experts find it works well for predicting the first influenza outbreak each year. But anyone's grandmother can predict the first influenza outbreak where I live, in the New York City area, since the symptoms are always the same and flu always starts here in the two weeks preceding Thanksgiving. For all its meager productivity, the syndromic surveillance software also throws out plenty of false-positive "clusters" that waste investigator's time. It is our new and expensive white elephant, justified by the fear of evildoers and germs.

It all sounds a little phantasmagoric.

In The Exposé of 1935, Walter Benjamin identified certain phantasmagorias of modern life as Wunschbilder, "wish symbols," that seek to "transfigure the ... inadequacies in the social organization." Benjamin was concerned with phantasmagorias as magical images, as he put it in his Passagen-Werk, "residues of a dream world," revelations of unfulfilled wishes. In this sense we might ask whether the many projects of the Bioshield—the electronic anthrax detectors, the hyperdatabanks, the supersecure biohazard-level-4 labs, the men and women in full-body protective suits, the urban-evacuation exercises, whatever it is they are doing with dogs at Auburn University, and so on—are emblems of some shared desire to feel that all the effort America expends on technology development protects us from something. We might ask whether the something is the Stranger Spreading Germs. And we must ask what the cost is.

The core issue here is that the Stranger Spreading Germs is a metaphor, and largely an empty one. Bioterrorism is not a public-health problem, and will not become one. The next plague, whatever it is, will not decimate us unheralded. In signing the contract on biopreparedness, we have bought a confection, a defense against the chimeric stranger with the metaphorical germs.

And the costs of buy-in? When our public-health "leaders" corroborate government rhetoric about bioterrorists by reassuring us that our state or municipal health department is ready for any smallpox, anthrax, or plague attack, they legitimate both their own efforts and the standing of their offices. The planned result is that we will not question spending tax dollars so those officials can continue to defend us, even when it means closing down municipal clinics or shortchanging programs for the poor, and even if such biodefense is not what we most need or want.

The biopreparedness campaign goes to work. It discredits the simple logic of public health. Lose the distinction between the minuscule risk of dying in an intentional outbreak and the millionfold-higher chance of dying in a natural pandemic, it says. Ignore the hundredfold-higher-still chance of dying of cancer or heart disease. Defund the prenatal-care clinics, the chest clinics, the exercise and cancer screening and lead abatement programs. Ignore the lessons of history: forget that human attempts to create epidemics have almost always failed, and dismiss the repeated ability of a well-funded public-health apparatus to control epidemic disease with time-tested measures. Just think about germs, and tremble.

The lesson of history that we ignore at our peril is this: nobody can tell us how the next epidemic will happen. New germs come and go, epidemics wax and wane, but national catastrophes happen rarely. And when they do, it is never because of a stranger spreading germs. Anyone who promises certain protection from the next plague is selling us a bill of goods.

ADDED MATERIAL

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