The Nightmare Scenario:

He stood for a moment on the corner of Court and Tremont streets, observing the gaggles of people purposefully making their way to work. Several inches of snow had fallen the day before, but the streets and walkways had been quickly and continuously plowed, leaving behind a dirty residue of slush.

Much of the activity centered around the odd-shaped brick building in front of him on the plaza of City Hall. He sloshed across Court Street, briefcase in hand, blending in as businessman, with his long overcoat providing protection against the brisk December wind. Though Christmas was only 9 days away, it was still too early in the day for shoppers. At the entrance to the building, he stopped to exchange a dollar bill for a token. With a momentary glance at the flower vendor and the string of lights adorning a small fake Christmas tree, he joined the line of commuters passing through the turnstile and descending the stairs into the bowels of Boston's MBTA subway system.

At the bottom of stairs, he briefly surveyed the scene before him, though it was unnecessary. He had been here on the first level of the Government Center station twice before, at the exact same time of day. The other instances had been dry runs. This was for real.

At 8:00 in the morning, the platform for the Green Line trains was crowded with people. Here, separate tracks carried commuters in one direction to other stations in the heart of Boston, such as Park Street or Boylston, or in an opposite direction to North Station and ultimately Lechmere. On a lower level were trains for the Blue Line, but it was the "wall" on the Green Line level that originally caught his attention.

Situated much like the crossbar of the letter "A," the sides being formed by the intersecting subway lines, the wall was a ceiling-high barrier located at the far end of the station platform, and it effectively blocked the view of the tracks beyond. Yet, to his satisfaction, he had noted on a previous "dry run" that it was easy to walk around the wall to the other side. Decorated with small orange and red ceramic tiles, the wall was almost certainly not there to improve the appearance of the station, but instead had been erected for purpose of signifying the stopping point for the lead outgoing car. He had another purpose in mind.

This early in the morning, trains were either entering or leaving the station every few minutes. He timed the sequences until he was sure he had at least the 60 seconds he would need to do the job.

As he waited for the right moment, the train to Lechmere left the station, and shortly afterwards, the train to Park Station entered, drained the platform of people, and left also. With nobody near him, he stepped around the wall and into the semi-darkness beyond. Placing his briefcase down and reaching into the pocket of his coat, he quickly removed a flat glass container about 3 inches square and an inch high. He peeled the paper off the bottom, exposing a sticky tape surface underneath, and pressed the sealed container down on the rail closest to him, applying enough pressure for the box to stick to the rail, while being careful not to crack the glass. He had debated about wiping the rail first, but the box only needed to remain in place for a couple of minutes, and the rail would be clean enough anyway, due to constant use.

He then picked up his briefcase, stepped back around the wall, crossed the platform to the stairs, and left the station. The entire process had taken a little more than 30 seconds. No one had paid any attention to him.

At 8:21 am, the next train to Park Street entered the station, crushing the container between the wheels of the train and releasing the contents of the box to the atmosphere. Inside the container were 100 grams of a fine white powder, Variola major, the virus that causes smallpox. Millions of spores of the deadly and highly contagious agent were dispersed by the wheels and ushered into the platform area by the draft of the train. The particles, under 5 microns in diameter, were inhaled by people waiting on the platform, and by those entering and exiting the trains. Once lodged in the lungs, the microbes began to multiply, slowly overwhelming the immune systems of the unsuspecting commuters.

Highly contagious and virtually undetectable in early stages, the infection spread relentlessly through coughing, sneezing, talking, and direct contact, even touching of clothing. The particles of virus would continue to infect people in the station for at least a couple of days, stirred up by air currents and indiscriminately attacking holiday shoppers, as well as those making their way to and from work. This Christmas would be remembered as the time the United States suffered its most serious disaster ever.

An unlikely scenario?

Not at all. The described attack is certainly feasible, and could be accomplished today by a terrorist group with the ability to produce – or buy – the dried and powdered smallpox. And with one smallpox carrier typically infecting up to 20 other people, the consequences are also realistic.

The miracle is that it has not happened yet. Epidemiologists have found that *Variola major* "needs a population of about 200,000 people living within a 14-day travel time from one another" in order to keep its life cycle going.[1] Episodes would have died out naturally in the days when walking and horseback were the primary modes of transportation between villages, but Boston and just about every other city and town in the world today fit that requirement.

While handling *Variola major* requires extreme care because it is both virulent and contagious, with the proper laboratory containment, the agent can be grown by injecting the virus into chicken eggs, which provide the necessary proteins and nutrients. The eggs are sealed with paraffin and incubated in thermostatic ovens, which keep them stabilized. They are then freeze-dried and milled into particles with diameters measured in microns.[2]

Laboratories capable of growing and processing dried smallpox exist in the United States and Russia. They are also almost certain to be found in countries known to support terrorism, such as China, Iran, Iraq, Libya, North Korea, and Syria, as well as other nations such as India, Israel, and Pakistan.[3]

No weapon in the hands of a terrorist is potentially more devastating to the population of the United States than a bioweapon. According to Dr. Ken Alibek, President of Advanced Biosystems, Inc., deadly viruses and bacteria can be obtained from more than 1,500 microbe "banks" around the world.* [4]

By allowing other countries, such as the Soviet Union and Iraq, to develop potent offensive weapons while U.S. biological arsenals were destroyed, and offensive development efforts were shelved, we have created seemingly insurmountable challenges and have left ourselves vulnerable to the efforts of a single determined individual carrying a glass container filled

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* Dr. Karatjan Alibekov was formerly Deputy Chief of Biopreparat, which was responsible for the Soviet Union's bioweapons program. When he defected to the United States in 1992, he took the name of Ken Alibek, and ultimately became President of Advanced Biosystems, Inc., a subsidiary of Hadron, Inc. Dr. Alibek remains one of the world's foremost authorities on biological agents.

with a white powder.

In the words of retired Major General Philip K. Russell, M.D., former Commander of the U.S. Army Medical Research and Development Command, "If smallpox really got going, people should be most concerned about a lack of effective leadership on the part of their government." *[5]

Why biological weapons? The answer is easy. They are cheaper to produce than nuclear weapons and more lethal than chemicals. The advantage of a biological agent is that only a comparatively small quantity is required (e.g., 100 grams of *Variola major* powder might equate to hundreds of kilograms of a chemical agent for a particular target and still have a more devastating, long-term effect). It can be dispersed, preferably by aerosol, in a subway or any place where people collect; and the person doing the dispersing can be long gone before the effects of the attack become evident. There is also little risk of detection while the microbes are being released; and unless the terrorist group chooses to identify itself, determining where the attack came from can be difficult.

Another advantage is that the attack can occur in a location where people are likely to scatter geographically, thus spreading the disease to other cities and other countries. A subway meets the criterion as a prime target, but an international airport could have even more widespread effects.[6] Bioterrorism lends itself to hoaxes as well, which can tie up resources and cause the public to panic.

Historically, bioweapons have not been used on a large scale against people in warfare, mainly because of the difficulty controlling "who" becomes infected. Sunlight and wind, for instance, can play a role in the direction and potency of an attack. Other obstacles have been the somewhat sophisticated microbiology required to isolate and grow the microbes in sufficient quantities, and the engineering required to develop effective delivery systems. Biological agents must be either inhaled, consumed, or taken in through cuts on the skin. Of the potential dispersion methods, 1) dispersing an agent into the air, particularly in a confined area, such as a building or a subway, and 2) contaminating food are logical choices. In the

* In fairness, at the time he made the statement, Dr. Russell was referring to administrations prior to that of President George W. Bush. An expert on infectious diseases and author of more than 100 papers on the subject, he currently serves as a special advisor on vaccine development and production in the Office of Public Health Services, directed by Donald A. Henderson, M. D. Dr. Russell was named to the position by U.S. Department of Health and Human Services Secretary Tommy G. Thompson.

case of a building, the heating and air conditioning system may even help to disseminate the pathogen.

Today, the barriers limiting the use of bioweapons have been lowered. With the disappearance of vast numbers of scientists from the Soviet Union, the technology has, without question, become available to various terrorist groups and nations. Not only that, seed stocks can be produced from nature; and the organisms themselves can be obtained from companies that sell them, as well as by stealing them from legitimate, government-approved laboratories.

In the recent past, the most virulent viruses, bacteria, and toxins could still be purchased by almost anyone from the American Type Culture Collection (ATCC), currently located in Manassas, Virginia. One may have had to demonstrate a connection with a lab or medical facility, but how difficult would that have been for a scientist in Iraq or Iran? Without question, deadly pathogens from ATCC and other sources are in the hands of technicians throughout the world. And the equipment necessary to create bioweapon materials is widely available.

In building a weapon, terrorists have a wide number of choices in terms of agents and delivery systems. More than a dozen microorganisms offer potential for development into bioweapons. Not only that, pathogens can be combined into a single compound (Ebola with smallpox, for example), which would make the use of a vaccine impractical.

A smallpox vaccine, even if sufficient quantities were available (less than 10 percent of the United States could be vaccinated today), would be ineffective against the combination.

Include genetic engineering as a possibility, and it is easy to see why vaccines are far from a perfect solution for protecting the United States against a bioterrorist attack.* [See Appendix A for a discussion of the different types of viruses, bacteria, and toxins, including *Bacillus anthracis* (anthrax) and *Yersinia pestis* (plague), either of which could wipe out a

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* The Soviet Union experimented with peptides, "strings of amino acids which perform various functions in our bodies, from regulating hormones and facilitating digestion to directing our immune systems." The Soviet Union was successful in synthesizing genes for a regulatory peptide which, in large quantities, could damage the myelin sheath that protects the transmission of electric signals from the brain and spinal cord to the rest of the body. The present status of this development is unknown, but such a deadly weapon would not be in violation of the Biological Weapons Convention, since it would be based on compounds occurring naturally in the human body.[7]

significant portion of the U.S. population.] Bioweapons can even be used against livestock and crops grown in fields; and they can be devised not to kill, but instead to incapacitate – for example, to neutralize front-line troops from resisting a conventional ground attack.

After the September 11th attacks against the World Trade Center in New York City and the Pentagon in Arlington, Virginia, and the subsequent anthrax attack mailings, our shield of invincibility as a nation has dissolved.

Can we expect another bioterrorism attack on the United States anytime soon? According to Bill Patrick, renowned bioweapons expert, it's only a matter of time.* "Whoever is doing this [mailing of anthrax] is probably loading up in the lab, making material for the next attack. Only, I think another means of dispersal will be used. The mail is not all that effective."[8]