

16.7: Detecting Hazards

In the future, disease-causing agents are more likely to be used than are chemicals for terrorist attack. Because of the ability of pathogens to multiply in the human body and to spread among people, they are much more effective than chemical agents per unit mass. A 1993 report from the U.S. Office of Technology Assessment estimated that as many as 3 million people could be killed by the airborne release of 100 kg of anthrax spores in a highly populated area such as Washington, DC. The magnitude of the collateral damage from a biological attack can be appreciated from the chaos that ensued from the October 2001 anthrax incident in which the spores for this deadly agent were spread by letters received in Washington, DC, New York, Connecticut, and Florida that resulted in 22 cases of anthrax, five of which were fatal. Congress and the U.S. Supreme Court were among the facilities closed for some time and decontamination costs came to \$300 million.

In modern times the most devastating biological warfare was carried out by Japan in its biological attacks on Manchuria and China in the 1930s and during World War II. Among the pathogenic agents studied by the Japanese army were anthrax, cholera, dysentery, typhoid, paratyphoid, bubonic plague, and tularemia. In 1940 and 1941 at least three Japanese air raids against Chinese cities using bombs laden with live human fleas infected by bubonic plague killed almost 150 people. During a retreat by the Japanese army in the Chekiang Province of China in 1942 water sources and houses were deliberately contaminated by cholera, plague, and dysentery agents causing many casualties among the populace and Chinese troops who occupied the area. This strategy backfired however when Japanese troops re-occupied the region suffering about 10,000 casualties of which about 1,700 were fatal due to the disease agents previously spread in the area. The release of plague agents by Japanese troop retreating from invading Soviet forces in Manchuria at the end of World War II caused plague epidemics in 1946 and 1947.

Although pathogenic organisms are the oldest form of terrorist attack, modern recombinant DNA biotechnology threatens much higher potential for devastation with these agents. The potential exists to modify known pathogens to strains that are more robust, more virulent, and resistant to antibiotics. As one particularly deadly example, Soviet scientists used recombinant DNA technology to add genes for the production of myelin toxin to *Yersinia pseudotuberculosis* bacteria so that targets infected with this pathogen would be afflicted by both tuberculosis lung symptoms and the paralysis caused by the myelin toxin.

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