**United States Biological Weapons Program**

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The **United States biological weapons program** officially began in the spring 1943 on orders from U.S. President [Franklin Roosevelt](http://en.wikipedia.org/wiki/Franklin_Roosevelt). Research continued following World War II as the [U.S.](http://en.wikipedia.org/wiki/U.S.) built up a large stockpile of [biological agents](http://en.wikipedia.org/wiki/Biological_agent) and [weapons](http://en.wikipedia.org/wiki/Biological_weapon). Throughout its history the program was secret. It became controversial when it was later revealed that laboratory and field testing (some of the latter using simulants on non-consenting individuals) had been common. The official policy of the United States was first to deter the use of bio-weapons against U.S. forces and secondarily to retaliate if deterrence failed. There exists no evidence that the U.S. ever used biological agents against an enemy in the field (see below for alleged uses).

In 1969, President [Richard Nixon](http://en.wikipedia.org/wiki/Richard_Nixon) ended all offensive (i.e., non-defensive) aspects of the U.S. bio-weapons program. In 1975 the U.S. finally ratified both the 1925 [Geneva Protocol](http://en.wikipedia.org/wiki/Geneva_Protocol) and the 1972 [Biological Weapons Convention](http://en.wikipedia.org/wiki/Biological_Weapons_Convention) (BWC) — these are international treaties outlawing biological warfare. Recent U.S. [biodefense](http://en.wikipedia.org/wiki/Biodefense) programs, however, have raised concerns that it may be pursuing research that is outlawed by the BWC.

**History**

**Early history (1918-41)**

The United States' first interest in any form of biological warfare came at the close of [World War I](http://en.wikipedia.org/wiki/World_War_I). The only agent the U.S. tested was the toxin, [ricin](http://en.wikipedia.org/wiki/Ricin). The U.S. conducted tests concerning two methods of ricin dissemination, the first, involved adhering the toxin to [shrapnel](http://en.wikipedia.org/wiki/Shrapnel) for delivery by [artillery shell](http://en.wikipedia.org/wiki/Artillery_shell), which was successful. The other method, delivering an aerosol cloud of ricin, proved less successful. Neither delivery method was perfected before the war in Europe ended.

In the early 1920s suggestions that the U.S. begin a biological weapons program were coming from within the Chemical Warfare Service (CWS). Chief of the CWS, [Amos Fries](http://en.wikipedia.org/wiki/Amos_Fries), decided that such a program would not be "profitable" for the U.S. Japan's [Shiro Ishii](http://en.wikipedia.org/wiki/Shiro_Ishii) began promoting BW during the 1920s and toured biological research facilities worldwide, including in the United States. Though Ishii concluded that the U.S. was developing a bio-weapons programs he was incorrect. In fact, Ishii concluded that all major powers he visited was developing a bio-weapons program. As the [interwar period](http://en.wikipedia.org/wiki/Interwar_period) continued, the United States did not emphasize biological weapons development or research. While the U.S. was spending very little time on BW research, its future allies and enemies in the upcoming second World War were researching the potential of BW as early as 1933.

**World War II (1941-45)**

Despite the World War I-era interest in ricin, as World War II erupted the United States Army still maintained the position that BW was, for the most part, impractical. Other nations, notably France, Japan and the United Kingdom, thought otherwise and had begun their own BW programs. Thus, as late as 1942 the U.S. had no biological weapons capabilities. Initial interest in BW by the Chemical Warfare Service began in 1941. That fall, [U.S. Secretary of War](http://en.wikipedia.org/wiki/U.S._Secretary_of_War) [Henry L. Stimson](http://en.wikipedia.org/wiki/Henry_L._Stimson) requested that the [National Academy of Sciences](http://en.wikipedia.org/wiki/National_Academy_of_Sciences) (NAS) undertake consideration of U.S. biological warfare. He wrote to Dr. [Frank B. Jewett](http://en.wikipedia.org/wiki/Frank_B._Jewett), then president of the NAS:

Because of the dangers that might confront this country from potential enemies employing what may be broadly described as biological warfare, it seems advisable that investigations be initiated to survey the present situation and the future possibilities. I am therefore, asking if you will undertake the appointment of an appropriate committee to survey all phases of this matter. Your organization already has before it a request from The Surgeon General for the appointment of a committee by the Division of Medical Sciences of the [National Research Council](http://en.wikipedia.org/wiki/National_Research_Council) to examine one phase of the matter.

In response the NAS formed a committee, the [War Bureau of Consultants](http://en.wikipedia.org/wiki/War_Bureau_of_Consultants) (WBC), which issued a report on the subject in February 1942. The report, among other items, recommended the research and development of an offensive BW program.

The British, and the research undertaken by the WBC, pressured the U.S. to begin BW research and development and in November 1942 U.S. President [Franklin Roosevelt](http://en.wikipedia.org/wiki/Franklin_Roosevelt) officially approved an American BW program. In response to the information provided by the WBC, Roosevelt ordered Stimson to form the [War Research Service](http://en.wikipedia.org/wiki/War_Research_Service) (WRS). Established within the [Federal Security Agency](http://en.wikipedia.org/wiki/Federal_Security_Agency), the WRS' stated purpose was to promote "public security and health", but, in reality, the WRS was tasked with coordinating and supervising the U.S. biological warfare program. In the spring of 1943 the [U.S. Army Biological Warfare Laboratories](http://en.wikipedia.org/wiki/U.S._Army_Biological_Warfare_Laboratories) were established at Fort (then Camp) Detrick in Maryland.

Though initially, under [George Merck](http://en.wikipedia.org/wiki/George_Merck), the WRS contracted several universities to participate in the U.S. BW program, the program became large quickly and before long it was under the full control of the CWS. By November 1943 the BW facility at Detrick was completed, in addition, the United States constructed three other facilities - a biological agent production plant at [Vigo County](http://en.wikipedia.org/wiki/Vigo_County%2C_Indiana) near [Terre Haute, Indiana](http://en.wikipedia.org/wiki/Terre_Haute%2C_Indiana), a field-testing site on [Horn Island](http://en.wikipedia.org/wiki/Horn_Island_%28Mississippi%29) in Mississippi, and another field site near [Granite Peak](http://en.wikipedia.org/wiki/Granite_Peak) in Utah. According to an official history of the period, "the elaborate security precautions taken [at Camp Detrick] were so effective that it was not until January 1946, 4 months after [VJ Day](http://en.wikipedia.org/wiki/VJ_Day), that the public learned of the wartime research in BW".

**Cold War (1946-69)**

Immediately following World War II, production of U.S. [biological warfare](http://en.wikipedia.org/wiki/Biological_warfare) (BW) agents went from "factory-level to laboratory-level". Meanwhile, work on BW delivery systems increased. By 1950 the principal U.S. bio-weapons facility was located at [Camp Detrick](http://en.wikipedia.org/wiki/Camp_Detrick) in Maryland under the auspices of the Research and Engineering Division of the [U.S. Army Chemical Corps](http://en.wikipedia.org/wiki/U.S._Army_Chemical_Corps). The U.S. also maintained bio-warfare facilities at [Fort Terry](http://en.wikipedia.org/wiki/Fort_Terry), an animal research facility on [Plum Island](http://en.wikipedia.org/wiki/Plum_Island_%28New_York%29). From the end of World War II through the Korean War, the U.S. Army, the Chemical Corps and the [U.S. Air Force](http://en.wikipedia.org/wiki/U.S._Air_Force) all made great strides in their biological warfare programs, especially concerning delivery systems.

The U.S. biological program expanded significantly during the Korean War. From 1952-1954 the Chemical Corps maintained a BW research and development facility at [Fort Terry](http://en.wikipedia.org/wiki/Fort_Terry) on Plum Island, New York. The Fort Terry facility's focus was on anti-animal biological weapon research and development; the facility researched more than a dozen potential BW agents. A facility was opened in Pine Bluff, Arkansas, [Pine Bluff Arsenal](http://en.wikipedia.org/wiki/Pine_Bluff_Arsenal) and by 1954 the production of weapons-grade agents began.

**End of the program (1969-73)**

Main article: [Statement on Chemical and Biological Defense Policies and Programs](http://en.wikipedia.org/wiki/Statement_on_Chemical_and_Biological_Defense_Policies_and_Programs)

President [Richard M. Nixon](http://en.wikipedia.org/wiki/Richard_M._Nixon) issued his "Statement on Chemical and Biological Defense Policies and Programs" on November 25, 1969 in a speech from [Fort Detrick](http://en.wikipedia.org/wiki/Fort_Detrick). The statement ended, unconditionally, all U.S. offensive biological weapons programs. Nixon noted that biological weapons were unreliable and stated:

The United States shall renounce the use of lethal biological agents and weapons, and all other methods of biological warfare. The United States will confine its biological research to defensive measures such as immunization and safety measures.

In his speech Nixon called his move "unprecedented"; and it was in fact the first review of the U.S. BW program since 1954. Despite the lack of review, the BW program had increased in cost and size since 1961; when Nixon ended the program the budget was $300 million annually. Nixon's statement confined all biological weapons research to defensive-only and ordered the destruction of the existing [U.S. biological arsenal](http://en.wikipedia.org/wiki/List_of_U.S._biological_weapons_topics).

U.S. biological weapons stocks were destroyed over the next few years. A $12 million disposal plan was undertaken at [Pine Bluff Arsenal](http://en.wikipedia.org/wiki/Pine_Bluff_Arsenal), where all U.S. anti-personnel [biological agents](http://en.wikipedia.org/wiki/Biological_agent) were stored. That plan was completed in May 1972 and included decontamination of facilities at Pine Bluff. Other agents, including anti-crop agents such as [wheat stem rust](http://en.wikipedia.org/wiki/Wheat_stem_rust), were stored at [Beale Air Force Base](http://en.wikipedia.org/wiki/Beale_Air_Force_Base) and [Rocky Mountain Arsenal](http://en.wikipedia.org/wiki/Rocky_Mountain_Arsenal). These anti-crop agents, along with agents at Fort Detrick used for research purposes were destroyed in March 1973.

**Budget history**

From the onset of the U.S. biological weapons program in 1943 through the end of World War II the United States spent $400 million on BW, mostly on research and development. When Nixon ended the U.S. bio-weapons program it represented the first review of the U.S. BW program since 1954. Despite the lack of review, the BW program had increased in cost and size since 1961; when Nixon ended the program the budget was $300 million annually.

**Geneva Protocol and BWC**

The 1925 [Geneva Protocol](http://en.wikipedia.org/wiki/Geneva_Protocol), ratified by most major powers in the 1920s and 30s, had still not been ratified by the United States at the dawn of World War II. Among the Protocol's provisions, was a ban on bacteriological warfare. The Geneva Protocol had encountered opposition in the [U.S. Senate](http://en.wikipedia.org/wiki/U.S._Senate), in part due to strong lobbying against it by the Chemical Warfare Service, and it was never brought to the floor for a vote when originally introduced. Regardless, on June 8, 1943 President Roosevelt affirmed a [no-first-use](http://en.wikipedia.org/wiki/No-first-use) policy for the United States concerning biological weapons. Even with Roosevelt's declaration opposition to the Protocol remained strong; in 1949 the Protocol was among several old treaties returned to President [Harry S. Truman](http://en.wikipedia.org/wiki/Harry_S._Truman) unratified.

When Nixon ended the U.S. bio-weapons program in 1969 he also announced that he would resubmit the Geneva Protocol to the U.S. Senate. This was a move Nixon was considering as early as July 1969. The announcement included language that indicated the Nixon administration was moving toward an international agreement on an outright ban on bio-weapons. Thus, the Nixon administration became the world's leading anti-BW voice calling for an international treaty. The [Eighteen Nation Disarmament Committee](http://en.wikipedia.org/w/index.php?title=Eighteen_Nation_Disarmament_Committee&action=edit&redlink=1) was discussing a British draft of a biological weapons treaty which the [United Nations General Assembly](http://en.wikipedia.org/wiki/United_Nations_General_Assembly) approved in 1968 and that [NATO](http://en.wikipedia.org/wiki/NATO) supported. These arms control talks would eventually lead to the [Biological Weapons Convention](http://en.wikipedia.org/wiki/Biological_Weapons_Convention), the international treaty outlawing biological warfare. Prior, to the Nixon announcement only Canada supported the British draft. Beginning in 1972, the Soviet Union, United States and more than 100 other countries signed the BWC. The United States finally ratified the Geneva Protocol in 1975.

**Post-1969 bio-defense program**

Both the U.S. bio-weapons ban and the [Biological Weapons Convention](http://en.wikipedia.org/wiki/Biological_Weapons_Convention) restricted any work in the area of biological warfare to defensive in nature. In reality, this gives BWC member-states wide latitude to conduct BW research because the BWC contains no provisions for monitoring of enforcement. The treaty, essentially, is a gentlemen's agreement amongst members backed by the long-prevailing thought that biological warfare should not be used in battle.

After Nixon declared an end to the U.S. bio-weapons program debate in the Army centered around whether or not toxin weapons were included in the president's declaration. Following Nixon's November 1969 order, scientists at [Fort Detrick](http://en.wikipedia.org/wiki/Fort_Detrick) worked on one toxin, [staphylococcus enterotoxin type B](http://en.wikipedia.org/wiki/Staphylococcus) (SEB), for several more months. Nixon ended the debate when he added toxins to the bio-weapons ban in February 1970. In another example of post-1969 U.S. bio-weapons work, a series of [anthrax](http://en.wikipedia.org/wiki/Anthrax) experiments in the late 1990s and early 2000s by the U.S. raised concerns that the country had violated the BWC.

In recent years the U.S. stance on biological warfare and the use of biological agents has come to differ significantly from its historical interpretation of treaties such as the BWC. Specifically, the U.S. now maintains that the Article I of the BWC, which explicitly bans bio-weapons, does not apply to "non-lethal" biological agents. Previous interpretation of the conventions ban of biological agents was in line with a definition laid out in Public Law 101-298, known as it passed through the [101st U.S. Congress](http://en.wikipedia.org/wiki/101st_U.S._Congress) as the [Biological Weapons Anti-Terrorism Act of 1989](http://en.wikipedia.org/wiki/Biological_Weapons_Anti-Terrorism_Act_of_1989). That law defined a biological agent as:

any micro-organism, virus, infectious substance, or biological product that may be engineered as a result of biotechnology, or any naturally occurring or bioengineered component of any such microorganism, virus, infectious substance, or biological product, capable of causing death, disease, or other biological malfunction in a human, an animal, a plant, or another living organism; deterioration of food, water, equipment, supplies, or material of any kind...

According to the [Federation of American Scientists](http://en.wikipedia.org/wiki/Federation_of_American_Scientists), U.S. work on non-lethal agents greatly exceeds limitations set forth in the BWC.

**Agents and weapons**

When the U.S. BW program ended in 1969 it had developed seven mass-produced, battle-ready biological weapons in the form of agents that cause: [anthrax](http://en.wikipedia.org/wiki/Anthrax), [tularemia](http://en.wikipedia.org/wiki/Tularemia), [brucellosis](http://en.wikipedia.org/wiki/Brucellosis), [Q-fever](http://en.wikipedia.org/wiki/Q-fever), [VEE](http://en.wikipedia.org/wiki/Venezuelan_equine_encephalitis_virus), and [botulism](http://en.wikipedia.org/wiki/Botulism). In addition [Staphylococcal Enterotoxin B](http://en.wikipedia.org/wiki/Staphylococcal_Enterotoxin_B) was produced as an incapacitating agent. In addition to the agents that were ready to be used the U.S. program conducted research into the weaponization of more than 20 other agents. They included: [smallpox](http://en.wikipedia.org/wiki/Smallpox), [EEE](http://en.wikipedia.org/wiki/Eastern_equine_encephalitis) and [WEE](http://en.wikipedia.org/wiki/Western_equine_encephalitis), [AHF](http://en.wikipedia.org/wiki/Argentinian_hemorrhagic_fever), [Hantavirus](http://en.wikipedia.org/wiki/Hantavirus), [BHF](http://en.wikipedia.org/wiki/Bolivian_hemorrhagic_fever), [Lassa fever](http://en.wikipedia.org/wiki/Lassa_fever), [glanders](http://en.wikipedia.org/wiki/Glanders), [melioidosis](http://en.wikipedia.org/wiki/Melioidosis), [plague](http://en.wikipedia.org/wiki/Bubonic_plague), [yellow fever](http://en.wikipedia.org/wiki/Yellow_fever), [psittacosis](http://en.wikipedia.org/wiki/Psittacosis), [typhus](http://en.wikipedia.org/wiki/Typhus), [dengue fever](http://en.wikipedia.org/wiki/Dengue_fever), [Rift Valley fever](http://en.wikipedia.org/wiki/Rift_Valley_fever) (RVF), [CHIKV](http://en.wikipedia.org/wiki/Chikungunya_virus), [late blight of potato](http://en.wikipedia.org/wiki/Late_blight_of_potato), [rinderpest](http://en.wikipedia.org/wiki/Rinderpest), [Newcastle disease](http://en.wikipedia.org/wiki/Newcastle_disease), [bird flu](http://en.wikipedia.org/wiki/Avian_influenza), and the toxin [ricin](http://en.wikipedia.org/wiki/Ricin).

Besides the numerous pathogens that afflict human beings, the U.S. developed a significant arsenal of anti-agriculture biological agents. The U.S. produced rye stem rust spores at [Edgewood Arsenal](http://en.wikipedia.org/wiki/Edgewood_Arsenal), where they were stored, from 1951 to 1957 and [wheat stem rust](http://en.wikipedia.org/wiki/Wheat_stem_rust) spores at the same facility from 1962-1969. Between 1965 and 1966 the causative agent of [rice blast](http://en.wikipedia.org/wiki/Rice_blast) were produced, these were stored at Fort Detrick.

The facility at Fort Terry primarily focused its efforts toward anti-animal biological agents. The first agent that was a candidate for development was [foot and mouth disease](http://en.wikipedia.org/wiki/Foot_and_mouth_disease) (FMD). Besides FMD, five other top secret BW projects were commissioned on Plum Island. The other four programs researched included RVF, rinderpest, [African swine fever](http://en.wikipedia.org/wiki/African_swine_fever), and a slew of miscellaneous exotic animal diseases. Among the miscellaneous diseases were 11 other animal pathogens. The 11 pathogens were: [Blue tongue virus](http://en.wikipedia.org/wiki/Bluetongue_disease), Bovine influenza, [Bovine virus diarrhea](http://en.wikipedia.org/wiki/Bovine_virus_diarrhea) (BVD), [fowl plague](http://en.wikipedia.org/wiki/Fowl_plague), [goat pneumonitis](http://en.wikipedia.org/wiki/Visna_virus), [mycobacteria](http://en.wikipedia.org/wiki/Mycobacteria), "N" virus, [Newcastle disease](http://en.wikipedia.org/wiki/Newcastle_disease), [sheep pox](http://en.wikipedia.org/wiki/Sheep_pox), Teschers disease, and [vesicular stomatitis](http://en.wikipedia.org/wiki/Vesicular_stomatitis).

Work on delivery systems for the U.S. bio-weapons arsenal led to the first mass-produced biological weapon in 1952, the [M33 cluster bomb](http://en.wikipedia.org/wiki/M33_cluster_bomb). The M33's sub-munition, the pipe bomb like, cylindrical [M114 bomb](http://en.wikipedia.org/wiki/M114_bomb), was also completed and battle-ready by 1952. Other delivery systems researched and at least partially developed during the 1950s included the [E77 balloon bomb](http://en.wikipedia.org/wiki/E77_balloon_bomb) and the [E86 cluster bomb](http://en.wikipedia.org/wiki/E86_cluster_bomb). The peak of U.S. biological weapons delivery system development came during the 1960s. Production of cluster bomb sub-munitions began to shift from the cylindrical bomblets to spherical bomblets, which had a larger coverage area. Development of the spherical [E120 bomblet](http://en.wikipedia.org/wiki/E120_bomblet) took place in the early 1960s as did development of the [M143 bomblet](http://en.wikipedia.org/wiki/M143_bomblet), similar to the chemical [M139 bomblet](http://en.wikipedia.org/wiki/M139_bomblet). The experimental [Flettner rotor bomblet](http://en.wikipedia.org/wiki/Flettner_rotor_bomblet) was also developed during this time period. The Flettner rotor was called, "probably one of the better devices for disseminating microorganisms", by [William C. Patrick III](http://en.wikipedia.org/wiki/William_C._Patrick_III).

**Alleged use**

**Cuba**

Rumors have persisted for years in reference to U.S. biological warfare in the [Communist](http://en.wikipedia.org/wiki/Communist) island nation of [Cuba](http://en.wikipedia.org/wiki/Cuba), off of its southern coast. Indeed, much evidence exists confirming some type of covert U.S. BW in Cuba, though the evidence is incomplete and disputed. Allegations in 1962 held that CIA operatives had contaminated a shipment of sugar while it was in storage in Cuba. Again, in 1962, a Canadian agricultural technician assisting the Cuban government claimed he was paid $5,000 to infect Cuban turkeys with the deadly [Newcastle disease](http://en.wikipedia.org/wiki/Newcastle_disease). Though the technician later claimed he had just pocketed the money, many Cubans and some Americans believed a clandestinely administered [BW agent](http://en.wikipedia.org/wiki/Biological_agent) was responsible for a subsequent outbreak of the disease in Cuban turkeys. In 1971 the first serious outbreak of [swine flu](http://en.wikipedia.org/wiki/Swine_flu) in the [Western Hemisphere](http://en.wikipedia.org/wiki/Western_Hemisphere) occurred in Cuba, Cuban allegations stated that U.S. covert BW was responsible for the outbreak which eventually led to the preemptive slaughter of 500,000 pigs. The evidence linking these incidents to biological warfare has not been confirmed.

Accusations have continued to come out of Havana concerning U.S. use of bio-weapons on the island. The Cuban government blamed the U.S. for a 1981 outbreak of [dengue fever](http://en.wikipedia.org/wiki/Dengue_fever) that sickened more than 300,000. Dengue, a [vector-borne](http://en.wikipedia.org/wiki/Vector_%28biology%29) disease usually carried by mosquitoes, killed 158 people that year in Cuba, including 101 children under 15. Poor relations between Cuba and the United States coupled with confirmed U.S. research into [entomological warfare](http://en.wikipedia.org/wiki/Entomological_warfare) during the 1950s makes the use of BW to spread dengue a tantalizing possibility. However, diseases such as dengue fever occur naturally in the region of the world where Cuba is located, thus it remains plausibly deniable for the United States.

**Korean War**

[North Korean](http://en.wikipedia.org/wiki/North_Korean) and Chinese officials leveled accusations that during the [Korean War](http://en.wikipedia.org/wiki/Korean_War) the United States engaged in biological warfare in North Korea. The claim is dated to the period of the war, and has been thoroughly denied by the U.S. In 1998, Stephen Endicott and Edward Hagermann claimed that the accusations were true in their book, *The United States and Biological Warfare: Secrets from the Early Cold War and Korea* The book received mixed reviews, some called it "bad history" and "appalling", while other praised the case the authors made. Other historians have revived the claim in recent decades as well.

In 1952 the Chinese and North Koreans insinuated that mysterious outbreaks of disease in North Korea and China were due to U.S. biological attacks. Despite assertions that this did not occur from the [International Red Cross](http://en.wikipedia.org/wiki/International_Red_Cross) and [World Health Organization](http://en.wikipedia.org/wiki/World_Health_Organization), whom the Chinese denounced as Western-biased, the Chinese government pursued an investigation by the [World Peace Council](http://en.wikipedia.org/wiki/World_Peace_Council). A committee led by [Joseph Needham](http://en.wikipedia.org/wiki/Joseph_Needham) gathered evidence for a report that included eyewitness testimony, and testimony from doctors as well as four American Korean War prisoners who confirmed the U.S. use of BW. The U.S. government denied the accusations and their denial was generally supported by top scientists in the West. In Eastern Europe, and China, North Korea it was widely believed that the accusations were true.

The same year Endicotts' book was published Kathryn Weathersby and Milton Leitenberg of the Cold War International History Project at the [Woodrow Wilson Center](http://en.wikipedia.org/wiki/Woodrow_Wilson_Center) in Washington released a cache of Soviet and Chinese documents which revealed the North Korean claim was an elaborate disinformation campaign. In addition, a Japanese journalist claims to have seen similar evidence of a Soviet disinformation campaign and that the evidence supporting its occurrence was faked.

**Experimentation and testing**

**Entomological testing**

Further information: [U.S. Cold War entomological warfare program](http://en.wikipedia.org/wiki/Entomological_warfare#United_States)

The [United States](http://en.wikipedia.org/wiki/United_States) seriously researched the potential of [entomological warfare](http://en.wikipedia.org/wiki/Entomological_warfare) (EW) during the [Cold War](http://en.wikipedia.org/wiki/Cold_War). EW is a specific type of biological warfare which aims to use insects as weapon, either directly or through their potential to act as [vectors](http://en.wikipedia.org/wiki/Vector_%28biology%29). During the 1950s the United States conducted a series of field tests using entomological weapons. [Operation Big Itch](http://en.wikipedia.org/wiki/Operation_Big_Itch), in 1954, was designed to test munitions loaded with uninfected fleas ([*Xenopsylla cheopis*](http://en.wikipedia.org/wiki/Xenopsylla_cheopis)). In May 1955 over 300,000 [yellow fever](http://en.wikipedia.org/wiki/Yellow_fever) mosquitoes ([*Aedes aegypti*](http://en.wikipedia.org/wiki/Aedes_aegypti)) were dropped over parts of the U.S. state of Georgia to determine if the air-dropped mosquitoes could survive to take meals from humans. The mosquito tests were known as [Operation Big Buzz](http://en.wikipedia.org/wiki/Operation_Big_Buzz). The U.S. engaged in at least two other EW testing programs, [Operation Drop Kick](http://en.wikipedia.org/wiki/Operation_Drop_Kick) and [Operation May Day](http://en.wikipedia.org/wiki/Operation_May_Day). A 1981 Army report outlined these tests as well as multiple cost-associated issues that occurred with EW.

**Experiments on consenting individuals**

[Operation Whitecoat](http://en.wikipedia.org/wiki/Operation_Whitecoat) involved the controlled testing of many serious agents on military personnel who did consent to experimentation, and understood the risks involved. No deaths are known to have resulted from this program.

**Experiments on non-consenting individuals**

In August of 1949 a [U.S. Army Special Operations Division](http://en.wikipedia.org/wiki/United_States_Army_Biological_Warfare_Laboratories), operating out of [Fort Detrick](http://en.wikipedia.org/wiki/Fort_Detrick) in [Maryland](http://en.wikipedia.org/wiki/Maryland), set up its first test at [The Pentagon](http://en.wikipedia.org/wiki/The_Pentagon) in [Washington, D.C.](http://en.wikipedia.org/wiki/Washington%2C_D.C.) Operatives sprayed harmless bacteria into the building's air conditioning system and observed as the microbes spread throughout the Pentagon.

There were massive medical experiments that involved civilians who had not consented to participate. Often, these experiments took place in urban areas in order to test dispersion methods. Questions were raised about detrimental health effects after experiments in [San Francisco](http://en.wikipedia.org/wiki/San_Francisco%2C_California), [California](http://en.wikipedia.org/wiki/California), were followed by a spike in hospital visits; however, in 1977 the [Centers for Disease Control and Prevention](http://en.wikipedia.org/wiki/Centers_for_Disease_Control_and_Prevention) determined that there was no association between the testing and the occurrence of [pneumonia](http://en.wikipedia.org/wiki/Pneumonia) or [influenza](http://en.wikipedia.org/wiki/Influenza). The San Francisco test involved a [U.S. Navy](http://en.wikipedia.org/wiki/United_States_Navy) ship that sprayed [Serratia marcescens](http://en.wikipedia.org/wiki/Serratia_marcescens) from the bay; it traveled more than 30 miles. One dispersion test involved laboratory personnel disguised as passengers spraying harmless bacteria in [Ronald Reagan Washington National Airport](http://en.wikipedia.org/wiki/Ronald_Reagan_Washington_National_Airport).

Scientists tested biological pathogens, including *Bacillus globigii*, which were thought to be harmless, at public places such as subways. A light bulb containing *Bacillus globigii* was dropped on [New York City](http://en.wikipedia.org/wiki/New_York_City)'s [subway system](http://en.wikipedia.org/wiki/New_York_City_Subway); the result was strong enough to affect people prone to illness (also known as Subway Experiment). Based on the circulation measurements, thousands of people would have been killed if a dangerous microbe was released in the same manner.

A [jet aircraft](http://en.wikipedia.org/wiki/Jet_aircraft) released material over [Victoria](http://en.wikipedia.org/wiki/Victoria%2C_Texas), [Texas](http://en.wikipedia.org/wiki/Texas), that was monitored in the [Florida Keys](http://en.wikipedia.org/wiki/Florida_Keys).

**GAO Report**

In February, 2008, the [Government Accountability Office](http://en.wikipedia.org/wiki/Government_Accountability_Office) (GAO) released report GAO-08-366 titled, "CHEMICAL AND BIOLOGICAL DEFENSE, DOD and VA Need to Improve Efforts to Identify and Notify Individuals Potentially Exposed during Chemical and Biological Tests." The report stated that tens of thousands of military personnel and civilians may have been exposed to biological and chemical substances through [DOD](http://en.wikipedia.org/wiki/United_States_Department_of_Defense) tests. In 2003, the DOD reported it had identified 5,842 military personnel and estimated 350 civilians as being potentially exposed during the testing, known as [Project 112](http://en.wikipedia.org/wiki/Project_112).

The GAO asserts that the U.S. Department of Defense's (DOD) 2003 decision to stop searching for people affected by the tests was premature. They also claimed that the DOD made no effort to inform civilians of exposure; furthermore, they assert that the [United States Department of Veterans Affairs](http://en.wikipedia.org/wiki/United_States_Department_of_Veterans_Affairs) (VA) is not using available resources to inform veterans of possible exposure or to determine if they were deceased. After the DOD halted efforts to find those who may have been affected by the tests, non-DOD sources identified approximately 600 additional individuals who were potentially exposed during Project 112. Some of the individuals were identified after the GAO reviewed records stored at the [Dugway Proving Ground](http://en.wikipedia.org/wiki/Dugway_Proving_Ground), others were identified by the [Institute of Medicine](http://en.wikipedia.org/wiki/Institute_of_Medicine). Many of the newly identified suffer from long term illnesses that may have been caused by the biological or chemical testing.

**See also**

* [United States Army Biological Warfare Laboratories](http://en.wikipedia.org/wiki/United_States_Army_Biological_Warfare_Laboratories)
* [Soviet biological weapons program](http://en.wikipedia.org/wiki/Soviet_biological_weapons_program)
* [Iraqi biological weapons program](http://en.wikipedia.org/wiki/Iraqi_biological_weapons_program)
* [Project SHAD](http://en.wikipedia.org/wiki/Project_SHAD)

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