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International Bioterrorism

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Abstract:

Bioterrorism can be defined as a form of terror, which utilizes, or involves the threat to use infectious biological agents in order to inflict harm among others, or to cause a political/economic destabilization in a region. This project investigated the allegation that several countries may be clandestinely developing such new weapons and how this issue is becoming a serious global concern.

1.0 Introduction

This could be a possible scenario for a biological attack. A fanatic supporter of a political party doesn't want the opponents to win the election. He wants to ensure that in the districts opposed to his own, the people are not able to go to the voting booth. In order to achieve this he will use bacteria in the district water supply to make the voters sick. Is this an act of terror, and can it be classified as bioterrorism? A similar scenario actually happened in 1984, when a religious cult put *Salmonella* bacteria in the salad bars of ten restaurants to incapacitate voters in The Dalles, Oregon, and influence a local election. More than 750 people became sick. [1,2]

Bioterrorism can be explained as a form of terror, which utilizes, or involves the threat to use infectious biological agents in order to inflict harm among others, or to cause a political/economic destabilization in a region.[3]

There are three possible targets of a bioterroristic attack. Humans are one of the most vulnerable but the most commercially important ones are the animals and plants, which are as susceptible and provide the most essential need for humans: food. [3]

"Where are the most feared threats coming from? Which countries are the most likely to use them? Which countries have the know-how and what will the targets be, and what agent will be used?" (Table 1: different agents)

These simple questions are very hard to answer because what is seen as a form of terrorism for some people is just an act of war for another. Because the usage of biological agents could be very devastating especially to humans, a convention was held on April 10, 1972 to regulate the development, production, stockpiling of bacteriological, biological, and toxic weapons and on their destruction. [4]

2.0 History

2.1 The biological weapons convention (BWC)

This convention updated the Geneva protocols dating from June 17, 1925, regarding warfare and the weapons used to carry it out. This convention regulated the biological weapons "on paper", but no cooperative verification provision was created. [Appendix 1] In 1972, it was politically and virtually unacceptable to allow an intrusive inspection at national military bases and laboratories. If a member country was suspected of non-compliance to the convention, only complaints could be made to the United Nation Security Council. Because of these limitations it is not surprising that many countries have violated the convention's policies, and that biological warfare techniques have proliferated. The United States suspects that more than 10 countries have developed offensive biological warfare programs since 1972, as did the US itself. [5] The US already had a biowarfare program as early as 1944, when in a plant near Terre Haut, Indiana, 20,000-gallon fermentors for the production of anthrax and the filling of huge anthrax bombs were found. [6] Proof of a formal chemical and biological program occurred in 1979, when an anthrax outbreak occurred in Sverdlovsk (USSR), killing at least 66 people [7].

In compliance with the inadequacies of the BWC, Russia, the United Kingdom and the US agreed to take part in a tri-lateral agreement to initiate data exchange and site inspections at military and private biological facilities. Despite

the BWC, it is estimated that ten countries possess offensive biological programs. Suspected proliferators are Iran, Iraq, Libya and Israel, which are concentrated in the Middle East; but also, Asian countries as Taiwan, North Korea, Japan and China are suspect. Several suspected proliferators are countries in the southern hemisphere, such as, South Africa, and Angola.

The detection of a biological warfare program is difficult. Many facilities that have bioweapon manufacturing capabilities are also used for medical and /or civilian practice. Because of the narrow line between military and peaceful research, regulations of such activities become exceedingly difficult. [5]

Map 1: Russia


SOVIET BIOLOGICAL WARFARE INSTALLATIONS
SWEDEN
NORWAY
ARCTIC OCEAN
POLAND
FINLAND
Baltic Sea
Vilnius
Minsk
Kirishi
Leningrad
Moscow
Zagorsk
Reutov
Kubinka
Pokrov
Gorkovskaya
Vladimir
Obolensk
Strizh
Kirov
Yoshkar-Ola
Penza
Omutninsk
Saratov
Shikhany
Volgograd
Sverdlovsk
Kurgan
Stepnogorsk
Koltsovo
Novosibirsk
Aralsk
Berdsk
Nukus
Zima
Irkutsk
Tashkent
Otar
Almaty
Vladivostok
Barents Sea
Kara Sea
Laptev Sea
East Siberian Sea
Bering Sea
Lake Baikal
Kamchatka
Sea of Okhotsk
Sakhalin
Sea of Japan
Black Sea
Caspian Sea
Aral Sea
URAL MOUNTAINS
ROMANIA
HUNGARY
CZECHOSLOVAKIA
TURKEY
IRAN
IRAQ
AFGHANISTAN
MONGOLIA
CHINA
CHINA
JAPAN

2.2 The Soviet Union

Fig 1: Dr. Ken Alibek

The Soviet Union had perhaps the largest biological warfare program. According to several sources, which all referred to Dr. Ken Alibek, the Soviet union program was made up of a complex network of at least 40 facilities and 11 research centers spread out throughout the Soviet Union. By the late 1980s, 60,000 people were employed in different programs. The Soviet program started after the Russian Revolution (1917). In 1921 the Red Army commanders extrapolated from the casualty list submitted during the revolution that not artillery but the epidemic of typhus caused the majority of fatalities. Typhus was the major cause for mortality and the Red Army saw its potential as a weapon. In 1928 a secret decree was signed, which ordered the development of typhus as a potential biological weapon. The program was placed under the direct command of the State Political Directorate (GPU), a precursor of the KGB. The GPU supervised the program until the early 1950s. The first lab was located in the Leningrad Medical Academy. By the 1930s the Academy had developed liquid and powdered versions of typhus to be used in an aerosol. This success allowed the program to expand and a second facility was opened on the island of Solovetsky where a political prisoner camp was located. Here the first field tests were conducted using the prisoners who served as involuntary "guinea pigs". Several prisoners were submitted to newly developed biological agent for warfare as typhus, Q fever, glanders and melioidosis. These

two facilities were relocated to a military hospital in Kirov in 1941 when Nazi tanks invaded Russia. The Soviets biological warfare program completely changed when Russia became involved in WWII. In September 1945 the Soviet troops defeated the Japanese Unit 731 in Manchuria. When Unit 731 was defeated, the Soviet troop confiscated all their documents. Some of these documents were blue prints, describing how to set up and construct a biological weapon facility. The Japanese documents captured were so useful to the Soviets, that in 1946 a totally new facility at Sverdlovsk was constructed, according to the blue prints from the Unit 731. [8]

In 1953, the entire Soviet biological weapons program was put under the command of the 15th Directorate and the Red Army with Commander Colonel General Yefim Smirnov in charge. By the late 1950s dozens of new facilities were constructed across the country, most of them located in places no one would imagine a facility to be, which researched future biological agents. By 1973, under President Leonid Breshnev, Biopreparat was created to supervise the biological warfare program. Biopreparat was led by an army general, Vsevolod Ogarkov, who used to work for the 15th Directorate and supervised biological weapons since WWII. The headquarters was located in Moscow. The goal of Biopreparat was to produce new biological weapons, but during the startup years nothing was achieved due to their bureaucratic means and internal conflicts between Biopreparat and the Fifteenth Directorate. In 1979 General Yury Tikhonovich Kalinin took control and enormously expanded Biopreparat by

seizing other institutes and their researchers and recruiting thousands of other scientists. In 1981, Kalinin appointed Alibekov as deputy director of Omutninsk. His job was to make *Francisella tularensis* into a more effective biological weapon, resistant to current vaccines. In 1982, the pathogen was tested on 500 monkeys imported from Africa. These tests took place in open air, at an island in the Aral Sea, Vozrozhdeniye Island (Uzbekistan). The tests killed almost all of the monkeys, showing how devastating these field experiments were. The Soviet Ministry of External Trade was in charge of acquiring the animal subjects.

The entire biological program was under the direct authority of the council of ministers and its Military Industrial Commission (VPK), which directed the different ministries involved in biowarfare. The Ministry of Defense directed the Fifteenth Directorate, which controlled different facilities; the Ministry of Medical and Microbiological Industries directed Biopreparat and their facilities, the Ministry of Health directed the Second and Third Directorate, which controlled yet other plants. The Ministry of Agriculture directed the Main Directorate for Industrial Production and Scientific Enterprise, which controlled still more facilities. The Ministry of Chemical Industry directed the Chemical Weapons Directorate, which controlled chemical plants, and the Ministry of External Trade directed some state foreign trade organizations, and was also in charge of procuring lab equipment. The KGB was also involved; it managed the First and Third Main Directorates that had some biological weapons related facilities. The Gosplan sponsored the whole biological program. The Gosplan

ensured that enough funds were available for the different facilities and organizations. [8]

Most of the information currently available came from Soviet defectors such as Vladimir Pasechnik and Dr. Kenneth Alibek, formally known as Mr. Kanatyan Alibekov. Vladimir Pasechnik defected to Great Britain in 1989 and shocked British and American intelligence with his revelations of the Soviet Unions biological warfare program. Most information became available to the public when Dr. Kenneth Alibek published his book called "Biohazard" in 1999 after he defected in 1992 to the United States.

The main point in the Soviet biological agent research program was to make new strains of agents for which no vaccine or treatment was available. This was in contrast with the US program that first ascertained that there is a cure before producing the agents. An example of this is that when the World Health Organization in 1980 declared that smallpox was eradicated, the Soviets used it as a new potential and effective agent for weaponization. Because the need for protection against smallpox diminished as a result of its eradication, vaccination for smallpox diminished, also due to the minor health risk associated with vaccination. In the US, smallpox vaccine is only available to military and lab scientists, making the "man in the street" vulnerable.

The best means for distributing pathogenic agents is through aerosols, but in order to do so the bioweapons producer needs to make the agent resistant to external effects such as weather, UV light from sun, humidity and the effects of the blast. After testing the aerosols in special static chambers in the lab, they were tested on live animals in real world conditions at testing sites as the one located in the Aral Sea. The Soviet Union spent enormous amounts of money, time and effort in these programs. The goals of the Russian program were to make agents that kill quickly and are themselves short living. This would allow the soviet troops to use the facilities of the enemy following the use of such agent.

After an outbreak of Anthrax in 1979, in Sverdlovsk (Yekaterinburg), the real value of the BWC came into discussion, making us realize that although many countries signed the convention, biological weapons were being developed. The Center for Military-Technical Problems of Antibacterial Defense in Sverdlovsk was under the command of the Ministry of Defense (MOB). The Russian government official explanation for the incident at Sverdlovsk-19 was that the casualties were due to the consumption of contaminated meat, but in fact it was an accident in the facility that was researching and producing biowarfare products. In an article in a Russian newspaper Izvestiya on March 3, 1998, Lieutenant General Valentin Yevstigneyev, who was the head of the 15th Directorate of the Russian Ministry of Defense until 1992, but currently Deputy Director of the Ministry of Defense's Directorate, answered to the anthrax incident of Sverdlovsk of 1979. He explained that people felt ill up to 50 km away

from the facility but not at the facility and at the military base two casualties were noted. Actually 94 people were affected and at least 64 died, but some sources speak of even higher numbers. So, Lieutenant General Valentin Yevstigneyev was obviously denying and covering up the actual truth. He admitted there were a few ampoules of anthrax for vaccine purposes and that only four sample bombs were made for evaluating biological situation. These were tested on an island in the Aral Sea. In 1992, president Yeltsin officially admitted that the incident was a result of a military activity at one of their facilities without going into details.

Western scientists visited Sverdlosk twice. Once in 1992 and once in 1993 and although KGB classified the medical records of the incident, the scientists were able to track down victims. The actual site was off limit; however, the scientists were able to establish the extent of the affected area where people and livestock became infected, which was directly downwind the facility. This made the team conclude the anthrax release was an aerosol-based agent, but how it happened was still a question. Later Dr. Kenneth Alibek explained that the release of the anthrax pathogen was caused by the exhaust system when workers failed to replace a filter. If the direction of the wind had been towards the town of Sverdlosk, the death rate would have been devastating. At the site, the Soviet Union was actually producing and stock piling tons of scores of anthrax biological formulation. [8] Proof that this could not have been a natural outbreak came when scientists at Los Alamos National Laboratory in New Mexico investigated the anthrax found in tissues collected at that time and which were preserved by two

pathologists Grinberg and Abramova of the Yekaterinburg morgue and a physician of Hospital No. 24, Margarita Ilyenko, and kept hidden by the KGB. [7] By means of polymerase chain reaction (PCR) small amount of anthrax DNA fractions were amplified. This technology permitted the scientists to identify four of the five strains. This discovery made the original announcement of a natural outbreak weak because if it had been natural only one strain would have been detected. Also the location the anthrax was found was primarily in the victim's airways and brain, which indicates, it came from an airborne agent. [11]

Another large facility, the Scientific Research Institute of Microbiology, is located in the city of Omutninsk, Kirov (now Vyatka). This plant was capable of producing 100 tons of plague, 100 tons of tularemia, 100 tons of glanders or brucellosis. This facility at Kirov manufactured tons and tons of plague biological weapons and stockpiled these weapons for a very long period of time. In addition to manufacturing capabilities, that site was developing delivery systems for the application of biological weapons. In 1982, Dr. Kenneth Alibek started his career as the acting director in Kirov, with as goal the development of Biological Warfare. While Dr. Kenneth Alibek was the acting director, rodents in the vicinity of the plant became chronically infected with the Schu-4 military strain of tularemia; a bacterium that causes a type of pneumonia, which was being made at the plant. The lethal strain was 'obtained' from the US in the 1980's. According to Alibek the infection was caused by a leak in a pipe in the plant, releasing some

of its contents into the ground. The staff sterilized the area but if there are still rodents carrying the bacterium is unknown.

At the State Center for Virology and Biotechnology "Vektor" in Koltsovo, where in the late 1980s, the smallpox virus genome was explored, genetic engineering was carried out in order to create chimera viruses. Inserting Venezuelan Equine Encephalomyelitis (VEE) or Ectromelia into smallpox to create chimera strains. It was here that Dr Nikolai Ustinov became infected with the Marburg virus. While studying the Marburg virus he stuck himself when he was injecting guinea pigs, to explore the effects of the virus. Dr Ustinov died two weeks after the infection on April 30, 1988. The ordeal was horrible, and being a dedicated scientist, he kept a record of it, while being isolated. The bloody marks in the diary show the horror of infection by the virus. Dr Ustinov had star-like hemorrhages in the under layers of his skin and was bleeding from every possible place. His blood was unable to clot. Where did the Soviets obtain this virus? Marburg virus is associated with Kitum Cave (near Mt Elgon) in East Africa where it seems to live in an unknown animal reservoir. But the strain did not come from there. In 1967 at the vaccine factory in central Germany, a number of people were killed while they were working with monkeys. The strain found in Dr Ustinov was the same one, that was responsible for the outbreak in Germany. During the late 1980s Lev Sandakhchiev directed this facility and also other agents were developed. This plant had along with the labs and the large virology research campus a farm where lab animals were bred and tested. This farm was

the largest in its kind. After his revelations the microbiologist from Biopreparat, Vladimir Pasechnik (1989) defected to Great Britain, both the British and American intelligence became frightened.

In 1991, under pressure of President George Bush and Prime Minister Margaret Thatcher the Russian President Mikhail Gorbachev permitted a joint inspection team visit Vektor and the giant, high-security facility south of Moscow called the State Research Center for Applied Microbiology at Obolensk. [8]

The most serious threat is currently coming from one of the Russian testing grounds. The island of Vozrozhdeniye in the Aral Sea and the Komsomolskiy Island are living time bombs, also known as the Red Army's Scientific Medical Institute and MOD's field Scientific Research Laboraty (PNIL). Tests started in 1936 and were headed by Professor Ivan Velikanov. The Southern part of the island of Vozrozhdeniye was used as an open-air test site, to study the dissemination patterns of the aerosols, methods of detection and the effective range of the bombs filled with different biological agents. This part of the island was equipped with an array of detectors, which were mounted towards the south, mainly because the islands prevailing wind, avoiding contamination of the northern half of the island. On the northern half the military site was located. Nevertheless people became infected and massive deaths occurred in the

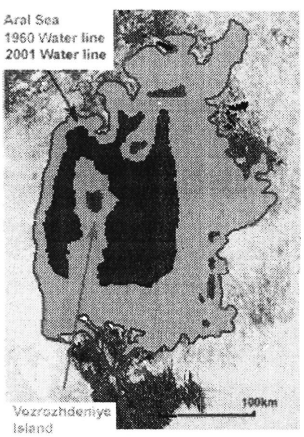


Figure 2: island of Vozrozhdeniye

local wildlife. This location was picked because of the high temperatures, which presumably would kill all agents after use. [8] Currently the safety of the area is under discussion due to the desiccation of the Aral Sea. The desiccation of the Aral Sea is caused by the massive diversion of its water for irrigation. The growth of the island does not help in containing the contamination site. [9] One more devastating fact is the burial of almost 100 tons of anthrax from other facilities on the island in 1988 when Gorbachev ordered the "burial of the evidence". The steel drums containing the agents were poured into open soil sandy burial pits. They tried to kill the spores with bleach, but when the inspection team of the US Department of Defense, that visited the island in August 1995 took samples, live spores were retrieved. The inspection team confirms the actually dismantling of the facilities on the island.

The question now is to see if the agents made were actually effective for use as a weapon and if they have ever been used. There was a tularemia outbreak among German panser troops in the late summer of 1942, which was partly responsible for halting the German advance in southern Russia shortly before the battle of Stalingrad. Thousands of Russian soldiers and civilians also were affected, but nearly one hundred thousand Germans were affected, and a large proportion of the German casualties were from the pneumonic form of the disease. Although this outbreak was generally reported to be of natural origin, a former official in the Soviet biological weapons program has indicated that this was more likely to have been the result of an early generation biological weapon.

The Soviet biological weapons program also successfully weaponized *B. mallei*.

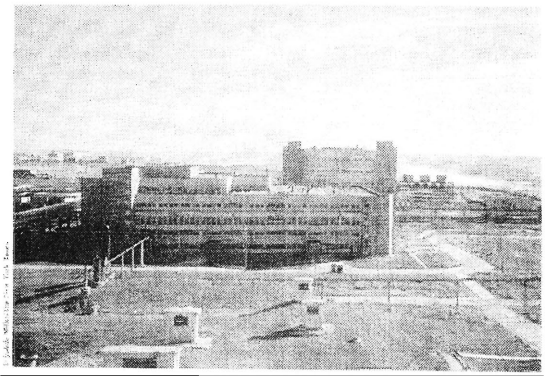


Figure 3: Stepnogorsk

A former official in the Soviet biological weapons program has indicated that B. *mallei* weapons were used in at least one Soviet biological attack between 1982 and 1984 in Afghanistan. [10]

Around 1992, the Soviet Union collapsed and for a lot of those facilities funding from Moscow vanished. When the funding disappeared, most facilities closed down or had to reform the biological warfare part of the plants to civilian usage. Transferring the plants to civilian use costs money and that was not available. [8] As a result of this, some of the scientists and staff became unemployed or left the Soviet Union for more readily available work in foreign laboratories. At least 23 defected to the US, but the biggest concern is the scientists who defected to countries like Iraq or Libya. [12] Those countries actually recruit scientists and equipment from those plants, mainly because of the financial needs. The recruited scientists know how to make the different biological agents and if this knowledge comes in the wrong hands who knows what could happen. In order to prevent this, the US and some other nations are investing in the former Soviet Union by creating new purposes for the previous labs and their scientists and to sanitize the plants. The Scientific Experimental and Production Base (SNOPB) or also know as PO Box 2076 in Stepnagorsk

(Kazakhstan) was one of those facilities. In 1993 the plant was put under the authority of the National Center for Biotechnology (NCB). NCB brought together most of the Kazakhstan's former Soviet military and civilian institutes. For some local authorities it was a surprise to find out what was really going on in the building that was heavily guarded in their backyard. The goal of NCB was to transfer them to produce civilian products, and make the plants self-sustaining. Currently, the plant is producing new medical equipment and products. [8]

2.3 South Africa

Map 2: South Africa

This country located in the south of the African continent, has been indulged with Apartheid for several decades. Apartheid is racial conflict, which started originally between the white landlords and the poor black inhabitants. During Apartheid the white population, which forms a vast but strong minority, occupied all major and important positions. The black population growing quickly and the fear that the growth would outgrow the resources of the nation, was becoming a major threat for the white leaders. It was very important for current military commanders that this would be brought under control and in order to stop the " black expansion" and continually growing communist-backed troops, the South African government decided it needed chemical and biological weapons to control the growing black threat. [14,16] This new political strategy was adopted after P.W. Botha became president in 1978. At that time, the South African Army applied a new military tactic that everything was permissible to stop the opponent of the Apartheid. In 1979 in order to achieve the development of biological weapons, the South African army recruited a cardiologist, Dr Wouter Basson. [16] In 1983, Dr. Basson was put in charge of the army's Roodeplaat Research Laboratories and with the assistance of Dr. Daan Goosen, they began the clandestine research effort called Project Coast. Project Coast was involved in manufacturing of cholera,

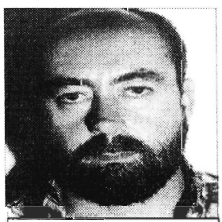


figure 4: Dr. Wouter Basson

botulism, and anthrax, as well as other chemical poisons and illegal drugs. The team studied the use of illegal drugs like ecstasy, THC, and LSD for crowd control. [13] In order to stop the explosive baby boom, Dr Basson tried to develop a biological substance that would make the black population sterile. If Dr Basson actually succeeded in developing this genetic weapon is not certain and only time will reveal if it was ever used and if the agent worked. This would result in a lower birthrate. The team also developed skin-absorbing poisons that could be applied to the clothing of the political targets, and poisons concealed in chocolates and cigarettes. [14]

The South African army released cholera in certain South African villages and provided the neighboring country, Rhodesia (Zimbabwe), with cholera and anthrax. Rhodesia government's troops used those agents against the rebel soldiers in the guerilla war. In 1979 there was a big outbreak of anthrax in Rhodesia, which killed 82 people, and thousands became ill but proof of South African involvement has not been acquired. Zimbabwe's current Minister of heath, Dr Timothy Stamps, has ordered an investigation into South Africans involvement. [14]

The whole South African biological weapon policy was reformed in 1989 when F.W. de Klerk became the new President. He appointed Pierre Styen to investigate the biological weapon program and shortly after Styen's report the program was dismantled and numerous scientists were fired. Basson was forced to

retire and he became a consultant. During this period Basson was a consultant, and therefore he frequently travelled abroad. The voyages he made to Libya and some former Soviet regions alarmed the American and British intelligence. Basson was therefore rehired by the South African government in 1995 in an attempt to keep him under control. After Nelson Mandela, the first black president and the former leader of the African National Congress (ANC), became president, Dr. Basson was still kept on the staff of a government hospital in order to keep the information concealed. [14]

In 1997 Dr Basson was arrested on charges of selling Ecstasy. During the investigation of Basson's drug allegation, investigators found documents dating from the period of Project Coast, which should have been destroyed when De Klerk became president in 1989. Basson was forced in becoming clean for the Truth and Reconciliation Commission (TRC). Most people who worked with Basson on biological weapons testified for the TRC, applied for amnesty, and got immunity from prosecution. Dr Wouter Basson has been acquitted on charges of murder, conspiracy, fraud and drug possession. [14]

2.4 Israel

Concerns about the Israelian biological and chemical weapon production rose when on October 4th, 1992 an airplane of the national aircraft company, El AL, crashed in an apartment complex in the Bijlmermeer (Amsterdam) in the Netherlands, killing at least 45 people and wounding hundreds of others. This Boeing 747 was carrying 240 kilos of DMMP (di-methyl methylphosphosphonate), and several other agents, for which there is still no official explanation. DMMP is one of the main ingredients for the production of sarin, a toxic gas, which was used by a Japanese cult in 1995. An American company Solkatronic Chemicals in Morrisville sold the chemical. [19,21]

Map 3: Israel

Since 1987 DMMP has been on the Core List as one of the 8 most used important chemicals for production of chemical weapons. This list was created in an attempt to stop the free trade of these chemical agents. Apparently the sale of 240 kilos of DMMP to the Institute of Biological Research (IIBR) in Ness Ziona (Israel) did not alarm officials. [21]

The production of sarin is done in three steps. First DMMP is treated with thionylchloride, secondly with hydrogenflouride and finally with isopropanol. Hydrogen fluoride and isopropanol were also found on the EL AL flights air bill.

Other chemical that raises suspicion to the Israel's weapon production is the chemical tributylphosphate (TBP). This was not on the air bill, but traces of

this chemical were found in samples taken at the crash site. TBP is used to regain plutonium and uranium from burned uranium and plutonium using the Purex-process.

All those facts make the existence of a chemical, nuclear and biological program in Israel very likely.

For the biological research purposes at the IIBR center, scientists are developing a genetic weapon to kill or harm certain ethnic groups. A scientist declared to the London Sunday Times that the center sought to identify and isolate certain genetic characteristics of Arabs, mainly the Iraqis. The biggest problem the Institute has in developing this genetic agent is that the Jews and Arabs are both Semitic, and likely have no distinct genetic differences. The biggest concern is that there may be a significant genetic diversity between the Jews themselves making it very hard to develop a specific agent. This program is similar to the one in South Africa preformed by Dr Wouter Basson with the only difference being that he was looking for genetic diversity due to pigmentation of the skin. South Africa and Israel worked closely together on their warfare program, which explains these similarities.

The IIBR is under the control of the Israeli authorities as it provides service to the Israeli Defense Ministry. The current authorities deny any production of biological or chemical weapon, but unlike most of its Arab neighbors, Israel has not signed the Biological Weapons Convention (BWC).

Israel has signed, but has not yet ratified, the Chemical Weapons Convention (CWC). If agents are being produced, and they are not specific enough, is Israel willing to sacrifice some of their own civilians?

It is very hard to evaluate the dimensions of this question. The doctrine the Israelis are living in makes it easy to see that this form of sacrifice would be accepted. The Israel Defense Forces (IDF) official website explains this doctrine. The Mission of the IDF states: "**TO DEFEND THE EXISTENCE, TERRITORIAL INTEGRITY AND SOVEREIGNTY OF THE STATE OF ISRAEL. TO PROTECT THE INHABITANTS OF ISRAEL AND TO COMBAT ALL FORMS OF TERRORISM".**

The statement lets us conclude that, if Israel was under threat from Palestine or any other Arabic power, they would use their genetic modified biological weapons. [22]

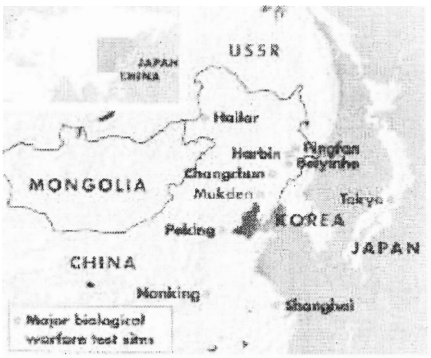
To counter any attack, the people of Israel are one of the most prepared populations. For centuries, the Jews have been persecuted, and due to this experience, their awareness to an eventual attack has been enormous.

Looking at the last 30 years, Israel has been in several conflicts and wars with neighboring countries and several attacks on the civilian population have prepared them for any form of weapon use, mainly chemical. Both men and women serve in the IDF. Women currently perform compulsory military service in the IDF for a period of one year and nine months where as 3 years service is

required for the male conscripts. Most adult civilians have served and received a military training of some sort and know-how to react if an attack occurs, may it be biological, chemical or nuclear. Even with the layout of a house interior, the IDF advises on how to build a safe room for use as a shelter as for any other emergency equipment needed. The IDF provides residents with a protective kit containing a gasmask and a syringe for use as primary defense. The whole awareness of the danger makes them perhaps the most prepared population in the world. [22]

2.5 Japan

Japans biological warfare program ended abruptly during the final days of the Pacific war in 1945 when the Japanese troops on August, 1945 destroyed the facilities in Manchuria in order to cover up the experiments. [23] Not everything was destroyed, however, and the Russians were able to recover some documents and blueprints, which they afterwards used to construct their own facilities (see Russia).



Map 4: Japan and China

Japan had probably the most destructive biological warfare program. The Japanese biological weapons program was born in the early 1930s. Japanese officials were so intrigued that germ warfare was banned by the Geneva Protocol of 1925, that the Japanese officers reasoned it would be an effective weapon.

Figure 5: General Shiro Ishii

When Japanese troops invaded Manchuria (China) in 1932, Shiro Ishii, a physician in the Japanese army, and intrigued by germ warfare started to perform some preliminary experiments. In 1936, Shiro Ishii started the construction of a huge facility in Harbin (Manchuria). Unit 731 was born, with as goal the development and testing of biological agents for warfare. The advantage of the facility was the availability of research subjects on

whom the germs could be tested. In the research center experiments were done with human test species, called marutas or logs. Healthy prisoners were placed in the same room with sick or contaminated ones to see if the various ailments would spread.

Afterwards the human subjects were vivisected without anesthesia to see the effects of the germs. The vivisections were done under normal conditions, and therefore the use of anesthesia was not permitted, because it might have somehow affected the body organs and blood vessels. [24]

Field experiments were done often to see if the agents could work outside the laboratory walls. Some experiments that were carried out were similar to the ones conducted on the island of Vozrozhdeniye in the Aral Sea, but here people were tied down to stakes rather then to use monkeys or other animals, to study the effectiveness of the weapons and the new technologies used. Planes not only dropped bombs on the test grounds, but also over villages such as Ningbo in eastern China and Changde in north-central China. There plague infected fleas were dropped but they also dropped cultures of cholera and typhoid into wells and ponds.

Some of the field tests were counterproductive because when dysentery, cholera and typhoid were released in the Zhejiang Province (China), the Japanese troops themselves were infected and 1700 died of the diseases. How many people

exactly died because of the experiments is unknown, but estimates range around 200,000. In the Harbin area alone, there were already 30,000 people killed between 1946 and 1948.There were even plans for sending germs to the United States mainland. Balloons were launched, and the prevailing winds directed them to the USA. Reports at that time let us believe about 200 landed in the Western states and their bombs killed one woman in Montana and six people in Oregon. But it could have been far worse, because some generals wanted to include in the bombs anthrax, plague, even the cattle plague virus to wipe out the American livestock, or grain smut which would destroy crops. The plans were not carried out, because one general, Hideki Tojo, vetoed the proposal. Tojo rejected it, in fear that biological assaults on the United States would invite retaliation with germ or chemical weapons being developed by America. Yet the Japanese Army was apparently willing to use biological weapons against the Allies in some circumstances. When the United States prepared to attack the Pacific island of Saipan in the late spring of 1944, a submarine was sent from Japan to carry biological weapons to the defenders but the sub was sunk. As the end of the war approached in 1945, Unit 731 embarked on its wildest scheme of all. Codenamed Cherry Blossoms at Night, the plan was to use kamikaze pilots to infest California with the plague. It is unclear whether Cherry Blossoms at Night ever had a chance of being carried out. Japan did indeed have at least five submarines that carried two or three planes each, their wings folded against the fuselage like a bird. But a Japanese Navy specialist said the navy would have never allowed its finest equipment to be used for an army plan like Cherry Blossoms at Night, partly

because the highest priority in the summer of 1945 was to defend the main Japanese islands, not to launch attacks on the United States mainland. If the Cherry Blossoms at Night plan was ever serious, it became irrelevant as Japan prepared to surrender in early August 1945. When Japan surrendered, few of the biowarfare scientists were punished for their share in the atrocities done during the war partly, because the Americans covered up the biological and medical warfare experiments in exchange for the data obtained during the experiments. Most of the doctors' careers flourished after the war, and the head of unit 731, General Shiro Ishii, lived peacefully until he died in 1959. [24]

Recently, several of the veteran officers who performed the tests are starting to admit the usage of germs as biological weapons. Actually, there is a lawsuit pending before a Japanese court demanding an apology from the Japanese government for germ warfare conducted by its troops in China during their invasion of 1937- 1945, as well as compensation for the Chinese victims. Four years ago, similar trials ended without any judgment pronounced, and the plaintiffs hope that finally, after so many years, a judgment will be handed down. [24]

3.0 Agriculture bioterrorism

3.1 Introduction

On august 10, 1999 there was a symposium in Montreal (Canada) that brought together plant pathologists, military intelligency and criminal experts. Part of their agenda was the discussion of anti-crop bioterrorism. This international symposium was the first of its kind, creating the awareness among the agriculture scientific community about the vulnerability of the agriculture sector [25].

All major food crops come in a number of varieties, which in turn are suited to a specific soil and climate. Each crop pathogen will in turn infect and damage those varieties in different degrees. These facts will make it possible to find just the right pathogen that will destroy only the wanted variety (26). These characteristics allow terrorists to attack their target without jeopardizing their own crops. As Soviet forces discovered in the summer of 1942 when the Russians tried to contaminate the German forces with tularemia, pathogens have no borders (See USSR).

Using agents against crops or livestock could inflict great economic damage. This is illustrated by evaluating naturally occurring outbreaks. In 1970, leaf blight destroyed over a billion dollars worth of corn, and coffee leaf rust has destroyed several plantations in Southeast Asia and is still causing problems in Latin America (26).

More recently, an outbreak in the United Kingdom of hoof and mouth disease is putting the British as well as the European agriculture into distress. The disease is spreading uncontrollably with already more than 1100 farms infected in the UK alone and it is still increasing with diagnosed cases in France, Bulgaria, Argentina, Iran, and Netherlands. This outbreak has demonstrated how vulnerable the world agriculture sector is to biological attack.

Using pathogens to naturally kill plants has been the research of several scientists of the Montana State University (MSU). These scientists investigated in the Chu River Valley in Kazakhstan for diseased Cannabis Sativa. This classified research tried to discover a natural herbicide to kill the narcotic plants. Professor David C. Sand of MSU seeks ways to find fungus to attack the plants, which are responsible for the production of marijuana, opium and cocaine [27].

3.2 Foot and Mouth Disease

After slowly recuperating from its bout with Mad Cow Disease or Bovine Spongiform Encephalopathy (BSE), is a prion similar to the agent which is responsible for Creutzfeldt-Jakob disease (CJD) in humans, the UK is having another major agriculture catastrophe. On February 19 of this year, foot and mouth disease was diagnosed in several piglets, and it is spreading to the other cloven-hoofed livestock population. [28]

Foot and mouth disease is one of the most contagious animal diseases. Unlike BSE, this disease is not harmful for humans. FMD is very contagious and spreads by way of aerosol, animal-to-animal contact or through contaminated equipment, feed or personnel. The FMD is caused by a virus and is very resistant to cold. It even survives freezing, but is susceptible to low pH (<5), sunlight, heat and dryness.

The primary infection site in cattle is through the nostrils. It is here where the virus starts to replicate and gains access to the bloodstream meanwhile infecting the epithelium of the respiratory and digest ional system as well as the feet and the heart muscle. Because the virus is located in the respiratory system, the virus is easily spread when the animal exhales. Each species, which is susceptible for the virus, has different degrees of signs and symptoms. Cattle will show big vesicular lesions, while pigs show fewer symptoms but put out greater than four log units more virus than cattle. Scientists have identified the strain currently in Britain to be type O. [31] Type O FMD virus infection has an approximate 36-hour incubation period. Consequently, by looking at the pathological lesions of the animals first believed to have been discovered with the disease, the virus may have been disseminating for 16 days prior. [29]

Figure 6: Vesicular lesions of the muzzle...

3.2.1 How can FMD be diagnosed?

Detecting FMD is not easy and a differential diagnose is easily made. Signs of FMD are vesicular lesions, erosions and ulcers of the oral cavity, throat, teats, coronary bands and interdigital area, lameness, fever, abortions, sudden drop of milk yield and sudden death of calves, lambs or piglet. Sounds very obvious, but there are similarities with other less contagious diseases: vesicular stomatis, bovine papular stomatitis, bovine herpes mammilitis, bluetongue, severe cases of IBR, BVD/MD, pseudocowpox, rinderpest, malignant catarrhal fever in cattle, swine vesicular disease in pigs and foot rot in sheep. In order to have total certainty if the animal is indeed infected with FMD, specific lab tests are needed. Then samples of vesicular fluids, tissue samples of the blisters, blood serum and esophageal secretions are to be collected and tested to confirm the clinical findings. Tissue culture, ELISA, virus neutralization, complement fixation, or agar-gel precipitation are used for the detection and typing of virus and antibodies. [29]

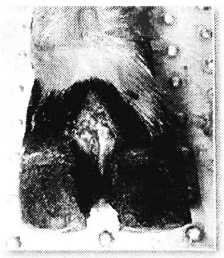


Figure 7: of the interdigital area

3.2.2 How can FMD be eradicated?

FMD can be eradicated by quickly diagnosing the disease. This already has been difficult in Europe. The last outbreak in the UK dates from 1967, which leave most of the current active veterinarians unaware of the clinical findings. The veterinarians learned about the disease but were to young in 1967, when it appeared in the UK, to see and diagnose the clinical signs in vivo. A second problem in diagnosing FMD is the profiled finding of a single infected individual in a large herd. In addition, the farmer might not immediately get a veterinarian to diagnose the dead or ill animal, certainly considering the financial aspect involved. Sometimes the value of the animal is less than the veterinarian's fee. In addition, the farmer might try to protect his or her herd by covering up the facts in order to survive. If FMD is discovered, the government seizes all animals, kills and burns them and destroys all feed in order to stop the spread. Although there is financial compensation, the emotional bond between farmer and animal, and horror of having to go through the ordeal of loosing livestock, is beyond any value. [30]

Figure 8: animal burning

The financial compensation may be sufficient to buy new livestock, but it will take years to re-establish a new good valuable herd. In general, it will take much more money then the compensation provided, and during the time the farm is rebuilding its livestock and regenerates the feed, there is almost no revenue, leaving the farmers without income for months or even years.

Currently, the measurements taken by the European Union in slaughtering all potential infected animals and the ones who have been in contact with them. If a farm is found to be positive for FMD, all other farms in the vicinity of the infected farm are cleaned up. Although the animals do not have the disease or any signs or symptoms, they are cleared to stop the spread. [30]

A second measurement is to vaccinate the animals. The problem occuring with vaccination is that the immunized animals produce identical antibodies as for the real virus, and tests for FMD cannot distinguish between antibodies from a vaccinated or a sick animal. Better vaccines, which allow veterinarians to distinguish between vaccinated and infected animals are possible and would be beneficial for the eradication of FMD. However, this is not the most important issue. According to the head of the European Federation of Animal Health, there is not much profit in the production of pharmaceuticals for the animal health market. Because of the non-vaccination policy in the EU, no pharmaceutical company will invest in developing a marker vaccine. According to EU-commissioner of Public Health and Consumption, David Byrne, there is no exclusion that vaccination helps efficiently. The virus is not killed, only the symptoms are reduced and this is not enough to stop the spread. In addition a general vaccination of the life stock in the EU, would cost an estimated 150 million Euro, and countries like the US and Japan will not import beef of vaccinated animals. Therefore, the EU decided 10 years ago to ban the systematic vaccination of the livestock, as they were considered important and growing trade

markets. The commission will investigate to see if the newer vaccines are better and if it is economically accountable to vaccinate. [32]

Currently in Belgium, there are demands being made by several agricultural organizations to start to vaccinate again, should the disease be discovered in Belgium. On March 20, 2001, the ministers of agriculture met in order to analyze the FMD situation. Recently, a couple thousand of sheep and goats, that were imported from Britain to Belgium before the outbreak, have been killed and incinerated in order to reduce any potential threat. [30]

A last resort in dealing with FMD is to let nature take its course. Economically this outbreak will devastate the UK as well as neighboring countries. After having the BSE outbreak, this second outbreak is isolating the UK even more. The UK already had been isolated for several years, prohibiting the export of livestock. This ban was recently lifted, while now a new export ban is being enforced. In 1967, 440 000 animals were destroyed and cost almost 4.26 billion dollars at today's prices. This new epidemic will cost Britain and indirectly the EU, which will partly aid in the cost, billions of dollars. [32]

3.2.3 Hoof and mouth disease as a model for bioterrorism

On 19 February, veterinarians in the abattoir of Little Warley (Essex) discovered that 27 piglets were infected with hoof and mouth disease. Immediately a movement restriction zone of 8 km in diameter around the abattoir and the farm where the pigs originated from was instated. In the restrictions zone all hunting, travel and all unneeded movement is prohibited.

A second source was discovered on a farm in the vicinity, where a bull was discovered with the disease. Immediate measurements were taken and the farm where the piglets originated from was investigated. Meanwhile the disease is spreading and by 23 February, already five outbreaks were noted. All animals are being slaughtered and incinerated and all movement of animals or their products is prohibited. [28]

By February 22, the EU suspended all exports of agriculture products from the UK to the mainland. During this period, countries like Belgium, France, and Germany are monitoring the situation. All animals imported from the UK within a month before the outbreaks were traced and if necessary destroyed. In Belgium, sheep and goats that were imported before the outbreak were tested and destroyed. Later the ELISA tests revealed the animals were not contaminated. France was not that lucky. There a cattle farm was found positive for FMD. Because of this outbreak in France, all exports and movements are prohibited. The

Netherlands are now also concerned, and are in order to stop the spread, killing animals imported out of France. [30]

All these actions and more are done in an attempt to stop the spread, but the disease is out of control in the UK. Farmers' union is revolting against the drastic actions taken by the government in killing healthy animals in the immediate location of outbreaks. Similar actions are seen in the Netherlands, farmers are prohibiting the government to slaughter their livestock and are therefore putting up barricades to close off the access to the farms in the buffer zones.

3.2.4 How did Britain obtain FMD?

Britain was free of FMD since more then thirty years. How is it possible that a disease that contagious suddenly appears in the British livestock? Scientist and investigators are trying to reconstruct the origin of the disease, but this is very hard to do. Some sources reveal that the virus was acquired from the use of airplane waste. Some farmers were still feeding leftover food from the local airport, as a cheap food for their animals. The EU banned this source of animal feed many years before because this could import diseases. [33] Another rumor is that the Iraqis introduced FMD in the British livestock. Allegedly, Iraqis did this in revenge to the joined bombings of the US and the British forces.

Why Britain and not the US was a target of such bioterrorism is a question that needs to be asked when we consider a terrorist attack. Perhaps British livestock are easier to infect then the American.

European farms are mostly small-scale farms and are very intensive production units, while farms are much bigger and more spread out in the US. [33] Geographically, the farms in Europe are very close to each other and because they are so intensive, many animals are kept on small areas. In Belgium, farmers keep on average 2-3 cows on an acre of land. This is not the case in the US and farms in the Midwest are much larger but they have a smaller animal to land ratio. Economically, it would hurt the British more then the Americans. Their agriculture sector already suffered for many years with BSE and an additional

disease would ruin the sector. How the disease will spread further and how bad the situation will be in the future, only time will let us know. [34]

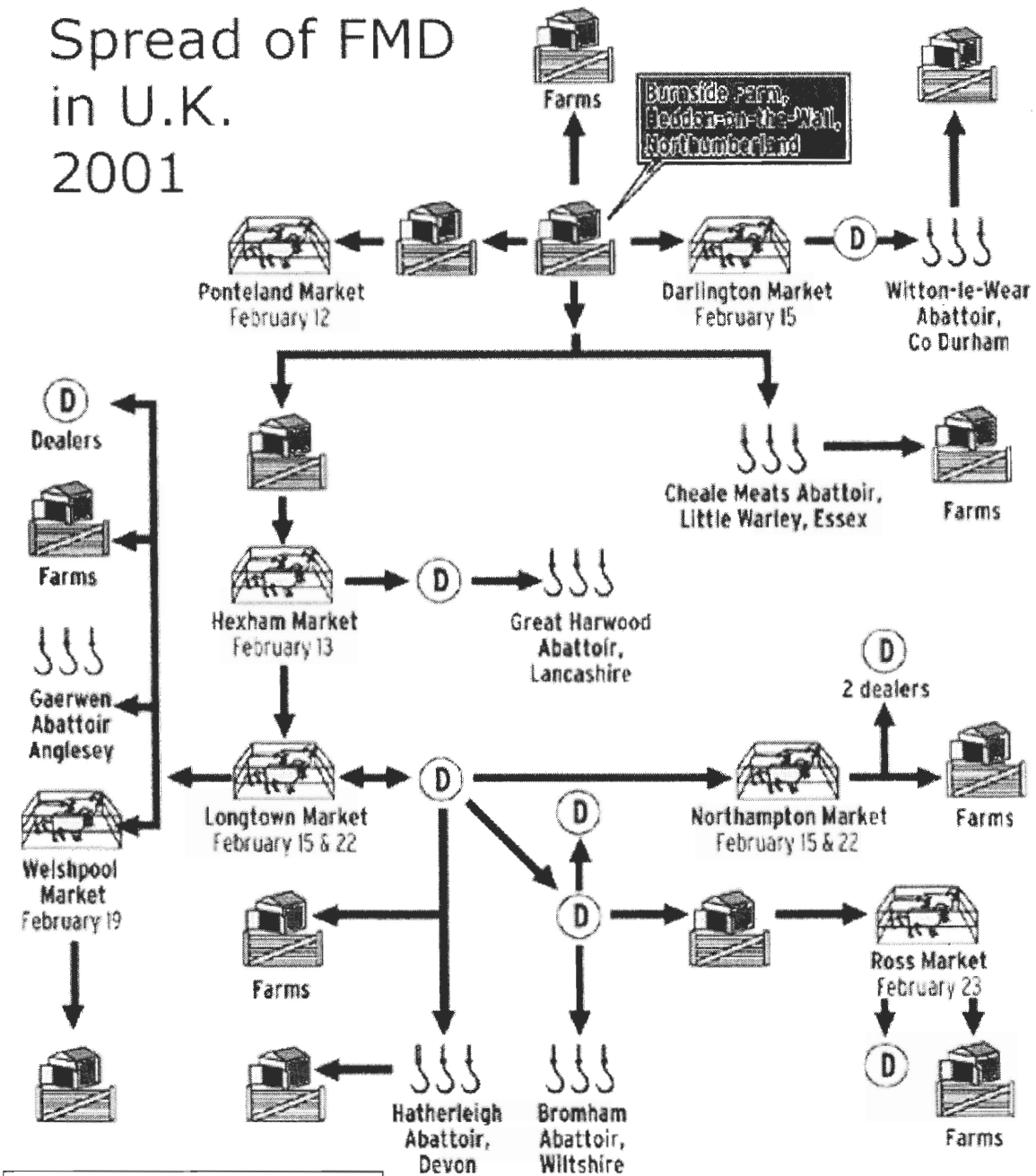


Figure 9: FMD spread in the UK

4.0 Conclusion

At the start of this new century, bioterrorism, as it has been defined, will perhaps be one of the major concerns for all countries of the world. Many countries routinely violate the convention of 1972 and new potential agents are always being discovered, intentional or not. The accidental engineering of a mouse virus in Melbourne, Australia, in order to find a better pest-control agent is one example of how bioengineering can be used to modify an organism . [35].

Biological weapons are cheap to produce and require little knowledge easy to fabricate. This feature makes them attractive for poorer nations that are unable to buy expensive high tech or conventional ordnance or individual organizations willing to sacrifice to advance their cause. Questions are raised about why biological weapons haven't been used so far, except for some rare cases. The use of a biological agent does not provide the instantaneously gratification to the terrorist of his action. Unlike bombing a building, where immediately one can see the human suffering, dropping an agent such as Marburg virus into a building will probably kill more people in the long run, but it will take weeks or even months before the total damage can be assessed. Because of the longer initiation time, it is harder to control who will be the victims and what the damage will be. Being that unpredictable is perhaps a reason why terrorist organizations are still withholding the use of them. Nevertheless, using an agent that will only start to cause problems after a certain time span will make it easy for the terrorist to "cover up his tracks" and will make it hard for the authorities to find the responsible party.

This anonymity will not give the terrorist the wanted publicity and perhaps discourage the use.

Perhaps the biggest advantage of the use of biological agents is that this eventually will kill the enemy, his livestock or other important economic crop or product, but will not destroy the infrastructure. Just imagine, if a bioterrorist were to drop a developed pathogen on a highly industrialized area. After a wait, and at a later time, it might be possible to invade the area with minimal personal losses, use the infrastructure and, then even start your new operations.

Biological agents are more likely to be used to harm a nation economically. This could result in major human losses, if the country is not able to acquire supplies to control or to substitute for the losses. A biological attack would financially jeopardize a country, making it weak and vulnerable.

If we consider the impact of FMD in Britain, so far more then 1200 farms have been contaminated. The same scenario has been seen in the Netherlands, where only 25 farms were contaminated, but already hundred thousands of animals have been killed in order to stop the spread. In both cases, this is costing the governments and the European Union millions of Euros. The governments have to reimburse the farmers for their animals, provide them with a new income because no animals means no income for the farmer. In addition, no animals can be traded and there value on the market dropped, other sectors that work closely

with farmers suffer greatly. A major cost in eradication of FMD is the cost of killing and cleaning up the animals. Thousands of people are in action to do so, but the biggest cost is the loss in revenue due to the ban of export of animal related products, together with the loss of tourism. If one look at the cost of the FMD outbreak in 1967, only a small percentage of the total cost was paid to the farmer, most of the money went to indirect related firms and people, who where affected because of the outbreak.

5.0 What can be done in the future?

For the future, governments can learn from this outbreak in Europe. Governments should be aware that a disease can ruin their agriculture patrimonies, and they need to be ready to respond quickly. The events on September 11, 2001 were a brutal wake up call for the United States concerning its vulnerability towards terrorism. Since then, significant progress has been made, but concerns remain that the deliberate introduction of a foreign animal disease (FAD) in multiple locations and/or with multiple pathogens could overwhelm the emergency response systems. The first step is to make sure nobody will try to cause a biological or even a chemical attack. If an attack would occur, it is very important to react quickly and identification is probably the most important. Once the source has been identified, eradication or treatment of the disease can start. Therefore, nations need to have enough trained physicians and veterinarians to identify the agent and treat the sign and symptoms. Also they need trained emergency crews to respond adequate and conceal the source of contamination properly. Secondly, there needs to be consistent reporting of zoonotic animal diseases, and other rare diseases, by veterinarians and doctors to public health officials and not only in the USA. In addition, research for new drug and treatments need to be developed and stockpiled in case the need emerges to treat an attack of any kind. We should therefore be aware and handle appropriate, if a biological agent is applied, and a FAD response plan should be ready if it would be required. [36, 37]

Appendix 1:

CONVENTION ON THE PROHIBITION OF THE DEVELOPMENT, PRODUCTION AND STOCKPILING OF BACTERIOLOGICAL (BIOLOGICAL) AND TOXIN WEAPONS AND ON THEIR DESTRUCTION

Signed at Washington, London, and Moscow April 10,1972
Ratification advised by U.S. Senate December 16, 1974
Ratified by U.S. President January 22, 1975
U.S. ratification deposited at Washington, London, and Moscow March 26, 1975
Proclaimed by U.S. President March 26, 1975
Entered into force March 26, 1975

The States Parties to this Convention,

Determined to act with a view to achieving effective progress towards general and complete disarmament, including the prohibition and elimination of all types of weapons of mass destruction, and convinced that the prohibition of the development, production and stockpiling of chemical and bacteriological (biological) weapons and their elimination, through effective measures, will facilitate the achievement of general and complete disarmament under strict and effective international control,

Recognizing the important significance of the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare, signed at Geneva on June 17, 1925, and conscious also of the contribution which the said Protocol has already made, and continues to make, to mitigating the horrors of war,

Reaffirming their adherence to the principles and objectives of that Protocol and calling upon all States to comply strictly with them,

Recalling that the General Assembly of the United Nations has repeatedly condemned all actions contrary to the principles and objectives of the Geneva Protocol of June 17, 1925,

Desiring to contribute to the strengthening of confidence between peoples and the general improvement of the international atmosphere,

Desiring also to contribute to the realization of the purposes and principles of the Charter of the United Nations,

Convinced of the importance and urgency of eliminating from the arsenals of States, through effective measures, such dangerous weapons of mass destruction as those using chemical or bacteriological (biological) agents,

Recognizing that an agreement on the prohibition of bacteriological (biological) and toxin weapons represents a first possible step towards the achievement of agreement on effective measures also for the prohibition of the development, production and stockpiling of chemical weapons, and determined to continue negotiations to that end,

Determined, for the sake of all mankind, to exclude completely the possibility of bacteriological (biological) agents and toxins being used as weapons,

Convinced that such use would be repugnant to the conscience of mankind and that no effort should be spared to minimize this risk,

Have agreed as follows:

Article I

Each State Party to this Convention undertakes never in any circumstances to develop, produce, stockpile or otherwise acquire or retain:

(1) Microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes;

(2) Weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict.

Article II

Each State Party to this Convention undertakes to destroy, or to divert to peaceful purposes, as soon as possible but not later than nine months after the entry into force of the Convention, all agents, toxins, weapons, equipment and means of delivery specified in article I of the Convention, which are in its possession or under its jurisdiction or control. In implementing the provisions of this article all necessary safety precautions shall be observed to protect populations and the environment.

Article III

Each State Party to this Convention undertakes not to transfer to any recipient whatsoever, directly or indirectly, and not in any way to assist, encourage, or induce any State, group of States or international organizations to manufacture or otherwise acquire any of the agents, toxins, weapons, equipment or means of delivery specified in article I of the Convention.

Article IV

Each State Party to this Convention shall, in accordance with its constitutional processes, take any necessary measures to prohibit and prevent the development, production, stockpiling, acquisition, or retention of the agents, toxins, weapons, equipment and means of delivery specified in article I of the Convention, within the territory of such State, under its jurisdiction or under its control anywhere.

Article V

The States Parties to this Convention undertake to consult one another and to cooperate in solving any problems which may arise in relation to the objective of, or in the application of the provisions of, the Convention. Consultation and cooperation pursuant to this article may also be undertaken through appropriate international procedures within the framework of the United Nations and in accordance with its Charter.

Article VI

(1) Any State Party to this Convention which finds that any other State Party is acting in breach of obligations deriving from the provisions of the Convention may lodge a complaint with the Security Council of the United Nations. Such a complaint should include all possible evidence confirming its validity, as well as a request for its consideration by the Security Council.

(2) Each State Party to this Convention undertakes to cooperate in carrying out any investigation which the Security Council may initiate, in accordance with the provisions of the Charter of the United Nations, on the basis of the complaint received by the Council. The Security Council shall inform the States Parties to the Convention of the results of the investigation.

Article VII

Each State Party to this Convention undertakes to provide or support assistance, in accordance with the United Nations Charter, to any Party to the Convention which so requests, if the Security Council decides that such Party has been exposed to danger as a result of violation of the Convention.

Article VIII

Nothing in this Convention shall be interpreted as in any way limiting or detracting from the obligations assumed by any State under the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare, signed at Geneva on June 17, 1925.

Article IX

Each State Party to this Convention affirms the recognized objective of effective prohibition of chemical weapons and, to this end, undertakes to continue negotiations in good faith with a view to reaching early agreement on effective measures for the prohibition of their development, production and stockpiling and for their destruction, and on appropriate measures concerning equipment and means of delivery specifically designed for the production or use of chemical agents for weapons purposes.

Article X

(1) The States Parties to this Convention undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the use of bacteriological (biological) agents and toxins for peaceful purposes. Parties to the Convention in a position to do so shall also cooperate in contributing individually or together with other States or international organizations to the further development and application of scientific discoveries in the field of bacteriology (biology) for prevention of disease, or for other peaceful purposes.

(2) This Convention shall be implemented in a manner designed to avoid hampering the economic or technological development of States Parties to the Convention or international cooperation in the field of peaceful bacteriological (biological) activities, including the international exchange of bacteriological (biological) agents and toxins and equipment for the processing, use or production of bacteriological (biological) agents and toxins for peaceful purposes in accordance with the provisions of the Convention.

Article XI

Any State Party may propose amendments to this Convention. Amendments shall enter into force for each State Party accepting the amendments upon their acceptance by a majority of the States Parties to the Convention and thereafter for each remaining State Party on the date of acceptance by it.

Article XII

Five years after the entry into force of this Convention, or earlier if it is requested by a majority of Parties to the Convention by submitting a proposal to this effect to the Depositary Governments, a conference of States Parties to the Convention shall be held at Geneva, Switzerland, to review the operation of the Convention, with a view to assuring that the purposes of the preamble and the provisions of the Convention, including the provisions concerning negotiations on chemical weapons, are being realized. Such review shall take into account any new scientific and technological developments relevant to the Convention.

Article XIII

(1) This Convention shall be of unlimited duration.

(2) Each State Party to this Convention shall in exercising its national sovereignty have the right to withdraw from the Convention if it decides that extraordinary events, related to the subject matter of the Convention, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other States Parties to the Convention and to the United Nations Security Council three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

Article XIV

(1) This Convention shall be open to all States for signature. Any State which does not sign the Convention before its entry into force in accordance with paragraph (3) of this Article may accede to it at any time.

(2) This Convention shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the United States of America, the United Kingdom of Great Britain and Northern Ireland and the Union of Soviet Socialist Republics, which are hereby designated the Depositary Governments.
(3) This Convention shall enter into force after the deposit of instruments of ratification by twenty-two Governments, including the Governments designated as Depositaries of the Convention.
(4) For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Convention, it shall enter into force on the date of the deposit of their instruments of ratification or accession.
(5) The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession and the date of the entry into force of this Convention, and of the receipt of other notices.
(6) This Convention shall be registered by the Depositary Governments pursuant to Article 102 of the Charter of the United Nations.

Article XV

This Convention, the English, Russian, French, Spanish and Chinese texts of which are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of the Convention shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding states.
IN WITNESS WHEREOF the undersigned, duly authorized, have signed this Convention.
DONE in triplicate, at the cities of Washington, London and Moscow, this tenth day of April, one thousand nine hundred and seventy-two.

Source:
http://www.fas.org/nuke/control/bwc/text/bwc.htm

Table 1: Characteristics and Symptoms of Some Anti-Human Biological Agents[1]

Agent Type	Name of Agent	Rate of Action	Effective Dosage	Symptoms/Effects	Prophylaxis/Treatment
Bacteria	*Bacillus anthracis* ● Causes anthrax	*Incubation:* 1 to 6 days *Length of illness:* 1 to 2 days Extremely high mortality rate	8,000 to 50,000 spores	Fever and fatigue; often followed by a slight improvement, then abrupt onset of severe respiratory problems; shock; pneumonia and death within 2 to 3 days	Treatable, if antibiotics administered prior to onset of symptoms Vaccine available
	Yersinia pestis ● Causes plague	*Incubation:* 2 to 10 days *Length of illness:* 1 to 2 days Variable mortality rate	100 to 500 organisms	Malaise, high fever, tender lymph nodes, skin lesions, possible hemorrhages, circulatory failure, and eventual death	Treatable, if antibiotics administered within 24 hours of onset of symptoms Vaccine available
	Brucella suis ● Causes brucellosis	*Incubation:* 5 to 60 days 2% mortality rate	100 to 1,000 organisms	Flu-like symptoms, including fever and chills, headache, appetite loss, mental depression, extreme fatigue, aching joints, sweating, and possibly gastrointestinal symptoms.	Treatable with antibiotics No vaccine available

	Pasturella tularensis ● Causes tularemia ● Also known as rabbit fever and deer fly fever	*Incubation:* 1 to 10 days *Length of illness:* 1 to 3 weeks 30% mortality rate	10 to 50 organisms	Fever, headache, malaise, general discomfort, irritating cough, weight loss	Treatable, if antibiotics administered early Vaccine available
Rickettsiae	*Coxiella burnetti* ● Causes Q-fever	*Incubation:* 2 to 14 days *Length of illness:* 2 to 14 days 1% mortality rate	10 organisms	Cough, aches, fever, chest pain, pneumonia	Treatable with antibiotics Vaccine available
Viruses	Variola virus ● Causes smallpox	*Incubation:* average 12 days *Length of illness:* several weeks 35% mortality rate in un-vaccinated individuals	10 to 100 organisms	Malaise, fever, vomiting, headache appear first, followed 2 to 3 days later by lesions Highly infectious	Treatable if vaccine administered early Limited amounts of vaccine available <u>Note:</u> World Health Organization conducted a vaccination campaign from 1967 to 1977 to eradicate smallpox.
	Venezuelan equine encephalitis virus	*Incubation:* 1 to 5 days *Length of illness:* 1 to 2 weeks Low mortality rate	10 to 100 organisms	Sudden onset of fever, severe headache, and muscle pain Nausea, vomiting, cough, sore throat and diarrhea can follow	No specific therapy exists Vaccine available

	Yellow fever virus	*Incubation:* 3 to 6 days *Length of illness:* 1 to 2 weeks 5% mortality rate	1 to 10 organisms	Severe fever, headache, cough, nausea, vomiting, vascular complications (including easy bleeding, low blood pressure)	No specific therapy exists Vaccine available
Toxins	Saxitoxin ● Produced by blue-green algae commonly ingested by shellfish, mussels in particular	*Time to effect:* minutes to hours *Length of illness:* Fatal after inhalation of lethal dose	10 micrograms per kilogram of body weight	Dizziness, paralysis of respiratory system, and death within minutes	
	Botulinum toxin ● Causes botulism ● Produced by *Clostridium botulinum* bacterium	*Time to effect:* 24 to 36 hours *Length of illness:* 24 to 72 hours 65% mortality rate	.001 microgram per kilogram of body weight	Weakness, dizziness, dry throat and mouth, blurred vision, progressive weakness of muscles Interruption of neurotransmission leading to paralysis Abrupt respiratory failure may result in death	Treatable with antitoxin, if administered early Vaccine available
	Ricin ● Derived from castor beans	*Time to effect:* few hours *Length of illness:* 3 days High mortality rate	3 to 5 micrograms per kilogram of body weight	Rapid onset of weakness, fever, cough, fluid build-up in lungs, respiratory distress	No antitoxin or vaccine available

	Staphylococcal enterotoxin B (SEB) ● Produced by *Staphylococcus aureus*	*Time to effect:* 3 to 12 hours *Length of illness:* Up to 4 weeks	30 nanograms per person	Fever, chills, headache, nausea, cough, diarrhea, and vomiting	No specific therapy or vaccine available

Anti-Plant Biological Agents[1]

Rice Blast

- Fungal disease causing lesions on leaves
- Up to 60% crop losses possible

Stem Rust

- Fungal disease affecting cereal crops (e.g., wheat, barley)
- Produces pustules on stems, leaves
- Can cause significant crop losses

Sugarbeet Curly Top Virus

- Viral disease causing dwarfed leaves and swollen veins
- Transmitted by beet leafhopper, an insect that can migrate over long distances and attack many different types of plants
- Can be controlled through insecticides

Tobacco Mosaic Virus

- Viral disease affecting wide range of plant species
- Causes leaf blotching in mosaic patterns and stunted growth in younger plants

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Anti-Animal Biological Agents[1]

Aspergillus

- Fungal disease caused by Aspergillus fumigatus infecting poultry
- Causes lethargy, loss of appetite, and, in extreme cases, paralysis

Foot and Mouth Disease

- Highly contagious viral disease infecting cloven hooved animals (e.g., cattle, pigs, sheep, goats)
- Up to 50% mortality rates in young animals; can cause dramatic production decreases in adults
- Incubation period generally between 2 and 8 days
- Causes fever, loss of appetite, interruption in milk production, blisters (particularly around feet and mouth)
- Considered one of the most feared animal diseases because of its high degree of contagiousness and the large number of species affected

Heartwater

- Caused by rickettsia Cowdria ruminantium
- Disease attacks ruminants, including cattle, sheep, goats and deer
- Transmitted by ticks
- Mortality rates range from 40% to 100%
- Results in loss of appetite, respiratory distress
- No effective treatment or vaccine available

Newcastle Disease

- Highly contagious viral disease infecting poultry
- Causes gastrointestinal, respiratory and nervous problems
- Up to 100% mortality rate
- Incubation period generally between 5 and 6 days; in severe cases, birds can die within 1 or 2 days
- Vaccine available

Rinderpest

- Highly contagious viral disease infecting cattle
- Also referred to as cattle plague
- Spread primarily through direct contact and infected drinking water
- Causes fever, frothy saliva, diarrhea
- Vaccine available

Source: http://www.stimson.org/cwc/bwagent.htm

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