

Biological Warfare in World War II

Lecture No. 3

1. Outline

- The French Programme
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2. The French Programme 1935 – 1940 (i)

- Probably influenced by its position as the Depositary State for the 1925 Geneva Protocol, France's programme was relatively dormant between 1926 and 1934
- The research seems to have been reduced to technological monitoring to retain an adequate scientific capability particularly in regard to defence against biological attack
- By 1934 German rearmament led to a renewed concerns about biological attacks. Trials were undertaken of the use of non-pathogenic bacteria in the Paris Metro and botulinum toxin was added to the list of agents that might be used
- By 1937 increasing concerns about war with Germany led to the establishment of a specialist laboratory at Le Bouchet

3. The French Programme 1935 – 1940 (ii)

- In 1938 a plenary session of the oversight committee heard reports on the dispersion of botulinum toxin in the air and on protection against ricin. Results of the experiments on the Paris Metro led to the view that epidemics could be generated in the civilian population
- The programme accelerated significantly in 1939 and considered both attacks and defence against ricin and attacks on German staple food crops by beetles and fungal agents. Work was also done on projectiles contaminated with tetanus or gangrene to attack human beings
- In early 1940 it was reported that it was quite feasible to infect cattle using aerosols of bovine plague virus

4. The British Programme in World War II (i)

- Because of similar concerns to France the UK's Committee of Imperial Defence established a Bacteriological Warfare Subcommittee in November 1936
- The UK had ratified the Geneva Protocol in 1930. Like many other states it had entered reservations that meant that it was bound only in regard to other parties and only if such states and their allies remained bound by the prohibition
- In late 1939 the Bacteriological Warfare Subcommittee reconvened as the War Cabinet Committee on Biological Warfare and it was authorised also to consider work "from the offensive angle"
- The work in the UK was strongly linked with Canadian activities and later with those in the US

5. The British Programme in World War II (ii)

- Canada was involved with the British biological warfare programme because of its links with the British military and government, and its excellent scientists including Sir Frederick Banting
- Banting had received the Nobel Prize for Physiology and Medicine as the co-discoverer of insulin in 1923, and ran an outstanding medical research laboratory at the University of Toronto. He had prestige and connections
- In 1937 concerned again about reports of German activities, Banting prepared a detailed analysis of potential biological attacks – which he considered a grave and immediate threat

6. The British Programme in World War II (iii)

- On the outbreak of war Banting led a mission to the UK where his main concern was pursuing biological warfare issues. He was killed in 1941 when flying again to the UK to deal, in part, with biological warfare issues
- By that time, however, he had engaged a number of other outstanding Canadian scientists in work on biological warfare
- Banting's view was that "the only safe defensive position against any weapon is afforded by a thorough understanding which can only be gained by a complete preparation for the offensive use of that weapon"

7. The British Programme in World War II (iv)

- In August 1940 after the fall of France a new department to deal with biological warfare was set up at Porton Down where the Chemical Defence Experimental Station was located. The new department was headed by Paul Fildes who had been head of the Bacterial Chemistry Unit at the Middlesex Hospital
- The immediate need was seen to be a requirement for a retaliatory deterrent. This need was met by the production of an anthrax anti-animal weapon which could significantly damage Germany's vulnerable wartime agriculture
- Experiments were carried out to determine the anthrax lethal doses for sheep, horses and cattle and it was shown that these animals could locate and eat randomly distributed linseed meal cattle cakes spread on pasture land

8. The British Programme in World War II (v)

- Cattle cakes were made by a London soap maker and sent to Porton in weekly batches of 250,000. A simple machine injected 0.05ml of a 10^{10} ml spore suspension into each cake and the cake was sealed and dried.
- The required 5 million anthrax-laced cakes were made in late 1942 and early 1943 and boxed up in 400s.
- Estimates were made of the proportion of land devoted to grazing in Germany, the likely number of cattle and operational flying heights and speeds.
- One type of attack scenario envisaged a massive single raid by 1250 aircraft each with 9 – 10 boxes of cakes which would be disseminated over a 18 to 20 minute run at 200mph.

9. The British Programme in World War II (vi)

- Whilst the anti-animal weapon was being developed Fildes and his colleagues concentrated their research on producing an anti-personnel biological weapon
- Consultation with the chemical weapons experts at Porton led to the conclusion that the best method of infecting people was through the respiratory tract. So if a biological agent could be aerosolised from a munition such an infection might best be achieved
- An apparatus was devised to produce bacterial clouds in the laboratory and it was shown that experimental animals could easily be infected
- Anthrax was chosen for most work for obvious reasons. The agent was code named “N”

10. The British Programme in World War II (vii)

- It was necessary to test if similar effects could be achieved in field tests using bursting munitions as had been found in the laboratory at Porton. Thus tests were made on an isolated island off the coast of Scotland
- A team from Porton and the services carried out the tests in the summer of 1942. They were to “ascertain the feasibility of producing lethal effects by explosion of a modified 30lb..bomb charged with a suspension of anthrax spores.”
- The bomb was suspended four feet off the ground and detonated electronically. Sheep and air-sampling devices were set out in arcs downwind of the device. A series of tests showed that the lethal effect was attained at least 250 yards downwind of the explosion

11. The British Programme in World War II (viii)

- A weapons test was carried out on an isolated shore off the coast of Wales in October 1942
- The bomb was dropped by a Blenheim bomber flying at 4950 feet. The single bomb fell some 20 yards upwind of the intended aim point. Sheep placed in 120 and 320 yard (110 metre and 295 metre) arcs subsequently died of anthrax
- The trial showed that anti-personnel biological warfare was feasible. The defined minimum lethal dose (LD50) for sheep showed that there was a serious risk downwind at 500 yards
- On a weight-for-weight basis the anthrax bomb was 100-1,000 times more potent than any chemical weapons agent available to the British at that time

12. The Japanese Programme before and during World War II (i)

- Military medical doctor Ishii Shiro undoubtedly played a leading role in this large scale attempt to develop and use biological weapons
- After hearing about the 1925 Geneva Protocol Ishii reasoned that “if the weapons were placed on a forbidden list, then Japan should possess them in order to acquire an advantage over its opponents in future wars”.
- There were four major offensive biological warfare units. The most well-known is Unit 731 in Ping Fan Manchuria. If ancillary units are added perhaps some 15,000 people were involved in total
- After the war the US gave immunity to those involved in exchange for information gained during the programme

13. The Japanese Programme before and during World War II (ii)

- Ishii clearly understood that he was involved in flouting conventional morality in the biological research that he carried out
- He is reported to have stated on numerous occasions that:
 - “There are two types of bacteriological warfare research, A and B. A is assault research, and B is defence research. Vaccine research is of the type B, and that can be done in Japan. However, A type research can only be done abroad...”
- Ishii was able to carry out type A research when he was posted to Manchuria in 1932. This involved large scale tests of potential agents on prisoners
- Ishii also invented a water purification system which was used extensively by Japanese armed forces during the war

14. The Japanese Programme before and during World War II (iii)

- This offensive programme was huge. Ishii's annual operating budget was 10 million yen or more for many years. The establishment at Ping Fan had at least 76 substantial buildings including the enormous "administrative" block
- Kitano Masaji was Ishii's second in command and eventually succeeded him as commander at Ping Fan from 1942. Masaji is said to have been a bitter rival of Ishii's, but a much better scientist
- Wakamatsu Yujiro was a veterinarian who commanded Unit 100 in a suburb of Changchun. This unit's main concern was animal and plant biological warfare
- Masuda Tomosada headed Unit 1644 In Nanking. He was a friend of Ishii and supported his activities in a number of ways

15. The Japanese Programme before and during World War II (iv)

- Ishii's unit was able to produce large quantities of bacteria using methods he devised. In 1939 production capacity for anthrax was 500 – 600 kilograms and for plague 300 kilograms
- The main aim of the offensive research was to determine the minimum dose necessary to infect 50 per cent of humans struck by the disease (MD50) for every biological warfare agent
- Much work was also undertaken on crop destruction agents. Fungi, bacteria, and nematodes were studied, particularly for the effects on practically all grains and vegetables, especially those grown in Manchuria and Siberia
- Viruses and rickettsia were not considered as Ishii's unit did not have the necessary production facilities, and only limited work was done on toxins

16. The Japanese Programme before and during World War II (v)

- Three types of dispersion techniques were tried: artillery shells, aircraft spraying and air delivered bombs. The bomb tests were considered the most successful and numerous types were developed
- In 1939 Japanese forces suffered a series of heavy defeats in fighting with Soviet forces and Ishii was given permission to spread salmonella and typhoid in Soviet positions by saboteurs. Artillery shells were also used
- Unit 731 was commended for this operation and between 1939 and 1942 a series of field trials of biological weapons were carried out in China
- Typhoid, cholera, anthrax and plague were all used in various major operations in different areas – to devastating effect in some cases

17. The US Programme in World War II (i)

- The US had promoted and signed the 1925 Geneva Protocol, but it had not been possible to gain ratification in the Senate. Thus the US was not formally bound by this treaty obligation during the war
- However, the President supported the principles of the protocol and there was considerable doubt about the possibility of biological warfare before the war
- Intelligence reports, including those concerning Japanese activities in China, began to change this perception as the US moved closer to involvement in the war
- A special committee was set up in the autumn of 1941 and its first report in February stated that “Biological Warfare is regarded as distinctly feasible...”

18. The US Programme in World War II (ii)

- The 1942 report of the special committee listed anti-personnel and anti-animal Agents as follows:
 - Anti-personnel: plague, smallpox, dengue fever, yellow fever, various forms of encephalitis and malaria;
 - Anti-animal: rinderpest, foot-and-mouth disease and fowl plague
- Plant diseases and insect pests were also of concern and were said to warrant study for defensive and offensive possibilities
- In a second report of June 1942 the surprising omissions of anthrax and botulinum toxin were corrected

19. The US Programme in World WAR II (iii)

- From the start the programme was top secret and gave equal consideration to offense as to defence. Indeed the best defence was considered to be the ability to react effectively and massively
- Collaboration with the British began in 1942 and at least 8 bacteriologist commissioned into US forces spent time at Porton Down. In May 1943 the UK provided all of its biological warfare results to the US and Canada
- This summary sent by the UK included the data from its 1942 trials of anthrax. In 1943 the US sent a serving officer to be part of the team carrying out further trials in Scotland

20. The US Programme in World War II (iv)

- US concerns about biological warfare were raised in 1944 – 45 by the descent of hundreds of hot air balloons sent from Japan across the Pacific onto the West Coast. Some intelligence officers thought that these might be charged with anti-plant biological agents
- By the end of the war the US programme had produced anti-plant agents thought likely to be effective:
 - Brown spot of rice (code named E)
 - Rice blast (code named IR)
 - Plant growth regulator (code named LN)
- Plans were made to destroy 30 per cent of Japanese rice crops by 1946, but the plans were shelved because of possible Japanese retaliation

Sample Questions

- 1. Compare and contrast the British and Japanese biological warfare programmes of the 1930s and 1940s.**
- 2. The role of major scientists has always been critical in the foundation and development of offensive biological warfare programmes. Discuss.**
- 3. Why did the British come to the view that biological weapons were many times more potent than any chemical weapons agent they had available during World War II?**
- 4. Why has anthrax been selected as a biological weapons agent in all the offensive biological weapons programmes we know of in the historical record?**

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