# Biological Warfare in World War II

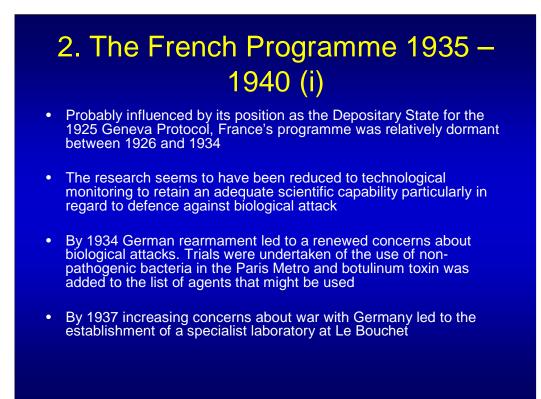
Lecture No. 3



Notes: The aim of this lecture is to review what might be called the second generation of biological warfare programmes. These produced the first effective biological weapons and the first attempts to use modern biological weapons against people. Unless stated otherwise the main source for the lecture is the SIPRI Volume No 18 as in lecture 2.

Ref:

Geissler, E., and van Courtland Moon, J. (2001) *Biological and Toxin Weapons Research, Development and Use from the Middle Ages to 1945* (SIPRI Chemical & Biological Warfare Studies No. 18). Oxford: Oxford University Press.



Notes: The point that is important for students to grasp is that France was responding to fears about German activities. Actually Germany had little interest in offensive biological warfare in World War II, but this was not clear to its adversaries at the time. For further analysis of the failure of intelligence, see chapter 8 of Dando, M. R. (2006) *Bioterror and Biowarfare: A Beginner's Guide*. Oxford: One World.

# 3. The French Programme 1935 – 1940 (ii)

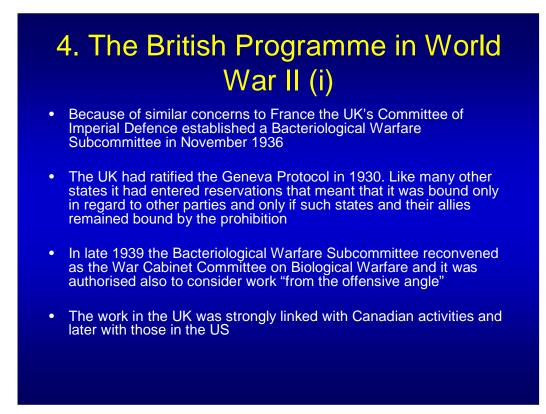
- In 1938 a plenary session of the oversight committee heard reports on the dispersion of botulinum toxin in the air and on protection against ricin. Results of the experiments on the Paris Metro led to the view that epidemics could be generated in the civilian population
- The programme accelerated 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

Notes: Clearly in a few years before the German occupation France had explored a very wide range of possible uses of biological weapons against humans, animals and plants.

## Ref:

Centre d'Etudes du Bouchet (CEB), Vert-le-Petit, Commission de Prophylaxie veterinaire contre la guerre modern, proces-verbal no 3, reunion du 10 fevrier 1949 a l'etat-major de la defense nationale [Commission for Veterinary Prophylaxis against Modern Warfare, Minutes no. 3, meeting of 10 Feb. 1949at the National Defence Headquarters] pp. 3-4

Cited at p. 87 Lepick, O. (1999) 'French activities related to biological warfare, 1919-45', In: Geissler, E. and van Courtland Moon, J. E. (eds.) *Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945.* SIPRI Chemical & Biological Warfare Studies, no.18. Oxford: Oxford University Press. pp. 70-90.



Notes: What is clear once again in the British example is the impact of the 1925 Geneva Protocol initially conditioning a defensive response, but then fears of German activities leading to a perceived need for a retaliatory deterrent.

Ref:

Balmer, B. (2001) *Britain and Biological Warfare: Expert Advice and Science Policy, 1930-65*, New York: Palgrave Macmillan.

Carter, G. B., and Pearson, G. S (2001). 'British Biological Warfare and Biological Defense: 1925-45', in Geissler, E., and van Courtland Moon, J. (eds.) *Biological and Toxin Weapons Research, Development and Use from the Middle Ages to 1945* (SIPRI Chemical & Biological Warfare Studies No. 18). Oxford: Oxford University Press. pp. 168-189.

## 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

Notes: Banting was an influential scientist and was important in raising concerns about biological warfare in Canada and the UK. Banting's involvement in biological warfare has been discussed in detail by Jeanne Guillemin

Ref:

Guillemin, J. (2007) *Biological Weapons: From the Invention of State-Sponsored Programs to Contemporary Bioterrorism*, New York: Columbia University Press.

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

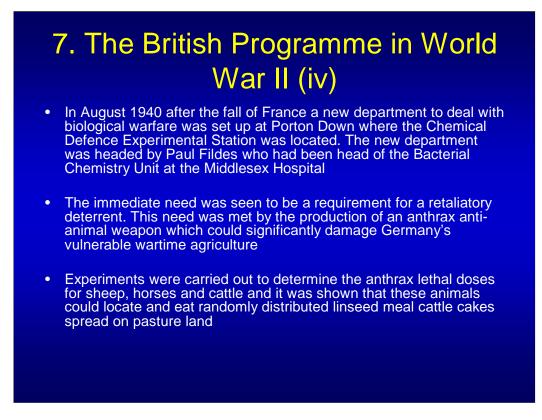
- On the outbreak of war Banting led a mission to the UK where his main concern was pursuing biological warfare issues. He was killed in 1941 when flying again to the UK to deal, in part, with biological warfare issues
- By that time, however, he had engaged a number of other outstanding Canadian scientists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

Notes: The Canadian link with the UK and the US in biological warfare activities was important during and after the war. For details see Avery's account in SIPRI No 18.

## Ref:

Avery, D. (1999) 'Canadian Biological and Toxin Warfare Research, Development and Planning', in Geissler, E., and van Courtland Moon, J. (Eds.), *Biological and Toxin Weapons Research, Development and Use from the Middle Ages to 1945* (SIPRI Chemical &

Biological Warfare Studies No. 18). Oxford: Oxford University Press. pp. 190-214 at p. 197



Notes: It is important to stress to students that a careful experimental approach was used in this British programme to ensure that useable and effective weapons were available if needed.

Ref:

Hammond, P. M., and Carter, G. (2002) *From Biological Warfare To Healthcare: Porton Down 1940-2000*, New York: Palgrave Macmillan.

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

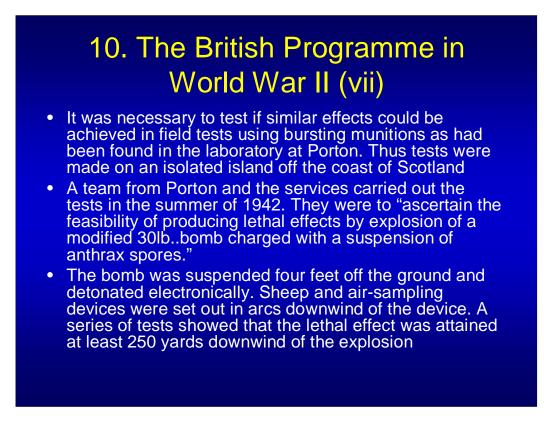
- Cattle cakes were made by a London soap maker and sent to Porton in weekly batches of 250,000 A simple machine injected 0.05ml of a 10<sup>10</sup> ml spore suspension into each cake and the cake was sealed and dried
- The required 5 million anthrax-laced cakes were made in late 1942 and early 1943 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

Notes: Anti-agriculture attacks are not what most people will first think of when discussing biological warfare, but the open literature has a number of detailed examples of scientific analyses of how biological weapons could be used to destroy staple crops and animal husbandry.

# 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 muniton 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"

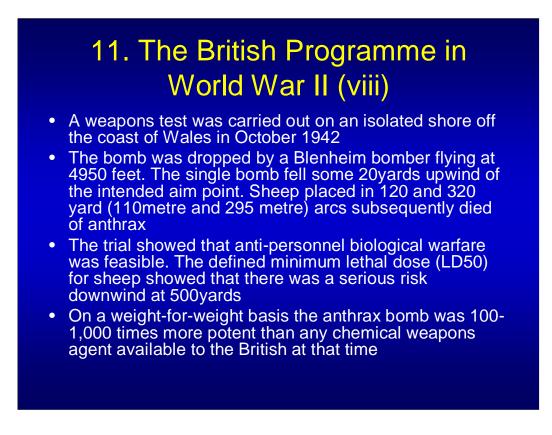
Notes: This was the crucial discovery that led to similar conclusions and attempts to produce aerosolising weapons in subsequent offensive programmes.



Notes: These tests clearly confirmed what had been found in the laboratory, but a real weapons test was still required.

Ref:

Center for Disease Control and Prevention (2006) 'History of Bioterrorism: Anthrax', *Podcasts at the CDC* [Online] CDC [retrieved at 15 June 2009]. Available from http://www2a.cdc.gov/podcasts/player.asp?f=1#

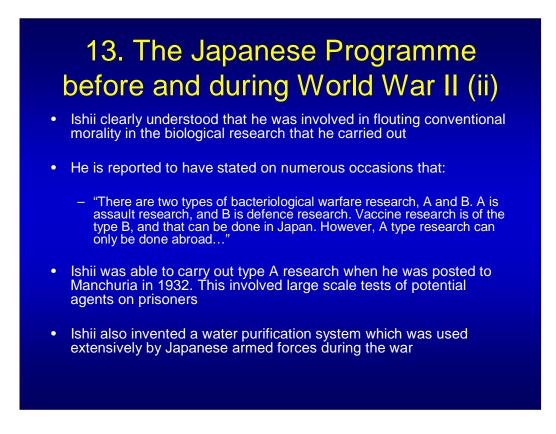


Further details of the British work in World War II are available in Pearson's chapter in SIPRI No18 and the more detailed books noted in the links in previous slides.

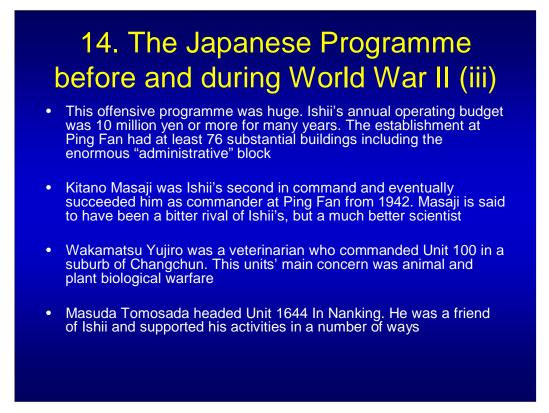
## 12. The Japanese Programme before and during World War II (i) Military medical doctor Ishii Shiro undoubtedly played a leading role in this large scale attempt to develop and use biological weapons After hearing about the 1925 Geneva Protocol Ishii reasoned that "if the weapons were placed on a forbidden 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.
- 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

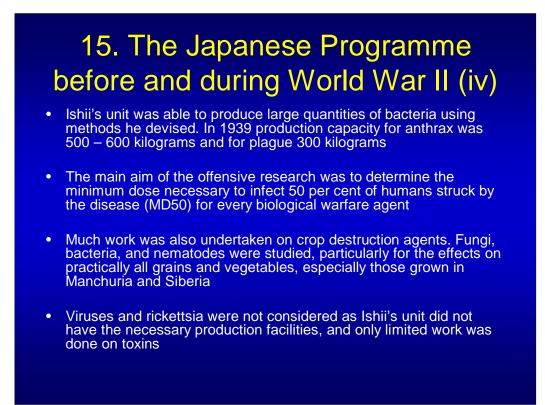
Notes: The following slides are developed mainly from Seldon Harris' article in SIPRI No 18. Two major books by Harris and Peter Williams and David Wallace are available in English, but much probably remains obscure.



Notes: As we shall see in more detail when we examine the accounts of the post war Soviet programme, some scientists clearly understood what they were doing. Others had various levels of knowledge and concern.



Notes: This slide is intended to give an idea of the size and scope of the programme and of the number of scientists involved.



Notes: Clearly this was a wide ranging programme. However, it does not seem to have been well directed and coordinated so as to achieve a viable weapon. Nevertheless, field trials were carried out on a very large scale as shown on the next slide.

# 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

Notes: Much remains unclear about this programme, but undoubtedly it was a serious and often gruesome effort to effectively develop and utilise biological warfare.

## Ref:

Table 7.5 produced in Harris, S (1999) 'The Japanese biological warfare programme: an overview', In: Geissler, E. and van Courtland Moon, J. E. (eds.) *Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945.* SIPRI Chemical & Biological Warfare Studies, no.18. Oxford: Oxford University Press. pp.127-152

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

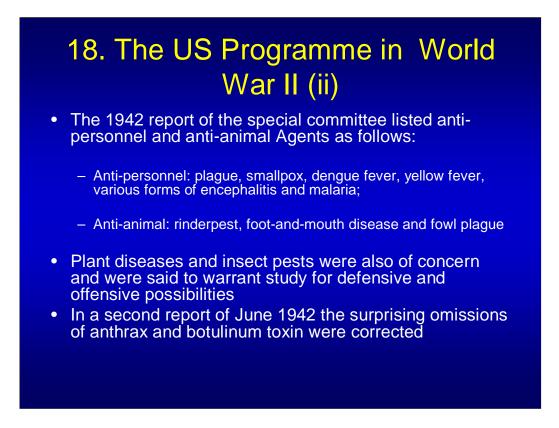
- The US had promoted and signed the 1925 Geneva Protocol, but it had not been possible to gain ratification in the Senate. Thus the US was not formally bound by this treaty obligation during the war
- However, the President supported the principles of the protocol and there was considerable doubt about 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..."

Notes: This and the following slides are taken from Moon's chapter in SIPRI No 18.

Ref:

The unpublished manuscript *The Hisorical Report of the War Research Office, November 1944 Final.* pp. 18-40.

Cited at p. 219 in van Courtland Moon, J. E. (1999) 'US biological warfare planning and preparedness: the dilemmas of policy', In: Geissler, E. and van Courtland Moon, J. E. (eds.) *Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945.* SIPRI Chemical & Biological Warfare Studies, no.18. Oxford: Oxford University Press. pp. 215-254

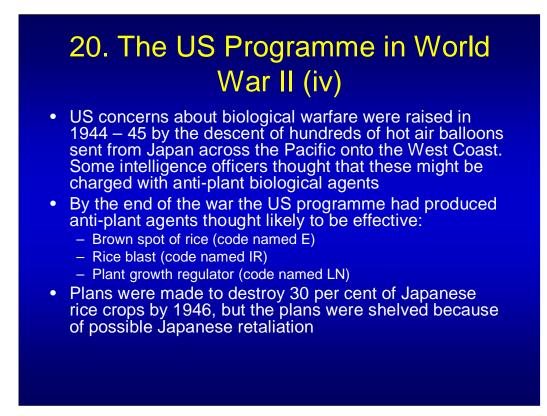


Notes: The committee was chaired by a civilian Professor of Bacteriology and included a number of other civilian scientists as well as military personnel.

## 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

Notes: This cooperation began a long term association between the UK, US and Canada in the study of offensive and defensive biological warfare.



Notes: The US did not have a long time during the war to investigate biological warfare, but the basis was laid for a massive programme that followed the war (see the next lecture).

Ref:

Whitby, S. (2002) *Biological Warfare against Crops*, New York: Palgrave Macmillan.

Rogers, P., Whitby, M., Dando, M. (1999) "Biological Warfare Against Crops", *Scientific American* **280**(6) pp. 62-67.

## **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?

## References

### (Slide 1)

Geissler, E., and van Courtland Moon, J. (2001) Biological and Toxin Weapons Research, Development and Use from the Middle Ages to 1945 (SIPRI Chemical & Biological Warfare Studies No. 18). Oxford: **Oxford University Press.** 

#### (Slide 2)

Dando, M. R. (2006) *Bioterror and Biowarfare: A Beginner's Guide.* Oxford: One World.

#### (Slide 3)

Centre d'Etudes du Bouchet (CEB), Vert-le-Petit, Commission de Prophylaxie veterinaire contre la guerre modern, proces-verbal no 3, reunion du 10 fevrier 1949 a l'etat-major de la defense nationale [Commission for Veterinary Prophylaxis against Modern Warfare, Minutes no. 3, meeting of 10 Feb. 1949at the National Defence Headquarters] pp. 3-4

Cited at p. 87 Lepick, O. (1999) 'French activities related to biological warfare, 1919- 45',. In: Geissler, E. and van Courtland Moon, J. E. (eds.) Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945. SIPRI Chemical & Biological Warfare Studies, no.18. Oxford: Oxford University Press. pp. 70-90.

(Slide 4)

Balmer, B. (2001) Britain and Biological Warfare: Expert Advice and Science Policy, 1930- 65, New York: Palgrave Macmillan.

Carter, G. B., and Pearson, G. S (2001). 'British Biological Warfare and Biological Defense:1925-45', in Geissler, E., and van Courtland Moon, J. (eds.) *Biological and Toxin Weapons* 

Research, Development and Use from the Middle Ages to 1945 (SIPRI Chemical & Biological Warfare Studies No. 18). Oxford: Oxford University Press. pp. 168-189.

(Slide 5)

Guillemin, J. (2007) *Biological Weapons: From the Invention of State-Sponsored Programs to Contemporary Bioterrorism*, New York: Columbia University Press. (Slide 6)

Avery, D. (1999) 'Canadian Biological and Toxin Warfare Research, Development and Planning', in Geissler, E., and van Courtland Moon, J. (Eds.), *Biological and Toxin Weapons* 

Research, Development and Use from the Middle Ages to 1945 (SIPRI Chemical & Biological Warfare Studies No. 18). Oxford: Oxford University Press. pp. 190-214 at p. 197

(Slide 7)

Hammond, P. M., and Carter, G. (2002) *From Biological Warfare To Healthcare: Porton Down 1940-2000*, New York: Palgrave Macmillan.

(Slide 10)

Center for Disease Control and Prevention (2006) 'History of Bioterrorism: Anthrax', *Podcasts at the CDC* [Online] CDC [retrieved on 15 June 2009]. Available from http://www2a.cdc.gov/podcasts/player.asp?f=1# (Slide 12)

Harris, S. (2002) Factories of Death: Japanese Biological Warfare 1932-45 and the American Cover-up, London: Routledge

Williams, P., and Wallace, D. (1989) *Unit 731: The Japanese Amry's Secret of Secrets*, London: Hodder & Stoughton

(Slide 16)

Harris, S (1999) 'The Japanese biological warfare programme: an overview', In: Geissler, E. and van Courtland Moon, J. E. (eds.) *Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945.* SIPRI Chemical & Biological Warfare Studies, no.18. Oxford: Oxford University Press. pp.127-152 (Slide 17)

The unpublished manuscript *The Hisorical Report of the War Research Office, November 1944 Final.* pp. 18-40.

- Cited at p. 219 in van Courtland Moon, J. E. (1999) 'US biological warfare planning and preparedness: the dilemmas of policy', In: Geissler, E. and van Courtland Moon,
- J. E. (eds.) Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945. SIPRI Chemical & Biological Warfare Studies, no.18. Oxford: Oxford University Press. pp. 215- 254

(Slide 20)

Whitby, S. (2002) *Biological Warfare against Crops*, New York: Palgrave Macmillan.

Rogers, P., Whitby, M., Dando, M. (1999) "Biological Warfare Against Crops", *Scientific American* 280(6) pp. 62-67. This document was created with Win2PDF available at <a href="http://www.win2pdf.com">http://www.win2pdf.com</a>. The unregistered version of Win2PDF is for evaluation or non-commercial use only. This page will not be added after purchasing Win2PDF.