‘Public Health in Reverse’: History, Innovation and the Dual-Use Problem of Biological and Chemical Warfare

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Problem of Dual-use

e.g. Thiodiglycol
- mustard gas and ball-point pen ink

e.g. Ricin (Fatal toxin extracted from castor beans)
- Industrial applications (e.g. in manufacture of paint resins, varnishes, nylon-type synthetic polymers, cosmetics and insecticides).
Context of Case Study

• Case study co-authored with Dr Caitriona McLeish (Sussex University)
• Commissioned for a project funded by UK FCO and US DTRA
• All but 2 cases are of emerging technologies
• Cases all focus on problem of ‘dual-use’
Two Generations of Nerve Gas

- Highly toxic compounds initially synthesised in Germany and the UK during the course of civil pesticide research then transferred to the military
  - G-agents (e.g., Tabun, Sarin etc) in Germany in late 1930s
  - V-agents (e.g., VX) in the UK in early 1950s
IG Farben

• World’s largest chemical firm formed in Germany in 1925
• Reluctant to become involved in chemical warfare research or manufacturing – fear of bad publicity
• Site of the discovery of first G-agent and later IG Farben establishes a manufacturing plant for the nerve agent
IG Farben and Pesticide Research
(See J. Tucker War of Nerves)

- Dr Gerhard Schrader – head of plant protection from 1934
- Synthesized candidate toxic substances and passed on to Dr Hans Kukentahl (biologist) to test. Schrader disappointed by the toxicology results because most promising compound was too poisonous to warm-blooded mammals to be marketed as a commercial insecticide.
- Results passed to War Office as required by Reich official ordinance
From G Agents
To V Agents
V-series agents

- Class of highly toxic organophosphorus compounds initially synthesised in the UK during the course of civil pesticide research

- Pesticide research at Plant Protection Ltd (PPL) produced ‘Amiton’

- Technology transfer from PPL (via ICI) to military took place between 1951 and 1953, most probably in late 1952 or early 1953
Military Context

• Cold War
• Post WWII – UK defence policy gives equal priority to chemical, biological, atomic research
• Recovery of German nerve agents (G-agents) spurs research at Chemical Defence Experimental Establishment (CDEE), Porton Down, Wiltshire
Industrial Context

• Historical links between chemical industry and the military

• After World War 2, the pesticide and insecticide industries expanded rapidly, with work on organophosphorus compounds undertaken by many firms.

• Between 1952-53 at least three firms came upon a group of organophosphate esters that had very potent insecticidal activity especially against mites
CDEE Search for New Agents

• Early 1950s: suggestions that work on G-agents showing diminishing returns;

• CDEE’s own search for new agents regarded as ‘empirical’ and haphazard:

“The methods of approach at the moment are mainly empirical and, in short of a staff out of all proportion greater than we can afford, only the fringes can be touched. In consequence, success depends largely on a stroke of luck. This state of affairs is regarded by all concerned as dangerous and unsatisfactory.”

TNA WO 188/2716 Letter to James Davidson Pratt, Association of British Chemical Manufacturers from AE Childs, DCDRD, Ministry of Supply (4 January 1951)
Military-Industry Links

- Early 1951: Ministry of Supply officials write directly to firms and to the Association of British Chemical Manufacturers (ABCM)
  - Request information on newly discovered highly toxic compounds
  - Produces little response due to industry concerns about commercial secrecy
Working Around Secrecy

New letter writing campaign in 1953 with assurances of secrecy: compounds given a “C number” by Ministry, to protect identity of firms:

“We should therefore appreciate the co-operation of industrial and other research organisations in providing us with data on the synthesis and properties of any new compounds which you prepare (or extract from natural products) and which show high toxicity or toxicity associated with new molecular structures or toxicity of a novel type.”
“We have been very grateful for the co-operation of the I.C.I in the past and hope very much that we can count on it in the future. For your own private information the last item received from you has now been put well within the barbed wire fence and is receiving much attention.”

TNA, WO 188/2721. Letter J McCaulay to RM Winter, Research Controller, Messrs ICI Ltd, Nobel House, Buckingham Gate (15 July 1953)
Amiton

- Discovered by scientists Ghosh and Newman
- Working for Plant Protection Ltd, a subsidiary company of I.C.I. and Cooper, McDougall and Robertson (CMR)
- A form of Amiton was later launched onto the market as an insecticide in 1957 as Tetram or ICI Amiton
- Withdrawn from market as highly toxic to humans and high percutaneous toxicity
Amiton at Porton

- 29 April 1953 – Amiton is coded as C11
- C11 discussed at the November 1953 meeting of the Chemical Defence Advisory Board (CDAB):

“There had, thus, appeared an entirely new lead in the nerve gas field, when it was thought to have been completely circumscribed, and it was inevitable that new light would be thrown on the structure/activity relationships.”

By May 1954 the UK had informed their counterparts in the USA and Canada of the new agents.

By November 1955 the agents referred to in UK documents as the V (venomous) agents [Amiton: VG]
VX and the US Military

• In February 1957 the Army Research and Development Command selected agent VX as the most promising for weaponisation.
• Production at Newport Plant, Indiana from 1961-1968.
“We do of course occasionally find compounds which are exceptionally toxic to mammals... but as you appreciate this is the signal for doing no further work on the subject and usually our information at this stage is meagre.”

TNA WO 188/2716, G.S. Hartley (Director of Research) to E.E. Haddon, Director of Chemical Defence Research & Development, Ministry of Supply, June 4, 1957.
Governance

• From V-agent case study:
Civil-military overlap and toxicity of compound did not ensure that particular transfer or future transfers.

Links continually forged and re-forged: problems of commercial secrecy; repeated letter-writing campaigns; different research agendas.