Bioterrorism: threats and prevention.

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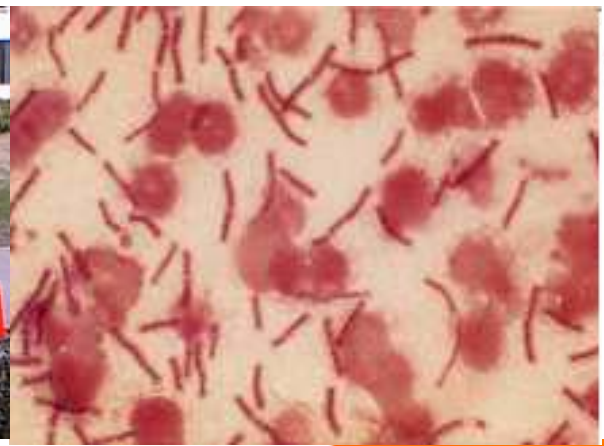


Bioterrorism

The deliberate release of a biological toxin or infectious agent to cause infection or economic disruption

History of bioterrorism

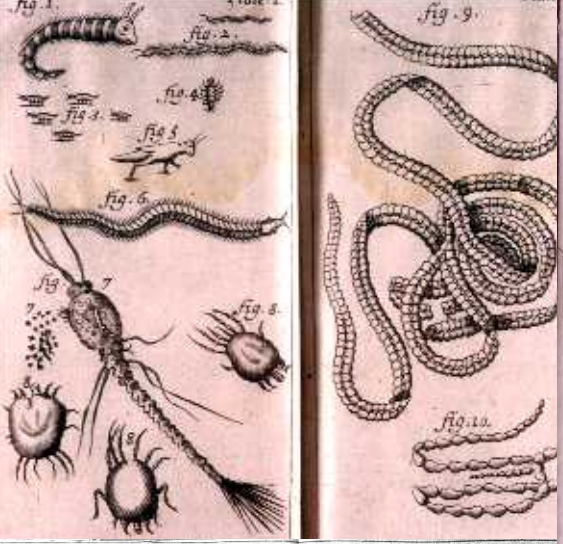
Cadavers or animal carcasses used throughout history to contaminate wells, reservoirs, and other water sources.

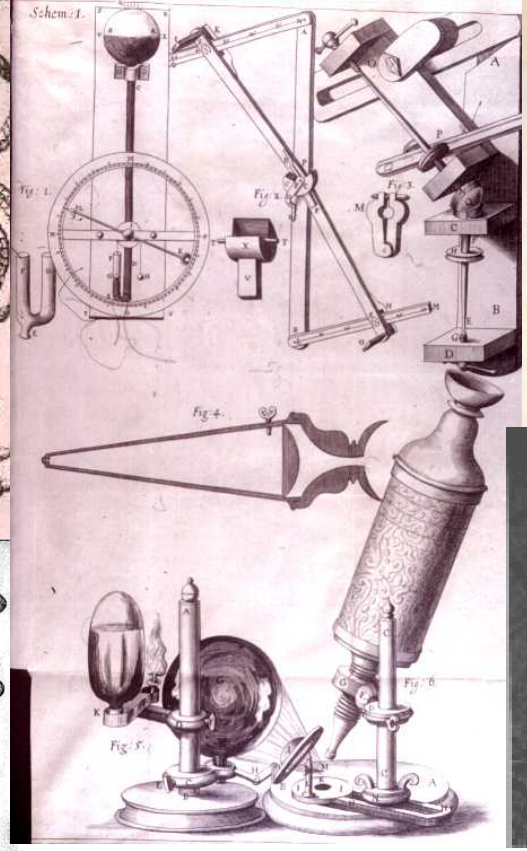
14th century siege of Kaffa (Foedossia, Ukraine)

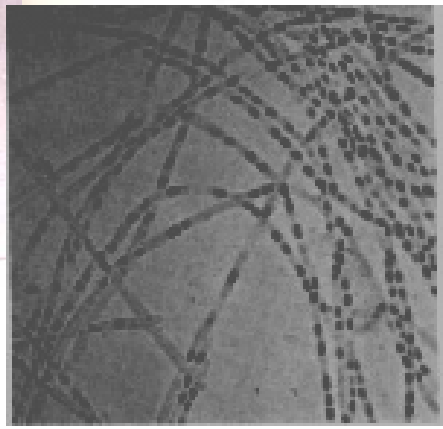
plague infected cadavers catapulted into the city

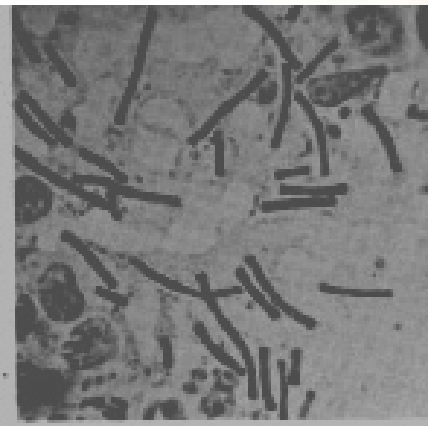
outbreak of plague preceded the conquest of the city

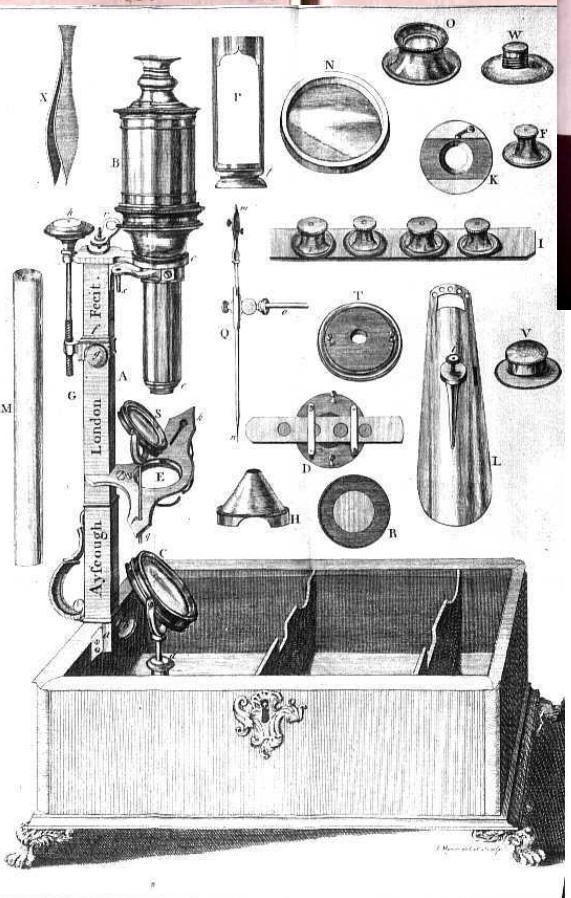
1750s Sir Jeffrey Amherst in North America gave small pox infected blankets to “reduce” tribes hostile to the British.





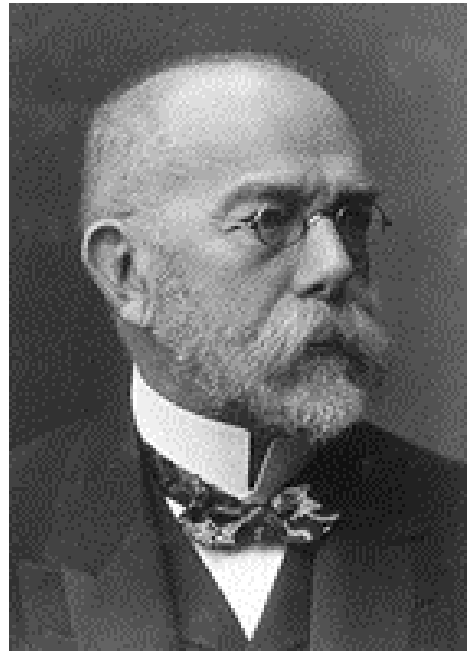






By the19th Century, medical and microbiological developments led to great increase in the understanding of infectious agents.

1877 Robert Koch in Germany cultured and observed *Bacillus anthracis*.



1881 Louis Pasteur in France demonstrated a protective anthrax vaccine in sheep

Germany WW1

Well developed biological warfare programme during WW1

Covert release of animal feed contaminated with the causative agents of anthrax (*Bacillus anthracis*) and glanders (*Burkholderia mallei*)

Sugar cube discovered in the luggage of Baron Otto von Rosen in Oslo 1917 suspected of being involved with espionage.

Redmond *et al*. Nature 1998;747-8.

WW2

Germany, Italy, Japan, France, UK, USA an USSR produced and stockpiled biological weapons.

UK *Bacillus anthracis* released on Gruinard Island off West coast of Scotland

Japan battlefield use in China

USA Large programme with production facility starting in 1942 at Fort Detrick (Maryland)

eg 5,000 bombs filled with *B.anthracis* during WW2

USA simulation of release over USA cities using surreptitious release of 'non pathogens' from aircraft (1949-1968)

1972 Biological Weapons Convention

Prevents development, stockpiling of biological and toxic weapons and prohibits their production

Treaty ratified in 1972 by >100 nations including Iraq, and all the members of the UN Security Council (including the USA and USSR)

USAMRIID

United States Army Medical Research Institute of Infectious Diseases

Medical defences for the US military against potential biological attack

1971-3, destroyed weaponized biological agents produced by US Military:

Lethal agents

Incapacitating agents

Anticrop agents

Russian post BWC

Large programme

55,000 employed

Various agents including smallpox virus

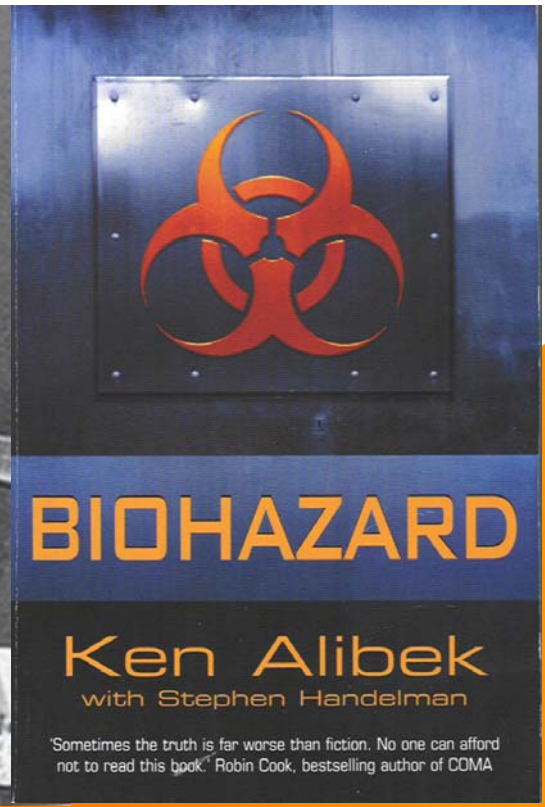
Outbreak of anthrax in 1979 in Sverdlovsk (now Ekaterinburg)

>100 infections in humans (66 deaths) and cases in livestock up to 50Km downwind of production plant

Dr Ken Alibek

Top scientist in USSR Biowarfare programme,

defected to USA in 1992



Iraq 1990s

Offensive weapons program

***B.anthracis*, rotavirus, camelpox, aflatoxin, botulinum toxin, mycotoxins and anticrop agents**

Deliverability by Scud missile

No evidence for use during Gulf War

Facilities demolished by UNSCOM (United Nations Special Commission on Iraq) 1996

Features of potential agents

Infectivity and toxicity

Susceptibility (immunity) of foe and friends

Disease/disruption severity

Very wide range of disease agents available

Category A

greatest potential for large scale dissemination, mass casualties and most requirements for public health preparedness.

Small pox, Anthrax, Plague, Botulism,

Tularemia, Viral Hemorrhagic fevers

Category B

potential for large scale dissemination with resulting illness

Q fever, Brucellosis, Melidosis, Encephalitis, Typhus,

Toxins (Ricin, staphylococcal enterotoxins), Psittacosis,

Enteric diseases from food or water

Category C

Anything else

BAPSU and others






WHO worst case estimates

Casualties from 50 Kg of agent released from an aircraft to a population of 5 million

	Dead	Incapacitated
Anthrax	**100,000**	**250,000**
Tularemia	**19,000**	**250,000**
Plague	**36,000**	**150,000**

Economic effect of Foot and Mouth Disease in the UK

2001 outbreak in the UK NOT a bioterrorist attack

Economic impact to livestock

~ 4 million animals culled

~ 3 million sheep

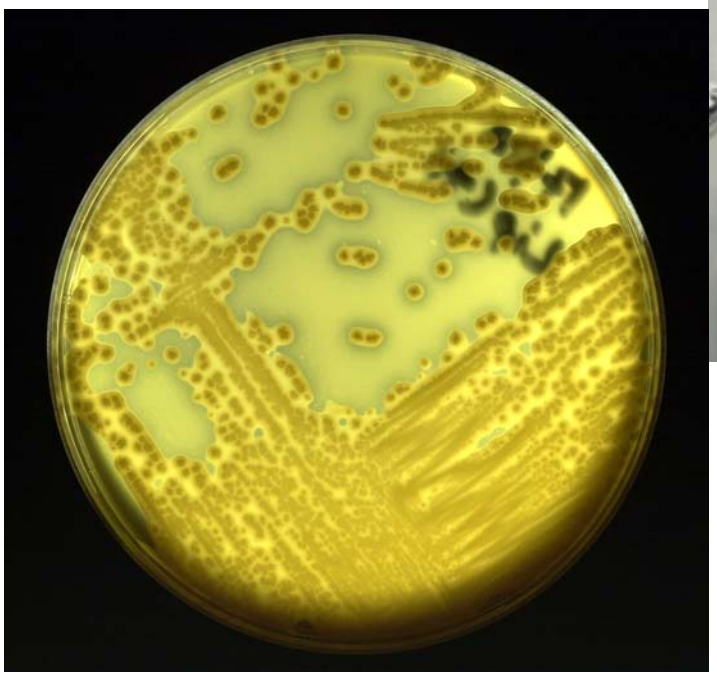
Cost £2.75 billion

Production of infectious agents

Growth systems

all of which have

legitimate uses



some things are easier to hide!

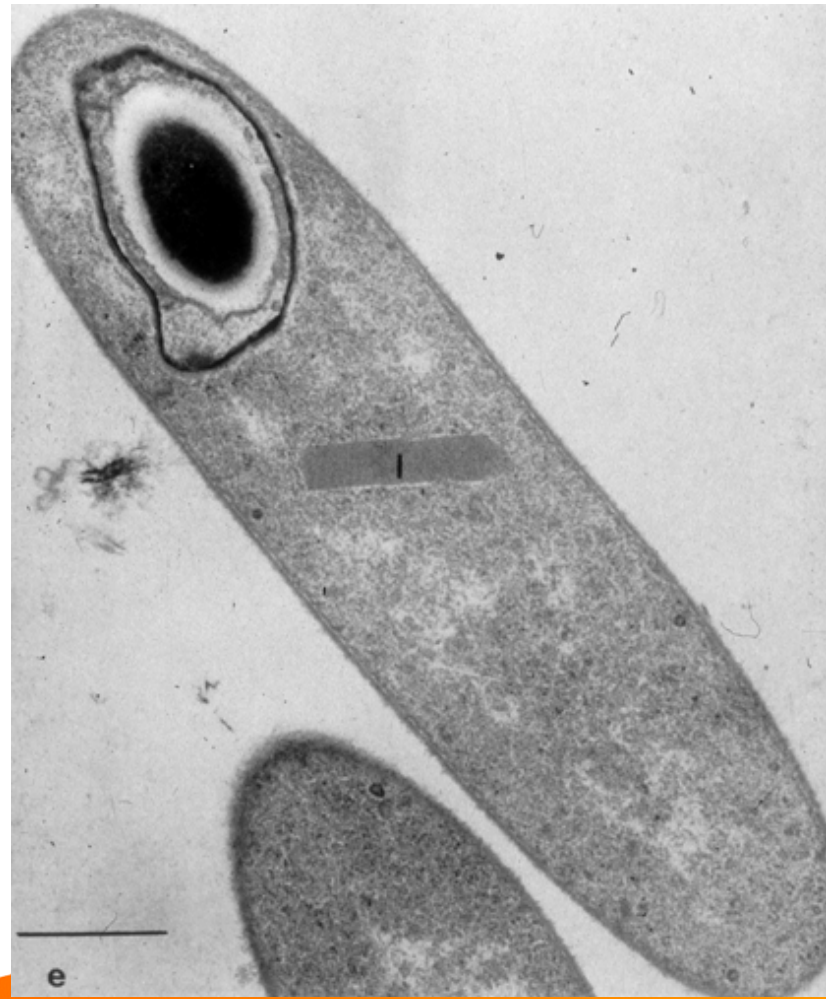
Weaponization processes also have legitimate uses

Reasons for industrial scale production of bacteria:

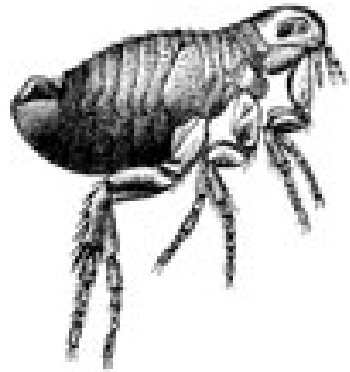
- **Enzymes**
- **Antibiotics**
- **Insecticides**
- **Vaccines**
- **Bioterrorism**

All may require:

- **large scale production,**
- **stable (viable) preparations,**
- **easily dispersed material**



Delivery and dispersal of infectious agents



Some things are easier to do!

Who are potential bioterrorists?

Perpetrators of bioterrorism

National organisations

State sponsored

Sophisticated agents and delivery systems

Warfare as motivation

Most likely to be cataclysmic

Microbiologists, chemists, engineers, plus others

Small ‘domestic’ terrorists

Simple systems (food or water more likely)

Motivations as

Hoaxes, attention, revenge, chaos,

copycat, economic, idealistic, unwell

More likely to be smaller scale

Microbiologists, untrained, inadvertent

Have infectious agents been used for bioterrorism attacks?

Japan Unit 731 1932-1945

Large programme using >3,000 scientists

Various agents developed as offensive weapons

Bacillus anthracis, *Neisseria meningitidis*, *Shigella* spp, *Vibrio Cholerae* and *Yersinia pestis.*

Release of bacterial cultures and 15 million plague infected fleas

Contamination of food and water supplies

At least 11 Chinese cities attacked

10,000 casualties in Manchuria

General Ishii, Head of Unit 731

Oregon, USA 1984

Outbreak of *Salmonella* Typhimurium gastroenteritis detected in 751 patients

Infection linked to consumption of salad in 10 restaurants

Criminal investigation identified deliberate contamination of salad and coffee creamer by a Bhagwan Shree Rajneesh Commune which had a clinic and laboratory facility where the same *Salmonella* was recovered.

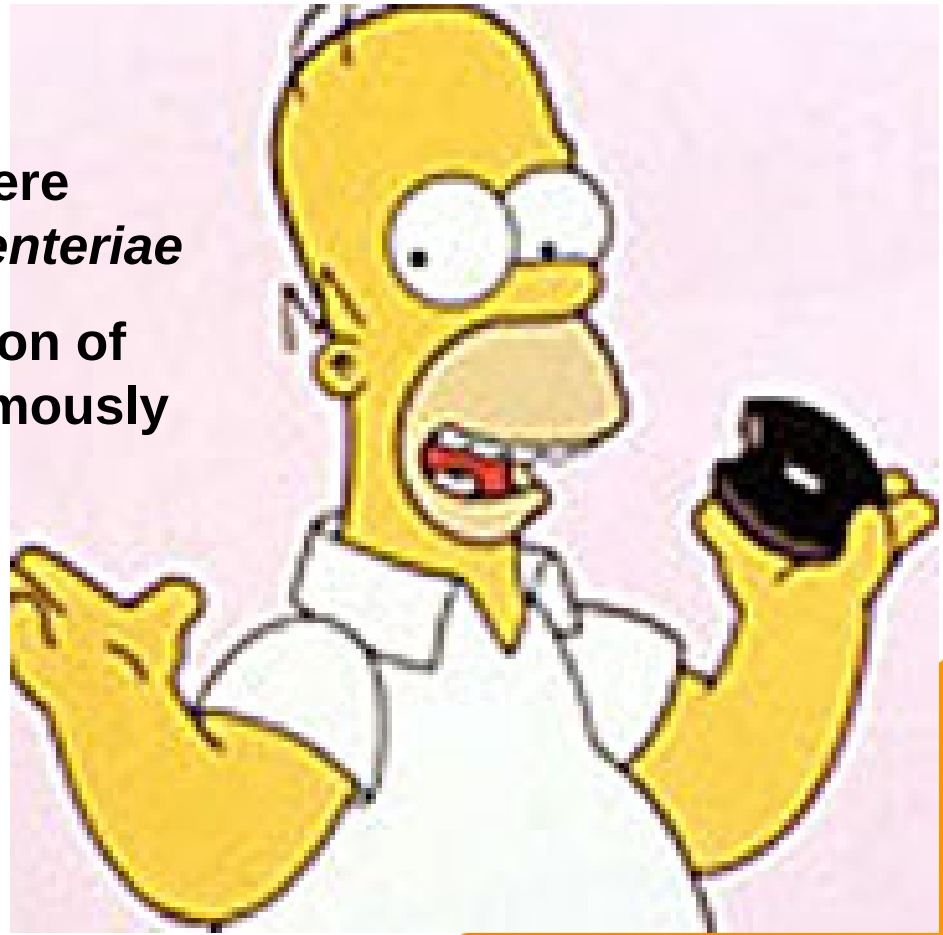
Török et al., JAMA 1997;278:389-95.

Japan 1995

Aum Shinrikyo cult released sarin gas in the Tokyo subway, 12 killed, 5,000 injured

The cult had also experimented with release of botulinum toxin and anthrax cultures and attempted to obtain ebola virus from Zaire

Texas, USA, 1996.



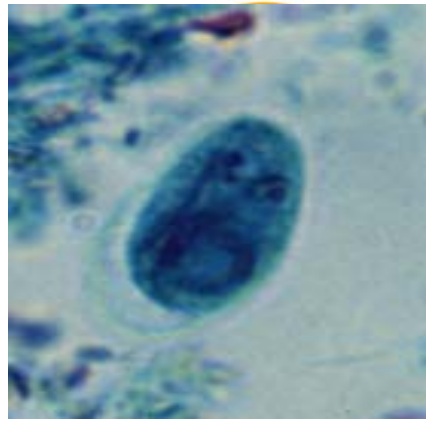
45 laboratory staff developed severe diarrhoea due to *Shigella dystenteriae*

Cases developed after consumption of muffins and doughnuts anonymously left in the break room

Same strain as laboratory control culture

Kolavic et al., JAMA 1997;278:396-8.

Giardia outbreak by deliberate contamination of water tank, Glasgow 1990



Nine confirmed and 26 suspected cases of giardiasis in a block of flats

Common water-tanks

one with high coliform, *E.coli* and faecal strep counts

Tanks not totally secure and contained a brown faecal deposit with *Giardia* cysts

Deliberate defecation into tank

- Ramsey & Marsh. Lancet 1990;336:880-1.

Anthrax in the USA, 2001

22 cases of anthrax detected in Eastern USA between 4th October to 31st December

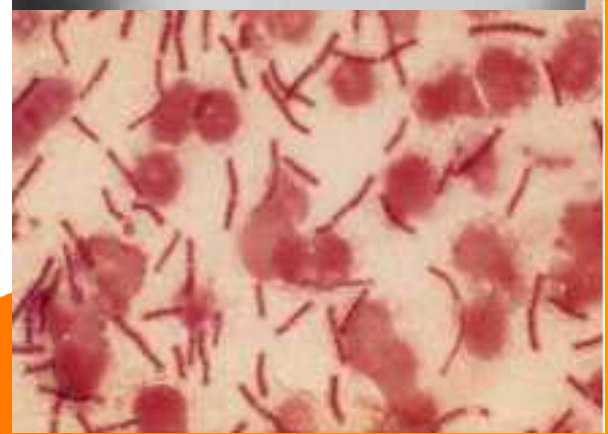
Florida, New York, Southern Maryland, Northern Virginia, New Jersey and Conneticut

11 cutaneous

11 inhalational (4 deaths)

All due to the same strain of *B.anthracis*

1 additional laboratory acquired cutaneous case



Anthrax in the USA, 2001

Amongst the 22 cases:

20 exposed at work

9 media workers

- 2 inhalational

11 postal workers

- 7 inhalational

2 exposure could not be identified

1 further laboratory acquired case occurred

- probably also infected through letters

post exposure antibiotic prophylaxis given to

~10,000 people

Anthrax attack in the USA, 2001

2 envelopes contain powdered *B.anthracis* sent to Government in Washington

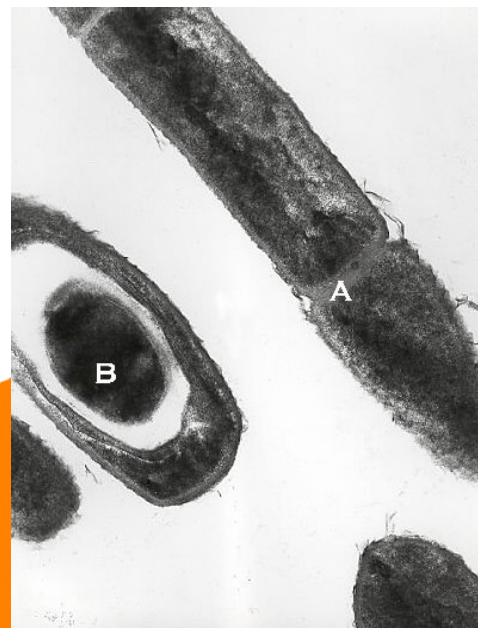
1 letter opened on 15th October by Senate staff

***B.anthracis* found in nasal swabs from 28 staff**

2,178 individuals tested

Rapid and widespread prophylaxis given

No anthrax cases identified




4TH GRADE
GREENDALE SCHOOL
FRANKLIN PARK NJ 08852
SENATOR DASCHLE
509 HART SENATE OFFICE BUILDING
WASHINGTON DC 20510
09-11-01
YOU CAN NOT STOP US.
WE HAVE THIS ANTHRAX.
YOU DIE NOW.
ARE YOU AFRAID?
DEATH TO AMERICA.
DEATH TO ISRAEL.
ALLAH IS GREAT.
SENATOR LEAHY
433 RUSSELL SENATE OFFICE BUILDING
WASHINGTON DC 20510-4502
EDITOR
NEW YORK POST
1211 AVE OF THE AMERICAS
NEW YORK NY 10036
TOM BROKAW
NBC TV
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112
TAKE PENACILIN NOW

Anthrax attack in the USA, 2001

>50,000 environmental samples tested

***B.anthracis* Ames strain isolated from:**

4 powder containing envelopes

15 sites along the mail path

- mail boxes, post offices, sorting machines

All isolates indistinguishable from those isolated from clinical cases

Investigations cost millions of US$

FBI is offering $2.5 million reward,

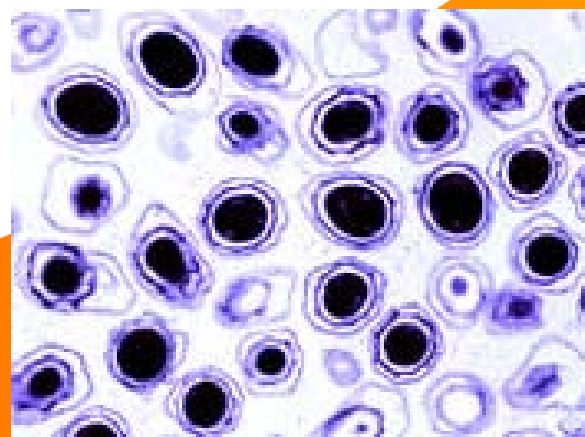
still unclaimed

Bioterrorism attack in the USA, 2001

Each envelope contained ~2g of weoponised *B.anthracis* Ames strain

This strain isolated from a cow in Texas in 1981 and is probably only available in few laboratories in the USA

Suggestion that the bioterrorist may be an USAMRIID (ex)employee or collaborator



The most common manifestation of bioterrorism is likely to be a hoax

Health Protection Agency

DAILY EXPRESS

THE BEST AND MOST UP TO DATE COVERAGE — The Award Winning Newspaper — WEDNESDAY OCTOBER 10, 2001 25p

WORLD EXCLUSIVE: Why I risked my life to tell the truth about the Taliban, by Express reporter PAGES 8&9

ANTHRAX

NEW TERROR FACING BRITAIN

As virus strikes America, Minister admits Bin Laden gang has chemical weapons

BRITAIN was facing the threat of chemical and biological warfare last night after the Government admitted Osama Bin Laden's terror network almost certainly has access to the weapons.

Foreign Office Minister Ben Bradshaw said: "We know that the Al Qaeda network has been trying to get hold of biological and chemical weapons for the last 10 years. We believe they've probably got some." While stressing there was no evi-

BY TOBY MOORE IN NEW YORK AND JOHN TWOMEY IN LONDON

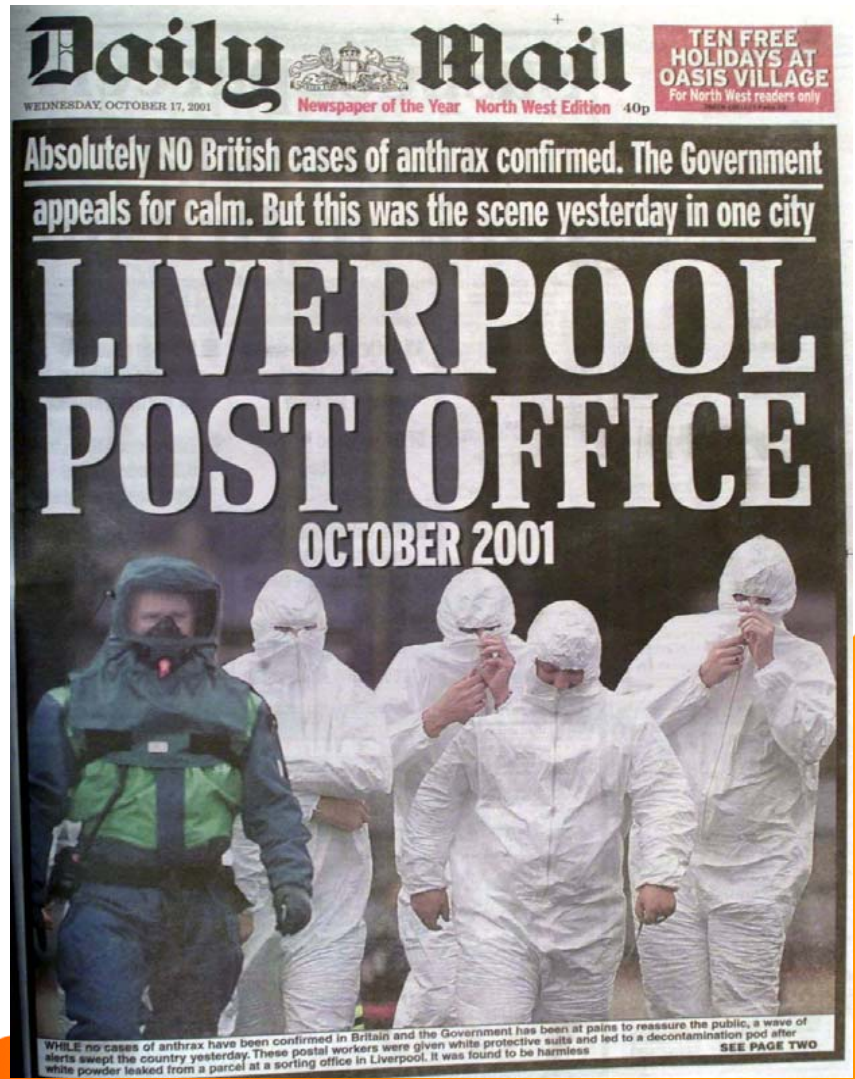
dence that Britain was under a specific threat, he warned: "We do not doubt their will to use these weapons if they're given an opportunity. What we're not sure about is whether they've got a delivery mechanism."

Bradshaw's warning came as the FBI investigated a second case of anthrax in

TURN TO PAGE 2, COLUMN 2

TERROR HUNT: FBI agents outside the Florida building at the centre of the anthrax alert

MIDNIGHT WAR EDITION : 11 PAGES OF REPORTS, PICTURES, COMMENT AND ANALYSIS



Daily Mail

WEDNESDAY, OCTOBER 17, 2001 — Newspaper of the Year — North West Edition 40p

TEN FREE HOLIDAYS AT OASIS VILLAGE For North West readers only

Absolutely NO British cases of anthrax confirmed. The Government appeals for calm. But this was the scene yesterday in one city

LIVERPOOL POST OFFICE

OCTOBER 2001

WHILE no cases of anthrax have been confirmed in Britain and the Government has been at pains to reassure the public, a wave of alerts swept the country yesterday. These postal workers were given white protective suits and led to a decontamination pod after white powder leaked from a parcel at a sorting office in Liverpool. It was found to be harmless

SEE PAGE TWO

Possible acts of bioterrorism

Scenarios

- A warning but intervention prevents actual release
- A warning followed by a release
- A covert release without warning
- A hoax

Detection of release

- Non-endemic illness
- Unusual presentations
- Sudden outbreaks
- Unusual distributions
- Illness in animals
- Information from security services

Coordinating responses to bioterrorist threats

Assessing the threat

Preventing a release

Public protection if there is a release

Managing the consequences of a release

Coordinating responses from:

police, fire, ambulance, local authorities, health authorities and the armed forces

Police coordinated actions on deliberate release

- **Decontamination**
- **Management of casualties including the deceased**
- **Prevention by shelter or evacuation**
- **Imposition of a cordon sanitaire**
- **Media management**
- **Investigation**

Role of health authorities in deliberate release

Confirmation of scale and nature of threat

Immunisation, treatment and prophylaxis

Public information

Guidance to health professionals

Laboratory facilities

Training

Bioterrorism in the 21st century

Are we prepared?