

UNIVERSITY OF SOUTH FLORIDA



Historical Perspective on Biological Warfare

USF
HEALTH

**USF Center for
Biological Defense**
www.bt.usf.edu

Outline

- How BW has been used throughout *history*
- U.S. & other *BW* programs
- *Disadvantages* of BW use



Disadvantages of Biological Warfare

- #1: May *never* determine *effectiveness*
- #2: Difficulty *protecting own troops*
- #3: Difficulty *decontaminating* territory
- #4: *Naturally occurring disease* may cloud issue



6th- 4th Century B.C.

- *600 B.C.:* Assyrians with rye ergot
- *500 B.C.:* Greco-Romans with dead animals
- *400 B.C.:* Epidemic during Athens siege by Spartans



Scythian Warriors- 400 B.C.

- Nomadic warriors
- *Unique dip* for arrows



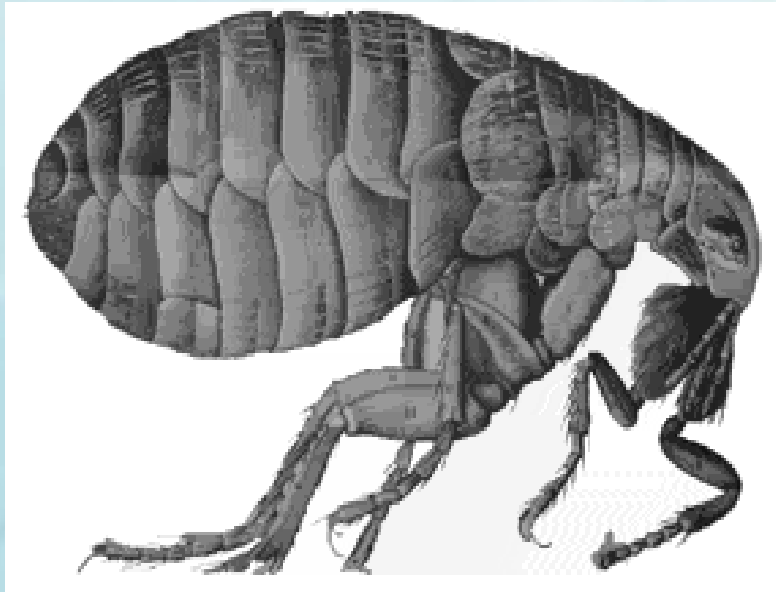
Hannibal: 190 B.C.



- Used
- *naval bio-warfare*
- with
- venomous snakes

History of Plague

- 3 pandemics in history
- Played significant role



First Pandemic: Justinian Age AD 542-543

- *First cycle* of plague
- *History of the Wars*
- *Killed 10,000/day*
- *50-60% mortality*
Egypt- Europe



Unique Strategy



- 1495 Spanish and French
- *Tainted* wine

Second Pandemic: 14th-17th Centuries



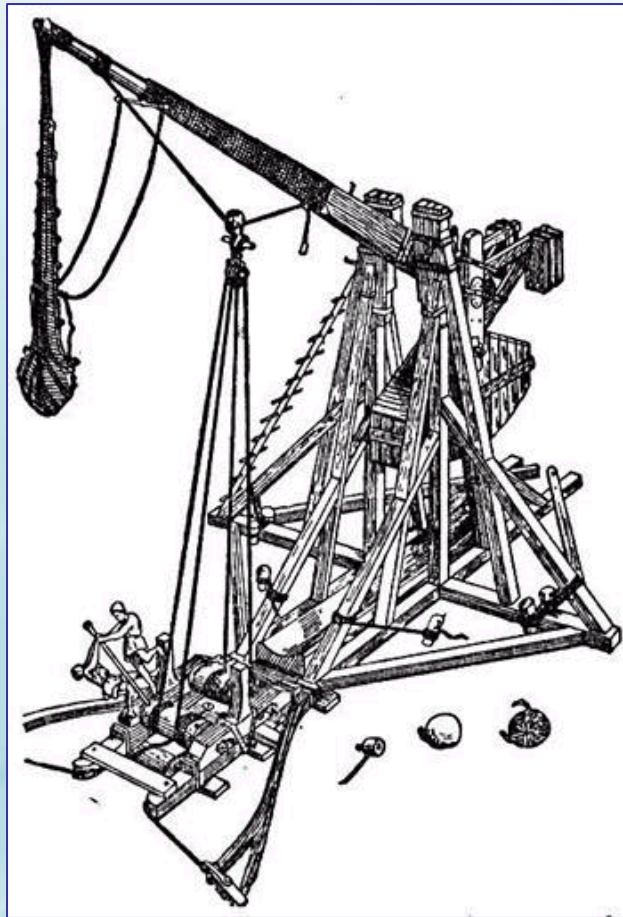
- “Black Death”
- Claimed *20-30 million, 1/3* Europe’s population

Biological Warfare & Plague



- Earliest account by de' Mussis, *1346*
- Mongol army *hurled plague-infected cadavers* into Caffa

Could plague have been caused by biological warfare?



Disadvantage # 4:
Naturally
occurring disease
Vs. BW

“Ring Around the Rosey”

- Is actually *about plague*
- Infected red circular sores ("Ring around the rosey"),
- Flowers to cover foul smell ("a pocket full of posies"),
- Victims burned to prevent spread ("ashes, ashes, we all fall down").



Siemenowics, 1650



Rys. M. Wiśniewski (1969)

www.uranos.eu.org/biogr/siemie.html

Unique use of artillery shells



www.mds.qmw.ac.uk/.../funmedpics/images/picdog.jpg

Intentional Use of Smallpox

French & Indian War

- 1763 smallpox at Fort Pitt
- Correspondence to “*reduce*” Native American tribes
- *What they did*
- How we know



Disadvantage # 4

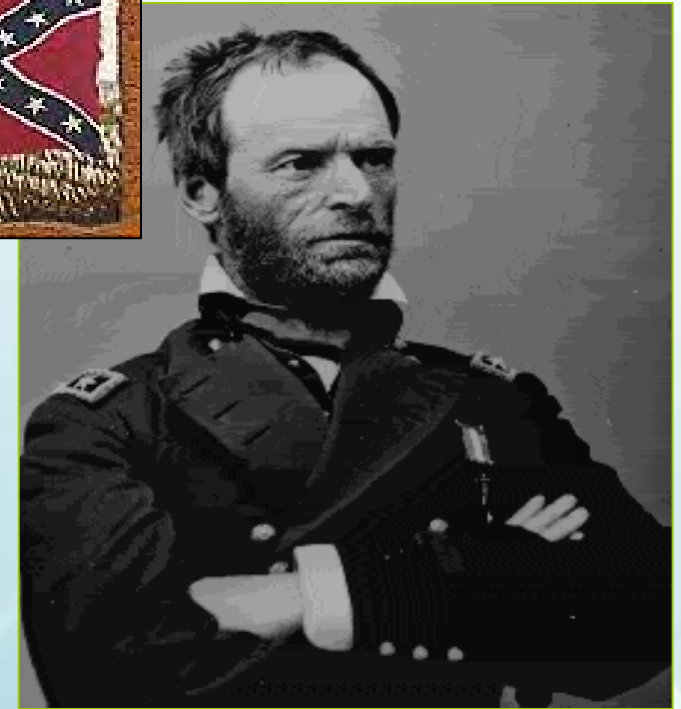
Was smallpox in Native Americans result of *biological warfare* or *naturally occurring disease* in a non-immune population?



Contaminating Water Supplies



***Confederate General
Joseph Johnston***



***Union General
William Sherman***

Alleged Plot to Infect Union Army



- Dr. Luke *Blackburn*
- Contaminated clothing
- Smallpox & yellow fever



Disadvantages #'s 1 & 4

- Efforts of Johnson, Blackburn **difficult to quantify**
- **More soldiers died of disease** during Civil War than on battlefield



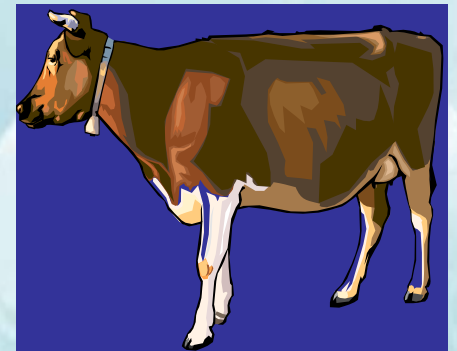
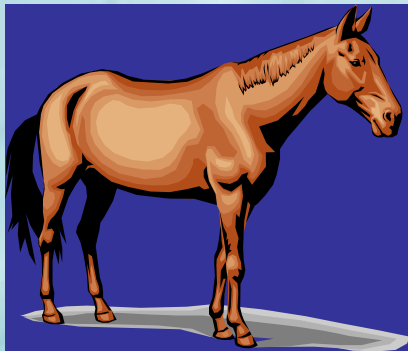
Modern Day Biological Warfare

- Germany in WW I
- Japan in WW II
- U. S. Biological program
- Soviet BW Program
- Attacks on U. S. soil
- Attacks on foreign soil



German Plot 1915

- Plots to use anthrax & glanders to infect horses & cattle
- *Erich von Steinmetz*- failed attempt
- 1915, *Dr. Anton Dilger* & brother Carl
- Captain Frederich Hinsch injected 3000 animals
- *Several hundred military personnel reportedly secondarily infected*



German BW Program

- 1915 start of 20th century *“Anti-animal” Bio-weapons Program*
- Poorly documented & much debated
- *Lesson #1*

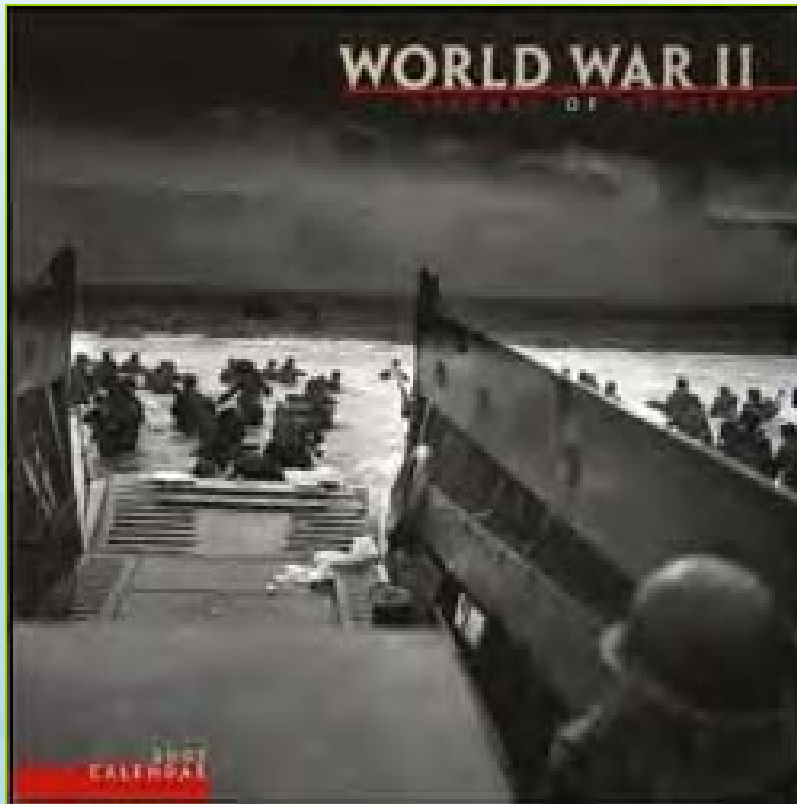


Influenza Pandemics

- 1918 “Spanish flu”
- Killed 30-100 million worldwide
- > 4 yr. Black Death
- 20-34 ↑ mortality
- ? BW

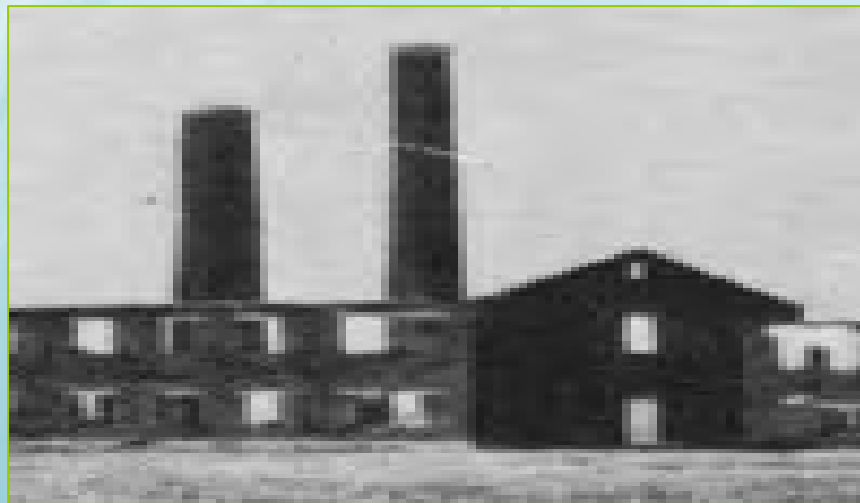


World War II



Japan's BW Program

- Conducted *biological & chemical warfare* in Manchuria 1932-1945
- 150 buildings, 5 camps, 3000 staff
- **Unit 731**-“Epidemic Prevention & Water Purification Department of the Kuantung Army”- *to prepare for BW*
- **Unit 100**- “Dept. of Veterinary Disease Prevention of the Kuantung Army”- *to ready BW for use*



Japan's Unit 731

- Prisoners *infected* with anthrax, meningitis, shigella, cholera & plague
- 3000 prisoners died following experimentation
- Remaining prisoners executed *after* autopsy

Japan's Unit 100 Activities

- 12 field trials of *weaponized biologicals*
- *11 Chinese cities* attacked
- Water & food supplies contaminated



Dr. Shiro Ishii

1941 Attack on Changteh

- Resulted in 10,000 cholera cases
- 1,700 deaths among Japanese troops
- *Disadvantage # 2:* Difficulty in protecting own troops



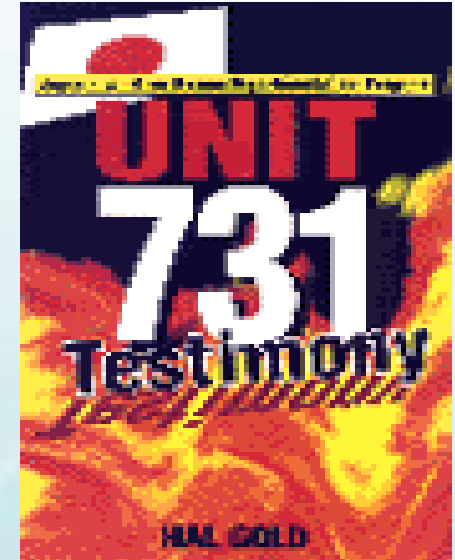
Plague as Biological Weapon

- Laboratory fleas fed on plague-infected rats
- 15 million fleas released over China
- Epidemiologic/bacteriologic data N/A
- *Illustrated disadvantages # 1 & 4*



How Unit 731 Ended

- Soviet capture
- Japanese executed remaining 150 prisoners
- U.S. captured Ishii & Misaji
- 9 medical staff convicted
- *No senior official charged-why?*



Great Britain: Porton Down

- *Secretly* developed own BW program
- Bombed *Gruinard Island* (off Scotland coast) to test dispersal
- *1943 outbreak of anthrax* in sheep & cattle on coast facing island
- *Decontamination* attempts ? to this day

“Operation Anthropoid”: 1942 British Plot

- Reinhard Heydrich
- How it happened
- Grenade
- Wounds minor but **died**
- ? Botulism
- *How do we know?*



Germany

- Forcibly infecting prisoners:
Rickettsia,
Plasmodia, typhus,
& hepatitis A
- *To develop vaccines & drugs*
- *Not* weaponized versions



Counter-attack

- Germans avoided areas with *epidemic typhus*
- Polish MDs created *biological false (+)*
- Residents protected



U.S. Offensive Bioweapons Program

- Began in **1942** at camp Detrick, MD
- **3,900** army, navy & civilian personnel
- **4 biological agent** production camps
- Production facility in Indiana



Divisions of U.S. BW Program

- Pilot Plant #1 (10/43)- *botulinum* toxin
- Pilot Plant #2 (3/44)- *anthrax* simulatant
- Pilot Plant # 3 (2/45)- *plant* pathogens
- Pilot Plant #4 (1/45)- *brucellosis* & *psittacosis*

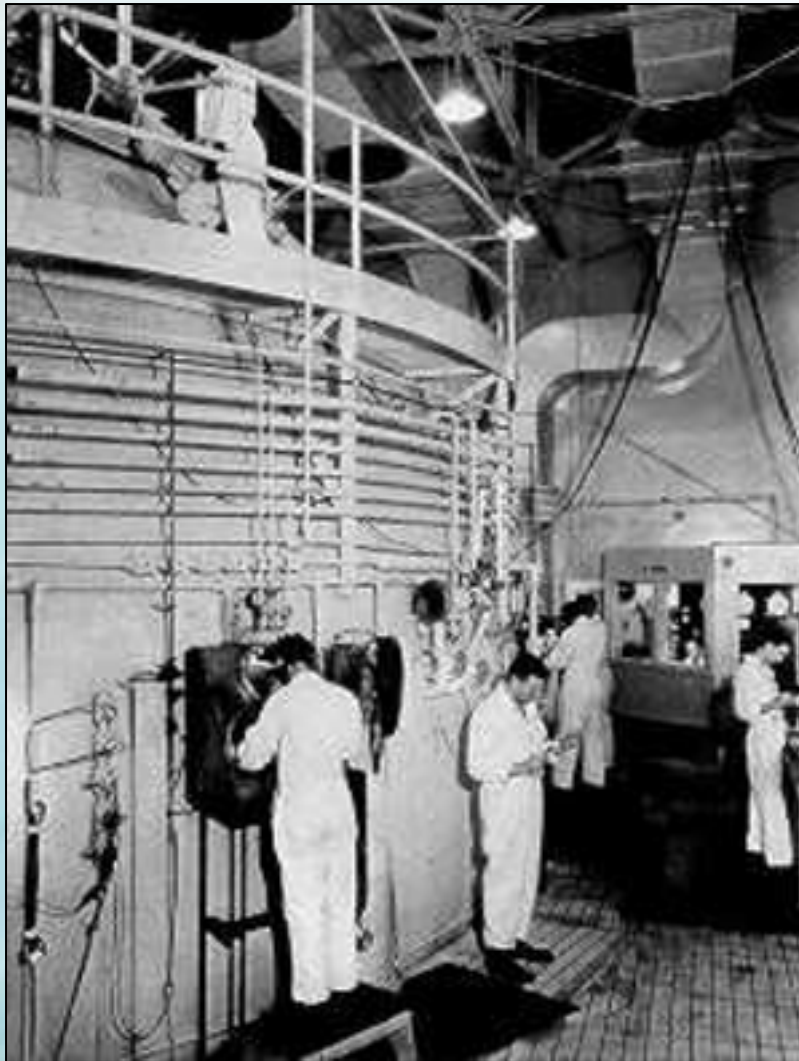
Activities

- *Investigated use of* anthrax, botulism, tularemia, plague, Q fever, Venezuelan Equine encephalitis, brucellosis, & *Staphylococcus enterotoxin B*
- *Animal & human* studies
- Tested *aerosolization & “dispersal”* methods in US cities

Korean War: Expansion of Program 1950-1953

- New facility incorporating biosafety in *Pine Bluff, Ak*
- *Large scale* weaponization
- To develop *countermeasures*: vaccines, antisera, & agents to protect troops from BW

The “Eight-Ball”



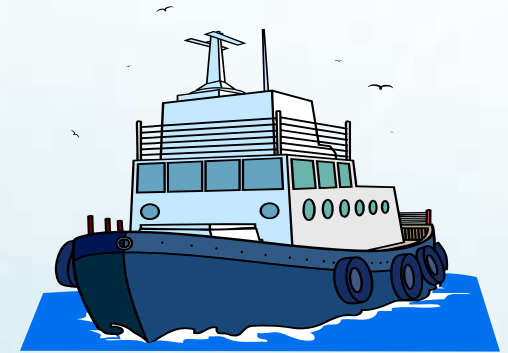
- Hollow, metallic *sphere*
- Experimentation with *military & civilian volunteers* began 1955
- *Exposed to agents* to test vaccines

Human Q-fever Experiments

- *7th Day Adventists*
- *Q-fever* tests at Dugway Proving Ground
- To test *efficacy of vaccine* & treatment options

Bioweapons Dispersal Methods

- Release of “harmless” organisms to simulate spread of ↑ deadly ones
- 1950’s- *Serratia marcescens* over San Francisco
- In 1966- *Bacillus subtilis* into NY City subway
- Other instances



Disadvantage # 2

1. Outbreak of *Serratia marcescens* infections at Stanford between September 1950 - February 1951.
2. Involved *11* cases, *1 death*
3. Sudden *↑ in pneumonia* after simulant tests in Alabama & Key West

Morbidity & Mortality

- 456 occupational infections 1943-1969 (<10 infections/1 mhw)
- 3 fatalities: 2 *anthrax* (1951), 1 *Bolivian hemorrhagic fever* (1964) at Fort Detrick
- 48 occupational infections, 0 fatalities at production & testing sites

Vietnam War



- Agent orange & other herbicides-
chemical
- Punji sticks

[www.jebensfamily.com/.../ Images/PunjiSticks.jpg](http://www.jebensfamily.com/.../Images/PunjiSticks.jpg)

The 1972 Treaty

- *Prohibits* stockpiling of biological agents for *offensive* military purposes & research
- Signed by *103 nations*, including Iraq & former Soviet Union
- Allegations of infractions lodged with Security Council to *inspect facilities*
- Security Council can veto

U.S. Defensive Program

- Continues medical *defensive* program against potential BW (since 1953)
- Under United States Army Medical Research Institute of Infectious Diseases (USAMRIID)
- Open institution- *not classified*

Soviet BW Program

- “Chief Directorate for Biological Preparations”, **Biopreparat**, 1973
- **6** research, **5** production facilities, >55,0000 scientists
- To carry out **offensive biological weapons R & D**
- ***Concealed*** behind legal & civilian biotech research

Biopreparat: The Accidents

- ? *Smallpox outbreak* in 1971: 9-10 cases, 2-3 fatalities, ? Voz island
- *Sverdlovsk 1979: accidental release of anthrax*



More about Sverdlovsk

- Original claim
- In 1992, Yelstin admitted *accidental aerosol release*
- Cause
- *Largest documented epidemic* of inhalation anthrax
- Final death toll

Assassinations & Attempts

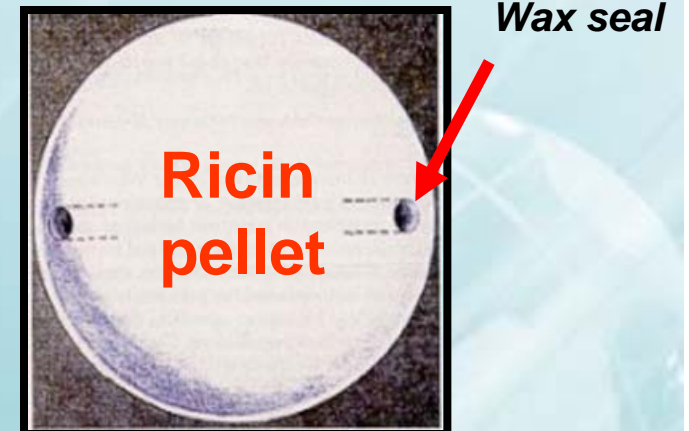
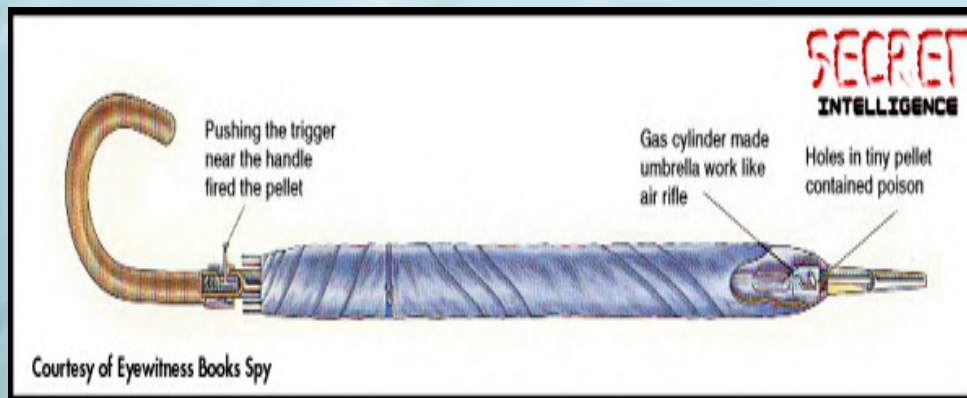
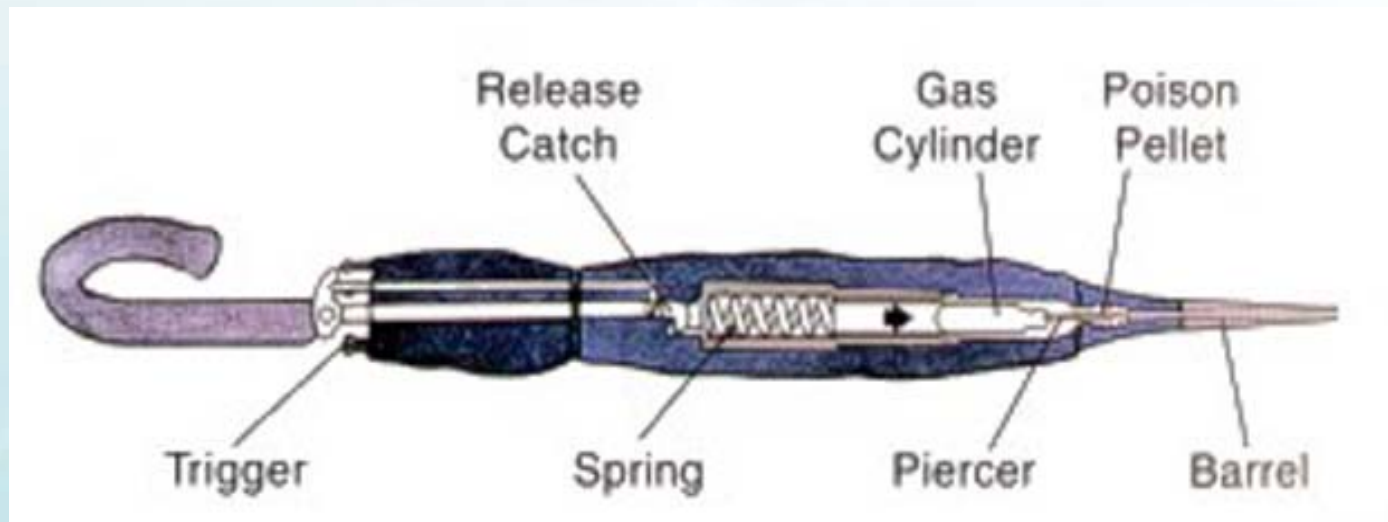


Georgi Markov

- Georgi Markov
- Vladimir Kostov
- *The weapon*
- Bulgarian & Russian operation

1978 Events

The Umbrella Gun & Ricin Pellet: *Assassination Weapons*



Intentional Attacks with Biological Agents

Rajneeshee Cult Biocrime

- Oregon, 1984
- Motivation
- Contaminated salad bars
- Result: 751 cases



Disturbing Facts

- *Not suspected as biocrime*
- **Ma Anand Puja**
- **Obtained cultures from *American Type Culture Company* for *Salmonella*, tularemia, & *Shigella***

Anthrax Attacks 2001

- Anthrax sent via *U.S. Postal service*
- Florida, New York City, Washington DC
- *Some clinical lessons*
- ? source of cultures

09-11-01
THIS IS NEXT
TAKE PENACILIN NOW
DEATH TO AMERICA
DLATH TO ISRAEL
ALLAH IS GREAT

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.

09-11-01
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Aum Shinrikyo



- Japanese doomsday cult
- Founder Shoko Asahara
- Elements from 3 religions
- Followers in Japan & worldwide

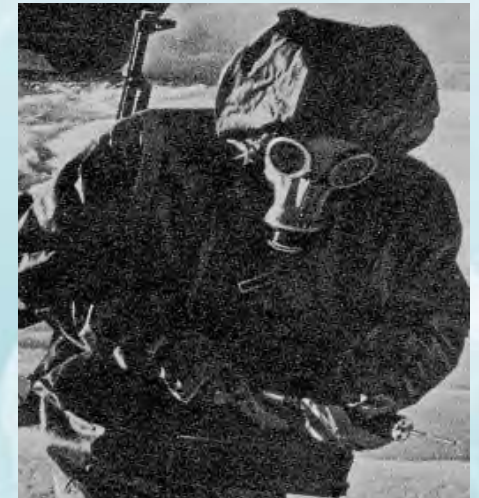
Aum Bioterrorist Activity

- *Laboratories* research on anthrax, botulism & Q-fever
- Allegedly tried to *spray anthra & botulism* 3X in Tokyo
- Seized arsenal: *botulinum tox & drone aircraft* with spray tanks
- Ebola



Lessons Learned

- BW charges difficult to substantiate
- No major battles won
- Risks to users & unintended victims
- Capabilities in several countries
- Prudent to be prepared
- Current & future threats?



References

- Numerous on-line & regular journal articles
- *Textbook of Military Medicine* excellent source
- Go to google.com & type in “Textbook of Military Medicine”