



**ARMY MEDICINE**  
Serving To Heal...Honored To Serve

# Biological Warfare & Terrorism

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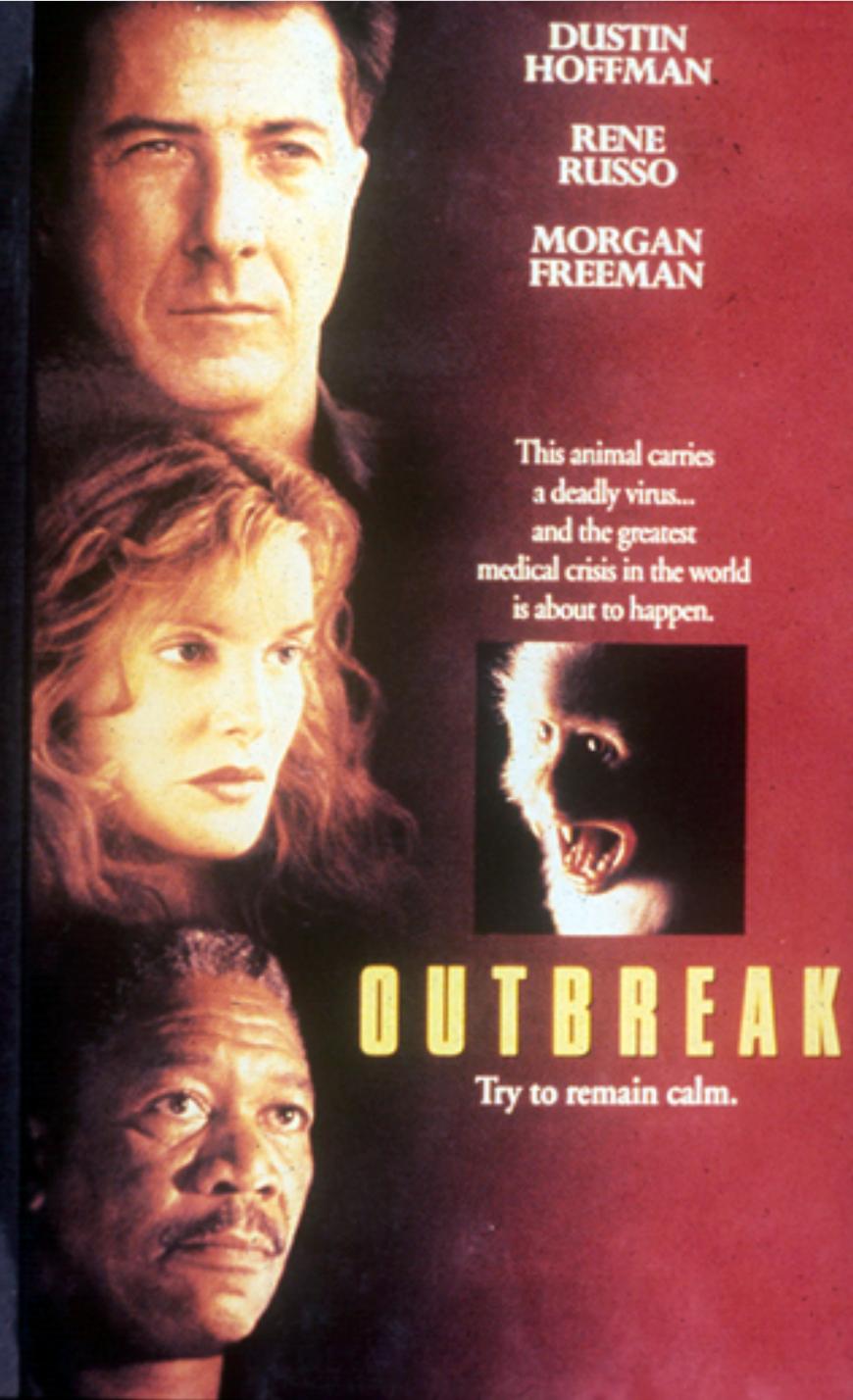
COL Ted Cieslak MD  
Director, Clinical Services Division  
U.S. Army Medical Command  
Ft Sam Houston TX

30 August 2012



# USAMRIID: A Unique National Resource





DUSTIN  
HOFFMAN

RENE  
RUSSO

MORGAN  
FREEMAN

This animal carries  
a deadly virus...  
and the greatest  
medical crisis in the world  
is about to happen.

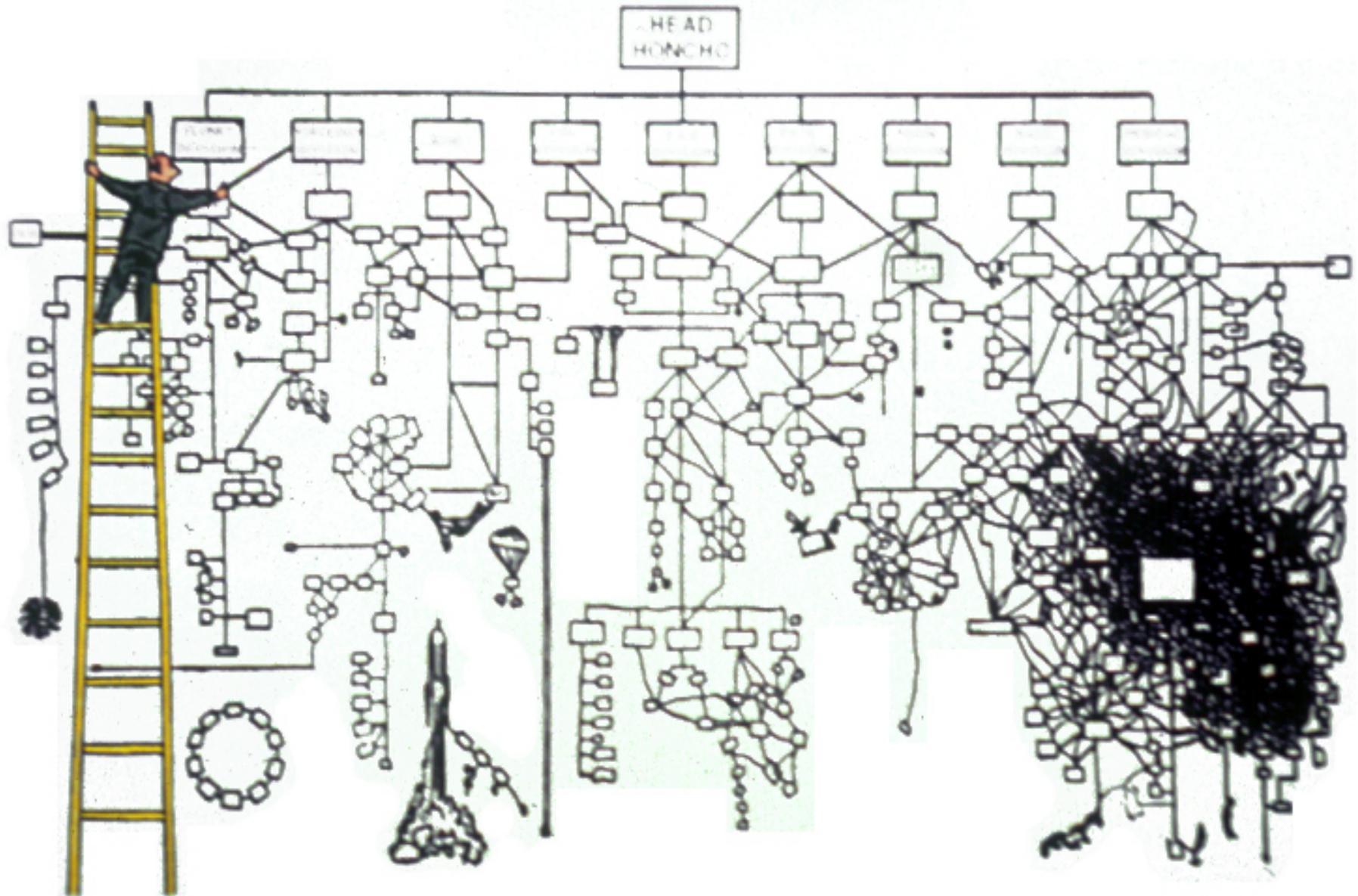


# OUTBREAK

Try to remain calm.



# ORGANIZATION CHART USAMRIID





# USAMRIID



**Putting the Soldier First**



# USAMRIID MISSION

|

Conduct research to develop strategies, products, information, procedures, and training for medical defense against biological warfare agents and naturally occurring agents of military importance that require special containment.



# Biological Warfare

The intentional use of microorganisms or toxins derived from living organisms to produce death or disease in humans, animals, or plants



# Biological Warfare History

- 14th Century: plague at Kaffa
- 18th Century: smallpox blankets
- 1943: USA program established
- 1953: Defensive program established
- 1969: Offensive program disestablished
- 1972: Biological Weapons Convention
- 1979: Sverdlovsk Anthrax incident
- SE Asia: Yellow Rain
- London, Virginia: Ricin

# The Sverdlovsk Incident



- April-May 1979
  - 66 Anthrax fatalities
- 1988
  - Soviets present data:
    - 96 cases
    - 79 gastrointestinal
- May 1992
  - Yeltsin admits “military developments”



# Biological Warfare Agreements

- 1925 Geneva Protocol
- 1969 Nixon renounces BW
- 1972 Biological Weapons Convention
- 1975 Geneva Conventions Ratified



# Biological Weapons Policy

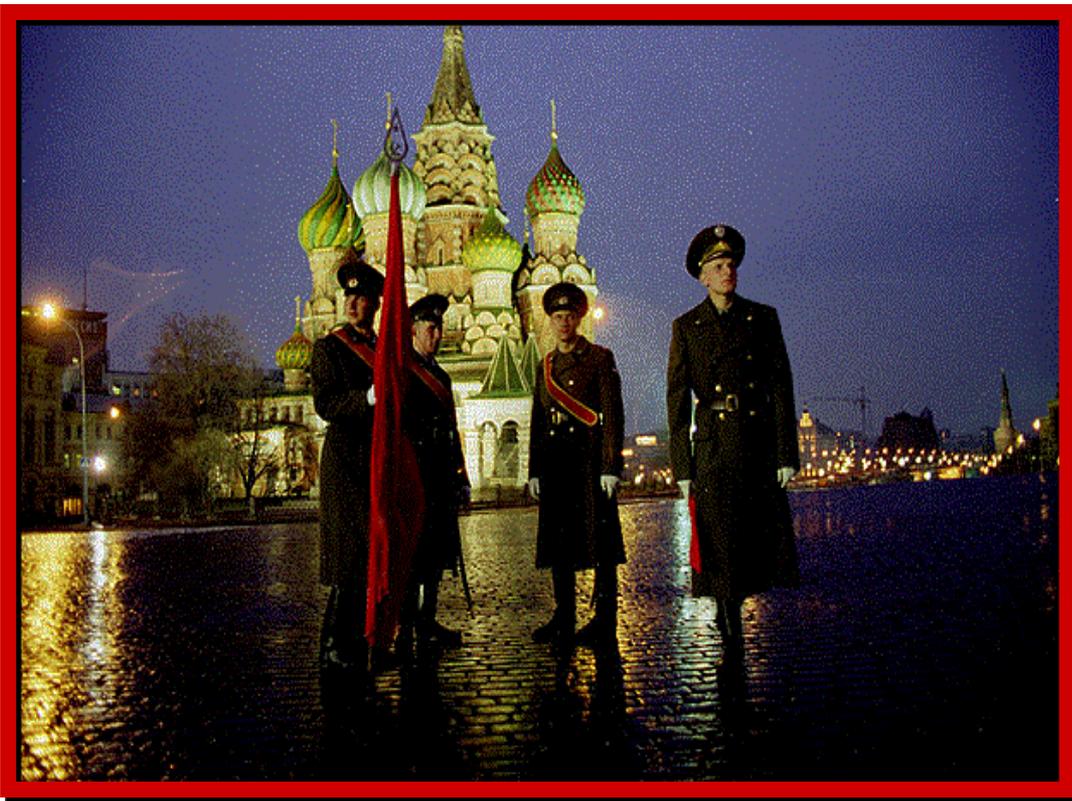
- No use under any circumstance
- Research limited to defensive measures
- We possess NO weaponized biologicals
- Previous weapons stocks destroyed
- Destruction supervised:
  - USDA
  - Dept of HEW
  - DNR of AR, CO, MD



# Destroyed U.S. Biological Warfare Agents

- Lethal
  - B. anthracis
  - Botulinum toxins
  - F. tularensis
- Anticrop
  - wheat stem rust
  - rye stem rust
  - rice blast
- Incapacitating
  - Brucella suis
  - VEE virus
  - SEB
  - Q fever agent

# Soviet BW Priorities: “Agents Likely to be Used”



Smallpox	26
Plague	23
Anthrax	21
Botulism	21
VEE	20
Tularemia	20
Q Fever	20
Marburg	18
Influenza	17
Melioidosis	17
Typhus	15



# Classification: Biological Agents

Type	Use	Operational
Pathogens	Antipersonnel	Lethal
Toxins	Antianimal	Incapacitating
Biomodulators	Antiplant	Transmissible
	Antimaterial	



# BW Agents as Threats

- Strategic
- Tactical
- Terrorist









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# Advantages of BW: Are Biologicals the Ultimate Weapon?

- agents easy to procure
- inexpensive to produce
- can disseminate at great distance
- agent clouds invisible
- detection quite difficult
- first sign is illness
- overwhelms medical capabilities
- simple threat creates panic
- perpetrators escape before effects
- ideal terrorist weapon



# Cost Comparison: Cost (km<sup>2</sup>) to produce mass casualties

<u>Agents</u>	<u>\$\$</u>
BW Agents	1
Nerve Agents	600
Nuclear Weapons	800
Conventional	2000



# Acquisition of Etiologic Agents

- Multiple Culture Collections
- Universities
- Commercial Supply Houses
- Foreign Laboratories
- Field Samples or Clinical Specimens

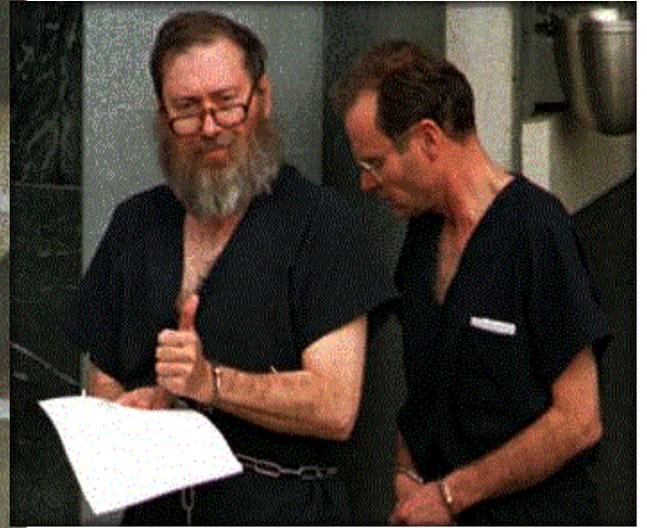
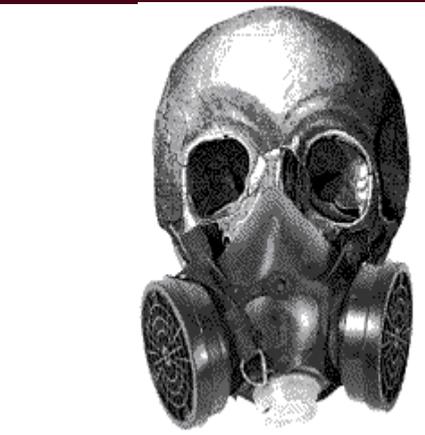
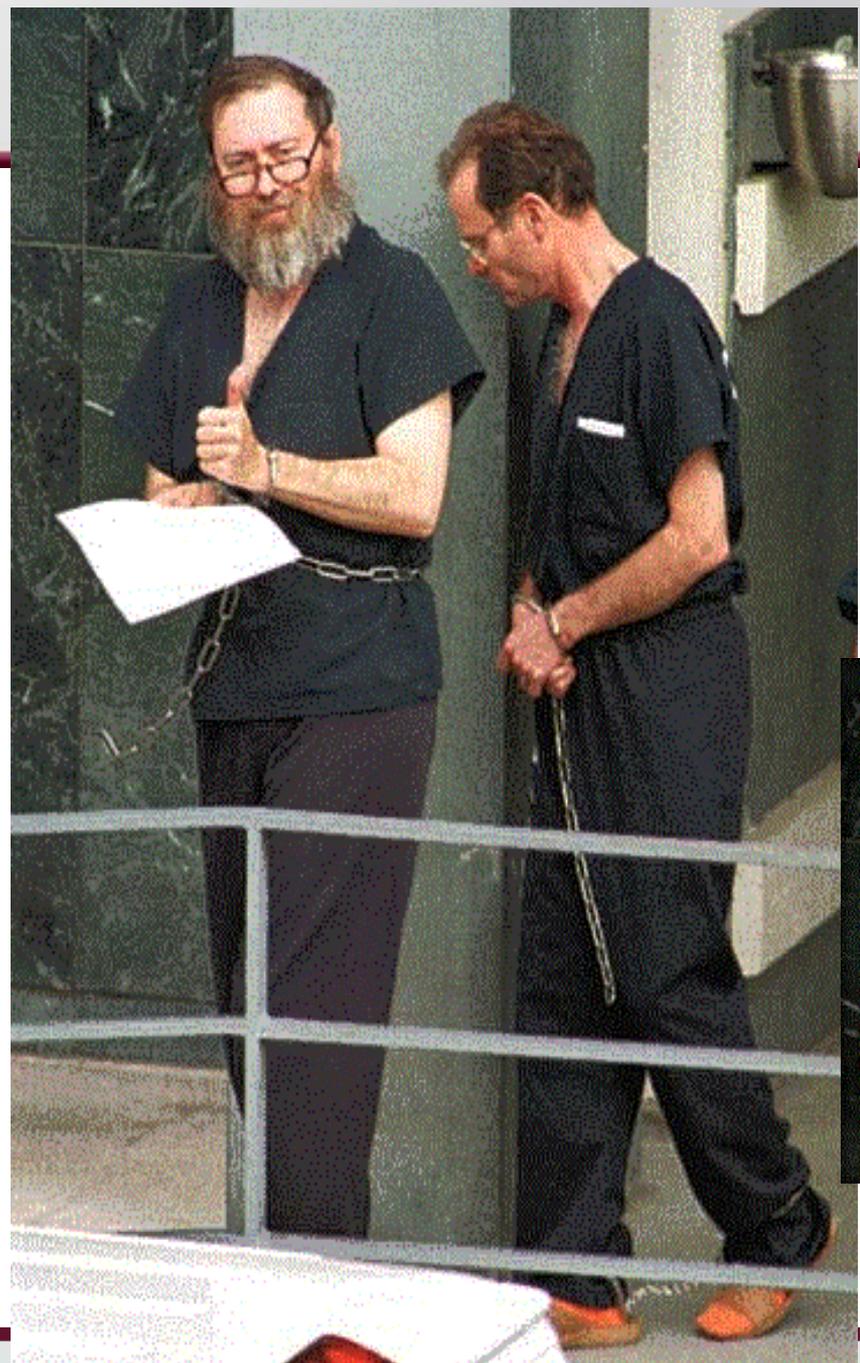
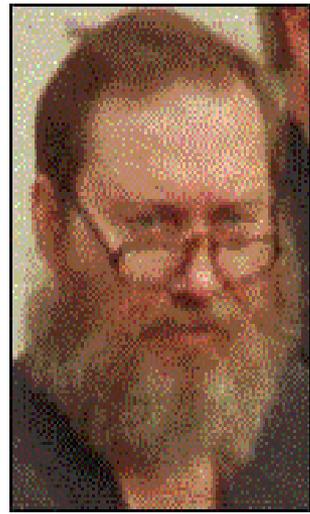
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## The Ag Pilatus Porter

Any Pilatus Porter can be converted to an Ag version and standardized by the operator within a few hours. Two versions are available:

### Integral Tank

installed in the cabin-compartment.  
Capacity 1125 liters (305 US Gal) stainless steel.  
Pump SIMPLEX with impellers.  
Spray boom for 62 nozzles or 2 to 6 MICRONAIRS.  
Operation ranges

### Self-contained

Underwing spray pod MICRONAIR.  
2 pods fixed on underwing hard points.  
Capacity 189 liters (50 US Gal) each.  
The atomizers MICRONAIR AU 4000 have a variable ou



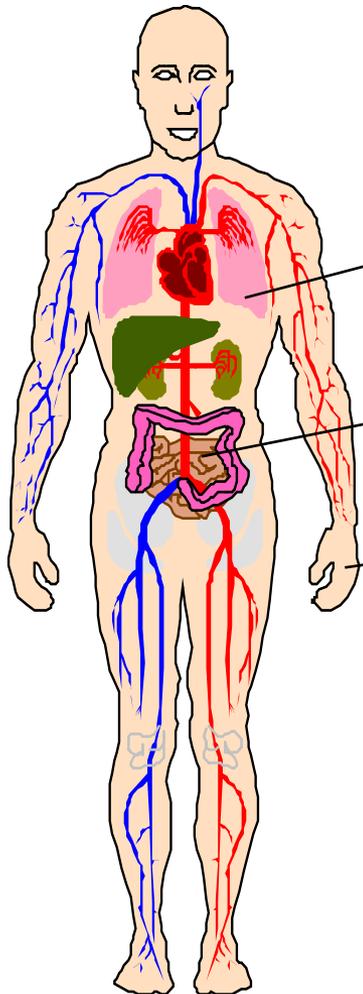


# Hypothetical Dissemination:

50 kg agent, 2 km front, upwind of city of 500,000

<u>Agent</u>	<u>Reach</u>	<u>KIA</u>	<u>WIA</u>
RVF	1	400	35000
TBE	1	9500	35000
Typhus	5	19000	85000
Brucella	10	500	100000
Q fever	>20	150	125000
Tularemia	>20	30000	125000
Anthrax	>>20	95000	125000

# Portals of Entry

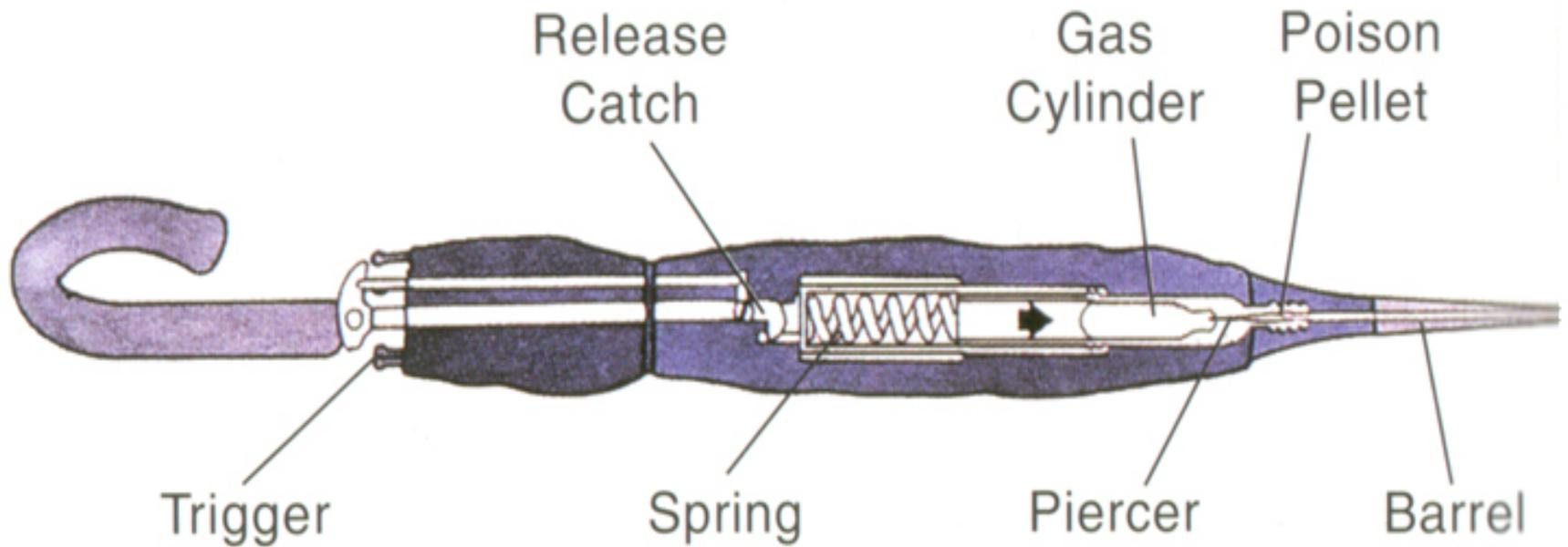


- **RESPIRATORY TRACT**

- **GASTROINTESTINAL TRACT**

- **SKIN / MUCUS MEMBRANES**

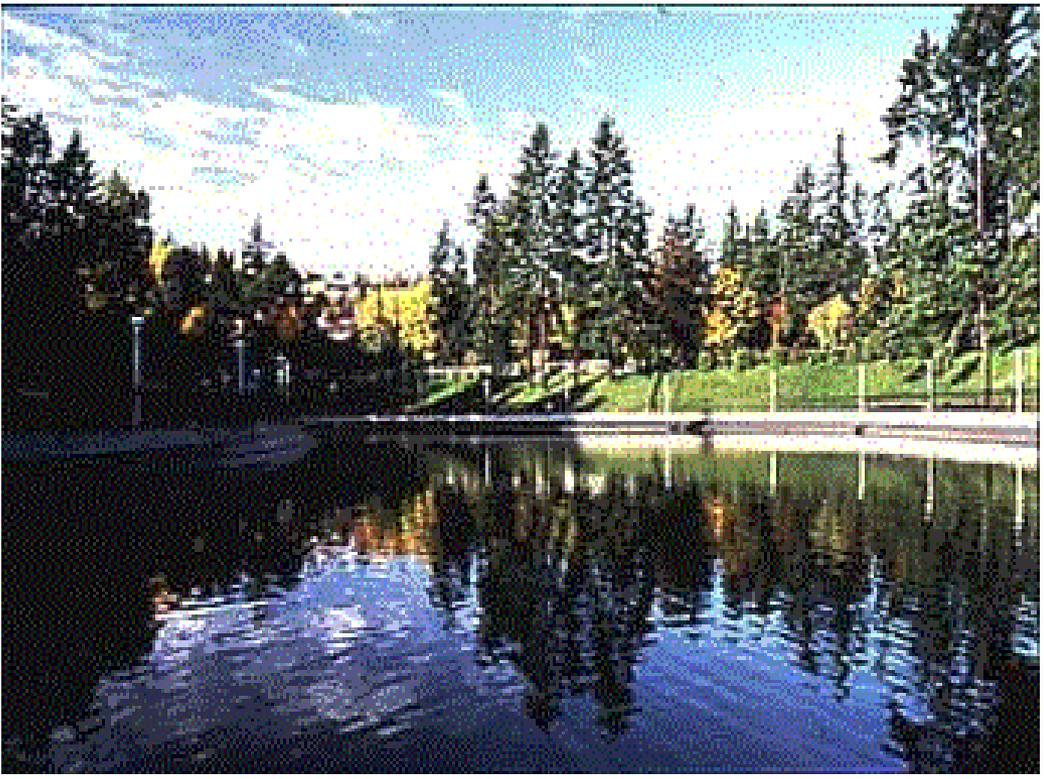
# Percutaneous Exposure?







# Oral Exposure?



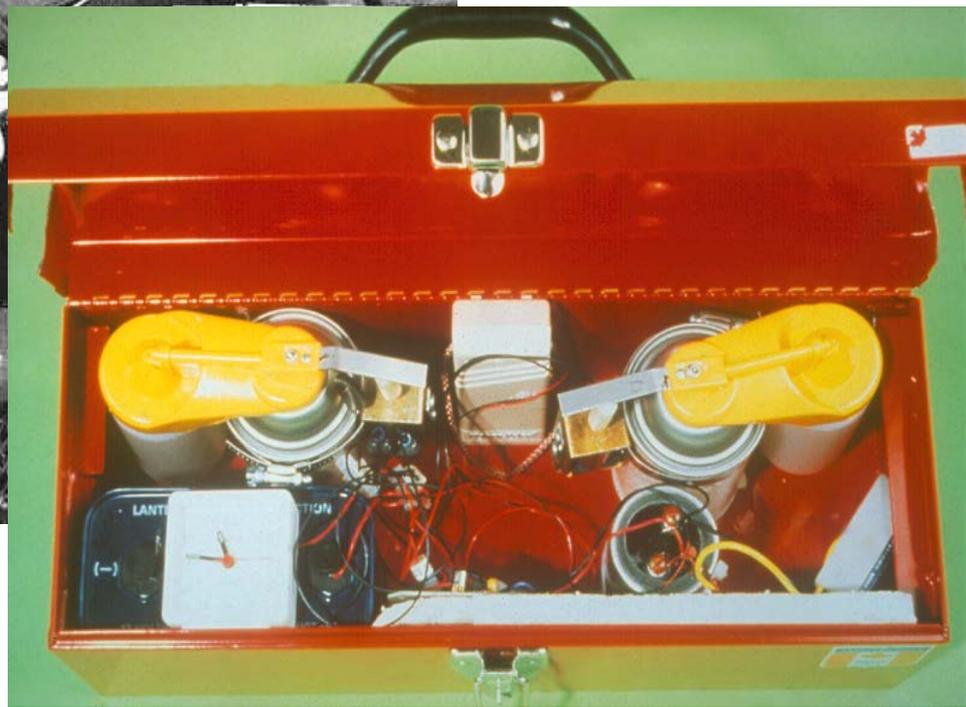
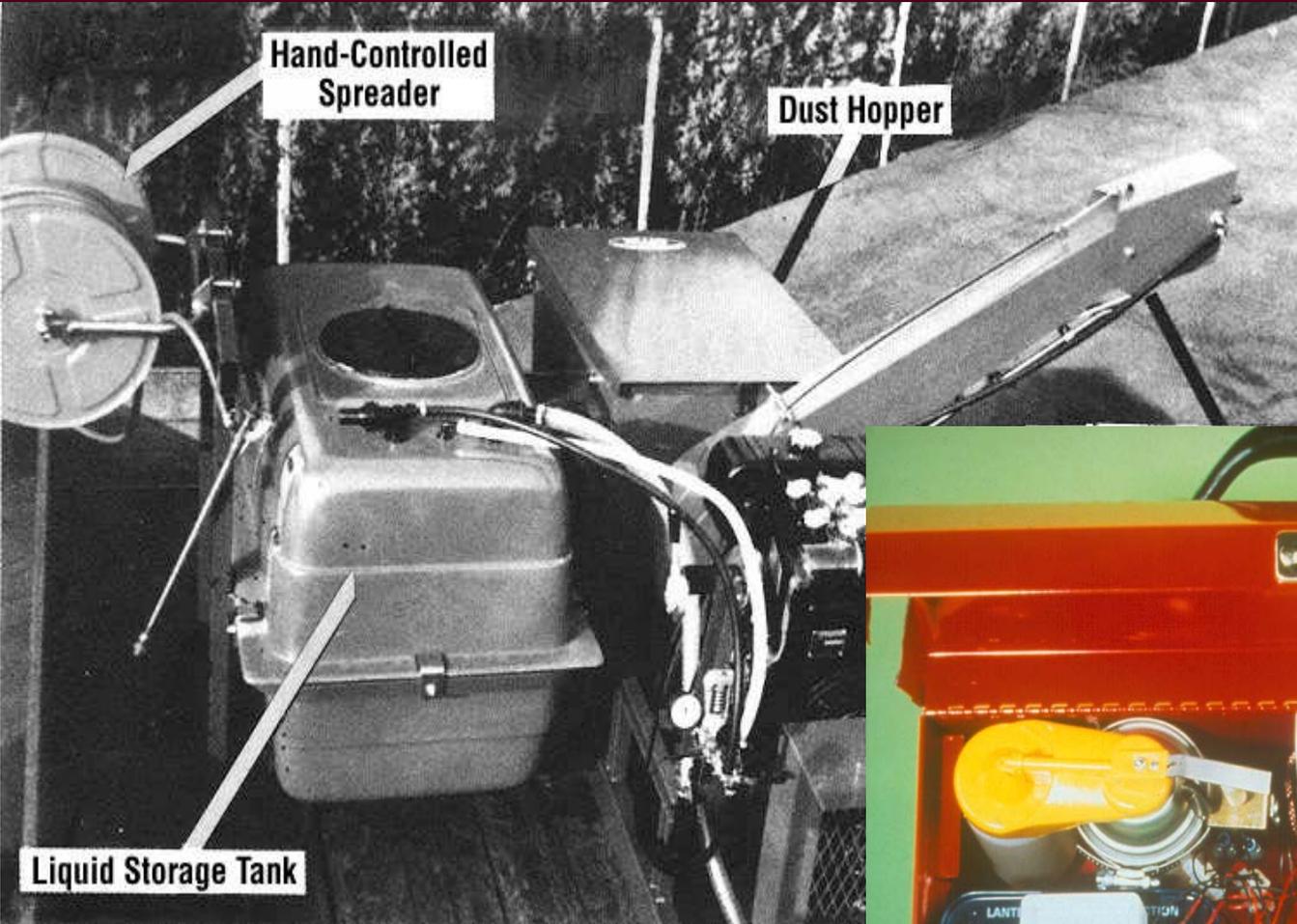


# Contamination of Water Supplies

- Significant contamination following attack with aerosolized toxins unlikely
- Dilution in reservoir or lake would result in nontoxic exposure
- Usual methods of water treatment (chlorination, filtration) effective vs viruses, bacteria, most protozoa
- Potential risk: contamination near end-user

# Inhalational Exposure?







# Disease from Aerosolized BW Agents

- Lethal or incapacitating effects may be sought
- Aerosols of some agents produce pulmonary syndromes (plague, Q fever, SEB)
- Aerosols of most agents produce typical systemic disease (botulinum, most viral agents)
- Person-to-person spread occasionally important (smallpox, pneumonic plague)
- Local disease cycles may occur if vector present (plague, VEE)

# Expression of cereolysine AB genes in *Bacillus anthracis* vaccine strain ensures protection against experimental hemolytic anthrax infection

A.P. Pomerantsev\*, N.A. Staritsin, Yu.V. Mockov and L.I. Marinin

*The cereolysin AB genes from Bacillus cereus VKM-B164 have been expressed in Bacillus anthracis strains: virulent H-7 (PXO1, PXO2), vaccine STI-1 (PXO1), 221 (without its own plasmids). Expression was achieved by cloning the genes in a high copy number plasmid pE194. This construct was integrated with host genomes in amplified form. Gold hamsters were vaccinated with parental and recombinant B. anthracis STI-1 and 221 strains and challenged with virulent ones subcutaneously. Gold hamsters vaccinated with 221 strains showed absence of protection. STI-1 immunisation protected against the H-7 strain, but did not protect against the recombinant strain. STI-1 recombinant strain protected gold hamsters against the H-7 as well as the recombinant H-7 strains. The results describe the modulation of immunopathogenic properties of B. anthracis due to expression of cereolysin AB genes. © 1997 Elsevier Science Ltd.*

**Keywords:** *Bacillus anthracis*; modulation of immunopathogenicity; *Bacillus cereus*



**ARMY MEDICINE**  
Serving To Heal...Honored To Serve



The Glory of Imperial Stout

LAGER BEERS



ALL ABOUT  
**BEER**

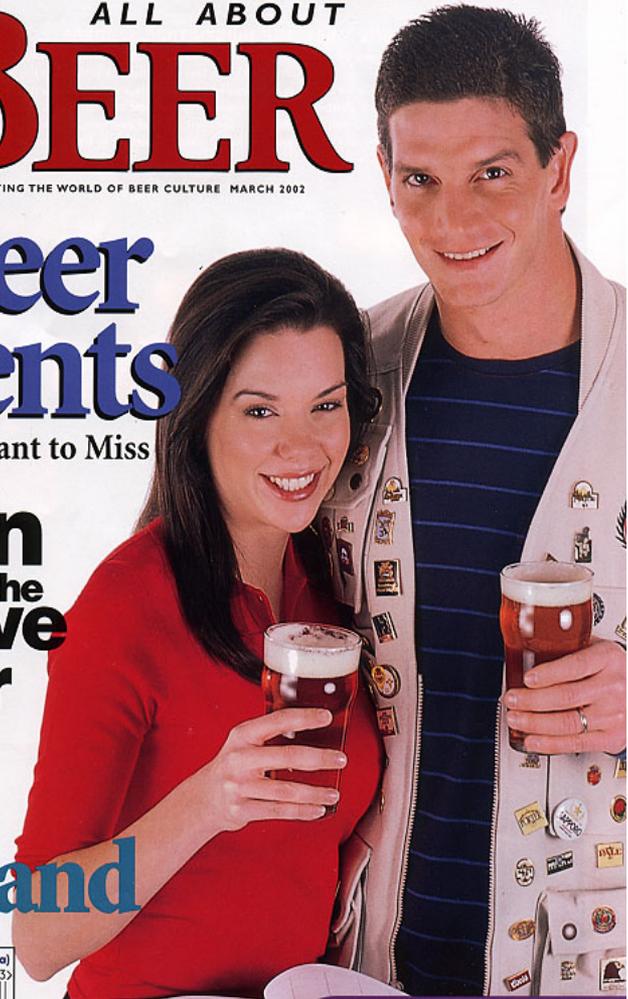
VOL. 23 NO. 1 CELEBRATING THE WORLD OF BEER CULTURE MARCH 2002

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**A Bock Family History**



## Letter from Washington

BY GREG KITSOCK

# Could Sabotage Hit US Beer?

**B**io-Threat to Brewing Industry? Eternal vigilance is the price of security, and the signs of vigilance are everywhere in Washington: concrete barriers ring the White House, national guardsmen patrol the US Capitol grounds, and fighter planes pass overhead.

The next target of terrorists, however, may be neither people nor buildings, but our crops. High on the list of potential targets are staple grains like wheat, corn, rice and barley—the heart and soul of American beer.

The United States is highly vulnerable to an attack by agri-terrorists, cautioned a panel of experts who spoke at the National Press Club on November 30, 2001.

“Some plant diseases are so highly contagious that it wouldn’t even take a crop duster to cause a major outbreak,” said Mark Wheelis, a microbiologist at the University of California-Davis. It might be

of cultivated land. The best defense would be a quick and accurate diagnosis, enabling authorities to destroy infected plants and contain the blight. But “there are no central or regional facilities prepared to deal with unusual outbreaks,” he added.

Madden, who comes from Pennsylvania originally and is a fan of single malt Scotch and Yuengling beer, commented later that he “would take it very personally” if terrorists were to target the barley and hop crops.

**High on the list of potential targets are staple grains like wheat, corn, rice and barley—the heart and soul of American beer.**

Committee. A similar measure, HR 3602, was introduced last year but never made it past the committee level.

Even if Stupak’s bill becomes law, home distillers would still have to fill out the necessary permits and would not be exempt from taxes. The bill, explained the congressman’s press secretary, Robert Meissner, is intended to aid entrepreneurs who want to branch into spirits production, and not hobbyists who’d like to distill liquor for their own use just as they can now ferment their own beer and wine tax-free.

The Traverse City area, Meissner noted, is home to numerous winemakers, some of who might like to try marketing a brandy. Michigan also has about 60 brewpubs and microbreweries, at least one of which—Local Color Brewing Co. in Novi—has already begun distilling its own spirits.

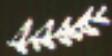
Meanwhile, moonshiners should beware: Uncle Sam is pursuing you with



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