



# Biological WMD: The Evolving Threat

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[www.biosecurity.sandia.gov](http://www.biosecurity.sandia.gov)

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# History of Biological Weapons

- **1346: Tartar invaders catapulted plague-infected bodies over city walls during siege of Kaffa**
- **1763: British soldiers distributed blankets used by smallpox victims to Native Americans during French and Indian Wars**
- **World War I**
  - Germany, France - anti-livestock sabotage
- **World War II – 1972**
  - Japan, USSR, US, UK, Canada
    - Japanese use against Chinese targets
    - Alleged USSR use against German soldiers
- **Intent and effect of BW use was tactical, not strategic (influence battle, not war)**





## SUMMARY OF STATE PROGRAMS BEFORE THE BWC ENTERED INTO FORCE (1975)

State	Year	Types of Activities
Germany	1914-1945 (sporadic)	R&D and deployment
France	1914-1941 (sporadic)	R&D and possible deployment
Japan	~1918-1945	R&D, production, and deployment
Soviet Union	1920s-1975	R&D, production, and possible deployment
United Kingdom	1936-1969	R&D and production
Canada	Post WWI-1969	R&D and production
United States	1942-1969	R&D and production

Source: Reynolds M. Salerno, Jennifer Gaudio, Rebecca L. Frerichs, and Daniel Estes  
“A BW Risk Assessment Based on Historical and Technical Perspectives,” Nonproliferation Review,  
Fall-Winter 2004.

# After the BWC Entered into Force

- **Biopreparat: The civilian arm of the Soviet biological weapons program**
  - Established *after* Soviet accession into the BWC
  - 40 – 50 facilities with up to 60,000 employees
- **Other incidents**
  - Iraq research program prior to 1991 Gulf War
  - Assassination of Bulgarian dissident
  - Alleged South Africa program to assassinate anti-apartheid activists
- **Other suspected BW programs since 1972**
  - Iran, North Korea, Syria, Sudan, Cuba



*Production Facility in Kazakhstan*



*Munitions in Iraq*

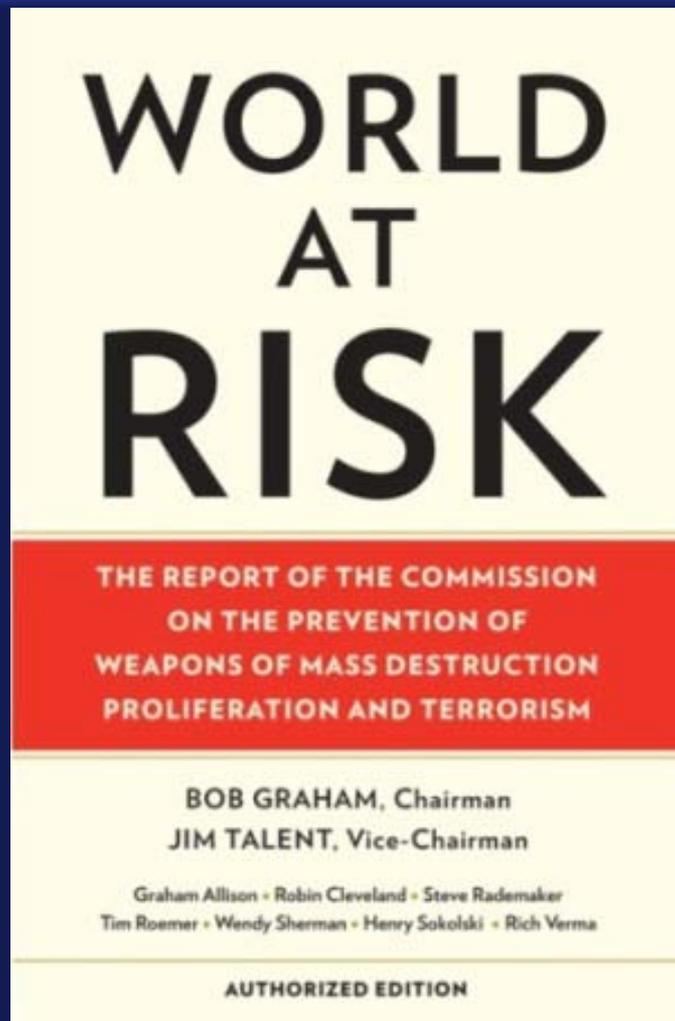


# Scenarios for State Biological Weapons Proliferation

Objectives	Acquisition	Development	Dissemination
<ul style="list-style-type: none"><li>• Defensive use in asymmetric scenario</li><li>• Offensive use in regional conflicts between symmetric states</li><li>• Battlefield or other territory denial</li><li>• Troop incapacitation</li></ul>	<ul style="list-style-type: none"><li>• Legitimate lab or culture collection (theft or fraud)</li><li>• Provided by another State</li><li>• Derived from natural sources</li><li>• Genetic engineering or chemical synthesis</li><li>• Theft from transport</li></ul>	<ul style="list-style-type: none"><li>• Advanced laboratory capabilities<ul style="list-style-type: none"><li>- Weaponize</li><li>- Grow</li><li>- Test</li><li>- QA</li><li>- Store</li><li>- Transport</li></ul></li></ul>	<p>Sophisticated dissemination methods:</p> <ul style="list-style-type: none"><li>• Ordnance (battlefield)</li><li>• Missile</li><li>• Airplane / UAV</li><li>• Large-scale sprayer</li></ul>



# WMD Commission Report



*“.... terrorists are more likely to be able to obtain and use a biological weapon than a nuclear weapon”*

*“...should be less concerned that terrorists will become biologists and far more concerned that biologists will become terrorists”*

*“promote a culture of security awareness in the life sciences community”*

# Illustrative Case: Egyptian gangster, 1940's



- **Location:**
  - Cairo, Egypt
- **Perpetrator:**
  - Egyptian gangster
  - Laboratory technician stole test tube
- **Objective:**
  - Plot to murder insured victims
- **Organisms:**
  - *Salmonella enterica typhi*



Sout El Umma (Egyptian newspaper)

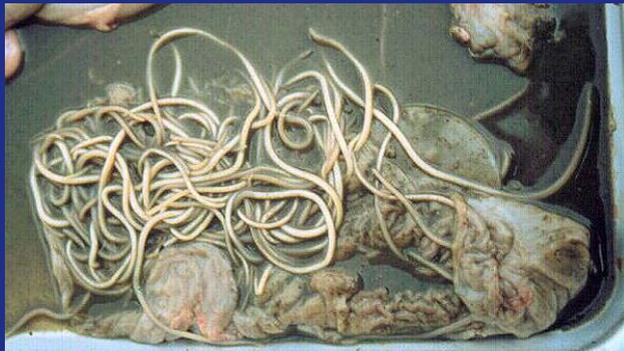




# Illustrative Case: Eric Kranz, February 1970



- **Location:**
  - MacDonald college in Canada
- **Perpetrator:**
  - Eric Kranz, Postgraduate student in Parasitology
- **Objective:**
  - Revenge after he was kicked out of his house by his four roommates for not paying his share of the rent
- **Organisms:**
  - *Ascaris Suum*
- **Dissemination:**
  - Contaminated food in the house with *Ascaris suum* before he left
    - Two of the boys suffered acute respiratory failure
    - *Ascaris suum* is a parasite found in pigs
- **Outcome:**
  - Kranz was tried for attempted murder





# Illustrative Case: Dr. Mitsuru Suzuki, Dec 1964 – Mar 1966

- **Location:** Japan
- **Perpetrator:** Dr. Mitsuru Suzuki
  - Physician
  - Training in bacteriology
- **Objective:**
  - Revenge due to deep antagonism to what he perceived as a prevailing seniority system
- **Organisms:**
  - *Shigella dysenteriae* and *Salmonella typhi*
  - Stolen from the Japan's National Institute of Health
- **Dissemination:**
  - Sponge cake, other food sources
  - Later implicated in 200 – 400 illnesses
    - 4 deaths
- **Outcome:**
  - Official investigation started after anonymous tip to Ministry of Health and Welfare
  - Charged with infecting people, but not with any deaths





# Illustrative Case: Diane Thompson, October 1996

- **Location: Hospital in Dallas, TX**
- **Perpetrator: Diane Thompson**
  - Clinical laboratory technician
- **Objective:**
  - Unclear, possibly revenge against former boyfriend and cover-up by infecting co-workers
- **Organism:**
  - *Shigella dysenteriae* Type 2
  - Acquired from clinical laboratory of the St. Paul Medical Center where she worked
- **Dissemination**
  - Contaminated pastries in the office break room
  - Infected 12 of her coworkers
- **Outcome**
  - Arrested, convicted, 20 year sentence



LTC Kay D Burkman  
Officer Basic Course: Veterinary Corps Track  
Food Security Risks  
[http://www-nehc.med.navy.mil/downloads/06Conference/EH/Food\\_Security\\_Risks\\_OBC\\_Sep05.ppt](http://www-nehc.med.navy.mil/downloads/06Conference/EH/Food_Security_Risks_OBC_Sep05.ppt)



# Bioterrorism, Biocrimes and the Medical Profession

- **Tubocurarine: 1966**
  - Dr. Mario Jascalevich, New Jersey doctor, accused of poisoning 5 patients with this plant-derived toxin
- **Curacit: May 1997 – November 1980**
  - Arnfinn Nasset, nursing home operator in Norway, killed 27 residents at a nursing home with curacit
- **HIV: 1987 – 1990**
  - Dr. David Acer, Florida dentist, infects 6 patients with HIV,
  - Unclear if deliberate act
- **Ricin: August 1995**
  - Dr. Ray W. Mettetal, Jr., a neurologist in Virginia, was found in possession of ricin after arrest on another issue
  - Debora Green, a physician, convicted of trying to murder her estranged husband with ricin



# Bioterrorism, Biocrimes and the Medical Profession (continued)

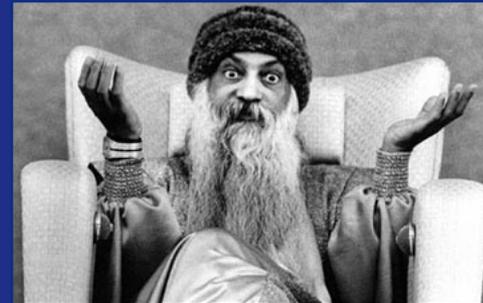
- **HIV: October 1998**
  - Richard Schmidt, a gastroenterologist in Louisiana, convicted of attempted second degree murder for infecting nurse Janice Allen with HIV by injecting her with blood from an AIDS patient
- **HIV: January 1999**
  - Brian T. Stewart, a phlebotomist, sentenced to life in prison for deliberately infecting his 11-month-old baby with HIV-infected blood to avoid child support payments
- ***Mycobacterium tuberculosis*: June 1999**
  - Physician reports theft of a vial

References: Carus WS. 1998. Bioterrorism and Biocrimes: The Illicit Use of Biological Agents in the 20th Century. Washington (DC): Center for Counterproliferation Research, National Defense University; Mohtadi, H. and Murshid, A. 2006. A Global Chronology of Incidents of Chemical, Biological, Radioactive and Nuclear Attacks: 1950-2005, National Center for Food Protection and Defense.



# Bioterrorism Examples

- **Rajneeshees – 1984**
  - Contaminated restaurant salad bars in The Dalles, Oregon with salmonella spp. bacteria



*Bhagwan  
Shree  
Rajneesh*

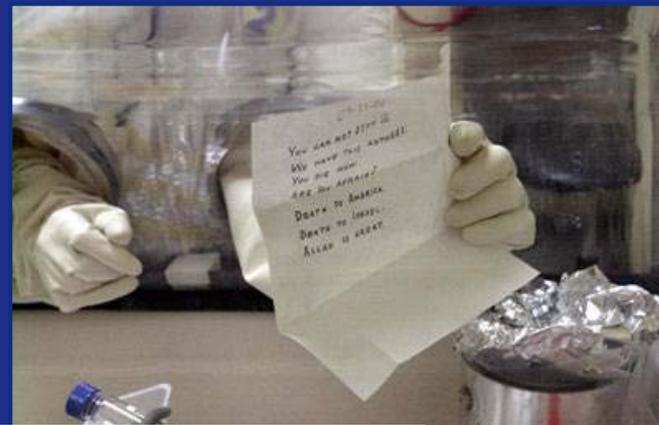


- **Aum Shinrikyo – 1990s**
  - Aerosolized and disseminated biological agents in Tokyo
    - Vaccine strain of *Bacillus anthracis*
    - Inactive strain of *Clostridium botulinum*

*Aerosolization of **Bacillus anthracis** and botulinum toxin by Aum Shinrikyo*

# Illustrative Case: Anthrax, October 2001

- Location: More than 60 sites in the US
- Perpetrator: FBI names Bruce Ivins
- Objective: Unknown
- Organism:
  - *Bacillus anthracis*
- Dissemination
  - 7 letters sent through postal system
  - 22 confirmed cases of anthrax
    - 11 Cutaneous
    - 11 Inhalational (5 Deaths)
- Outcome:
  - FBI unveils evidence against Ivins



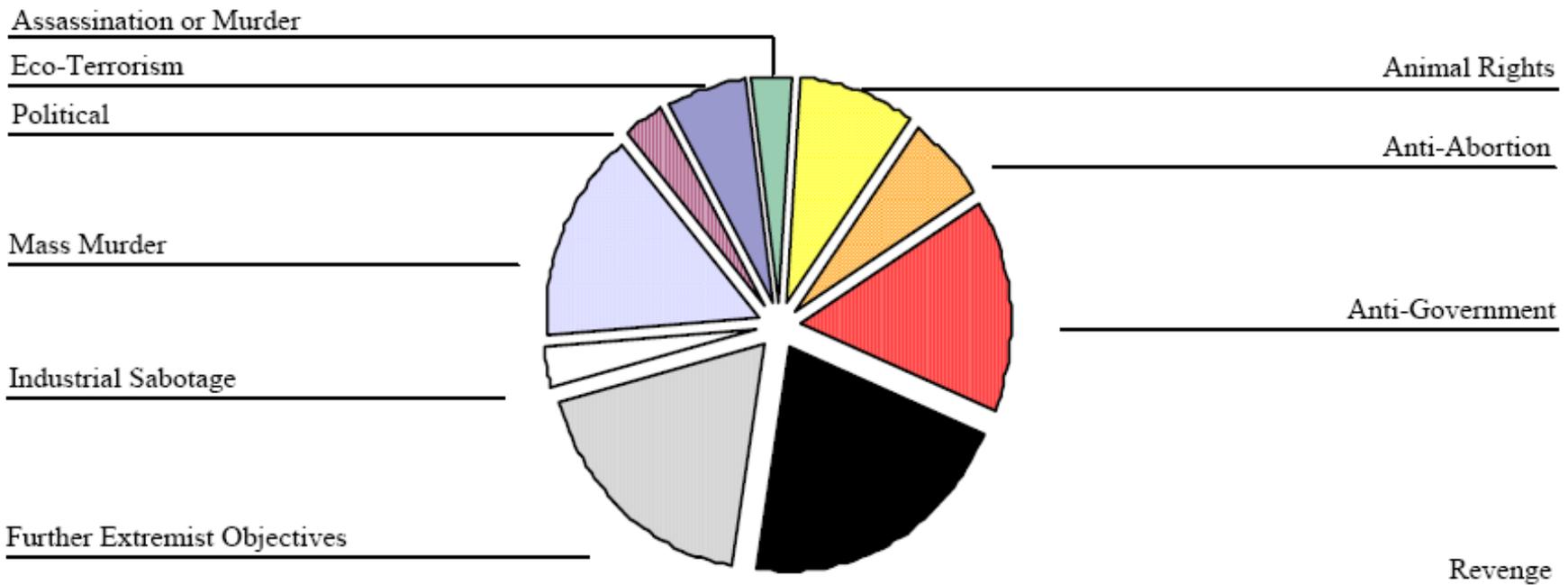
ANTHRAX INVESTIGATION

**FBI Discusses Microbial Forensics—  
But Key Questions Remain Unanswered**



# Bioterrorism and Biocrime Motives

- Review of 33 alleged incidents involving biological agents from 1960 to January 1999



Reference: [Historical Trends Related to Bioterrorism: An Empirical Analysis](#)  
by Jonathan B. Tucker, Monterey Institute of International Studies

# Scenarios for Non-State Biological Weapons Proliferation



Objectives	Acquisition	Development	Dissemination
<ul style="list-style-type: none"> <li>•Generate terror</li> <li>•Promote geopolitical objectives</li> <li>•Genocide</li> <li>•Invigorate support base</li> <li>•Assassination</li> </ul>	<ul style="list-style-type: none"> <li>•Legitimate lab or culture collection (theft or fraud)</li> <li>•Theft from transport</li> <li>•Derived from natural sources</li> <li>•Provided by hostile state actor</li> </ul>	<ul style="list-style-type: none"> <li>•Tactical quantities</li> <li>•Limited development / weaponization</li> <li>•Use proven bugs (non GMOs for at least the next 5 years)</li> </ul>	<ul style="list-style-type: none"> <li>•Natural (human vector)</li> <li>•Commercial sprayers</li> <li>•Unconventional - mail systems</li> <li>•Food / water</li> <li>•Building HVAC systems</li> <li>•Percutaneous inoculation</li> </ul>

# US Domestic Efforts to Reduce Access to Dangerous Biological Materials



- **Realization that bioscience facilities are potential sources of biological weapons material**
- **USA PATRIOT Act of 2001 – US Public Law 107-55**
  - Restricted Persons
- **Bioterrorism Preparedness Act of 2002 – US Public Law 107-188**
  - US Select Agent Rule
  - Hazardous Material transport security
- **No international standards for managing dangerous pathogens internationally**



*National Animal Disease Center,  
Ames, Iowa*



*Centers for Disease Control and  
Prevention, Atlanta, Georgia*

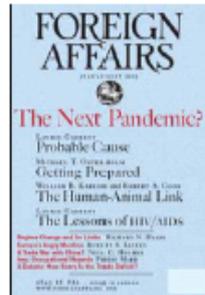
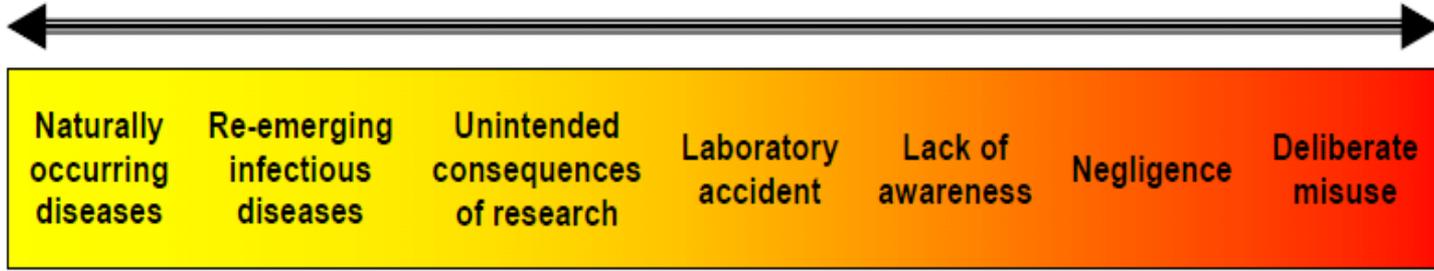


# *US National Strategy for Countering Biological Threats*

- **Promote global health security**
  - Possible oversight role to help agencies build capacity with a nonproliferation mindset
- **Reinforce norms of safe and responsible conduct**
  - Main focus of current IBTR program
- **Obtain timely and accurate insight on current and emerging risks**
  - Some IBTR analytical work on current risks; little effort to date on emerging risks
- **Take reasonable steps to reduce the potential for exploitation**
  - IBTR focus on materials; little effort to date on knowledge and technologies
- **Expand our capability to prevent, attribute, and apprehend**
  - IBTR focus on prevention (biosecurity) and connecting law enforcement with scientists
- **Communicate effectively with all stakeholders**
  - A core component of IBTR execution nationally and internationally
- **Transform the international dialogue of biological threats**
  - Lots of opportunities here; IBTR currently has many unfunded/underfunded efforts under this objective



# Spectrum of Biological Risks



Wilton Park, September 2009



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