







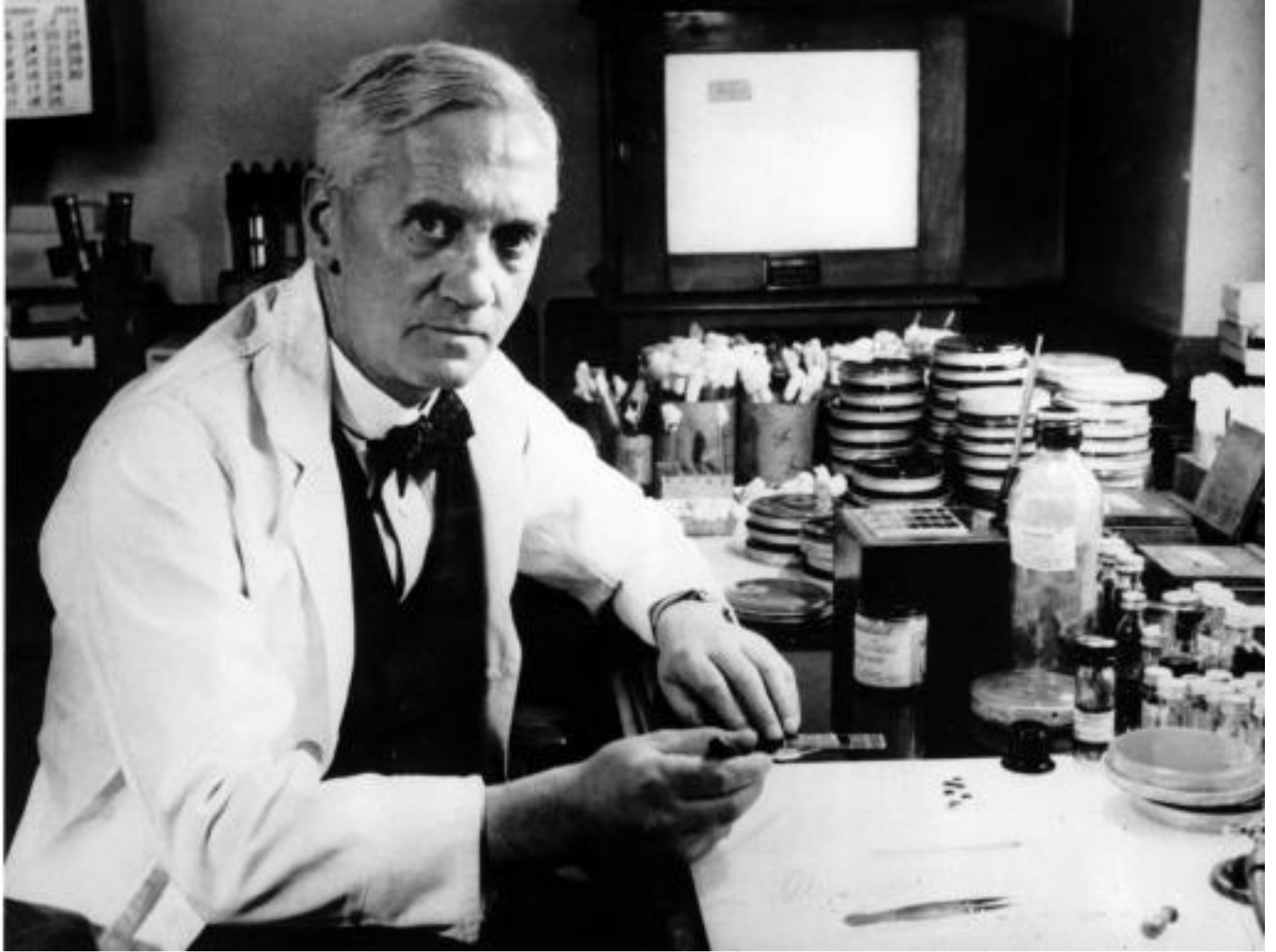
# Lecture 16: Biosafety



	Your risk	Risk to society (likelihood of an epidemic)
Cholera	-	\$ (clean water)
Tuberculosis	-	\$ (healthcare)
Bubonic Plague	-	\$ (sanitation)
Lyme Disease		\$ (information & testing)
AIDS		
Ebola	-	\$ (hospital funds)
MRSA		\$ (search and destroy)

### Fear Factor key

-	Not a problem
\$	Can be fixed with investment
	Can be fixed by taking sensible precautions
	Oh crap



Alexander Fleming 1881-1955

## 3,921 cases of lab acquired infections

Most common infections:

- Hepatitis
- Tuberculosis
- Typhoid Fever
- Brucellosis
- Tularemia
- Venezuelan Equine Encephalitis



**10% fatal but only 20% linked to an accident**



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.

WARNER BROS. PRESENTS  
A WOLFGANG PETERSEN FILM "OUTBREAK" WOLFGANG PETERSEN AND SAM WEIS "THE LABORERS DANCE" & ROBERT ROY POOL  
CASTING BY BRONKHORST AND ANNE ROSENZWEIG COSTUME DESIGNER MICHAEL BALLHAUS EXECUTIVE PRODUCERS WILLIAM SHARPEY AND NEAL TRAVIS EXECUTIVE PRODUCERS ANDREW COOPER AND ANDREW HOP  
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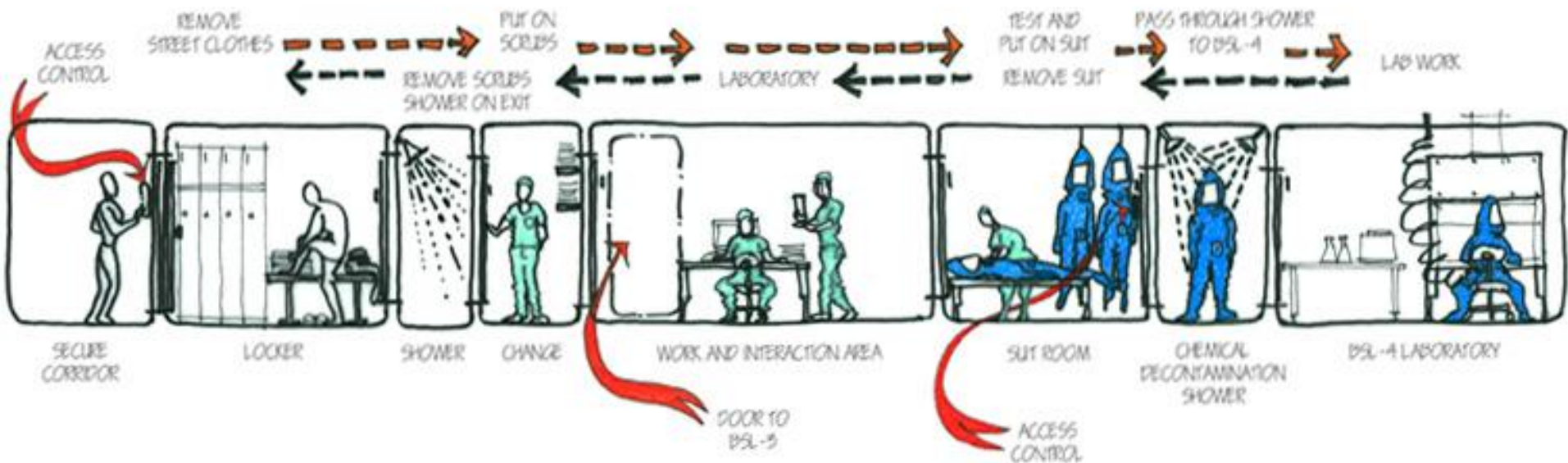
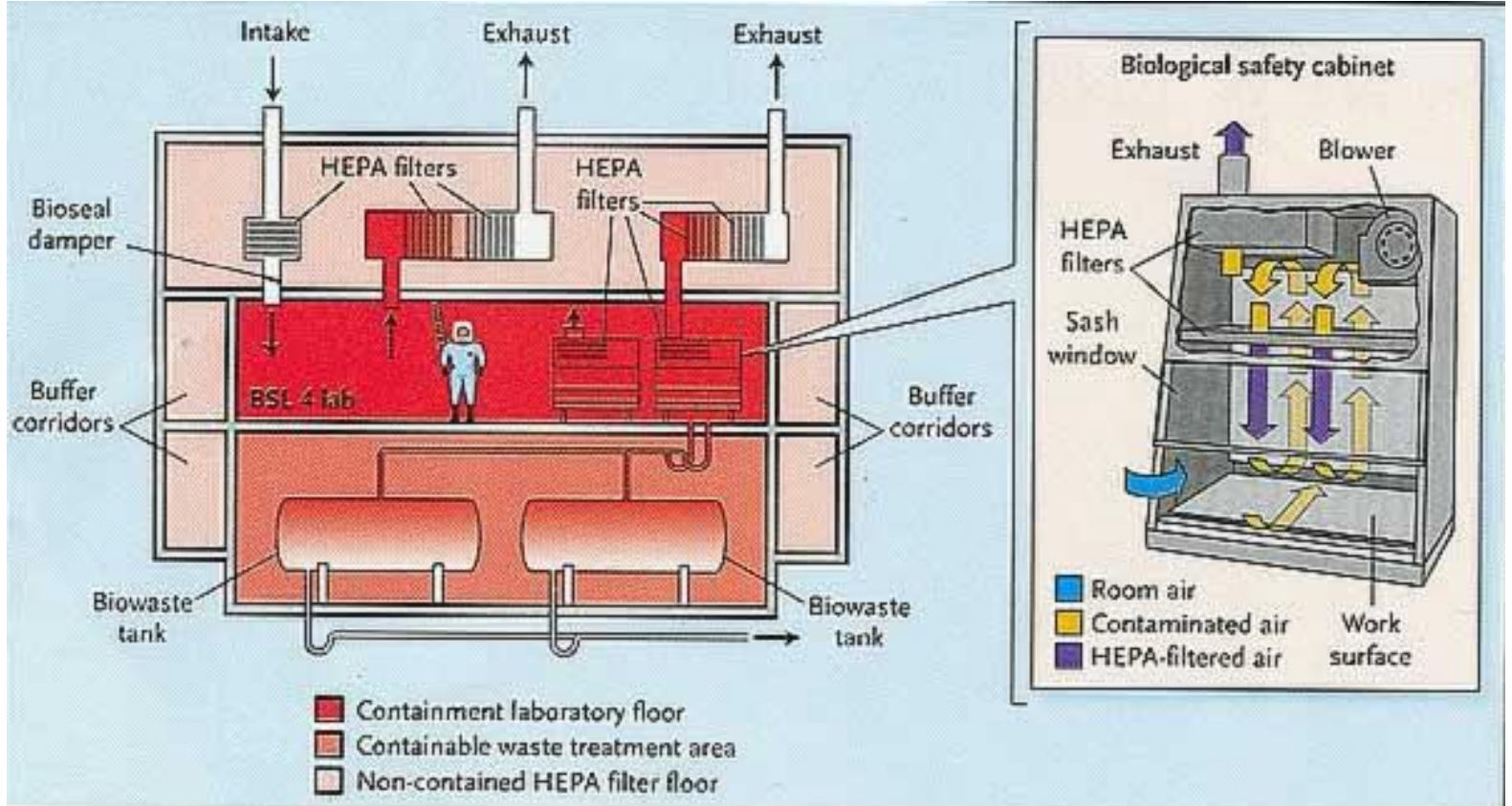
Biosafety Level	Criteria	Example pathogens
1	Agents that <b>do not ordinarily cause human disease</b> and are of <b>minimal potential hazard to laboratory personnel and the environment</b>	Canine hepatitis
2	Agents of <b>moderate potential hazard to personnel and the environment</b>	Mumps HIV Measles
3	Agents which may cause <b>serious or potentially lethal disease</b> as a result of exposure by the inhalation route.	SARS Tuberculosis Anthrax
4	Agents that pose a <b>high individual risk of aerosol-transmitted laboratory infections</b> , and which cause <b>severe to fatal disease in humans</b> for which vaccines or other treatments are <b>not available</b>	Marburg and Ebola virus, Hantaviruses, Lassa fever and other hemorrhagic diseases.



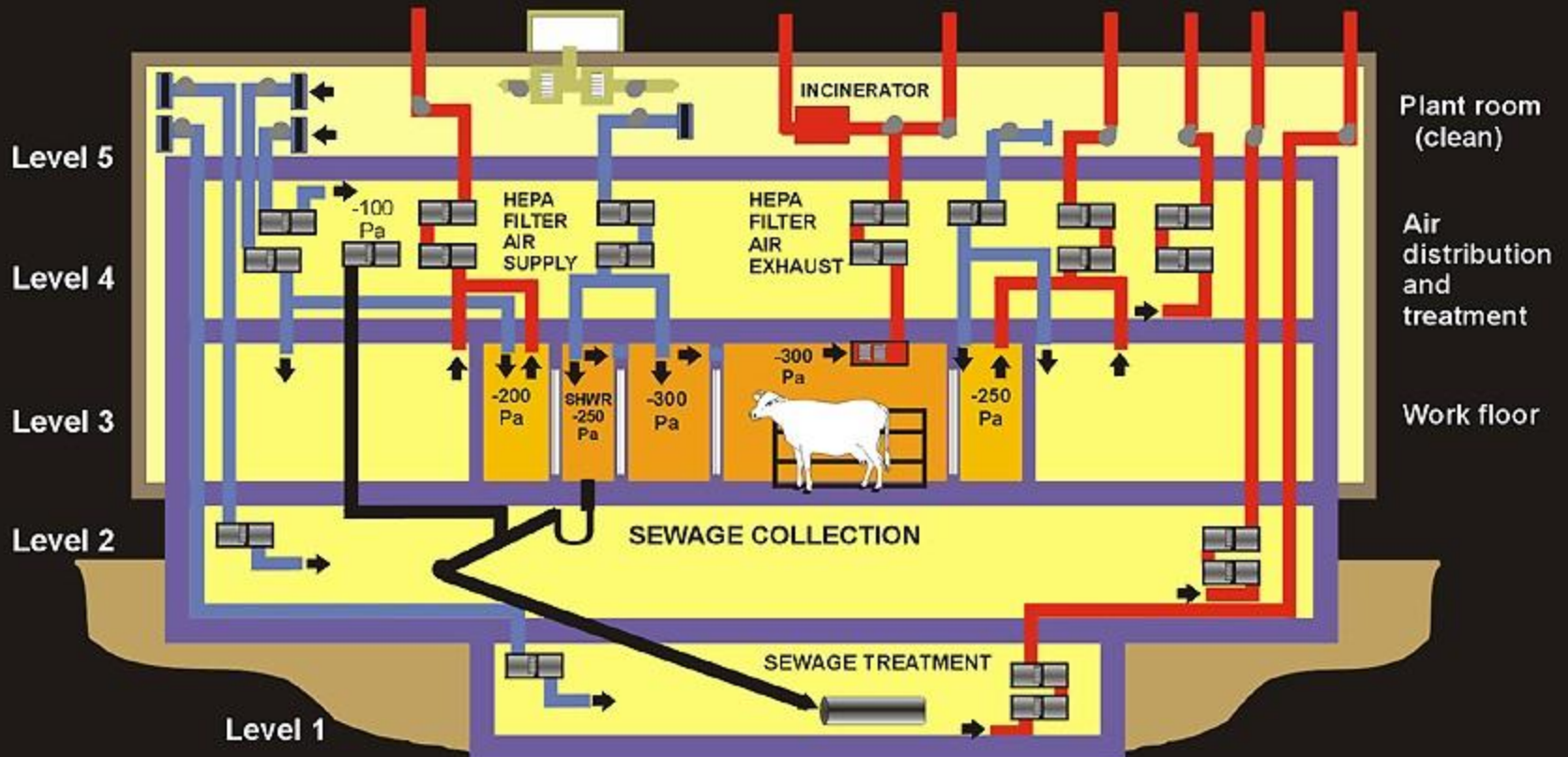
# BSL-4 Facilities Worldwide

● black: existing BSL-4 (or equivalent) facility  
○ white: planned BSL-4 facility





# BIOCONTAINMENT AT AAHL



## NIH Funding

Disease(s)	FY 1999-2001	FY 2002-2004	Change
Priority BW Bacteria Agents (anthrax, glanders, melioidosis, brucella, plague)	\$7,450,634	\$185,399,724	<b>+2388%</b>
Priority BW Virus Agents (Ebola, Marburg, Lassa, Smallpox)	\$5,941,136	\$119,856,911	<b>+1917%</b>
Influenza	\$43,001,408	\$94,331,807	+119%
HIV	\$534,668,521	\$426,047,982	-20%
Tuberculosis	\$166,890,306	\$134,189,062	-20%
Hepatitis	\$139,438,806	\$59,063,452	-58%
Malaria	\$92,207,407	\$54,401,748	-41%
Chlamydia	\$36,395,364	\$22,185,593	-39%
Lyme Disease	\$13,556,147	\$13,335,231	-2%
Gonorrhea	\$23,126,416	\$12,282,975	-53%
Candida albicans	\$20,801,528	\$10,249,011	-51%

Nancy Connell, who heads a Pentagon-funded bio-defense lab in Newark, NJ, doesn't think a biological strike is all that likely. But she takes grants to study smallpox and anthrax, because she can use the same research funds to work on flu and TB, which "actually do kill people," she notes.

# Five sample 'incidents' from the last few years



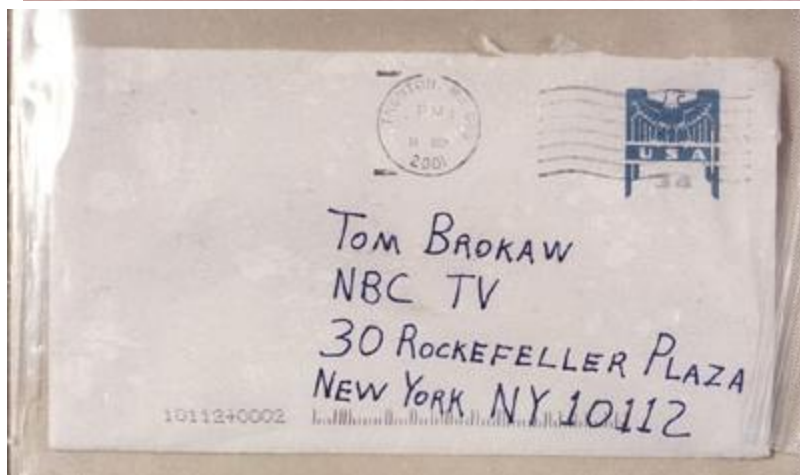
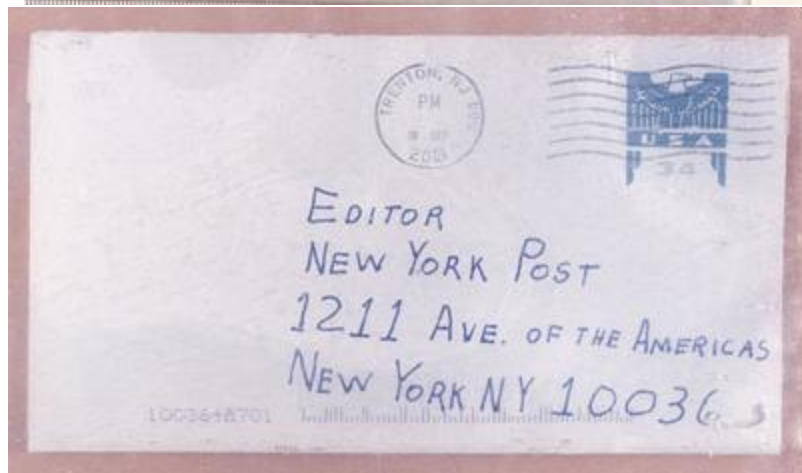
- 35 vials of Bubonic Plague go missing from Texas Tech, but are recovered and returned to an unguarded mini-fridge.
- Southern Research Institute in Frederick, MD mistakenly sends live anthrax bacteria to Oakland Children's Hospital, CA
- A shipment of live plague bacteria goes missing and turns up in Belgium.
- A US scientist lives after accidentally sticking himself with an Ebola-laced needle - twice.
- Three plague infected lab mice are unaccounted for at a lab in New Jersey.



More than 100 accidents and missing shipments involving anthrax, bird flu virus and other poisons occurred at 44 labs since 2003.



**"It may be only a matter of time before our nation has a public health incident with potentially catastrophic results,"** said Rep. Bart Stupak, D-Mich., chairman of the House Energy and Commerce investigations subcommittee.



**SPECIAL REWARD**  
Up to **\$2.5 million**



For information leading to the arrest and conviction of the individual(s) responsible for the mailing of letters containing anthrax to the New York Post, Tom Brokaw at NBC, Senator Tom Daschle and Senator Patrick Leahy:



**AS A RESULT OF EXPOSURE TO ANTHRAX,  
FIVE (5) PEOPLE HAVE DIED.**

The person responsible for these deaths...

- Likely has a scientific background/work history which may include a specific familiarity with anthrax
- Has a level of comfort in and around the Trenton, NJ area due to present or prior association

Anyone having information, contact **America's Most Wanted** at **1-800-CRIME TV** or the **FBI** via e-mail at **amerithrax@fbi.gov**

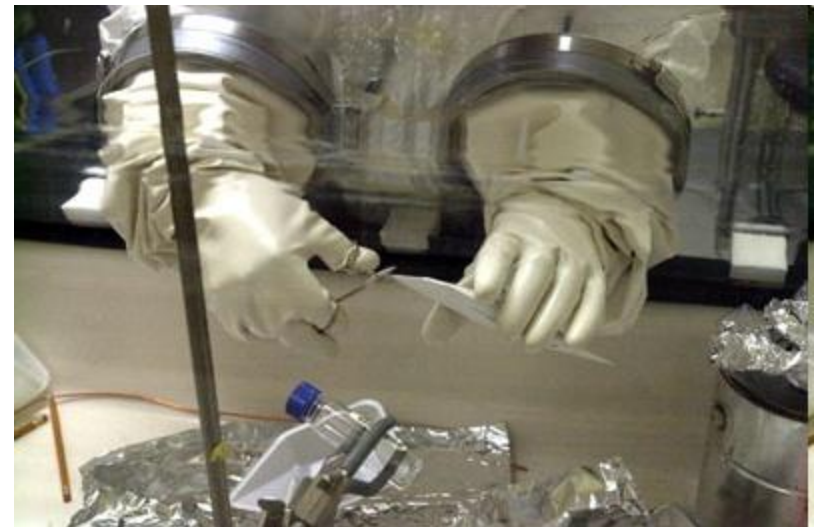
All information will be held in strict confidence. Reward payment will be made in accordance with the conditions of Postal Service Reward Poster 296, dated February 2000. Source of reward funds: U.S. Postal Service and FBI \$2,000,000; ADVO, Inc. \$500,000.



# USAMRIID

United States Army  
Medical Research Institute  
of Infectious Diseases

Biodefense solutions to protect our nation



## Black Death 'kills al-Qaeda operatives in Algeria'

The Black Death has reportedly killed at least 40 al-Qaeda operatives in North Africa.

Last Updated: 3:33PM GMT 19 Jan 2009

The disease, which struck Europe in the Middle Ages killing more than 25 million people, has swept through a training camp for insurgents in Algeria.

The arrival of the plague was discovered when security forces found the body of a dead terrorist by a roadside, the Sun reports.

The victim belonged to the large al-Qaeda network AQLIM (al-Qaeda in the Land of the Islamic Maghreb).

A security source told the paper: "This is the deadliest weapon yet in the war against terror. Most of the terrorists do not have the basic medical supplies

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