

# THE CASE OF THE PARALYZED PARTURIENT CAT, A STUDY IN COLLABORATION

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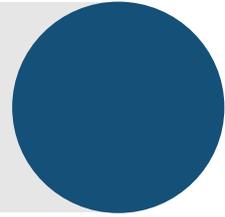
WISCONSIN STATE LABORATORY OF HYGIENE

**NO FINANCIAL DISCLOSURES**

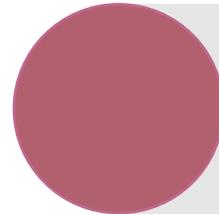
**Many images generated by AI,  
not actual case photos**

# IT STARTS WITH A LOVE STORY

BOY FROM WISCONSIN



GIRL FROM IOWA



## The Girlfriends Cat

- Outdoor cat
- Would disappear for days at a time
- Often fought with the boyfriend's cat



# THE SHOWDOWN

After an extended absence, the girlfriends cat returns looking scruffier than ever

A cat battle royale develops at the top of the stairs



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# THE INCIDENT

The boyfriend tries to break up the cat fight and gets bit on the arm by the girlfriend's cat

The girlfriend's cat falls down the stairs, landing poorly

As the couple tries to help the injured cat they are surprised as she starts to deliver pre-term kittens



## At the Vet's Office

- The couple learns that the girlfriends cat is paralyzed and severely injured, they recommend euthanasia.
- Unfortunately, the kittens were too young to make it.



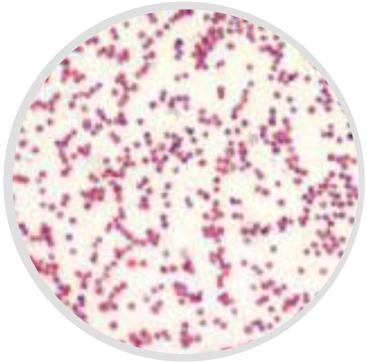
# THE PLOT THICKENS

- The young man cleaned and bandaged his cat bite wound, but it's not healing.
- The hand swells, the bite ulcerates, and he develops a fever
- The doctor is concerned enough to take a biopsy for culture.



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# IN THE CLINICAL LABORATORY



**GRAM STAIN**

Gram negative coccobacilli



**MACCONKEY AGAR**

No growth



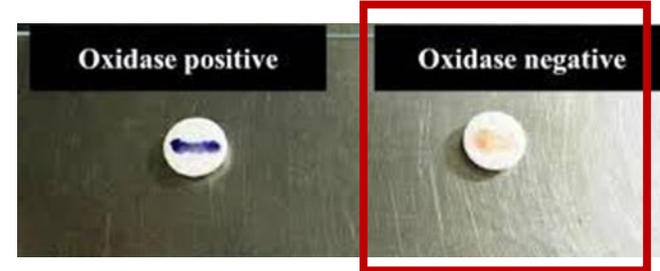
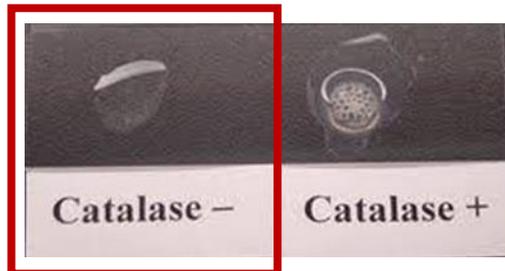
**BLOOD AGAR**

Little to no growth



**CHOCOLATE AGAR**

Growth after 48 hours



# THE SECOND INCIDENT

A pregnant lab technician, puzzled by the growth pattern, sniffs the plates

She then sent it for MALDI-TOF analysis



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# The Lab Investigation

- Puzzled by the MALDI results they consulted a more experienced laboratorian.
- They referred to the Biothreat Agent Bench Cards and following the algorithm, they were unable to rule out a Select Agent.
- They contacted the State LRN-B lab.
- Using the LRN supported courier the isolate arrived quickly and results were available the next day.



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# FRANCISELLA TULARENSIS

LRN-B IDENTIFICATION

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# FRANCISELLA TULARENSIS

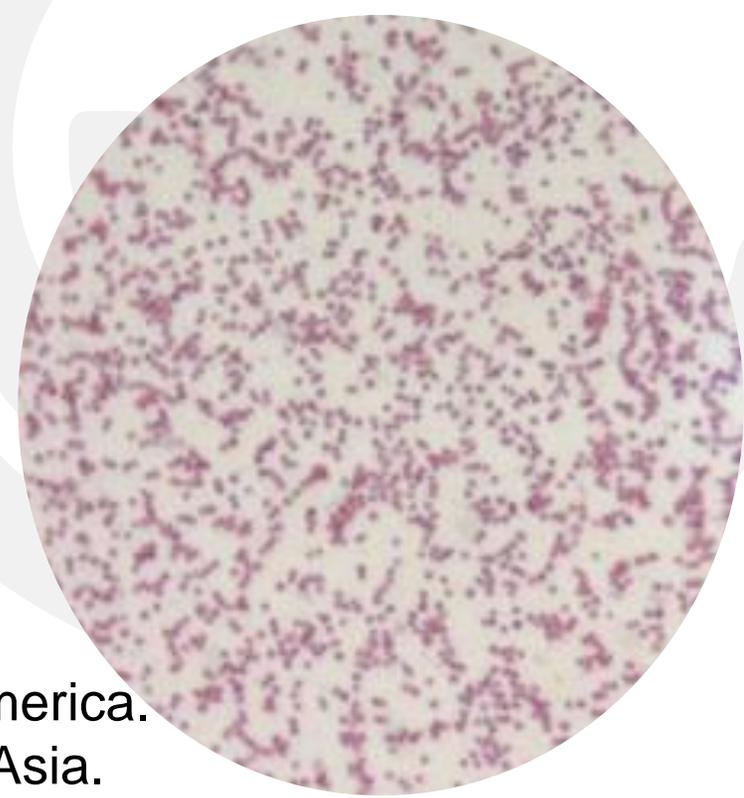
*Francisella tularensis* is a Gram-negative, intracellular coccobacillus.

- **Two main subspecies of concern:**

- Type A (subsp. tularensis) – Highly virulent, primarily in North America.
- Type B (subsp. holarctica) – Less virulent, found in Europe and Asia.

- **Virulence Factors**

- Ability to survive and replicate inside macrophages.
- Low infectious dose (10–50 organisms can cause disease).



# Transmission Routes

- **Animal Contact**

- Rabbits, rodents, cats.

- **Vectors**

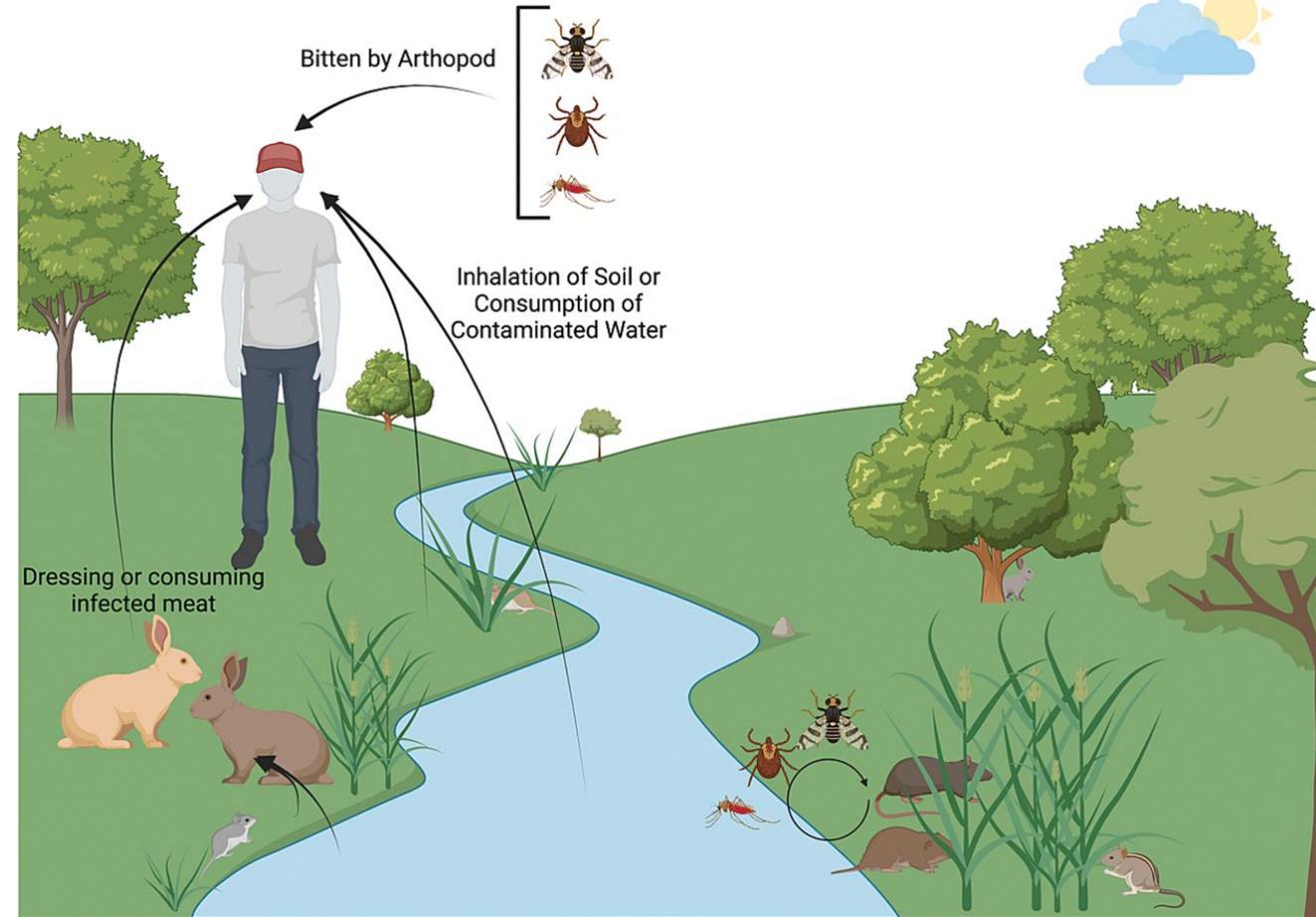
- Ticks, deer flies.

- **Environmental**

- Contaminated water or soil.

- **Inhalation**

- Aerosolized particles (lab accidents, bioweapon scenarios).



# Epidemiology

- **Geographic Distribution**

- Endemic in North America, parts of Europe, Asia. naturally acquired disease in many parts of the northern hemisphere

- **Seasonality**

- Peaks in summer (tick exposure) and winter (hunting season).

- **Reservoirs**

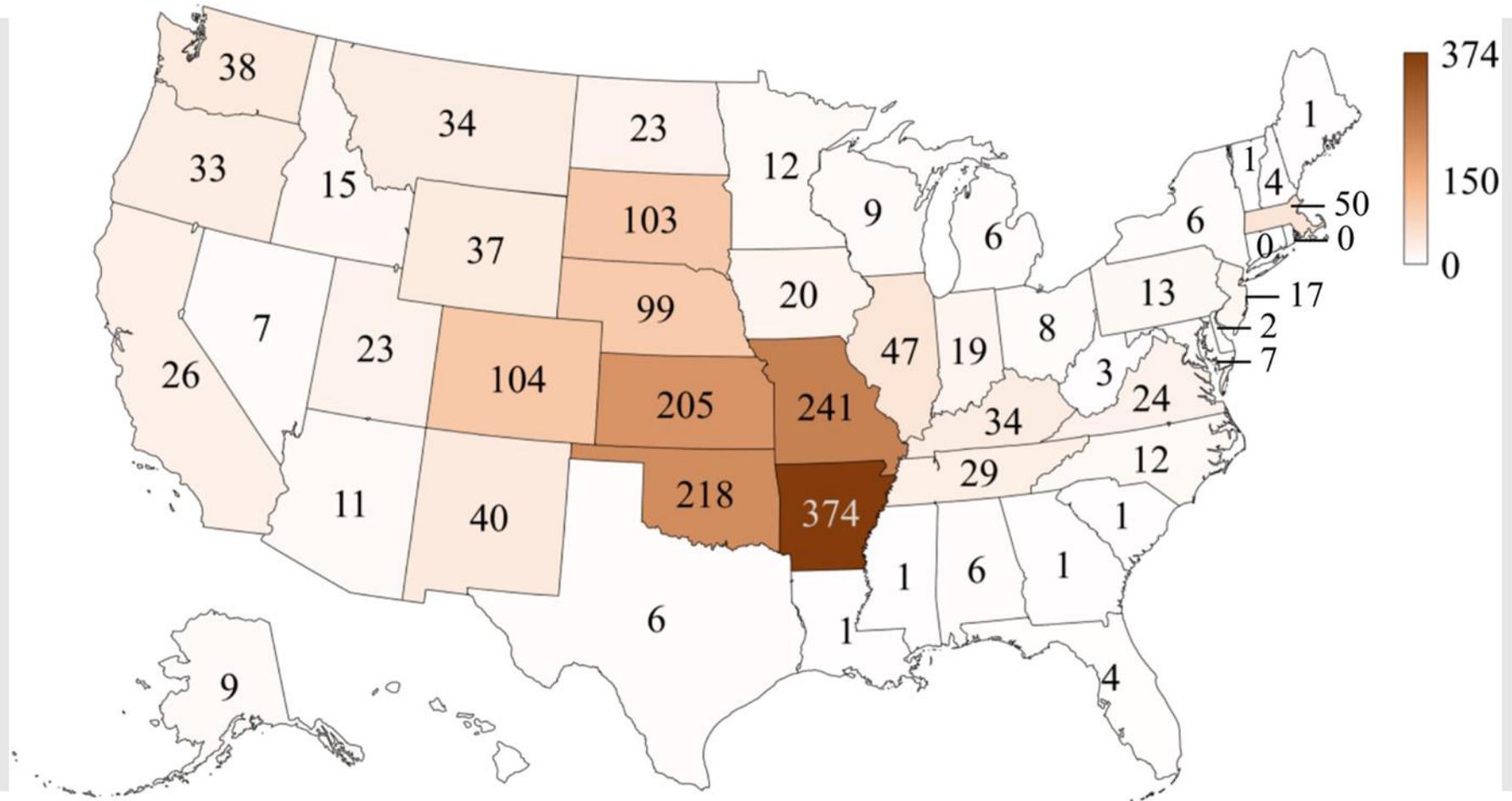
- Rabbits, rodents, cats, and occasionally dogs

# GEOGRAPHIC DISTRIBUTION

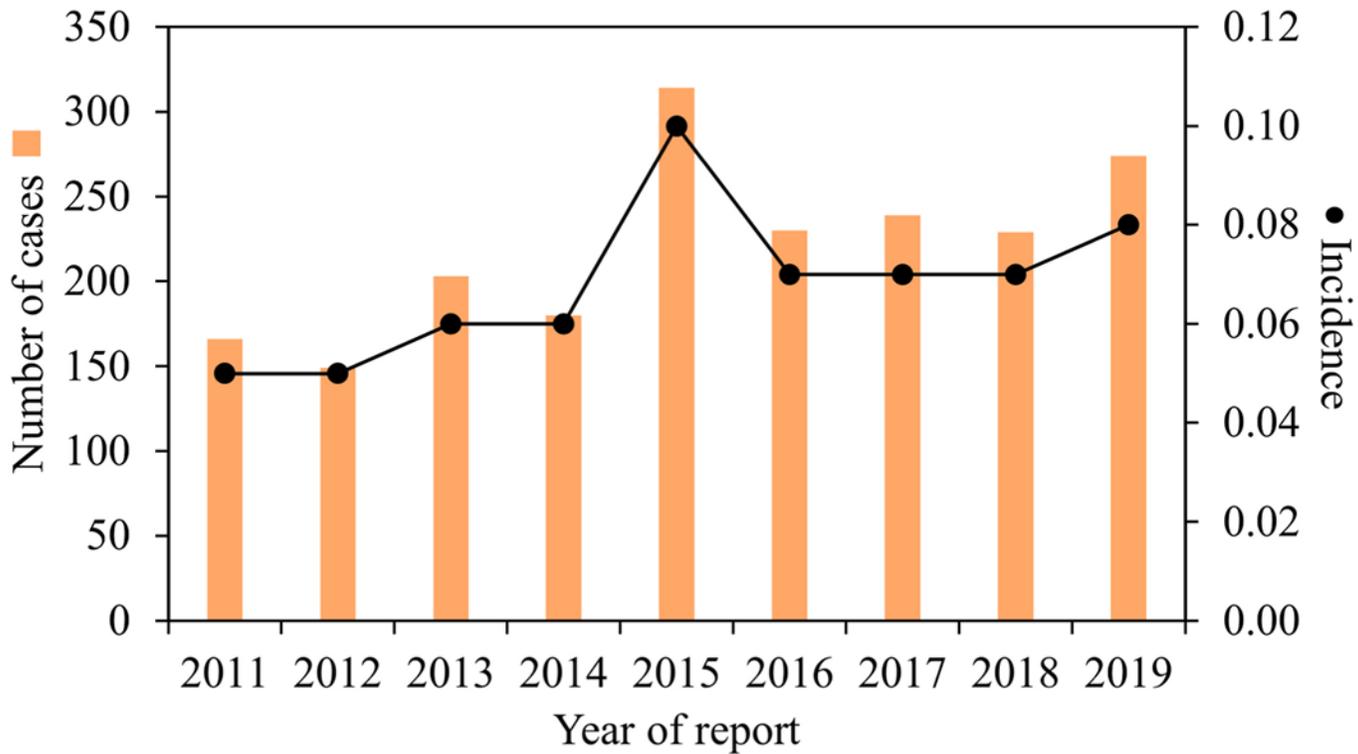


2011-2019

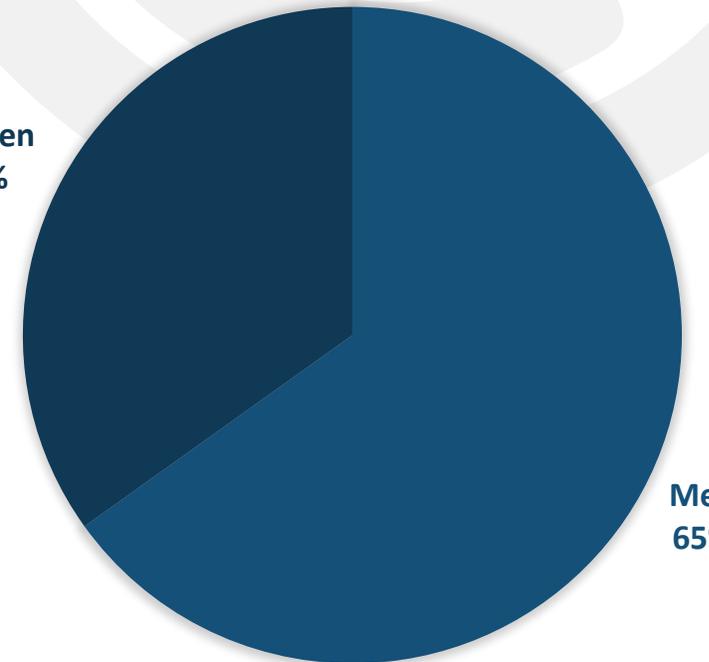
Most cases are in the central states  
Previously WI had ~1 case per year  
Recently, we are up to 4-6 per year  
Nearly all from outdoor cat bite



# CHART



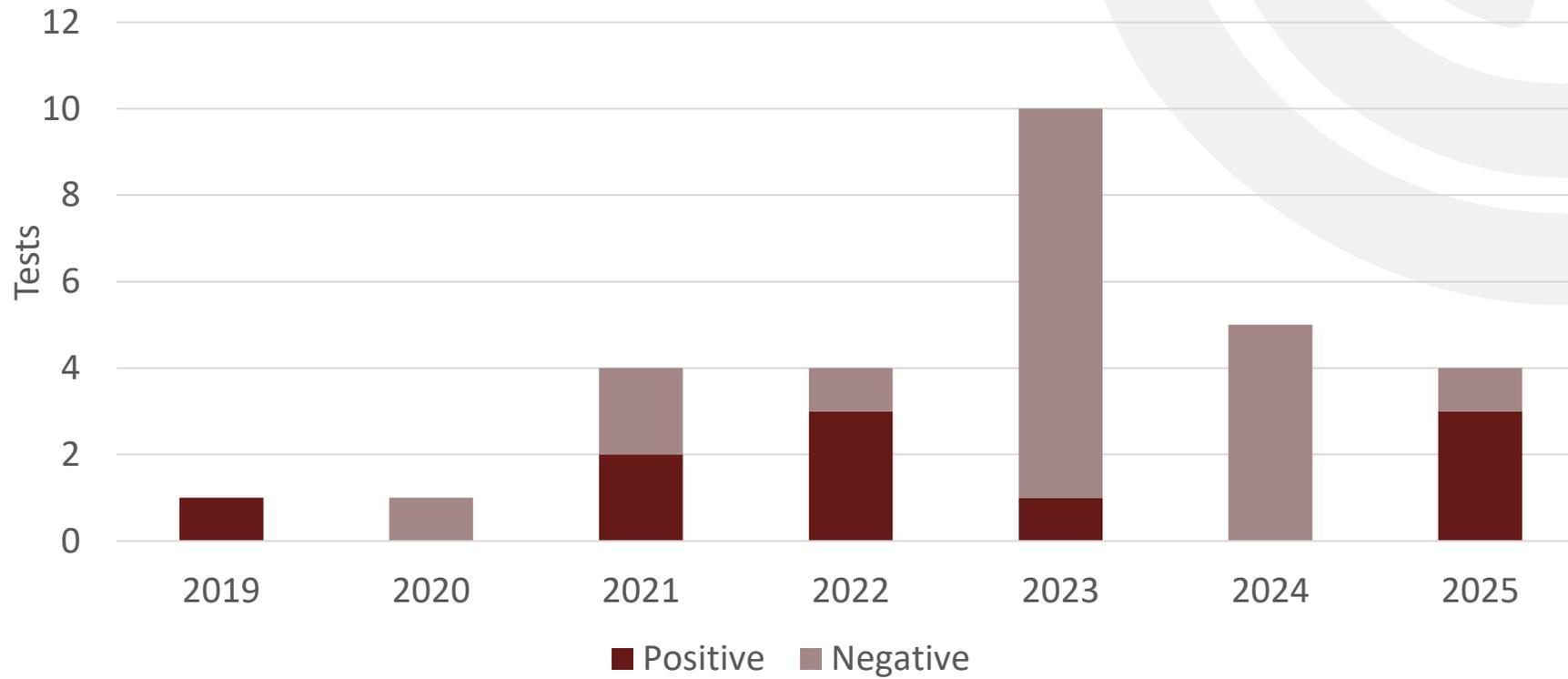
Women  
35%



Men  
65%

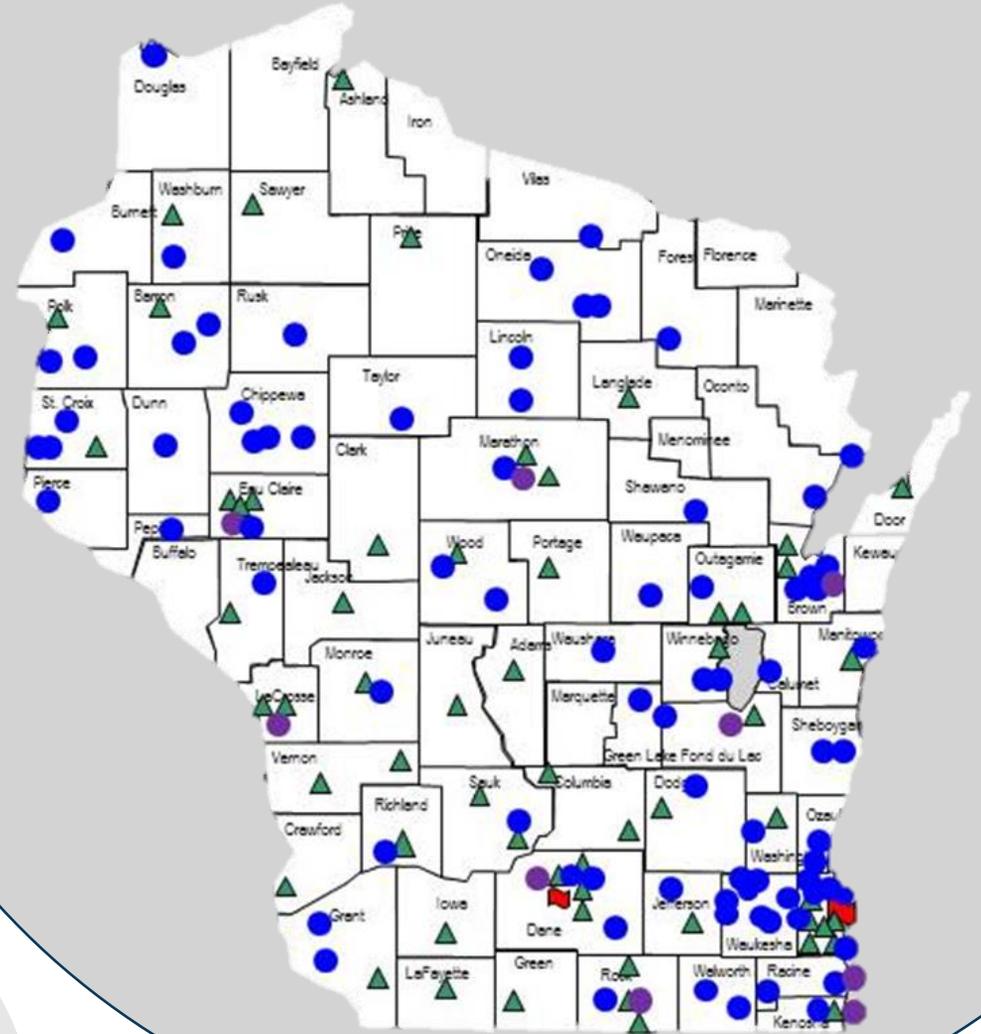
# Wisconsin *F. tularensis* testing

June 2019- June 2025



# WISCONSIN CLINICAL LABORATORY NETWORK

- Comprised of 152+ laboratories
- Focus on Microbiology
- Facilitated by the Wisconsin State Laboratory of Hygiene
  - Erin Bowles, Coordinator
- Facilitates surveillance across the state



# Clinical Spectrum

## •Forms of Disease

- Ulceroglandular** – Most common; ulcer at inoculation site + lymphadenopathy.
- Glandular** – Lymphadenopathy without ulcer.
- Oculoglandular** – Eye involvement.
- Pneumonic** – Most severe; inhalation route.

## •Mortality

- Untreated pneumonic tularemia can have up to 30–60% mortality.

## •Treatment Challenges

- Requires aminoglycosides (streptomycin, gentamicin) or doxycycline.
- doxycycline, ciprofloxacin, or chloramphenicol as alternatives
- post-exposure prophylaxis, doxycycline and ciprofloxacin are the drugs of choice
- Given the threat of intentional release and engineered resistance, it is critical to evaluate all potential options for treatment and prophylaxis of tularemia.

# Vaccine

- No widely available vaccine.
- vaccine developed in 1930-1940
- Live vaccine strain (LVS) tested in soldiers and reduced infections in laboratorians
  - cell-mediated immune responses persist for at least 3 decades after vaccination
  - never been licensed
- A number of promising vaccine candidates are currently in development

## Patient Follow-up

- The patient receives appropriate antibiotics and makes a full recovery!
- But, now there's a new problem



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# PARTNERS AND OUTREACH

- Laboratory exposure
  - Plate sniffing
  - MALDI-TOF
  - Pregnant laboratorian
  - Surrounding staff
  - Some chose to take prophylaxis. Fever watch for others



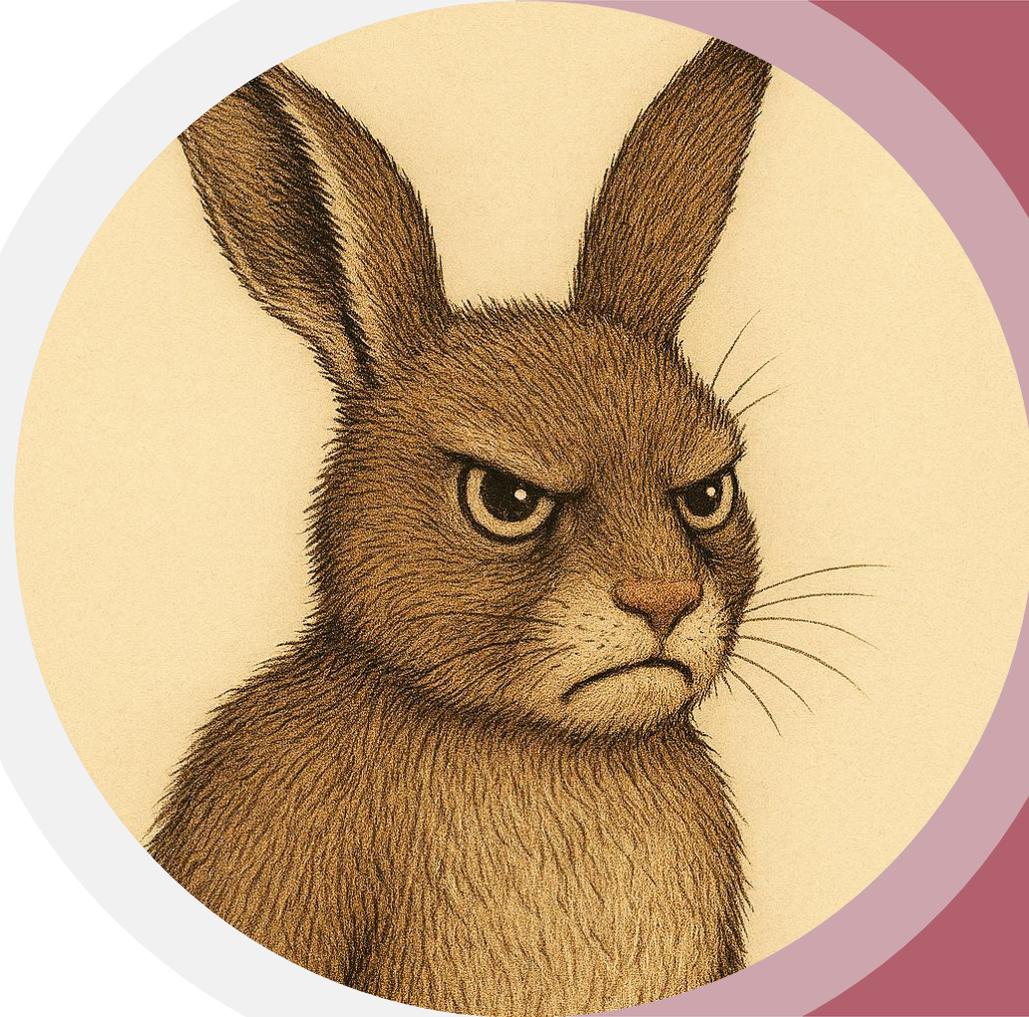
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# Laboratory-acquired infections

*Francisella tularensis* is extremely infectious. Following its identification as the causative agent of tularemia, the Medical Research Council of England stated in 1922 that occupational infection is “an accident which seems...to befall practically all laboratory workers who attempt the cultivation.”

# OUTBREAK

- In 2005, 39 people participated in a hare hunt in Germany
- Captured hares were disemboweled and rinsed with a water hose
- Ten participants had serologic evidence of acute *Francisella tularensis* infection; 1 other participant died before laboratory confirmation was obtained.
- Investigators determined that many participants were likely infected by aerosolized droplets when standing within 5 meters of the hose.



# Exposure Response

- Laboratory exposure
  - Some chose to take prophylaxis. Fever watch for others
- Clinic staff
  - Lower risk for biopsy
  - Fever watch recommended
- Vet Staff
  - Lower risk
  - Fever watch recommended

# Why It's a Tier 1 Select Agent

Highest US risk category for potential bioweapons

- **Low Infectious Dose**

- Inhalation of as few as 10 organisms can cause pneumonic tularemia.

- **High Morbidity**

- Severe illness requiring hospitalization, even if not always fatal.
- has been engineered as an antibiotic-resistant organism

- **Environmental Stability**

- is easily stored in dried form
- Can survive in water, soil, and organic matter for extended periods.

# Historical U

## •World War II E

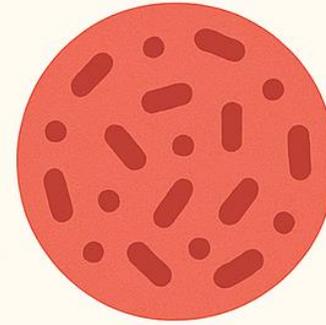
- Both the U.S. and the Soviet Union investigated its ability to incapacitate

## •Cold War

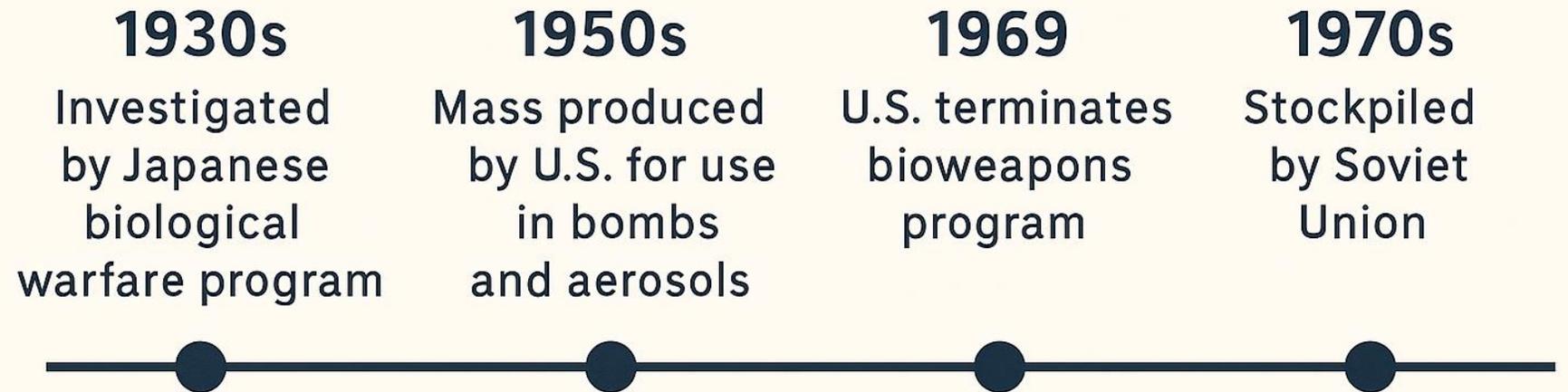
- The Soviet Union was suspected of developing biological weapons
- Allegations exist that the U.S. was also developing biological weapons

## •U.S. Offensive

- Before the Biological Weapons Convention, the U.S. was the only country to have developed biological weapons for battlefield use.
- It was considered a strategic weapon



# BIOWEAPON HISTORY OF TULAREMIA



# Bioweapons Research

- A disturbing example was Japan's notorious bioweapons program, which conducted research on military and civilian prisoners before and during WWII. These experiments involved infecting prisoners with often fatal inocula of *F. tularensis* and other pathogens to study disease effects and pathophysiology

- The United States conducted operation Red Cloud in Alaska from 1966–1967, releasing *F. tularensis* via mechanical disseminators into a spruce forest to study distribution and biological decay rates [7]

- In the 1970s-1980s, the Soviet Union conducted a focused research program with the sole purpose of creating multi-drug resistant strains of *F. tularensis* [8].

# Why This Matters for Biowatch

- Low infectious dose + aerosol transmission = high concern for environmental detection.
- Clinical cases can be sentinel events for environmental contamination or intentional release.
  
- According to World Health Organization predictions, aerosolization of 50 kg of *F. tularensis* under certain atmospheric and wind conditions in a metropolitan area with a population of 5 million would lead to an estimated 250 000 incapacitated individuals and 19 000 deaths. Effects would linger for weeks to months, as some survivors experience prolonged illness or relapse. Moreover, distribution of the bacteria could establish new enzootic reservoirs in mammals, sparking subsequent outbreaks [11].

# THE TEAM

Clinical Lab

LRN-B State  
Lab

Physician and  
nurses

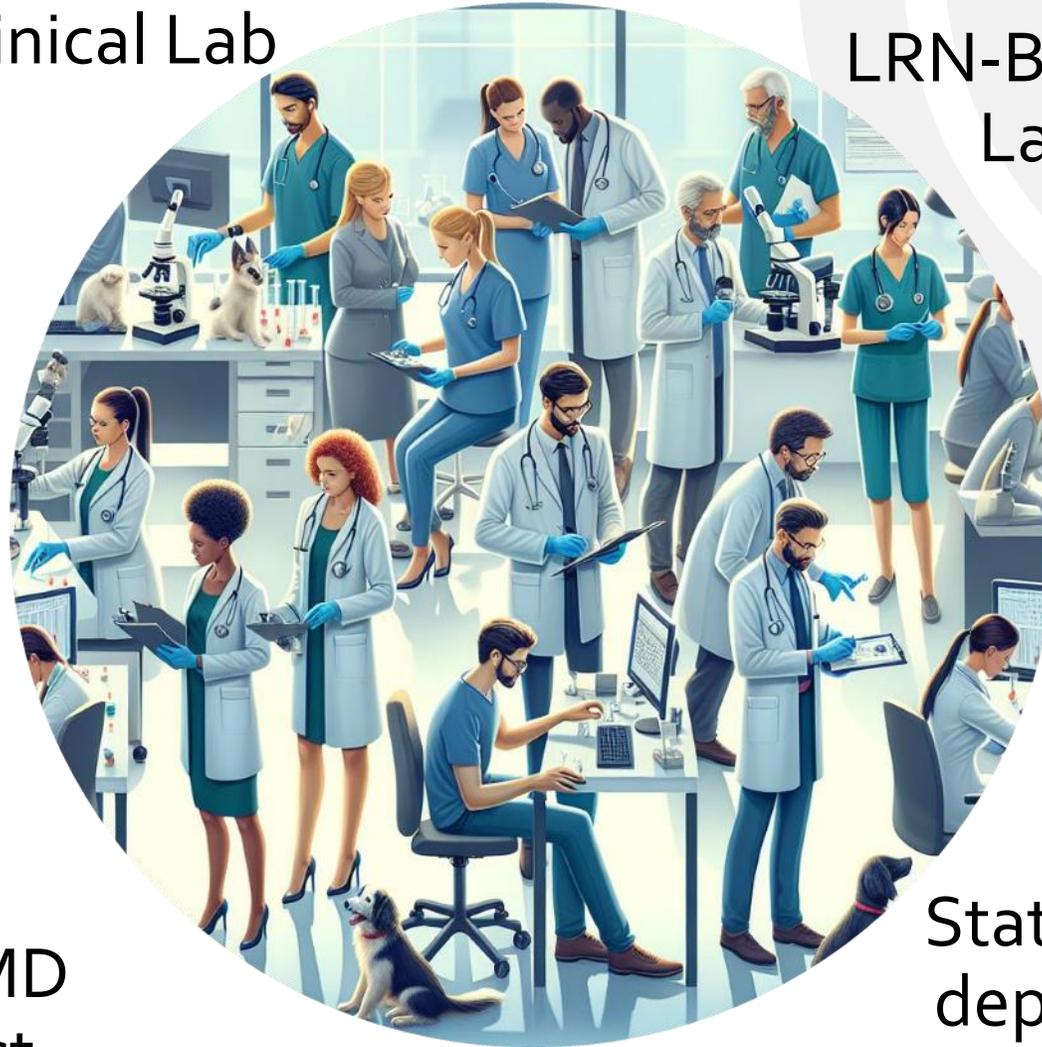
Local health  
department

CDC- LRN-B

State Health  
department

FBI-WMD  
contact

Veterinarians



# PARTNERS AND OUTREACH

- Girlfriend
  - Fever watch due to close contact with the infected cat
- The Veterinarians office is also consulted for potential exposures
  - Considered minimal risk
  - Fever watch



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# Closure

- All materials were destroyed by the clinical lab.
- But, what about the cat?
- The couple had buried the cat and kittens at a family farm
- But, the couple knows the cat was the source of the select agent, is this a security concern?
- Consultation with CDC experts revealed that the bacteria, capable of growth in anaerobic environments in hot summer weather could theoretically still be viable for some time.
- The decision was made to let dead cats lie



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# THANK YOU

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# REFERENCES

- Alexandra Bishop, Hsiao-Hsuan Wang, Taylor G. Donaldson, Emily E. Brockinton, Esha Kothapalli, Scott Clark, Tanvi Vishwanath, Tatyana Canales, Krishnendu Sreekumar, William E. Grant, Pete D. Teel, Tularemia cases increase in the USA from 2011 through 2019, *Current Research in Parasitology & Vector-Borne Diseases*, Volume 3, 2023, 100-116, ISSN 2667-114X, <https://doi.org/10.1016/j.crpvbd.2023.100116>.
- Christina A Nelson, Anders Sjöstedt, Tularemia: A Storied History, An Ongoing Threat, *Clinical Infectious Diseases*, Volume 78, Issue Supplement\_1, 15 February 2024, Pages S1–S3, <https://doi.org/10.1093/cid/ciad681>
- Hauri AM, Hofstetter I, Seibold E, Kaysser P, Eckert J, Neubauer H, Splettstoesser WD. Investigating an airborne tularemia outbreak, Germany. *Emerg Infect Dis*. 2010 Feb;16(2):238-43. doi: 10.3201/eid1602.081727. PMID: 20113553; PMCID: PMC2957990.
- Dennis DT, Inglesby TV, Henderson DA, et al. Tularemia as a biological weapon: medical and public health management. *J Am Med Assoc* 2001; 285:2763–73.
- Harrell JE, Roy CJ, Gunn JS, McLachlan JB. Current vaccine strategies and novel approaches to combatting Francisella infection. *Vaccine*. 2024 Apr 2;42(9):2171-2180. doi: 10.1016/j.vaccine.2024.02.086. Epub 2024 Mar 8. PMID: 38461051; PMCID: PMC11095077.