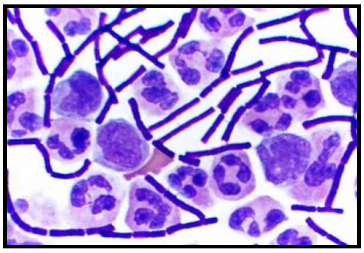
Top 30 Zoonotic Diseases Part 1

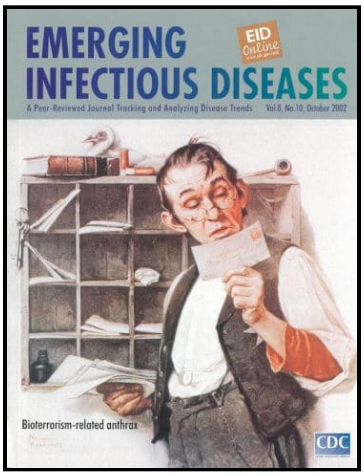
Zuku's Top 30 Zoonotic Diseases: Part 1:

1. **Anthrax**
   - **Classic case:**
     - Cattle, sheep, goats, bison, camels, antelope:
       - Sudden death
       - Bloating
       - Bleeding from orifices after death
     - Human:
       - Skin lesions with dark eschars
       - Malaise
       - Gastrointestinal signs
       - Fever
       - Acute respiratory distress
       - Septicemia
   - **Etiology:** *Bacillus anthracis*
     - Gram-positive aerobic rod-shaped bacteria
     - Bacteria sporulates when exposed to oxygen
     - Endemic in North America
   - **Zoonotic issues:**
     - Routes of human infection:
       - Cutaneous
       - Ingestion (infected meat)
       - Inhalation
     - Precautions: Personal protective equipment (PPE): Respiratory protection
   - **Pearls:**
     - World Organisation for Animal Health (OIE) notifiable disease
     - Bioterrorism agent: In 2001, powdered anthrax spores were deliberately mailed through the US Postal Service, leading to 22 infections in people & 5 deaths
     - Spores persist in environment for decades
     - Outbreaks can occur with heavy rainfall, flooding, or drought
     - Avoid full necropsies (i.e., do not open the carcass) of affected animals as bacteria will sporulate and contaminate environment



Cerebrospinal fluid with gram-positive anthrax bacteria

Brown-black eschar that resembles anthracite coal (hence the name anthrax, Greek for coal) on the arm of a man in the country of Georgia



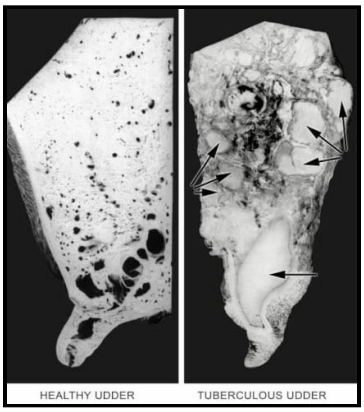
In 2001, powdered anthrax spores were mailed through the US Postal Service

2. ***Baylisascaris***
   - **Classic case:**
     - Definitive host (raccoons, sometimes dogs or kinkajous): No clinical signs
     - Intermediate host (commonly rodents, opossums, foxes, badgers, sea otters, birds, non-human primates, humans; NOT livestock):
       - CNS signs
       - Ocular disease

- **Etiology:** *Baylisascaris procyonis*
  - Intestinal nematode
  - Definitive host infected by ingesting eggs or eating infected intermediate host
- **Zoonotic issues:**
  - Humans infected by fecal-oral transmission
  - Precaution: Avoid direct contact with dog and raccoon feces
- **Pearls:**
  - Dogs can also be intermediate hosts and develop clinical signs
  - Keep dogs on monthly heartworm/nematode preventives to minimize risk of intestinal infection

Contact with raccoon feces can lead to transmission of B. procyonis

3. **Bovine tuberculosis (TB)**
   - **Classic case:**
     - Cow:
       - Decreased appetite, progressive emaciation
       - Cough
       - Fever
       - Weakness
     - In humans, affects:
       - Lymph nodes
       - Bones
       - Joints
       - CNS
       - Lungs
       - Genitourinary system
   - **Etiology:** *Mycobacterium bovis*
     - Gram-positive, acid-fast bacterium in *Mycobacterium tuberculosis* complex
     - Cattle are primary host
     - Many "spillover" hosts (e.g., sheep, goats, horses, llamas, dogs, pigs, ferrets, cats, rodents)
   - **Zoonotic issues:**
     - Routes of human infection:
       - Ingestion of unpasteurized dairy products or undercooked/raw meat
       - Inhalation of aerosolized agent
       - Bacterial contact on broken skin
       - Wildlife and soil are potential sources of infection
     - Precautions: PPE: Respiratory protection
   - **Pearls:**
     - OIE notifiable disease
     - Canada is bovine TB-free
     - Eradication programs in US and Mexico
     - Control efforts in the US & routine pasteurization of milk have decreased *M. bovis* cases to less than 2% of total human TB cases (the rest caused by *M. tuberculosis*)
     - Cats are rarely infected with *M. bovis* and have been suspected of transmitting TB to humans (and vice versa)

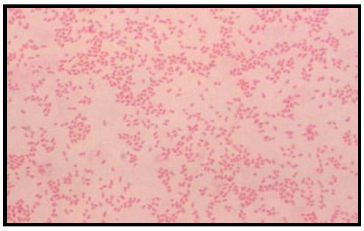


Two 1929 images comparing a healthy bovine udder (left) and an udder from a cow with tuberculosis (right)

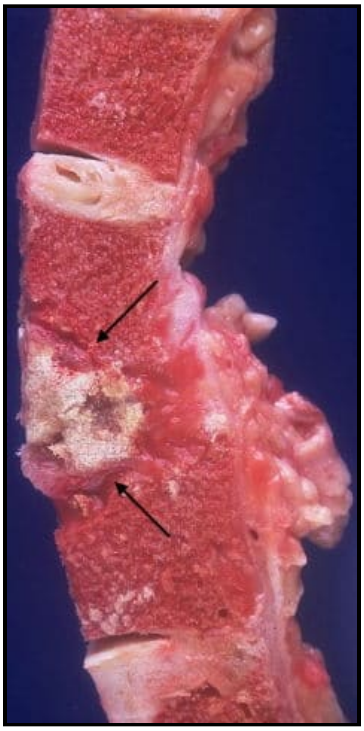
4. **Brucellosis: cattle, sheep, goats, dogs**
   - **Classic case:**
     - Bovine, ovine, and caprine:
       - Abortions, usually in second half of gestation

        - Epididymitis and orchitis in bulls
    - Canine:
        - Abortions, stillbirths
        - Orchitis
        - Diskospondylitis
    - Human:
        - "Undulant fever"
        - Drenching sweats
        - Headache
        - Flu-like symptoms
        - Can be chronic debilitating disease
- **Etiologies:** *Brucella* spp. are gram-negative, coccobacillary, facultative intracellular bacterium
    - *Brucella abortus* : Cattle (also found in bison, elk, and [recently] feral pigs)
    - *B. melitensis* : Ovine and caprine
    - *B. canis* : Dogs

Sheep and dogs are two species that can be infected with <u>Brucella</u> bacteria



Gram-stained <u>B. canis</u>



Vertebral tuberculosis (arrows) in a human

- **Zoonotic issues:**
    - *B. abortus* and *B. melitensis* :
        - Routes of infection:
            - Ingestion of unpasteurized dairy product
            - Exposure to *Brucella* vaccine, infected animals, or in a laboratory
        - Precautions:
            - <u>PPE</u>
            - Handle vaccines with care
    - *B. canis* :
        - Importance as a cause of disease in humans not well-established
        - People infected by exposure to infected animals and in the laboratory
        - Precautions: <u>PPE</u>
- **Pearls:** *B. abortus* and *B. melitensis* are <u>OIE notifiable diseases</u>
    - Bovine:
        - Eradicated in Canada, nearly eradicated in US
        - Possible bioterrorism agent
        - Poll evil and fistulous withers in horses may be caused by *B. abortus*
    - Ovine and caprine:
        - Found in Mediterranean, Middle East, and Central America
        - Exotic to Canada and US, endemic in Mexico
    - Canine:
        - Reportable in many US states
        - Owners of *Brucella*-positive dogs should be advised that the disease could potentially spread to humans and dogs can't be "cleared" of infection

5. **<u>Bartonellosis (cat scratch fever)</u>**
    - **Classic case:**
        - Cats:
            - Usually asymptomatic
            - +/- Fever
            - +/- Inappetence

<u>*Bartonella henselae*</u> *is spread by fleas from cat to cat*

        - Humans:
            - Small, reddish-brown papules or pustules at inoculation site
            - Lymphadenopathy
            - Fever
            - Malaise
            - Neurologic signs
            - Psychiatric signs
    - **Etiology:** *Bartonella henselae*
        - Gram-negative rod bacterium
        - Reservoir host: Domestic cats and other felids
        - Transmitted via flea feces between cats
    - **Zoonotic issues:**
        - Transmitted to humans by cat bites or scratches
    - **Pearls:**
        - Worldwide distribution
        - Most cases of human bartonellosis are mild or asymptomatic and self-limiting; immunocompromised people are more susceptible

Images courtesy of CDC PHIL (anthrax in Georgian man, anthrax in CSF, animated *B. procyonis* egg, tuberculosis udder, *B. canis* , and journal cover), Baerni (raccoon), Yale Rosen (spinal tuberculosis), Don DeBold (dog and sheep), Luis Fernández García (flea), and John Cummings (PPE).